Central Texas Freshwater Mussels

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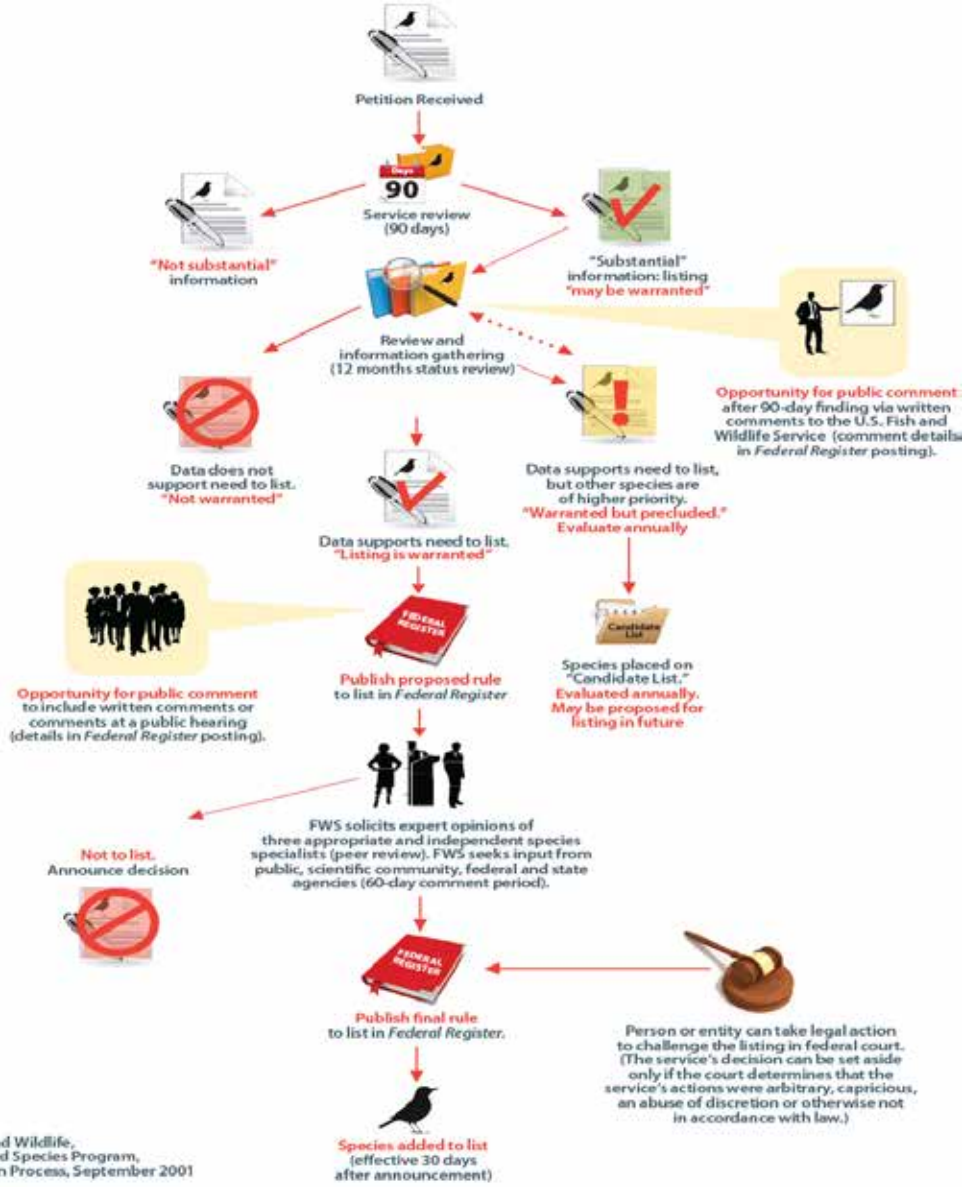
Economic Growth and Endangered Species Management Division

The goal of the Economic Growth and Endangered Species Management Division is to protect the Texas economy and to ensure compliance with the federal Endangered Species Act regulations.

The Listing Process

A species is evaluated on the following factors for the listing process:

1. Present or threatened destruction, modification, or curtailment of its habitat or range;
2. Overutilization for commercial, recreational, scientific, or educational purposes;
3. Disease or predation;
4. Inadequacy of existing regulatory mechanisms;
5. Other natural or manmade factors affecting its survival.



Species Research Program

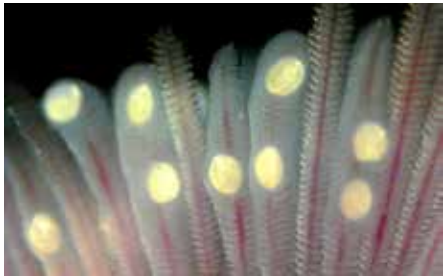
Priorities are identified based on the following factors:

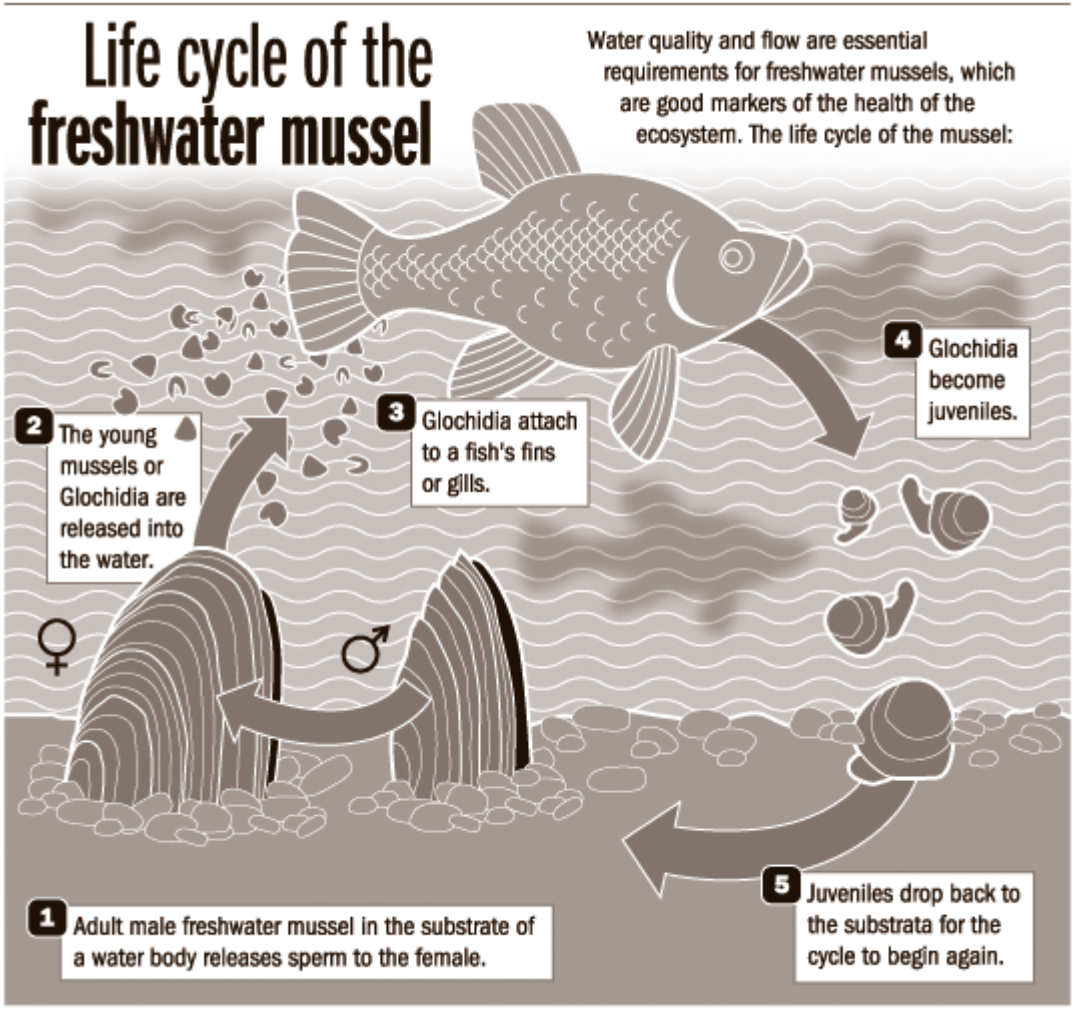
- Immediacy of the listing decision
- Existing data gaps
- Potential impacts of listing

Research is designed to ensure science is available for listing decisions and for the development of any voluntary conservation efforts

Mussels in Texas

Mussel Species	Package Name and Grouping	Historical Range in Texas River Basin	Federal ESA Listing Status
False Spike	Central Texas Mussels (2018)	Brazos, Colorado, Guadalupe	Petitioned
Texas Fatmucket		Colorado, Guadalupe	Candidate
Texas Pimpleback		Colorado, Guadalupe	Candidate
Texas Fawnsfoot		Brazos, Colorado	Candidate
Triangle Pigtoe	East Texas Mussels (2019)	Neches, San Jacinto	Petitioned
Louisiana Pigtoe		San Jacinto, Trinity, Neches, Sabine	Petitioned
Texas Heelsplitter		Neches, Trinity, Sabine	Petitioned
Golden Orb	Texas Quadrula Species (2020)	Guadalupe, San Antonio, Nueces-Frio	Candidates
Smooth Pimpleback		Brazos, Colorado	Candidate
Mexican Fawnsfoot	Rio Grande Mussels (2022)	Rio Grande, Pecos, Rio Salado	Petitioned
Salina Mucket		Rio Grande	Petitioned
Texas Hornshell	-	Rio Grande	Proposed Endangered




Life cycle of the freshwater mussel
Water quality and flow are essential requirements for freshwater mussels, which are good markers of the health of the ecosystem. The life cycle of the mussel:
1 Adult male freshwater mussel in the substrate of a water body releases sperm to the female.
2 The young mussels or Glochidia are released into the water.
3 Glochidia attach to a fish's fins or gills.
4 Glochidia become juveniles.
5 Juveniles drop back to the substrata for the cycle to begin again.
Source: Texas Parks and Wildlife
James Hilston/Post-Gazettte

FWS 12-Month Finding

- All mussels likely face the same or very similar threats
- Decline of mussels in Texas and throughout the U.S. is mainly due to **habitat loss and degradation** primarily caused by:

  - Ø **Impoundments**
  - Ø **Sedimentation**
  - Ø **Dewatering**
  - Ø **Sand and gravel mining**
  - Ø **Chemical contaminants**

- Additional factors – nonnative species, climate change, inadequacy of existing regulatory mechanisms

Impoundments

- Fluctuation in flow regime
- Scouring and erosion
- Impaired water quality
- Changes in reproductive cycle
- Decreased DO and temperature
- Increased sedimentation

Sedimentation

- Livestock access, grazing
- Removal of vegetation
- Urbanization, population growth
  - Increased impervious surface
  - Construction
  - Road crossings

Dewatering

- Surface water diversions
- Groundwater pumping
- Hydropower facilities
- Construction
- Drought

Chemical Contaminants

- Chemical spills
- Industrial waste
- Municipal effluents
- Animal feedlots
- Fertilizer use
- Pesticide use
- Emerging contaminants

Sand and Gravel Mining

- Channel degradation and erosion, turbidity, bank and stream instability
- Changes in water flow, temperature, quality
- Increased fine sediment, suspended sediment

Objectives

Ensure accurate science is available to inform listing decisions

If listings occur, ensure that compliance is cost-effective

Assist in the development of voluntary conservation measures if stakeholders are interested in pursuing

Texas State University Research

- Surveys throughout historical range– combined with other efforts to determine distribution
  - Brazos River
    - Little River drainage
    - Upstream from Possum Kingdom Reservoir (main-stem and tributaries)
  - Colorado River
    - Lower Colorado River (Between Longhorn Dam and Bay City Dam)
    - Middle Colorado River (Between O.H. Ivie Lake and Lake Buchanan)
  - Upper Guadalupe River
    - Upstream of Canyon Lake (main-stem and tributaries)
- Applied research to understand potential threats – applicable range wide

Texas State University Research

Long-term captive propagation study to gather information needed for future reintroduction efforts

University of Texas at Tyler: East Texas Mussels

- Genetic analysis to resolve the taxonomic status of the Texas and Triangle Pigtoes
- Applied research to understand potential threats,
  - Siltation (simulating stream bank erosion)
  - Thermal tolerance study
  - Nitrogen (water quality changes)
- Develop an ecological niche model based on the genomic analysis to evaluate habitat suitability
- Surveys within species range (completed)

Texas A&M University: Central and West Texas

- Surveys within historical range– developed conservation maps for selected species (completed)
  - False spike (*Brazos, Colorado, Guadalupe*)
  - Mexican fawnsfoot (*Rio Grande*)
  - Golden orb (*Guadalupe, San Antonio, Nueces-Frio*)
  - Smooth pimpleback (*Brazos, Colorado*)
  - Salina mucket (*Rio Grande*)
  - Texas fatmucket (*Colorado, Guadalupe*)
  - Texas fawnsfoot (*Brazos, Colorado*)
  - Texas pimpleback (*Colorado, Guadalupe*)

- Genetic analysis to resolve the taxonomic status of the Golden orb and Smooth pimpleback

Sam Houston State University: Bluehead Shiner

- Conduct surveys to determine the current population distribution
  - Big Cypress Bayou and Caddo Lake
- Rain garden experiments to evaluate life history

Texas State University: Prairie Chub

- Conduct surveys to determine the current population distribution
  - Upper Red River Basin
- Evaluate the population genetic structure to assess the effects of hybridization
- Quantify life history information (reproduction, age groups, and growth rates)

Current Research Projects

- Black Rail
- Bluehead Shiner
- Freshwater Mussels
- Monarch Butterfly
- Plains Spotted Skunk
- Prairie Chub
- Sprague's Pipit
- Spot-tailed Earless Lizard
- Texas Kangaroo Rat



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