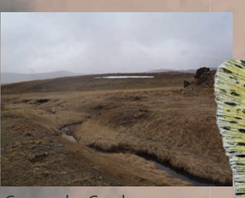
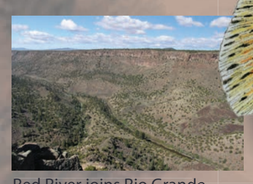
Native Fishes of the Rio Grande, New Mexico


Comanche Creek

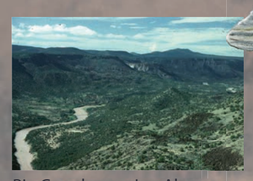

Red River joins Rio Grande


Rio Brazos

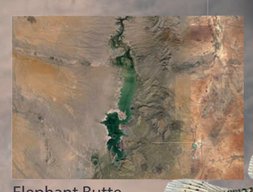

Heron Reservoir

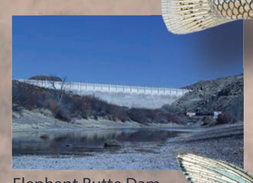

Drought at El Vado Lake


Rio Chama


Rio Grande near Los Alamos

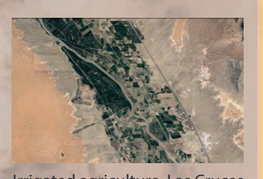

Rio Grande during flood

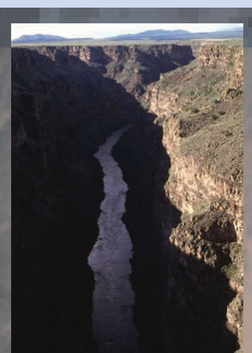

Elephant Butte


Elephant Butte Dam


Percha Creek

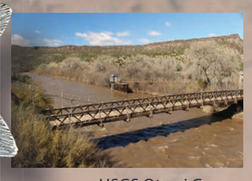

Rio Grande below Caballo

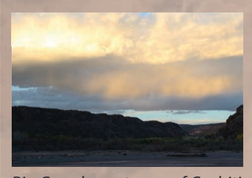

Irrigated agriculture, Las Cruces

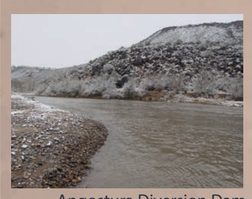

Taos Box

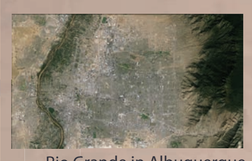

Rio Hondo


Rio Pueblo

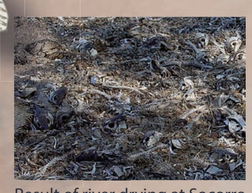

USGS Otowi Gauge


Rio Grande upstream of Cochiti

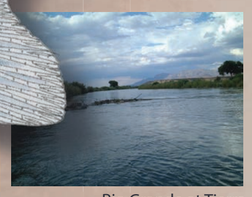

Angostura Diversion Dam

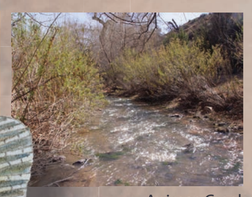

Rio Grande in Albuquerque


San Acacia Diversion Dam


Result of river drying at Socorro


Flooded bosque


Rio Grande at Tierra


Animas Creek


Downstream of Hatch

Colorado

Rio Costilla

Comanche Creek

Heron Reservoir

Rio Brazos

Red River

Rio Hondo

Taos

Rio Pueblo

Rio Chiquito

Vallecitos

Rio Chama

Abiquiu Reservoir

Embudo Creek

Rio Grande Cutthroat Trout
Oncorhynchus clarkii virginalis

Rio Grande Chub
Gila pandora

Cebolla Creek

Rio Grande Sucker
Catostomus (Pantosteus) plebeius

Cochiti Reservoir

Santa Fe River

Santa Fe

Angostura Diversion Dam

Jemez River

Longnose Dace
Rhinichthys cataractae

Flathead Chub
Platygobio gracilis

RIO GRANDE

Albuquerque

Red Shiner
Cyprinella lutrensis

Fathead Minnow
Pimephales promelas

Isleta Diversion Dam

Rio Puerco

Rio Grande Silvery Minnow
Hybognathus amarus

River Carpsucker
Carpiodes carpio

Blue Catfish
Ictalurus furcatus

San Acacia Diversion Dam

Bluegill
Lepomis macrochirus

Socorro

Alamosa River

Elephant Butte Reservoir

Smallmouth Buffalo
Ictiobus bubalus

Western Mosquitofish
Gambusia affinis

Animas Creek

Gizzard Shad
Dorosoma cepedianum

Percha Creek

Caballo Reservoir

Hatch

Flathead Catfish
Pylodictis olivaris

Las Cruces

Texas

Ephemeral river
Perennial river
City or town
Large dam
Restoration site
Endangered fish rearing site

Native Fishes of the Rio Grande, New Mexico

A ribbon of life

The Rio Grande begins as small tributary streams in the high elevation mountains of southern Colorado and northern New Mexico. These clear and cold streams converge to form the Rio Grande.

As the river flows through New Mexico, it cuts the whole of the state down the middle. In northern New Mexico, the river flows through deep basalt canyons and gorges. In the middle of the state, the Rio Grande meanders through a wide river valley bordered by a parched desert. Forests of cottonwood trees (***bosque***) grow on the floodplains. In the southern half of the state, the river channel becomes narrow and straight and waters of the Rio Grande are used to grow crops such as alfalfa, chile, and pecans. Water must be delivered efficiently to reservoirs in New Mexico, Texas, and Mexico. After leaving New Mexico, the Rio Grande forms the border between Texas and Mexico and eventually trickles into the Gulf of Mexico, 2000 miles from where it began.

Valuable water

The Rio Grande has supported human populations for over 10,000 years. Pueblos, towns, and cities have been built along the Rio Grande. Water from the river has grown crops for food and provided water for industry.

Today, water from the Rio Grande Basin is heavily managed for human use. The water is diverted, stored, and even moved across from other river basins. Currently, there are six major reservoirs that store and distribute water: Heron, El Vado, Abiquiu, Cochiti, Elephant Butte, and Caballo. There are also scores of large-scale diversion structures that move water from the river to agricultural fields.

Native fish

Some of the earliest records of fishes in the Rio Grande can be seen in petroglyphs and pottery created by Native Americans. Europeans first collected fish during surveys for railroad development in the 1850s. This information provides an important record of the distribution of native species.

Historically, more than 24 species of fish were found in the Rio Grande in New Mexico. Today, the fish community includes 15 native species and dozens of introduced species. Native species no longer present include large, long-lived fishes (**Shovelnose Sturgeon**, **American Eel**, **Blue Sucker**, and **Longnose Gar**). Many of these species needed a large, uninterrupted river that flowed throughout the year so that they could migrate and spawn.

Other species no longer found in the Rio Grande are small minnows, including **Speckled Chub**, **Rio Grande Shiner**, **Phantom Shiner**, and **Rio Grande Bluntnose Shiner**. **Phantom Shiner** and **Rio Grande Bluntnose Shiner** are now extinct. These minnows all produced buoyant eggs that developed and hatched while drifting downstream. Today, the **Rio Grande Silvery Minnow** is the only species left in the Rio Grande that produces these kinds of eggs.

The **Rio Grande Silvery Minnow** was historically found from northern New Mexico to Texas. Now it is found only in the Middle Rio Grande from just north of Albuquerque to Elephant Butte and it is listed as **Federally Endangered**. When snow melts in the spring it causes high flow in the river, and then the fish start to spawn. The male and female swim spirals around each other, releasing eggs and sperm. The fertilized eggs swell with water, then drift downstream as the young larvae develop then hatch and disperse. The fish migrate back upstream once they are mature adults.

Despite the loss of fish species, the river still supports a diverse assemblage of fish. Minnows are relatively abundant in the river. They are small fish that live for only a year or two. They fill many biological niches in the river ecosystem. There are also long-lived native suckers. They are often mistaken as "**trash fish**" but have an important role of cleaning detritus from the river bottom. Many of the native suckers are listed as **"species of greatest conservation need"** in New Mexico.

Threats to native fishes in the Rio Grande

The natural processes of the river have changed. Conservation activities are imperative to maintain aquatic ecosystems. The first step to conservation is understanding the threats.

Dams can affect fish habitat in three ways:

1. Fish can no longer move up and down the whole length of the river. Dams and diversions break up the river into short "fragments" that block fish movement.
2. Dams change the way that water flows through the river. Dams reduce the number of major floods and protect our land. But this means that floodplains don't get wet very often. Wet floodplains provide important habitat for larval fish and are also an important part of the river food web.
3. Dams store water, and often this means that not enough water is left in the river channel. River drying is worse during drought years. Hundreds of miles of river can be reduced to dry channels. Without water, fish and other aquatic organisms cannot survive.

Non-native species compete and prey upon native fish. Sometimes, they breed with native fishes and create hybrids. For example, **Rio Grande Sucker** can hybridize with **White Sucker**, an introduced species. Over time, this makes the native fish species more likely to go extinct. Non-native plant species also threaten the bosque. For example, salt cedar and Russian olive line the banks of the river. This means that there is less flooding, the river becomes straight and deep, and there are changes to natural nutrient cycles in the river.

Wildfires are a major threat for rivers that flow through forests. After a fire, ash can be washed into the river and cause the oxygen in the water to decrease rapidly. This causes massive fish die-offs. It can take years for the forest to regrow: without any vegetation to hold the soil and nutrients in place, there can be more erosion. This leads to more sediment in the river and a change in habitat quality for fish and other aquatic plants and animals.

Conservation of native fishes and riverine habitat

In the Rio Grande, there are many types of conservation activities. The aim of this conservation work is to restore and protect fish species and their aquatic habitats.

Conservation activities are utilized for **Rio Grande Cutthroat Trout**, the state fish of New Mexico. This species lives in small, cold streams in the northern mountains of New Mexico. It is threatened by habitat loss and hybridization with non-native fishes. To combat these threats, biologists have ***reduced invasive fish species*** (**Rainbow** and **Brown Trout**). Barriers are constructed to keep invasive species out of restored waters. **Rio Grande Cutthroat** are raised in local hatcheries and are ***reintroduced to expand the range of the species.***

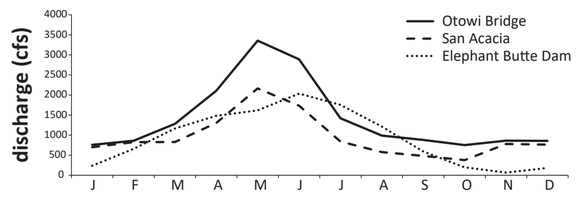
Seasonal water flow is altered using water reserves in reservoirs to benefit the **Rio Grande Silvery Minnow**. Flows are increased in the spring to create favorable spawning conditions and rearing habitats for their young. Adults are salvaged from drying pools in the summer and fall (when water use exceeds what flows in the river). Fish are put back in the river near Albuquerque.

Monitoring efforts are extremely important for fish that are "**Species of Greatest Conservation Need**" (SGCN). One type of monitoring records the number of fish in the river, and another type records the genetic identity of these fish. Using monitoring data, scientists assess the distribution and abundance of sensitive species like **Rio Grande Chub**. Genetic monitoring provides information about how often (and where) hybridization occurs. Scientists use monitoring data to identify priorities for conservation efforts.

As an individual, you can also help to protect rivers like the Rio Grande and the species that rely on them. Reducing water use and conserving water at home makes more water available for rivers and resident aquatic species. Treat all fish species and their habitats with respect. When we all work together, the river will continue to support life and diversity throughout New Mexico.

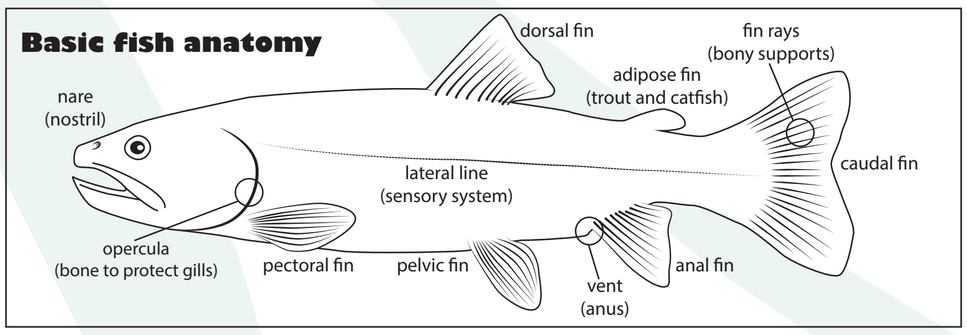
RIVER DISCHARGE

USGS gauges: 08313000 (Otowi Bridge), 08354900 (San Acacia), 08361000 (Elephant Butte)



Average monthly discharge is shown for three sites on the Rio Grande. ***Otowi Bridge*** gauge measures discharge in Taos Canyon, north of any major dams. The highest discharge is in spring, when snow is melting in the mountains. ***San Acacia*** gauge is south of Socorro. Discharge is lower here because some water is used for agriculture. At the gauge below ***Elephant Butte Dam***, discharge is usually low and there is no big peak in the spring. Water is released from the dam to be delivered downstream.

Basic fish anatomy



DEFINITIONS OF TERMS AND SYMBOLS

NM state conservation status	max. length
(T) Threatened (E) Endangered (SGCN) Species of Greatest Conservation Need	TL: total length (from tip of snout to end of tail) 25.4 mm = 1 inch

stream type			
intermittent	small	intermediate	large

substrate			
silt	sand	gravel	cobble

food resources			
fish		zooplankton *microscopic animals*	
insects *more abundant in silt and sand*		algae *more abundant in clear water*	
insects *more abundant in cobble*		aquatic vegetation	
non-insects *snails, clams, crayfish*		detritus *decaying vegetation from trees*	

habitat	
riffle: shallow, cobbled, fast flow	pool: deep, slow flow
run: moderate depth and flow	backwater: off channel, no flow

Poster design: Lateral Lines (Ayesha S. Burdett and W. Howard Brandenburg) • Fish illustrations: W. Howard Brandenburg • Photographs: Lateral Lines, American Southwest Ichthyological Researchers, L.L.C. (ASIR), Stephen Davenport (US Fish and Wildlife Service), and Steven P. Platania (ASIR) • Distribution records: Dr. Thomas F. Turner and Alexandra M. Snyder (Museum of Southwestern Biology, University of New Mexico), ASIR, New Mexico Department of Game and Fish (NMDGF) • Review: Dr. Virginia A.Seamster and Joanna Hatt (NMDGF), Kim Eichhorst (Bosque Ecosystem Monitoring Program) • Special thanks to Kirk Patten (NMDGF)

lateral lines

/nmdgf @nmdgf /NMGameandFish

Rio Grande Cutthroat Trout
Oncorhynchus clarkii virginalis

max. length	lifespan
385 mm TL	8 years

stream type

substrate

food resources

habitat	prefers clear, cold streams and lakes; habitat is affected by livestock use
spawning period	J F M A M J J A S O N D
life history	state fish of New Mexico; males have bright red breeding colors; eggs are laid in gravel nest built by females

Rio Grande Sucker
Catostomus plebeius

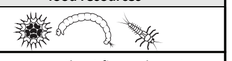
SGCN

max. length	lifespan
200 mm TL	7 years

stream type

substrate

food resources



habitat	prefers areas without fine sediment; found at high elevation (above 6,500 ft)
spawning period	J F M A M J J A S O N D
life history	sexual maturity occurs at 3 years; spawns in riffles; females produce about 2,000 eggs; only found in Rio Grande basin

Rio Grande Chub
Gila pandora

SGCN

max. length	lifespan
175 mm TL	3 years

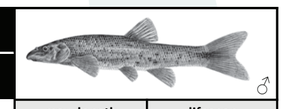
stream type

substrate

food resources

habitat	prefer cool water in pools and runs; like cover (debris piles, aquatic vegetation)
spawning period	J F M A M J J A S O N D
life history	females lay up to 6,000 eggs; nest building and parental care have not been observed; abundance in decline

Longnose Dace
Rhinichthys cataractae

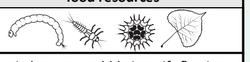


max. length	lifespan
100 mm TL	3 years

stream type

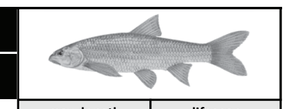
substrate

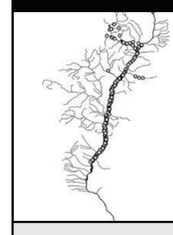
food resources



habitat	lives in between cobble in swift-flowing riffles; larvae prefer areas of slow flow
spawning period	J F M A M J J A S O N D
life history	active at night; females deposit adhesive eggs in cobble crevices; up to six clutches of eggs per year

Flathead Chub
Platygobio gracilis



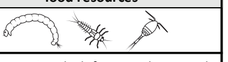


max. length	lifespan
200 mm TL	5-6 years

stream type

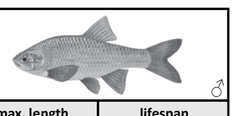
substrate

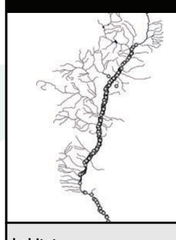
food resources



habitat	swift current with shifting sand or gravel substrate in the main river channel
spawning period	J F M A M J J A S O N D
life history	breeding males grow small nuptial tubercles; females lay up to 7,000 eggs; eggs roll along river bottom as they grow

Red Shiner
Cyprinella lutrensis



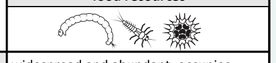


max. length	lifespan
75 mm TL	3 years

stream type

substrate

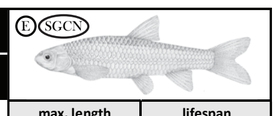
food resources

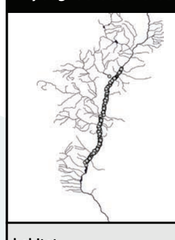


habitat	widespread and abundant; occupies rivers canals, lakes and ponds
spawning period	J F M A M J J A S O N D
life history	females produce sounds to attract males; many clutches of eggs per year; spawns in riffles, sometimes over sunfish nests

Rio Grande Silvery Minnow
Hybognathus amarus

E SGCN



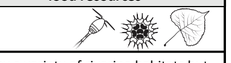


max. length	lifespan
85 mm TL	2 years

stream type

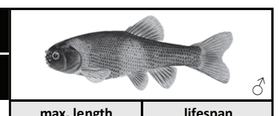
substrate

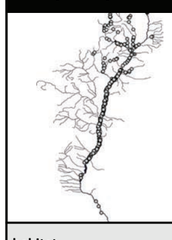
food resources



habitat	occupy a variety of riverine habitats but prefer deeper pools and backwaters
spawning period	J F M A M J J A S O N D
life history	spawns during increasing spring flows; females broadcast up to 3,000 eggs that develop and hatch in the drift

Fathead Minnow
Pimephales promelas



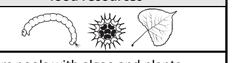


max. length	lifespan
65 mm TL	2 years

stream type

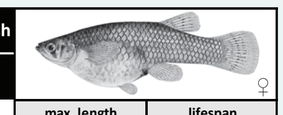
substrate

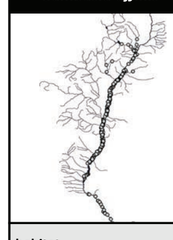
food resources



habitat	prefers pools with algae and plants; tolerates heat and salinity
spawning period	J F M A M J J A S O N D
life history	breeding males develop nuptial horns and broader bodies; spawns in crevices; females deposit eggs on nest ceiling

Western Mosquitofish
Gambusia affinis



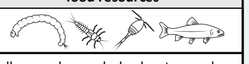


max. length	lifespan
50 mm TL ♀	2 years

stream type

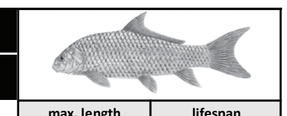
substrate

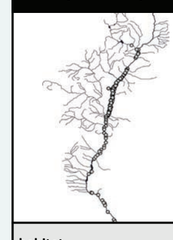
food resources



habitat	shallow pools, ponds, backwaters and stream margins; survives in drying pools
spawning period	J F M A M J J A S O N D
life history	males have modified anal fin for internal fertilization; females bear live young; males are small (27 mm TL)

River Carpsucker
Carpiodes carpio



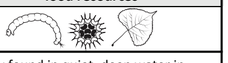


max. length	lifespan
590 mm TL	10 years

stream type

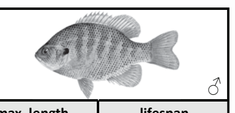
substrate

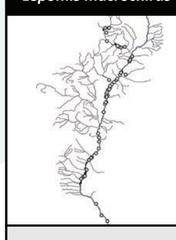
food resources



habitat	mostly found in quiet, deep water in rivers, large creeks, lakes, and reservoirs
spawning period	J F M A M J J A S O N D
life history	gathers in schools; matures at 3 years of age; produces more than 100,000 eggs; spawning occurs in flowing water

Bluegill
Lepomis macrochirus





max. length	lifespan
170 mm TL	8 years

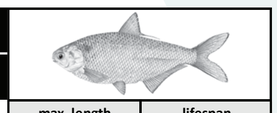
stream type

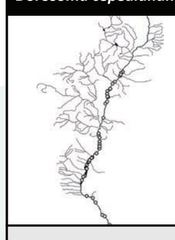
substrate

food resources

habitat	avoids fast-flowing, main channel habitat; prefers shallow, warm, low velocity water
spawning period	J F M A M J J A S O N D
life history	males build nests by fanning their tails and attract females by grunting; females spawn up to five times each year

Gizzard Shad
Dorosoma cepedianum



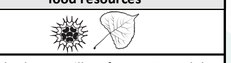


max. length	lifespan
350 mm TL	7 years

stream type

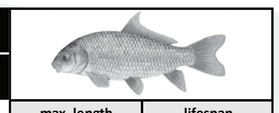
substrate

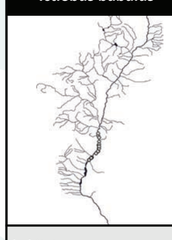
food resources



habitat	juveniles live in still surface water; adults inhabit deep water near the river bottom
spawning period	J F M A M J J A S O N D
life history	spawning occurs over sand and rock; lay up to 350,000 eggs; eggs attach to plants and rocks; young move in schools

Smallmouth Buffalo
Ictiobus bubalus





max. length	lifespan
900 mm TL	18 years

stream type

substrate

food resources

habitat	warm, slow flowing pools with aquatic vegetation in rivers; adapted to reservoirs
spawning period	J F M A M J J A S O N D
life history	prefers to spawn on the floodplain during floods; females can spawn 80,000 to 320,000 eggs; no parental care of young

Blue Catfish
Ictalurus furcatus

max. length	lifespan
1200 mm TL	20 years

stream type

substrate

food resources

habitat	lives in areas of swift current and high turbidity; young fish prefer pools
spawning period	J F M A M J J A S O N D
life history	usually feeds at night; finds food with barbels; older fish mainly eat other fish; builds nests; parental care until hatching

Flathead Catfish
Pylodictis olivaris

max. length	lifespan
1200 mm TL	20 years

stream type

substrate

food resources

habitat	prefers deep, turbid, low-velocity pools; also found in lakes and reservoirs
spawning period	J F M A M J J A S O N D
life history	lays up to 100,000 eggs; tastes with its barbels; ambush predator that feeds at night; adults have few predators