Scientific Name: *Gila elegans*
Common Name: Bonytail chub
BISON No.: 010115

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: Endangered, State AZ: Species of special concern, State NM: Endangered, extirpated. In 1973 the bonytail chub persisted in unknown numbers in some mainstream reservoirs of the Colorado River, and maintains a declining population in the Colorado River upstream from Grand Canyon (Minckley 1973). The endemic bonytail chub is very rare in the Colorado basin (Holden and Stalnaker 1975). Presently the bonytail chub is very rare, near extinction, and taken only from Green River and Lake Mohave (Lee et al 1981). The largest population of bonytail chubs is known to persist Lake Mohave, a reservoir on the lower Colorado River (Foster et al 1997). By 1973 the bonytail chub was extinct in the moderate-sized tributaries of the Colorado River, such as the Gila and Little Colorado (Minckley 1973). Remarkably little is known of the ecology of bonytail, and they are almost gone in nature (Minckley 1991).

Declines of this and other native southwestern fishes have been attributed to dewatering; mainstream dams and impoundments; altered stream flow, channel morphology, and water quality; and introduction of exotic fishes (Marsh 1985). Specific threats to the bonytail chub include cold discharges from Glen Canyon Dam resulting in lowered temperatures of the Colorado River in Glen, Marble, and Grand Canyons, and combined with little warming from the sun because of high canyon walls and no large, warm tributaries have made it unfavorable for most native fishes, and spawning temperatures, especially for rare forms, seldom occur (Holden and Stalnaker 1975). Hypolimnetic discharges result in downstream temperatures in most of these streams that are relatively cool in summer and warm in winter, and these temperature effects upon reproduction by the species below dams have played a role in their population declines (Marsh 1985). Another reason for the decline in endemic fish numbers in the upper basin is competition from introduced species such as the abundant small cyprinid, red shiner, have created more competition for space and food with juvenile fish (Holden and Stalnaker 1975). The bonytail chub appears to be hybridizing extensively in the vicinity of Lake Powell with both the Colorado and humpback chubs (Minckley 1973).

Distribution (narrative)**:**

Bonytail chubs are found in creeks and rivers west of the continental divide (Koster 1957). They are found in large main channels of Green Colorado, and Gila rivers in Colorado River basin (Lee et al 1981). The historic range included larger rivers throughout the Colorado River basin or middle and upper Colorado and Green Rivers (Marsh 1985). Present distributions are severely limited, and bonytail chub currently persist in Green River and Lake Mohave (Marsh 1985).

Key Distribution/Abundance/Management Areas:

Panel key distribution/abundance/management areas:

Breeding (narrative)**:**

Bonytail chubs apparently spawned in June and July (Minckley 1973). The only reproductive activities recorded for bonytail are of aggregations of adults over gravelly "reefs" in artificial impoundments; habitats (Minckley 1991). Minckley (1973) observed spawning in reservoirs but no success was noted. Marsh (1985) reported the percentage hatch of bonytail chub was highly dependent upon incubation temperature with statistically equivalent success (35 and 32%) at 15 and 20^{o}C, respectively. Time of peak hatch decreased with increasing temperature from 204 h at 15^{o}C to 103 h at 20^{o}C (Marsh 1985). Breeding males have reddish lower parts (Koster 1957).

Habitat (narrative)**:**

Bonytail chubs are most common near heads of pools or in riffles with large adults occupy very fast water (Koster 1957). Vanicek & Kramer (1969) reported bonytail chubs occurring principally in eddies and pools of the Green River, Utah. Young of bonytail in streams presumably behave

similar to other chub species, moving to the margins to feed and grow, then progressively invading deeper and larger waters (Minckley 1973). Crowl et al (1995) in their laboratory studies found that individuals that have undergone three months of training in intermittent flow (0.07m/s) selectively inhabit higher velocities in stream channels and feed exclusively in high flow, high turbulent habitats. Bonytail that have undergone flow training spend a large proportion of their time near the substrate in high velocity, high turbulent areas, feeding on drifting organisms (Crowl et al 1995). In Lake Mohave, bonytail primarily utilized the Arizona shoreline. Foster et al (1997) typically found bonytail chubs to be in the surface waters over the deepest portions of the lake during the day, and then they moved near shore at night.

Key Habitat Components: eddies and pools with moderate to swift current.

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)**:**

All the chubs are carnivorous as adults, feeding upon aquatic invertebrates and sometimes other smaller fishes with smaller individuals often feed on aquatic plants, usually algae (Rinne and Minckley 1970). The food of bonytail chubs consists largely of insects and other small animals (Koster 1957). Adult bonytail in the Green River feed primarily on terrestrial insects, plant debris, and algae with young feeding mostly on aquatic insects. Minckley (1973) found that in lakes, bonytail chubs feed on plankton and algae on the basis of a few stomachs examined. A few adults examined for food habits had eaten a high percentage of terrestrial invertebrates, drifting insects that had been blown by wind or otherwise fallen into the river (Minckley 1991). Occurrence of adult aquatic insects in stomachs also implies feeding at or near the water surface (Minckley 1991).

Diet category (list):

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

Grazing Effects (narrative):

Similar to the other big river fishes grazing has little direct effect on this species due to limited distribution in mainstream reservoirs and the Grand Canyon where livestock grazing is absent.

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. and Rinne, J.N.
- **GP 2001:**
- **GP 2002:**
- **Revision:**

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