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Distribution, Abundance, and Habitat Use of the Saltmarsh Topminnow (*Fundulus jenkinsi*)

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Habitat

- In saltmarshes along the Gulf of Mexico from FL to TX
- In low to moderate salinities \(^1,2,3\)
- Link between *Spartina alterniflora* habitat and *F. jenkinsi* occurrences \(^4\)
- Utilize edge of saltmarsh habitat \(^5\)
- Small intertidal creeks act as access points for evading predators, foraging, and reproduction

Conservation Status

- Listed as a species of concern in LA, MS, AL, and FL¹

- 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

- TPWD responsible for coordinating with partners to monitor and address the needs of *F. jenkinsi* within Texas²,³

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¹ NOAA 2009; ² TPWD 2011; ³ TPWD 2012b
Significance of this Study

- Lack of information about the population and distribution of the Saltmarsh Topminnow within Texas

- Need to obtain more complete and comprehensive data on environmental and habitat characteristics of *F. jenkinsi* for effective conservation management
Study Objectives

- Estimate distribution and abundance of *F. jenkinsi* in Galveston Bay and Sabine Lake

- Identify factors attributing to differences in *F. jenkinsi* presence between sites in Galveston Bay and Sabine Lake
Location of Study

- Quarterly sampling within Galveston Bay and Sabine Lake, Texas
- Sites tidally influenced
- Site contained some degree of saltmarsh vegetation
Methods – Data Collection

- Water quality measurements
- Water levels
- Fish collected using straight seine
- Fish Assemblages
  - *F. jenkinsi* presence/absence
  - Species Abundance (N)
  - Diversity (H’)
Methods – Fish Community Data Analysis

- 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
  - Test differences in fish assemblages
    - *F. jenkinsi* presence vs absence
    - *F. jenkinsi* presence vs absence – Seasonal effects
    - *F. jenkinsi* presence vs absence – Tidal effects
Results – Distribution & Abundance
Results – Salinity Gradients

The bar chart shows the distribution of *F. jenkinsi* abundance across different salinity levels for two locations: Sabine Lake and Galveston Bay. The x-axis represents salinity levels, while the y-axis indicates the abundance of *F. jenkinsi*. Each bar represents a specific salinity level, with different colors indicating the location:
- Blue bars represent Sabine Lake.
- Red bars represent Galveston Bay.

The chart highlights the variation in *F. jenkinsi* abundance across the different salinity gradients for both locations.
Results – Conspecific Associations

<table>
<thead>
<tr>
<th>Species</th>
<th>Sites F. jenkinsi Present (%)</th>
<th>Sites F. jenkinsi Absent (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Saltmarsh Topminnow</td>
<td>100</td>
<td>0</td>
</tr>
<tr>
<td>Gulf Killifish</td>
<td>80</td>
<td>30</td>
</tr>
<tr>
<td>Seilfin</td>
<td>66.8</td>
<td>0</td>
</tr>
<tr>
<td>Molly Sheepshead Minnow</td>
<td>66.7</td>
<td>0</td>
</tr>
<tr>
<td>Mosquito Fish</td>
<td>46.7</td>
<td>0</td>
</tr>
<tr>
<td>Bayou Killifish</td>
<td>46.7</td>
<td>0</td>
</tr>
<tr>
<td>Diamond Killifish</td>
<td>46.7</td>
<td>0</td>
</tr>
<tr>
<td>Gulf Menhaden</td>
<td>17.8</td>
<td>27.3</td>
</tr>
<tr>
<td>Inland Silvershide</td>
<td>63.1</td>
<td>0</td>
</tr>
<tr>
<td>Bay Anchovy</td>
<td>47</td>
<td>0</td>
</tr>
<tr>
<td>Spot</td>
<td>41.1</td>
<td>0</td>
</tr>
<tr>
<td>Mullet</td>
<td>32.4</td>
<td>0</td>
</tr>
<tr>
<td>Atlantic Croaker</td>
<td>26</td>
<td>0</td>
</tr>
</tbody>
</table>
Results – Site Diversity

Diversity (H') of Site Assemblages

Site Diversity (H')

N1= 72, N2=1; W= 458; p= 0.547
N1= 38, N2= 9; W= 365 P< 0.001

F. jenkinsi Absent F. jenkinsi Present
Galveston

F. jenkinsi Absent F. jenkinsi Present
Sabine
Results – Analysis of Similarity

A one-way ANOSIM showed a significant difference in the fish community assemblages between Galveston Bay and Sabine Lake, Texas ($R=0.08$, $p=0.001$)

ANOSIM showed significant difference between assemblages where *F. jenkinsi* present vs absent at both Sabine Lake ($R=0.14$, $p=0.013$) and Galveston Bay ($R=0.18$, $p=0.008$)
F. jenkinsi Presence in Galveston Bay vs Season

2D Stress: 0.19

(Global R = 0.34, p = 0.003)
Global $R = 0.41$

$p = 0.001$
F. jenkinsi Presence in Galveston Bay vs Tide

FjenkinsiTide Stage
- PresentFalling
- AbsentFalling
- PresentLow
- AbsentLow
- AbsentRising
- PresentHigh
- AbsentHigh

2D Stress: 0.19

Global R= 0.13
p= 0.112

F. jenkinsi Presence in Sabine vs Tide

Global R=0.26
p= 0.052
Conclusions

- *F. jenkinsi* were 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

- Seasonal differences influence assemblages with *F. jenkinsi* presence

- Water level may be a contributing factor influencing the presence of *F. jenkinsi* in our samples and the conspecifics associated with their presence
Future Analysis

- Further analyses will be done to evaluate specific effects water level and other environmental factors have on *F. jenkinsi* presence.

- Comparison of sampling methods (*Breder Trap* vs *seine*)
Acknowledgements
Questions?