# Determining Incidental Mortality Of Atlantic Sea Scallops In The Dredge Fishery

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In Cooperation With
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# Background

- Previous estimates suggest that between 5% and 20% of scallops that are contacted but not retained by the gear die (Caddy 1973; Murawski and Serchuk 1989).

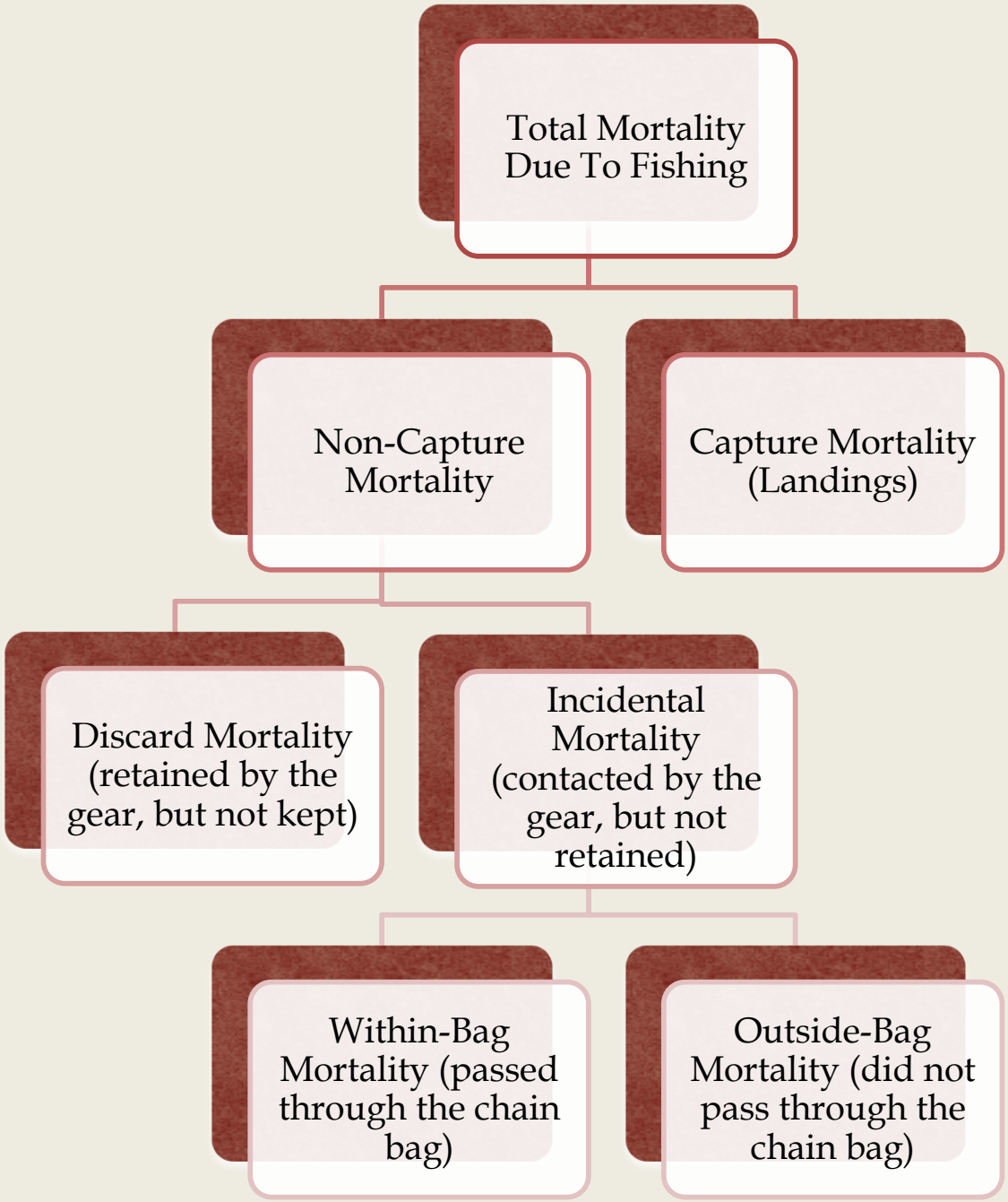
- Current analytical approach is to assume 10% and 20% incidental mortality (applied across a function that accounts for the size-selectivity and efficiency of the fishing gear) respectively in the Mid-Atlantic and on Georges Bank.

- The 10% and 20% assumptions are based on experiments conducted using out-of-date gear (smaller chain bag ring size).

Caddy, J. F. 1973 J. Fish Res. Board Can. 30: 173 – 180.

Murawski, S. A. and F. M. Serchuk. 1989. ICES C.M. 1989/K:27.

# Background


Total Mortality Due To Fishing
Non-Capture Mortality
Capture Mortality (Landings)
Discard Mortality (retained by the gear, but not kept)
Incidental Mortality (contacted by the gear, but not retained)
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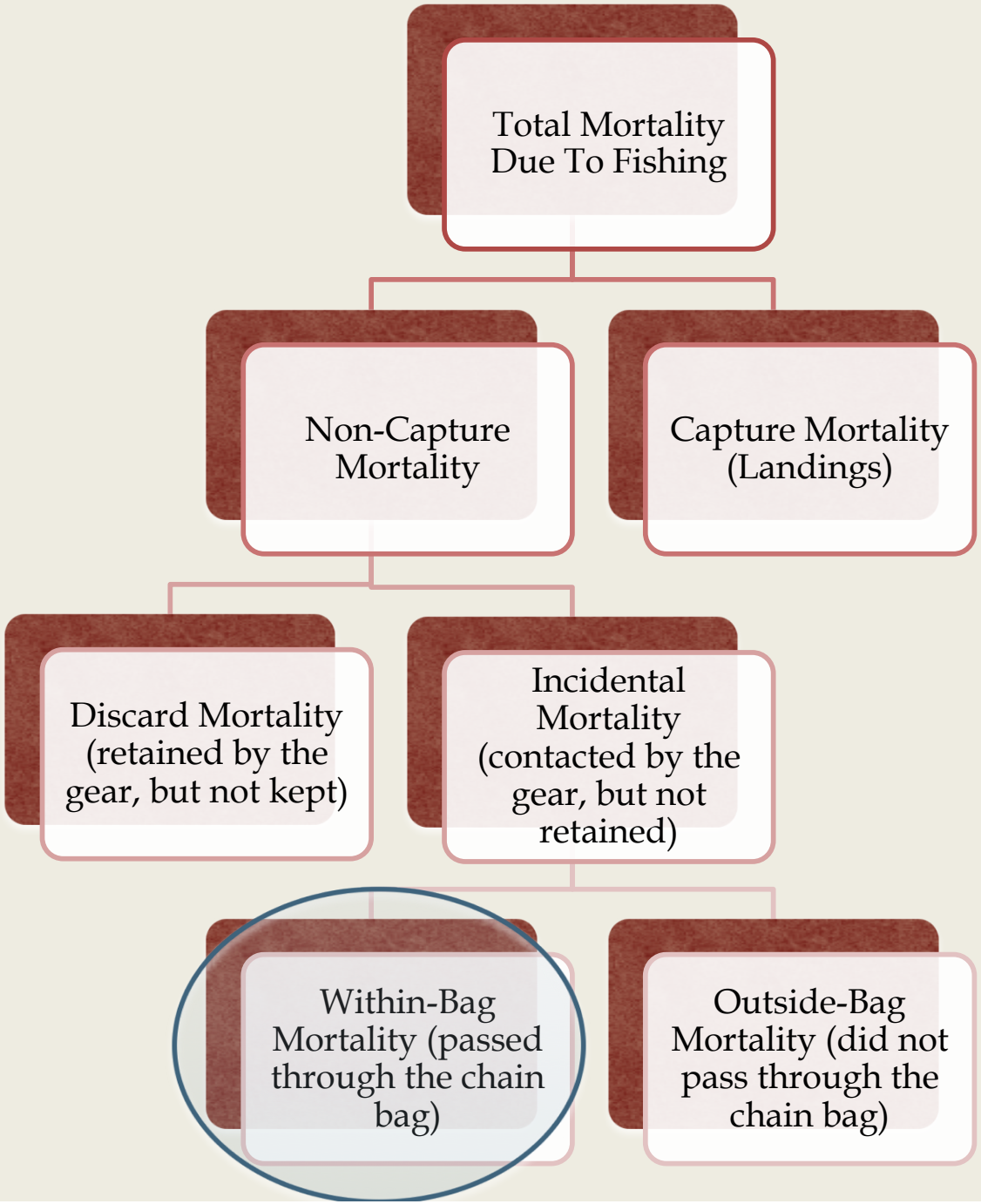
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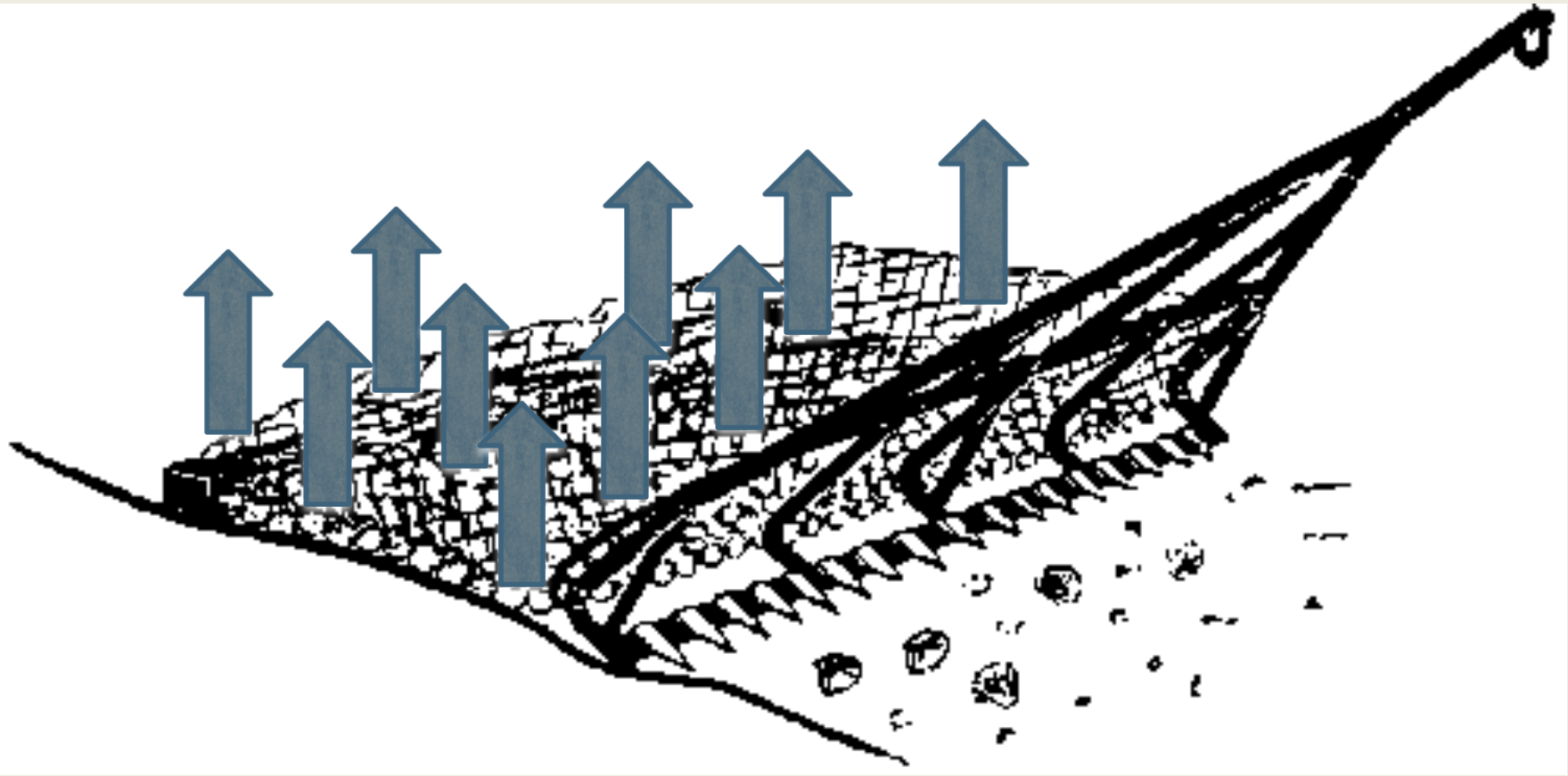
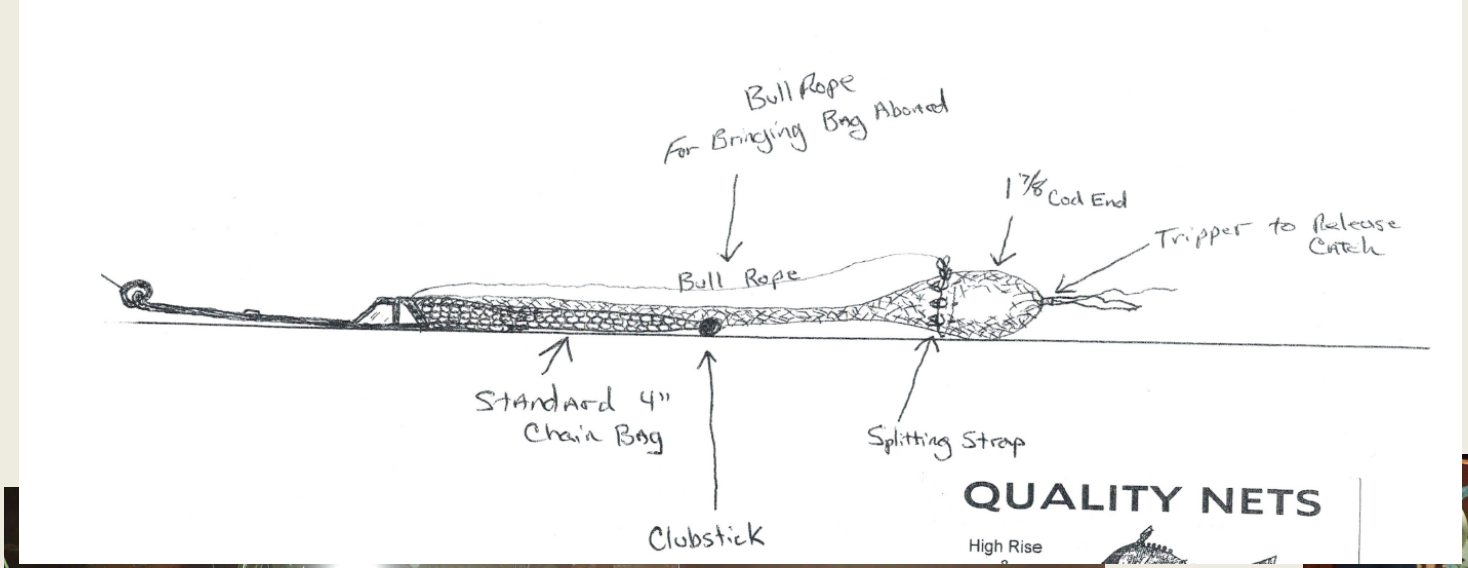


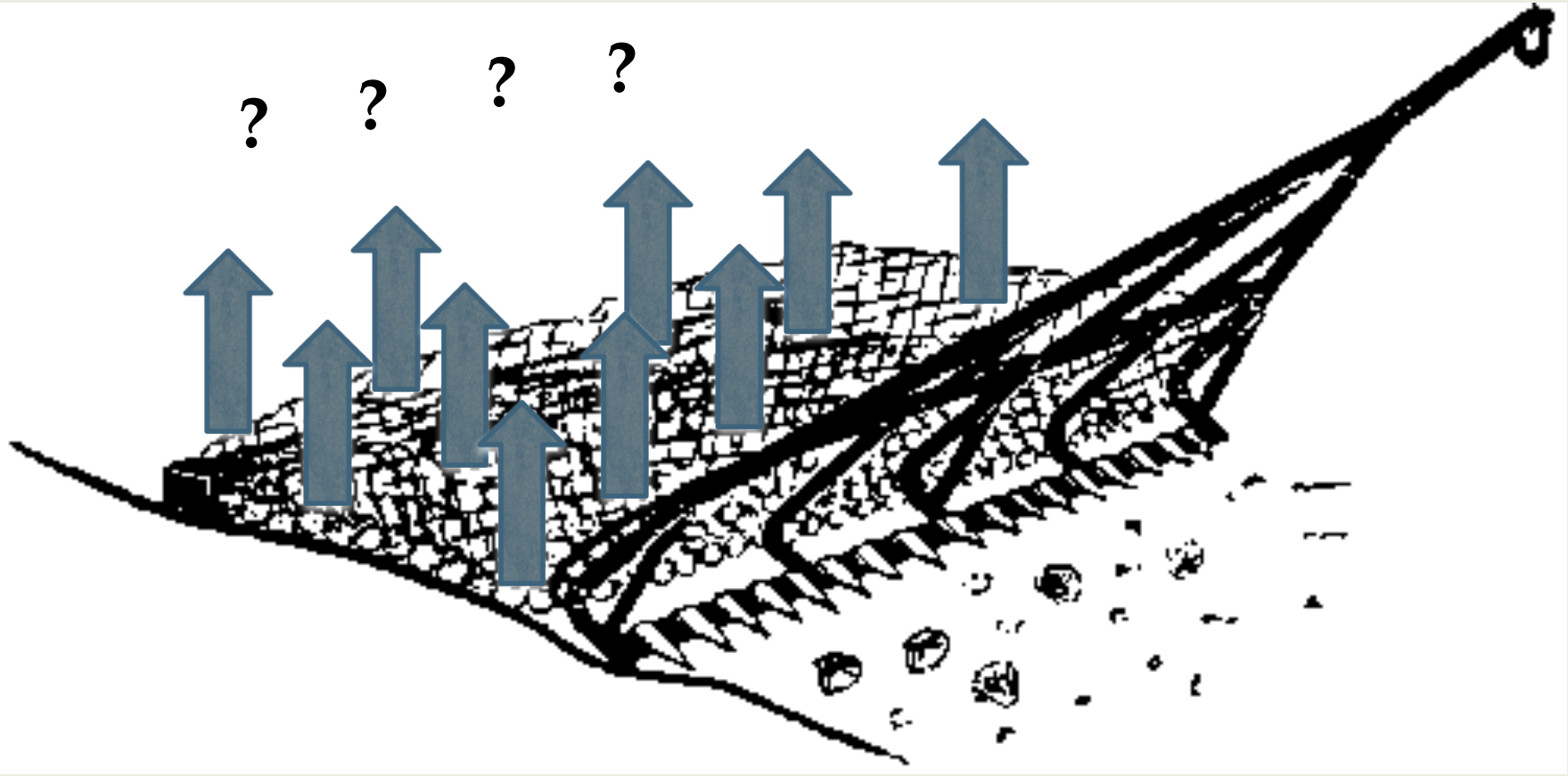
# Introduction



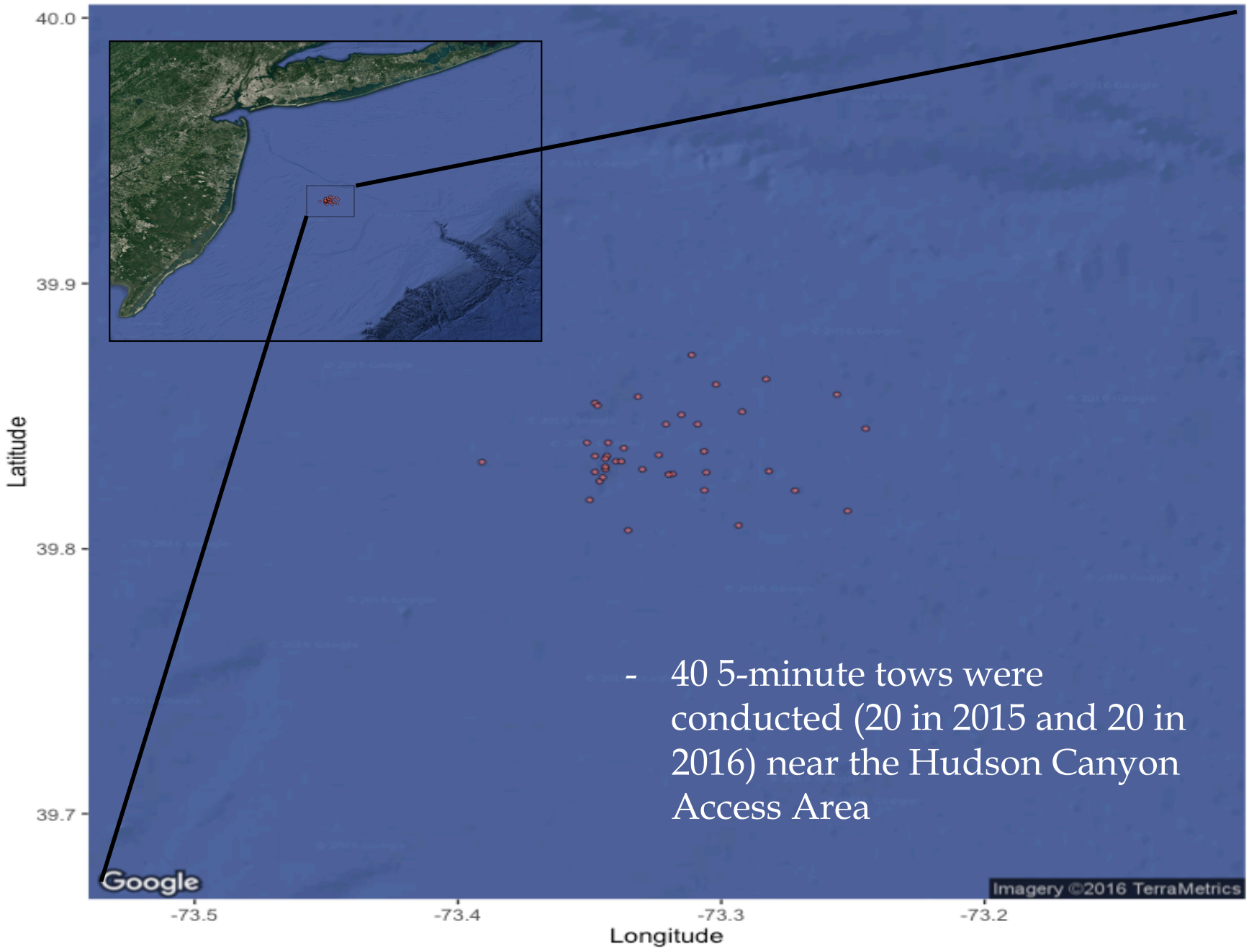

- Standard 4-inch chain bag
- 1 and 7/8 inch mesh sewn to the top of the dredge apron

# Introduction

1. What proportion of the scallops passing through the dredge are injured?
2. What proportion of the scallops passing through the dredge die?
3. What is the size-selectivity of the dredge?
4. Combine information from 1., 2., and 3. to estimate size-specific incidental mortality.



# Methods




- 40 5-minute tows were conducted (20 in 2015 and 20 in 2016) near the Hudson Canyon Access Area

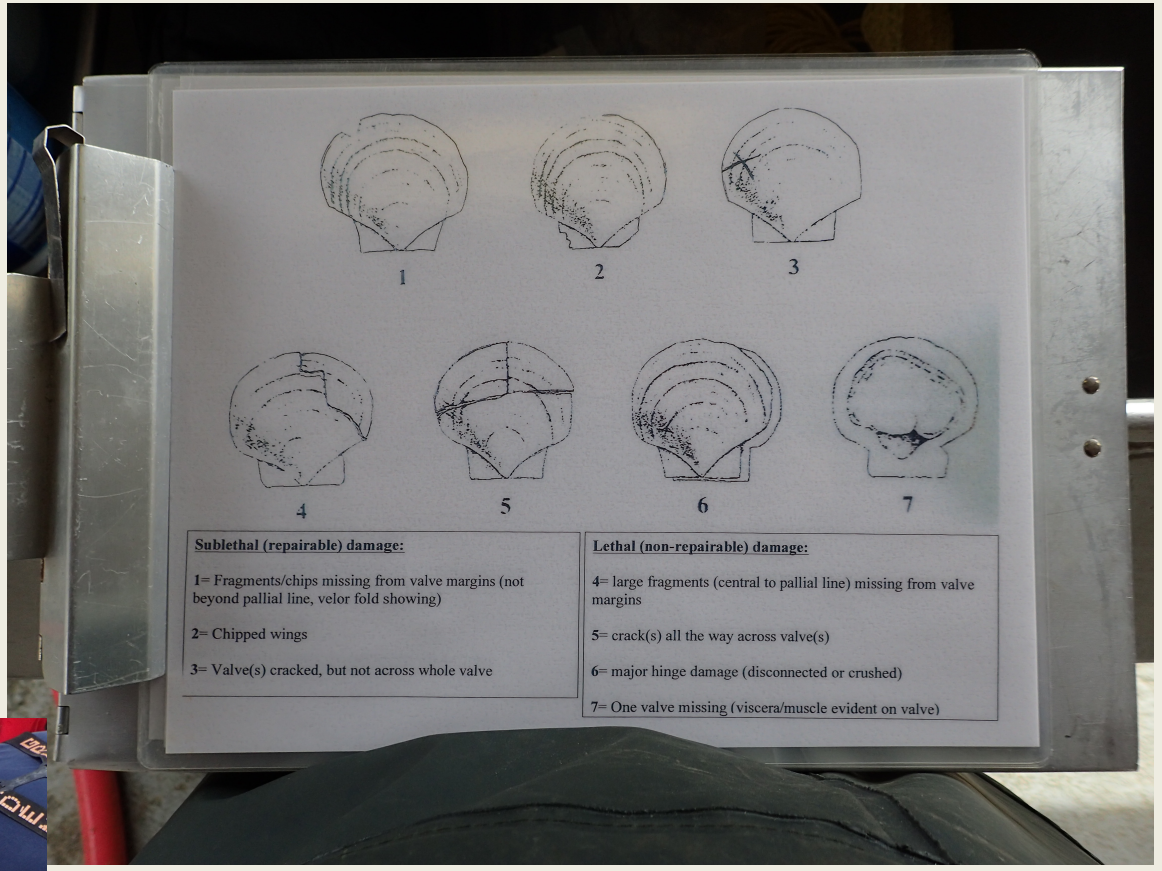
# Methods

- Dump the catch from the chain bag of the dredge near the middle of deck and shovel it into a pile.

- Lay the dredge over catch from chain bag, lift the net bag with bull rope, and trip the codend to dump net bag catch at the rail.

# Methods

- Scallops and bycatch were counted and measured in the chain bag (catch), and the net bag (incidental catch).




- Scallops in the incidental catch were separated by injury type according to Medcof and Bourne (1964) as having no damage, lethal damage, or sub-lethal damage.

Medcof, J. C. and N. Bourne. 1964. Proc. Natl. Shellfish Assoc. 53: 33-50.

# Methods


- Up to 20 randomly selected incidental catch scallops from each injury category (undamaged, sub-lethal damage, lethal damage) were placed in a square three dimensional plastic mesh cage and tagged with the injury type and tow number.

- Scallops from each tow were stored in live well on deck, in the shade, with running sea surface water until 5 tows were completed.

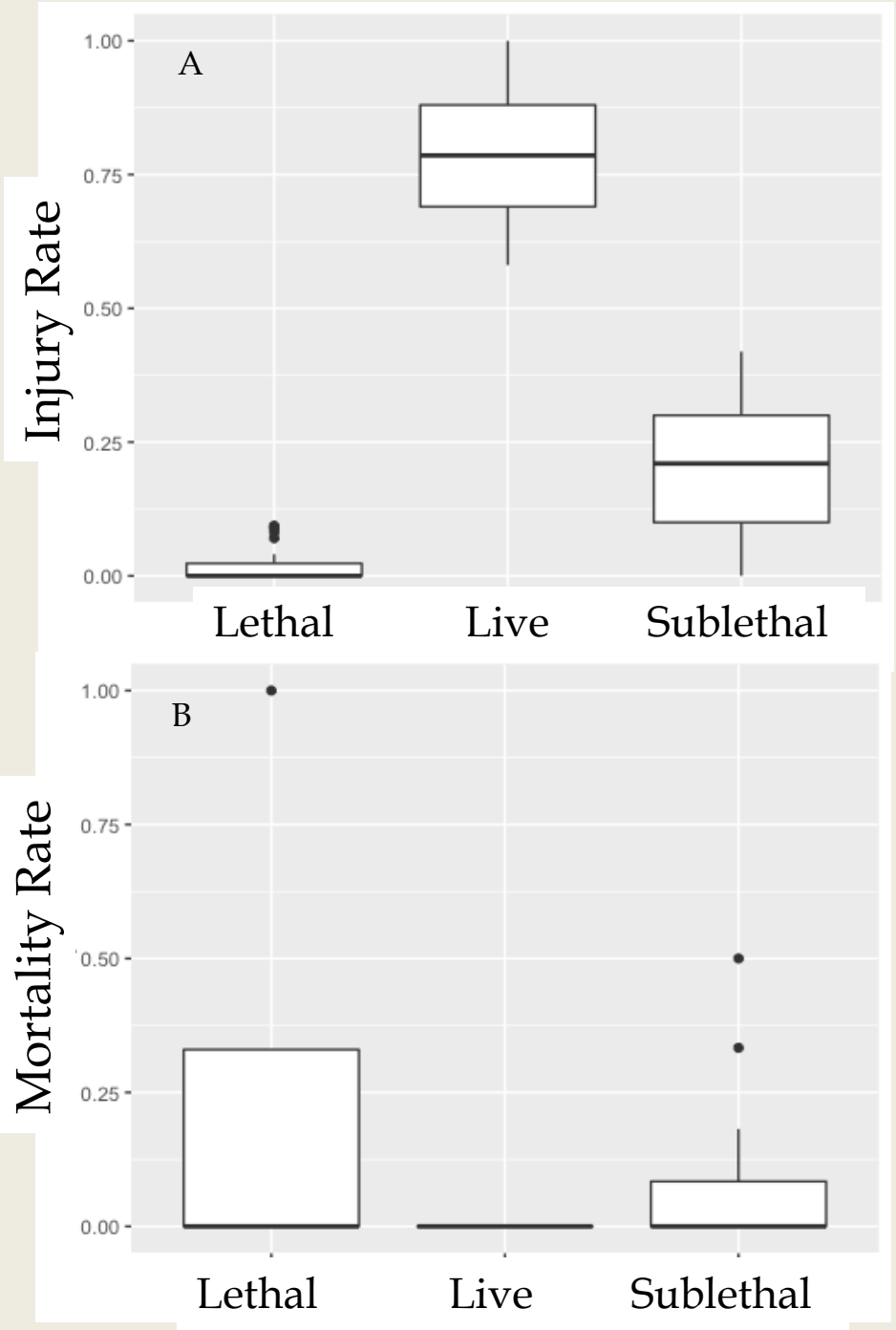
# Methods

- After 5 tows were complete, plastic mesh cages were removed from the live well and zip-tied into a whelk pot.

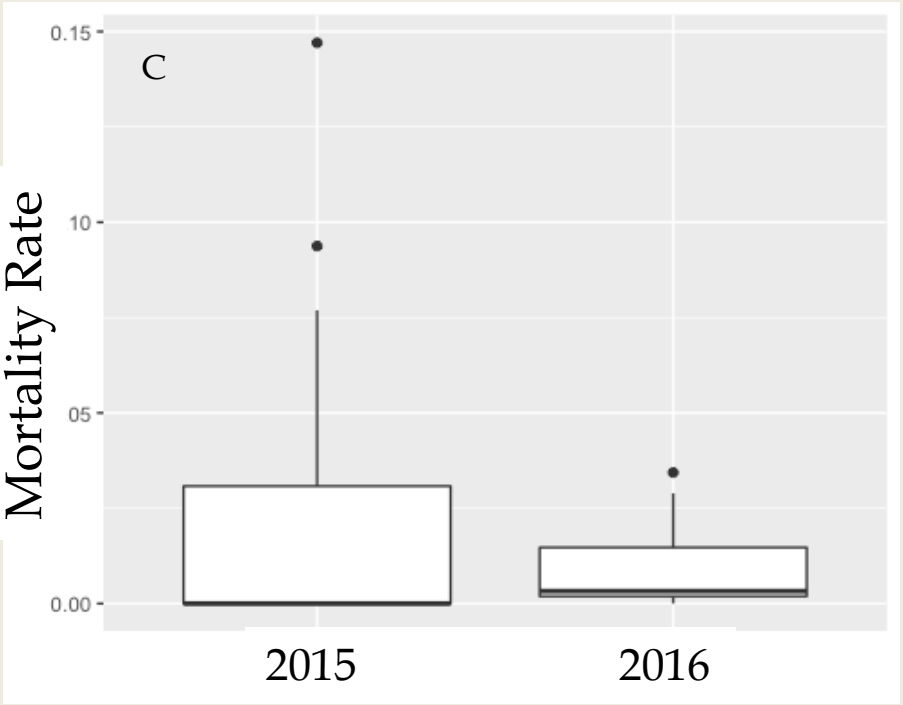
- All pots from those 5 tows (up to 15 pots) were tied to pot string and transported back to the sea floor.

- Pots were hauled and live and dead scallops counted at 1- and 2-week intervals post-release.

# Results




1. Injury Rate?
2. Mortality Rate?



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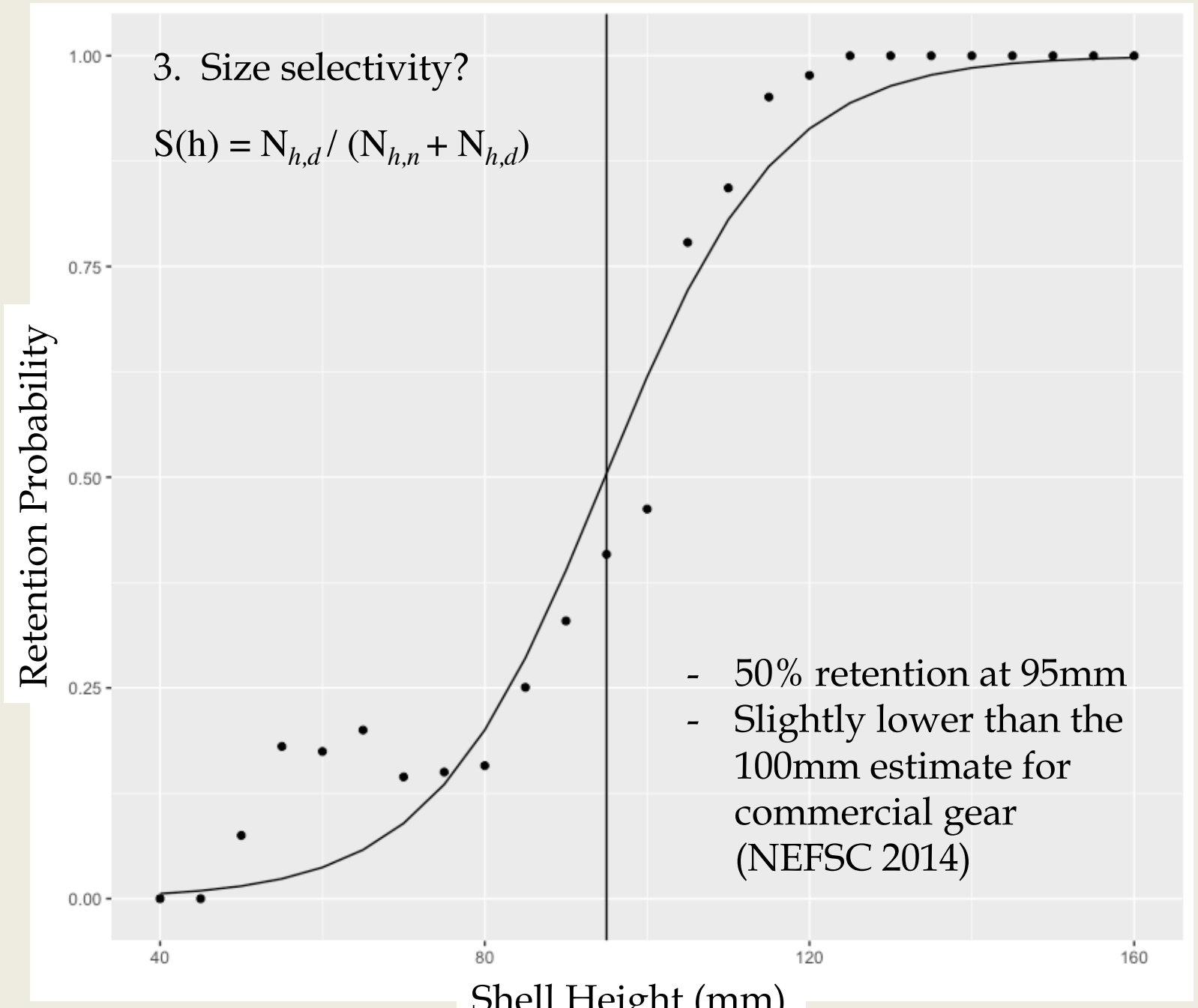
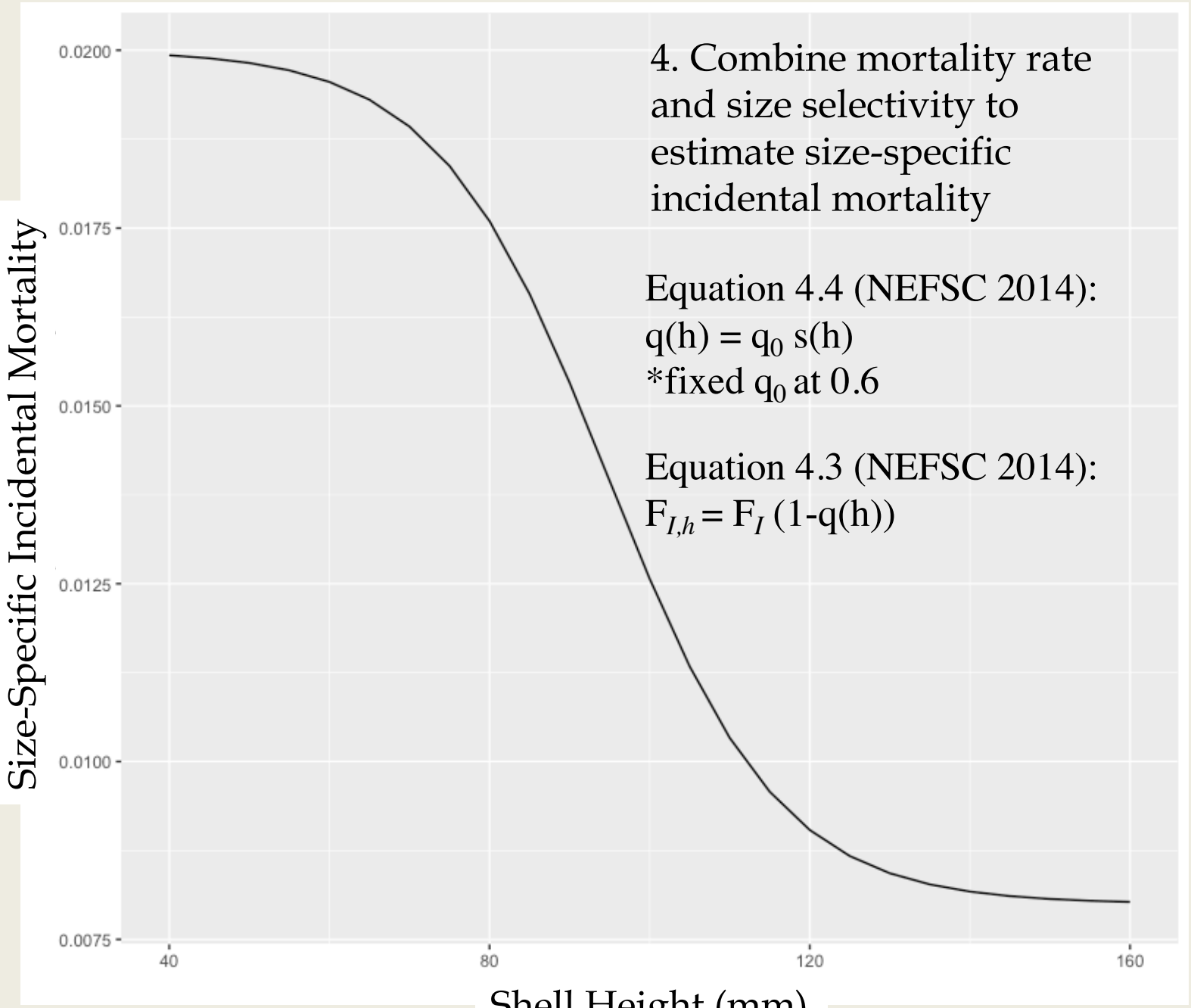

3. Size selectivity?
S(h) = N_{h,d} / (N_{h,n} + N_{h,d})
- 50% retention at 95mm
- Slightly lower than the 100mm estimate for commercial gear (NEFSC 2014)
Retention Probability
1.00
0.75
0.50
0.25
0.00
40
80
120
160
Shell Height (mm)

# Results

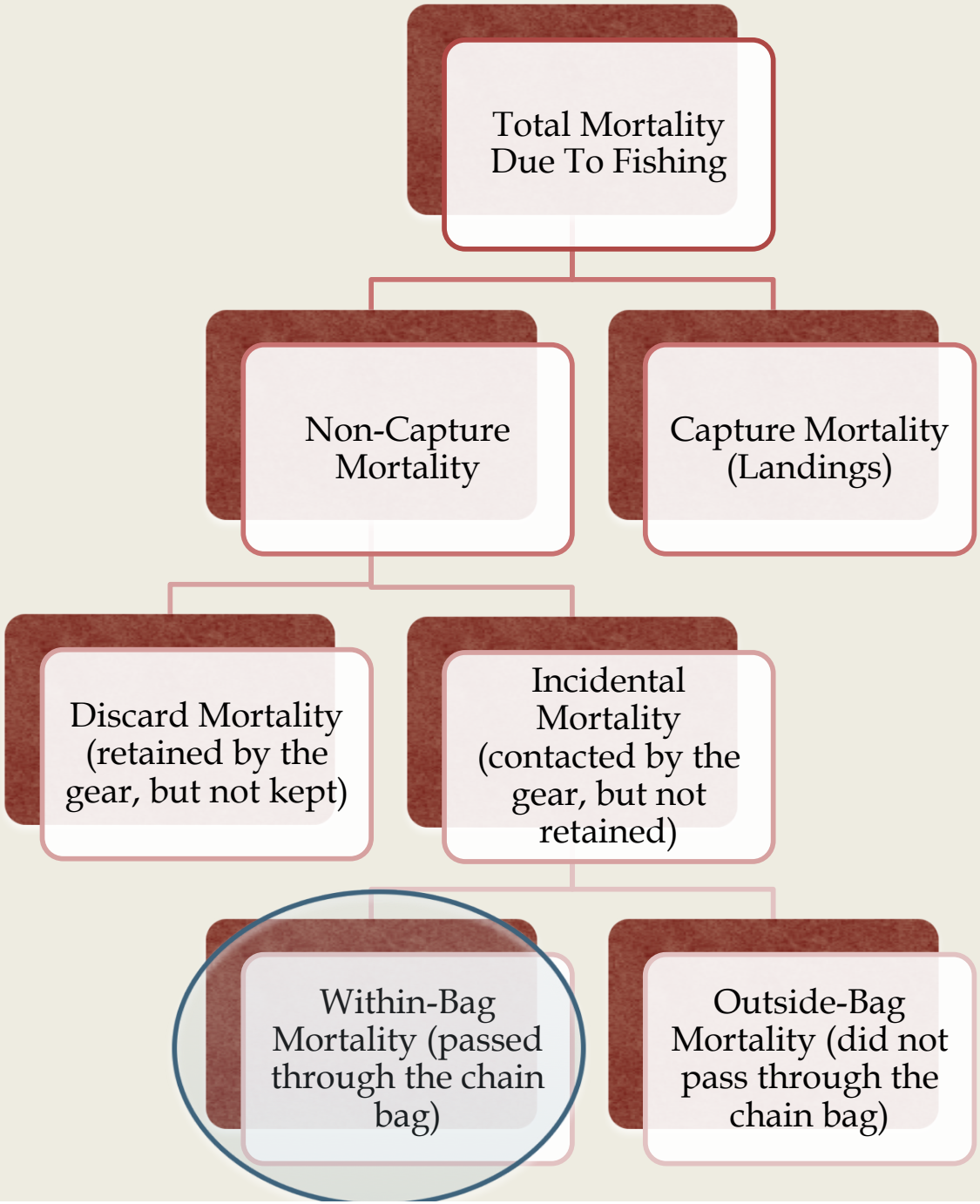



4. Combine mortality rate and size selectivity to estimate size-specific incidental mortality

Equation 4.4 (NEFSC 2014):
$q(h) = q_0\, s(h)$
*fixed $q_0$ at 0.6

Equation 4.3 (NEFSC 2014):
$F_{I,h} = F_I\,(1\text{-}q(h))$

# Discussion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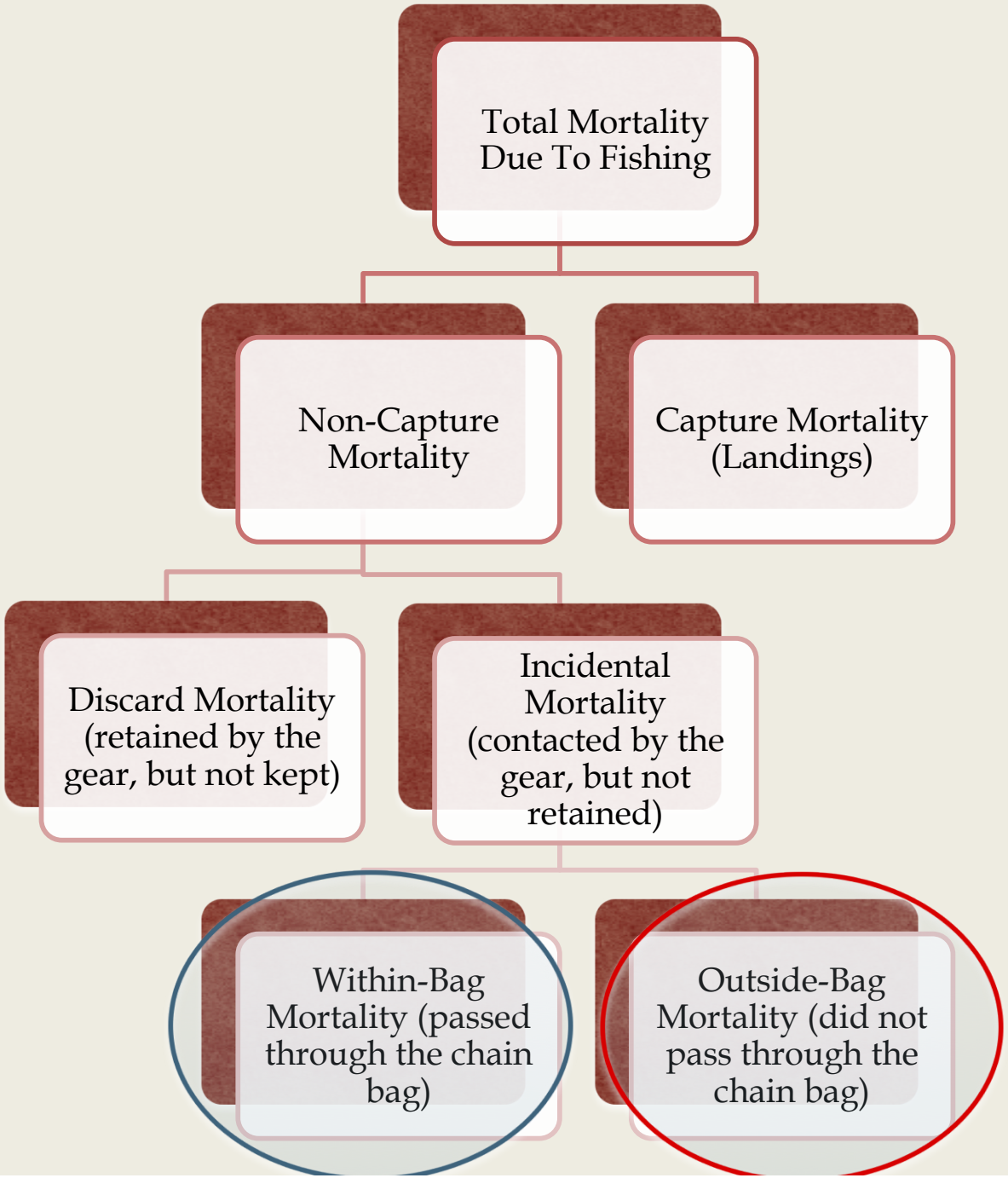
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# Acknowledgements

- Atlantic Sea Scallop Research Setaside Program and NOAA/NMFS

- Albert Carlson at Quality Nets

- Captains and crews of the F/V Elizabeth and the F/V Provider III

- Daphne Munroe and her lab at Rutgers University, especially Sarah Borsetti, Joe Caracappa, Collin Dobson, and Sean Martin

* Air temperature
* Year
* Total scallop catch
* Bottom type (hard/soft)
* Wire scope
* Depth
* Tow Speed

- Year, bottom type, air temperature had significant effects