

MIMBRES WATERSHED

The Mimbres River occupies a small endorheic basin in southwest New Mexico. Its headwaters are on the west and south-facing slopes of the Black Range. It flows southward and dissipates onto the desert north of Deming. Much of the permanently watered portion of the river is in the Mimbres Valley, where the system was historically more swamp-like in character than river. For most of its perennial course, the Mimbres River flows within Grant County. The lower-most point with permanent water occurs in northern Luna County. Formerly small farms, orchards, and dispersed livestock grazing were the predominant land use in much of the Mimbres Valley. Upstream of the village of San Lorenzo, the valley becomes a checkerboard of small “ranchitos”. The watershed uplands are mostly US Forest Service administered lands, but valley lands are largely privately owned. Although rural, the valley has been subdivided into numerous small tracts, many with dwellings that have private wells and septic systems. Here, the river channel is frequently mechanically realigned and woody riparian vegetation has been removed. The Nature Conservancy and the New Mexico Department of Game and Fish own several tracts along the river, which provide some protection to the aquatic habitat.

Bear Canyon Reservoir supports a non-native sport fishery including channel catfish (*Ictalurus punctatus*), largemouth bass (*Micropterus salmoidesi*), and rainbow trout (*Oncorhynchus mykiss*). Sediment accumulation in Bear Canyon Reservoir prompted recent draining and excavation to improve sportfish habitat. Though the rate of sediment deposition is expected to diminish as watershed conditions improve, excavation is likely to again be necessary.

Key habitats identified in the Mimbres Watershed include 1) perennial marsh/cienega/spring/seep, 2) perennial 1st and 2nd order streams, and 3) perennial 3rd and 4th order streams (Fig. 5-11). Although historically the watershed contained many springs and seeps, these habitats are now limited to just Mimbres Spring.

Species of Greatest Conservation Need

Historically, three fish species were native to the Mimbres Watershed (Table 5-13). Some have suggested that trout may have naturally occurred in system, but there is no evidence to support this. A non-native population of federally and state listed Gila trout (*Oncorhynchus gilae*) occupies McKnight Creek, a 1st and 2nd order headwater tributary. Non-native rainbow and Gila trout inhabit several other headwater streams. The Rio Grande sucker (*Catostomus plebeius*) is the only native fish in 1st or 2nd order streams.

The Mimbres Watershed hosts a high diversity (37 species; excluding arthropods other than crustaceans) of Species of Greatest Conservation Need (SGCN) (Table 5-13). Eighteen species (49%) are classified as vulnerable, imperiled, or critically imperiled both statewide and nationally. An additional 13 species are classified as vulnerable, imperiled, or critically imperiled in the state, but secure nationally. Conservation status codes (abundance estimates) for each SGCN are provided in Appendix H. Conservation concerns for birds, mammals, amphibians, and reptiles are primarily addressed within the appropriate Riparian Habitat, Ephemeral Habitats, and/or Terrestrial Habitat sections.



Figure 5-11. Key perennial aquatic habitats in the Mimbres Watershed in New Mexico. Key habitats are designated with an asterisk (*).

Table 5-13. Species of Greatest Conservation Need in the Mimbres Watershed in New Mexico.

Common Name	Perennial		
	Marsh/ Cienega/ Spring/ Seep	1 st and 2 nd Order Stream	3 rd and 4 th Order Stream
<i>Fish</i>			
Gila Trout		X	
Chihuahua Chub	X		X
Rio Grande Sucker	X	X	X
<i>Birds</i>¹			
Eared Grebe	X		X
American Bittern	X		
White-Faced Ibis	X		
Northern Pintail	X		X
Osprey			X
Bald Eagle	X		X
Northern Harrier	X		
Common Black-Hawk	X	X	X
Peregrine Falcon	X		X
Sandhill Crane	X		
Southwestern Willow Flycatcher	X		X
Bell's Vireo			X
Bank Swallow			X
Lucy's Warbler	X		X
Yellow Warbler	X	X	X
<i>Mammals</i>¹			
Arizona Shrew	X		
Western Red Bat	X		
Spotted Bat	X		
Allen's Big-Eared Bat	X		
Pocketed Free-Tailed Bat	X		
American Beaver	X	X	X
New Mexico Meadow Jumping Mouse	X		
<i>Amphibian</i>¹			
Tiger Salamander	X		
Arizona Toad	X	X	X
Western Chorus Frog	X	X	X
Plains Leopard Frog	X		X
Chiricahua Leopard Frog	X	X	X
Northern Leopard Frog	X	X	X
Lowland Leopard Frog	X	X	
<i>Reptiles</i>¹			
Sonoran Mud Turtle		X	X
Mexican Garter Snake	X	X	X
Narrowhead Garter Snake		X	X

Table 5-13 Cont.

Common Name	Perennial		
	Marsh/ Cienega/ Spring/ Seep	1 st and 2 nd Order Stream	3 rd and 4 th Order Stream
<i>Molluscs</i> ¹ <i>Pyrgulopsis</i> spp. Snail	X		
<i>Crustaceans</i> ¹ Sideswimmers / Scuds	X	X	X

Perennial Marsh/Cienega/Spring/Seep

Habitat Condition

Historically, much of the Mimbres Valley was a complex system of spring, seep and cienega habitats. With European settlement, the system was modified and the river generally restricted to a well-defined single channel. Spring, seep, and cienega habitats were intentionally drained and largely eliminated. The drilling of numerous wells lowered the water table and further diminished these habitats. Currently, perennial spring, seep, marsh, and cienega habitats in the Mimbres Watershed are limited to Mimbres Spring.

Problems Affecting Habitats or Species

Water Withdrawal

Continued lowering of the water table is likely to adversely affect all spring, seep, and cienega habitats remaining in the Mimbres Valley. Surface water loss resulting from additional demands on the water supply will have significant adverse effects on the aquatic species associated with this habitat type. Extended drought conditions are compounding this problem.

Non-Native Species

Invasive and non-native plants and animals are a concern for the longevity of perennial spring-fed habitats. Non-native sportfish, particularly from Bear Canyon Reservoir, present a potential for predation and competition that may diminish native fauna. With increasing demand on limited sources of moisture, non-native plants may disrupt the structure and stability of native plant communities and degrade wildlife habitat.

Habitat Alteration

Livestock access to springs increases sedimentation, denudes banks of vegetation, and introduces fecal wastes. Most of the natural springs in the Mimbres have been modified for human use. The likelihood of disease and parasite outbreaks increases significantly where such modifications crowd fish populations into a much reduced habitat.

Information Gaps

There are numerous information gaps that impair our ability to make informed conservation decisions regarding perennial marsh/cienega/spring/seep habitats.

- Information is lacking on recharge or subsurface connectivity of springs to the Mimbres River.
- Demographics of fish populations are largely unknown in spring habitats.
- Interactions are largely unknown between various species that rely on perennial marsh/cienega/spring/seep habitats.
- The existing environmental conditions or thresholds are unknown that limit populations of SGCN.
- Factors causing parasite outbreaks in perennial marsh/cienega/spring/seep habitats are unclear.
- The long term effects of parasitic infections on resident fishes are unknown.
- Information is lacking as to the extent to which invasive and non-native species may alter perennial marsh/cienega/spring/seep habitats and limit populations of associated SGCN.

Research, Survey, and Monitoring Needs

Research or survey efforts needed to make informed conservation decisions for perennial marsh/cienega/spring/seep habitats or associated SGCN are detailed below.

- Research, surveys, and monitoring programs are greatly needed for SGCN associated with perennial marsh/cienega/spring/seep habitats. Little is currently known of the extent of their distribution, their biology, or the stability of their populations and microhabitats.
- Gather information to help understand the life history and control measures of various parasites, particularly the yellow grub (*Clinostomum marginatum*). Parasites infect fish associated with perennial marsh/cienega/spring/seep habitats.
- Determine the movement of the Chihuahua chub (*Gila nigrescens*) from springs to the Mimbres River.
- Investigate the extent to which land use activities, such as livestock grazing timing, intensity, and duration, human development and invasive or non-native species invasions fragment and alter habitats in relation to size, edge effect, and use by wildlife. This information is important in understanding how different land use intensities and frequencies of disturbances affect SGCN in perennial marsh/cienega/spring/seep habitats.

- Investigate hydrologic relationships in perennial marsh/cienega/spring/seeps to provide a better understanding of physiochemical and hydrologic processes that allow sustainable watershed conservation and management practices. This information will help evaluate the effects of extended drought periods on springs and associated SGCN.

Desired Future Outcomes

Desired future outcomes for perennial marsh/cienega/spring/seep habitats in the Mimbres Watershed include:

- Perennial marsh/cienega/spring/seep habitats persist in the condition, connectivity, and quantity necessary to sustain viable and resilient populations of resident SGCN and host a variety of land uses with reduced resource use conflicts.
- There is no net loss of perennial marsh/cienega/spring/seep habitat in the Mimbres River Watershed.
- Livestock use of perennial marsh/cienega/spring/seep habitats does not increase sedimentation, denude banks of vegetation, or introduce fecal wastes that affect water quality and associated SGCN.
- Perennial marsh/cienega/spring/seep habitats are free of non-native species that threaten the persistence of native species.
- Viable populations of Chihuahua chub are maintained in Mimbres Spring.
- A barrier to invasion of Mimbres Spring by non-native fish exists and is maintained in operating condition.

Prioritized Conservation Actions

Approaches for conserving New Mexico's biological diversity at the species or site-specific level are inadequate for long-term conservation of SGCN. Conservation strategies should be ecosystem-based and include public input and support (Galeano-Popp 1996). Monitoring of species and habitat will be employed to evaluate the effectiveness of the conservation actions described below. Those found to be ineffective will be modified in accordance with the principles of adaptive management. Conservation actions, in order of priority, which assist in achieving desired future outcomes, are outlined below.

1. Continue to cooperate with private landowners and The Nature Conservancy to protect Mimbres Spring.
2. Work with public and private land managers to develop sustainable livestock practices on rangelands around perennial marsh/cienega/spring/seep habitats to reduce spring degradation.

3. Annually monitor the Chihuahua chub population in Mimbres Spring.
4. Use Chihuahua chub from Mimbres Spring to maintain stock at Dexter National Fish Hatchery & Technology Center.
5. Collaborate with federal and state agencies, research institutions, and universities to develop and implement methods to suppress yellow grub parasite in Mimbres Spring.
6. Work with federal, state, and private agencies and institutions to remove non-native species from Mimbres Spring.
7. Work with appropriate state and federal government entities, NGOs, and private landowners to construct barriers to prevent invasion by non-native fishes into Mimbres Spring.
8. Encourage partnerships between federal and state land managers and private landowners to protect and rehabilitate perennial marsh/cienega/spring/seep habitats.
9. Work with federal and state agencies, private landowners, research institutions, and universities to design and implement projects that will provide information about SGCN and perennial marsh/cienega/spring/seep habitats outlined in the Problems or Research, Survey, and Monitoring Needs sections.

Perennial 1st and 2nd Order Stream

Habitat Condition

Most 1st and 2nd order perennial streams in the Mimbres Watershed, particularly those at high elevation, are on lands administered by US Forest Service. Improper livestock grazing contributed to bank erosion and loss of woody riparian vegetation. Modified grazing practices have resulted in some improvements. Aquatic habitats are generally in comparatively good condition. High intensity floods have incised stream channels in some areas but habitat quality has improved as riparian vegetation is restored. Wildfire and associated ash flow has diminished habitat quality in some stream reaches.

Problems Affecting Habitats or Species

Fire Management

The primary factor adversely affecting 1st and 2nd order stream habitats in the Mimbres Watershed is wildfire and associated ash flows. Until burned watersheds recover, ash flows and elevated sediment transport will continue to diminish habitat quality.

Non-Native/Invasive Species

Non-native rainbow and brown trout (*Salmo trutta*) inhabit 1st and 2nd order streams. Their continued presence is a threat to the Chihuahua chub that occurs in downstream reaches.

Information Gaps

There are numerous information gaps that impair our ability to make informed conservation decisions regarding perennial 1st and 2nd order streams.

- Interactions and habitat associations are unknown of sympatric Gila trout and Chihuahua chub in McKnight Creek.
- The presence and distribution is unclear of SGCN, especially fish species, in perennial 1st and 2nd order streams.
- Long-term effects of wildfire on stream biota are unknown.
- The location, area and quality of perennial 1st and 2nd order stream habitats for SGCN in the Mimbres Watershed are unknown.
- Suitability of habitats for restoration of native fishes, particularly Chihuahua chub is unknown.

Research, Survey, and Monitoring Needs

Research or survey efforts needed to make informed conservation decisions for perennial 1st and 2nd order streams and SGCN are detailed below.

- Develop comprehensive spatial data designating the location, area and quality of perennial 1st and 2nd order stream habitats to provide the foundation for monitoring impacts and facilitating risk assessment for SGCN that occupy this habitat type.
- Investigate the extent to which wildfire and associated ash flow has diminished habitat quality.
- Systematic inventories are needed of all perennial 1st and 2nd order streams.
- Research is needed to evaluate the potential for the persistence of mixed Gila trout and Chihuahua chub assemblages.
- Streams suitable for restoration of the Chihuahua chub need to be identified and prioritized.
- Available habitats throughout perennial 1st and 2nd order streams need to be quantified in the Mimbres Watershed.

Desired Future Outcomes

Desired future outcomes for perennial 1st and 2nd order streams in the Mimbres Watershed include:

- Perennial 1st and 2nd order stream habitats in the Mimbres Watershed persist in the condition, connectivity, and quantity necessary to sustain viable and resilient populations of resident SGCN, facilitate uninterrupted movements of native aquatic and terrestrial SGCN, and host a variety of land uses with reduced resource use conflicts.
- Non-native species in perennial 1st and 2nd order stream habitats are controlled or eliminated.
- Healthy populations of Chihuahua chub persist in McKnight Creek.

Prioritized Conservation Actions

Approaches for conserving New Mexico's biological diversity at the species or site-specific level are inadequate for long-term conservation of SGCN. Conservation strategies should be ecosystem-based and include public input and support (Galeano-Popp 1996). Monitoring of species and habitat will be employed to evaluate the effectiveness of the conservation actions described below. Those found to be ineffective will be modified in accordance with the principles of adaptive management. Conservation actions, in order of priority, which assist in achieving desired future outcomes, are outlined below.

1. Collaborate with federal and state agencies to continue augmentation and monitoring of Chihuahua chub in the McKnight Creek.
2. Work with the US Forest Service to develop strategies to reduce the effects of wildfire induced ash flows on native fish assemblages.
3. Continue to monitor the Gila trout population in McKnight Creek.
4. Work with federal and state agencies, private landowners, research institutions, and universities to continue fish assemblage monitoring efforts. Identify suitable stream reaches for restoration of native fishes.
5. Collaborate with federal and state agencies and affected publics to develop and implement strategies to remove non-native species and restore native fish species in perennial 1st and 2nd order stream habitats.
6. Work with federal and state agencies, private landowners, research institutions, and universities to design and implement projects that will provide information about SGCN and perennial 1st and 2nd order streams outlined in the Information Gaps and Research, Survey, and Monitoring Needs sections.

Perennial 3rd and 4th Order Stream

Habitat Condition

The upper 3rd and 4th order stream reaches in the Mimbres Watershed are within lands administered by US Forest Service. The lowermost reaches of several tributaries and main stem Mimbres River are 3rd and 4th order streams. NMDGF and The Nature Conservancy own short reaches of main stem Mimbres River. These streams are generally shaded and aquatic habitats in moderate to excellent condition.

Within the Mimbres Valley, land ownership is largely private and habitat quality is seriously compromised. Extensive reaches of the river are regularly bulldozed to straighten the channel and remove large woody debris. Pool habitat has been eliminated by such activities and the stream receives little shade. Diversion of water for agriculture seasonally diminishes flows in much of the river and it dries up downstream of San Lorenzo. Woody riparian vegetation has been removed from riverbanks on most private lands. Dispersed livestock grazing is the primary land use on upland portions of the watershed.

Problems Affecting Habitats or Species

Habitat Conversion

Extensive channel dewatering and straightening and the removal of woody debris are major activities adversely affecting perennial 3rd and 4th order stream habitats in the Mimbres Watershed. Resultant conditions diminish the capacity of these habitats to sustain associated SGCN.

Non-Native/Invasive Species

Introduced rainbow trout prey upon native fishes. Longfin dace (*Agosia chrysogaster*) compete with them for limited habitat. The specific effects of this predation and competition are perceived as problems affecting the persistence of native fishes.

Information Gaps

There are numerous information gaps that impair our ability to make informed conservation decisions regarding perennial 3rd and 4th order streams in the Mimbres Watershed.

- The status of the Chihuahua chub within the reaches of the Mimbres River that are bounded by private lands is largely unknown.
- The response of SGCN to various flow regimes, including channel drying, needs to be understood.
- Current trends and status of perennial 3rd and 4th order streams in the Mimbres Watershed are largely unknown.

- Information is lacking on the extent to which invasive or non-native species may alter perennial 3rd and 4th order streams and limit populations of SGCN.

Research, Survey, and Monitoring Needs

Research or survey efforts needed to make informed conservation decisions for perennial 3rd and 4th order streams or SGCN are detailed below.

- Annual monitoring of Mimbres River fish assemblages should continue.
- Movement and survival of stocked Chihuahua chub should be monitored and evaluated through use of implanted PIT tags.
- Research, surveys, and monitoring programs are greatly needed for SGCN associated with perennial 3rd and 4th order streams of the Mimbres Watershed. Little is currently known of the extent of their distribution, biology, or the stability of their populations and microhabitats.

Desired Future Outcomes

Desired future outcomes for perennial 3rd and 4th order streams in the Mimbres Watershed include:

- Perennial 3rd and 4th order streams persist in the condition, connectivity, and quantity necessary to sustain viable and resilient populations of resident SGCN and host a variety of land uses with reduced resource use conflicts.
- Additional lands along the Mimbres River are managed for conservation of native fishes and other associated SGCN.
- Viable populations of the beautiful shiner (*Cyprinella formosa mearnsi*) have been restored in the Mimbres Watershed.
- The Chihuahua chub has expanded its range to include all warm water reaches of the Mimbres River and suitable tributary streams such as Gallinas Canyon.
- Public awareness and appreciation of perennial 3rd and 4th order stream resources is improved.
- Improved riparian corridor management exists through the development and adoption of management practices that protect the ecological integrity of stream habitats.
- Channel straightening and debris removal activities have ceased. Channel conditions are stabilized with appropriate streamside vegetation and substrates.

- Implementation and compliance with baitfish regulations that minimize introduction of non-native fish are realized.
- Impacts to native species communities by non-natives are eliminated.

Prioritized Conservation Actions

Approaches for conserving New Mexico's biological diversity at the species or site-specific level are inadequate for long-term conservation of SGCN. Conservation strategies should be ecosystem-based and include public input and support (Galeano-Popp 1996). Monitoring of species and habitat will be employed to evaluate the effectiveness of the conservation actions described below. Those found to be ineffective will be modified in accordance with the principles of adaptive management. Conservation actions, in order of priority, which assist in achieving desired future outcomes, are outlined below.

1. Continue to work with landowners (public and private) to maintain and enhance riparian conditions along the Mimbres Watershed.
2. Identify and implement opportunities for further habitat conservation on private properties along the Mimbres River. Approaches may include enactment of conservation easements or other agreements and acquisition from willing sellers.
3. Encourage public participation in state and federal incentive-based programs to protect, enhance, and restore perennial 3rd and 4th order stream habitats. Such incentive-based programs may include: Wetlands Reserve Program, and the Landowner Incentive Program, among others.
4. Work with federal and state agencies and affected publics to establish minimum flows for fishes within important Chihuahua chub habitats in perennial 3rd and 4th order streams of the Mimbres Watershed.
5. Collaborate with federal and state agencies and affected publics to actively remove non-native predators from perennial 3rd and 4th order streams of the Mimbres Watershed.
6. Maintain the fish screen on Bear Canyon Reservoir outflow to prevent emigration of non-native fishes from the reservoir into the Mimbres River.
7. Continue to maintain the captive population of Chihuahua chub at Dexter National Fish Hatchery and Technology Center. This population is periodically augmented with wild fish. Similarly, continue to augment the wild population of Chihuahua chub with fish propagated at Dexter National Fish Hatchery and Technology Center.
8. Adopt and encourage compliance by anglers with baitfish regulations that will preclude introduction of non-native species.

9. Continue to manage properties owned by NMDGF and The Nature Conservancy to provide habitat for Chihuahua chub and other SGCN of the Mimbres River.
10. Evaluate the potential to successfully re-establish beautiful shiner in the Mimbres River.
11. Work with federal and state agencies, private landowners, research institutions, and universities to design and implement projects that will provide information about SGCN and perennial 3rd and 4th order stream habitats outlined in the Problems or Research, Survey, and Monitoring Needs sections.
12. Encourage partnerships with private, state, and federal land managers to protect, enhance, and rehabilitate perennial 3rd and 4th order stream habitat.
13. Educate local resource users about the measures necessary to conserve perennial 3rd and 4th order streams and associated SGCN in the Mimbres Watershed.