



# U.S. Fish and Wildlife Service Texas Freshwater Mussel Updates

MATT JOHNSON

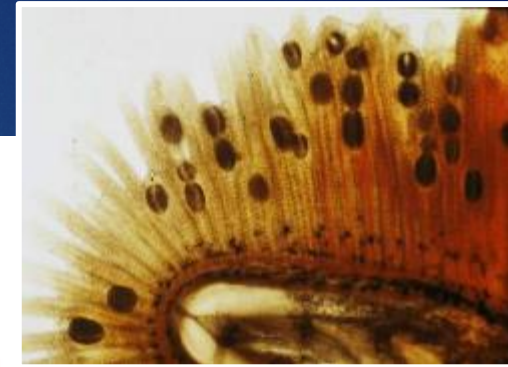
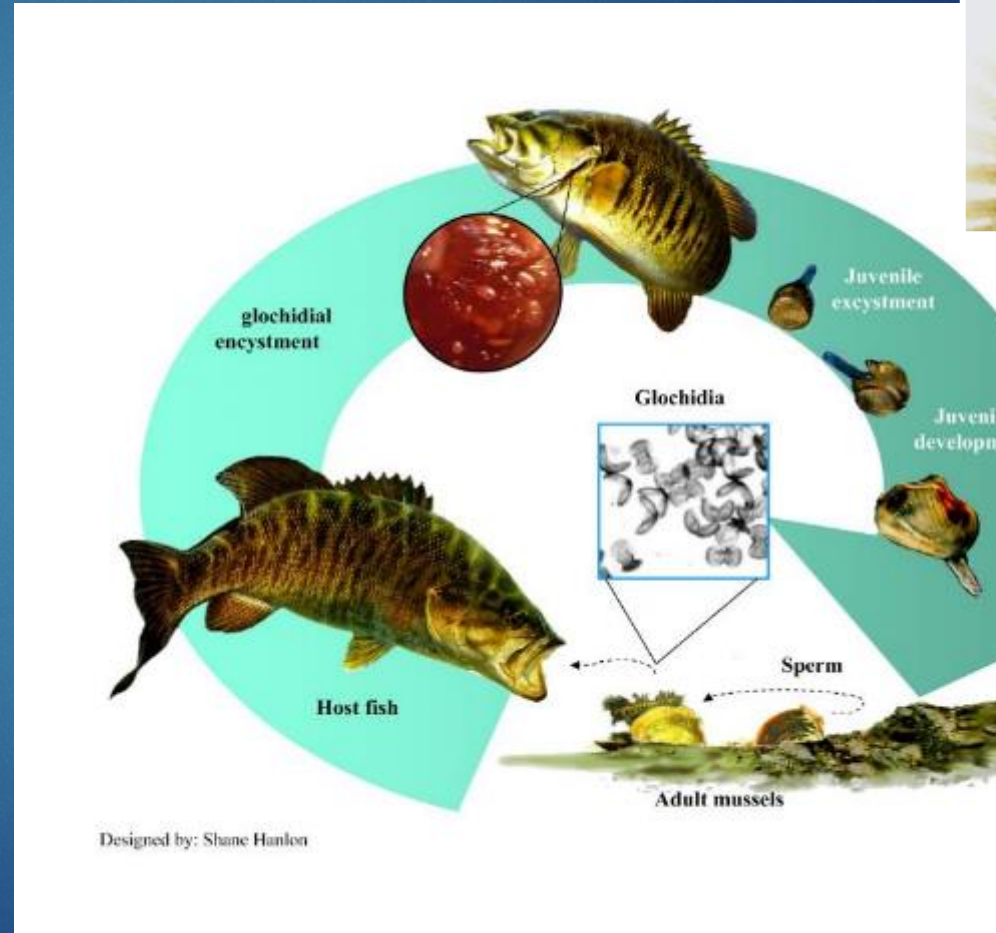
TEXAS FRESHWATER MUSSEL CONSERVATION AND RECOVERY COORDINATOR

AUSTIN TX ESFO

[MATTHEW\\_S\\_JOHNSON@FWS.GOV](mailto:MATTHEW_S_JOHNSON@FWS.GOV)

# General Central Texas Freshwater Mussel Ecology

- ▶ Occupy freshwater rivers, creeks, and streams
- ▶ Inhabit streambeds consisting of mixtures of bedrock, cobble, gravel, sand, and silt
- ▶ Require a host fish to complete their unique reproductive cycle.
  - ▶ Mussels can be host fish specialists or generalists.
- ▶ Require stable habits and adequate water quantity and quality:
  - ▶ Pollution
  - ▶ Appropriate Temperatures
  - ▶ Instream Flows



# Habitat Requirements

- ▶ Substrate
  - ▶ Suitable substrate requirements vary by species
  - ▶ Cobble, gravel, sand, silt – Stability!
  - ▶ Some species will utilize undercut banks or root wads
- ▶ Water Flow/Quantity
- ▶ Appropriate Flow Regime
- ▶ Flow Refugia – area of stream bed that is not mobilized during high flooding events
- ▶ Water Quality – Pollution, ammonia, turbidity, conductivity, etc.
- ▶ Water Temperature – behavior, feeding rate, dissolved oxygen consumption and reproduction are all tied to temperature





# Freshwater Mussel Habitats

# Primary Threats

- ▶ Habitat Alterations
- ▶ Flow alteration and decline (water quantity)
- ▶ Sediment accumulation
- ▶ Reduced water quality
- ▶ Fish barriers
- ▶ Overcollection



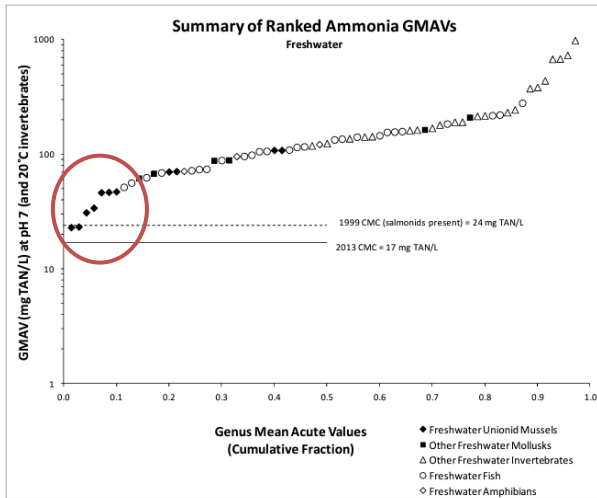


Figure 3. Ranked Freshwater Genus Mean Acute Values (GMAVs) with Criterion Maximum Concentrations (CMCs).

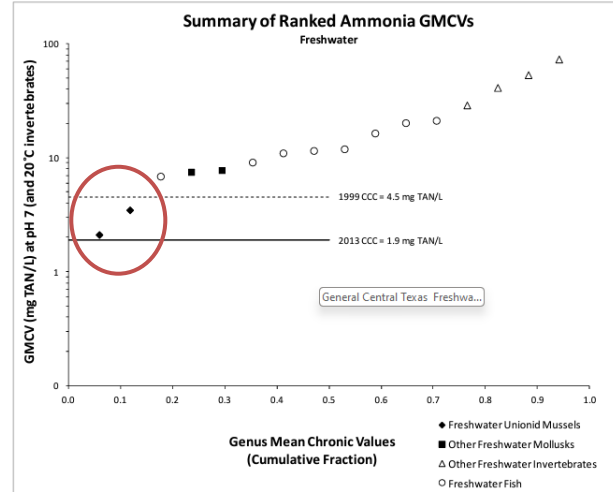


Figure 4. Ranked Freshwater Genus Mean Chronic Values (GMCVs) with Criterion Continuous Concentrations (CCCs).

Rank	GMAV (mg TAN/L)	Species	SMAV (mg TAN/L)
		Plain pocketbook, <i>Lampsilis cardium</i>	50.51
		Wavy-rayed lampmussel, <i>Lampsilis fasciola</i>	48.11
		Higgin's eye, <i>Lampsilis higginsii (LS)</i>	41.90
		Neosho mucket, <i>Lampsilis rafinesqueana (LS)</i>	69.97
		Fatmucket, <i>Lampsilis siliquoidea</i>	55.42
4	34.23	Rainbow mussel, <i>Villosa iris</i>	34.23
3	31.14	Oyster mussel, <i>Epioblasma capsaeformis (LS)</i>	31.14
2	23.41	Green floater, <i>Lasmigona subviridis</i>	23.41
1	23.12	Ellipse, <i>Venustaconcha ellipsiformis</i>	23.12
FAV = 33.52			
CMC = 17			

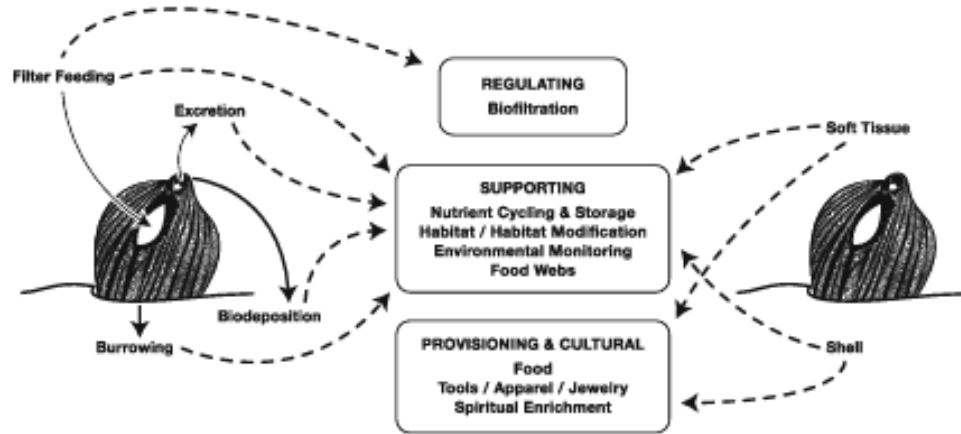
LS = Federally-listed as threatened or endangered species

5	7.828	Pebblesnail, <i>Fluminicola sp.</i>	7.828
4	7.547	Long fingernailclam, <i>Musculium transversum</i>	7.547
3	6.920	Green sunfish, <i>Lepomis cyanellus</i>	14.63
		Bluegill, <i>Lepomis macrochirus</i>	3.273
2	3.501	Rainbow mussel, <i>Villosa iris</i>	3.501
1	2.126	Fatmucket, <i>Lampsilis siliquoidea</i>	3.211
		Wavy-rayed lamp mussel, <i>Lampsilis fasciola</i>	1.408
FCV = 1.887 mg TAN/L			
CCC = 1.9 mg TAN/L			

LS= Federally-listed species as threatened or endangered

LS\* = Listed at the subspecies only for specific populations

# Ammonia



# Freshwater Mussel Ecosystem Services

Fig. 1 Mussel tissue and activities that mussels perform can be translated into ecosystem services that are beneficial to humans

**Table 1** Ecosystem service classes, mussel-provided ecosystem services, and the benefits that they provide for humans

Ecosystem service class	Mussel-provided ecosystem service	Benefits for humans
Regulating	Biofiltration	Water quality
Supporting	Nutrient cycling and storage	Water quality
	Habitat/habitat modification	Fish habitat
	Environmental monitoring	Water quality
	Food webs	Biodiversity
Provisioning	Food for other species	Biodiversity
	Food for humans	Food provisioning
	Products from mussel shells	Pottery, jewelry, art
Cultural	Cultural value	Spiritual benefits
	Existence value	Conservation value

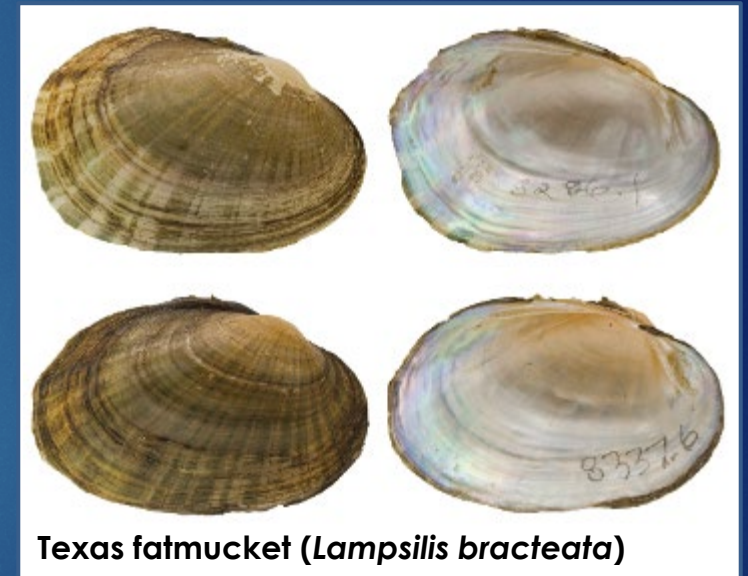
# Texas Freshwater Mussel Conservation History

- ▶ 2007 – Suite of mussel species petitioned for listing under the ESA
- ▶ 2009 – USFWS issued a positive 90-day finding for most of the petitioned species
- ▶ 2009 – TPWD listed 15 species as State-Threatened
- ▶ 2011 – 12-month finding determined listing was warranted but precluded by other activities
  - ▶ Resulted in mussel species being added to the Candidate List
- ▶ Species placed into listing work plan to be completed between FY20 and FY22.
- ▶ The Service created several Species Status Assessment (SSA) packages to review the status of selected freshwater mussel species across the state.
  - ▶ SSA information is presented to a Recommendation Team where policy is applied to the best available science to reach a listing recommendation.
  - ▶ The listing recommendation is then made to the Regional Director who decides if they approve or disapprove of the recommendation.



# What Actions did the Service Take?

- ▶ **On August 26, 2021, the Service proposed:**
  - ▶ The listing of 5 freshwater mussels as Endangered with associated Critical Habitat
  - ▶ The listing of 1 freshwater mussel as Threatened with a 4(d) rule and associated Critical Habitat
  - ▶ Proposed critical habitat in 27 units (1,944 river miles total)
- ▶ **On June 4, 2024 (and effective July 5, 2024), the Service listed:**
  - ▶ Listed 6 species as Endangered with associated Critical Habitat
  - ▶ Listed 1 species as Threatened with a 4(d) rule and associated Critical Habitat
  - ▶ Designated habitat in 20 units (~1,053 river miles total)



**Texas fatmucket (*Lampsilis bracteata*)**

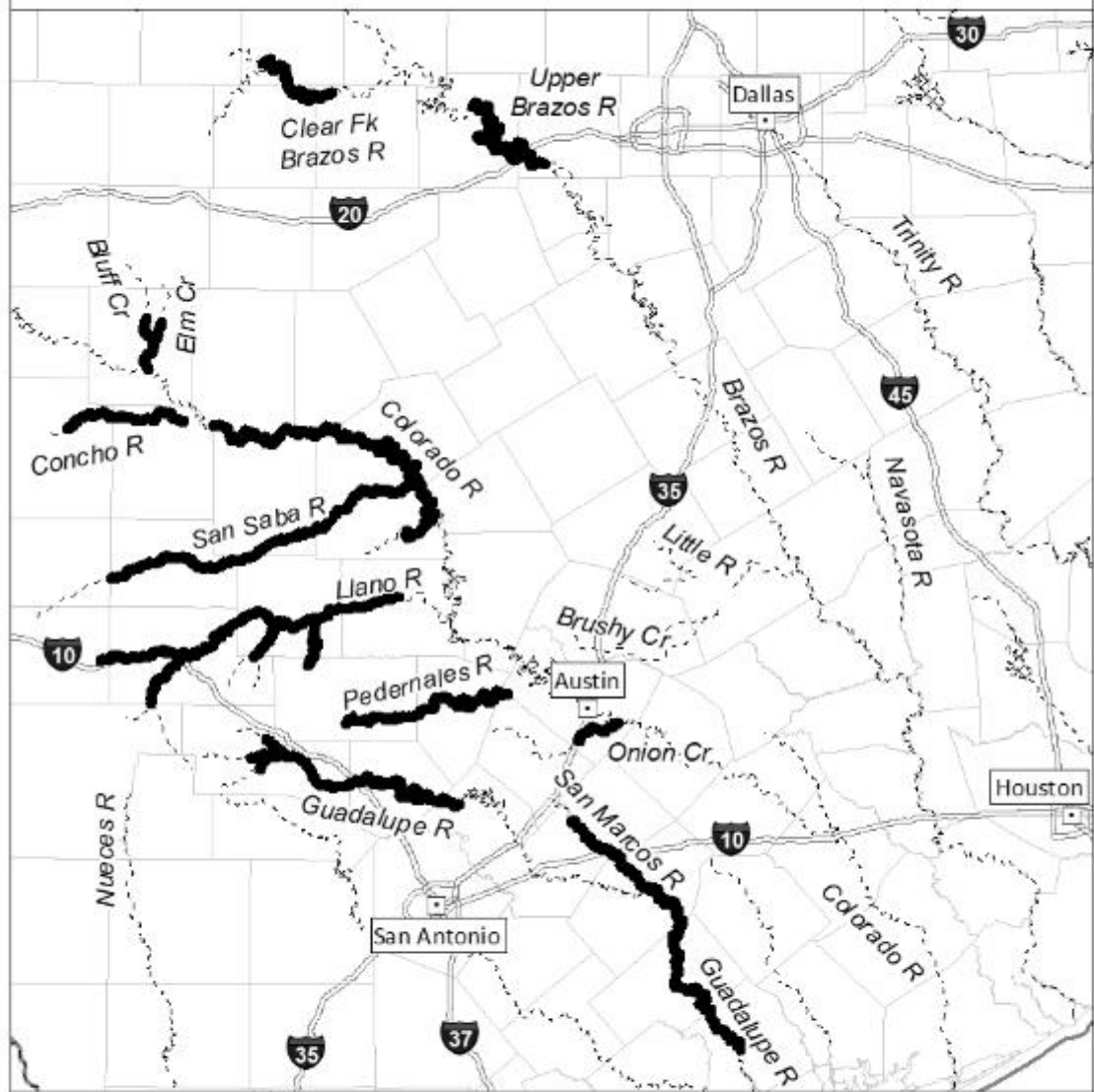
# What are the listed species designations?

- ▶ Endangered Species – a species which is in danger of extinction throughout all or a significant portion of its range.
  - ▶ These species receive all ESA legal protections.
- ▶ Threatened Species – any species likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range.
  - ▶ These species receive tailored ESA legal protections through a Section 4(d) rule.

# What is Critical Habitat?

- ▶ Critical habitat identifies geographic areas that are essential to the conservation of federally listed threatened or endangered species and include necessary Physical and Biological Features
- ▶ A **riverine system** with habitat to support all life stages of the species, which includes:
  - (a) **Suitable substrates and connected instream habitats**
  - (b) **Adequate flows**
  - (c) **Adequate water and sediment quality**
  - (d) **Identified host fish present**
- ▶ Federal agencies are required to consult with the USFWS when they undertake, fund, or authorize any activity that may affect the species or critical habitat.
- ▶ Critical habitat **DOES NOT** affect land ownership or establish a refuge, wilderness, reserve, preserve, or other conservation area.

Central Texas Mussels Critical Habitat  
All Species Overview



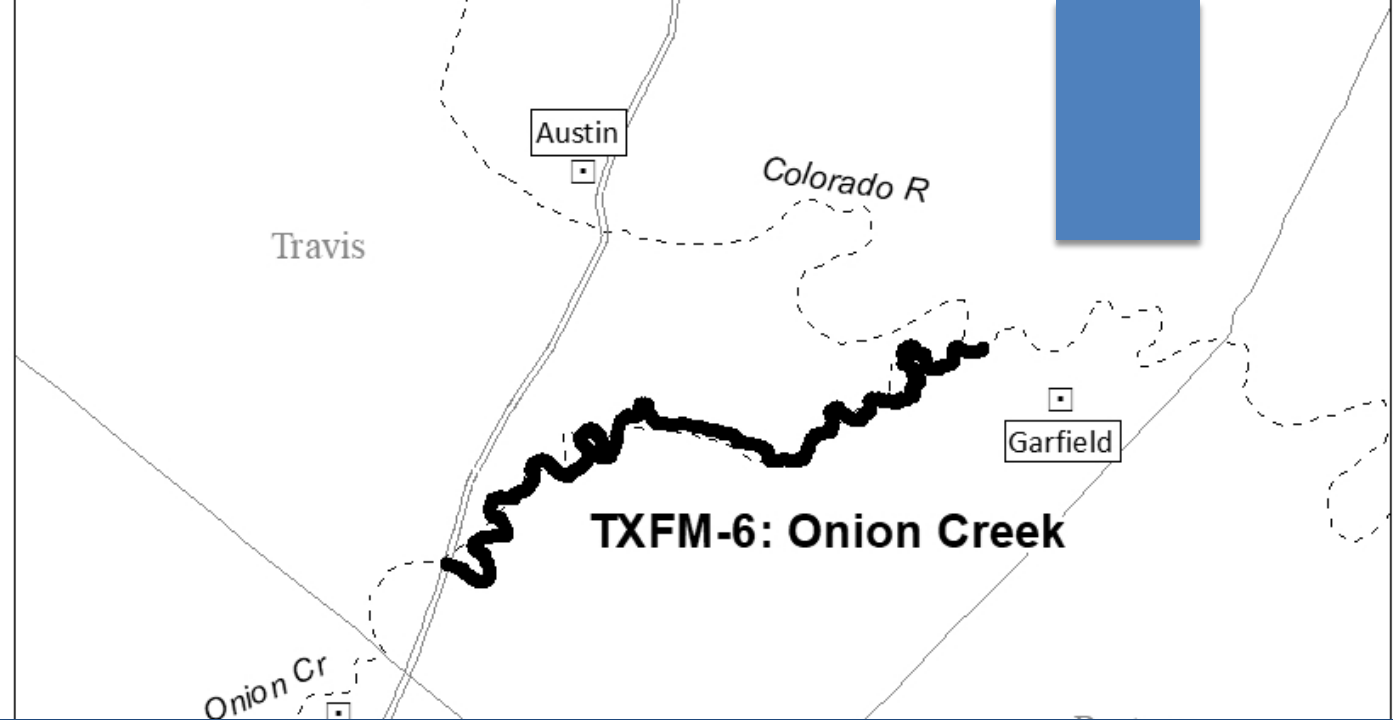
- Critical Habitat
- River
- County
- ▨ Lake
- Interstate
- City

# Unit TXFM-6: Onion Creek

▶ The Onion Creek unit consists of 23.5 river mi (37.8 river km) in Travis County, Texas. Unit TXFM-6 begins at the Interstate Highway 35 bridge crossing downstream to the confluence with the Colorado River.

▶ This unit combines the proposed Lower Onion Creek (TXFM- 6a) subunit and the proposed Upper Onion Creek (TXFM-6b) subunit. This unit was consolidated due to recent survey data confirming that Texas fatmucket inhabit Upper Onion Creek, which had been thought to be unoccupied.

▶ Critical habitat restricted to within the Ordinary High-Water Mark of the stream but impacts outside of this boundary can be considered.



# What protections do listed species have?

- Under section 9 of the ESA, it is illegal to import, export, or take endangered species for any purpose, including commercial activity unless authorized under Section 10 of the Act.
  - ▶ Take = kill, hunt, shoot, wound, trap, harm, harass, collect
- ▶ Impacts to instream habitats via construction, sedimentation, flow alteration, etc. also now need to be reviewed through the consultation process when appropriate.



# Questions?

Matt Johnson

Texas Freshwater Mussel Conservation and Recovery Coordinator

Austin TX ESFO

*Matthew S Johnson@fws.gov*