

The Status and Trends of Zebra Mussels in Texas

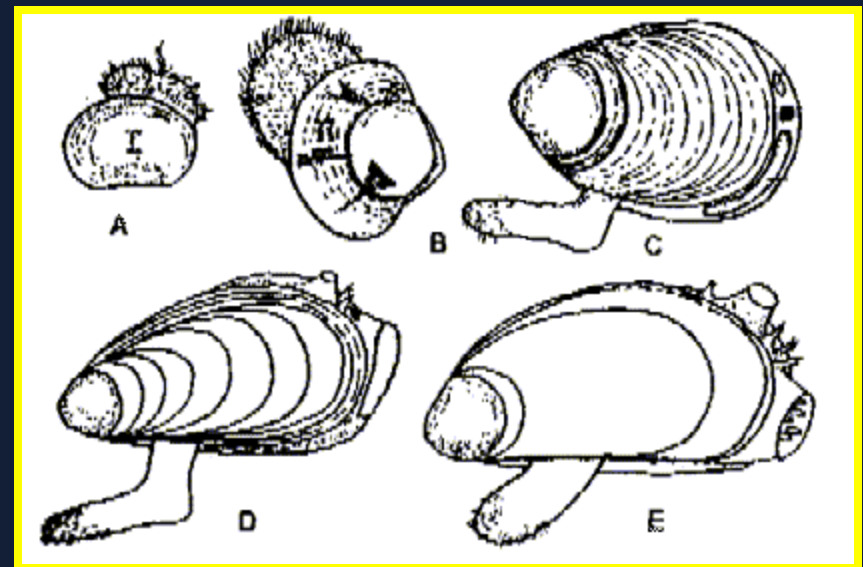
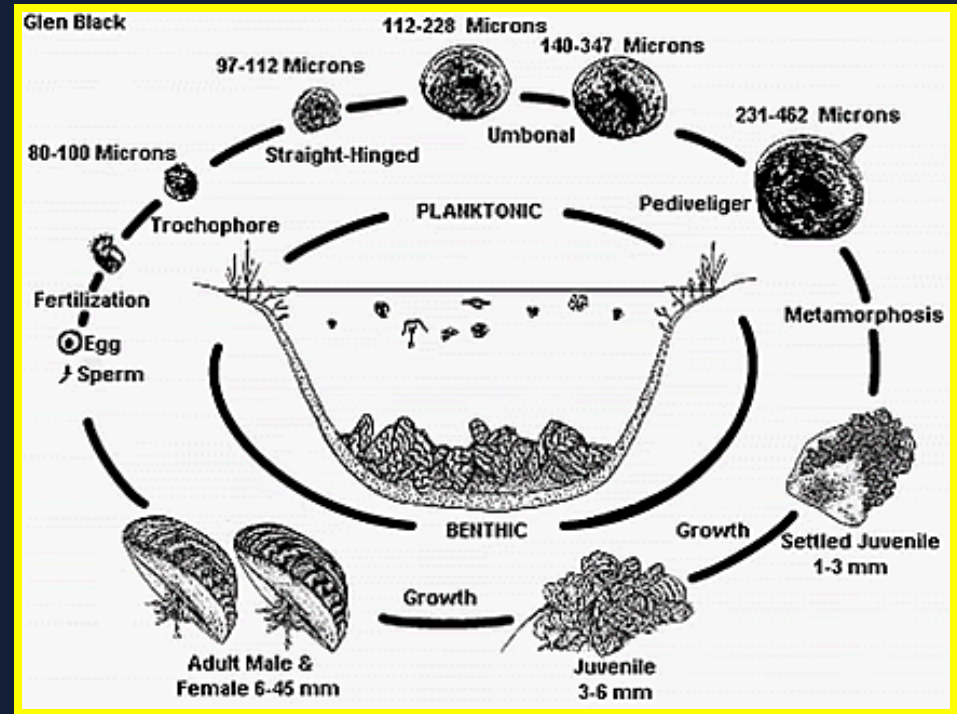


The University of Texas
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- **Separate sexes - external fertilization**
- **Fecundity as high as 1,000,000 eggs per adult female per year**
- **Trochophore larva (6-20 Hours)**
 - No shell ($\geq 40 \mu\text{m}$)
- **Early Veliger larva (3-4 Days)**
 - D-shaped shell (80-100 μm)
- **Late veliger larva (1-2 weeks)**
 - Umbonal shell (100-250 μm)
- **Pediveliger larva (2-3 weeks)**
 - Develops foot – settles, crawls to attachment site (200-400 μm)
- **Plantigrade (3-4 weeks)**
 - Byssal attachment – transforms to mussel shape (250-500 μm)
- **Juvenile (3-5 Weeks)**
 - Mussel-shaped shell ($>400 \mu\text{m}$)
- **Spawning occurs at $> 16-28^\circ\text{C}$**
- **Settle in three to five weeks**





2009

NEW MEXICO

OKLAHOMA

ARKANSAS

Oklahoma City

Dallas

TEXAS

Austin

San Antonio

Houston

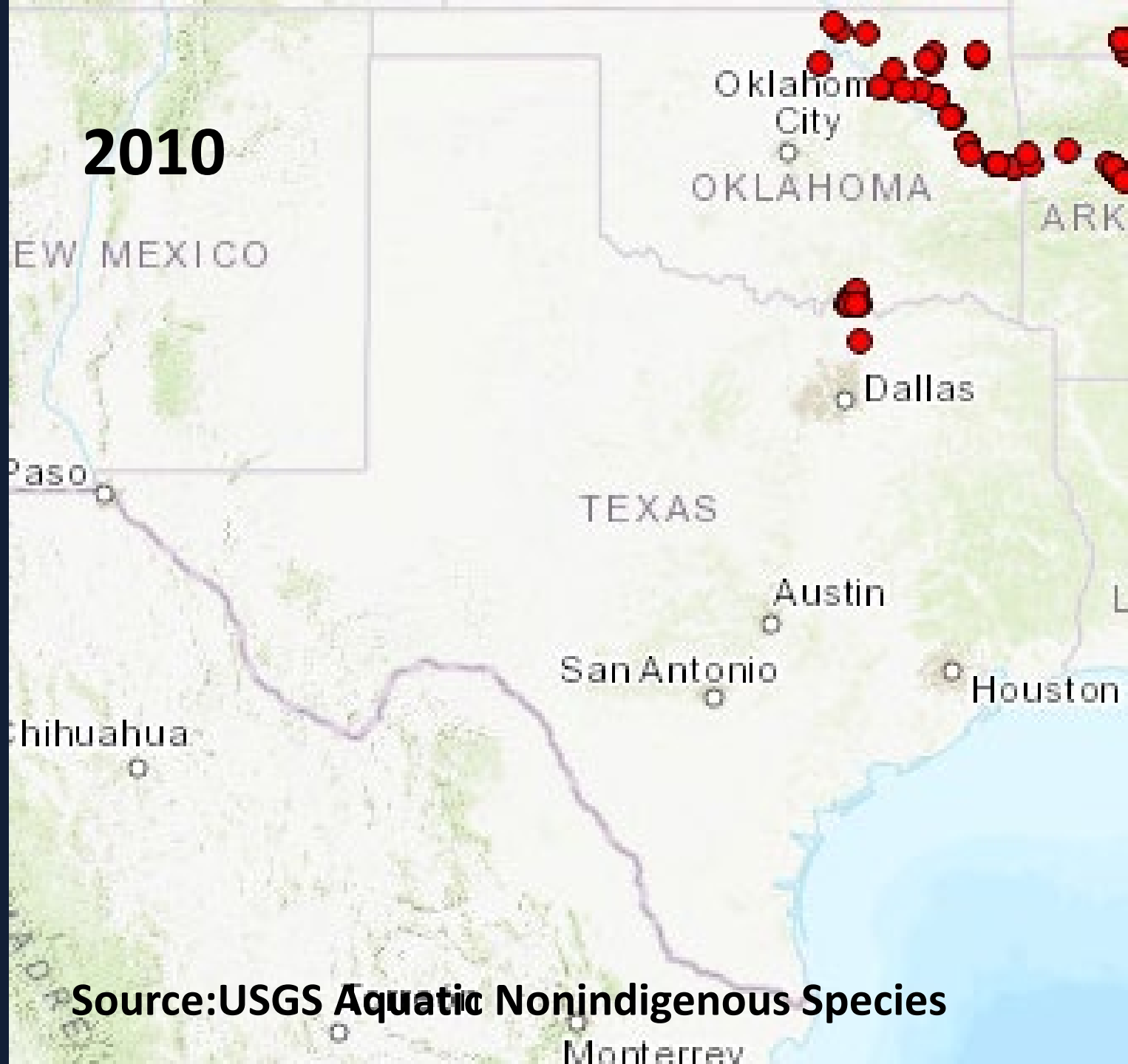
El Paso

Chihuahua

Source: USGS Aquatic Nonindigenous Species

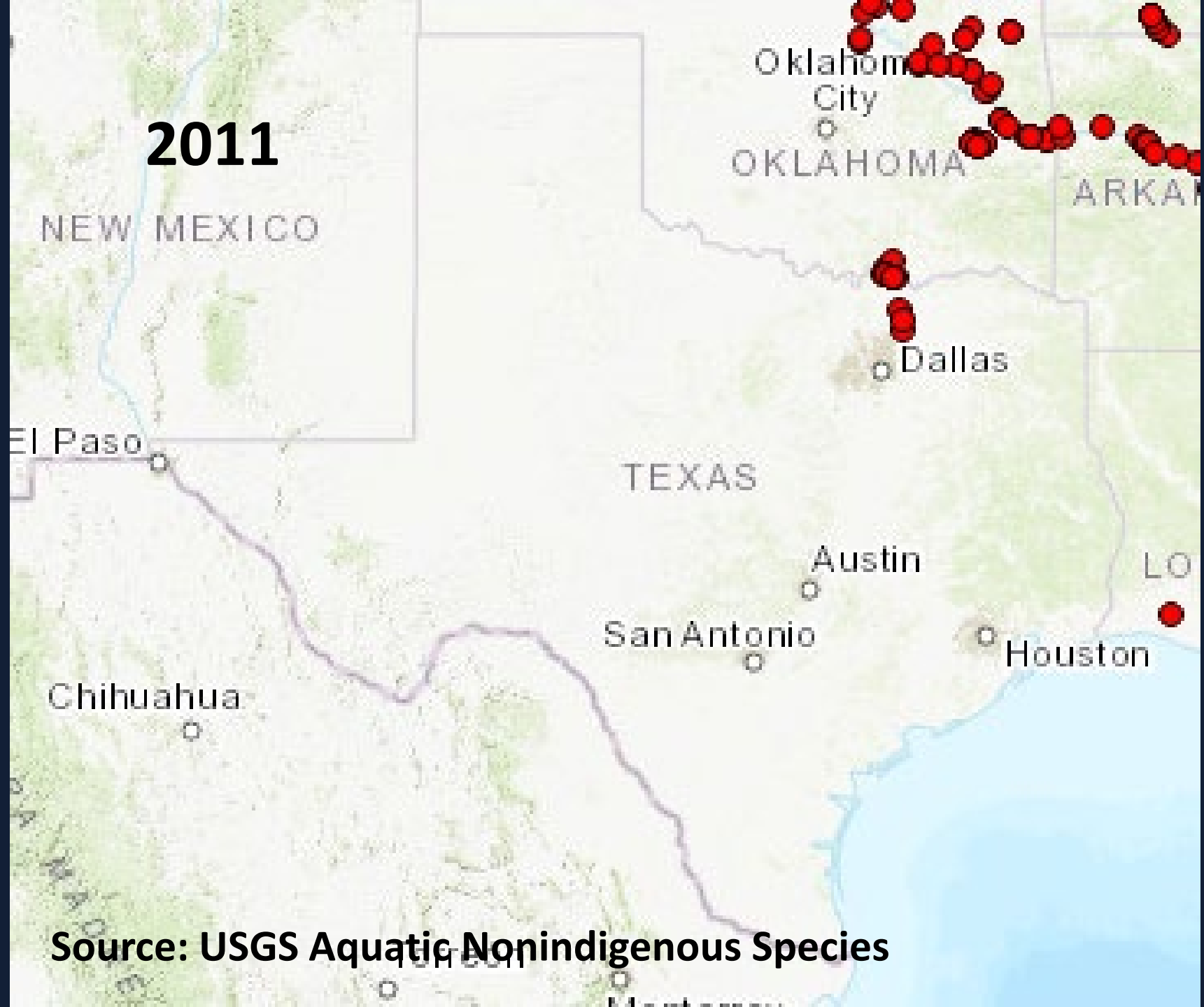
Source: USGS Aquatic Nonindigenous Species

2010



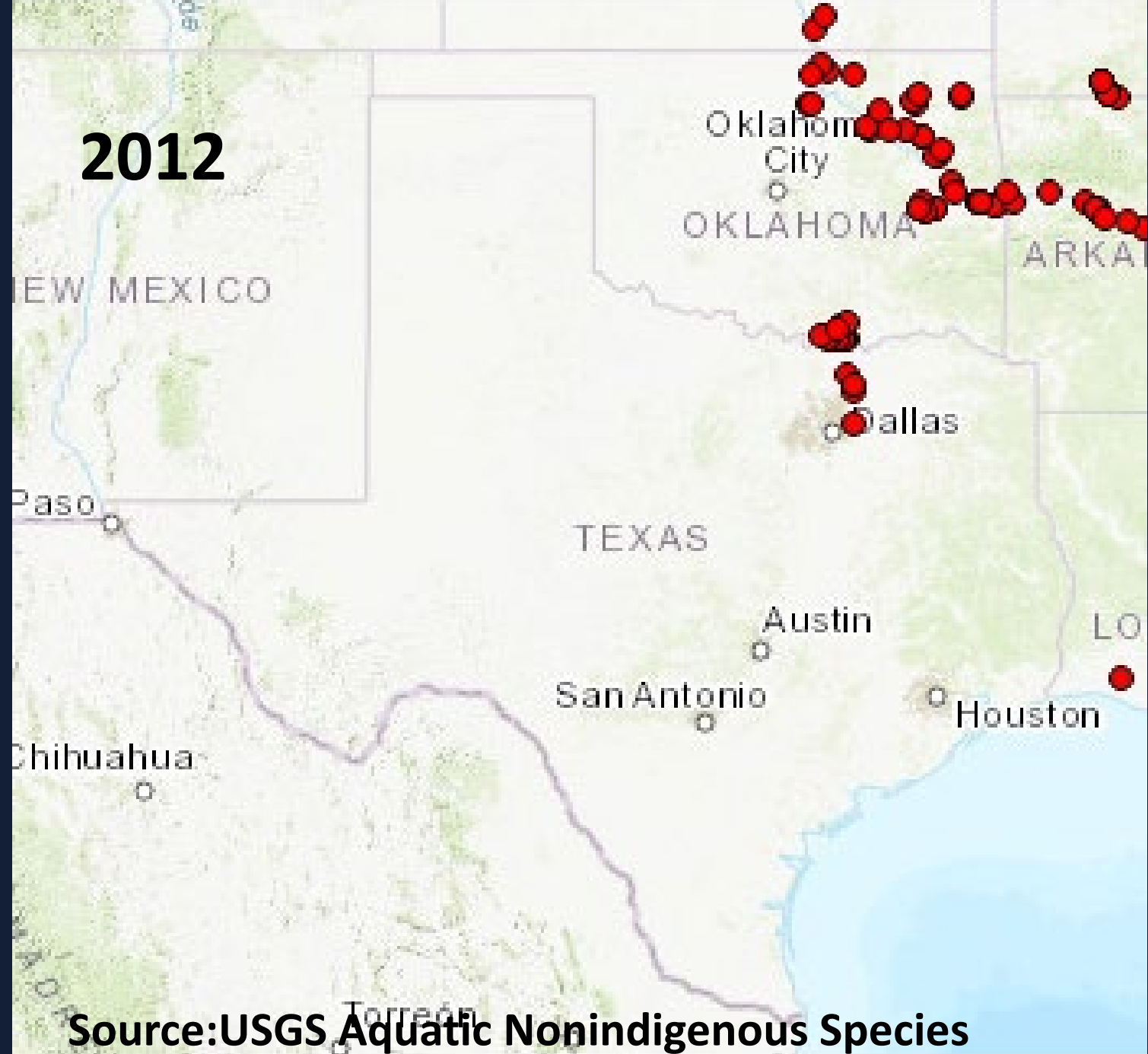
Source:USGS Aquatic Nonindigenous Species

2011

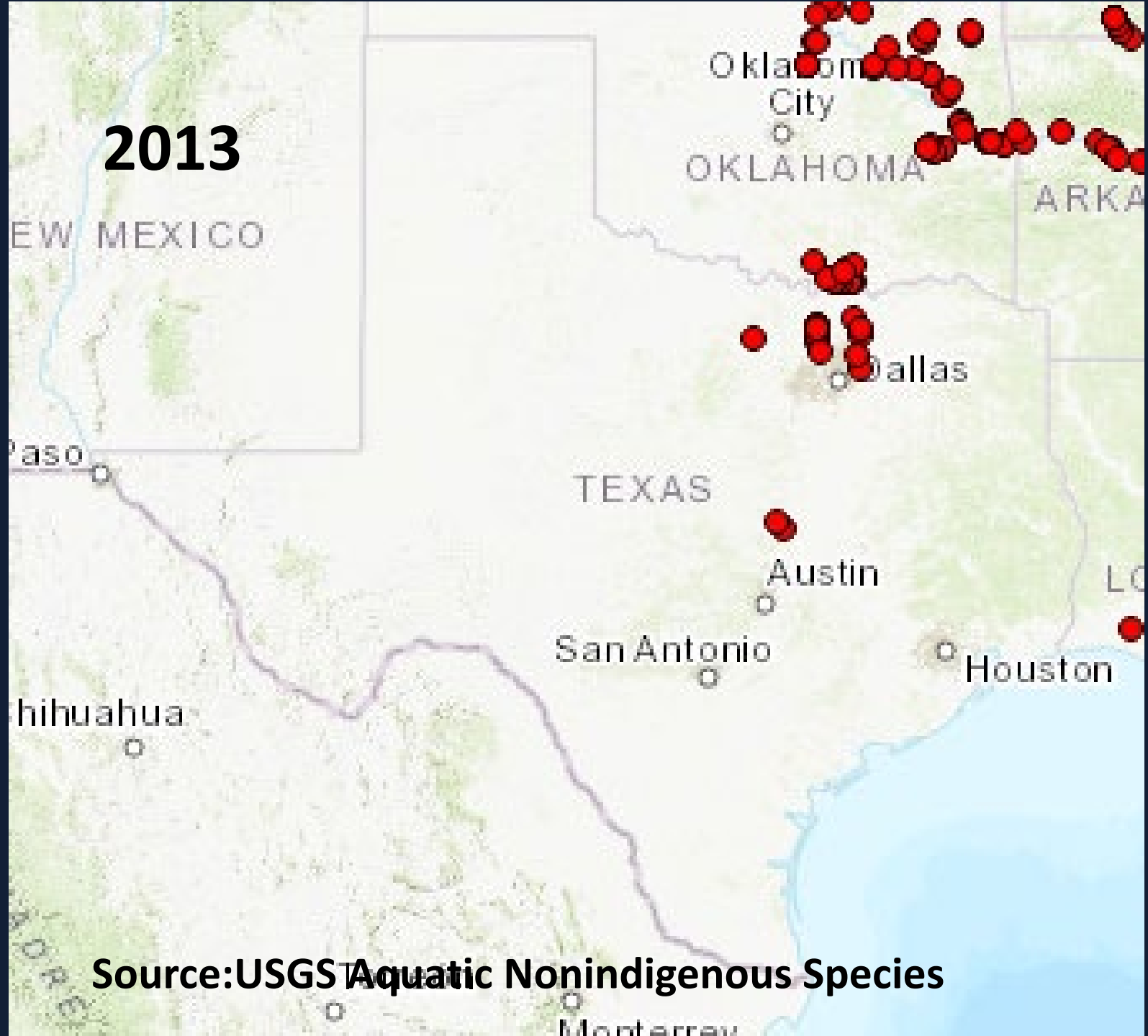


Source: USGS Aquatic Nonindigenous Species

2012

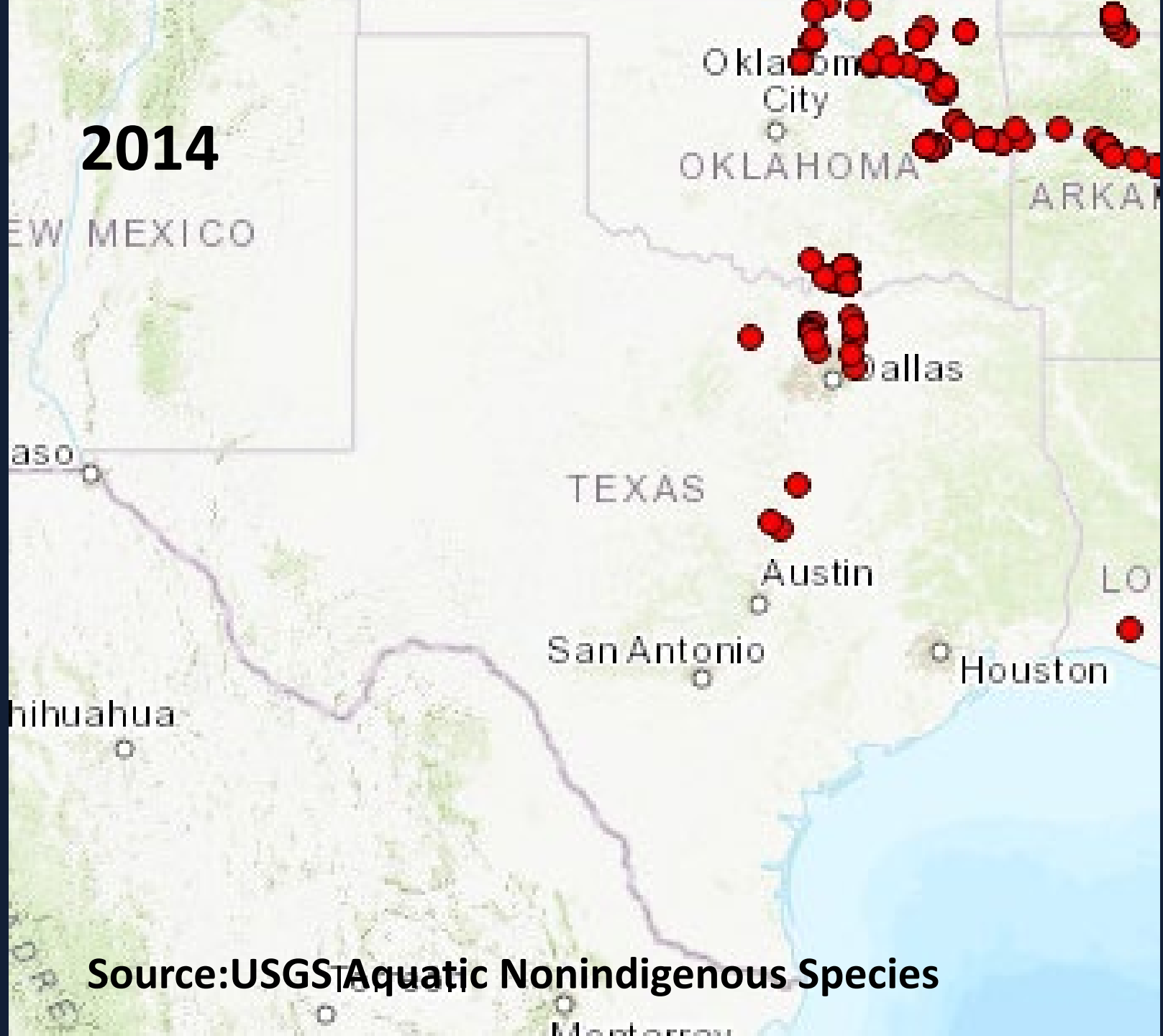


2013



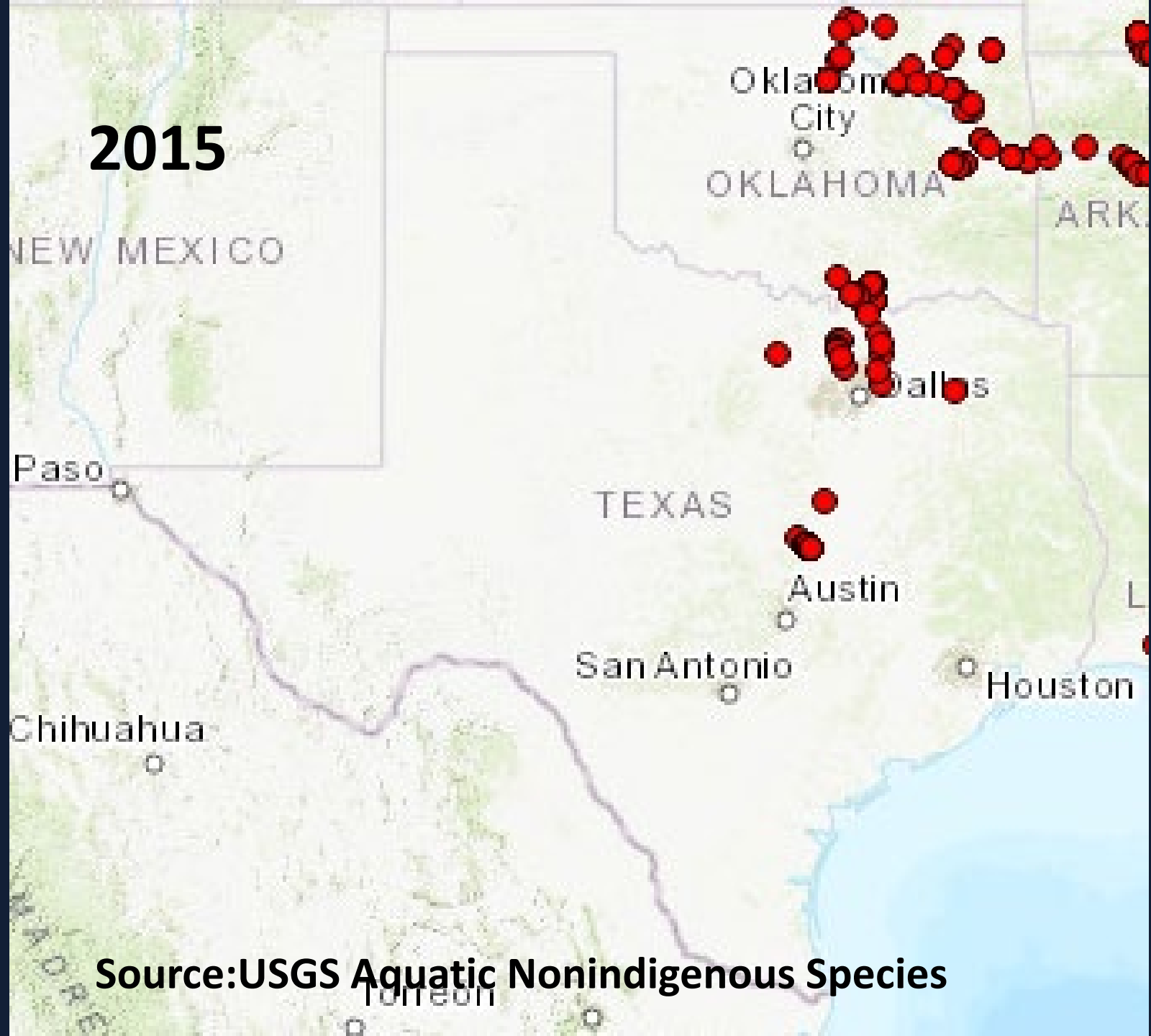
Source:USGS Aquatic Nonindigenous Species

2014

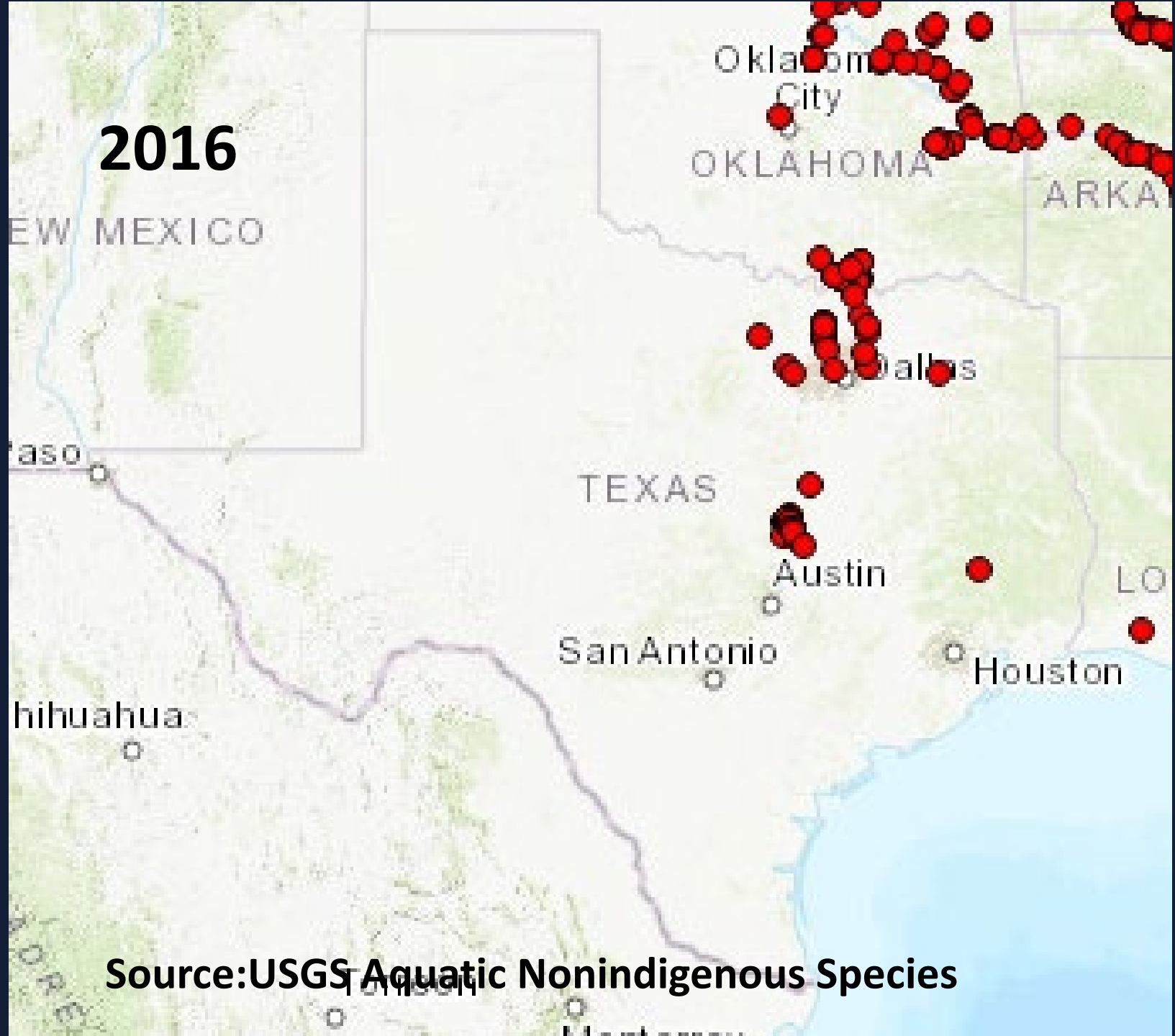


Source:USGS Aquatic Nonindigenous Species

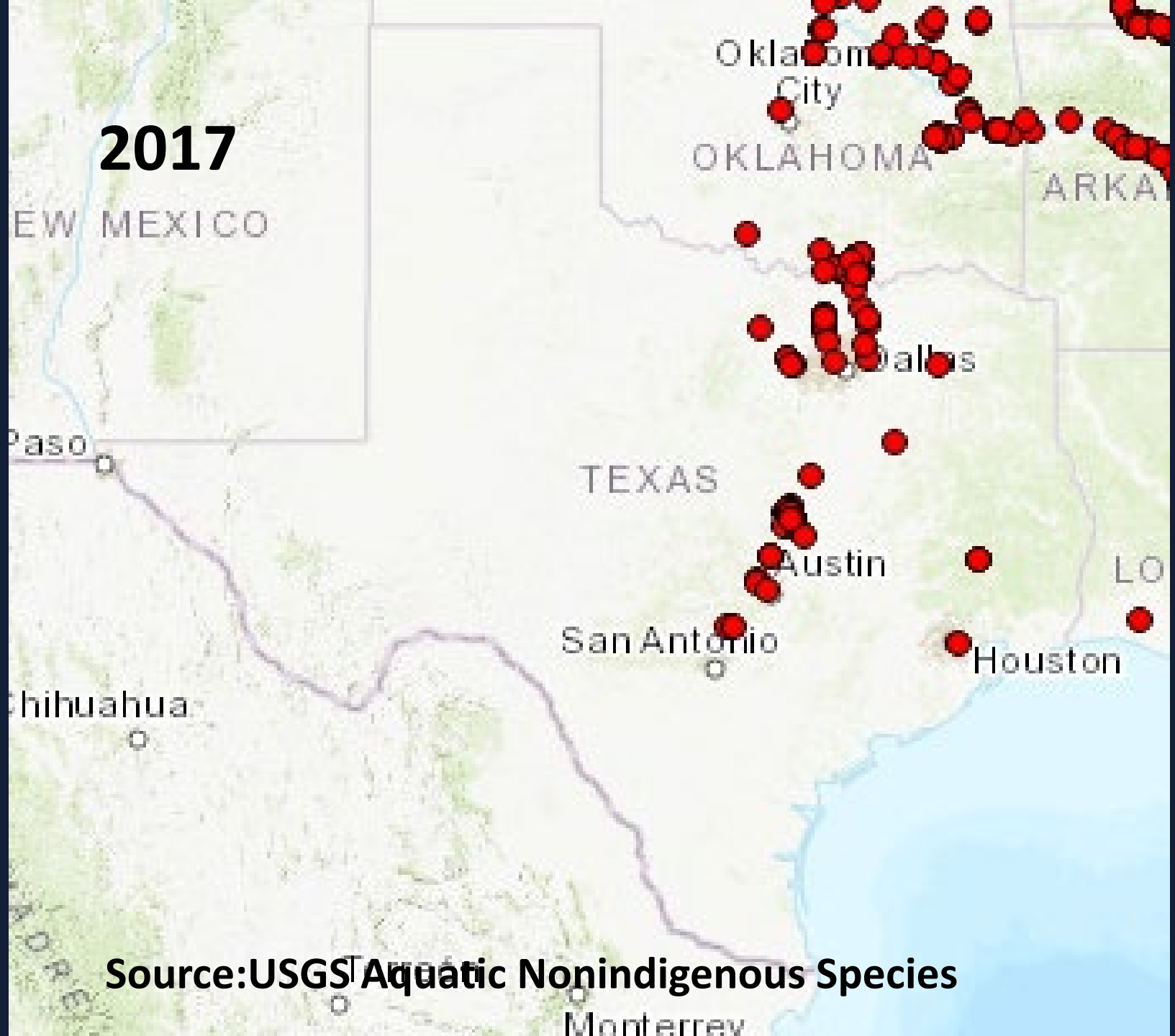
2015



Source:USGS Aquatic Nonindigenous Species

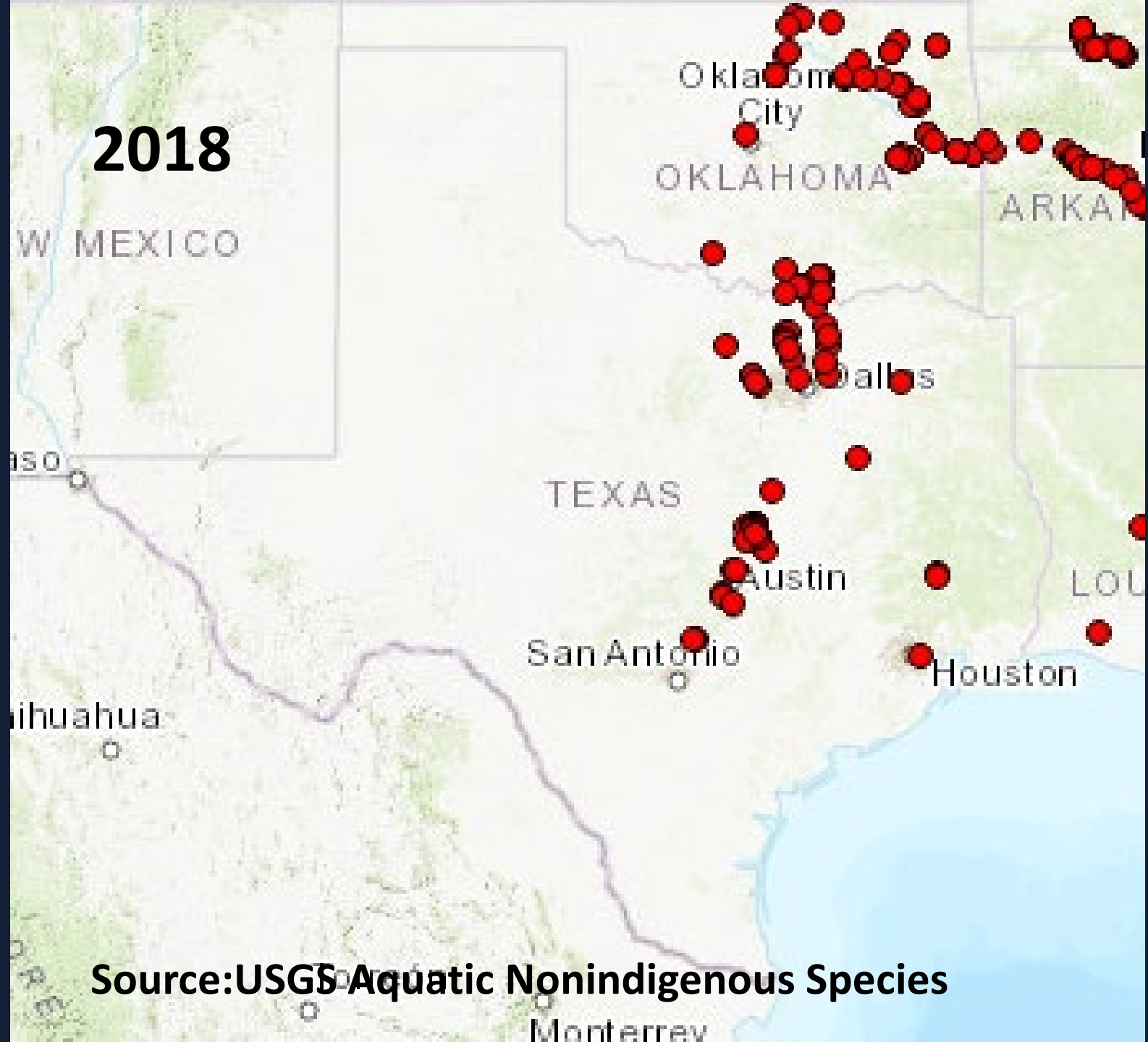


2017



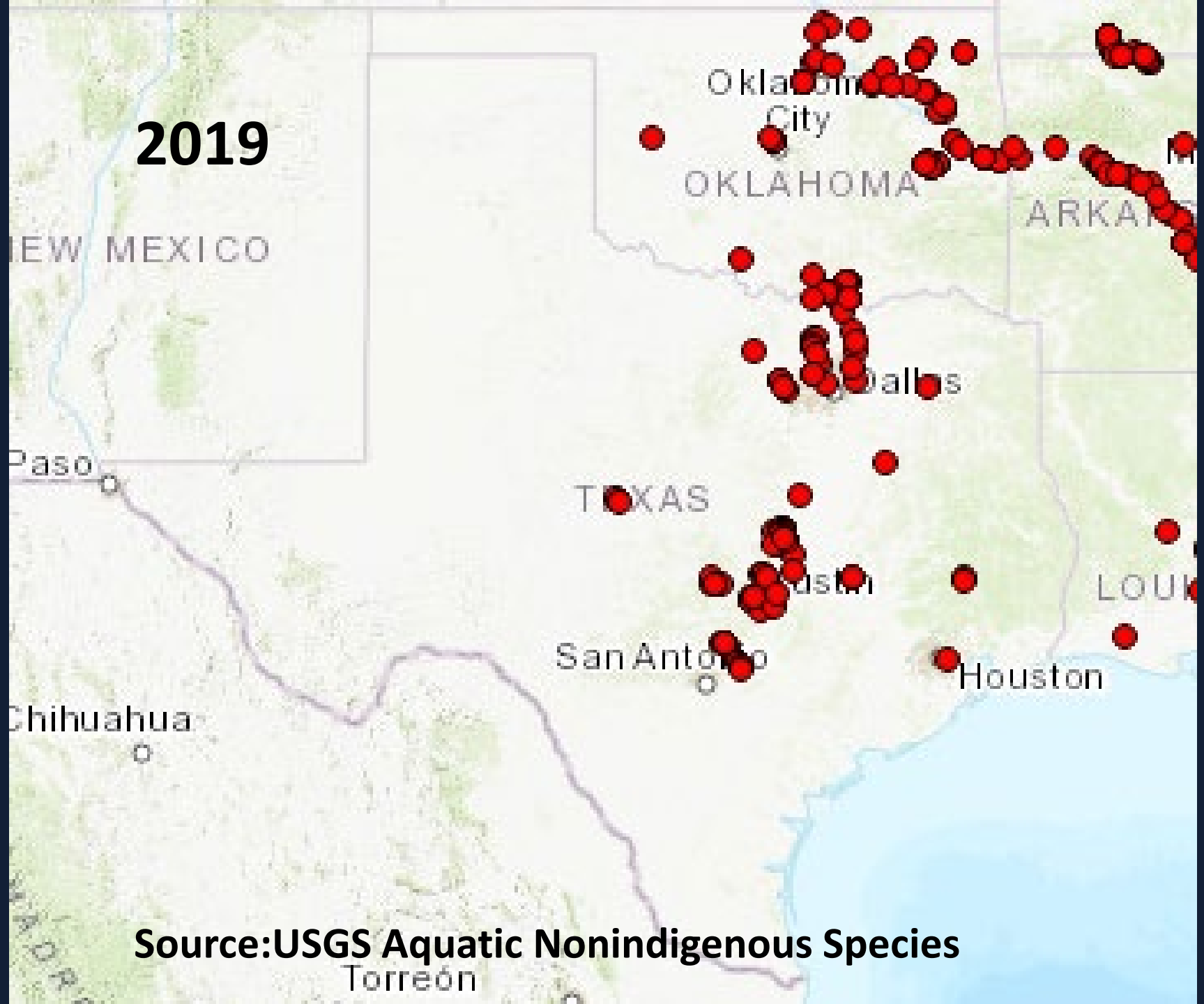
Source:USGS Aquatic Nonindigenous Species

2018



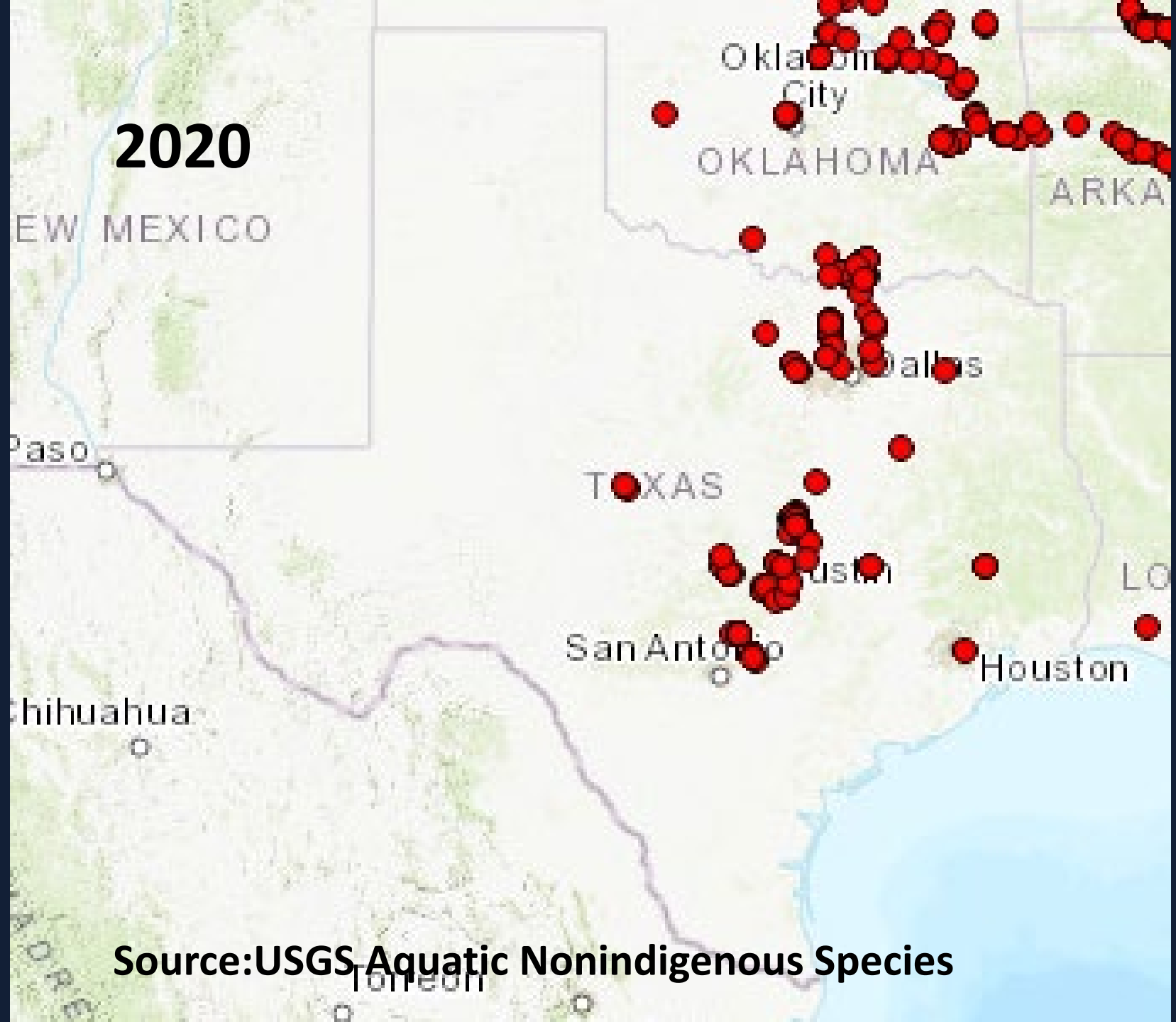
Source:USGS Aquatic Nonindigenous Species

2019

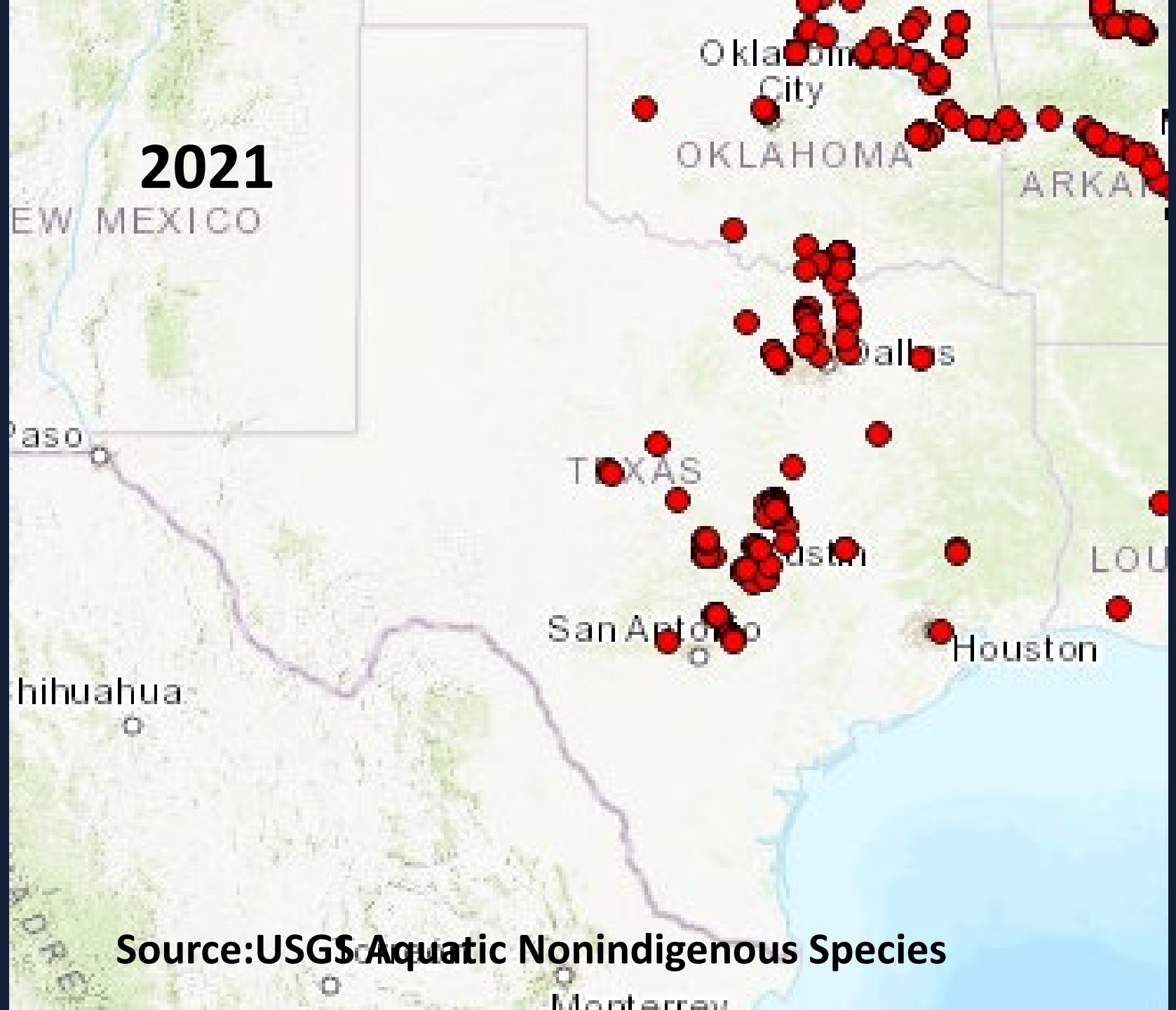


Source:USGS Aquatic Nonindigenous Species

2020



Source:USGS Aquatic Nonindigenous Species



2022

NEW MEXICO

OKLAHOMA

ARKANSAS

Louisiana

Dallas

Texas

Austin

San Antonio

Houston

Monterrey

Source: USGS Aquatic Nonindigenous Species

2022

NEW MEXICO

OKLAHOMA

ARKANSAS

Louisiana

Dallas

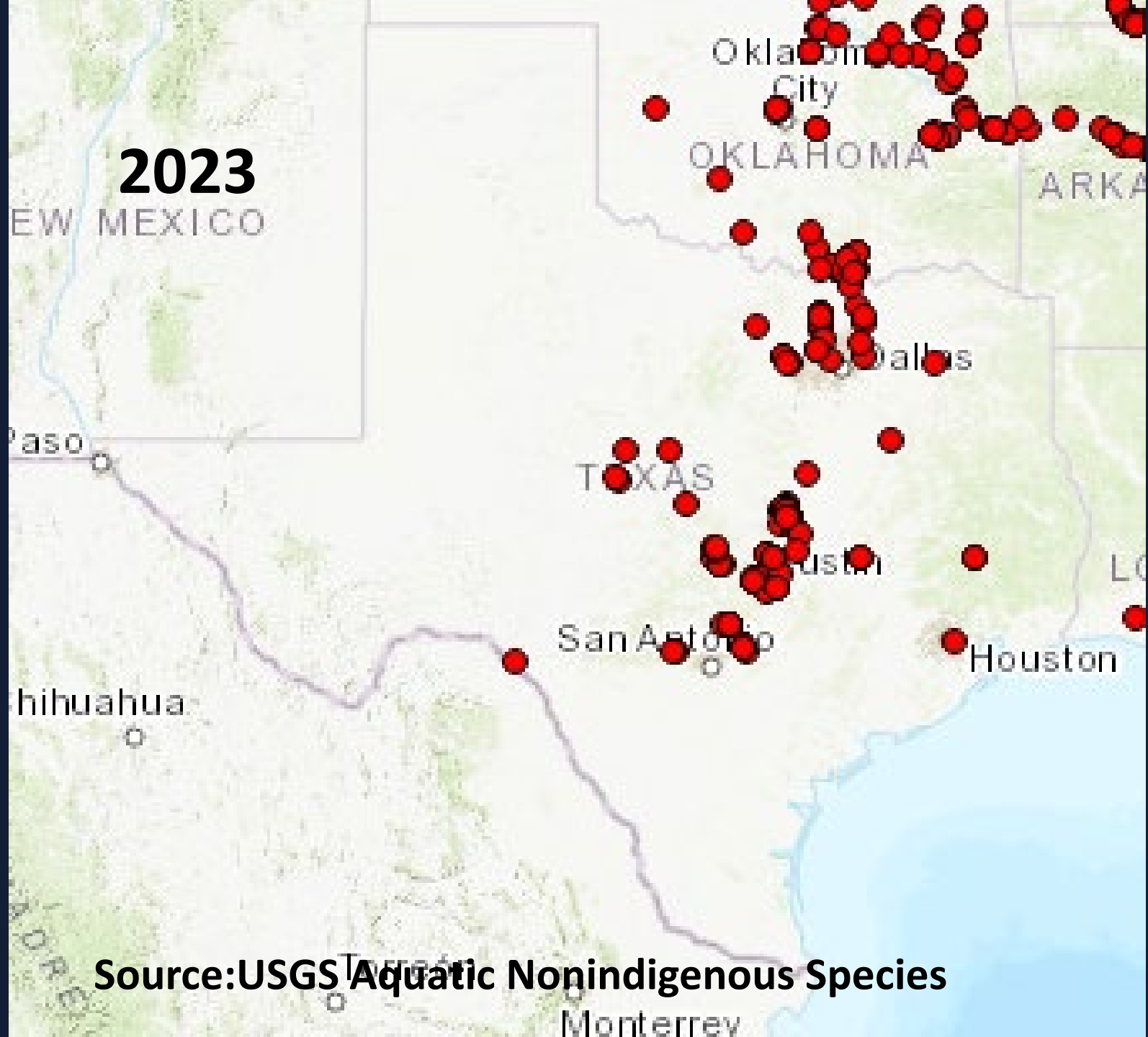
Texas

Houston

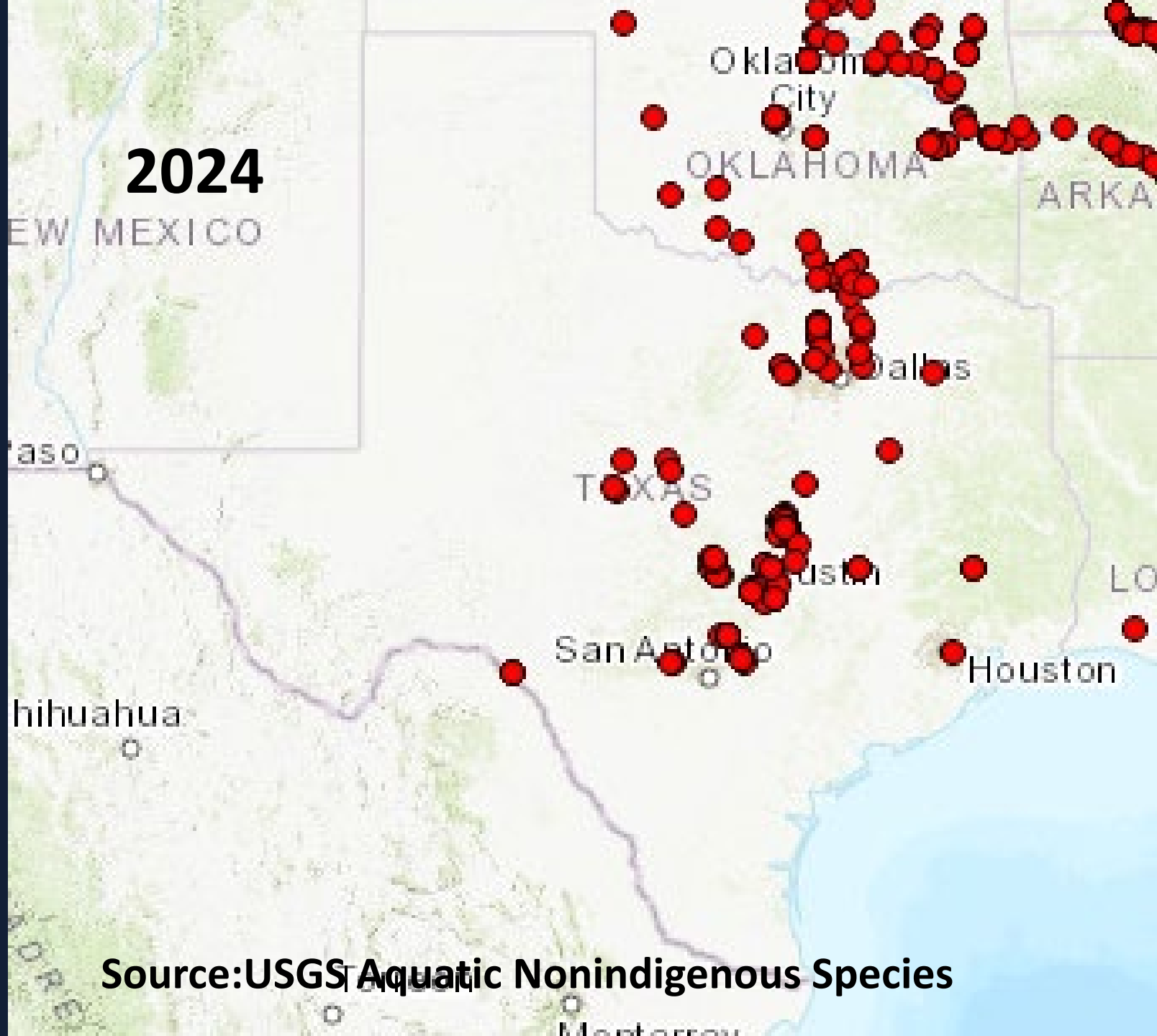
San Antonio

Monterrey

Source: USGS Aquatic Nonindigenous Species

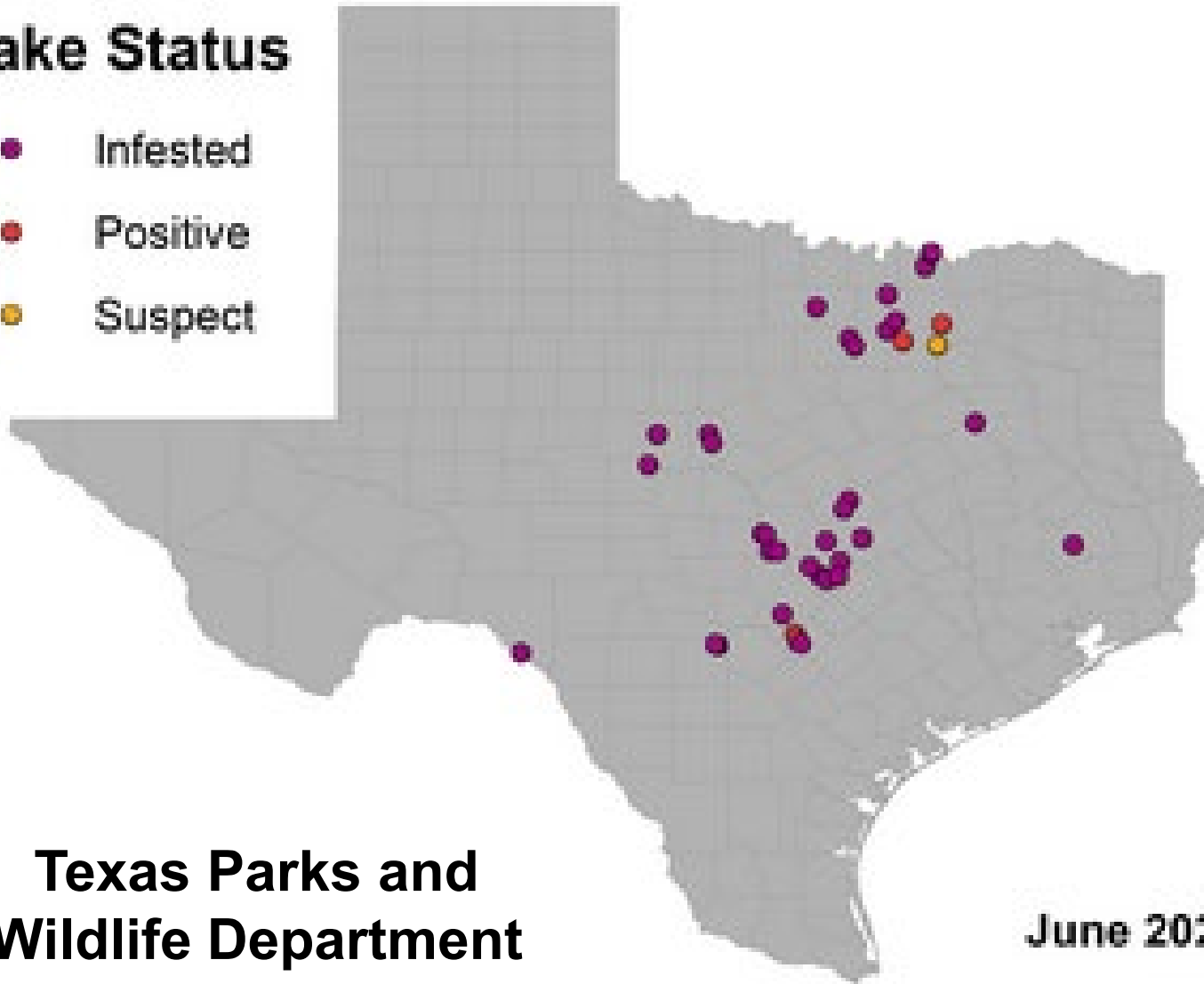


Source:USGS Aquatic Nonindigenous Species



Lake Status

- Infested
- Positive
- Suspect



**Texas Parks and
Wildlife Department**

June 2024

Zebra mussel establishment risk thresholds for key water body physicochemical characteristics

Physical Risk Factor: Minimal Risk, Moderate Risk, High Risk.

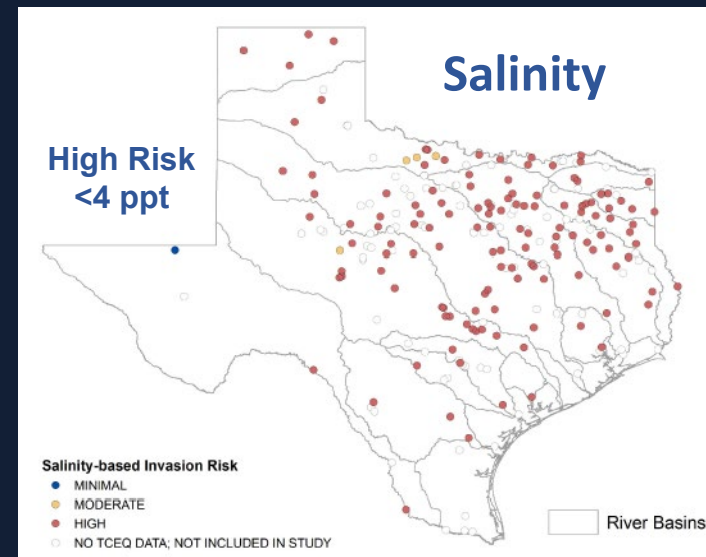
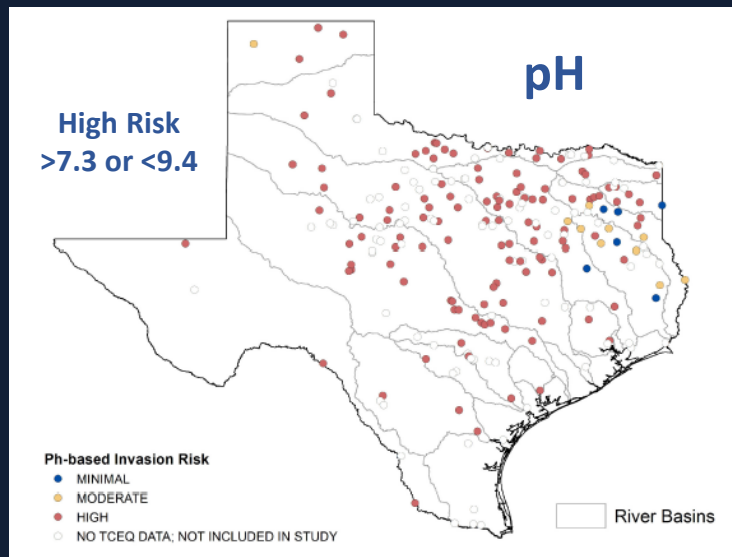
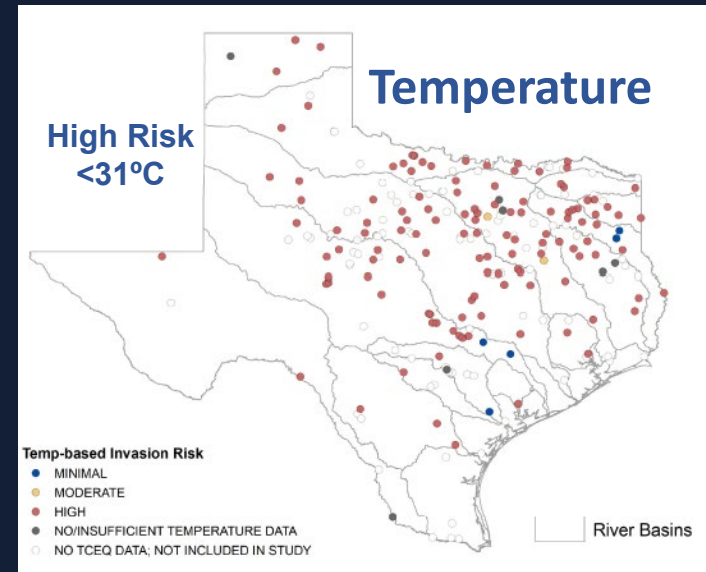
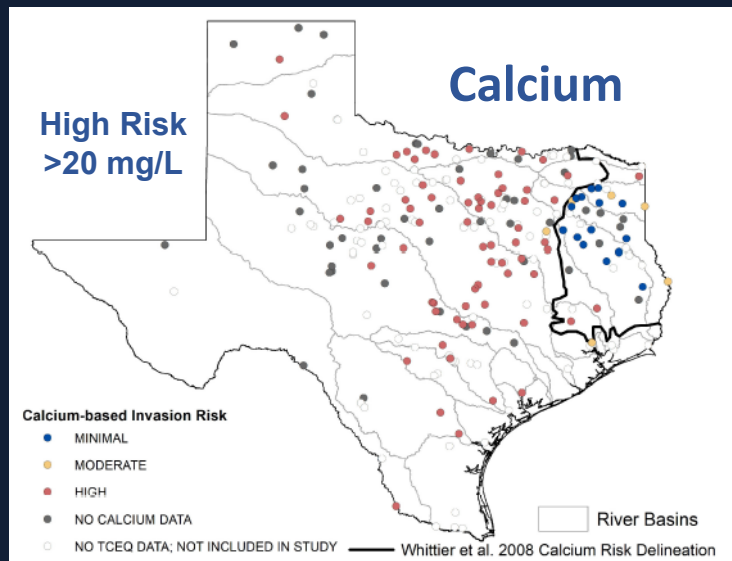
Calcium: < 12 mg/l, 12–20 mg/l, > 20 mg/l: Davis et al. 2015; Jones and Ricciardi 2005; Ramcharan et al. 1992; Ruhmann 2014; Sprung 1987

pH: < 7.0 or > 9.6, <7.0–7.3 or >9.4–9.6, > 7.3 or < 9.4: Arterburn and McMahon 2022; Claudi et al. 2012; Sprung 1987

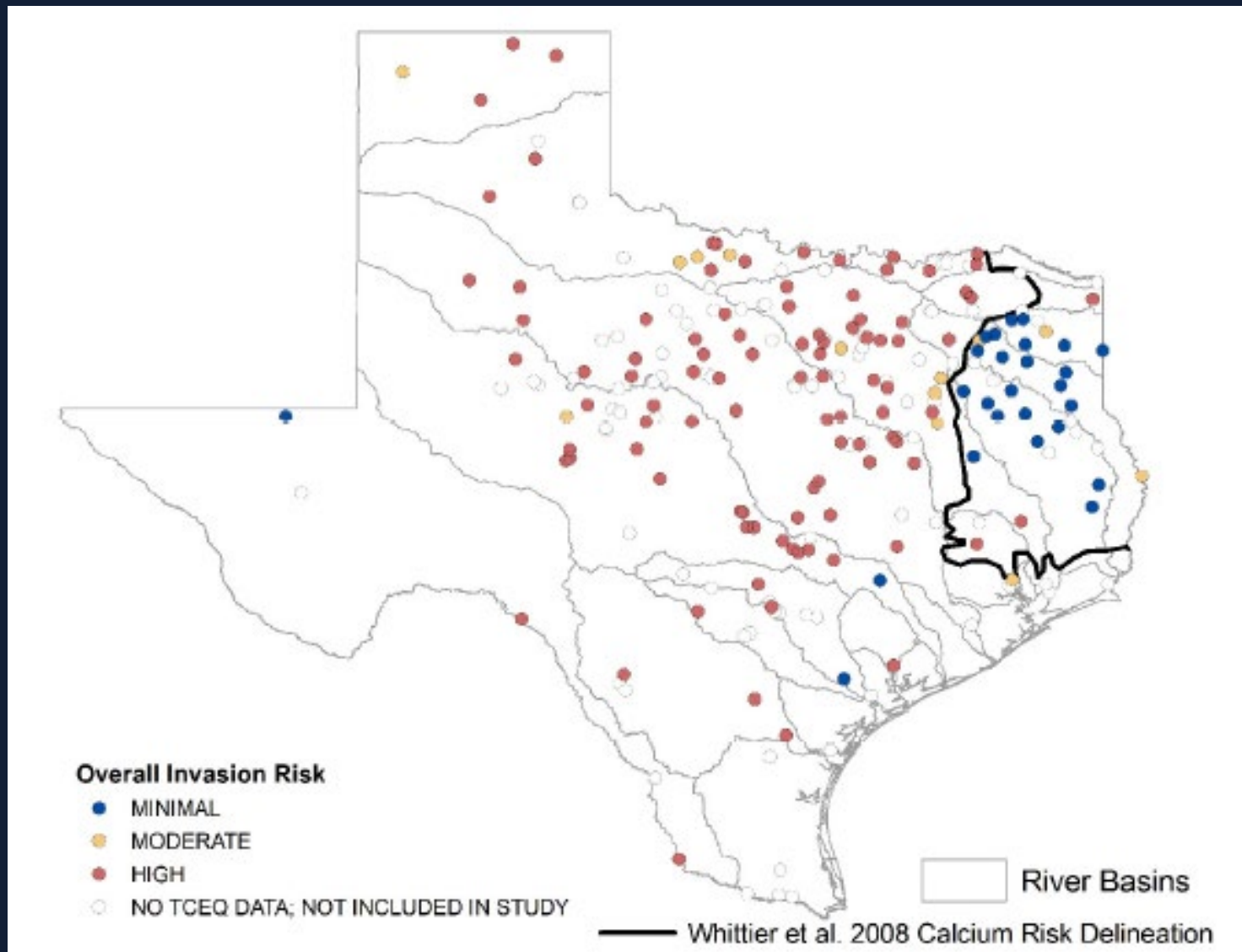
Salinity: > 5 ppt, 4–5 ppt or < 4 ppt: Kilgour et al. 1994; Spidle et al. 1995; Wolff 1969; Wright et al. 1996

Summer Water Temperature: > 32 °C, 31–32 °C, < 31°C: Kopllyay 2020; McMahon *unpublished data*; Morse 2009; Spidle 1995

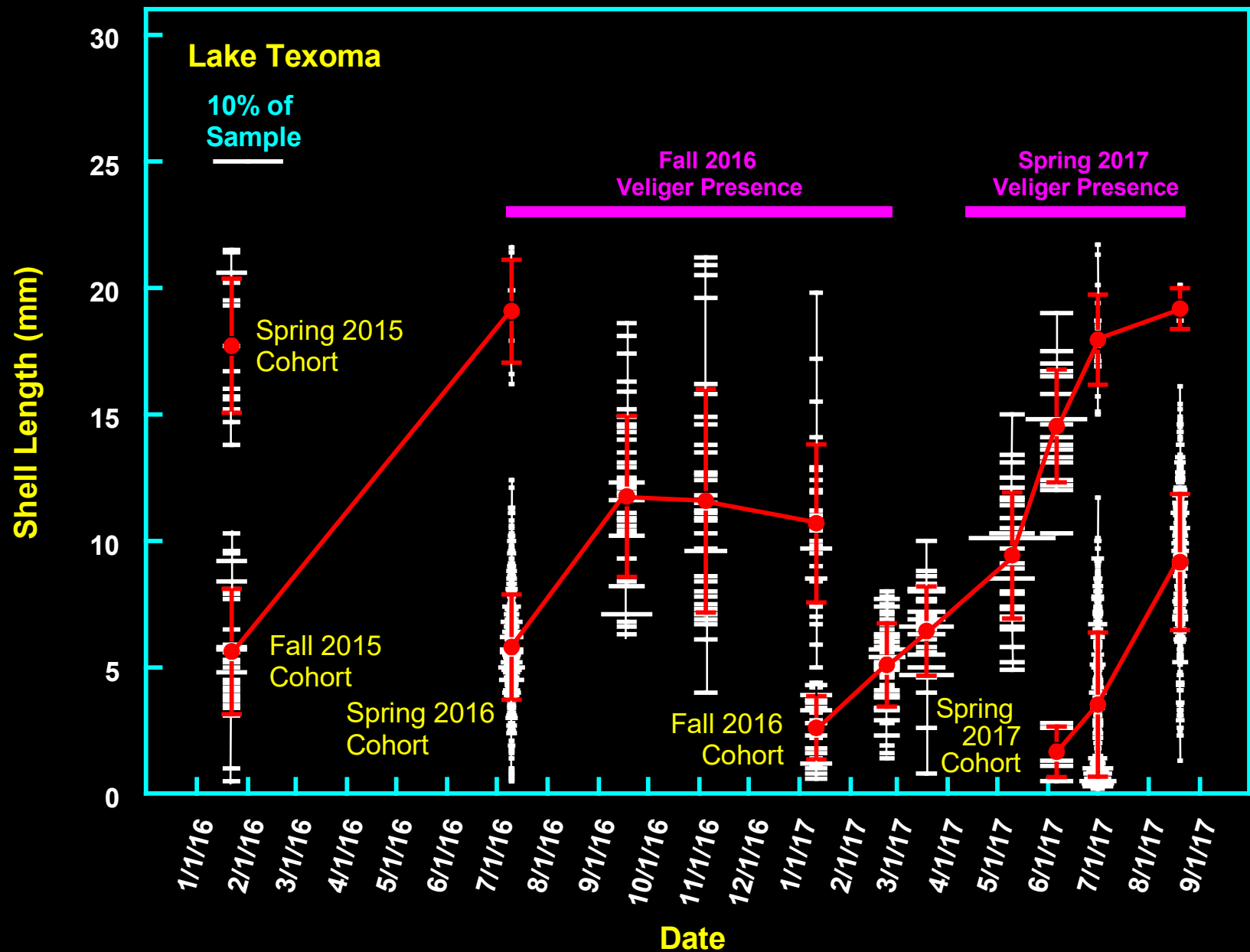
McGarrity, M.E. and McMahon, R.F., Management of Biological Invasions 2024



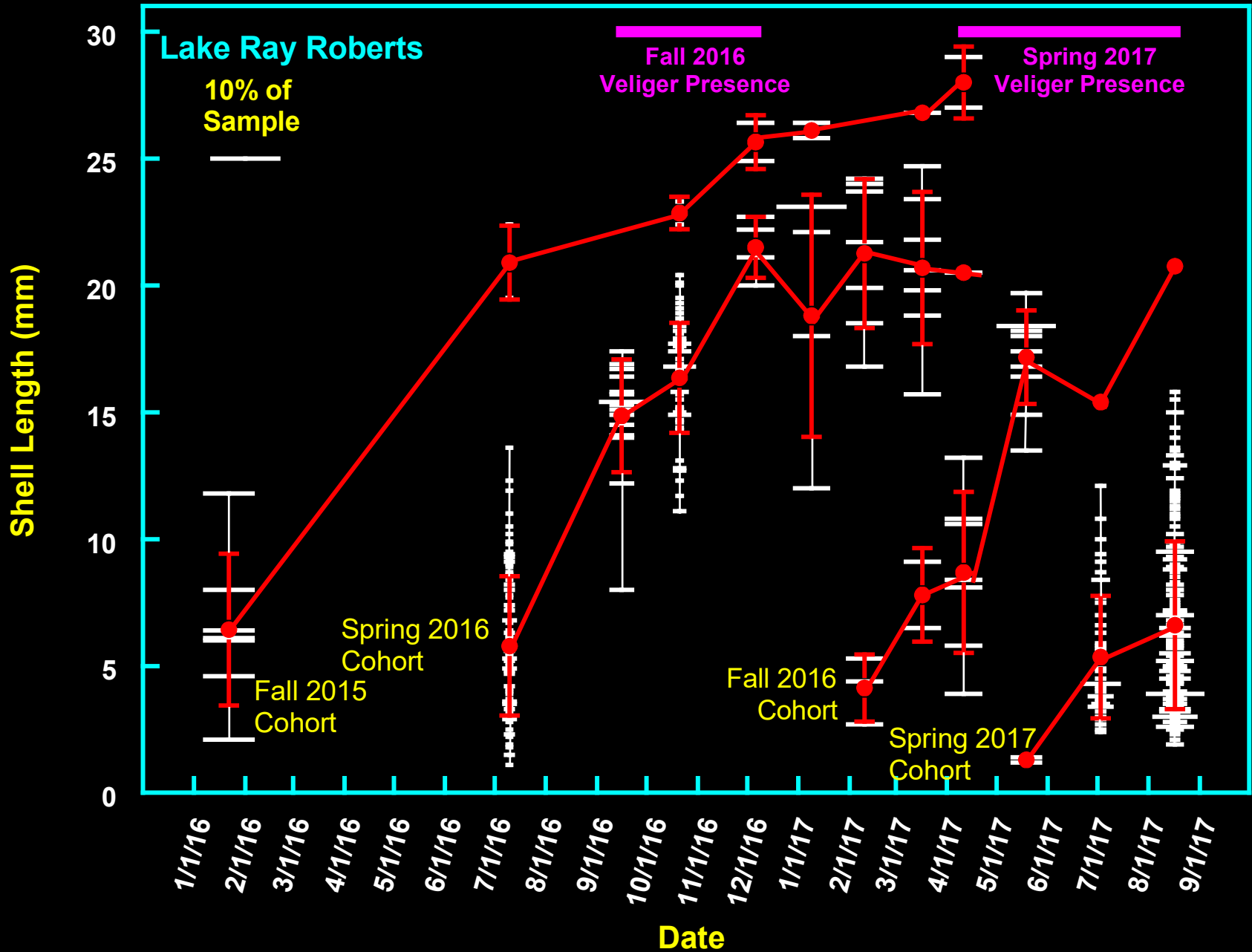
McGarrrity, M.E. and McMahon, R.F., Management of Biological Invasions. 2024



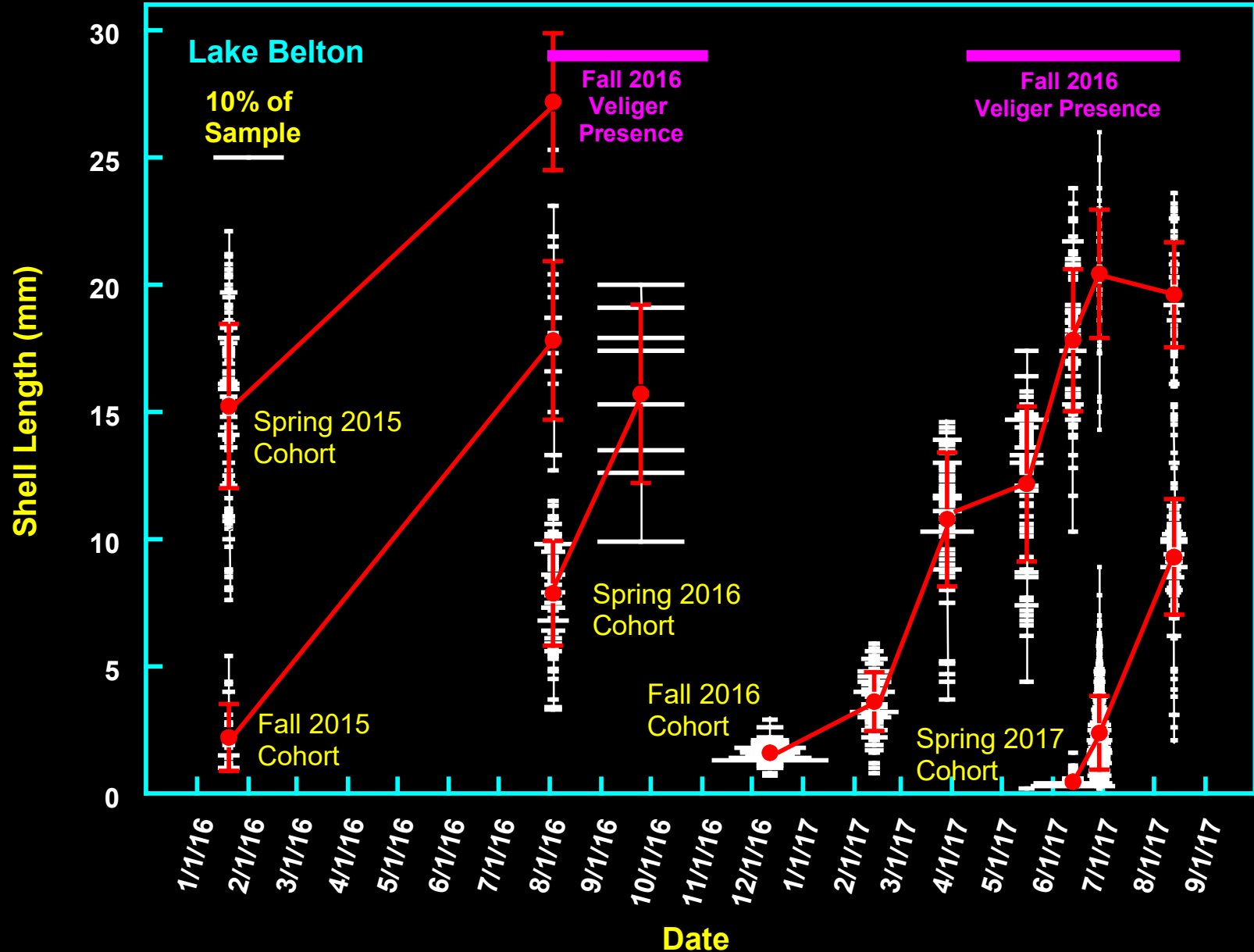
Lake Texoma Mussel Shell Length Distributions Through Time



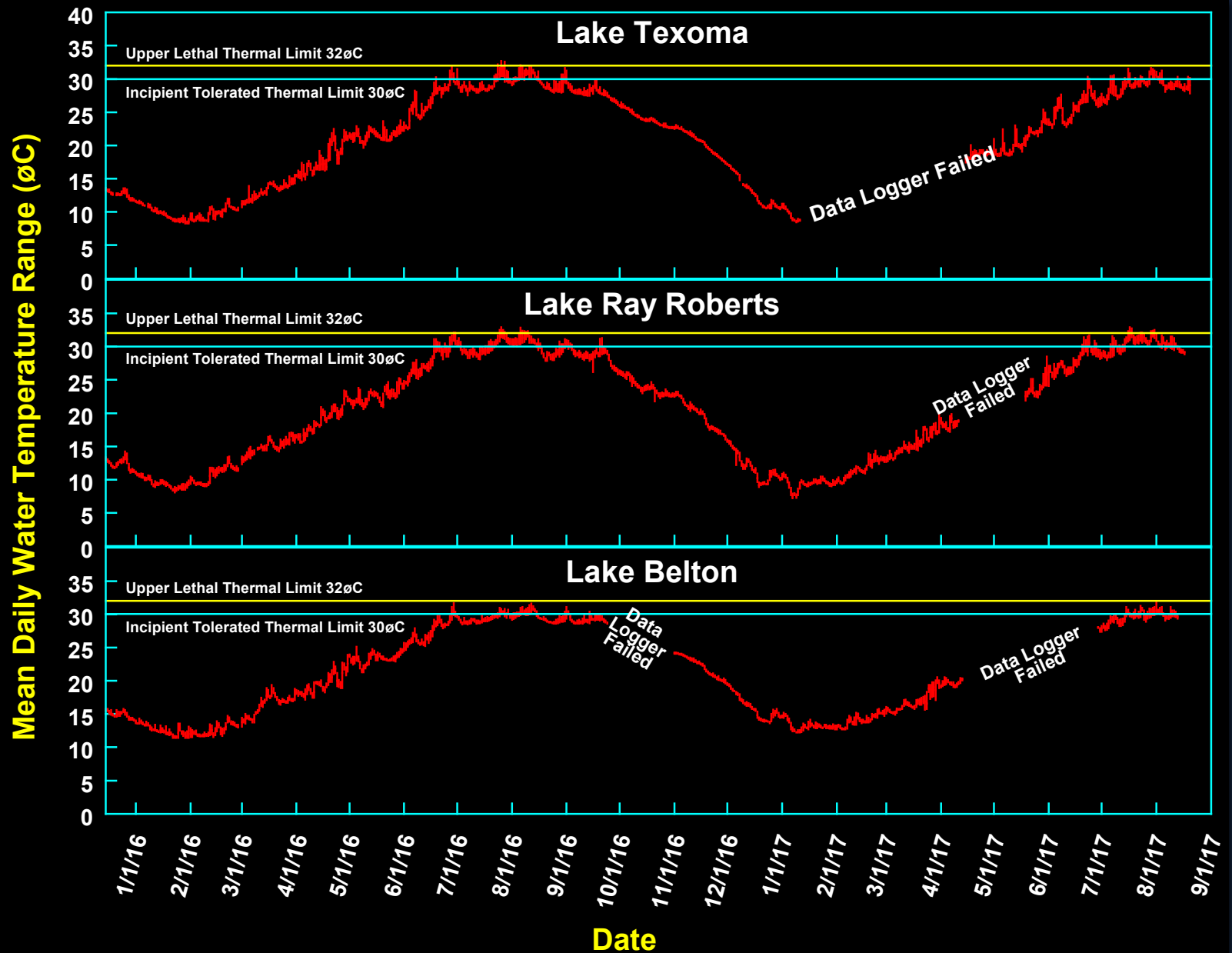
Lake Ray Roberts Mussel Shell Length Distributions Through Time



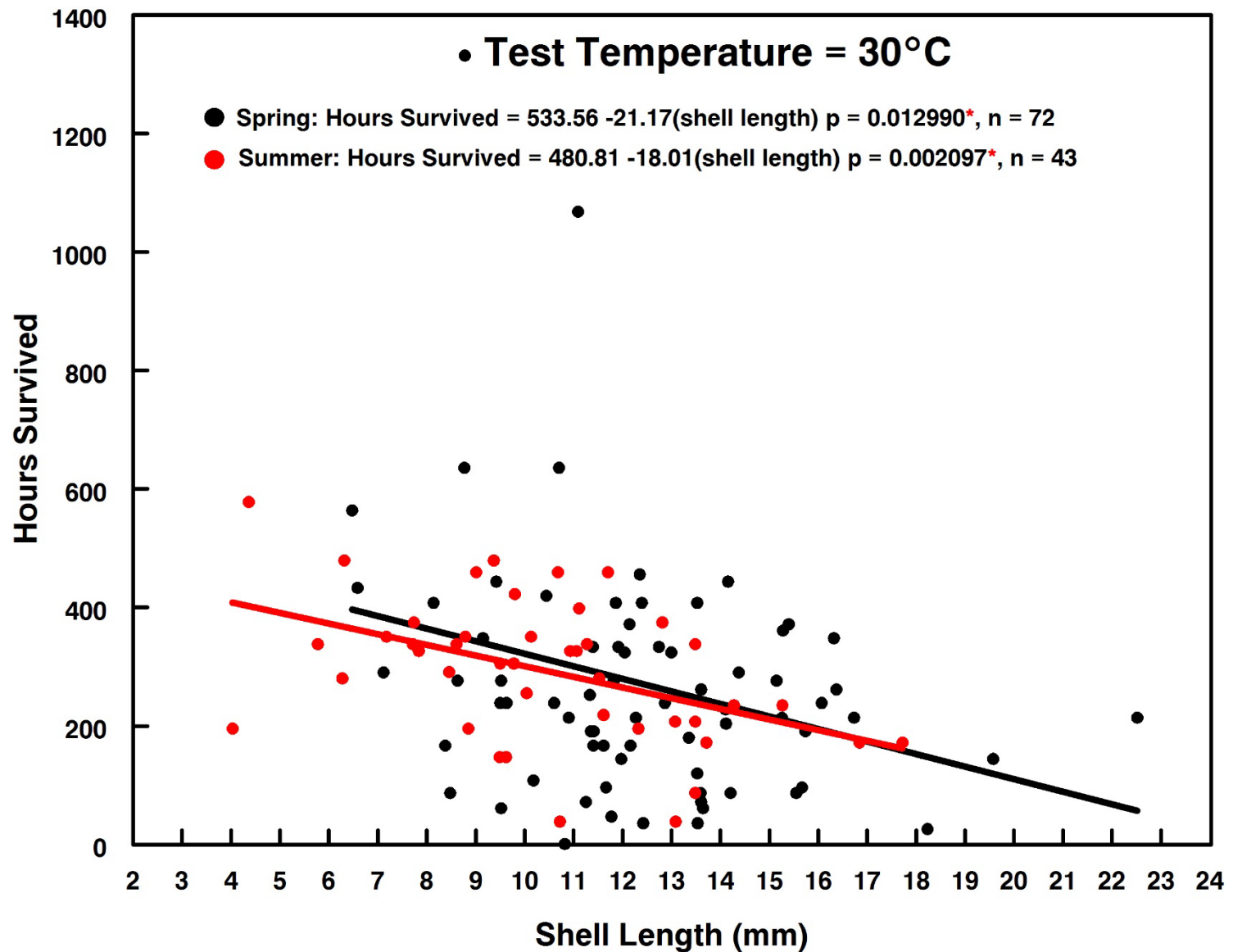
Lake Belton Mussel Shell Length Distributions Through Time



Daily Surface Water Temperature Range through Time



Locklin, J.L. and McMahon, R.F., Unpublished



Thanks For Your Attention

