



# ***Freshwater Mussels***

***Presented by  
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***Meeting Date: April 30, 2018***



# ***Freshwater Mussels Under Consideration for Federal Protection in Brazos River Basin***



Texas Fawnsfoot

Smooth Pimpleback



False Spike

# ***Freshwater Mussels v. Zebra Mussels***

- **Freshwater Mussels**

- Native
- Rivers and lakes
- Filter feeders
- Soft Substrate

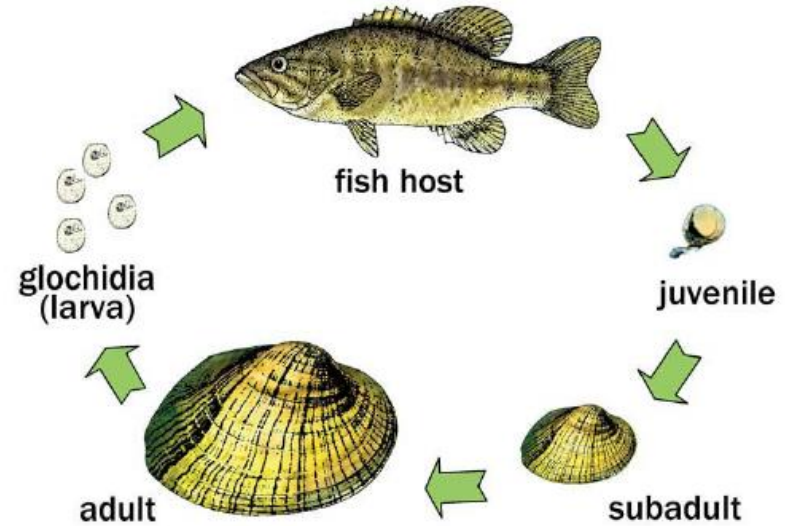
- **Zebra Mussels**

- Non-native
- Lakes, generally
- Aggressive breeders
- No known predators
- Hard substrates



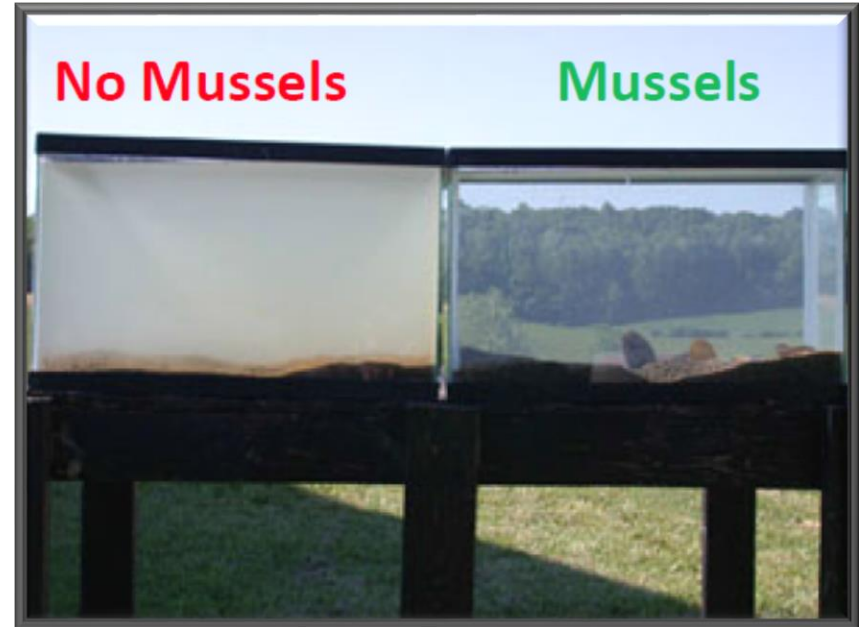
# Mussel Life Cycle

- **Unique life history**
  - parasitic juvenile stage
- **Fish host unique to species**
- **Fish host movements affect mussel recruitment and distribution**



# ***Why are mussels important?***

- **Part of the food pyramid**
  - Fish
  - Racoons
  - Humans
- **Filter feeders**
  - Ecological value
  - Economic value
- **Indicators of ecosystem health**





## Recently Documented Candidate-Listed Mussel Populations in the Brazos River Basin

### Legend

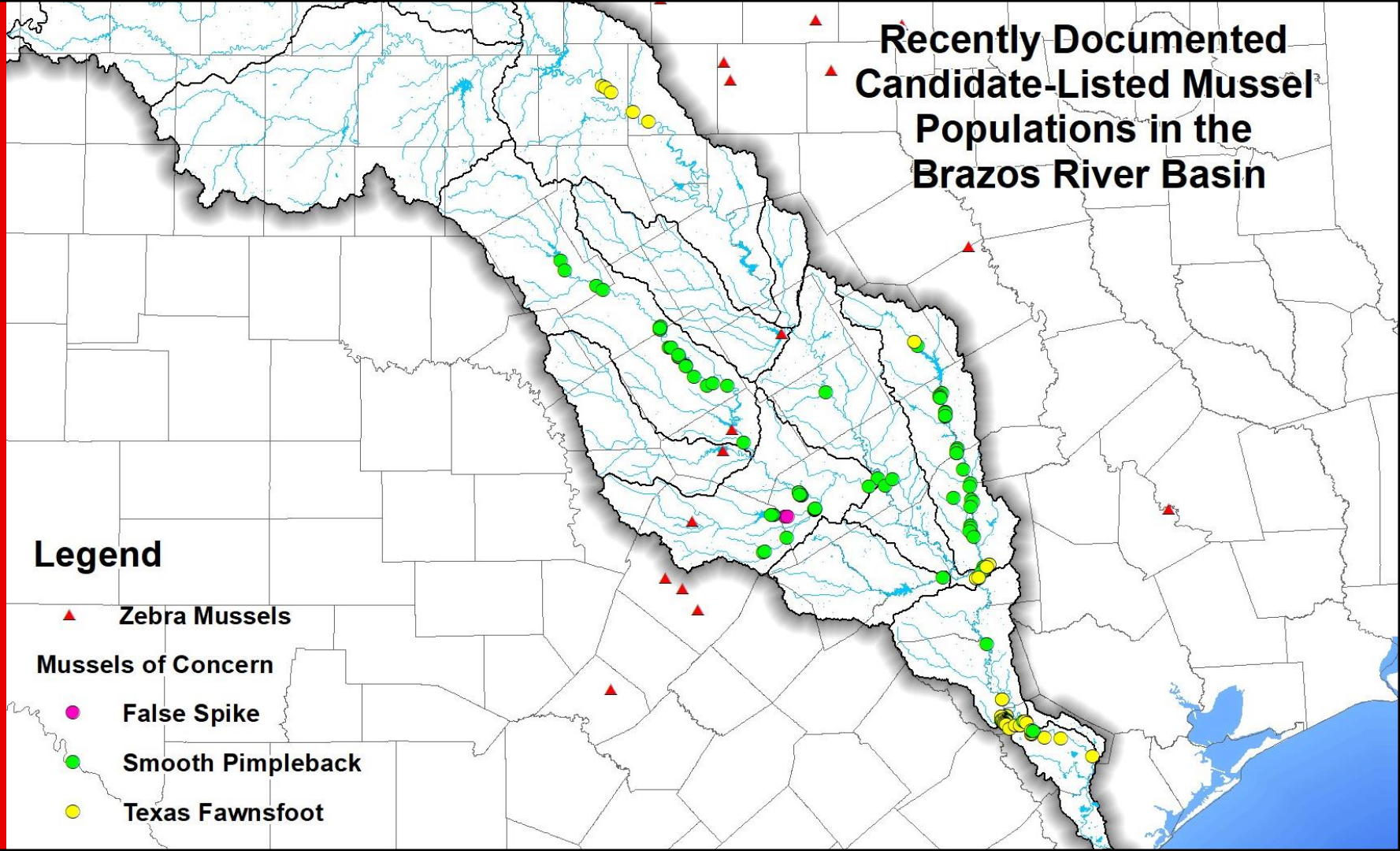
▲ Zebra Mussels

#### Mussels of Concern

● False Spike

● Smooth Pimpleback

● Texas Fawnsfoot





# ***Listing Schedule***

- **September 2018**
  - Proposal to list
  - Texas Fawnsfoot
  - False Spike
- **September 2019**
  - Final Decision
- **September 2020**
  - Smooth Pimpleback



Smooth pimpleback in Navasota River.



# ***Why do we Care?***

- **Since 1973, the Endangered Species Act (ESA) has proven to be one of the nation's strongest conservation laws**
  - Has been widely upheld in the court system
  - Never substantially defeated
- **ESA can and has affected state-based water rights and regulations in other states**
  - Can limit the traditional exercise of established water rights
  - Restrict or modify new water projects
  - Any water use that results in the direct or incidental take or harm of listed species falls within the ESA's reach
- **ESA's ability to preempt state law derives from US Constitution's Supremacy Clause**

# ***Water Projects Impacted by ESA***

- **Cappaert v. United States – 1976 – Nevada**
  - Stopped ground water pumping by private landowners
- **TVA v. Hill – 1978 - Tennessee**
  - Halted construction on dam
- **Riverside Irrigation District v. Andrews – 1983 – Nebraska**
  - Dam never built
- **Carson-Truckee Water Conservancy District v. Clark – 1984 – California**
  - ESA needs trump municipal and industrial water use
  - Changed water releases and pumping from a reservoir

# ***ESA Quagmires***

- **Tri-State Water Wars – (1990 – present) - Alabama, Florida, and Georgia**
  - Too many suits to summarize briefly
- **Columbia Dam Project, Tennessee (1979 – 1999)**
  - \$83 million dam project 90% complete when two species of freshwater mussel declared endangered
  - Dam never completed and eventually removed
- **California State Water Project and Central Valley Project (2007-present) – California**
  - Too many suits to summarize briefly
  - Requires changes in pumping from rivers and deltas impacting municipalities, agriculture and industry

# ***Statements of Concern from Texas Hornshell Proposal to List***

- **State Water Plan proposed reservoir and groundwater projects cited as an immediate threat**
- **Water management/release strategies will be required**
- **Improved wastewater discharge quality**
- **Sediment control strategies will be needed**



# ***Threats Listed in USFWS Documents***



# ***Modified/Reduced Stream Flow***

- **Reservoirs**
  - **Controlled systems rarely mimic natural flow regimes**
  - **Scouring of riverbed**
  - **Dewatering downstream**
- **Groundwater pumping**
- **Drought**





# Water Quality

- Dissolved oxygen > 3.0 mg/L\*
- Ammonia < 0.7 mg/L\*
- Salinity < 0.9 ppt\*
- Water temperature
- WWTP discharges
- Contaminant spills



\* Endangered and Threatened Wildlife and Plants; Endangered Species Status for Texas Hornshell, 83 Fed. Reg. 5720 (February 9, 2018) (to be codified at 50 CFR 17).



# ***Sedimentation***

- **Smothers mussel beds**
- **Low flows encourage build up**
- **Less cleansing flows**
- **Riparian zone disruption**





# ***Barriers to Fish Host Movement***

- **Population fragmentation and isolation**
- **Reservoirs**
- **Low-water dams**
- **Low-water crossings**
- **Pipelines**





# ***Climate Change***

- **Will exacerbate the previous four threats**



# ***What's Been Done?***

- **B.R.A.**
  - Stream Surveys
  - Customer interaction
  - Comptroller Work Group
  - Provided Data and Public Comment to USFWS
- **Comptroller's Freshwater Mussel Stakeholder Work Group**
- **USFWS Science Meetings**
- **River Authority Work Group**





## ***What's Next?***

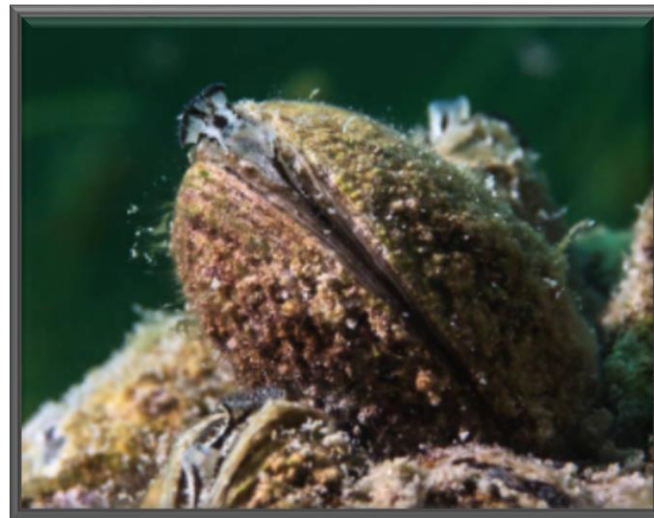
- **Begin permitting process with USFWS**
- **Solicit consulting firm with permitting experience**
- **BOD approval in July 2018 of consulting firm**
- **Attempt to negotiate permit before September 2019**  
**Final Decision**





# ***Why Federal permitting?***

- **Minimizes future impacts to B.R.A. water supply and operations**
- **Required for activities that may “take” threatened or endangered species**
- **Minimize exposure to violations of ESA**



# ***Federal Permitting Options Available***

- **Incidental Take Permit**
  - Post-listing
  - Most intense permit
  - Requires a habitat conservation plan
  - NEPA Environmental Impact Statement required
  - Adaptive management
- **Enhancement of Survival**
  - Pre- or Post-listing
  - Encourage land owners to take actions to benefit the species
  - Will not be subject to additional regulatory restrictions
  - NEPA Environmental Assessment required
  - Adaptive management



**Brazos  
River  
Authority**