



# Shark Depredation

**NOAA  
FISHERIES**

Office of  
Sustainable  
Fisheries



HMS Advisory Panel Meeting  
September 2020

# Outline

- Background
- Objectives
- Preliminary Analysis
  - Pelagic longline
  - Reef fish



# Background

- Depredation occurs in many fisheries
- Concerns raised by SAFMC, GMFMC, and others
- Limited research
- Identified as a management-based research priority



Photo credit: Chase Green

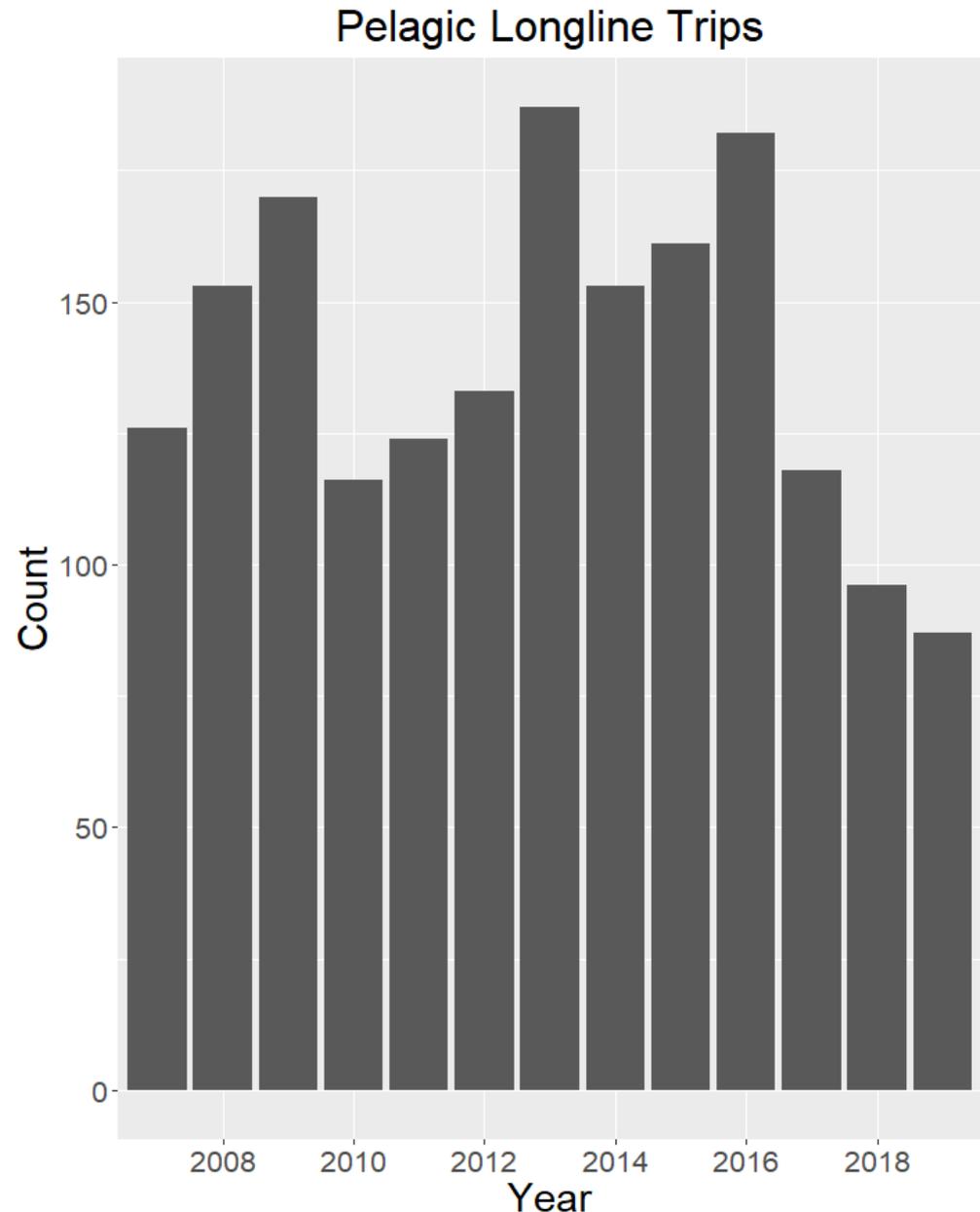
# Objectives

- Provide background on data available
- Present preliminary analysis for shark depredation
  - Quantify depredation rates in pelagic longline and reef fish fisheries
  - Look for spatial and seasonal trends
  - Comparison between gear types
- Spur discussion on shark depredation issues

# Pelagic Longline Fishery

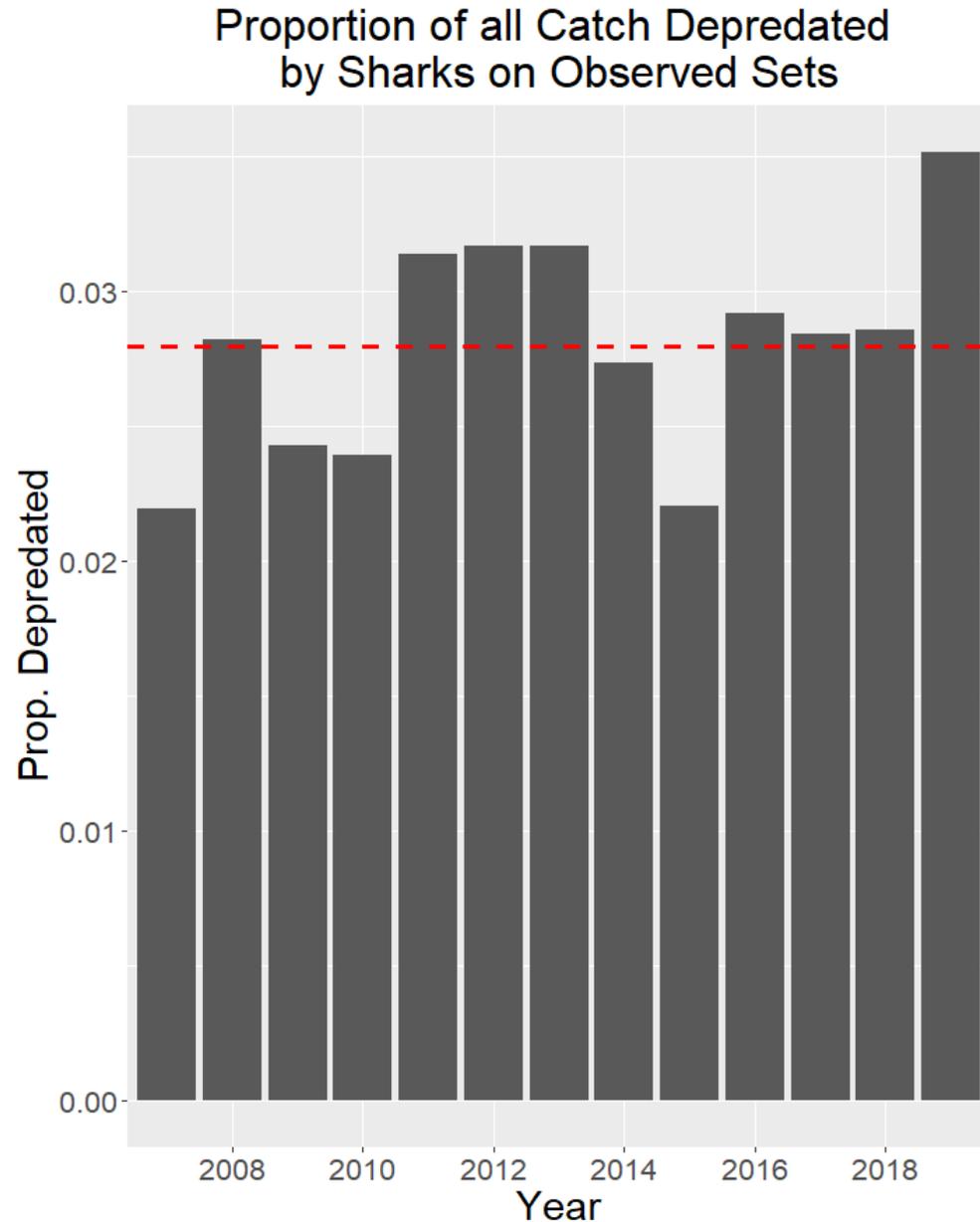
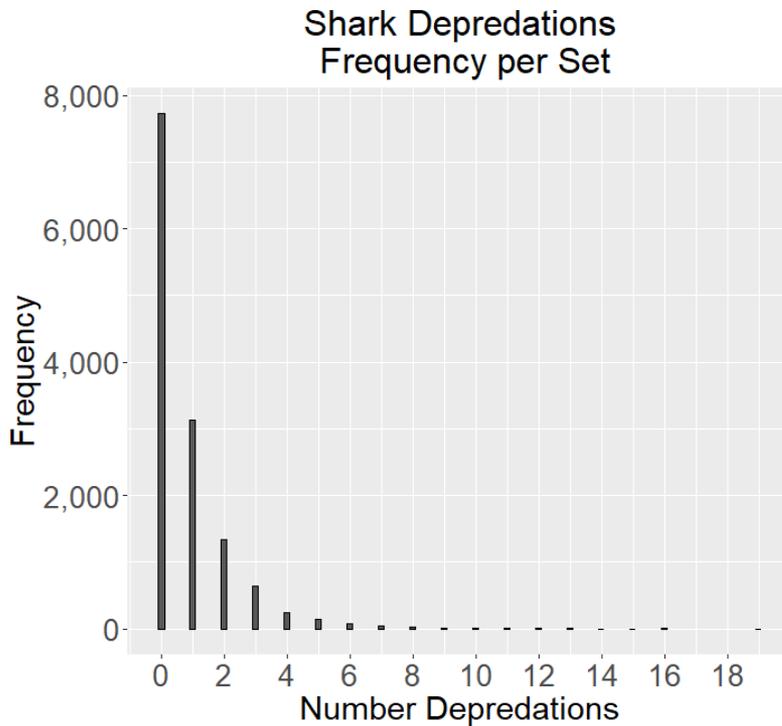
# Pelagic Longline

- Pelagic Longline Observer Program
- Data from 2007 to 2019
  - 1,795 unique trips
  - 13,463 hauls observed
  - 403,238 animals caught



# Pelagic Longline

- 11,153 shark depredation events (from 5,732 sets)

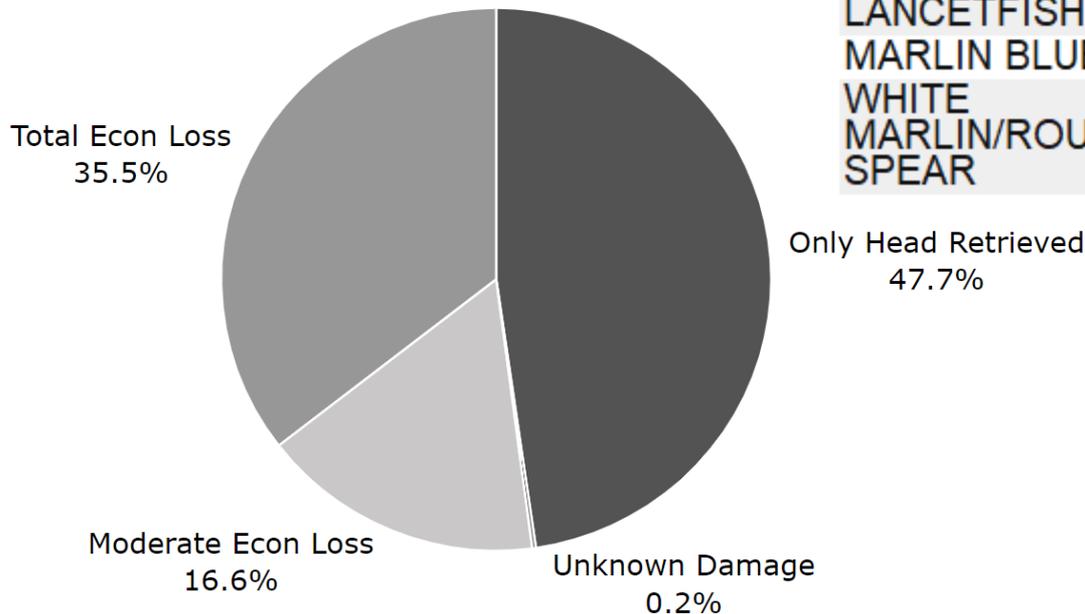


# Pelagic Longline

- Top 15 species by number of depredations observed
- 62 species preyed upon

Species	Num Depred	Total	Prop Depred
SWORDFISH	3,237	82,815	0.0391
TUNA YELLOWFIN	3,093	66,544	0.0465
TUNAS	1,625	3,332	0.4877
DOLPHIN FISH (MAHI MAHI)	627	43,940	0.0143
TUNA BIGEYE	548	19,141	0.0286
TUNA ALBACORE	408	13,665	0.0299
ESCOLAR	223	13,063	0.0171
WAHOO	204	3,817	0.0534
TUNA BLACKFIN	188	9,162	0.0205
BILLFISH	104	1,835	0.0567
TUNA BLUEFIN	81	3,293	0.0246
SHARK REQUIEM	71	7,246	0.0098
LANCETFISH	67	18,989	0.0035
MARLIN BLUE	62	2,941	0.0211
WHITE MARLIN/ROUNDSCALE SPEAR	60	4,616	0.0130

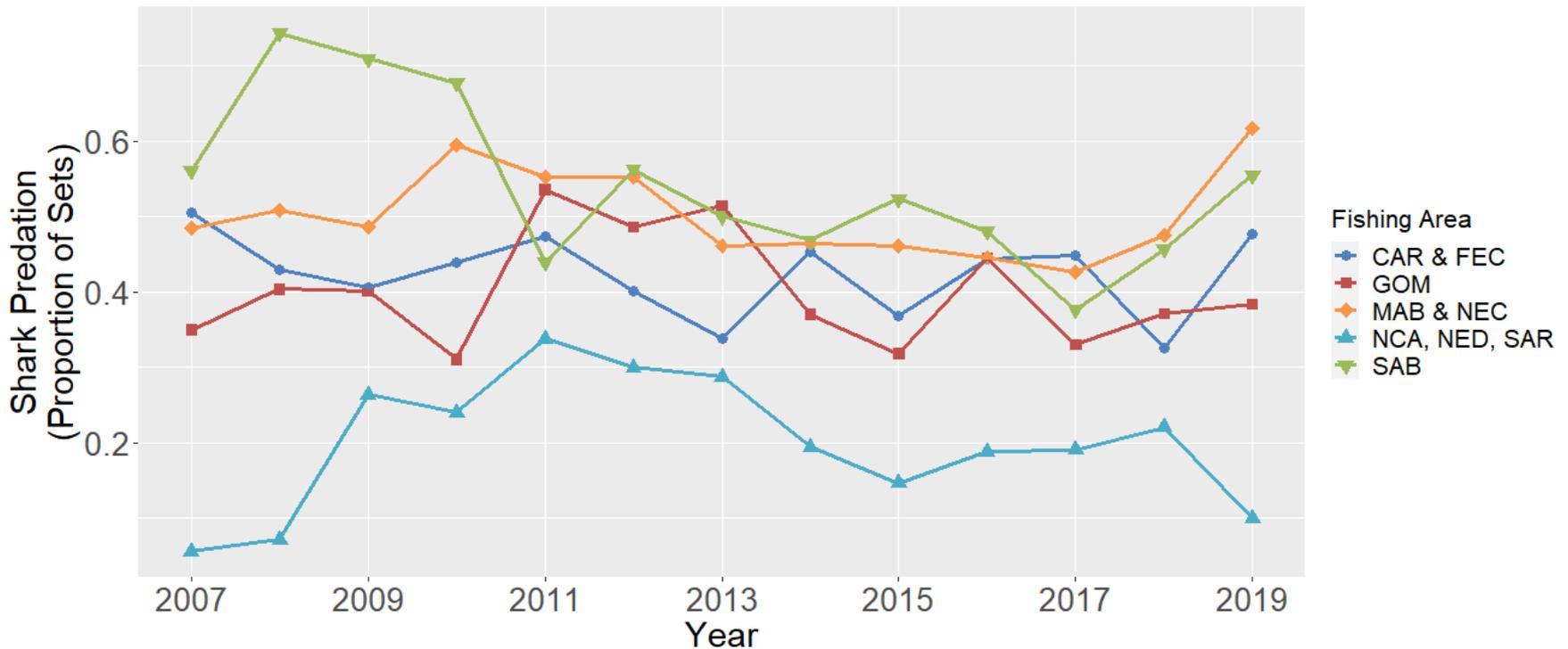
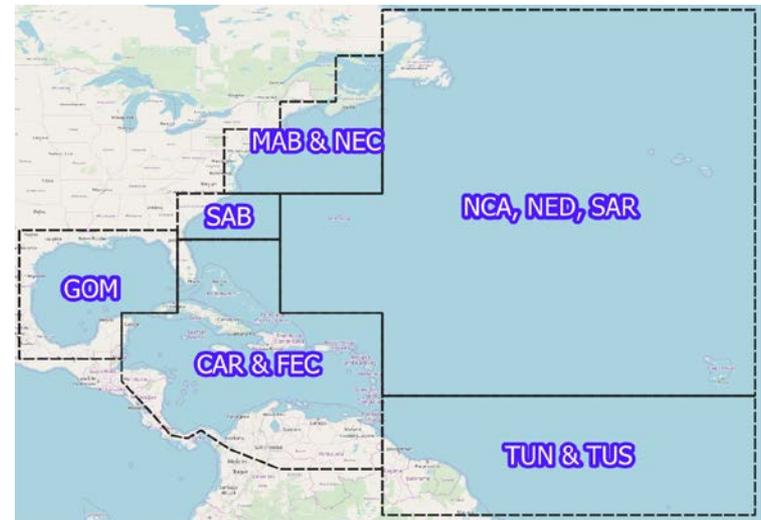
Damage Extent YFT/SWO



- YFT and SWO: 57% of total depredated animals
- Probably a total economic loss if only head retrieved

# Pelagic Longline

- Proportion of Sets with Shark Depredation



# Pelagic Longline

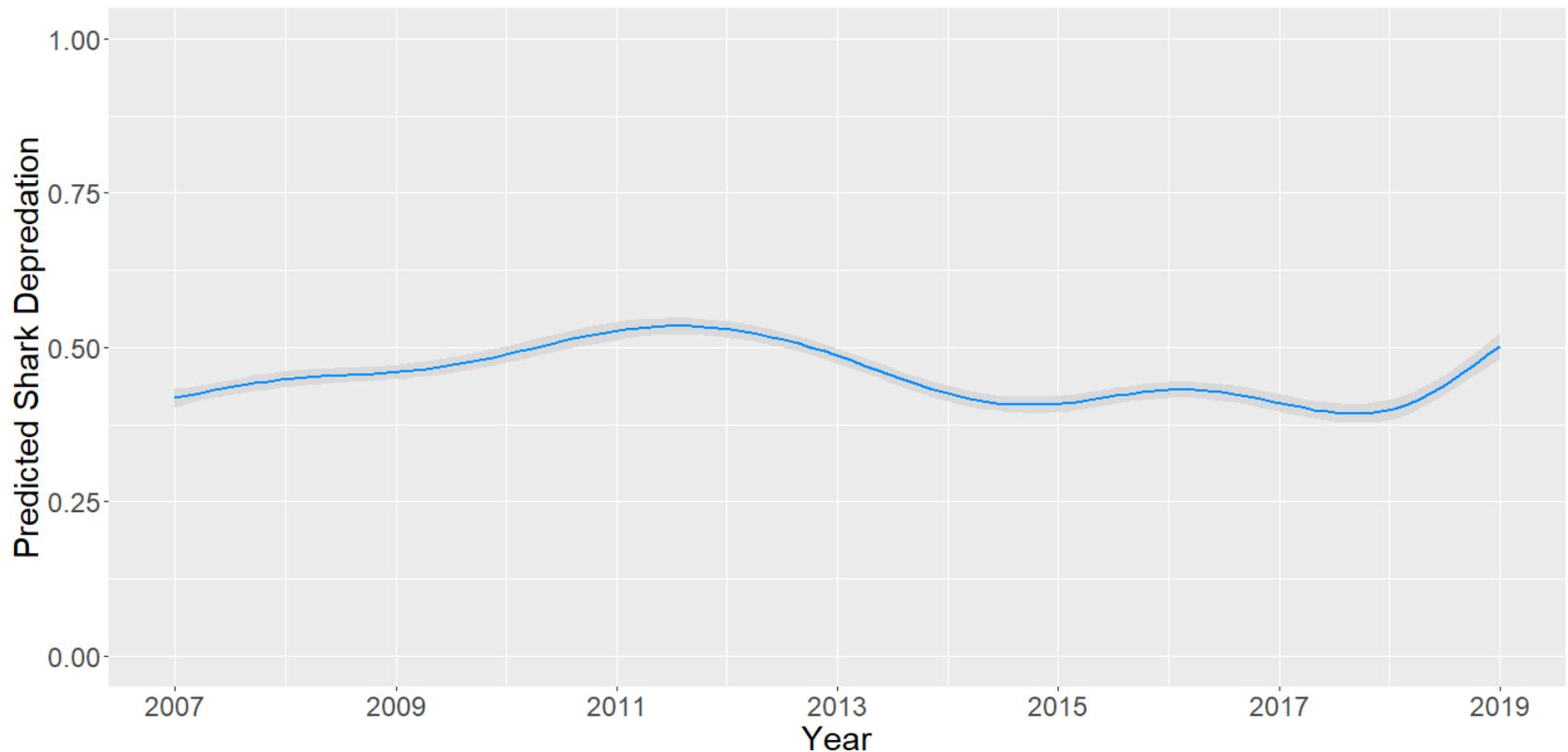
Season	Total Hauls	Total Hooks	Hauls Depred.	Prop Hauls Depred.	Individual Depredations
Spring	5,227	3,762,932	2,189	0.419	4,021
Summer	3,612	2,638,448	1,808	0.501	3,851
Fall	2,619	1,912,782	1,012	0.386	2,065
Winter	2,005	1,488,699	723	0.361	1,216

Maximums for each column are highlighted

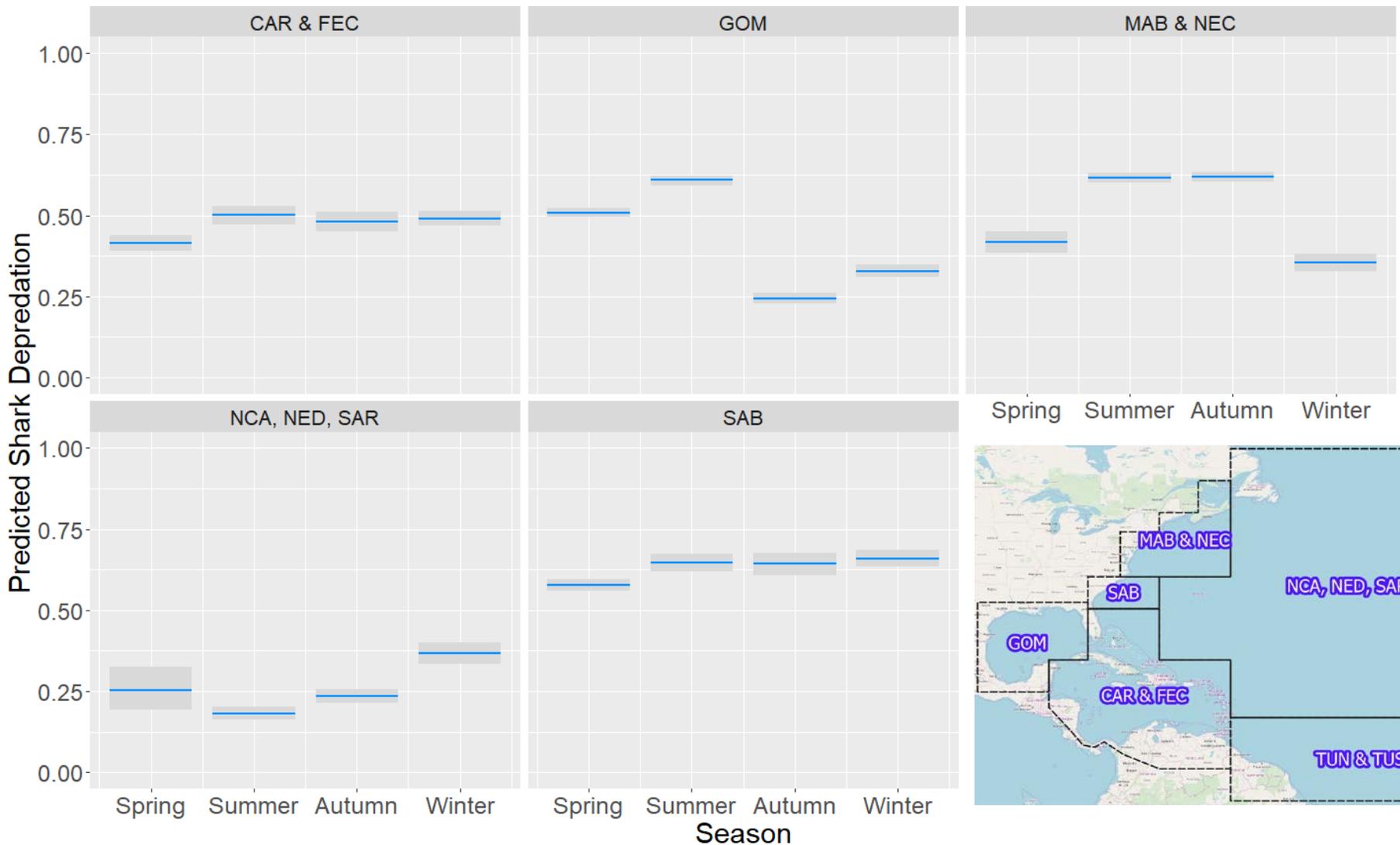
# Pelagic Longline

*Proportion of Sets with Depredation ~*

*s(Year) + fishing area + season + season\*fishing area*



# Pelagic Longline

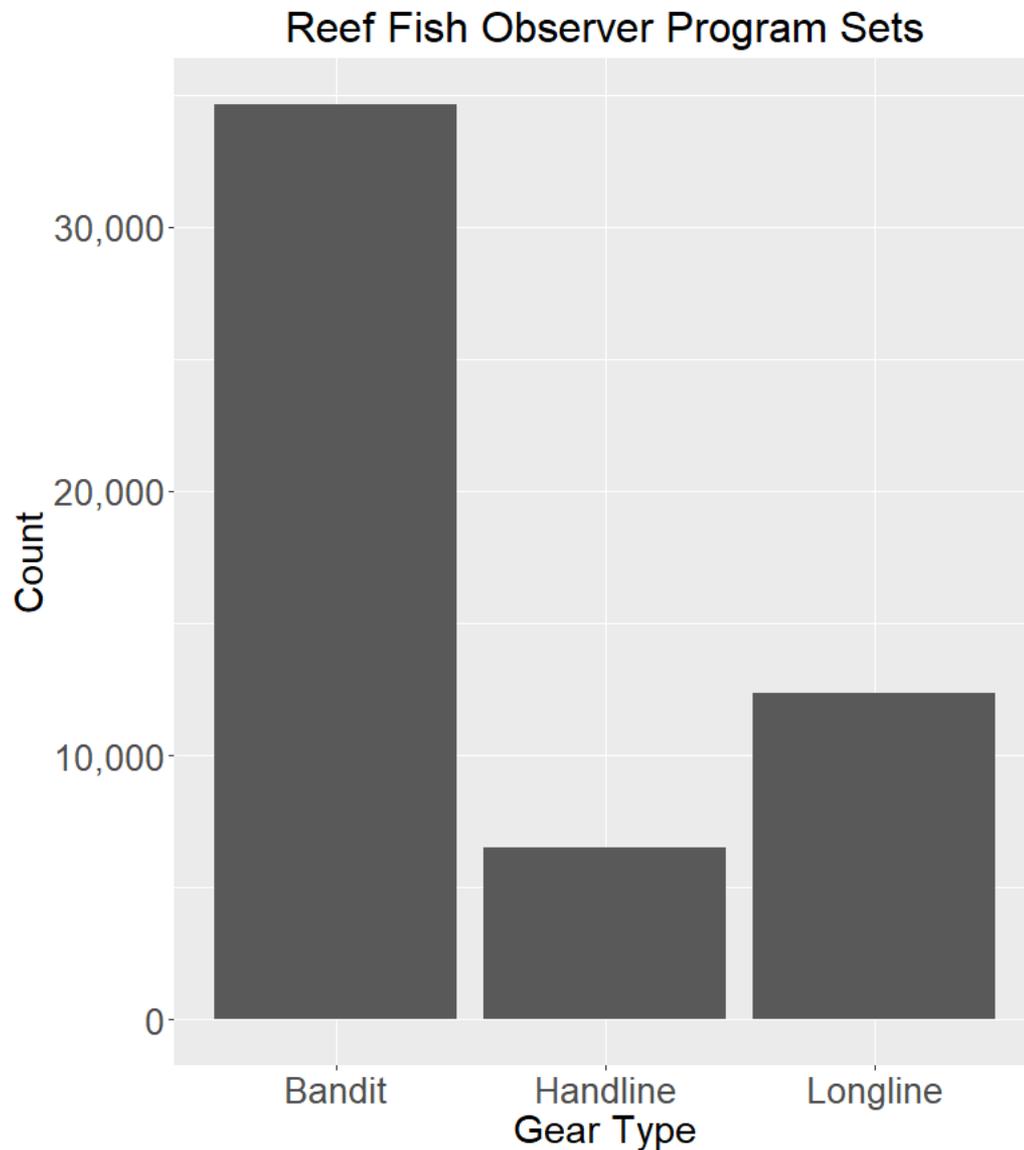


# Reef Fish Fishery

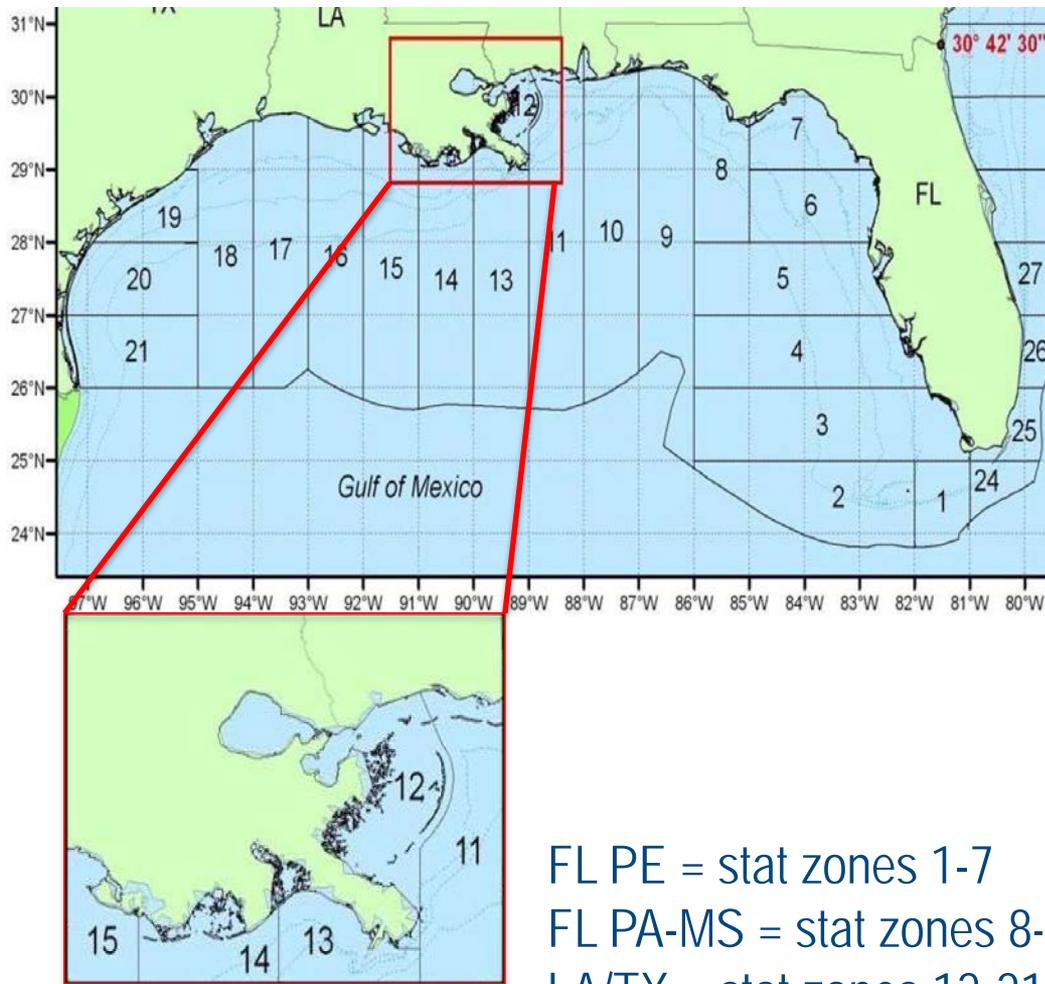


# Reef Fish

- Reef Fish Observer Program
- Several gear configurations
- Data from 2007 to 2019
  - 1,732 trips observed
  - Set level depredation
  - 1,782 of 53,474 sets with depredation

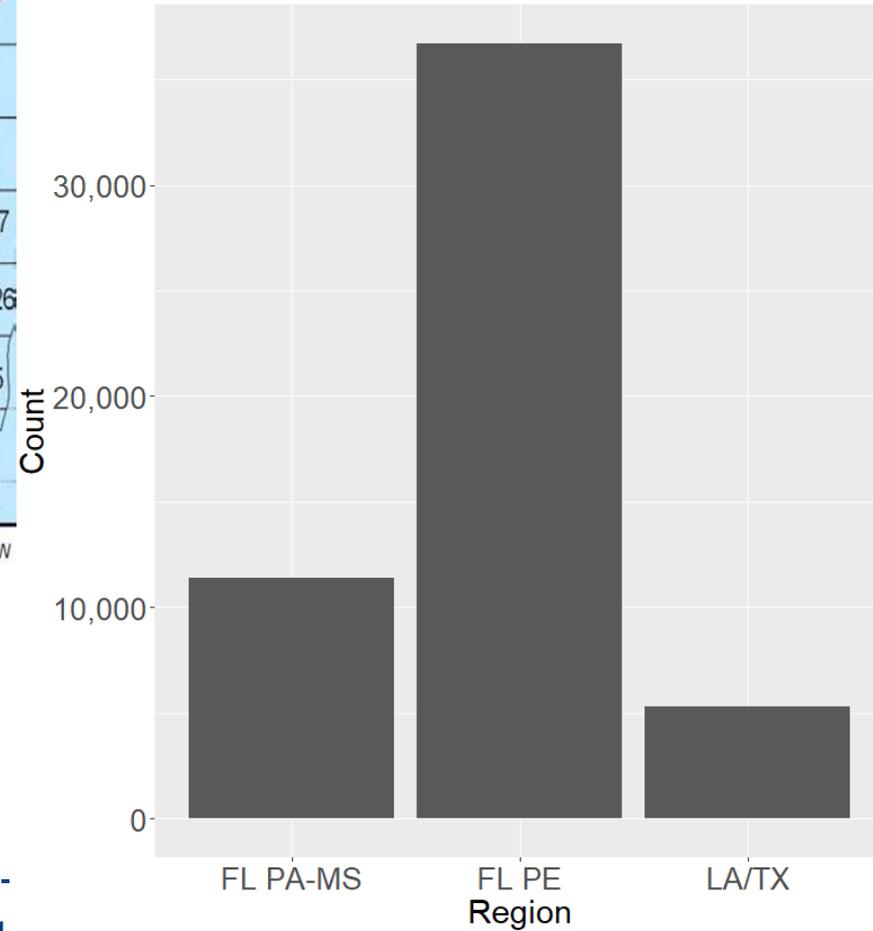


# Reef Fish



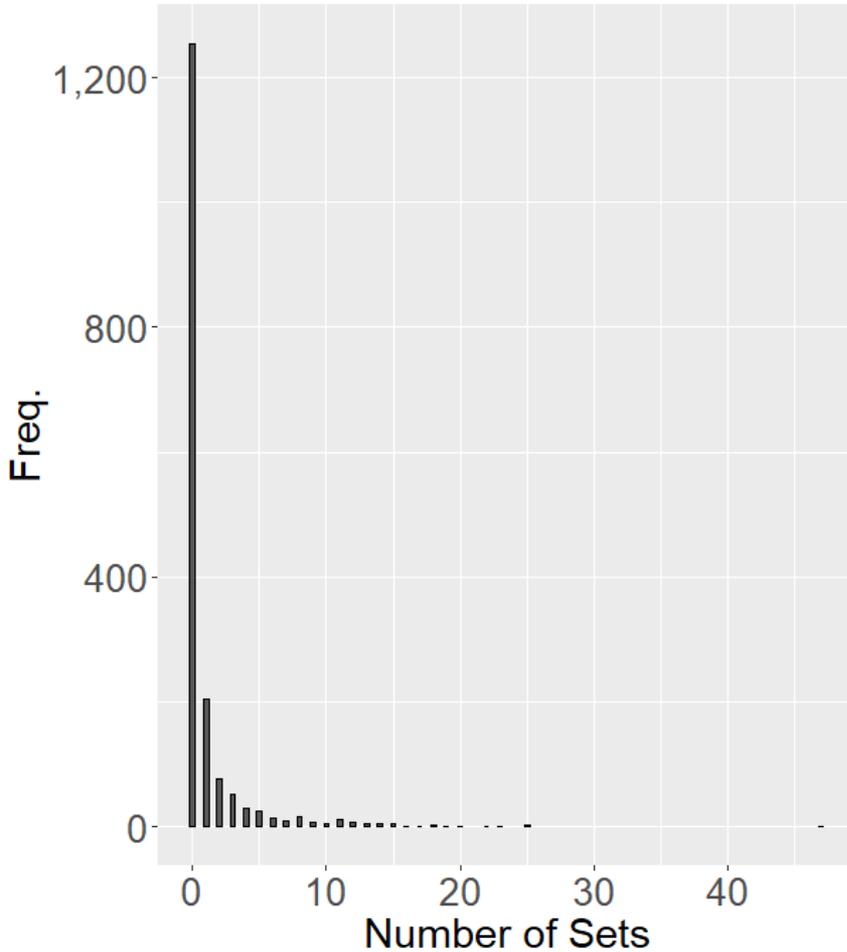
FL PE = stat zones 1-7  
 FL PA-MS = stat zones 8-11  
 L/ATX = stat zones 12-21

Reef Fish Observer Program Sets

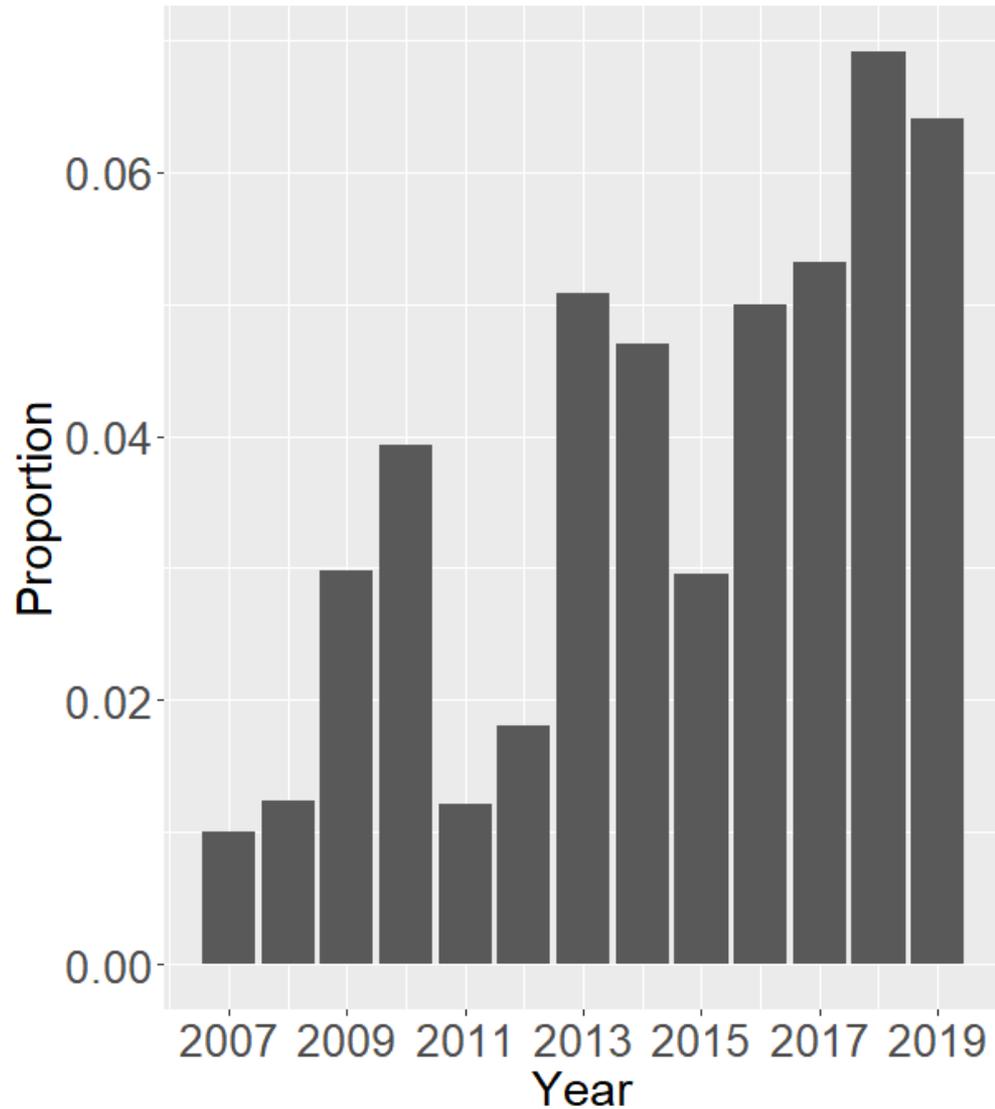


# Reef Fish

## Shark Depredation Sets per Trip

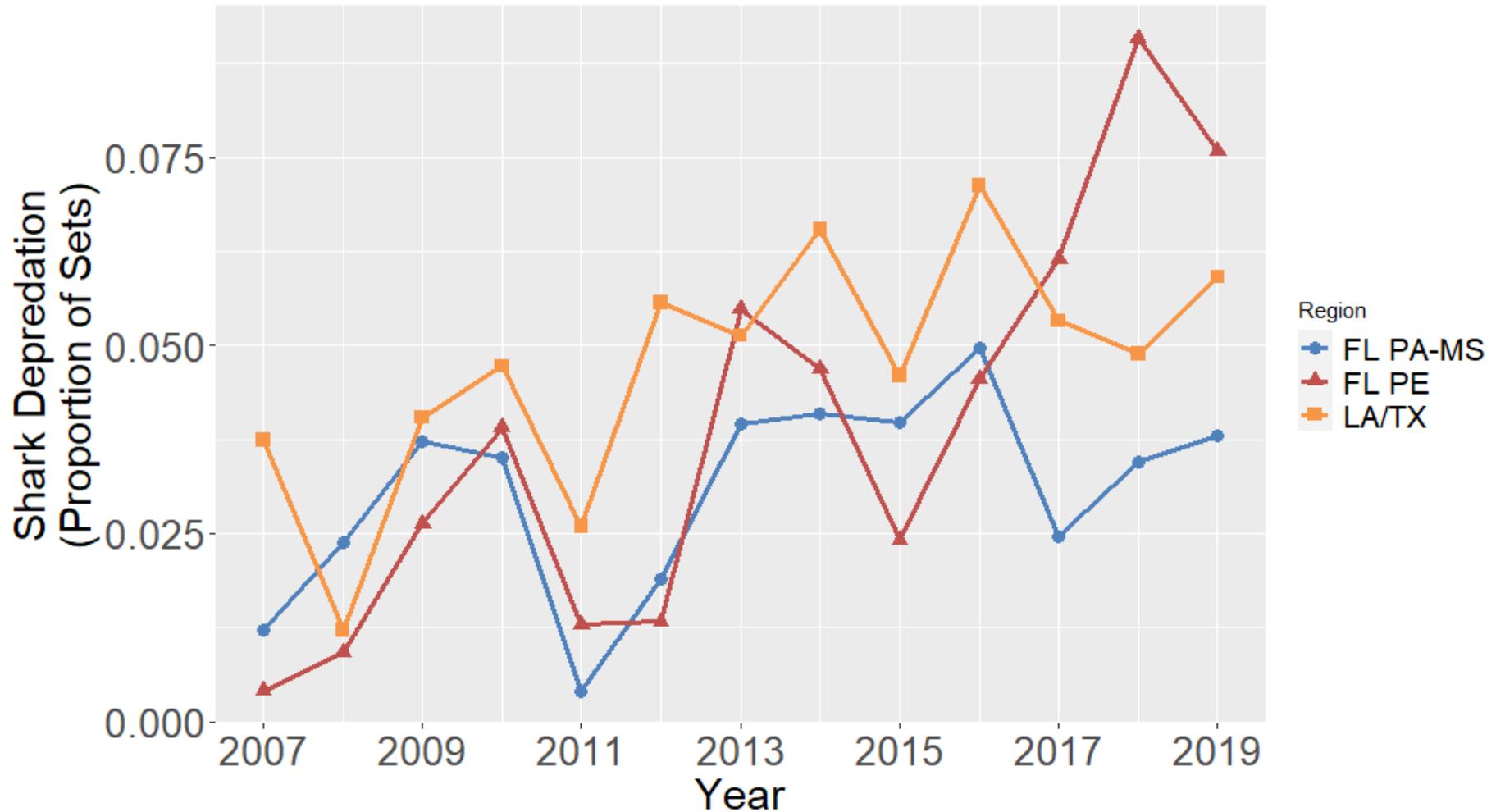


## Mean Set-Level Shark Depredation

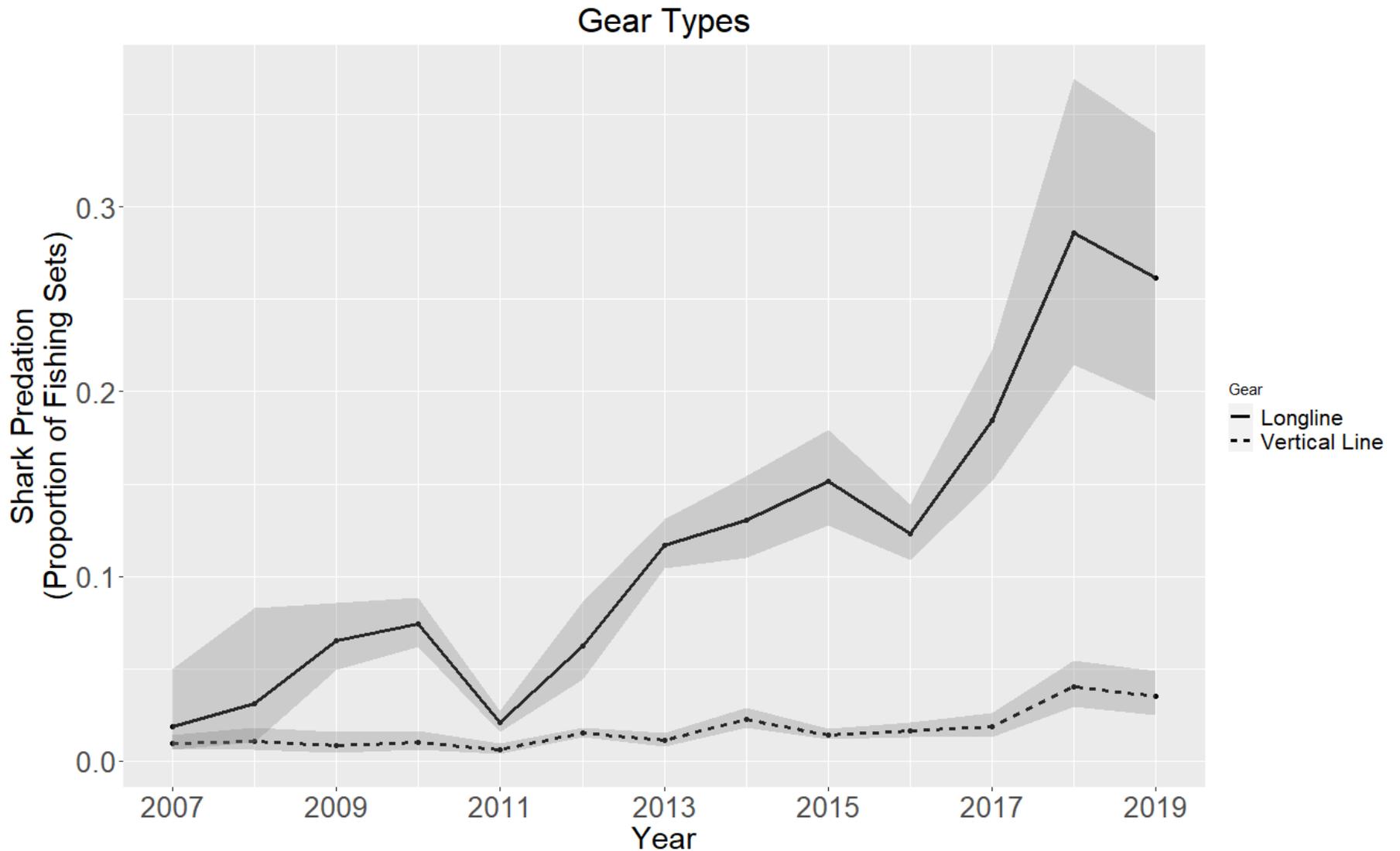


# Reef Fish

## Shark Depredation by Area

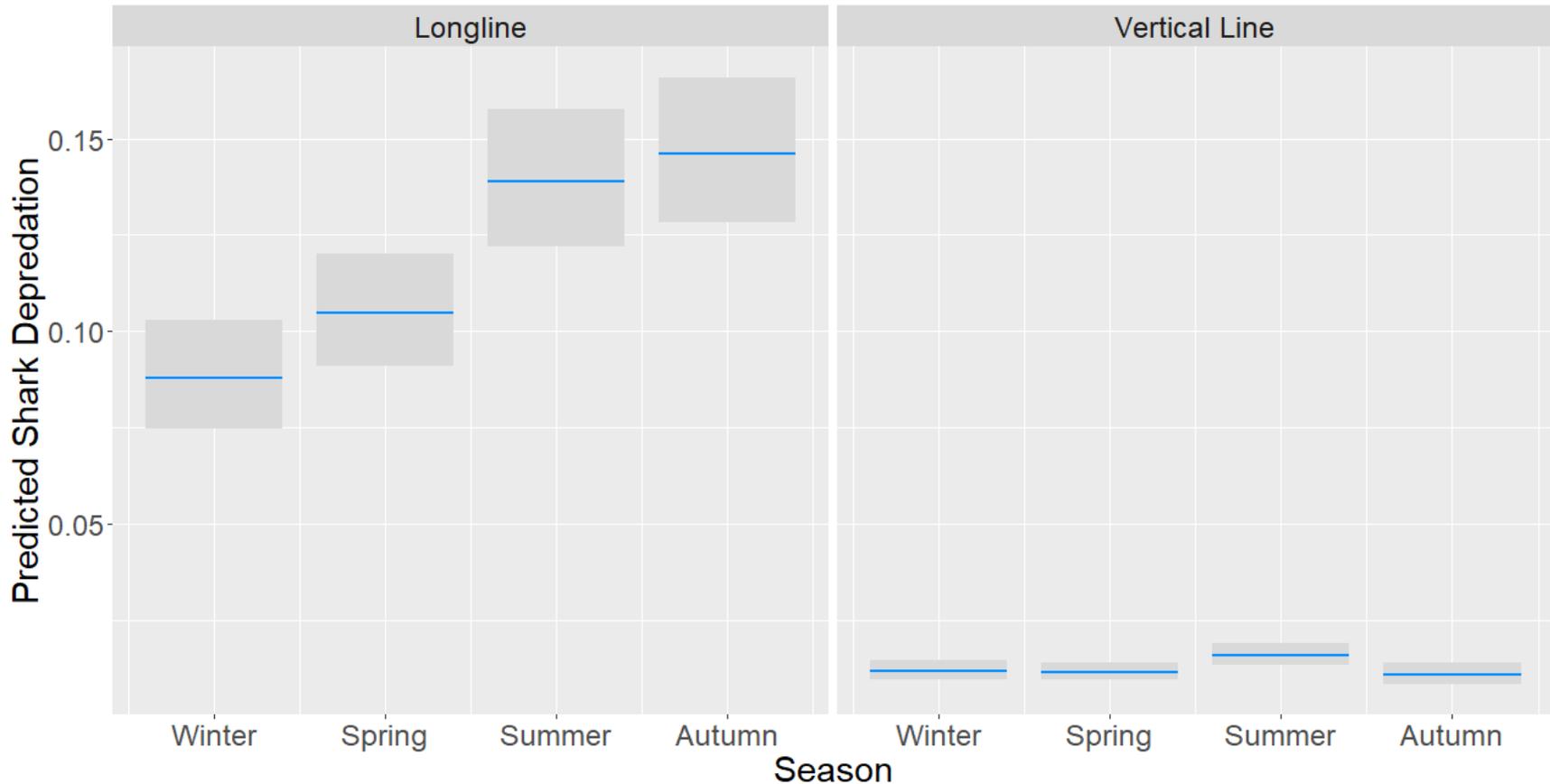


# Reef Fish

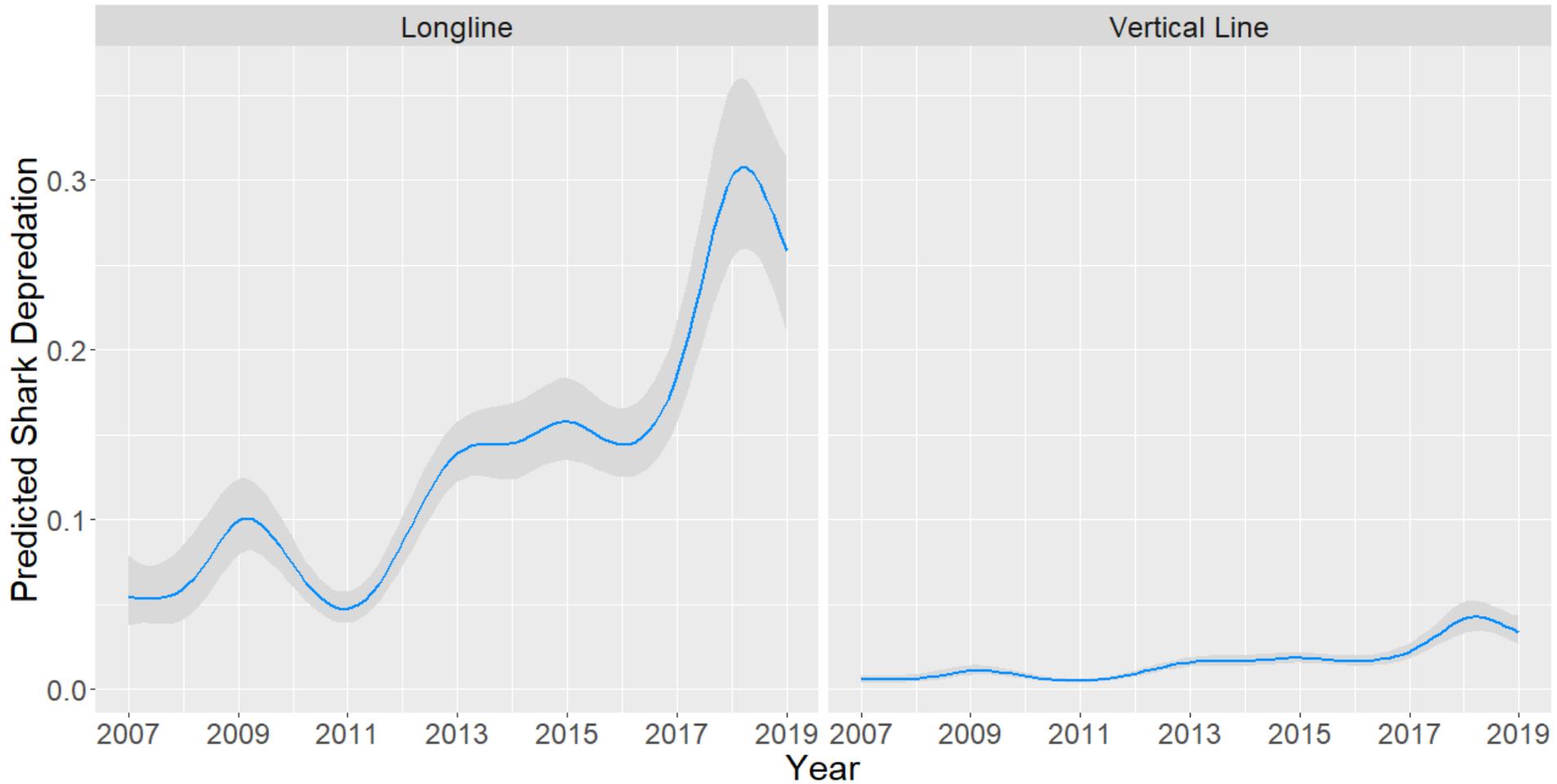


# Reef Fish

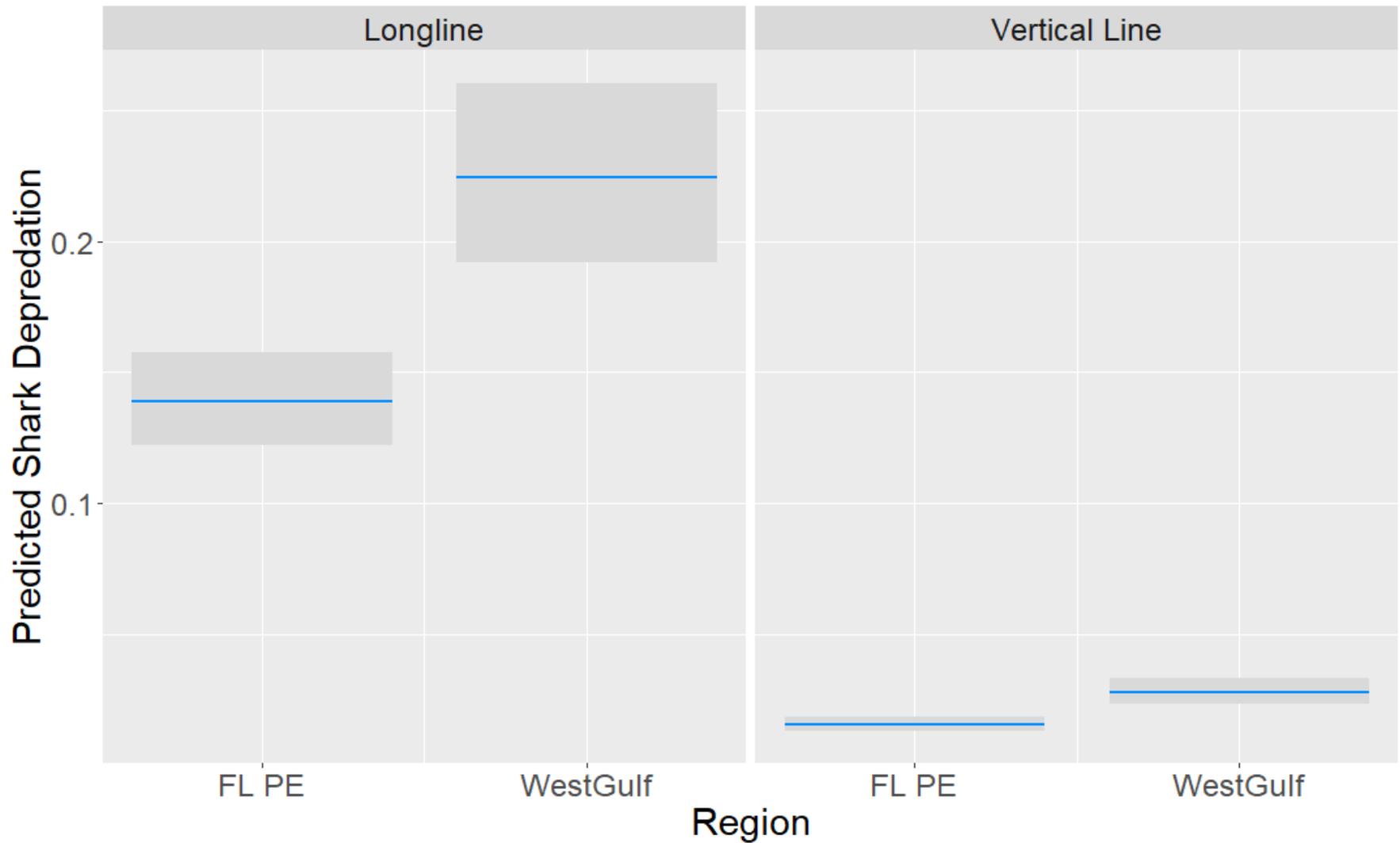
*Proportion of Sets with Depredation ~ s(Year) + Gear + region + Season + Gear\*Season + Gear\*Depth*



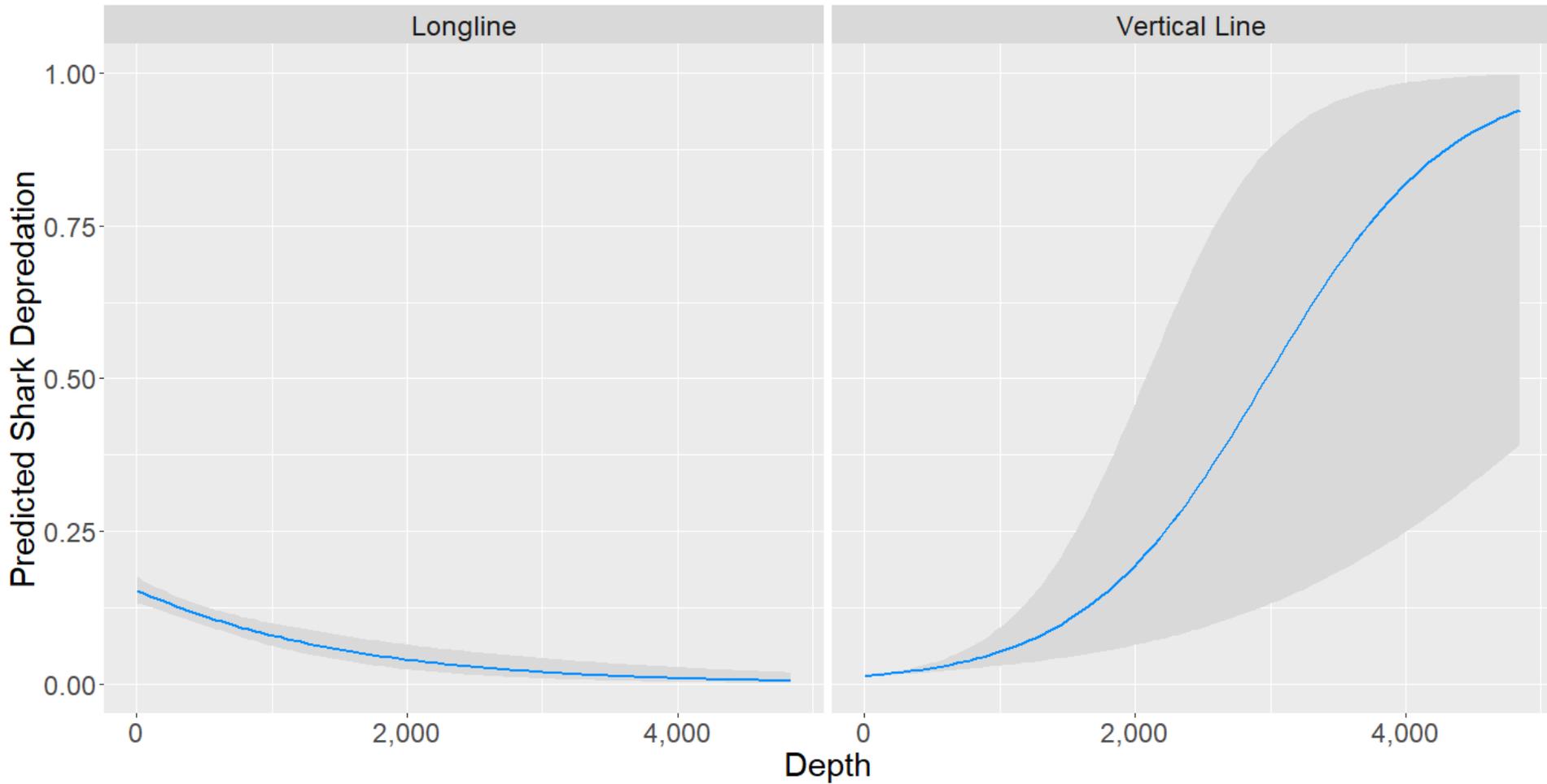
# Reef Fish



# Reef Fish



# Reef Fish



# Conclusion



# Shark Depredation

- Pelagic Longline
  - Much higher rates of depredation than reef fish
  - Generally stable through time
  - Seasonal and regional variation
- Reef Fish
  - Increasing over time
  - Gear matters
  - W. Gulf with higher rates of shark depredation
  - Seasonal variation exists
  - Depth affects depredation differently for LL & VL

# Looking Ahead

- Explore ways to obtain more/better data on depredation in recreational fisheries
- Exploring further model development
  - Shark Indices
  - Other Data Sources
- Inform Shark Fishery Review
- Depredation identified as a management-based research priority
  - <https://www.fisheries.noaa.gov/resource/document/atlantic-highly-migratory-species-management-based-research-needs-and-priorities>

# Questions for us?

## What else to explore/consider?

## What factors drive depredation events?

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