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Population and Habitat Characteristics of the Saltmarsh Topminnow (*Fundulus jenkinsi*)



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Habitat

- ▶ Saltmarshes along the Gulf of Mexico from FL to TX
- ▶ Low to moderate salinities ^{1,2,3}
- ▶ Link between saltmarsh vegetation and *Fundulus jenkinsi* occurrences ⁴
- ▶ Utilize edge of saltmarsh habitat ⁵



Conservation Status

- ▶ Listed as a species of concern in LA, MS, AL, and FL
- ▶ Petition to list species as threatened or endangered under the Endangered Species Act issued in 2011
 - ▶ USFWS commissioned to review species' status and make a determination



Significance of Study

- ▶ Lack of information about the minnow's population and distribution within Texas
- ▶ Need to obtain more complete and comprehensive data on characteristics and habitat needs for effective management



Study Objectives

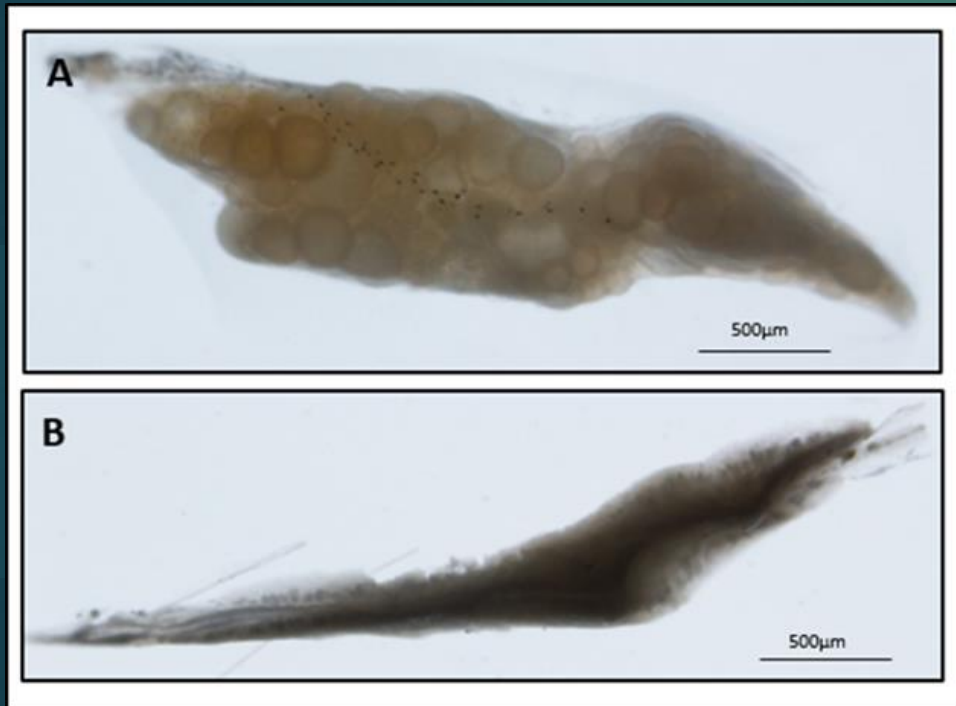
- ▶ Assess distribution and abundance of the *Fundulus jenkinsi* in Galveston Bay and Sabine Lake, TX
- ▶ Identify factors attributing to *F. jenkinsi*'s presence between sites
- ▶ Understand population and reproductive characteristics



Data Analysis of Fish Assemblages

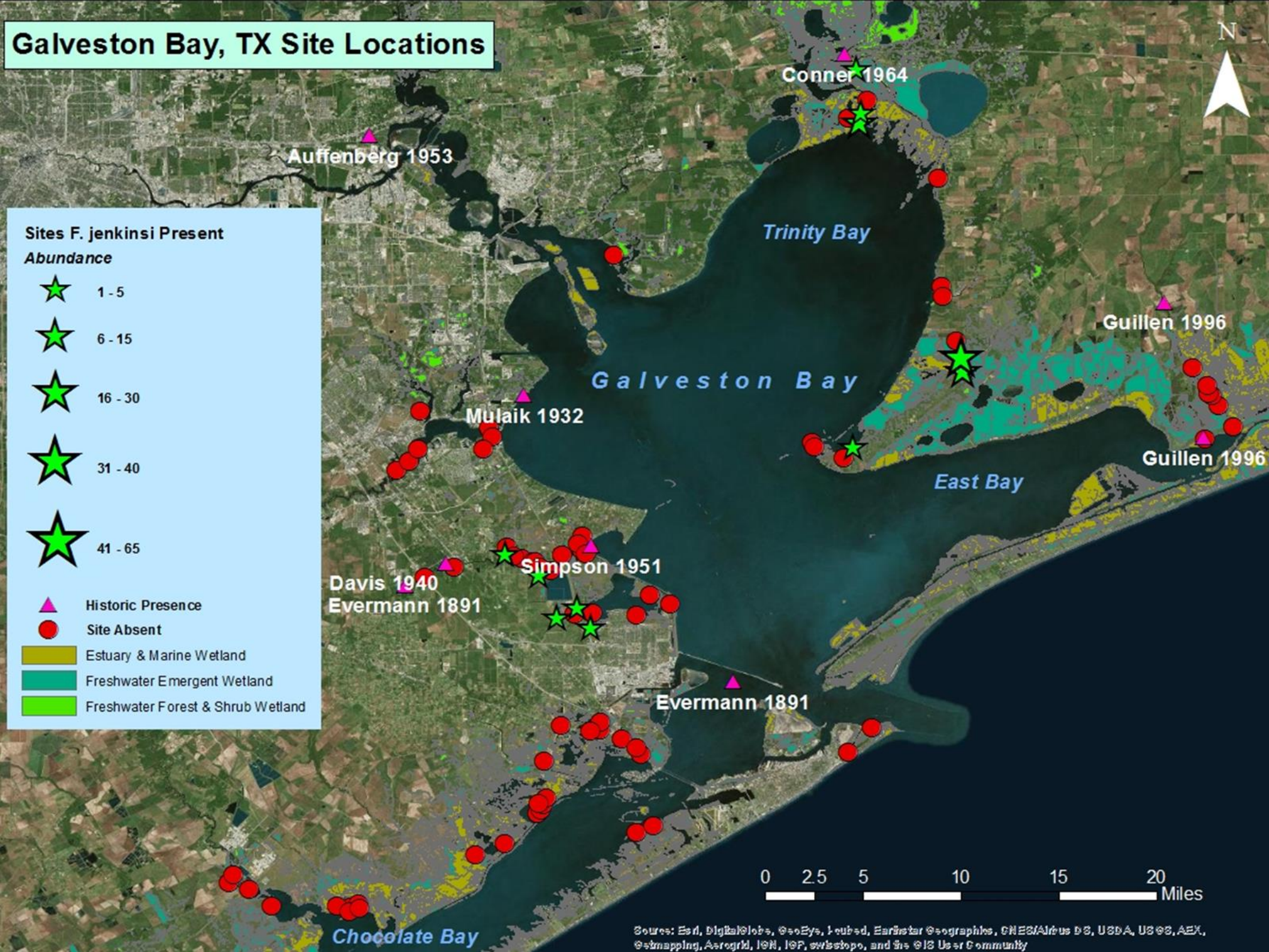
- ▶ Data run through 4th root transformation
- ▶ Community comparison using Bray-Curtis similarity index
- ▶ Analysis of similarity (ANOSIM) used to test for differences in fish assemblages
 - ▶ *F. jenkinsi* presence vs. absence
 - ▶ Seasonal effects
 - ▶ Tidal effects

Reproductive Analysis








- ▶ Gonads extracted from individuals collected at monthly sampling events
- ▶ Sex determined
- ▶ Mean Gonadosomatic Index (GSI) calculated for each month
 - ▶ $GSI = \left(\frac{Gonad\ Weight\ (g)}{Total\ Body\ Weight\ (g)} \right) * 100$

Galveston Bay, TX Site Locations



Sites *F. jenkinsi* Present

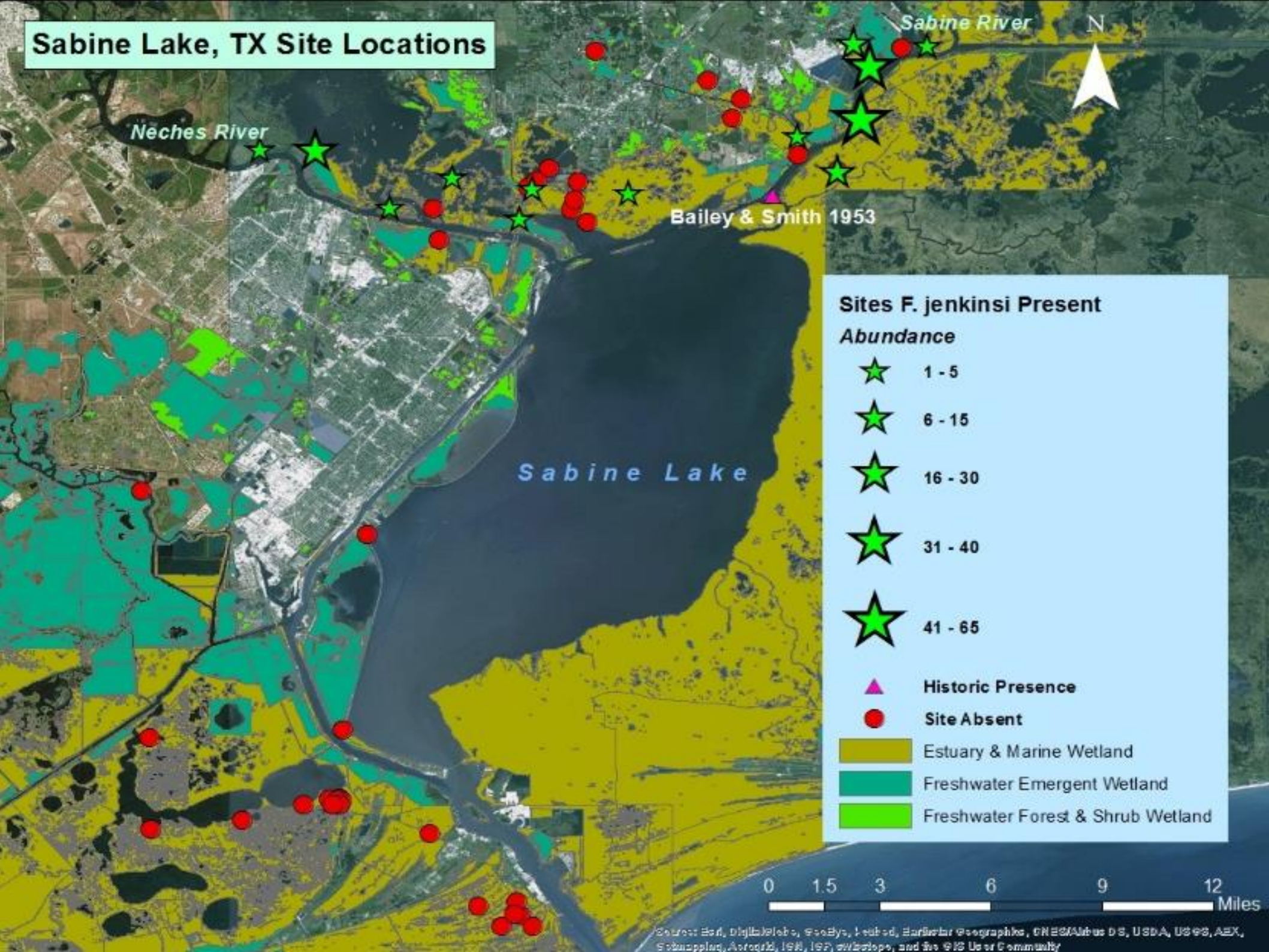
- Abundance**
-  1 - 5
 -  6 - 15
 -  16 - 30
 -  31 - 40
 -  41 - 65

-  Historic Presence
-  Site Absent
-  Estuary & Marine Wetland
-  Freshwater Emergent Wetland
-  Freshwater Forest & Shrub Wetland

0 2.5 5 10 15 20 Miles

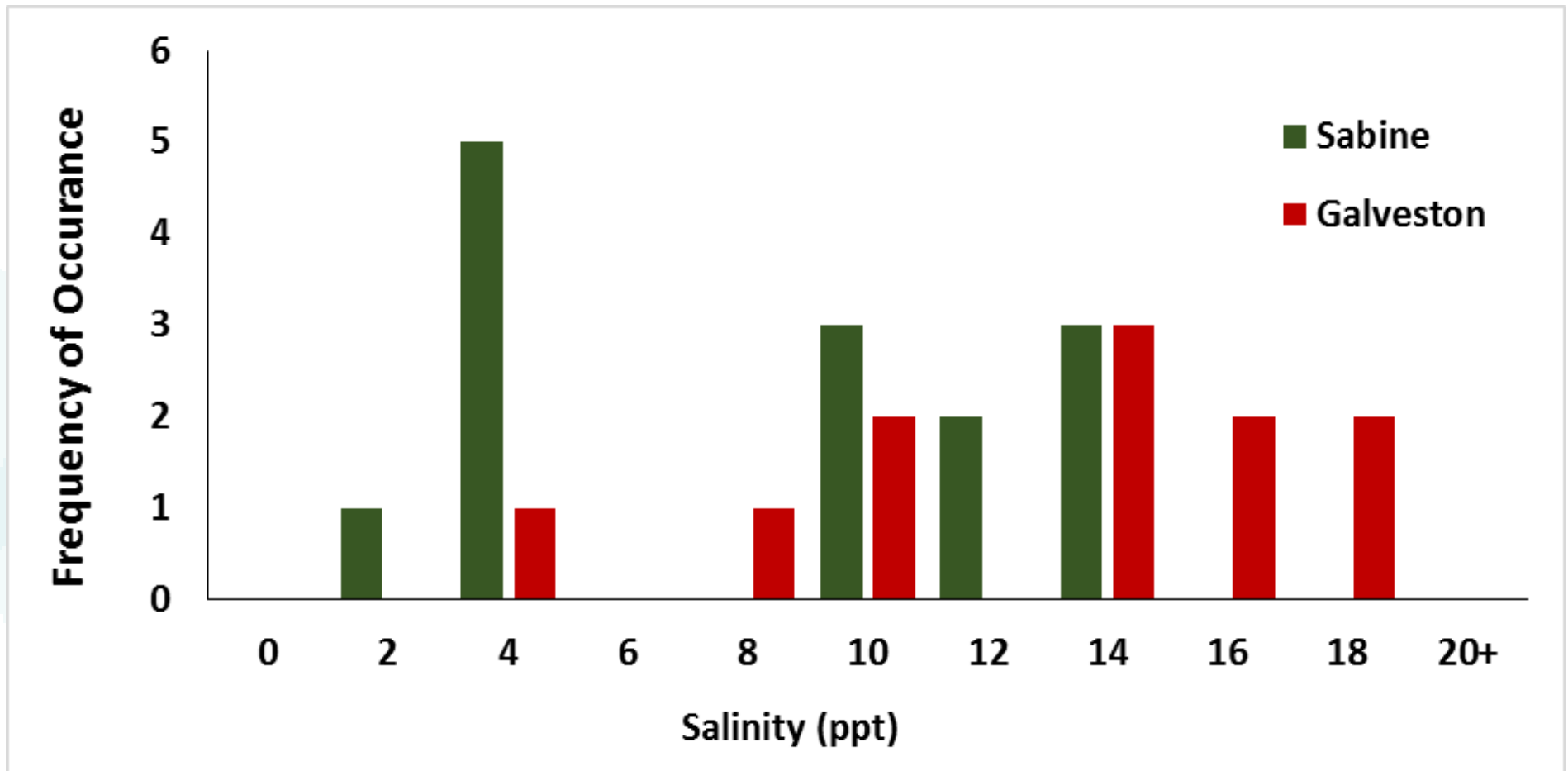
Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroX, Swisstopo, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community

Sabine Lake, TX Site Locations



Source: Esri, DigitalGlobe, GeoEye, AeroGRID, IGN, Swayze, Earthstar Geographic, GEBCO/USGS, USGS, AEX, Earthstar, AeroGRID, IGN, Swayze, and the GIS User Community

Results - Salinity Gradient



Results – Analysis of Similarity

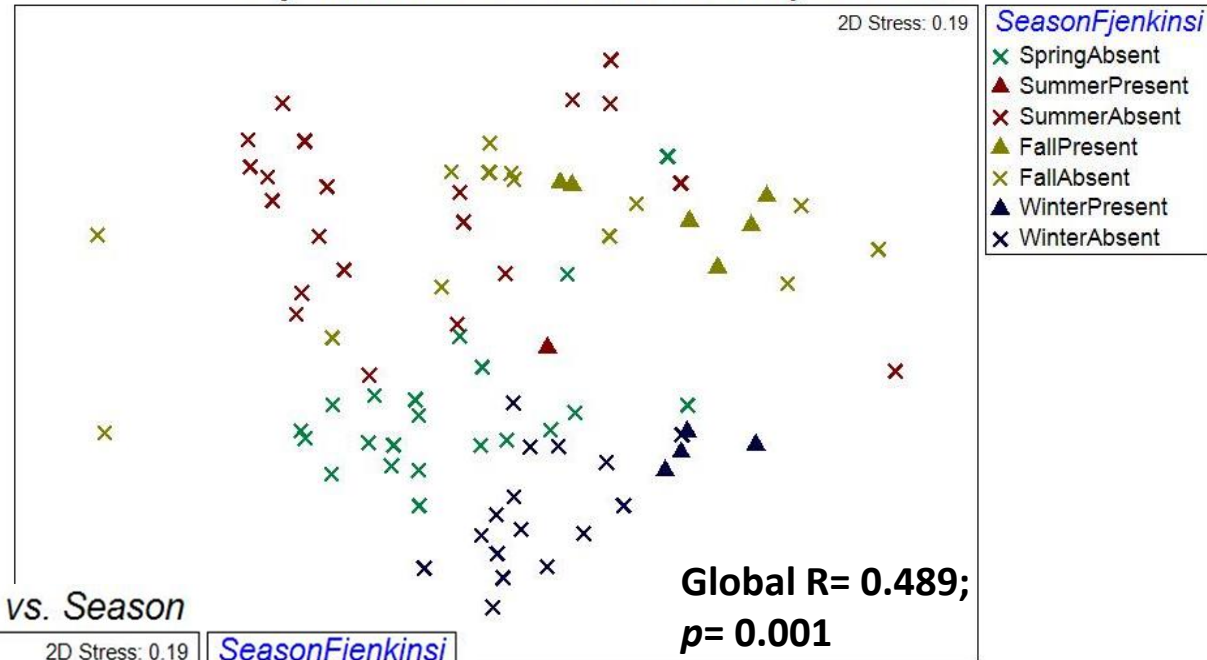
- ▶ One-way ANOSIM showed a significant difference in the fish community assemblages between Galveston Bay and Sabine Lake (Global $R=0.066$, $p= 0.003$)
- ▶ One-way ANOSIM showed significant difference between assemblages where *F. jenkinsi* collected vs not collected for both systems
 - ▶ Galveston Bay (Global $R=0.165$, $p=0.020$)
 - ▶ Sabine Lake (Global $R=0.174$, $p= 0.005$)

Results – Seasonal Influence

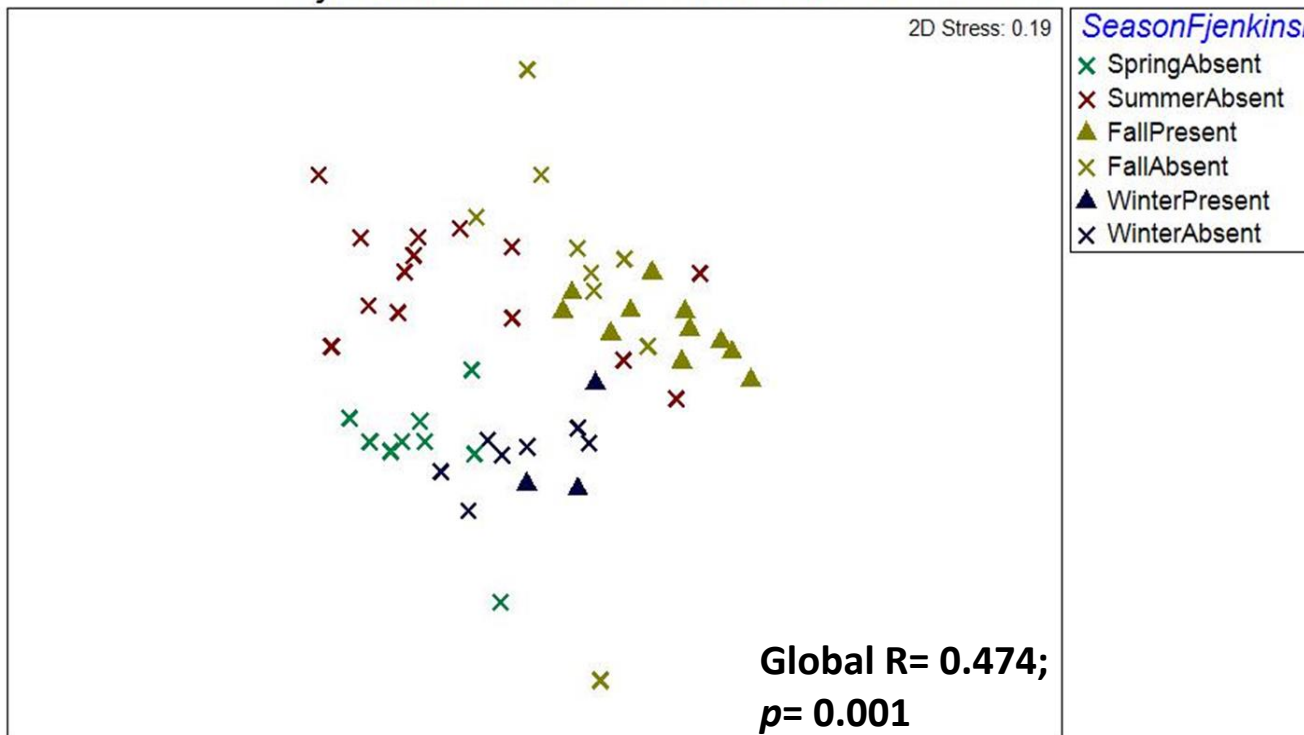
▶ Significant difference in *F. jenkinsi* presence across seasons

- ▶ Galveston Bay (R=0.304; p=0.002)
- ▶ Sabine Lake (R= 0.388; p=0.001)

F. jenkinsi Presence in Galveston Bay vs. Season



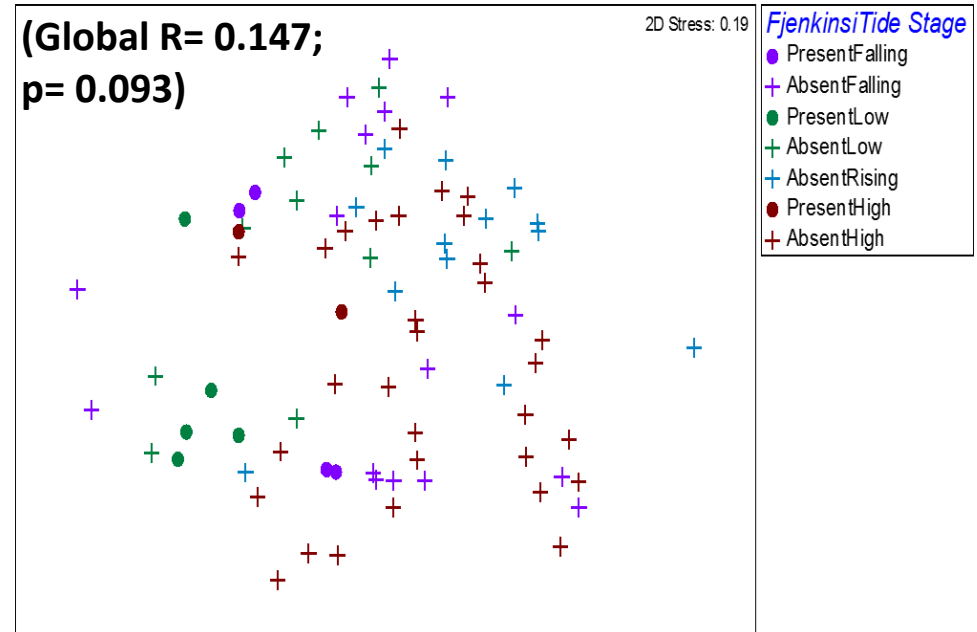
F. jenkinsi Presence in Sabine Lake vs. Season



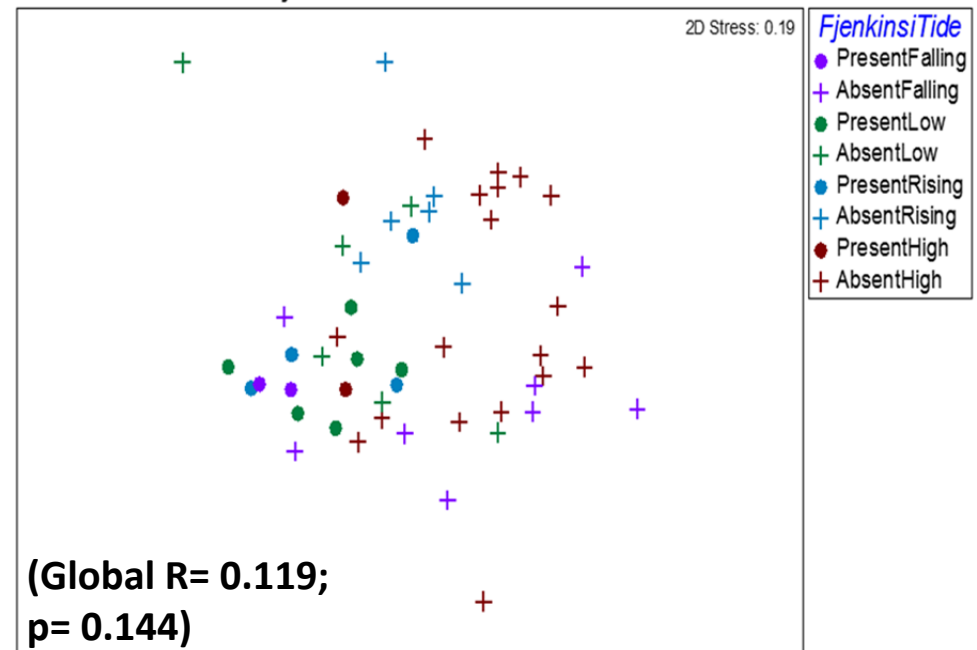
Results – Tidal Influence

- ▶ No significant difference in *F. jenkinsi* presence across tide stages

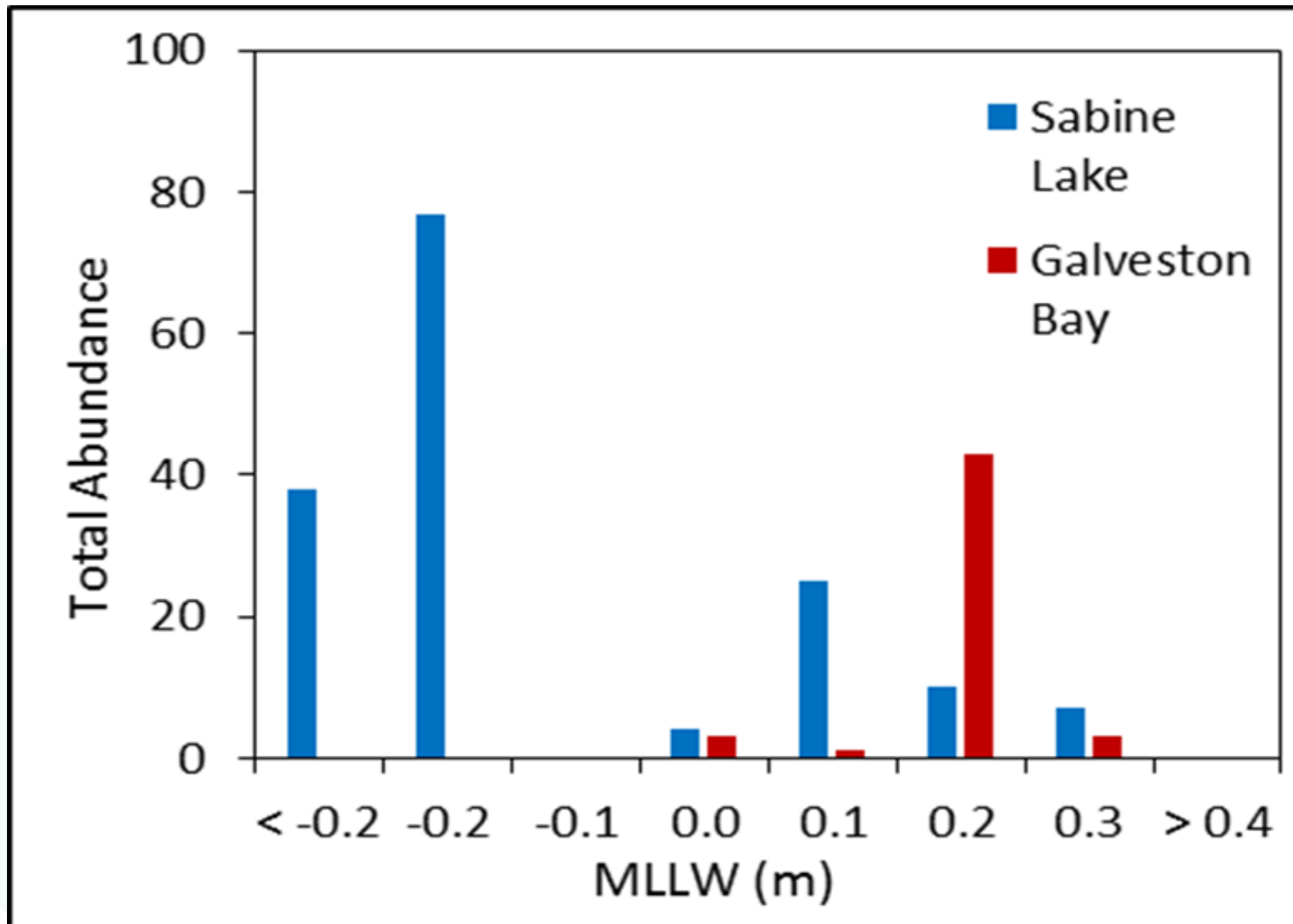
F. jenkinsi Presence in Galveston Bay vs Tide



F. jenkinsi Presence in Sabine vs Tide



Results - Water Level

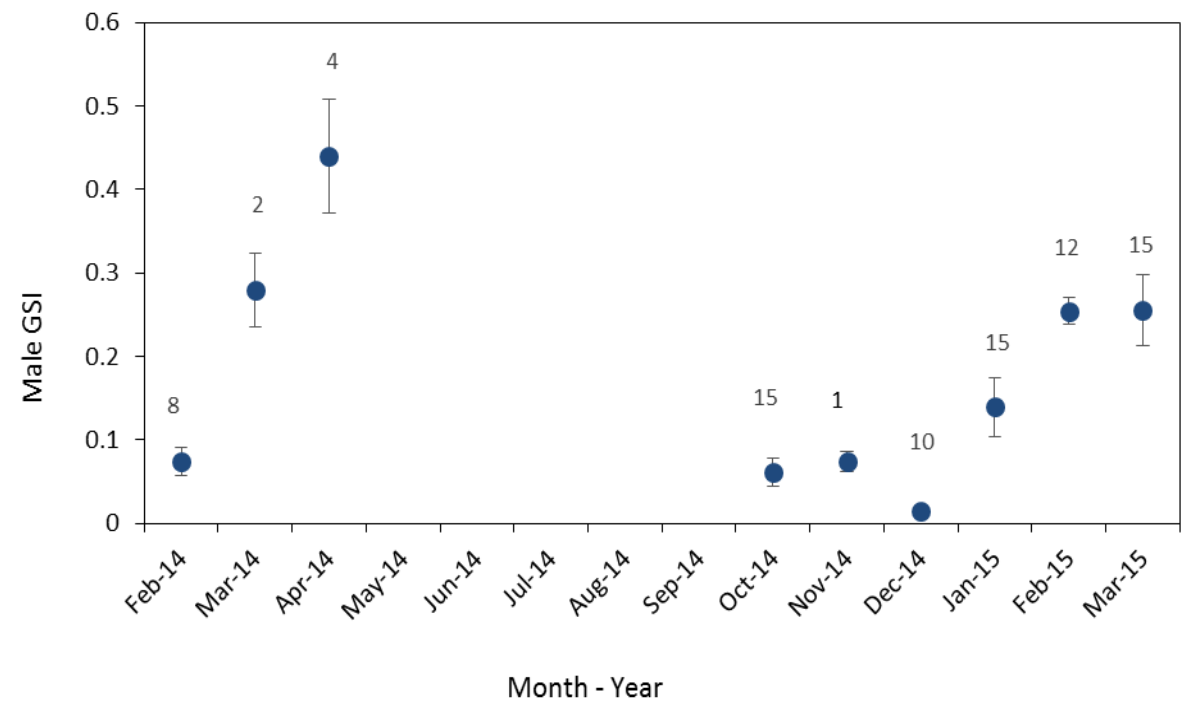
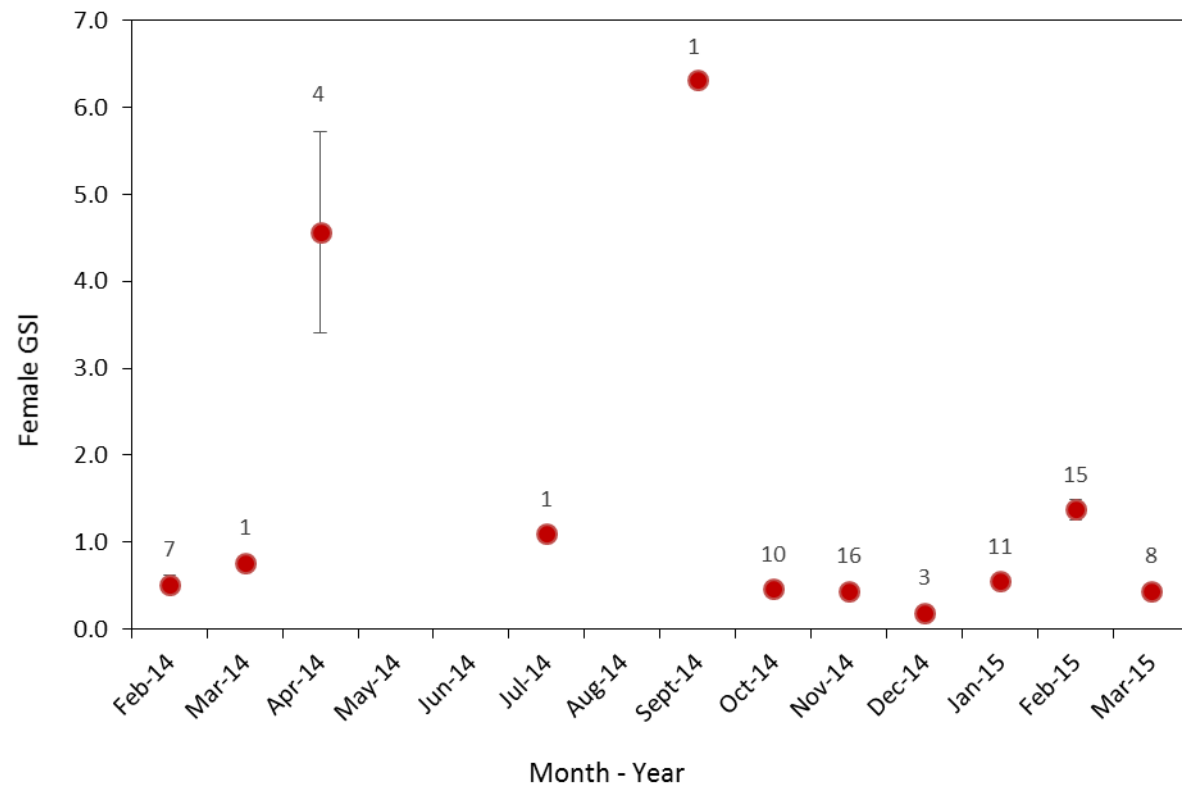


Results - GSI

▶ Mean GSI values significantly differ between months

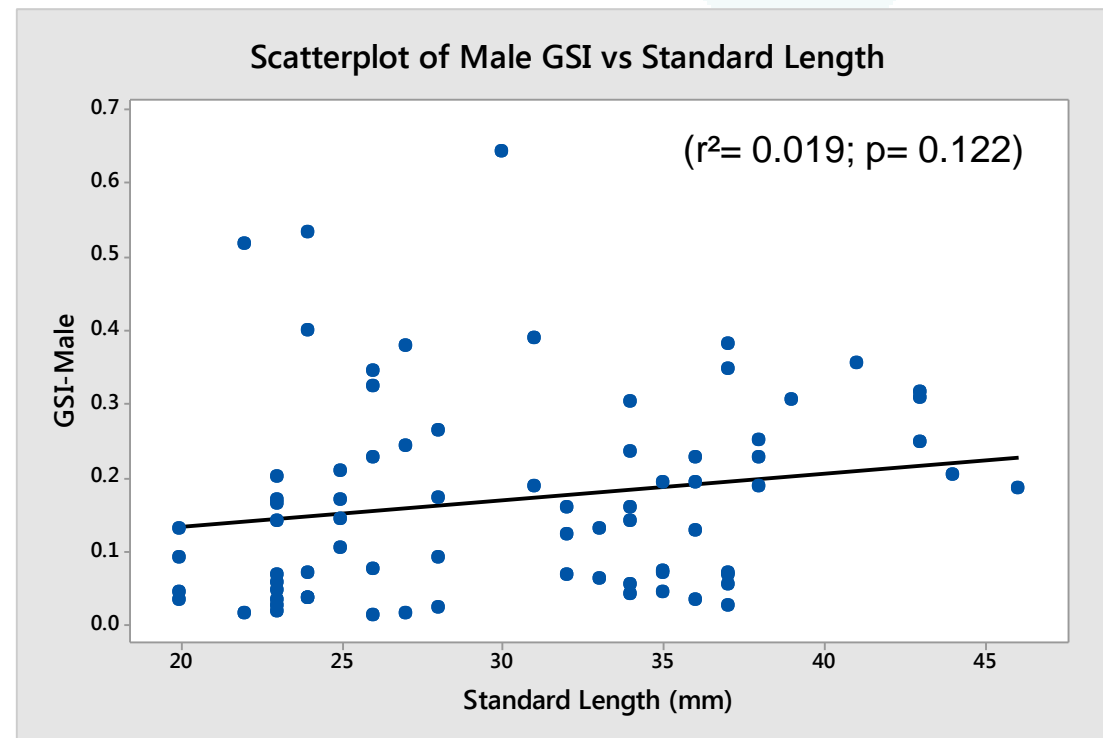
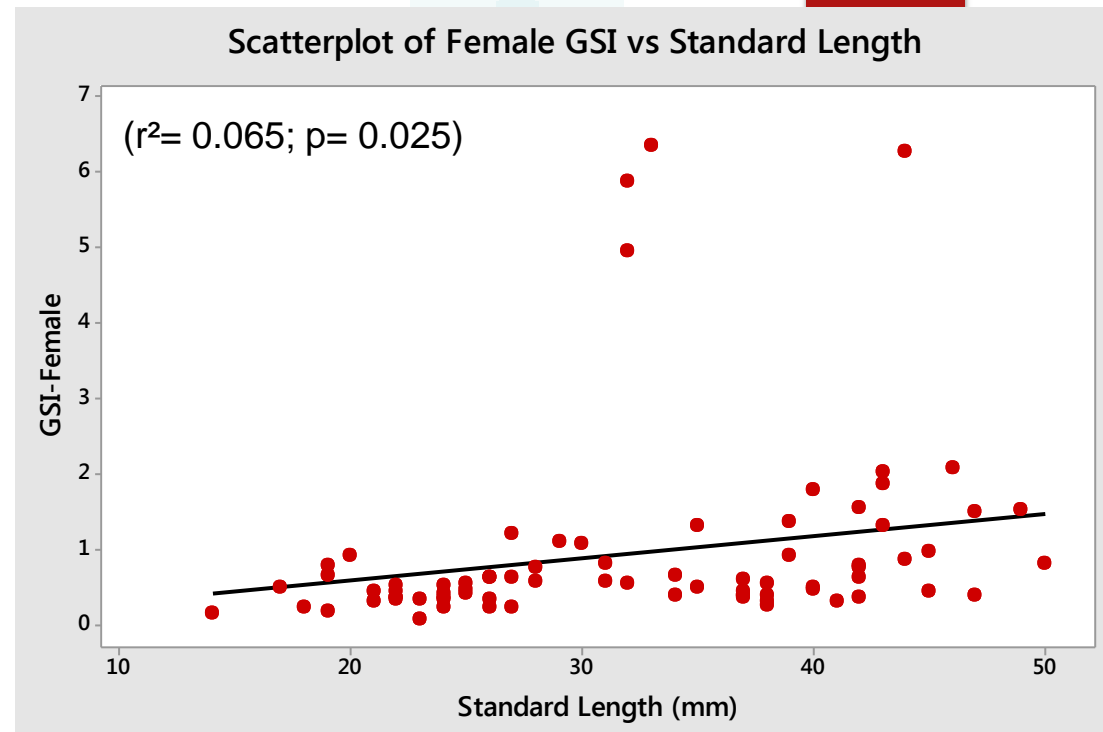
▶ Females ($F_{10,76} = 31.58; p < 0.001$)

▶ Male ($F_{8,74} = 13.11; p < 0.001$)



Results

- ▶ Female standard length showed a significant relationship to GSI value
- ▶ Male standard length did not show a significant relationship to GSI value
- ▶ Body weight not significantly correlate to GSI value
 - ▶ Females ($p= 0.085$)
 - ▶ Males ($p= 0.108$)



Conclusions

- ▶ *F. jenkinsi* found in multiple locations within Galveston Bay and Sabine Lake
- ▶ Salinity gradient *F. jenkinsi* found in may vary depending on the system and habitat availability
- ▶ Effectiveness of capturing individuals likely linked to sampling strategy
- ▶ Greatest reproductive activity in Spring and Summer months
- ▶ Larger females correlate to larger GSI values

Management Implications

- ▶ Balance of fresh and saltwater influence
- ▶ Maximization of saltmarsh edge habitat
- ▶ Maintain connectivity between habitats
- ▶ Targeted sampling methods needed for future monitoring



Acknowledgements



Questions?

