PHASE II: DEVELOPING A NEW METHOD FOR ESTIMATING SHRIMP FISHING EFFORT AS A REPLACEMENT FOR THE FAILING 3G cELB METHOD

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Outline

- Introduction
  - Why monitoring shrimping effort matters
  - Recent history of monitoring shrimping effort
  - Current problem for monitoring shrimping effort
- Industry-led solution for monitoring shrimping effort
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  - Phase I summary
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- Long-term outlook

Introduction

- Monitoring shrimping effort matters.
  - 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

NOAA Fisheries
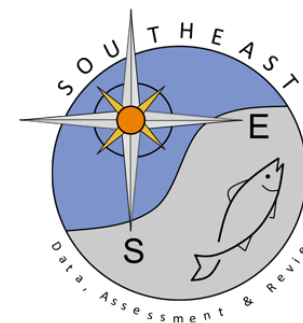
Introduction

- Recent history of monitoring shrimping effort
  - 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 determined.
    - 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.
  - In the early 2000's LGL developed an Electronic Logbook (ELB) that recorded lat/lon and date/time from the GPS device of shrimp boats at 10-minute intervals
    - Early versions required direct retrieval and replacement of computer chips for researchers to obtain recorded data.
    - In collaboration with NMFS this system was adopted for monitoring shrimping effort in the Gulf of Mexico.
    - Updates to this system allowed recorded data to be sent via the Verizon 3G cellular network (using a cELB).

Speed Range	Code
< 1 knot	H
1.0 < 2.0	h
2.0 < 3.8	T
3.8 < 5.0	s
> 5.0	S
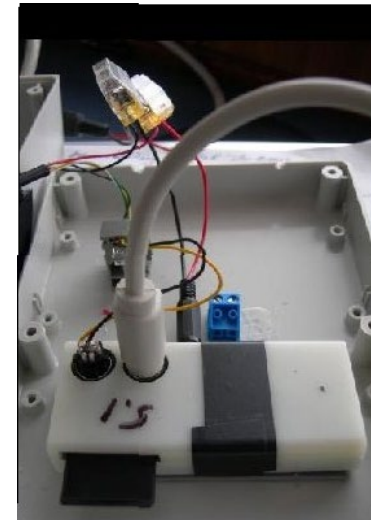
Introduction

- Current problem for monitoring shrimping effort
  - The cELB devices that record and transmit data via the Verizon 3G cellular networks no longer function because Verizon has discontinued this service.
  - Data can still be recorded to the cELB, but there is no mechanism for retrieval.
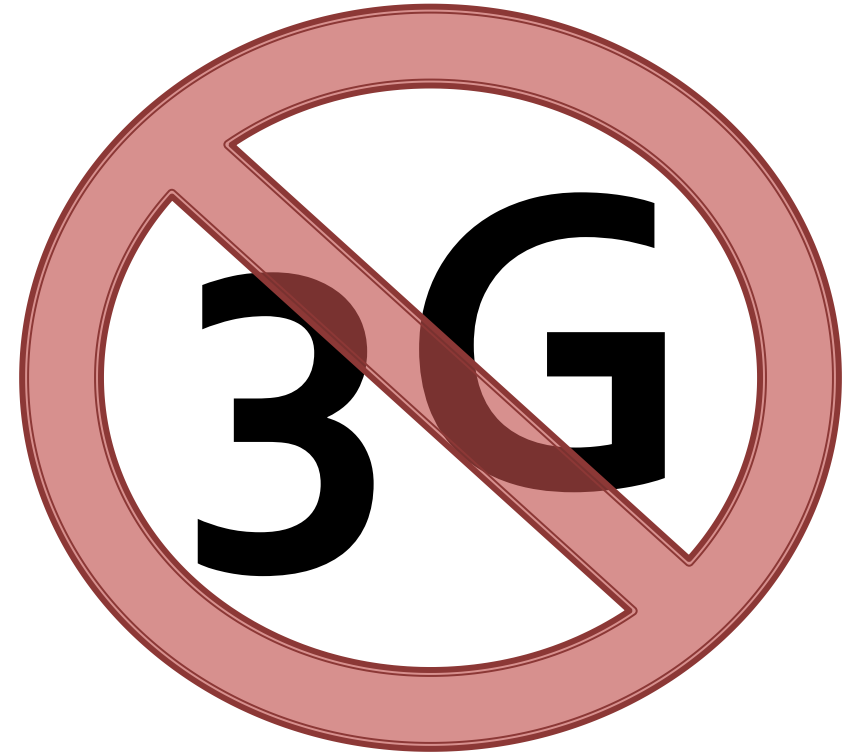
Industry-led solution for monitoring shrimping effort

- Use existing navigational software
  - Shrimpers routinely use P-Sea WindPlot navigational software to determine their position and record their tow tracks.
  - Could this software be modified to record the two essential data elements for calculating effort (lat/lon and date/time at 10-minute intervals)?

    - Southern Shrimp Alliance (SSA) requested LGL Ecological Research Associates explore whether P-Sea WindPlot could be used to record the same information as the cELB in a way that would be compatible with existing NMFS software routines that use those data to calculate shrimping effort.

Industry-led solution for monitoring shrimping effort

- Phase I Summary.
  - LGL's project to develop a new method for estimating shrimping effort using P-Sea WindPlot navigational software cost $327,000 and was entirely industry (SSA) funded.
  - Over a 4-month period, LGL worked 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.
  - This software was designed to be available free of charge to anyone already running P-Sea WindPlot (which LGL determined is likely a very large portion of the offshore fleet).
  - LGL also devised a method to pair effort (location) data with landings data for each trip and thus improve matching these values for more robust CPUE estimates.

Industry-led solution for monitoring shrimping effort

- Phase I Summary (cont.)
  - P-Sea WindPlot has gone through several versions and the present version is 7.29.
  - Initially the ELB update was written for just this latest version but after discussion with workers in the marine electronics sector we decided to also provide an ELB update to version 7.28 which some shrimpers were more comfortable with.
  - The ELB component of the versions work in the same way, the only differences are associated with the graphical user interface.

Industry-led solution for monitoring shrimping effort

- Every time P-Sea WindPlot is turned on a new ELB file (simple text, ".dat" file) is generated in a "hidden" folder within the P-Sea WindPlot folder on the computer's C: drive.

- The latitude and longitude and date/time stamp are written to this file every ten minutes. If P-Sea WindPlot is closed for any reason (turned off, power lost, etc.) then the program closes the file, but all previously written data is saved.
  - When P-Sea WindPlot is turned back on, a new file is written, and data is again recorded.

- Upon the completion of a trip, a USB memory stick with a folder titled "ELBprog" can be inserted to the computer and a dialog box will automatically ask to download the files from the ELBprog folder with a ".dat" extension.

- After these files have been downloaded to the USB memory stick's ELBprog folder the files in the computer's C: drive are renamed with the extension ".old"
  - This will allow the location data to be maintained on ship's computer (as a potential backup) but will keep these files from being downloaded a second time on subsequent trips.

- The USB memory stick is then taken by the captain and provided to the person who produces trip tickets.

- The files from the memory stick and an electronic copy of the trip ticket are then emailed to LGL staff.
  - Alternatively, a trip ticket hard copy and the USB stick can be directly mailed to LGL staff.

Industry-led solution for monitoring shrimping effort

- These location data can then be run through the effort calculation programs that LGL provided to NOAA nearly a decade ago with catch data simultaneously paired.

- An initial field test demonstrated the efficacy of these methods for generating CPUE and assessing fine-scale information on effort.
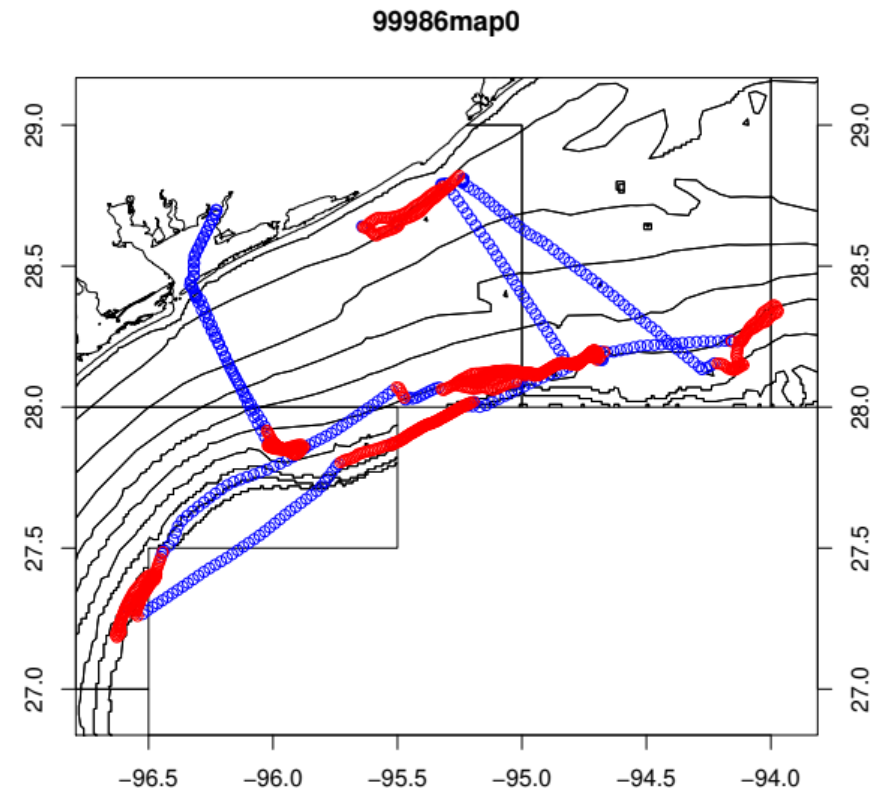 - Two more tests are being conducted currently.

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Figure 1: Trip from 12/04/20 to 12/18/20

Industry-led solution for monitoring shrimping effort

- Phase II Proposal: Alternative A
  - A similar amount ($326,760) would be needed to expand the number of shrimp boats running P-Sea WindPlot with the ELB update.
  - This would involve LGL staff's close coordination with those in marine electronics industry, P-Sea WindPlot software developers, shrimp boat captains/owners, and businesses responsible for issuing trip tickets.
  - The purpose of this would be to build towards a fleet-wide rollout of this new method. As part of software updates, the developer of P-Sea WindPlot will revise the program to allow captains to automatically add their old tracks and marks to the updated version.
    - This should make it easier to integrate and encourage greater participation.
  - Given that anyone who operates a vessel using the P-Sea WindPlot software can participate at no additional cost to them, we will work to install the new software on 25-50 vessels.
  - We will follow the protocols established in Phase I to track effort and landings data.
  - Raw data will be provided to NMFS and the GMFMC upon request and summaries will be included in reports and requested presentations.

Industry-led solution for monitoring shrimping effort

- **Phase II Proposal: Alternative A**
  - Costs are primarily associated with salary for LGL staff's time spent coordinating with shrimp boat owners and captains, traveling to install software updates on shrimp boats, ensuring compatibility with existing track data used for navigation and fishing, organizing retrieved trip tickets and effort data, and reporting.
  - Several thousand USB memory sticks will be purchased and prepared for use in advance (e.g., creating the appropriate folder structure within them).
  - Computing the spatial distribution of effort and CPUE will also be required for testing purposes.

Work to be Completed	Gallaway (days)	Cole (days)	Putman (days)	Beyea (days)	McCain (days)
Pre-roll out planning	5	2	5	5	2
Troubleshooting with P-Sea WindPlot Developer	1		10	5	
Organizing/phone calls with captains, boat owners, and trip ticket issuers	5		10	10	10
Installing P-Sea WindPlot updates	5		25	25	25
Data processing of effort and trip tickets	1	12	5	15	25
Discussing progress with counterparts at NMFS / GMFMC	3		5		
Reporting	5		5	5	3
TOTAL	**25**	**14**	**65**	**65**	**65**

Industry-led solution for monitoring shrimping effort

- Following discussion of the industry proposal for monitoring shrimp effort, it has been suggested that, to be approved, the method must include near real time, automated transmission of the effort data; i.e. at completion of each trip.
- If so, this would require that a precursor research effort be conducted prior to the Phase II program described above.
- We will label this study as "Phase II Proposal: Alternative B" as described below. This study would need to be conducted prior to the Phase II: Alternative A study.

Industry-led solution for monitoring shrimping effort

- Phase II Proposal: Alternative B
  - We have estimated that $350,000 would be needed to devise a method to develop software that will automatically transmit ELB data obtained from P-Sea WindPlot to a designated server.
  - This would involve LGL staff's close coordination with those in marine electronics industry, P-Sea WindPlot software developers, shrimp boat captains/owners, and a cell phone company (e.g., Verizon) to electronically transmit recorded ELB data. One of the approaches that will be evaluated is summarized:
    - At the completion of each trip, the boat captain turns on a hotspot which trigger P-Sea WindPlot to email the ".dat" ELB files.
    - As before, ".dat" ELB files are then renamed to ".old" so that multiple uploads do not occur.
  - Long-term costs for a fleet-wide rollout
    - Costs for hotspot devices (e.g., from Verizon) would be ~$20 (when ordered in bulk, ~500+ devices)
    - Costs for monthly data fees (e.g., from Verizon) would be ~$10
    - Assuming 577 boats are used to monitor effort, first year costs would be $80,780.

Industry-led solution for monitoring shrimping effort

- **Phase II Proposal: Alternative B**
  - Costs are primarily associated with salary for LGL staff's time to develop software modifications to link P-Sea WindPlot to mobile hotspots and transmit ELB files.
  - Significant time will be spent coordinating with shrimp boat owners and captains, traveling to install software updates on shrimp boats, ensuring compatibility with existing track data used for navigation and fishing, organizing transmitted effort data, and reporting.
  - Computing the spatial distribution of effort and CPUE (and thus obtaining trip tickets) will also be required for testing purposes.

Work to be Completed	Gallaway (days)	Cole (days)	Putman (days)	Beyea (days)	McCain (days)
Pre-roll out planning	5	2	5	5	2
Software development with P-Sea WindPlot Staff	1		25	25	25
Organizing/phone calls with captains, boat owners, and trip ticket issuers	5		5	5	5
Installing P-Sea WindPlot updates	5		10	10	10
Data processing of shrimping effort	1	12	15	20	25
Discussing progress with counterparts at NMFS / GMFMC	3		5		
Reporting	5		5	5	3
TOTAL	**25**	**14**	**70**	**70**	**70**