**Scientific Name:** *Gila robusta*
**Common Name:** Roundtail chub
**BISON No.:** 010145

## 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: (FWS) Species of concern, (USFS) Region 3 Sensitive, State AZ: Species of special concern, State NM: Endangered.

The first examples of the roundtail chub were caught and described as new in the Zuni River, New Mexico, by Dr. S. W. Woodhouse, while attached as Surgeon and Naturalist to the expedition of Capt. Sitgreaves, for the exploration of Zuni and its tributaries (Baird and Girard 1853). Roundtail chub, although reduced in range and abundance, remain comparatively widespread and common in much of the upper Colorado River basin, (Kaeding et al. 1990). In New Mexico, the roundtail chub has been extirpated from the Zuni River drainage (Propst and Hobbes 1996). The physical and biological characteristics of the entire Colorado River system, have been altered by the operation of water development projects upstream, by the introduction of nonnative fishes and by other human activities (Minckley 1973). Additional human

alterations of the aquatic ecosystem of the Colorado River will occur; perhaps most predictably as the result of developments planned to meet the increasing demands for water (Kaeding et al 1990, Propst 1999).

Rinne and Minckley (1970) found evidence of massive hybridization between bonytail chub, humpback chub, and the roundtail chub in the area of Glen Canyon Dam near Page, Arizona in the late 1960's. Valdez and Clemmer (1982) suggested that apparent hybridization between humpback and roundtail chubs was caused by human-induced habitat alteration causing a breakdown of reproductive isolating mechanisms between these species in the upper Colorado River.

A large number of nonnative fishes have been established throughout the historic range of roundtail chub (Propst 1999). Minckley (1973) reported a "population explosion" of smallmouth bass in the upper Salt River tributaries, following their introduction in the mid-1960s suppressed all reproductive success by the roundtail chub in the Black River. Vanicek and Kramer (1969) found no evidence of spawning success in the Green River above its confluence with the Yampa River in 1964 and 1966. This apparent absence of reproduction was related to lowered water temperatures due to increased discharges from the dam during theses 2 years (Vanicek and Kramer 1969). Water temperatures in the Green River above the mouth of the Yampa were well below 65F, the suspected threshold temperature for spawning (Vanicek and Kramer 1969).

## **Distribution** (narrative)**:**

Roundtail chubs occur in moderate-sized to larger rivers throughout the Colorado River basin (Minckley 1973). Roundtail chub formerly inhabited the Colorado River and its primary tributaries from Wyoming south to the confluence of the Little Colorado River (Arizona), primary tributaries of the Colorado River downstream of the Little Colorado, and the Rios Yaqui, Fuerte, and Sinaloa in northwestern Mexico (Minckley, 1973). Roundtail chubs can be found in warm streams and larger tributaries of Colorado River basin in largest river channels (Holden and Stalnaker 1975), south through Rio Yaqui basin, to Rio Piaxtla, Sinaloa, Mexico (Smith et al. 1979, Minckley 1991). (Lee et al 1981). Rinne and Minckley (1970) reported that in the late 1960's the roundtail chub was the most widespread and abundant chub in Arizona streams.

In New Mexico, the historic range of roundtail chub included the San Juan River and its tributaries (Platania, 1990), the Zuni River (a Little Colorado River tributary; Baird and Girard, 1853), and the Gila and San Francisco rivers (Koster, 1957; Bestgen and Propst, 1989). In the Gila River drainage of New Mexico, roundtail chub are limited mainly to the upper East Fork Gila River, the lower Middle Fork River, and lowermost West Fork Gila River (Bestgen and Propst, 1989).

## Key Distribution/Abundance/Management Areas:

| **Panel key distribution/abundance/management areas:** |
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## **Breeding** (narrative)**:**

The breeding habits of the roundtail chub have yet to be carefully observed, but appear to resemble those described before for bonytail chub (Minckley 1973). The roundtail chub breeds in spring and early summer in pool habitats, often in association with beds of submerged vegetation or other kinds of cover such as fallen trees and brush (Minckley 1991). Bestgen (1985) observed spawning of roundtail chubs was in pool-riffles or in riffles immediately upstream of pools. In the East Fork River, Bestgen and Propst (1989) observed roundtail spawning in May when water temperature was about 22$^{o}$C. The spawning activities of roundtail chub and bonytail chub may be spatially separated but concurrent in time (Vanicek and Kramer 1969). Vanicek and Kramer (1969) reported roundtail chubs and bonytail chubs were taken in spawning condition at the same time of year, but they were never found together in the same gill-net set.

Jonez and Sumner (1954) described the spawning act of Colorado chubs in Lake Mohave. Approximately 500 bonytails were observed spawning over a gravel shelf up to 9 m deep, in May of 1954. Each female had three to five male "escorts." The adhesive eggs were broadcast on the gravel shelf. Females do not spawn until Age 3 but males may spawn at Age 2 (Bestgen 1985). Scoppetone (1988) reported that a roundtail chub might live 20 or more years.

## **Habitat** (narrative)**:**

The roundtail chub is secretive and is often found in pools along canyon walls, with undercuts sculptured by degradation processes inherent in periodic spates in this stream (Schrieber and Minckley 1981, Rinne 1992). The roundtail chub is locally abundant in channels of large rivers or in association with cover such as boulders or overhanging cliffs, cut banks, or vegetation in smaller streams (Lee et al 1981, Minckley 1991). Roundtail chub are most commonly found in pools with cover (boulders, uprooted trees, and undercut banks) having depths of 2 m or more with sand and gravel substrates (Bestgen and Propst, 1989; Rinne, 1992). Propst (1999) reported water velocity preferred by roundtail chubs is typically less than 20 cm/sec. Juvenile and subadult roundtail (75 to 150 mm TL) are occasionally found in shallower and faster velocity water then adults; such areas typically are along undercut stream banks with overhanging vegetation (Propst 1999).

In Arizona rivers the fish tends to occupy pools and eddies, often concentrating in relatively swift, swirling waters below rapids, and moving into smoothly-flowing chutes in small groups (Minckley 1973, 1991). Roundtails require pools in which to live with the largest populations in Aravaipa Creek were living in pools behind irrigation diversions (Barber and Minckley 1966).

**Key Habitat Components:** Pools with associated cover in form of undercut banks, rootwads and boulders.

## **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)**:**

Roundtail are variable in food habits, sometimes feeding on algae and other times becoming piscivorous or even eating terrestrial animals such as lizards that fall into the water (Minckley 1991). Roundtail chub are omnivores, consuming a wide variety of aquatic and terrestrial invertebrates, aquatic plants, and detritus (Minckley 1973, Propst 1999). The Virgin River roundtail chub is an omnivore showing considerable dietary shift with age (Greger and Deacon 1988). Vanicek and Kramer (1969) demonstrated increased dietary diversity in larger roundtail chubs of upper Colorado River. Greger and Deacon (1988) reported young roundtail chubs (>70 mm TL) in the Virgin River feed almost entirely on macroinvertebrates while adults > 110 mm TL feed almost exclusively on algae and debris. The roundtail chub appeared to be rather opportunistic and sporadic in its feeding habits, taking fish, aquatic insects, and terrestrial insects (Vanicek and Kramer 1969). However, Rinne (1992) reported the roundtail chub as the top carnivore in this low desert ecosystem, preying on larvae and juveniles of the other species as they occupy pools or displacement by increased flows (Rinne 1992). Larger sized food items found in the stomachs of the roundtail in Aravaipa Creek, Arizona substantiates its large predatory nature (Schreiber & Minckley 1981).

Vanicek and Kramer (1969) reported that all specimens of roundtail chub (<50 mm TL) analyzed from Fossil Creek, Arizona were herbivorous and that adult roundtail were omnivores, feeding primarily on macroinvertebrates in Jan.-May and shifting largely to algae and macrophytes in June-Dec. Plant debris commonly found in stomachs included leaves, stems, seeds, woody fragments, and horsetail stems (Vanicek and Kramer 1969).

Midge larvae and mayfly nymphs were the most abundant food items in the smaller fish, and as they grow, roundtail chubs consumed a greater diversity of food items, including aquatic and terrestrial insects (Schreiber & Minckley 1981). Six (28.6 percent) items found in the roundtail chub stomachs did not appear in other fishes, and a single order of insects, ephemeropterans, (mayflies) bore the brunt of predation by most fish species (Schreiber & Minckley 1981). Principal food items of fish over 200 mm long were terrestrial insects-mostly adult beetles, grasshoppers, and ants-which were commonly found floating on the surface (Vanicek and

Kramer 1969). Young move into quiet backwaters until 25 to 50 mm long, where they feed on small insects, crustaceans, and algal films (Minckley 1973).

## **Diet category** (list):

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

## **Grazing Effects** (narrative):

This species is currently present in larger river systems and due to inhabiting pools in these systems is probably little affected by livestock grazing. However, in areas where present in smaller, more headwater tributaries, potential bank damage caused by livestock could reduce cover in form of undercut banks. Livestock grazing that results in loss of riparian gallery forests and increased bank erosion also contributes to habitat deterioration (Propst 1999).

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

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| **Panel causal mechanisms comments:** |

## Authors

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

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