Assessing the effects of freshwater inflows and other key drivers on the population dynamics of blue crab and white shrimp using a multivariate time-series modeling framework: Phase 2

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Phase 1 summary

- Data from the Texas Parks and Wildlife Department (TPWD) Coastal Fisheries monitoring program, U.S. Geological Survey (USGS) flow gage stations, and several other sources were acquired for 1982–2013.

- Drivers of blue crab and white shrimp population dynamics were assessed using multivariate autoregressive (MAR) models.

- Detected significant lagged effects of predators, water temperature, salinity, and river discharge on the abundances of both focal species.

- Effects of freshwater inflows on focal species abundances must be assessed in conjunction with other drivers at time lags of up to two years.
# Phase 2 Timeline

<table>
<thead>
<tr>
<th>Tentative timeline</th>
<th>Accomplishments</th>
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<tbody>
<tr>
<td>2016 Apr-May</td>
<td>✔️ Update datasets and rerun original models</td>
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<tr>
<td>2016 Jun-Aug</td>
<td>✔️ Reformat datasets to reflect TCEQ inflow standard seasonal increments</td>
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<td>2016 Sep-Dec</td>
<td>✔️ Run new sets of MAR models using reformatted data ✔️ Assess whether particular seasons are more influential on focal species abundances</td>
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<tr>
<td>2017 Jan-Jun</td>
<td>✗ Present results at national meeting ➡️ Model adaptation for inflow scenario assessment</td>
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<tr>
<td>2017 Jul-Oct</td>
<td>• Prepare final report • Present results to GSA BBASC • Submit final report • Submit data and annotated R code</td>
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Behind schedule
Updated Data

Seasonal divisions:
- Winter (Jan-Mar)
- Spring (Apr-Jun)
- Summer (Jul-Sep)
- Fall (Oct-Dec)
Updated Data

Seasonal divisions:

- Winter (Jan-Mar)
- Spring (Apr-Jun)
- Summer (Jul-Sep)
- Fall (Oct-Dec)

![Graph showing seasonal divisions with discharge and salinity data from 1982 to 2015.](image-url)
Updated vs. Original Data Models
Updated vs. Original Data Models
Seasonal models

**Blue Crab (trawl)**

- Temperature-related

**White Shrimp (trawl)**

- Salinity- & Discharge-related
Seasonal model adaptation

- Simplify seasonal model configurations and code
  - See how omitting predator effects and intraspecific effects changes model results
  - Model selection not needed for inflow assessment model ⇒ use native R models

- Simulate inflow values based on various scenarios

- Run model with simulated datasets to assess whether focal species abundances increase or decrease in response to inflow changes