

Scientific Name: *Cottus bairdi*
Common Name: Mottled sculpin
BISON No.: 010385

Legal Status:

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

Distribution:

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

Major River Drainages:

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

Status/Trends/Threats (narrative):

No federal or state listing for status. State NM: Provides limited protection. Mottled sculpins are carnivorous (Minckley 1973). Mottled sculpins are cannibalistic and large males may eat small females; thus, the female has to be a certain size in the mate selection to avoid being devoured (Downhower et al. 1983).

Distribution (narrative):

The mottled sculpin is distributed discontinuously throughout much of North America, from Savannah, Mobile and Tennessee River drainages in Georgia and Alabama, north to Canada, and disjunct populations in Missouri, Arkansas, Utah, and New Mexico (Lee et al 1981). The mottled sculpin is restricted to North America with major regions of occurrence scattered in

Canada east from Saskatchewan, along the Rocky Mountains (including the Columbia and Colorado basins); along the Appalachian Mountains; Ozark Plateau region of Missouri and Arkansas; and areas surrounding the Great Lakes (Sublette et al 1991). The mottled sculpin is native to the San Juan River basin including Pine, Navajo, Animas, and San Juan Rivers upstream from Shiprock, New Mexico (Sublette et al 1990).

Key Distribution/Abundance/Management Areas:

Panel key distribution/abundance/management areas:

Breeding (narrative):

Spawning occurs in the spring when water temperatures are 5.6-16.7°C (Sublette et al 1990). Spawning is highly synchronous, lasting less than 30 days (Downhower & Brown 1980). The entire breeding season may last two to three months from the time of the nest site selection to departure of the larvae (Downhower et al. 1987). The mottled sculpin has a resource-based mating system in which resource quality determines male choice of spawning site and male quality determines female choice (Downhower & Brown 1980). With the onset of the spring spawning season, male sculpins take up residence in cavities under other miscellaneous streambed rubble (Downhower & Brown 1980). Females do not necessarily mate with the first male they encounter, but may visit more than one male before spawning (Downhower & Brown 1980). Females of this species appear to choose mates on the basis of male size (Downhower & Brown 1980). By choosing a larger male, a female increases the probability that some of her eggs will hatch because large males are unlikely to abandon their nest sites (Downhower & Brown 1980). Female mottled sculpin spawn only once during a season, then abandon the nest to be guarded by the male until after the larvae leave (Sublette et al 1990).

Eggs are laid in nests under rubble/cobble or among gravel or under objects and adhere to the undersurface of the nest cover (Minckley 1973, Sublette et al 1990). The male may then entice other females to lay eggs in the nest with the number of matings per male ranging from 1 to 12 (Sublette et al 1990). After hatching, the fry drop to the bottom of the nest, where they continue to be guarded by the male until yolk sacs have been absorbed and dispersal begins (Bailey 1952). Males exhibit distinct territoriality (Savage 1963), and remain with the egg masses and fry at that nesting site for as long as eight weeks (Downhower & Brown 1980).

Habitat (narrative):

In clear, cold to warm (typically cool) streams and lakes with sand and gravel substrates, however, there is considerable variation in habitat preference throughout a wide range (Lee et al 1981). Mottled sculpins are most often found on clean rock substrates composed of boulder, cobble, and pebble; however, females also show an affinity for silty substrates, occurring there twice as often as either males or immature (Matheson and Brooks 1983). Most mottled sculpins live on the bottom, beneath rocks on riffles of streams or along shorelines of lakes, but some venture to great

depth in larger lakes and in the sea (Minckley 1973). Juveniles and mature females tend to occupy faster current than mature males (Matheson and Brooks 1983).

Key Habitat Components: Clean substrates comprised of cobble/boulder materials, medium (25-40 cm/sec) velocity,

Breeding Season:

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

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 $\mu\text{S}/\text{cm}$)
- High (750-2000 $\mu\text{S}/\text{cm}$)
- Intermediate (250-750 $\mu\text{S}/\text{cm}$)
- Low (< 250 $\mu\text{S}/\text{cm}$)
- 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):

Mottled sculpins are benthic feeders, feeding from underneath or between rocks, taking mostly chironomid larvae as well as amphipods, other insects and invertebrates, and some plant material (Sublette et al 1990). Prime feeding time is late evening, extending onto the night (Sublette et al 1990). This species is cannibalistic with large males consuming small females (Downhower et al. 1983).

Diet category (list):

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

Grazing Effects (narrative):

The most probable impact of grazing would be in the form of increased fines in stream substrates that could preclude spawning surfaces on cobble and boulder substrates. Excessive siltation during spring runoff could smother developing eggs in nests, and affect benthic food supply.

Panel limiting habitat component relative to grazing and comments:
<p>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</p>

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

May be Revised

- | | | |
|---|---|--|
| <ul style="list-style-type: none"> ➤ Alteration of bank structures ➤ Alteration of substrate ➤ Alteration of water regimes ➤ Altered stream channel characteristics ➤ Altered aquatic vegetation composition | <ul style="list-style-type: none"> ➤ Altered bank vegetation structure ➤ Change in food availability ➤ Change in water temperature ➤ Change in water quality ➤ Habitat fragmentation | <ul style="list-style-type: none"> ➤ 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. and Rinne, J.N.
- **GP 2001:**
- **GP 2002:**
- **Revision:**

Bibliography:

Bailey, J.E. 1952. Life history and ecology of the sculpin *Cottus bairdi punctulatus* in southwest Montana. *Copeia* 1952, 243-255.

Downhower, J. F. and L. Brown. 1980. Mate preference of female mottle sculpins, *Cottus bairdi*. *Animal Behavior* 28: 728-34.

Downhower, J.F., Brown, L., Pederson, R., and Staples, G. 1983. Sexual selection and dimorphism in mottled sculpin. *Evolution* 37: 96-103.

Downhower, J. F., Blumer, L.S., and L. Brown. 1987. Seasonal variation in sexual selection in the mottled sculpin. *Evolution* 41: 1386-94.

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.

Matheson, R.E. and Brooks, G.R. 1983. Habitat segregation between *Cottus bairdi* and *Cottus girardi*: An example of complex inter- and intraspecific resource partitioning. *American Midl. Nat.* 110(1):165-76

Minckley, W. L. 1973. Fishes of Arizona. Arizona Game and Fish Department. Phoenix, Arizona. 293 pp.

Savage, T. 1963. Reproductive behavior in the mottled sculpin *Cottus bairdi* Girard. *Copeia* 1963, 317-325.

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