Testing P-Sea WindPlot for Expanded Sampling of the Fleet for Effort Monitoring in the Gulf of Mexico Shrimp Industry

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Outline of Presentation

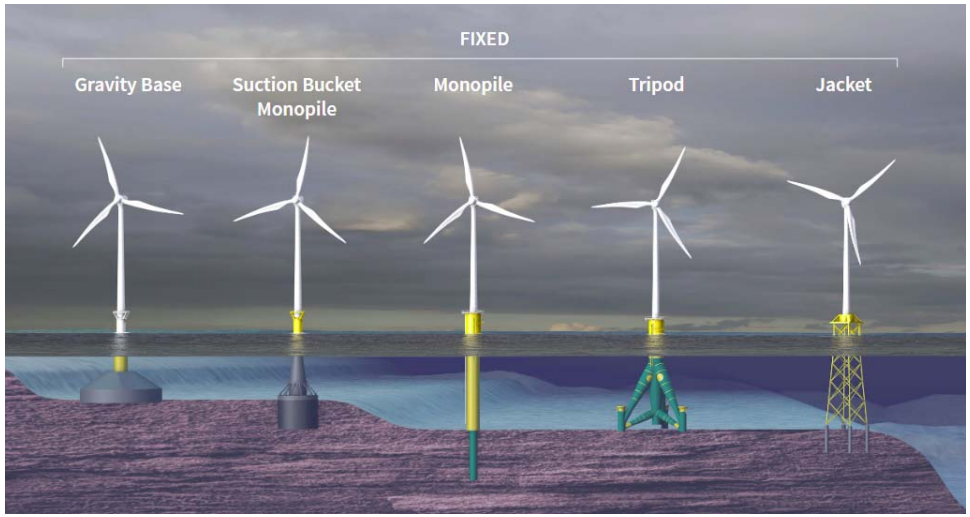
- Background & Goals
- Summary of prior work
- Results of final testing
- Recommendations

Background

Monitoring shrimping effort is important

- Assessing how shrimping impacts others
  - Calculating takes and interactions with sea turtles
  - Red Snapper stock assessments

- Assessing how others impact shrimping
  - Artificial reef placement
  - Infrastructure associated with offshore energy
  - Aquaculture siting



Background

- Previously, monitoring was achieved by NOAA Fisheries with a cELB (cellular electronic logbook)
  - Vessel speed is indicative of fishing behavior, shrimp towing occurs between 1.9 and 3.8 knots.
    - By recording a boat's (1) latitude/longitude and (2) date/time vessel speed can be estimated.
    - Recording these two standard data elements at 10-minute intervals over the length of a trip allows the amount of towing time (effort) to be calculated.
  - Data were transmitted via 3G cellular networks (Verizon) to NOAA Fisheries for estimating effort, but in December 2020 Verizon discontinued 3G service
    - Data are recorded to cELB, but there is no mechanism for automatic retrieval
    - Shrimpers must return/replace SD cards within the cELB units manually

Background

- Shrimping industry stakeholders suggested that existing navigational software on shrimp boats could be used to obtain the same data as recorded by cELBs
- Southern Shrimp Alliance (SSA) funded LGL Ecological Research Associates to work with the P-Sea WindPlot developer to modify the software to record the same information as the existing cELB program (location data at 10-minute intervals) in a way that would be compatible with existing software routines that use that data to calculate shrimping effort.
- These efforts were successful, but P-Sea WindPlot was not designed to automatically transfer data.
- The automatic transfer of position data (similar to the cELB system) was considered an essential component of any effort monitoring system by NOAA Fisheries.

Goals

The Gulf of Mexico Fisheries Management Council funded the project, 'Expanded Sampling of the Fleet for Effort Monitoring in the Gulf of Mexico Shrimp Industry' with the following five objectives:

(1) update P-Sea WindPlot so that it electronically transmits ELB files with the latitude/longitude and date/time in the format used in the cELB program to a specified destination (e.g., server);

(2) develop a mechanism by which computers using P-Sea WindPlot can connect to a mobile communications services network;

(3) conduct initial tests on five commercial shrimp boats from across the Gulf of Mexico;

(4) troubleshoot and revise software/hardware and implementation protocols as necessary;

(5) conduct secondary tests on 20* additional commercial shrimp boats.

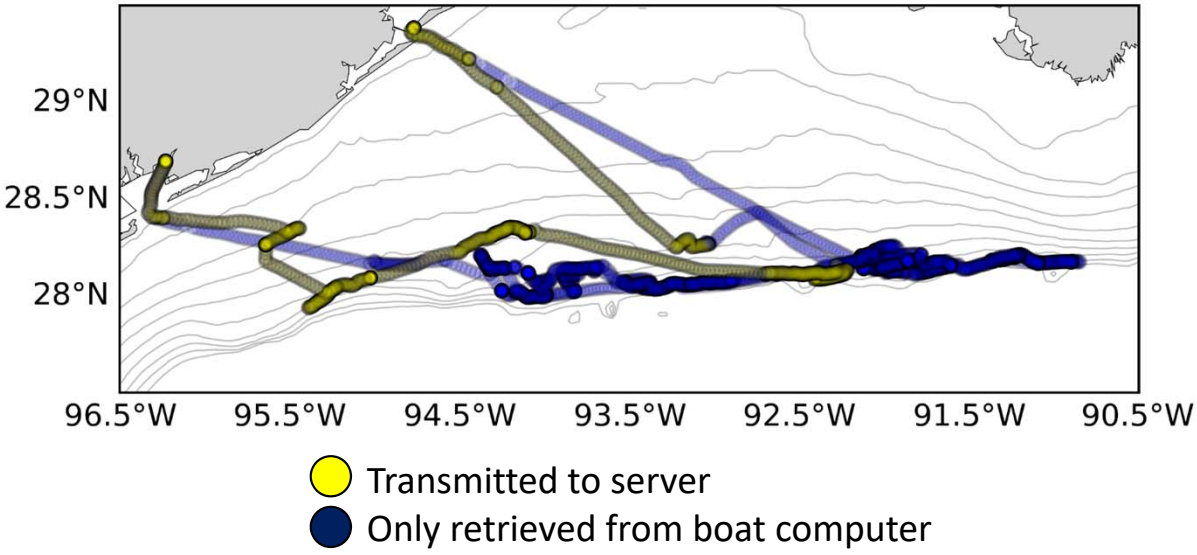
*Owing to (a) the need for more extensive troubleshooting and desktop testing of P-Sea WindPlot and (b) a major drop in shrimping activity as a result of Hurricane Ian and high fuel prices, only 10 tests were conducted.

Goal 1 and 2: Software update and data transfer

- Software Update
  - An FTP client was successfully added to P-Sea WindPlot and can connect to internet with cellular hotspot
- Desktop testing
  - P-Sea WindPlot writes and sends position data to LGL server when connected to internet by cellular hotspot
  - Continues logging data when hotspot is out of cellular range
  - Automatically reconnects to hotspot and transmits unsent data upon return to cellular range

Goal 3: Preliminary Testing

- Installations of P-Sea WindPlot on 8 vessels
  - 3 vessels out of Bayou La Batre
  - 5 vessels out of Palacios
- 9 trips to Palacios for installing revisions (6/15 – 10/03)
  - Typically, ~2 boats per trip.
  - Lots of software troubleshooting, some hardware issues.



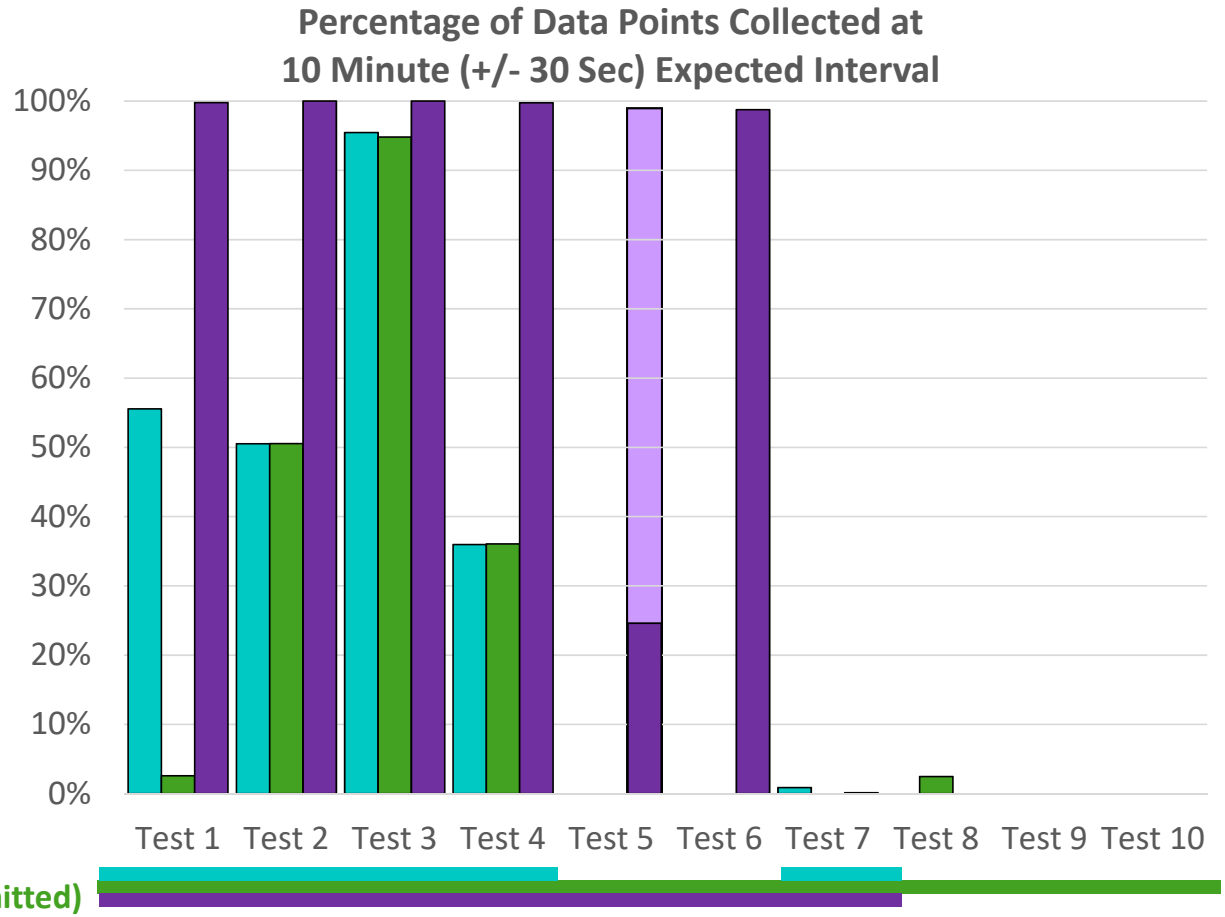
Goal 3: P-Sea WindPlot Problems

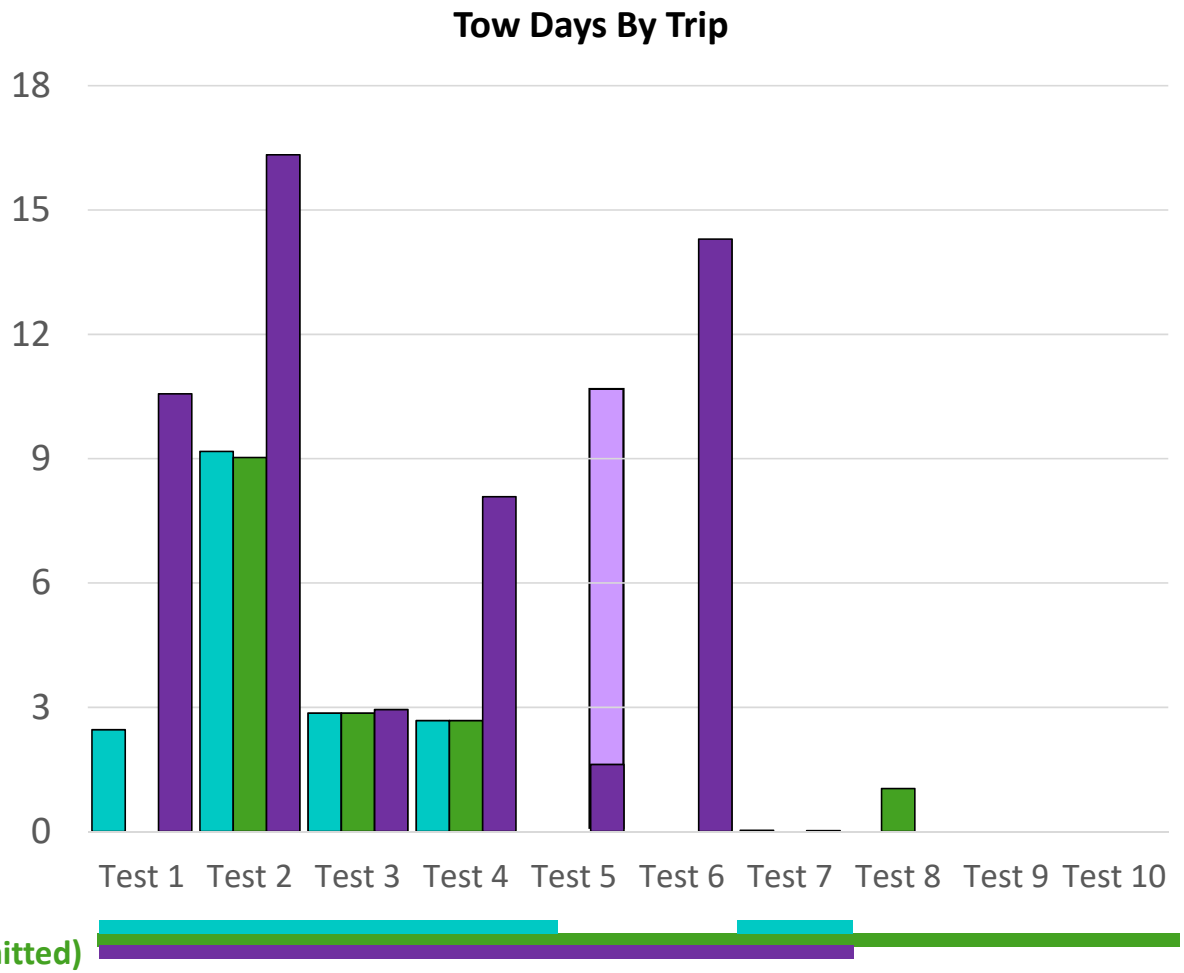
- Installation issues:
  - Lots of errors, e.g., differing Windows versions resulted in incompatibilities
- Technical issues
  - e.g., GPS devices on some vessels give the wrong date/time, P-Sea WindPlot freezing
- People problems:
  - e.g., Some captains don't like us messing with their computers, some turn off their computers, some forget to turn on hotspots
- *<u>Biggest hurdle</u>: Each computer is its own, unique set of problems. It's hard to guarantee that what we install won't "mess something up"*

Goal 4: Revised P-Sea WindPlot software

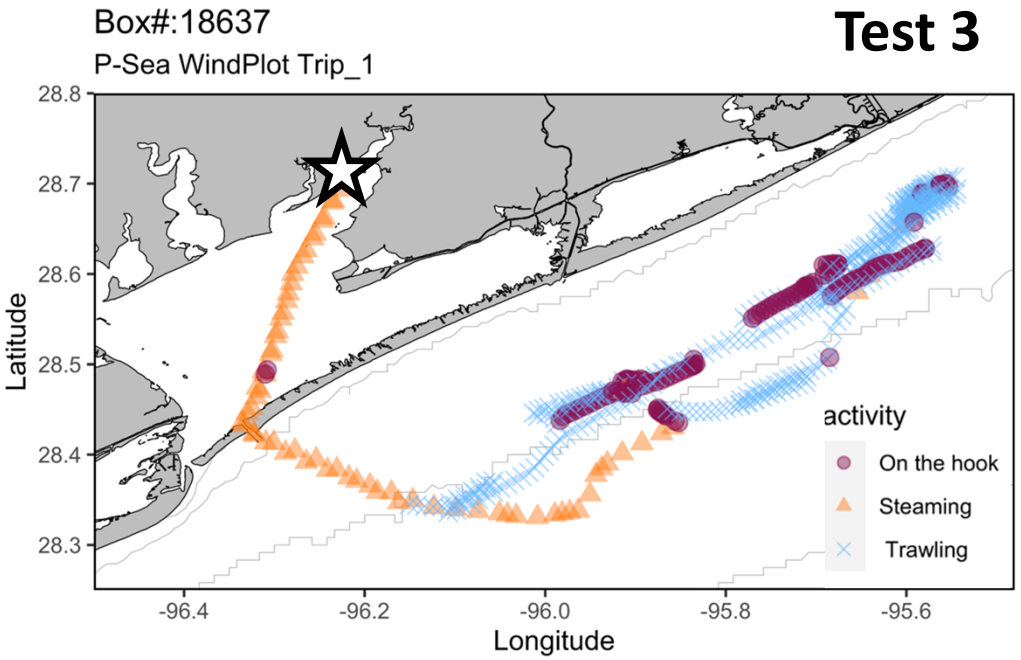
- Installer can select the attempted transmission frequency (e.g., every 10 minutes or every 24 hours) to reduce freezing/plotting issues
- Installer can input the shrimp boat's permit number as the unique ID for ELB files
- Revision of the function that sends all ELB files from a vessel's computer to the server (to help with the "partial" transmission issue)
  - Each position record sent to server as an individual file, rather than appending to a single, large file.
- Installer can select the ELB program to use the GPS time or computer time (based on which one is more accurate)

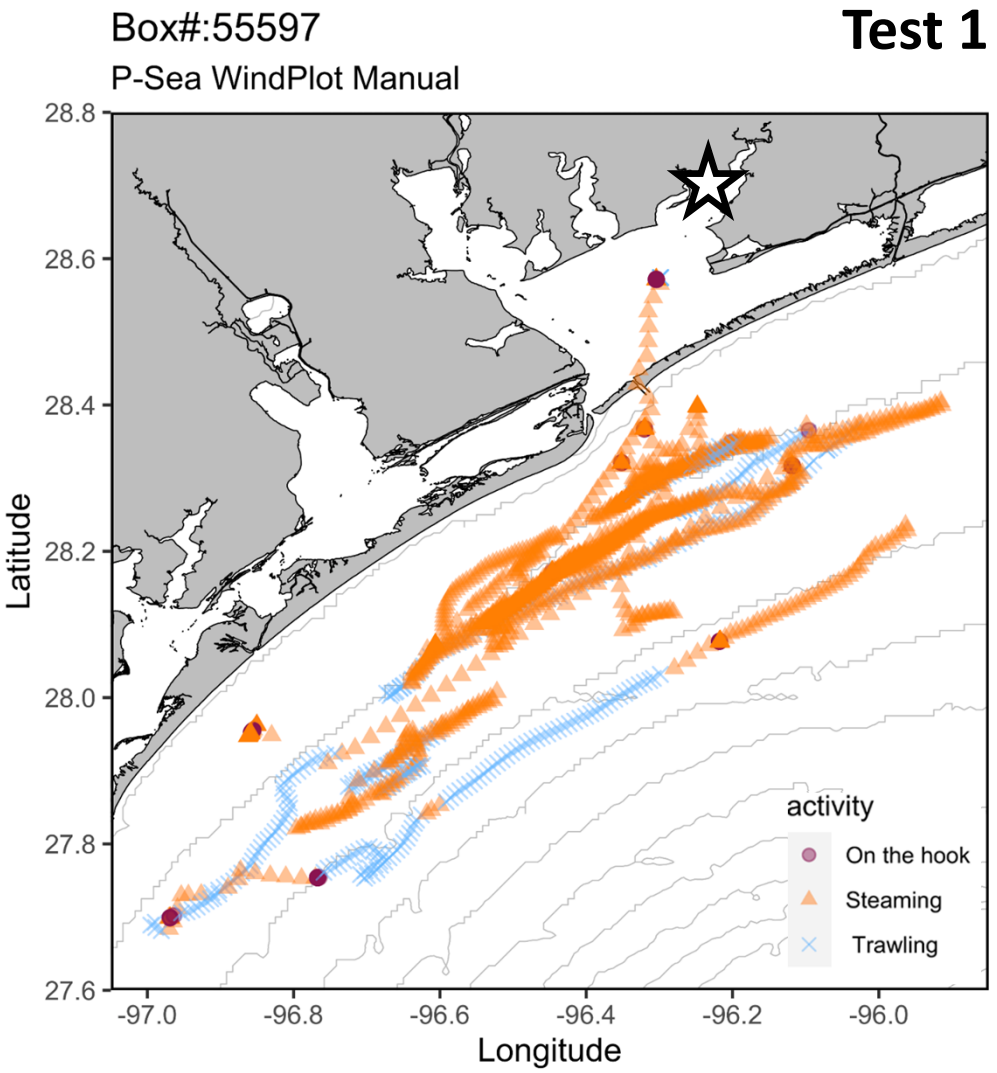
Goal 5: Vessel Testing




Tow Days By Trip
18
15
12
9
6
3
0
Test 1
Test 2
Test 3
Test 4
Test 5
Test 6
Test 7
Test 8
Test 9
Test 10
P-Sea (manually retrieved)
P-Sea (automatically transmitted)
cELB (new cELB)

Position data run through the "LGL Effort Algorithm"





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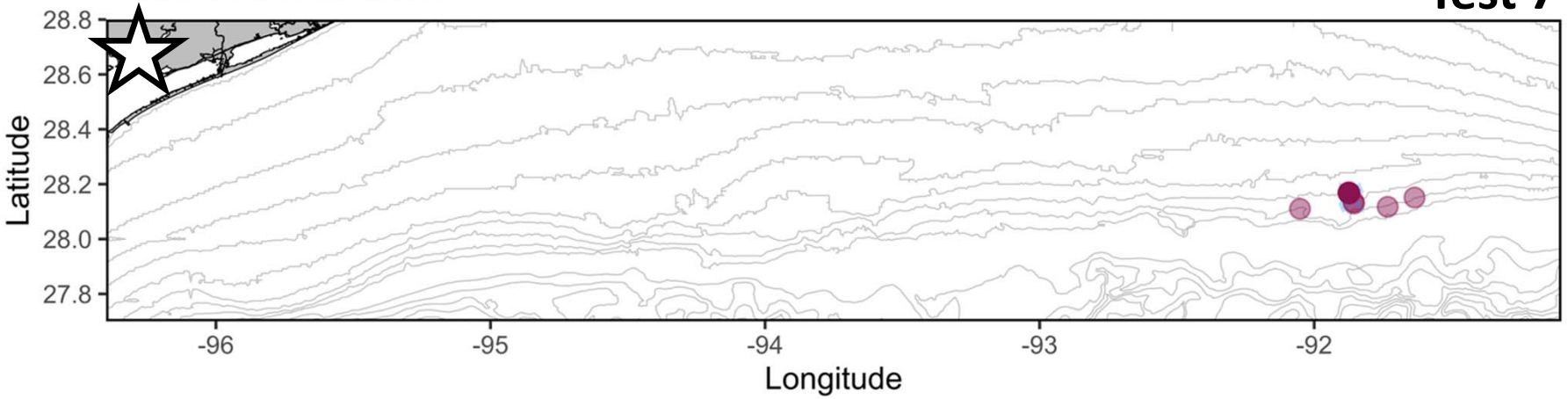
P-Sea WindPlot Manual

Test 7



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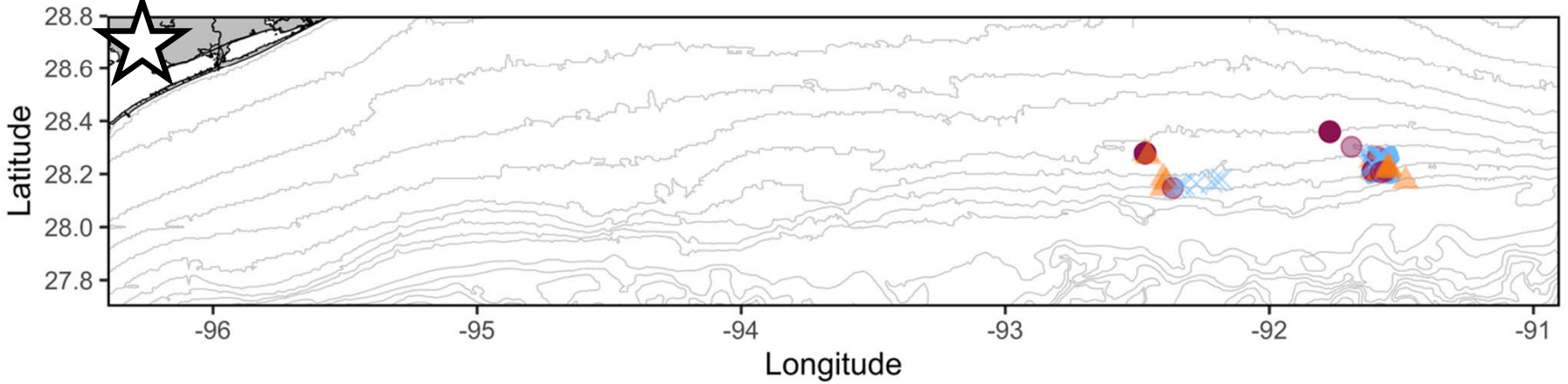
P-Sea WindPlot

Test 8



Goal 5: Vessel Testing Summary

Test #	Dates	Port	P-Sea Details	Data Recorded / Transmitted	Problems Encountered
Test 1	11/30 – 12/19 2022	Palacios, TX	New Laptop/GPS	55.6% / 2.6%	Failed to transmit after leaving port, erratic recording. Likely Windows 11 incompatibility.
Test 2	11/29 – 12/18 2022	Palacios, TX	New Laptop/GPS	50.5% / 50.5%	Erratic (on/off) recording and transmission. Likely Windows 11 incompatibility.
Test 3	11/28 – 12/3 2022	Palacios, TX	Captain Desktop/GPS	95.4% / 94.8%	Performed well.
Test 4	12/8 – 12/17 2022	Palacios, TX	Captain Desktop/GPS	36.0% / 36.0%	P-Sea WindPlot “froze” during trip resulting in captain turning off computer for parts of the trip
Test 5	11/27 – 12/12 2022	Palacios, TX	Captain Laptop/GPS	-- / 0%	Failed to transmit after leaving port Laptop was old/unreliable
Test 6	11/27 – 12/15 2022	Palacios, TX	Captain Laptop/GPS	-- / 0%	Failed to transmit after leaving port Laptop was old/unreliable
Test 7	11/27 – 12/16 2022	Palacios, TX	Captain Laptop/GPS	0.8% / 0%	Failed to transmit after leaving port. Capt. may have primarily used another P-Sea WindPlot version
Test 8	10/27 – 12/8 2022	Palacios, TX	Captain Desktop/GPS	-- / 2.5%	Scattered transmissions of location. Capt. proficient with P-Sea WindPlot troubleshooting
Test 9	11/27 – 12/17 2022	Palacios, TX	Captain Laptop/GPS	-- / 0%	Failed to transmit after leaving port. Unsure why.
Test 10	12/3 – 12/19 2022	Tampa, FL	New Laptop/GPS	-- / 0%	Failed to transmit after leaving port. Unsure why.

Conclusions and Recommendations

- Psea Windplot continues to display a variety of malfunctions despite extensive troubleshooting and revision.
  - Erratic performance depending on specific vessel hardware/software configurations.
  - Potential for captain introduced error
  - Installation process on onboard computers received pushback from some captains (don't mess with their navigation software).
- Psea Windplot cannot perform according to requirements of the shrimp industry, Council, or NOAA Fisheries and is not able to reliably record and transmit vessel position data as necessary.
- We do not recommend further investment in Psea Windplot as a method to record shrimp vessel positions for calculating effort. It's a great piece of software for navigational purposes.