Tab D, No. 4(b)

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Progress Report

24 October 2022

Expanded Sampling of the Fleet for Effort Monitoring in the Gulf of Mexico Shrimp Industry

Outline

- Background
  - Problem
  - Past work
- Goals
- Previous Results
  - Software update / desktop testing
- Results of Vessel Testing
  - Problems encountered
  - Status of tests and steps forward
- Questions

Background

- Monitoring shrimping effort is important.
  - Assessing how shrimping impacts others
    - Calculating takes and assessing potential for interactions with sea turtles
    - Red Snapper stock assessments
  - Assessing how others impact shrimping
    - Artificial reef placement
    - Infrastructure associated with marine-based energy
    - Aquaculture siting

Background

- Previously, monitoring was achieved with a cELB (cellular electronic logbook)
  - Vessel speed is indicative of fishing behavior, shrimp towing occurs between 2 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), but in December 2020 Verizon discontinued 3G service
    - Data is recorded to cELB, but there is no mechanism for automatic retrieval

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.

Goals

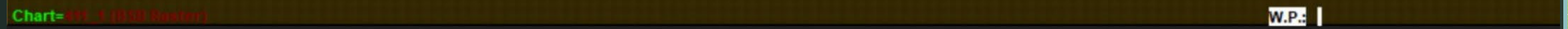
- The GMFMC funded ‘Expanded Sampling of the Fleet for Effort Monitoring in the Gulf of Mexico Shrimp Industry’ with the following five objectives:
  - (1) update P-Sea WindPlot so that it electronically transmits ELB files with the latitude/longitude and date/time in the format used in the cELB program 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 twenty additional commercial shrimp boats.

Previous Results

- Software Update
  - An FTP client was successfully added to P-Sea WindPlot
    - Secure Shell (SSH) transfers files to a designated server
  - At the start of a new trip, P-Sea WindPlot automatically writes a file designated by unique ID based on either the MMSI number for the boat (an AIS designation) or the P-Sea WindPlot Key and the date/time the trip began.
  - Every 10 minutes, the date/time (GMT) and lat/lon are appended to this file.
  - If the computer is connected to internet, every 10 minutes this file is transferred to a designated server.
  - If the internet connection is lost, data continues to be recorded and upon re-connection with the internet, files are automatically transmitted to the server.
  - File naming conventions and processing ensure that no duplicate files are transmitted to the server.

Previous Results

- Desktop testing
  - Computer wired with GPS and updated version of P-Sea WindPlot
  - Verizon hotspot used as connection
  - Local LGL server used as repository
  - Success - simulated logged ELB files sent automatically to server from P-Sea WindPlot upon connection to internet signal
  - Success – P-Sea WindPlot continues to log data when hotspot out of range
  - Success – P-Sea WindPLot automatically reconnects to hotspot when in range and transmits unsent data, seamlessly continues transferring data thereafter



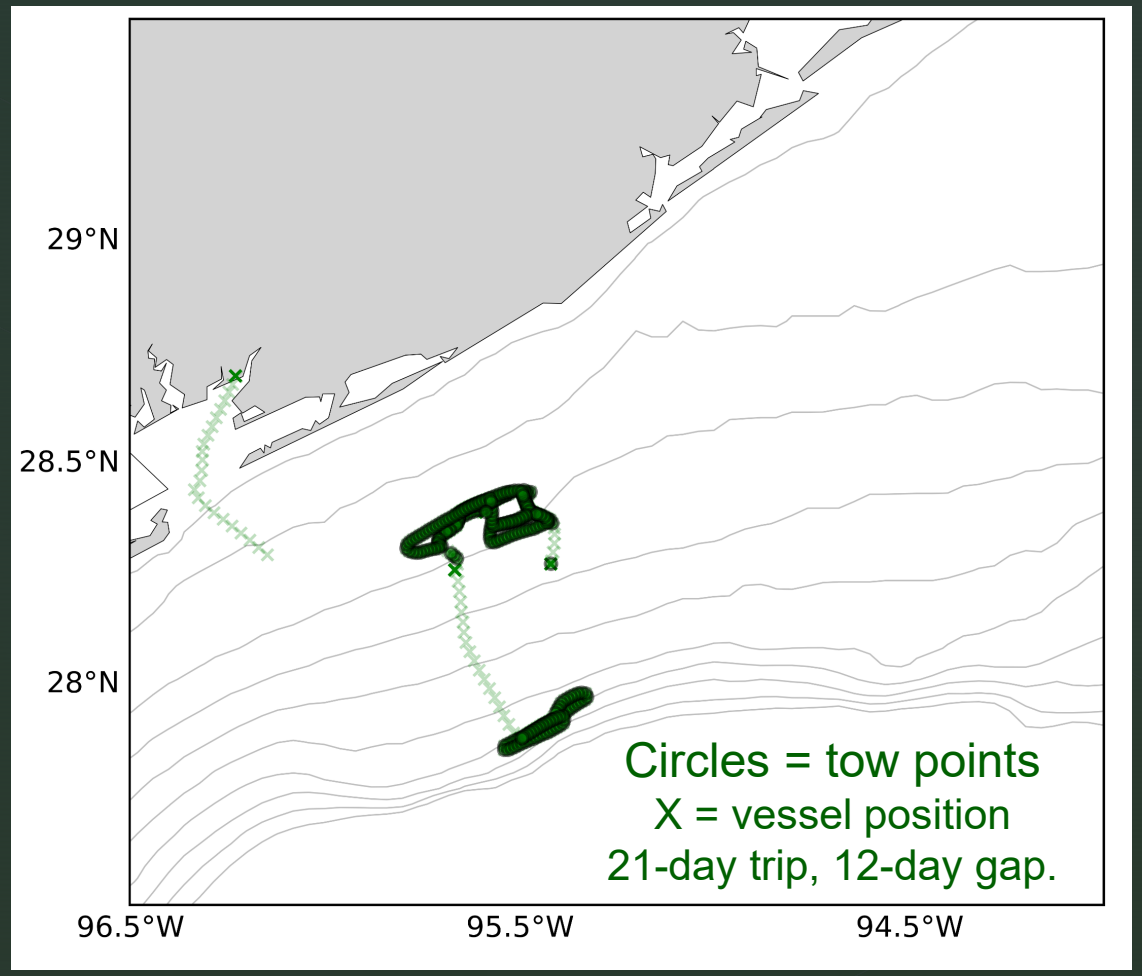
Results of Vessel Testing

- 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.

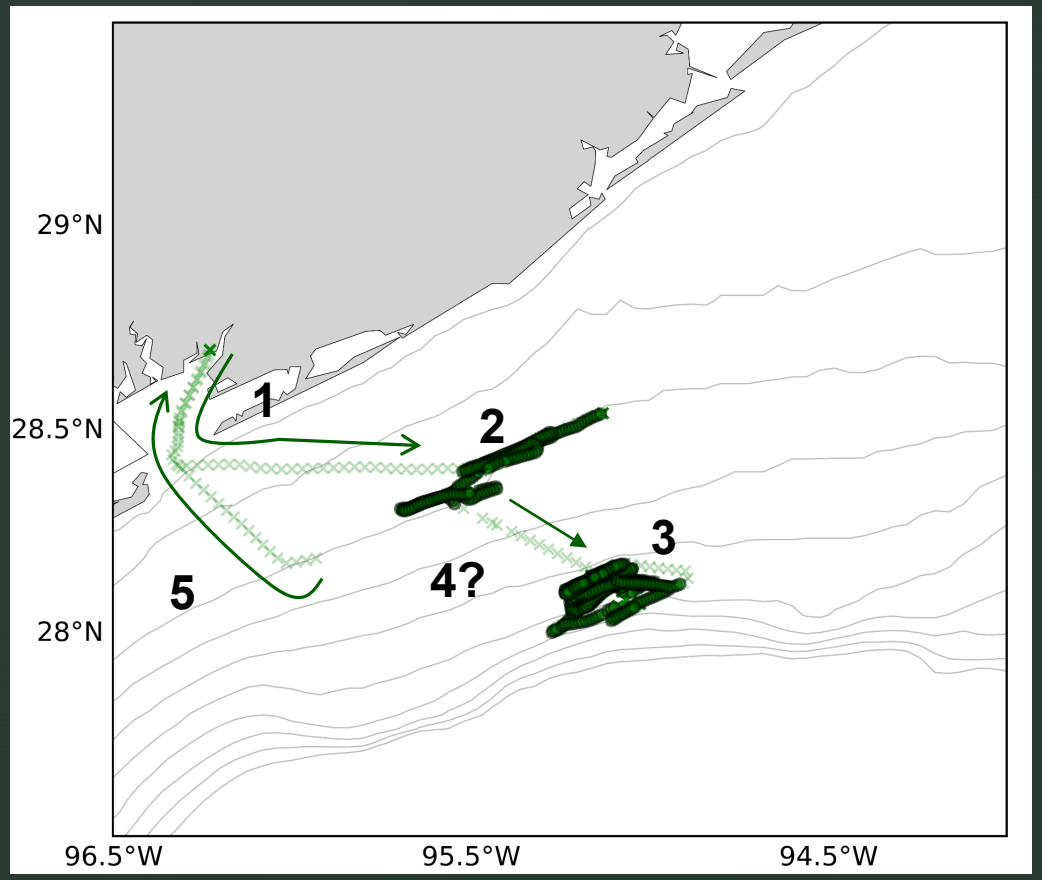
Results of Vessel Testing

Gappy data was generally characteristic of our initial tests (June – August)

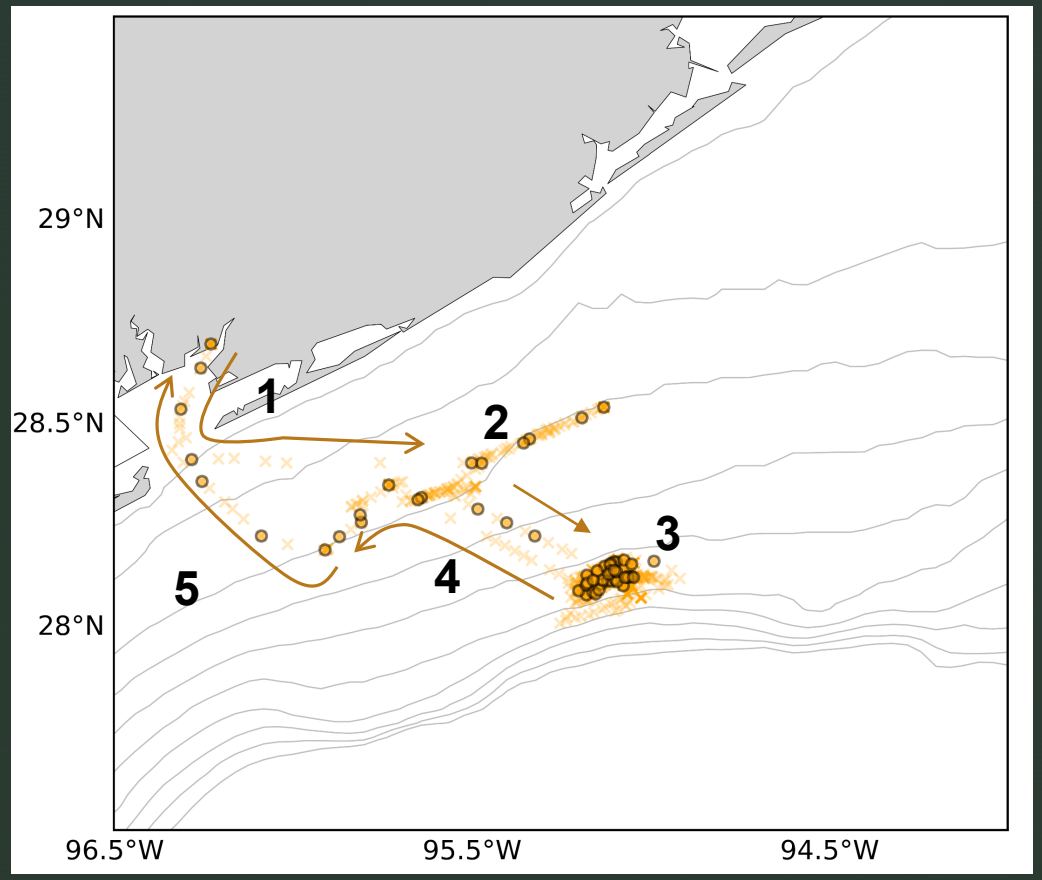
But why?



Results of Vessel Testing



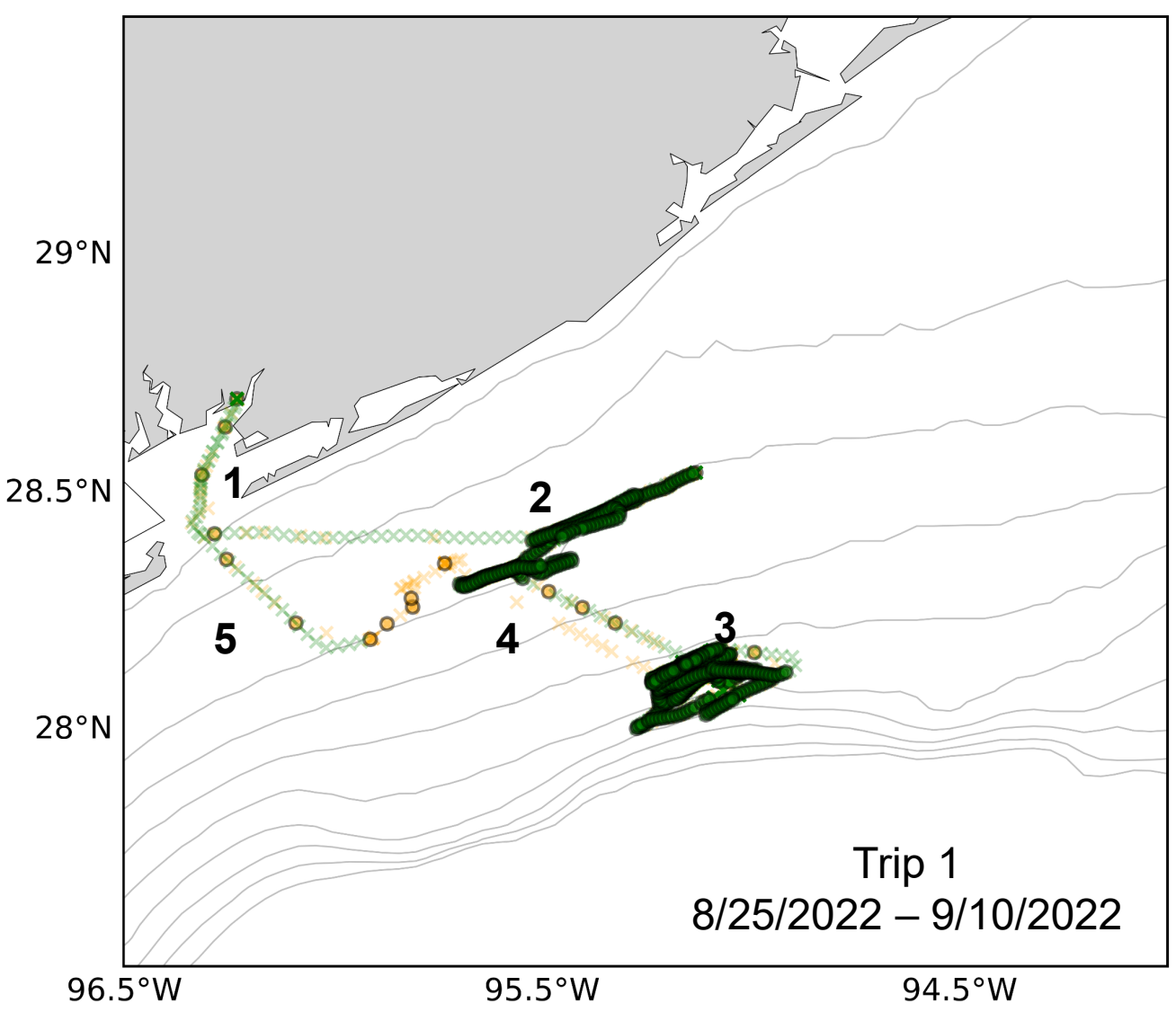
PSea WindPlot
Circles = tow points
X = vessel position



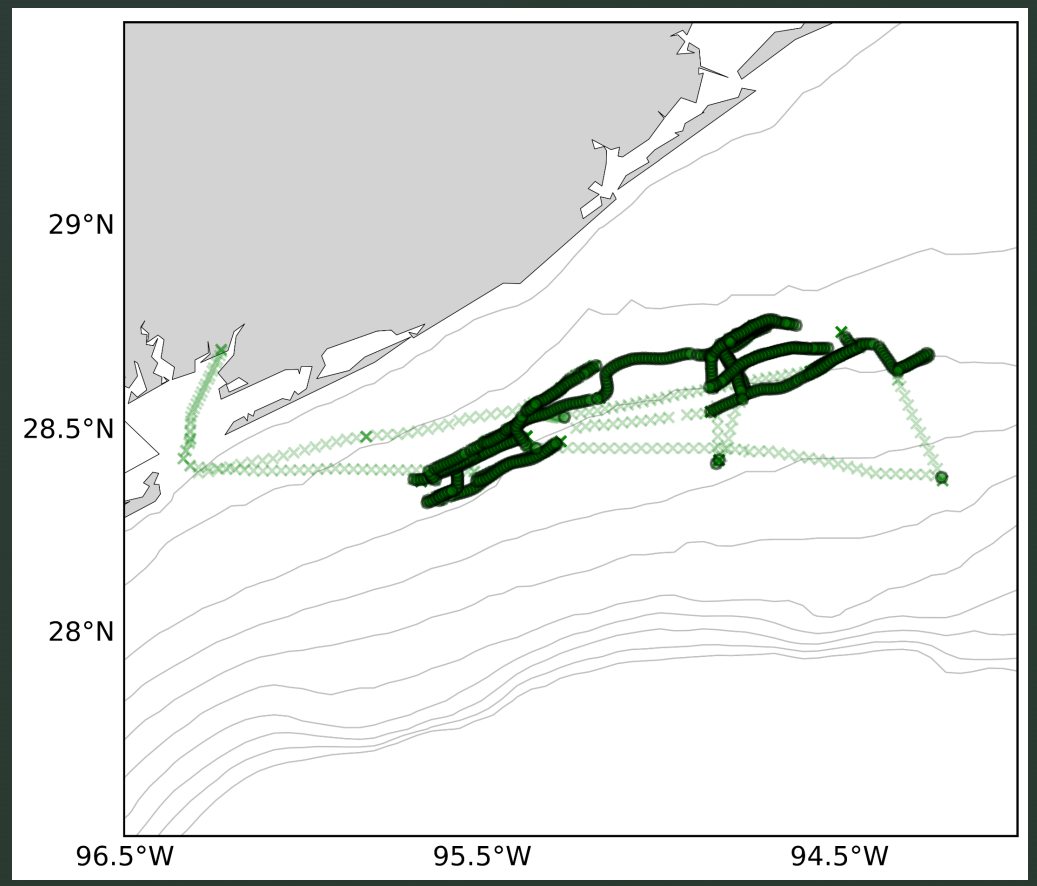
Solar-powered satellite GPS
Circles = tow points
X = vessel position

Trip 1
8/25/2022 – 9/10/2022

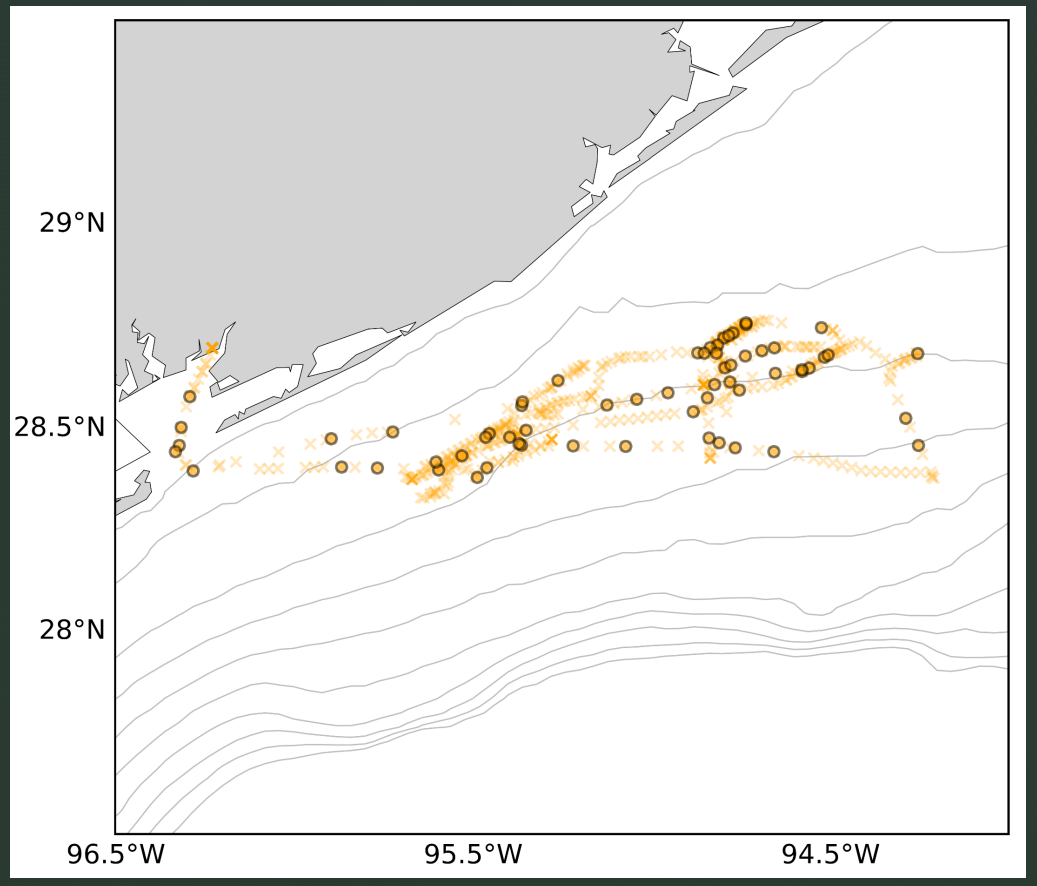
Results of Vessel Testing



Results of Vessel Testing



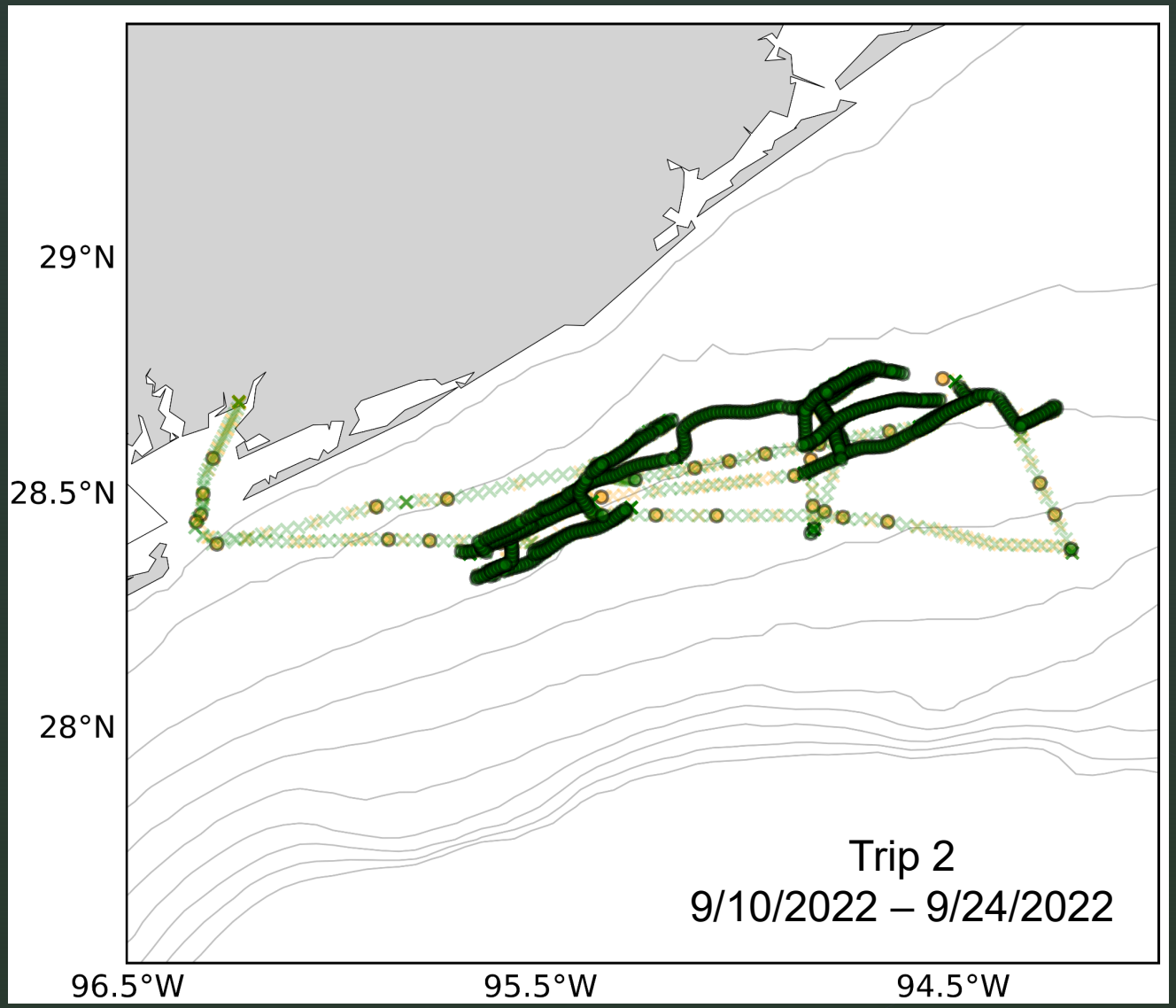
PSea WindPlot
Circles = tow points
X = vessel position



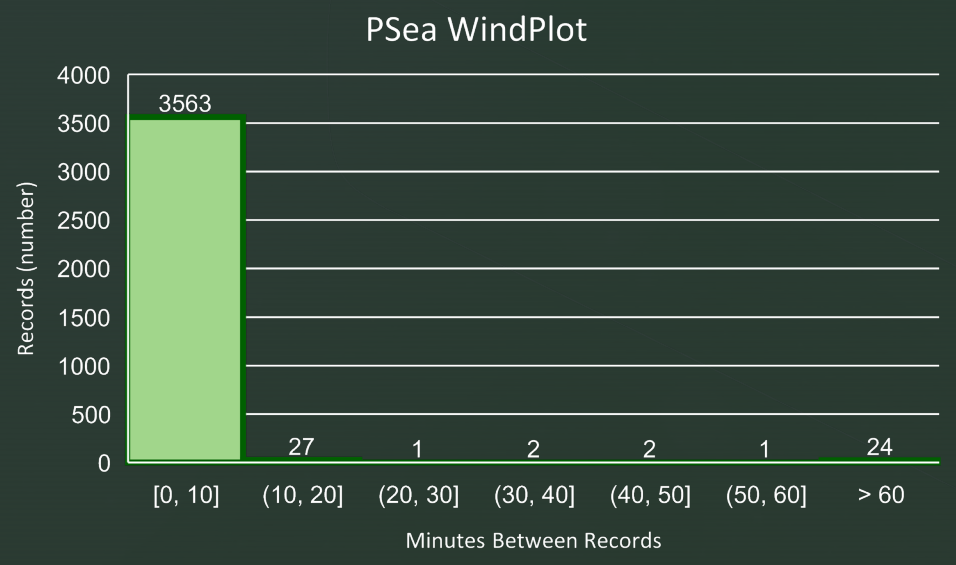
Solar-powered satellite GPS
Circles = tow points
X = vessel position

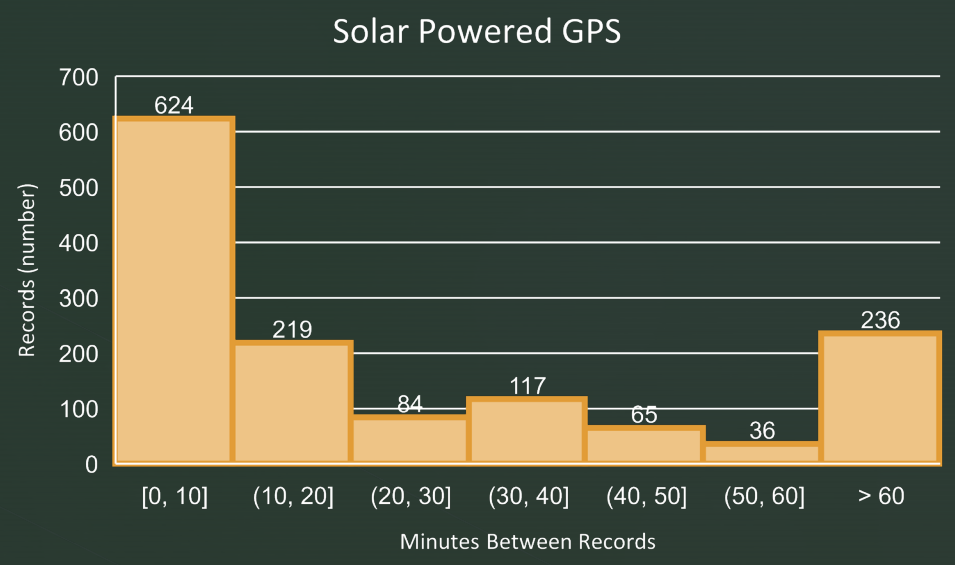
Trip 2
9/10/2022 – 9/24/2022

Results of Vessel Testing



Results of Vessel Testing

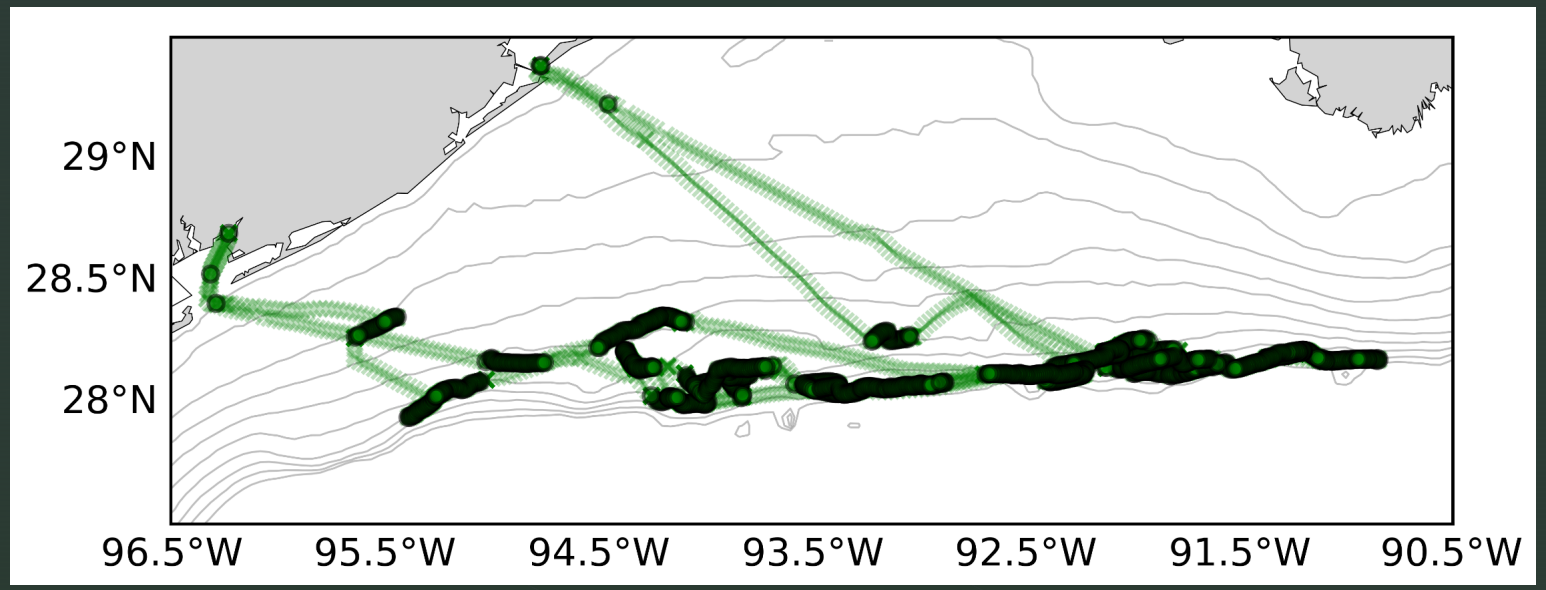


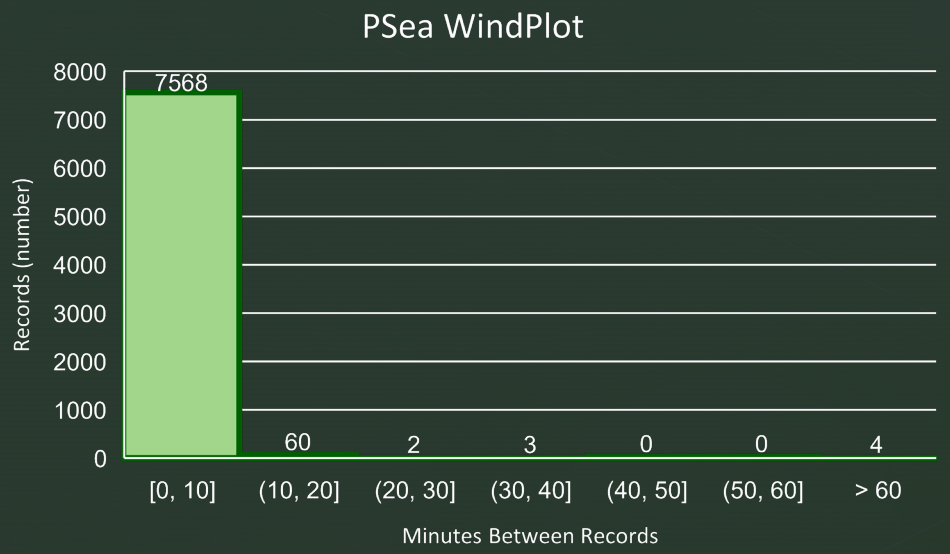


PSea WindPlot
98.5% of records 10 min or less
12.7 tow days
8/25/2022 – 9/24/2022

Solar-powered satellite GPS
45% of records 10 min or less
1.7 tow days
8/25/2022 – 9/24/2022

Results of Vessel Testing

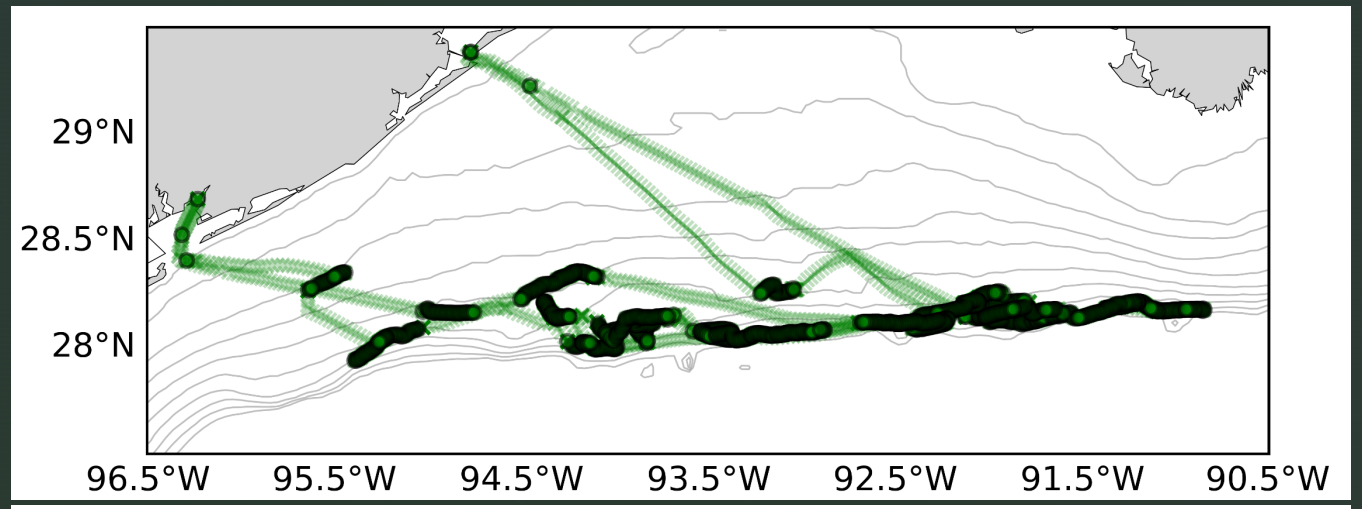




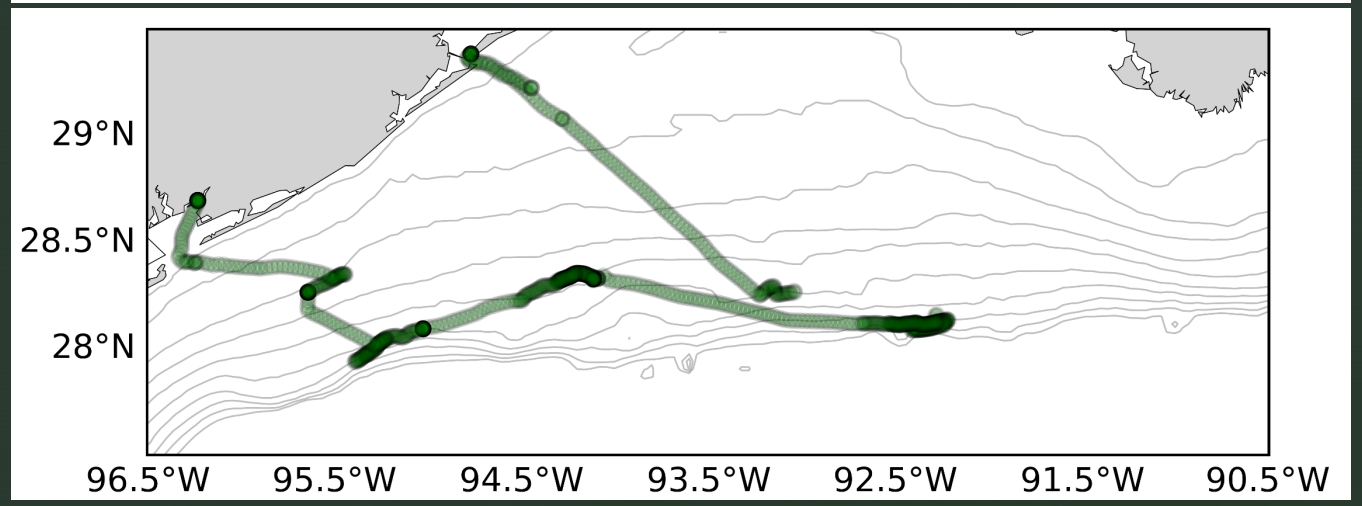
8/5/2022 – 9/27/2022

Results of Vessel Testing

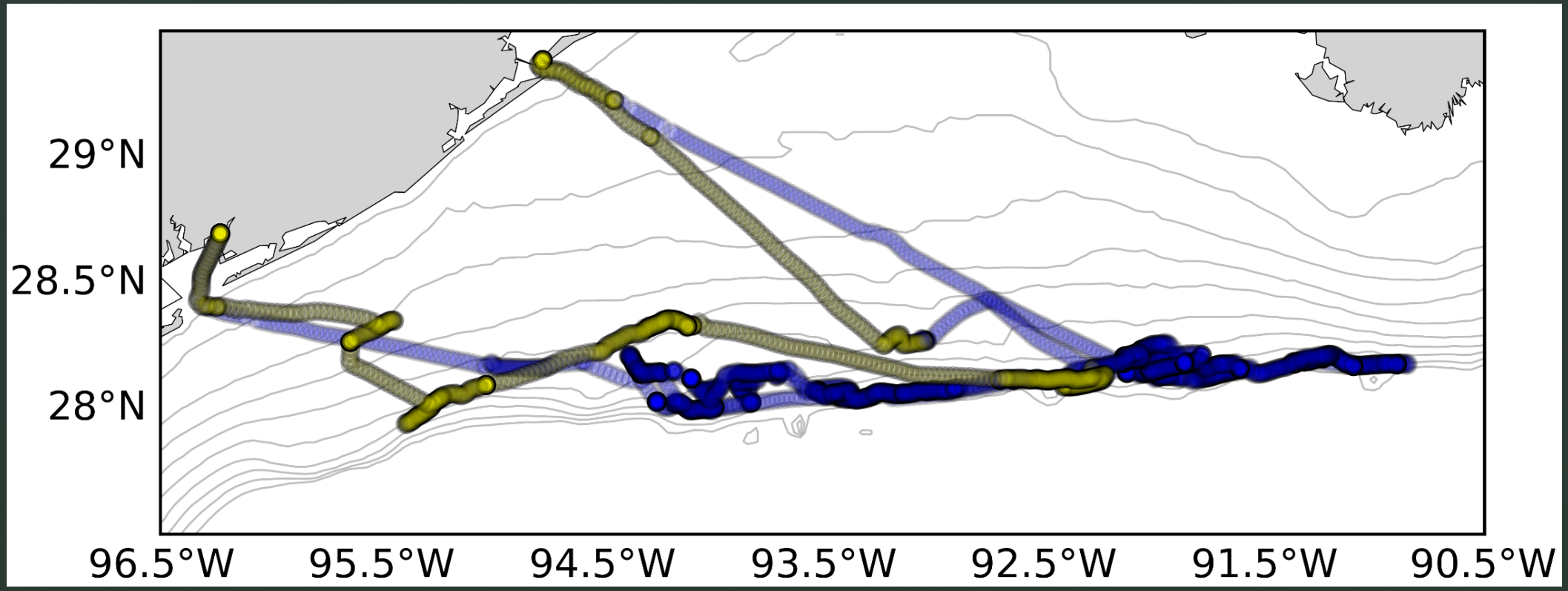
Recorded by PSea WindPlot



Transmitted to LGL server



Results of Vessel Testing



Transmitted to server
Only retrieved from boat computer

Challenges

- Installation issues:
  - Different problems for different computers
    - Some unrelated to PSea WindPlot (e.g., GPS drivers not connecting)
    - Some related to Windows update incompatibilities (e.g., file transfers don't always function)
- Technical issues
  - The GPS devices on some vessels give the wrong date/time
    - e.g., GPS on Sept. 7, 2022 was reporting January 3, 2022.
  - Some "freezing" issues (e.g., PSea WindPlot needs to be restarted after remaining on for a number of days)
  - Some cosmetic issues (e.g., setting map range, boat heading icon)
  - Unique IDs on ELB files may change if different PSea WindPlot keys are used (makes compiling data difficult)
- People problems:
  - Some captains don't like us messing with their computers
  - There are lots of versions of PSea WindPlot and some folks are comfortable with "their" version (cosmetic issues are problems for them)
  - Some captains haven't turned on hotspots
  - Some captains turn off PSea WindPlot at different points during the trip
- *<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"*

Changes

- Revised PSea 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 (should help with the "partial" transmission issue)
  - Installer can select the ELB program to use the GPS time or computer time (based on which one is more accurate)

Next steps

- Desktop testing of revised PSea WindPlot software on as many versions of Windows Operating Systems as possible
- Restrict next round of testing to a single boat to minimize possible (future) pushback from captains.
- Organize for a late November rollout, possibly making use of the period around Thanksgiving when a large number of shrimp boats are often in port.

Goals and Timeline

Study Components	2022										2023		
	M	A	M	J	J	A	S	O	N	D	J	F	M
Modify P-Sea WindPlot software	X	X	X										
Select vessel participants		X					X						
Install software and hardware			X					X	→	→			
Field testing on vessels				X					X				
Analyze data					X					X			
Revise software / hardware						X	X	→			X	X	
Prepare report				X						X		X	X
Present to Shrimp Advisory Panel						X	—	—			X		
Present to Council						X	—	—			X		

X = complete
X = in progress
X = future work

Questions?

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