



Introduction

Human-wildlife conflicts are often portrayed as one-way interactions, with either ecological or social components emphasized, when in fact these are complex and dynamic social-ecological issues. For example, short-finned pilot whales (*Globicephala macrorhynchus*) depredate bait and catch in the US mid-Atlantic pelagic longline fishery, resulting in economic losses for fishermen and potential hooking or entanglement of pilot whales. The objective of this project is to better understand the history and dynamics of human-wildlife interactions, specifically between pilot whales and fishermen in the US pelagic longline fishery. This includes how fishers' behavior has adapted in response to conflict with the whales, how whales modify their behavior to interact with fisheries, and how existing regulatory frameworks have shaped these interactions. This project aims to provide knowledge and recommend solutions to the depredation problem by communicating results with fishermen and the Pelagic Longline Take Reduction Team (PLTRT) stakeholder meetings convened by NMFS.

Methods

In order to improve our knowledge and identify solutions to the problem of depredation in the longline tuna fishery, we will use a mixed methods approach including qualitative interviews and quantitative methods:

- Quantitative:
 - Geospatial Analysis: Analysis of the locations of tagged short-finned pilot whales, association with environmental variables, and overlap with longline fishing effort.
- Qualitative:
 - Semi-Structured Interviews: A total of five NC pelagic longline fishers have been interviewed; these hour long interviews were transcribed, and coded for personal fishing history, experiences and perceptions of depredation, and proposed potential solutions.

Locations of tagged short-finned pilot whales and corresponding oceanographic variables in the CHSRA

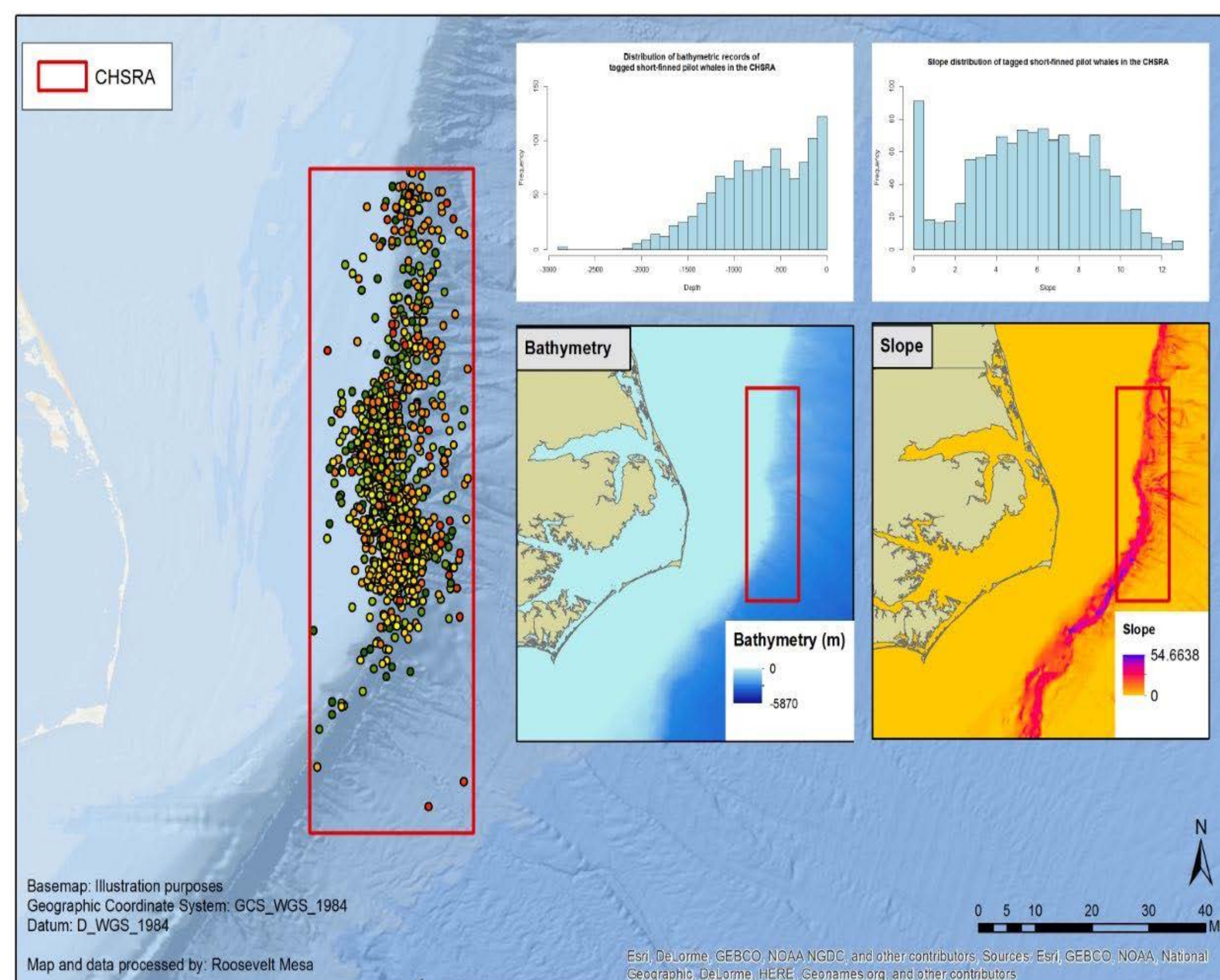


Figure 1: The point locations shown correspond to the geographic locations of 57 short-finned pilot whales tagged between 2014 and 2017 by researchers with Duke University and Cascadia Research Collective. The locations were retrieved from satellite tags through the Argos satellite-based system and processed using a Douglas Argos-Filter. The locations shown are those that occur within the Cape Hatteras Special Research Area (CHSRA), an area established as one of the main regulatory measures of the Pelagic Longline Take Reduction Plan (PLTRP) enacted in 2009. The CHSRA consists of 5927 square kilometers delimited based on the historic records of high fishing effort and high pilot whale bycatch. Additionally, the map shows the frequency distribution of static oceanographic variables such as depth and ocean bottom slope based on the values interpolated at each of the point locations. Tagging was authorized under NMFS permit nos. 15330, 17086 and 20605 to Cascadia Research Collective.

Results

Preliminary Interview Conclusions

Preliminary Codes from Fishermen Interviews

Category	Code	Quote
Perception of Whale Depredation Behaviors	Irregular acts of depredation	"Go a month without seeing one, then a pod shows up and [in] 3 to 4 days, they nail you." - Interview 3
	Depredation shift from catch to catch & bait	"As soon as you think you have a pattern down, they do something totally different and you're like: Well that just throws that little theory out the window." - Interview 2
	Social/learned behavior	"And when you set it out, you don't get any bait back. I might not have caught anything anyway you know? You never know, you didn't see 'em." - Interview 2 "It's definitely getting worse and worse over time, you know. And they're teaching the babies." - Interview 2 "They are getting smarter, only gonna get worse." - Interview 3
Strategies to Combat Depredation	Change bait (smell, appearance, taste, & fake bait)	"Doesn't matter if we set mackerel or squid or sardines or herring or what - it's gone." - Interview 2
	Change location	"I'd rather go somewhere else and catch less fish than feed [pilot whales]. You know it's just costing me money setting anywhere around them. I'd rather go somewhere else." - Interview 2 "[It's a] pain to pick up and run 30 miles and reset." - Interview 3
	Change depth	"They go down there 2000-3000 feet and we can't put our hooks anywhere near that because we can't haul back up." - Interview 2
	Turn off sounder	"Every time he runs the bottom machine, he gets bait-raped." - Interview 3
Impacts of Depredation	Economic	"When you pull back 85-100 pound plus bigeye [tuna] heads and you know they're all big it's like pfft there's a grand, there's a grand, there's a grand, there's 500 dollars. Ya know it's sickening." - Interview 2
	Time	"There's been a lot of times when I was in meetings when I should have been fishing." - Interview 1
	Cultural	• Missing out on family time for fishing • Major shifts in fishing patterns in recent decades



References

Thorne, L.H., et al. *Movement and foraging behavior of short-finned pilot whales in the Mid-Atlantic Bight: importance of bathymetric features and implications for management.* Marine Ecology Progress Series, 2017. **584**: p. 245-257.

Garrison, L.P. *Interactions between marine mammals and pelagic longline fishing gear in the US Atlantic Ocean between 1992 and 2004.* Fishery Bulletin, 2007. **105**(3): p. 408-417.

Pelagic Longline Take Reduction Team Timeline

