

Pecos River through Bitter Lake

National Wildlife Refuge



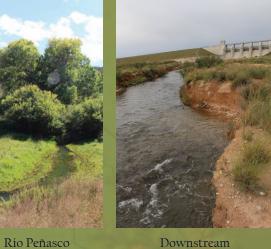
during drought

anta Rosa Lake



Wetlands

Native Fishes of the Pecos River



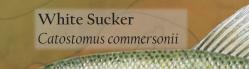
Rio Grande Cutthroat Trout Oncorhynchus clarkii virginali

of Brantley Dam

New Mexico



perennial waters ephemeral waters town refuge or park 🔽 dam





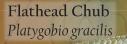


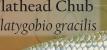












Rio Grande Shiner

Notropis jemezanus



Longnose Dace Rhinichthys cataracta

Green Sunfish Lepomis cyanellı

> Sand Shiner Notropis stramineus

Pecos River

upstream of Roswell

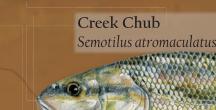
Bigscale Logperch Percina macro

Rio Grande Chub

Gila pandora



Central Stoneroller Campostoma anon



Roundnose Minnow Dionda episcopa



Native Fishes of the Pecos River, New Mexico



Diversity: from the mountains to the plains

The Pecos River flows more than 900 miles through eastern New Mexico and into Texas, where it meets the Rio Grande. The headwaters of the Pecos begin in the high elevations of the southern end of the Sangre de Cristo Mountains. The Pecos River flows south through the Western Great Plains and into the Chihuahuan Desert in southern New Mexico. In the north, the water is cool and clear as it emerges from the mountains. Further south, it becomes warm and full of sediment (sand and dirt particles) as it passes through the flat plains and desert. The water also becomes more saline (contains more salt).

There are many tributary creeks and rivers that flow into the Pecos River in New Mexico. The majority are found in higher elevations and form the river's headwaters. There are fewer tributaries at lower elevations. All the tributaries contribute to the flow of water in the Pecos. In the headwaters, water comes from snowmelt (melting snow that accumulated in the mountains over winter). Another source of water to the Pecos River is groundwater (water that is naturally stored underground). It gradually flows to the surface, and forms vast wetlands, such as the Bureau of Land Management's Overflow Wetlands near Roswell, and forms springs that feed

tributaries like the Black and Delaware rivers. Groundwater can form deep, clear pools in **sinkholes** (a deep cavity in limestone that is filled with groundwater) that dot the landscape – some of these can be seen at Bitter Lake National Wildlife Refuge and Bottomless Lakes State Park.

Native fishes of the Pecos River There are currently 34 native fish species found in the Pecos River. Fish diversity is high because there are several different habitats found along the length of the river. Some fishes are only found in cool, clear water and others are only found in warm, turbid water. Still others are found in unique habitats, such as springs or sinkholes, or in areas with high salinity.

Minnows (family Cyprinidae) make up about one-third of the native fish species found in the Pecos River. Fish in this family are usually small and live for only a year or two. They can be found in diverse habitats and water conditions. The different species of minnows have different functions in the river and are an important part of the food web. After a dry river is re-wetted, the minnows are often the first fishes to recolonize.

Suckers (family Catostomidae) can live for decades and grow to be very large fish. They feed on the **benthos** (bottom of the river)

and are an important part of the ecosystem because they break down organic matter. In New Mexico, Blue Sucker could become locally extinct (**extirpated**) if their abundance continues to decline.

There are some species of fish that are only found in a few small areas near the Pecos River and nowhere else in the world. Pecos Pupfish and Pecos Gambusia are two of these. They live in sinkholes and can survive harsh water conditions, such as high temperatures and high salinity.

There are also unique predatory species like Longnose Gar. Fossils indicate that this species has survived for 100 million years! The fish that we see today has several primitive characteristics. For example, it has a long snout full of long, sharp teeth and an armor of thick scales.

Conservation of native fishes

Unfortunately, many of the native fishes found in the Pecos River today are under threat. Three species have been extirpated (locally extinct, but found in other rivers). Some fishes are threatened by non-native species that compete with them for food and habitat. Other native fish species are threatened by hybridization. When two species breed, the hybrid fish have a different genetic makeup than their ancestors.

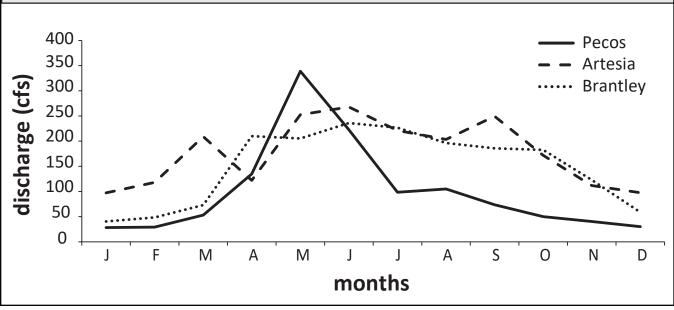
Other threats include toxic algal blooms, increasing levels of salinity, and river fragmentation (when the movement of fish up and down the river is blocked by structures like dams and diversions). Fish are also threatened when patches of rivers dry up due to natural drought in combination with human activities.

Two species of minnows have been extirpated from the Pecos River in New Mexico. These are the Rio Grande Silvery Minnow, which is listed as federally endangered, and the Texas Shiner. These two minnows produce **semi-buoyant eggs** (floating under the surface of the water) that drift from upstream to downstream as the embryos develop and hatch. The two fishes were affected by water management practices and introductions of non-native fish to the river.

Learning about fish is an important first step in their successful conservation. Fish can be difficult to observe in the wild, so their unique characteristics and natural beauty can easily be overlooked. They have important roles to play in creating a healthy aquatic ecosystem. There are many ways to protect native fishes and their habitats, such as conserving water, keeping rivers clean, and reducing the spread of non-native fish.

RIVER DISCHARGE

USGS gauges: 08378500 (Pecos), 08396500 (Artesia), 08401500 (Brantley)

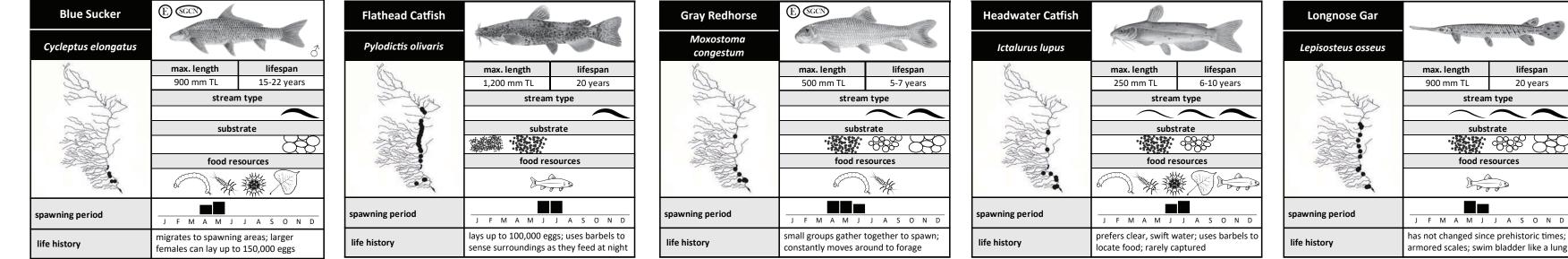


The hydrograph shows the amount of water flowing down the river at different times of the year. The values represent a 30 year monthly average (1986 to 2016). Upstream, at the Pecos gauge, there is a distinct peak in discharge in May as snow starts to melt. Further south, dams alter the flow of water depending on water needs downstream, such as water delivery for agriculture. At Artesia and below Brantley Dam, discharge appears to be relatively consistent throughout the year, except in the winter months when it is lower. However, the monthly average does not show shorter term changes in the river flow. For example, discharge in summer is mostly low with occasional high flows after reservoir releases.

White Sucker Catostomus max. length lifespan 320 mm TL 17 years stream type substrate Substrate Stream type imax. length 10 years substrate Stream type imax. length 10 years substrate Stream type imax. length 10 years imax. length 10 years imax. length 11 years imax. leng	Flathead Chub max. length lifespan Platygobio gracilis max. length lifespan 200 mm TL 5-6 years stream type substrate substrate substrate imax. length lifespan spawning period image: stream type image: life history image: stream type image: life history image: stream type	Longnose Dace Rhinichthys Rhinichthys Imax. length ifespan 100 mm TL 3 years stream type Imax. length Ifespan 100 mm TL 3 years substrate Imax. length Imax. length Ifespan 100 mm TL 3 years Stream type Imax. length Imax. length Imax. l	Rio Grande Chub Imax. length lifespan Gila pandora max. length lifespan Max. length lifespan 175 mm TL 3 years Stream type substrate Imax. length Imax Substrate Imax Imax Imax Substrate Imax Imax Imax Imax Imax Imax Imax	Rio Grande Cutthroat Trout Image: Cutthroat Trout Oncorhynchus clarkii virginalis Image: Cutthroat Trout Image: Cutthroat Trout Trout Image: Cutthroat Trout Image: Cutthroat Trout	DEFINITIONS OF TERMS AND SYMBOLS MM state conservation status max.length Image: Conservation status max.length Image: Conservation Need TL: total length (from tip of snout to end of tail) 25.4 mm = 1 inch Species of Greatest Conservation Need TL: total length (from tip of snout to end of tail) 25.4 mm = 1 inch stream type Image: Conservation Need Image: Conservation Need stit sand gravel Coble fish Image: Conservation Need Image: Conservation Need Image: Conservation Need sist and sand Image: Conservation Need Image: Conservation Need Image: Conservation Need fish Image: Conservation Need Image: Conservation Need Image: Conservation Need Image: Conservation Need fish Image: Conservation Need Image: Conservati
Rio Grande Shiner Notropis jemezanus max. length lifespan 75 mm TL 2 years stream type substrate substrate Solution food resources J F M A M J J A S O N D spawning period J F M A M J J A S O N D spawns during high flow in spring and summer; eggs are semi-buoyant	Green Sunfish Imax. length Ifespan Lepomis cyanellus max. length Ifespan 180 mm TL 6 years stream type Substrate Stream type food resources Spawning period J F M A M J J A S O N D males grunt to attract mates; females lay 50,000 eggs in nests made by males	Sand Shiner Notropis stramineus max. length lifespan 70 mm TL 3 years stream type substrate Substrate Sources Sources Spawning period IF M A M J J A S O N D Swims in schools; spawns in warm water; females lay 1,000 eggs on sand surface	Bigscale Logperch Imax. length lifespan Percina macrolepida max. length lifespan 120 mm TL 2-3 years stream type substrate Spawning period food resources J F M A M J J A S O N D lays small clutches of twenty eggs but spawns multiple times in a year	Central Stoneroller Campostoma anomalum Imax. length Ifespan 160 mm TL 4 years stream type Imax. length Ife history	Creek Chub Semotilus Semotilus max. length atromaculatus max. length 250 mm TL 4 years stream type substrate substrate substrate substrate substrate substrate substrate stream type stream type substrate stream type stream type stream type stream
Pecos Bluntnose Shiner Image: Constraint of the system Notropis simus pecosensis max. length lifespan 90 mm TL 2 years stream type substrate Substrate Stream type food resources Stream type spawning period J F M A M J J A S O N D life history females lay 1,000 semi-buoyant eggs during periods of high flow	Speckled Chub Macrhybopsis Macrhybopsis max. length aestivalis max. length 60 mm TL 2 years stream type substrate food resources j F M A M J J A S O N D bodies are covered in taste buds; spawns during periods of high river flow	Red Shiner Cyprinella lutrensis max. length lifespan 75 mm TL 3 years stream type substrate food resources spawning period Image: Spawning stream type fish facts females produce sounds to attract mates; males protect spawning sites	Gizzard Shad max. length lifespan J F M A M J J A S O N D J F M A M J J A S O N D Iffe history lays up to 350,000 eggs that attach to plants and rocks; moves in large schools	Boundnose Minnow Imax. length lifespan Dionda episcopa max. length lifespan 85 mm TL 3 years stream type substrate Substrate Stream type Imax. length lifespan substrate Stream type Imax. length Stream type	River Carpsucker Carpiodes carpio max. length lifespan 590 mm TL 10 years stream type substrate substrate food resources spawning period life history spawning occurs in large groups; females produce more than 100,000 eggs
Fathead Minnow Pimephales promelas max. length lifespan 65 mm TL 2 years stream type substrate Substrate j F M J A S N D spawning period j F M J A S N D fish facts breeding males are highly decorated; females deposit eggs in crevices deposit eggs in crevices deposit eggs in crevices	Western Mosquitofish Gambusia affinis Imax. length Ifespan 50 mm TL 2 years stream type Imax. length Ifespan 50 mm TL 2 years stream type Imax. length Imax. length 1 Substrate Imax. length Imax. length 1 If M A M J J A S O N D males have modified anal fin for internal fertilization; females produce live young	Plains Killifish Fundulus zebrinus max. length lifespan 80 mm TL 2 years stream type substrate food resources spawning period Image: Construct of the story life history burrows in sand when resting, with head exposed; lays up to 30 eggs in the sand	Rainwater Killifish Imax. length lifespan Lucania parva 8 Imax. length lifespan 55 mm TL 2 years Stream type 1 Substrate 1 Imax. length lifespan Substrate 1 Imax. length lifespan Substrate 1 Imax. length life history Ife history Imax. length Ife history Imax. length Imax. length Imax. length Imax. length Imax. length Imax. length life history	Pecos Gambusia Imax. length lifespan Gambusia nobilis Imax. length lifespan Max. length lifespan 48 mm TL 2 years stream type substrate Imax. length lifespan 48 mm TL 2 years stream type Imax. length Imax. length lifespan J F M J J F M J J F M J J F M J J F M J J F M J J F M J J F M J J F M J J F J S J S J S J S J S J S <	Greenthroat Darter Imax. length lifespan Etheostoma lepidum max. length lifespan 75 mm TL 3 years stream type substrate Imax. length lifespan 75 mm TL 3 years stream type Imax. length Imax. length lifespan 75 mm TL 3 years Stream type Imax. length Imax. length lifespan Imax. length lifespan Imax. length life history Imax. length life streams with swift flow
Bluegill Imax. length lifespan Lepomis macrochirus max. length lifespan Max. length lifespan 170 mm TL 8 years stream type Substrate Subs	Largemouth Bass Micropterus salmoides max. length lifespan 700 mm TL 5-7 years stream type substrate substrate food resources b j F MA j j j j j j j j j j j j j j j j j j j j j j j j j j j j <t< th=""><th>Longear Sunfish max. length lifespan Lepomis megalotis 8 max. length lifespan 150 mm TL 4 years stream type substrate substrate soubstrate south of the sources south of the sources south of the sources stream stre</th><th>Pecos Pupfish Imax. length lifespan Cyprinodon pecosensis max. length lifespan Max. length lifespan 60 mm TL 1 years stream type substrate Substrate Imax. length lifespan Substrate Imax. length Imax. length Imax. length Substrate Imax. length Imax. length Imax. length Imax. length Substrate Imax. length Imax. length Imax. length Imax. length Imax. length Substrate Imax. length Imax. length Imax. length Imax. length Imax. length Imax. le</th><th>Mexican Tetra Imax. length lifespan Astyanax mexicanus Imax. length lifespan Imax. length lifespan 3 years Stream type Imax. length substrate Imax. length lifespan Imax. length Imax. length Imax. length lifespan Imax. length Imax. length Imax. length Imax. length Imax. length Imax. length Imax. length Imax. length Imax. length Imax. length Imax. length Imax. length Imax. length Imax. length Imax. length Imax. length Imax. length Imax. length Imax. length Imax. length Imax. length Imax. length Imax. length Imax. length Imax. length Imax. length Imax. length Imax. length Imax. length Imax. length Imax. length Imax. length Imax. length Imax. length Imax. length Imax. length Imax. length Imax. length Imax. length Imax. length Imax. length Imax. length Imax. length Imax. length Imax. length Imax. length Imax. length Imax. length Imax. length Imax. length Imax. length</th><th>Smallmouth Buffalo Ictiobus bubalus Intervention Intervention</th></t<>	Longear Sunfish max. length lifespan Lepomis megalotis 8 max. length lifespan 150 mm TL 4 years stream type substrate substrate soubstrate south of the sources south of the sources south of the sources stream stre	Pecos Pupfish Imax. length lifespan Cyprinodon pecosensis max. length lifespan Max. length lifespan 60 mm TL 1 years stream type substrate Substrate Imax. length lifespan Substrate Imax. length Imax. length Imax. length Substrate Imax. length Imax. length Imax. length Imax. length Substrate Imax. length Imax. length Imax. length Imax. length Imax. length Substrate Imax. length Imax. length Imax. length Imax. length Imax. length Imax. le	Mexican Tetra Imax. length lifespan Astyanax mexicanus Imax. length lifespan Imax. length lifespan 3 years Stream type Imax. length substrate Imax. length lifespan Imax. length Imax. length Imax. length lifespan Imax. length Imax. length Imax. length Imax. length Imax. length Imax. length Imax. length Imax. length Imax. length Imax. length Imax. length Imax. length Imax. length Imax. length Imax. length Imax. length Imax. length Imax. length Imax. length Imax. length Imax. length Imax. length Imax. length Imax. length Imax. length Imax. length Imax. length Imax. length Imax. length Imax. length Imax. length Imax. length Imax. length Imax. length Imax. length Imax. length Imax. length Imax. length Imax. length Imax. length Imax. length Imax. length Imax. length Imax. length Imax. length Imax. length Imax. length Imax. length Imax. length Imax. length Imax. length	Smallmouth Buffalo Ictiobus bubalus Intervention

ard Brandenburg) Brandenburg • Photographs: Lateral Lines, American Southwest Ichthyological Researchers, L.L.C. (ASIR), Stephen R. 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]) • Review: Dr. Virginia A. Seamster (NMDGF), Stephen R. Davenport • Special thanks to Kirk Patten lateral lines (NMDGF) •

ucker	E SCCN	



lifespan

Poster design: Lateral Lines (Dr. Avesha S. Burdett and W.

LATERALLINESART.COM

