

Fisheries Independent Assessment of Red Snapper Populations in Alabama's Reef Permit Zone



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Goals

- Improve current stock assessments
- Merge single species assessments into an ecosystem framework:
 - Targeted & non-targeted species
 - Physical parameters
 - Anthropogenic factors
 - Direct and indirect species interactions
 - Fishing fleet dynamics

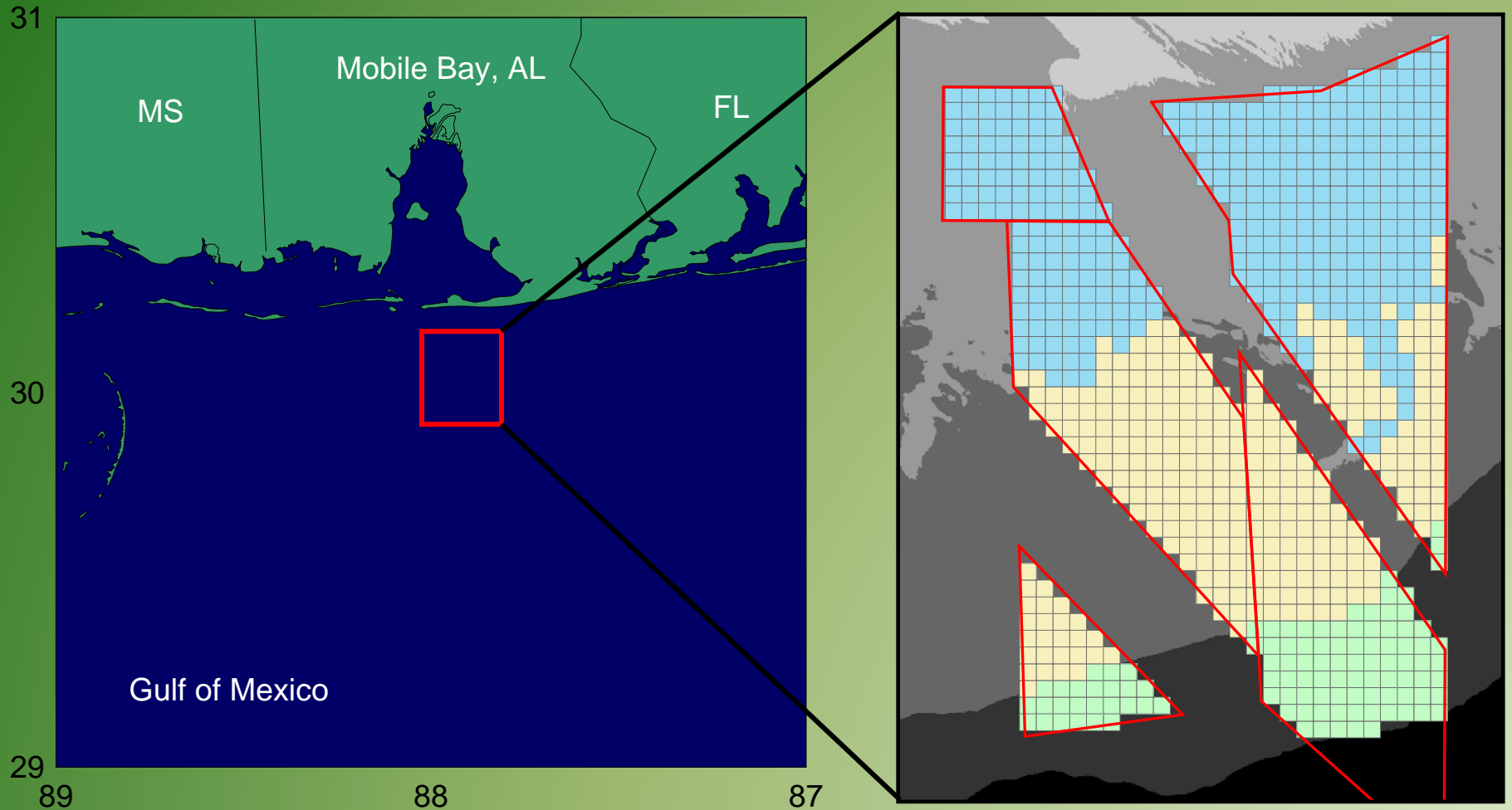


Ponwith, NOAA Fisheries

Objectives

- Short term (1yr): Determine selectivity of gears and adopt standard practices.
- Mid-term (2-3 yrs): Assess reef fish assemblages in coastal Alabama to support SEDAR stock assessments.
- Long-term (multi-year): Establish an ecosystem based fishery independent sampling program.

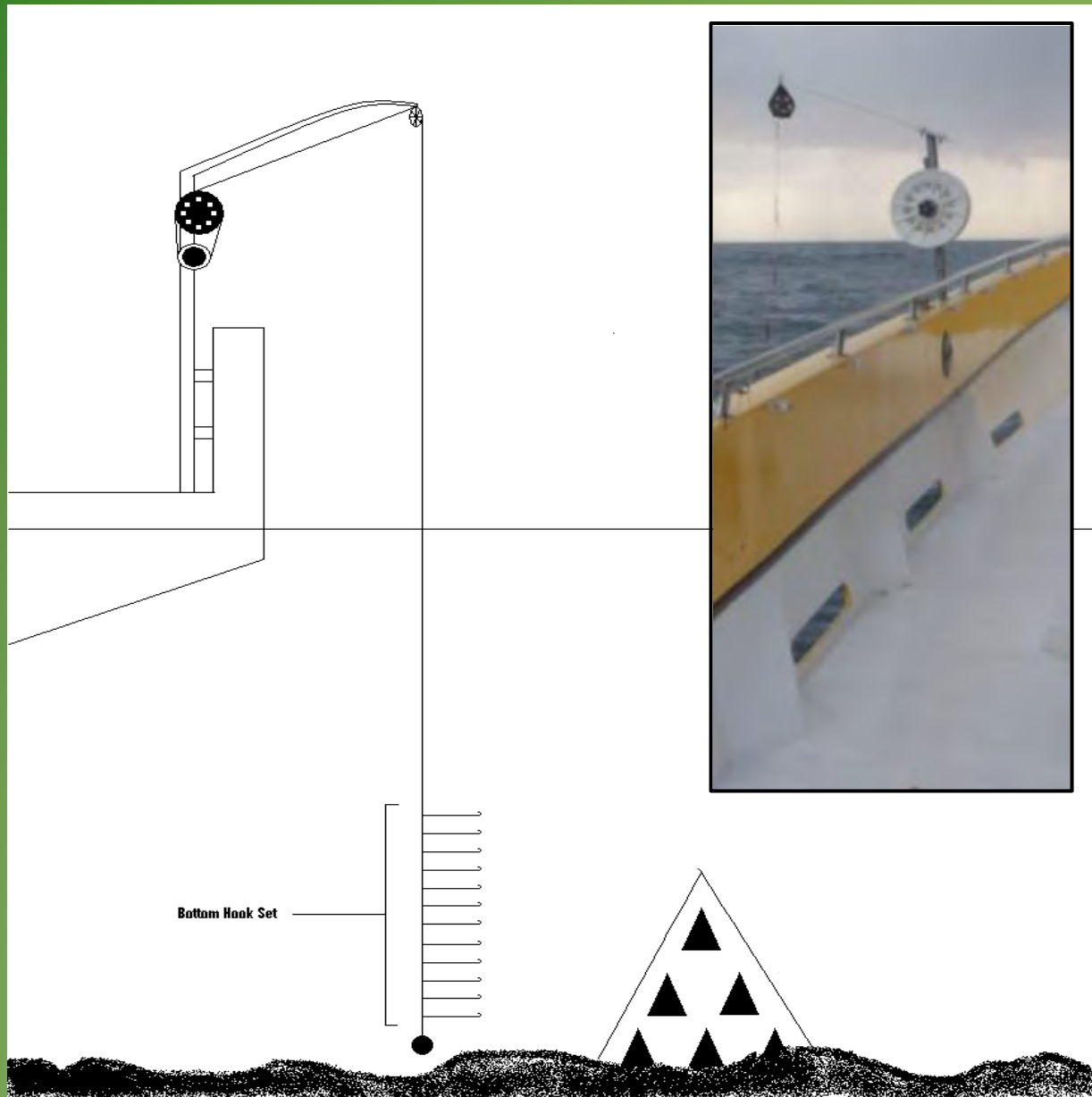
Coastal Alabama as an Example



Today: Short Term Objectives

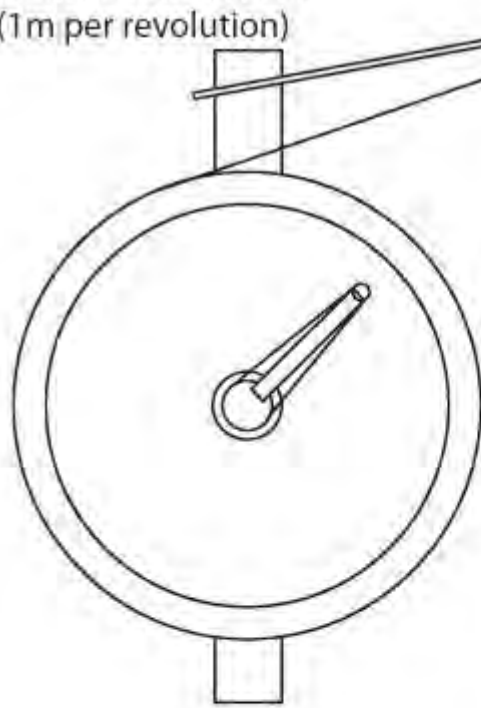
- Short term (1yr): Determine selectivity of gears and adopt standard practices.
- Hook size
- Soak time
- Replicate
- Bait type



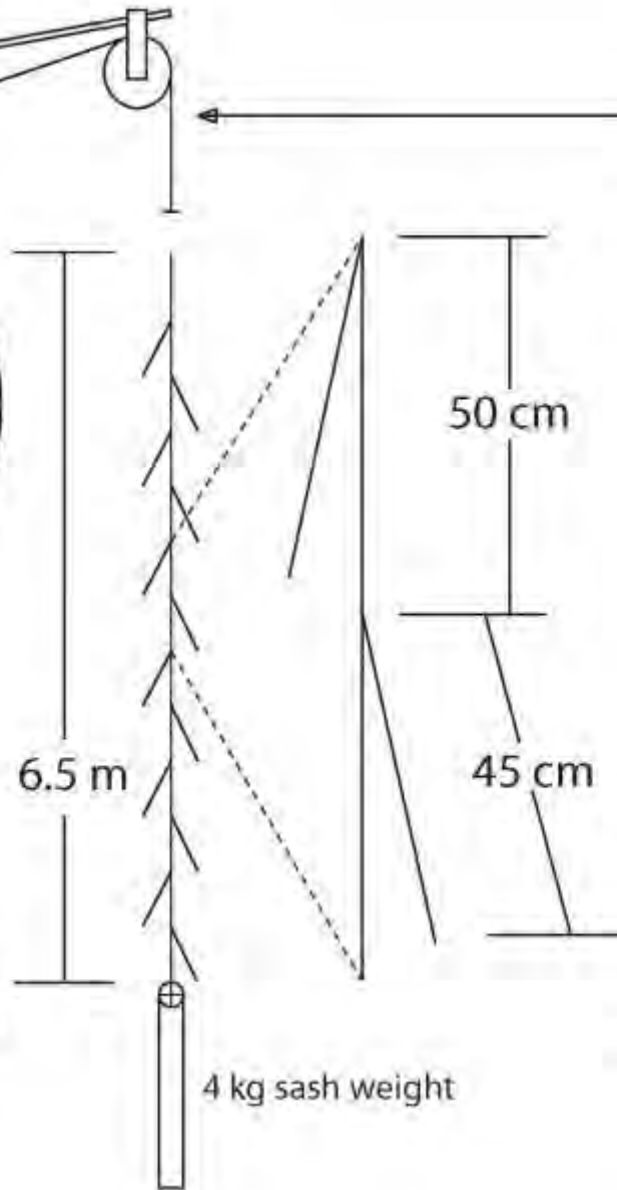


Vertical longline gear configuration

Manual Bottom Reel
(1m per revolution)



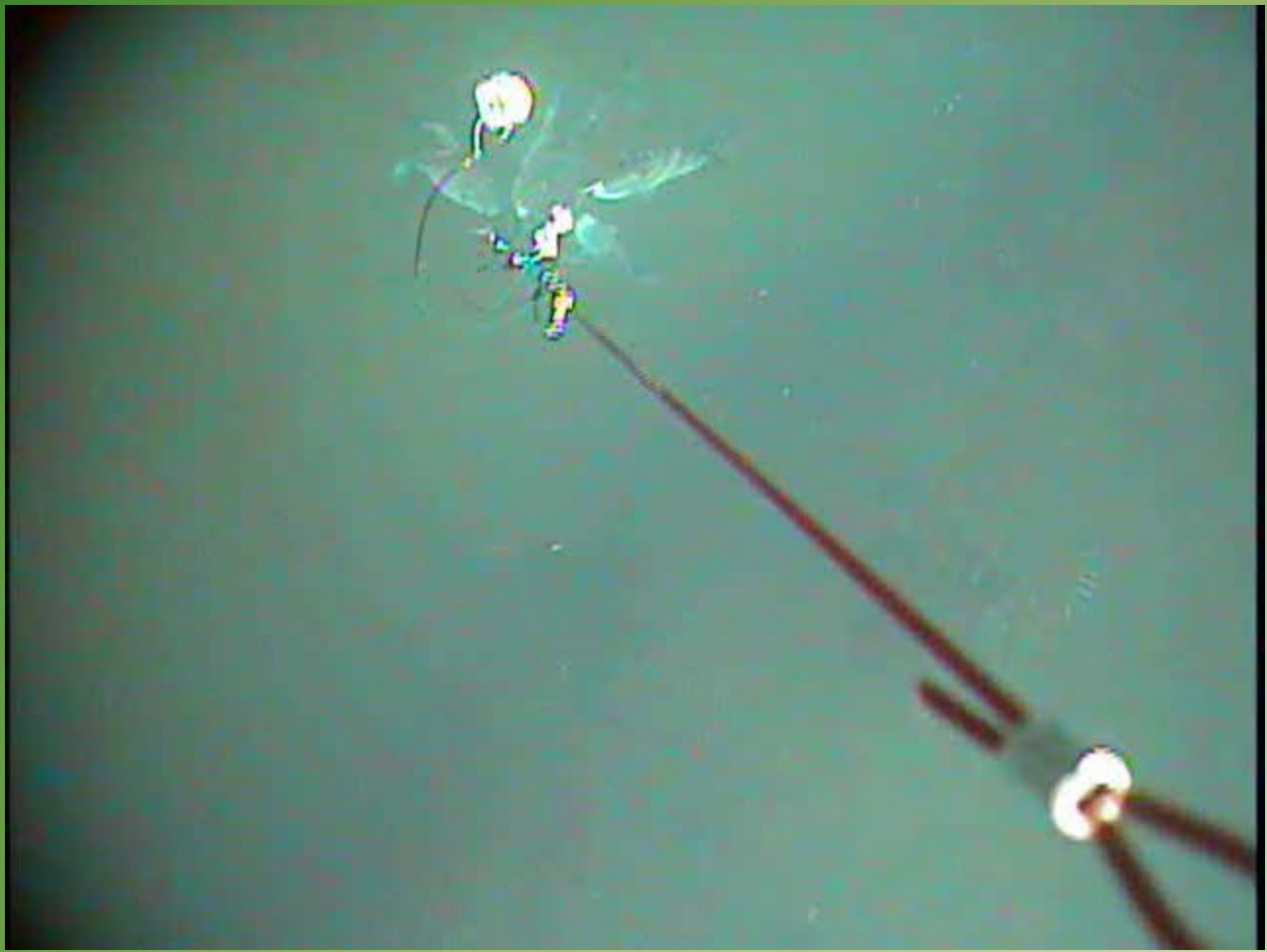
Backbone (6.5 m)
400 lb test red mono,
twelve 2.3mm swivel
sleeves, crimped loop at
top, 2/0 roscosnap swivel
at bottom

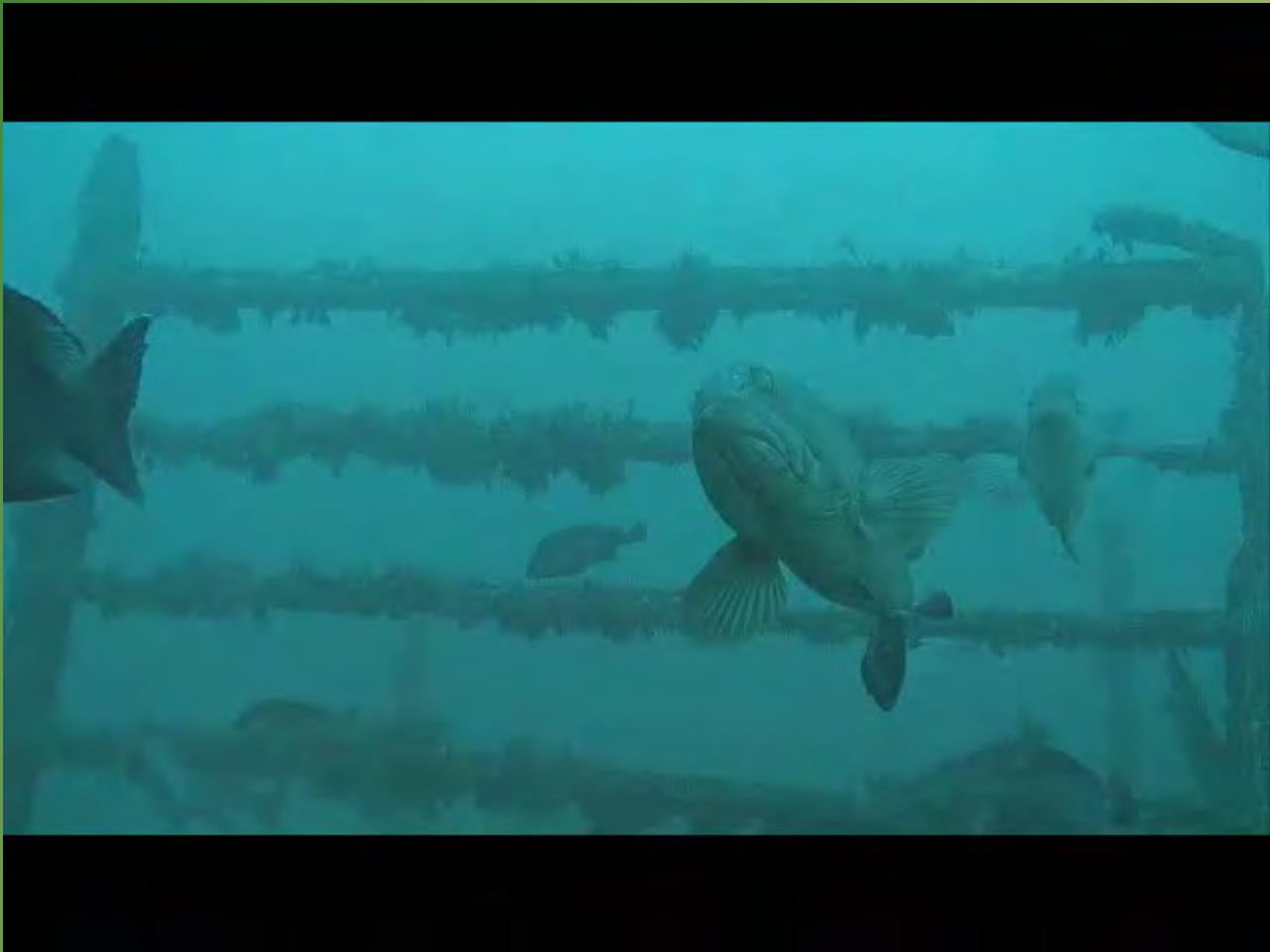


Mainline
300 lb test clear
mono (167m),
crimped 6/0 roscosnap
swivel using
2.3mm double
copper crimp sleeve
at end to attach
backbone

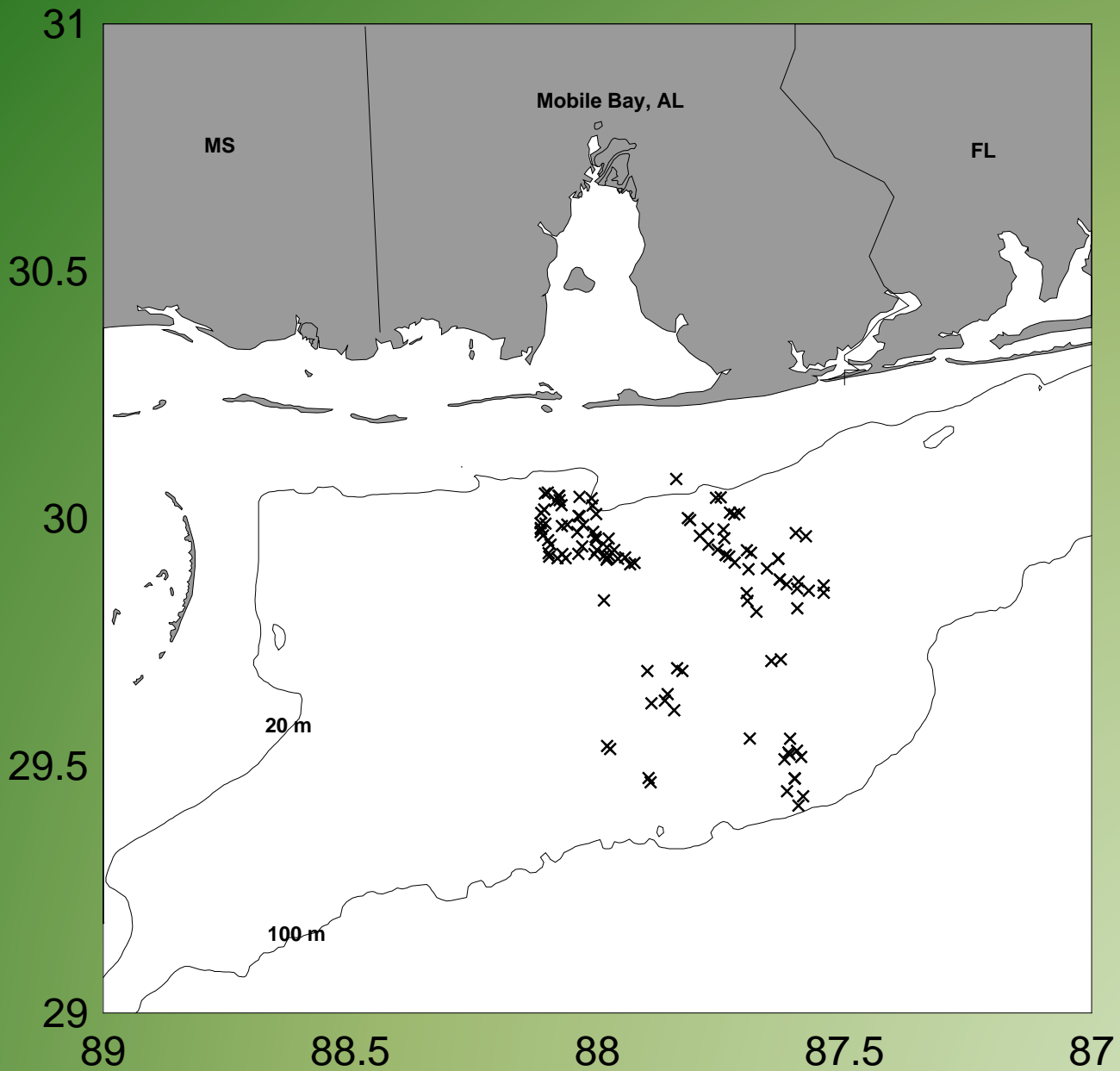
Gangion (45 cm)
4/0 roscosnap swivel,
200 lb test camo mono,
3/0, 8/0, or 11/0
mustard circle hook,
two 1.9mm double
copper crimp sleeve for
snap swivel and hook
attachment

4 kg sash weight





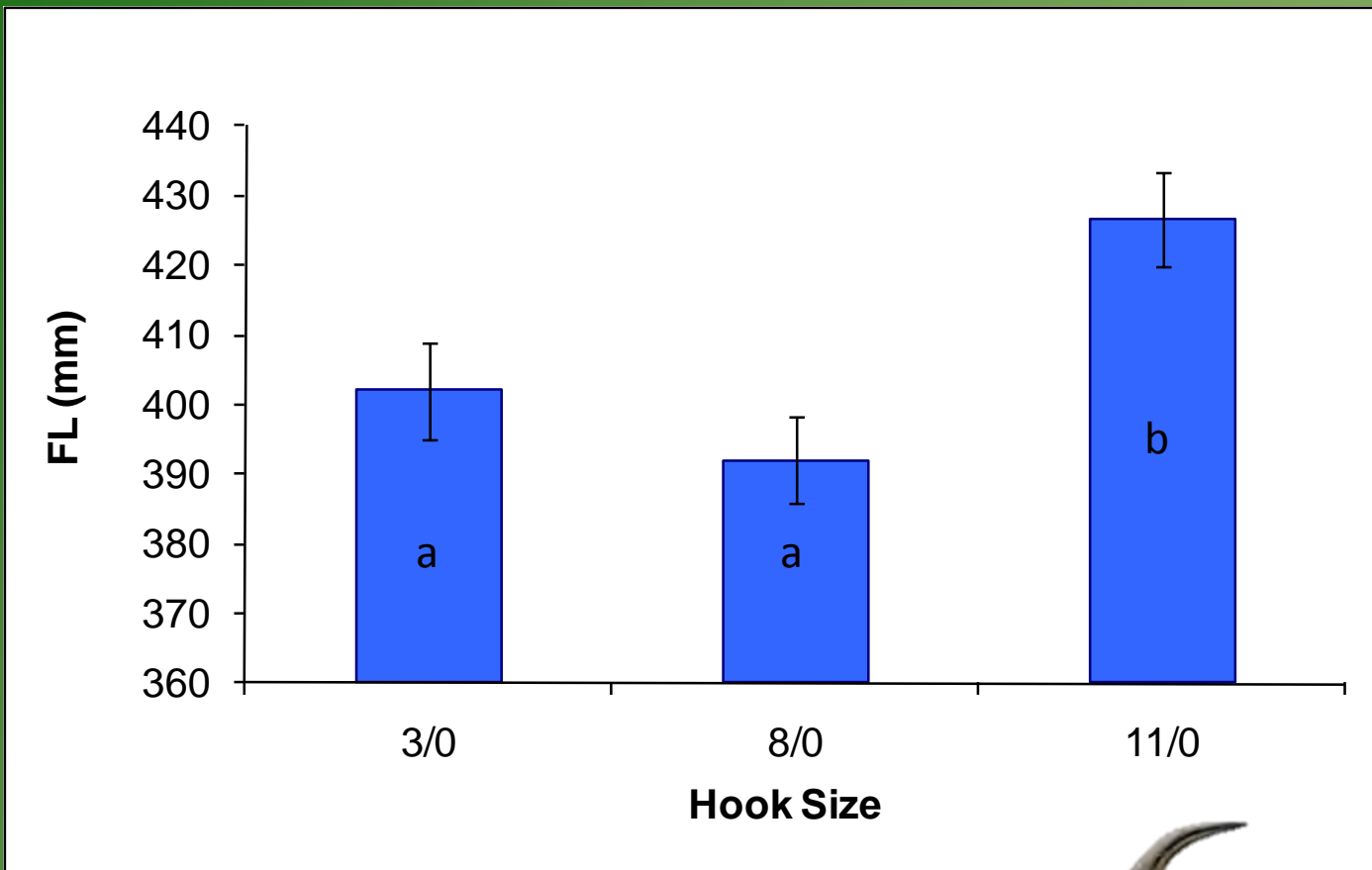




Vertical longline sampling locations

Species	Hook Size				Total
	3/0	8/0	9/0	11/0	
Red snapper <i>Lutjanus campechanus</i>	197	236	168	428	1029
Grey triggerfish <i>Balistes capricus</i>	24	19	6	12	61
Vermillion snapper <i>Rhomboplites aurorubens</i>	6	7	5	6	24
Sharksucker <i>Echeneis naucrates</i>	3	8	0	4	15
Tomtate <i>Haemulon aurolineatum</i>	1	0	2	4	7
Atlantic sharpnose shark <i>Rhizoprionodon terraenovae</i>	0	0	3	4	7
Red porgy <i>Pagrus pagrus</i>	3	1	0	1	5
Rock seabass <i>Centropristis philadelphica</i>	0	1	3	1	5
Red drum <i>Sciaenops ocellatus</i>	0	0	2	2	4
Scamp <i>Mycteroperca phenax</i>	2	0	0	1	3
Almaco jack <i>Seriola rivoliana</i>	0	0	0	2	2
Red grouper <i>Epinephelus morio</i>	0	1	0	1	2
Warsaw grouper <i>Hyporthodus nigritus</i>	0	0	1	1	2
Gag <i>Mycteroperca microlepis</i>	0	0	0	1	1
Hardhead catfish <i>Arius felis</i>	0	0	0	1	1
Blackline tilefish <i>Caulolatilus cyanops</i>	1	0	0	0	1
Round scad <i>Decapterus punctatus</i>	0	0	1	0	1
Little tunny <i>Euthynnus alletteratus</i>	0	0	0	1	1
Lane snapper <i>Lutjanus synagris</i>	0	0	0	1	1

Vertical longline species composition



Red snapper catch by hook size

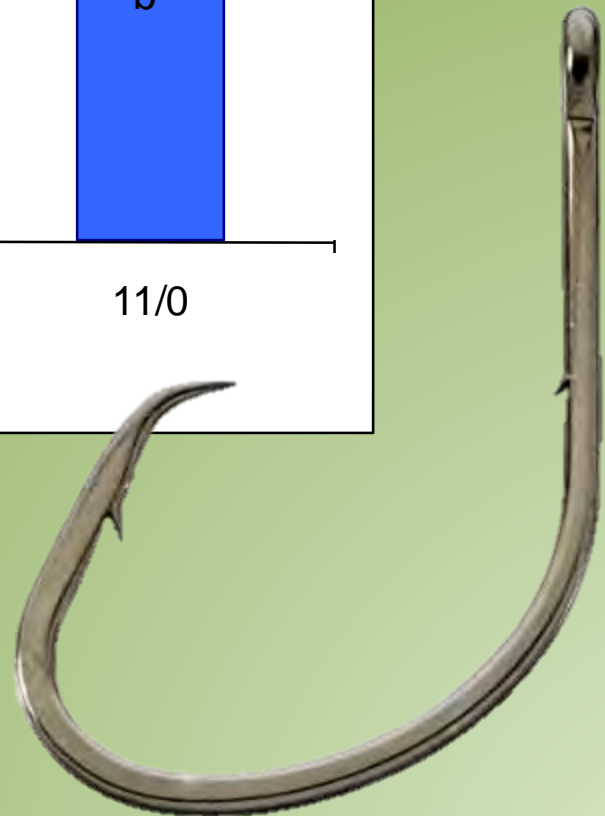
Analysis of variance:

Source	DF	SS	MS	F	Pr > F
Model	2	94561.836	47280.918	7.581	0.001
Error	424	2644370.867	6236.724		
Corrected	426	2738932.703			

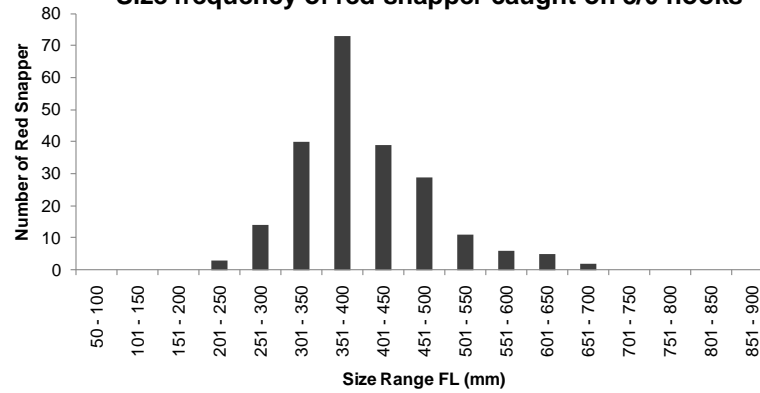
Computed against model $Y = \text{Mean}(Y)$

Hook Size / Newman-Keuls (SNK) Post-Hoc test

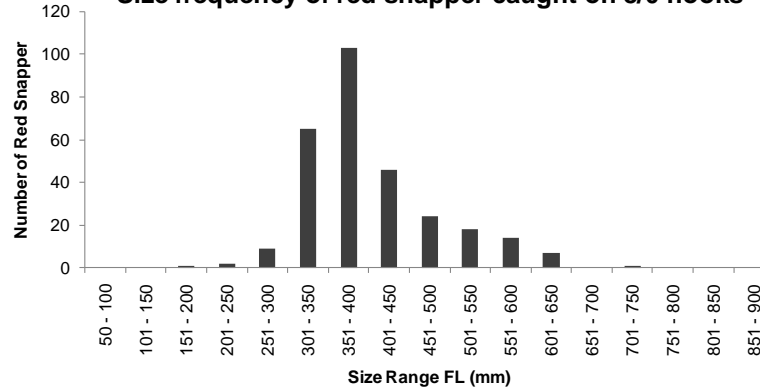
Contrast	Difference	STND Diff	Crit value	Pr > Diff	Significant
11/0 vs 8/0	34.647	3.786	2.344	0.000	Yes
11/0 vs 3/0	24.652	2.604	1.960	0.009	Yes
3/0 vs 8/0	9.995	1.049	1.960	0.294	No



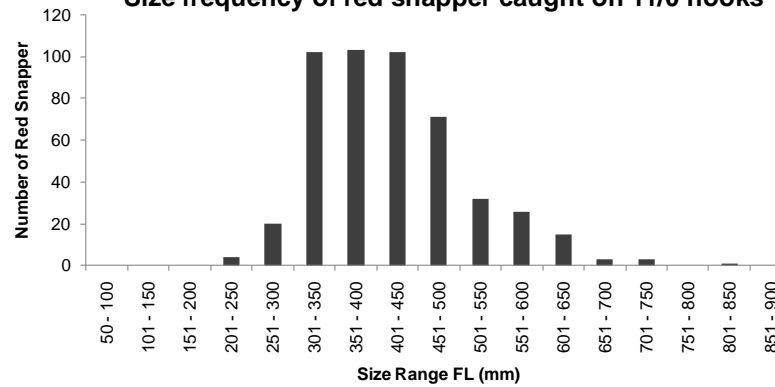
Size frequency of red snapper caught on 3/0 hooks

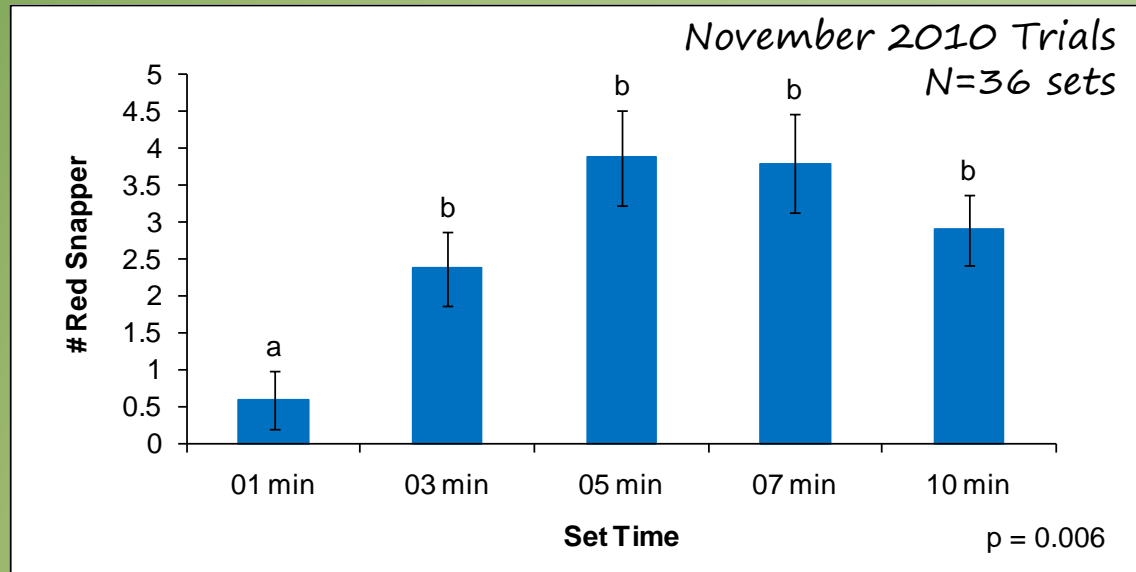
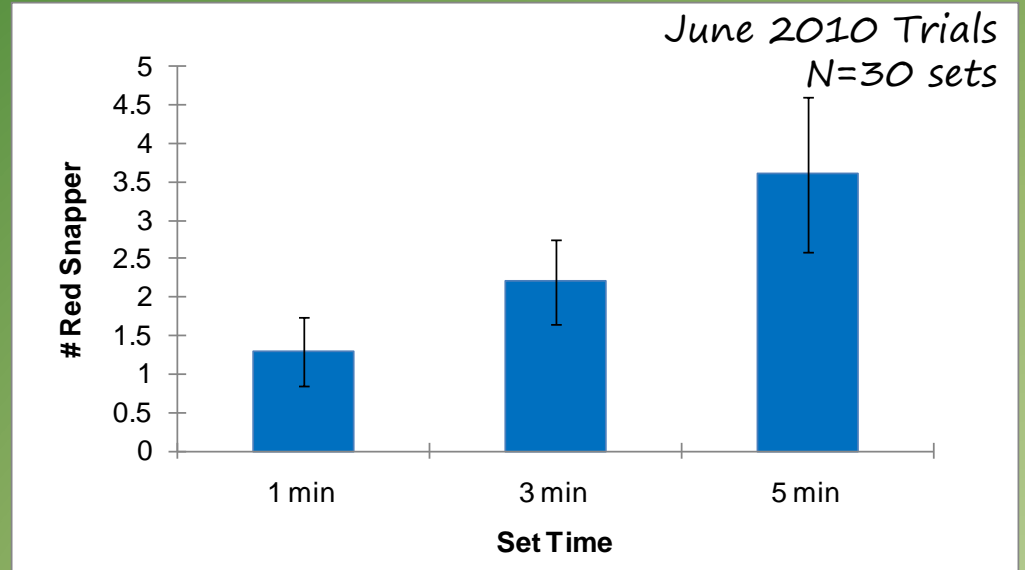


Size frequency of red snapper caught on 8/0 hooks

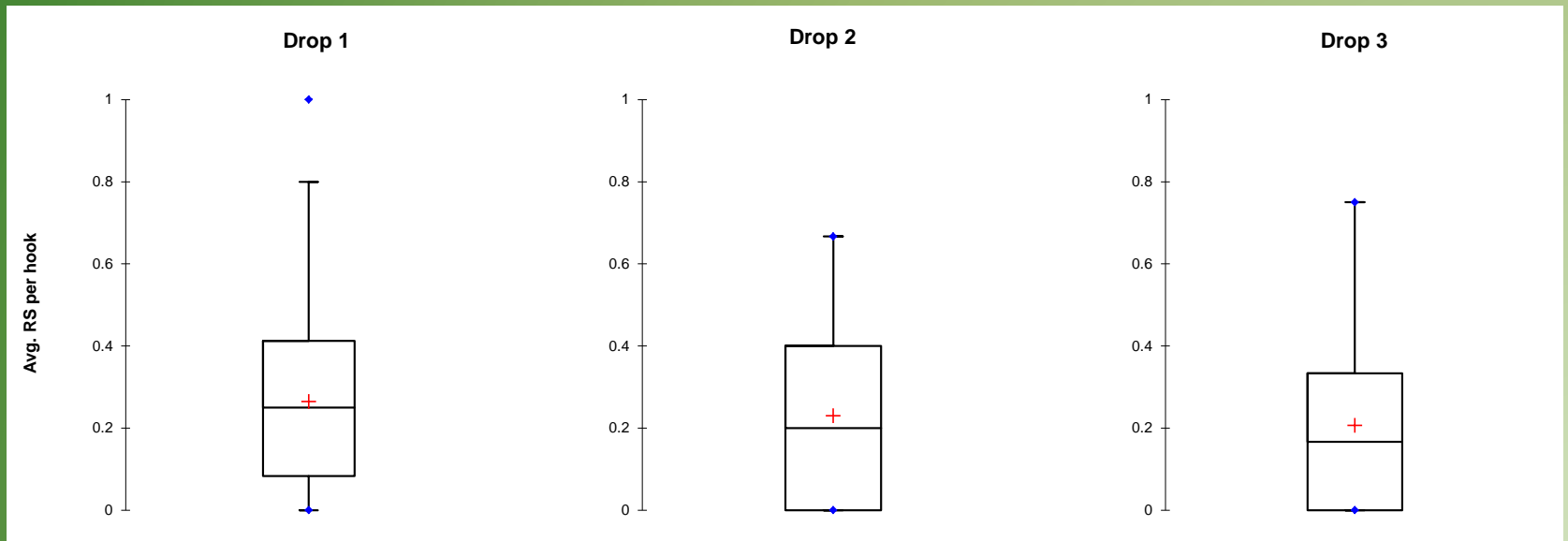


Size frequency of red snapper caught on 11/0 hooks

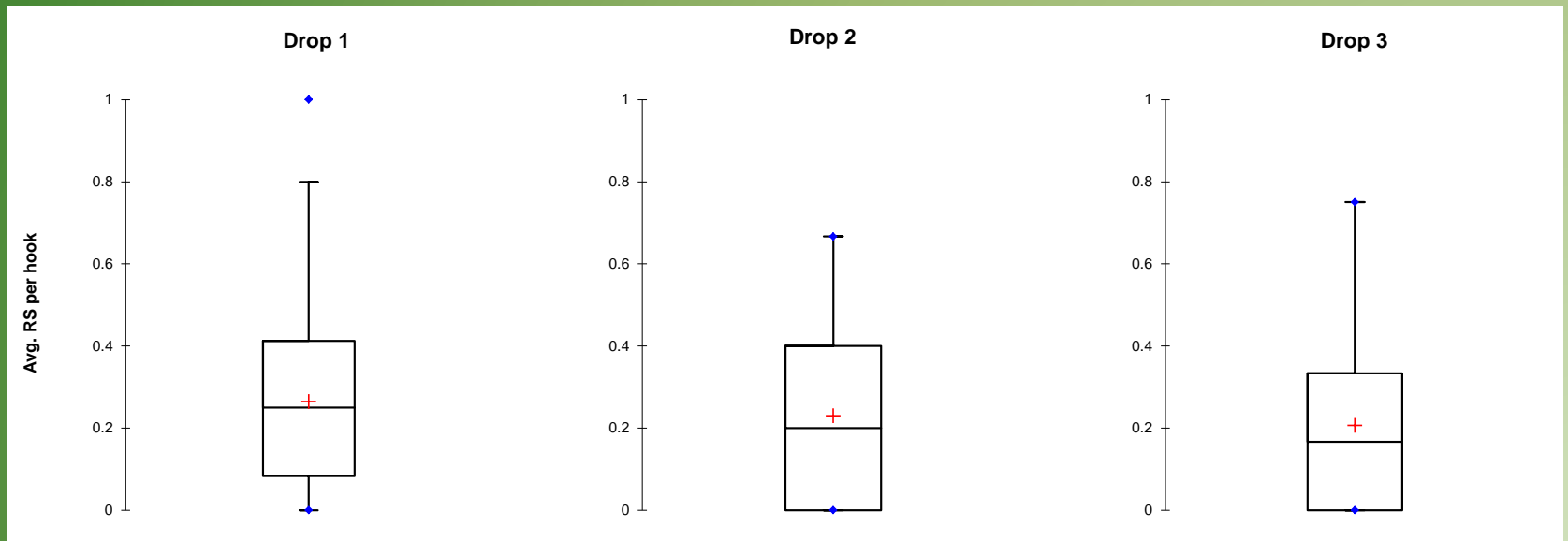




Statistic	Drop 1	Drop 2	Drop 3
No. of observations	126	126	126
Minimum	0.000	0.000	0.000
Maximum	1.000	0.667	0.750
Mean	0.265	0.230	0.206
Variance (n)	0.048	0.038	0.038
Variance (n-1)	0.048	0.039	0.038
Standard deviation (n)	0.218	0.196	0.195
Standard deviation (n-1)	0.219	0.196	0.196
Standard error of the mean	0.020	0.017	0.017



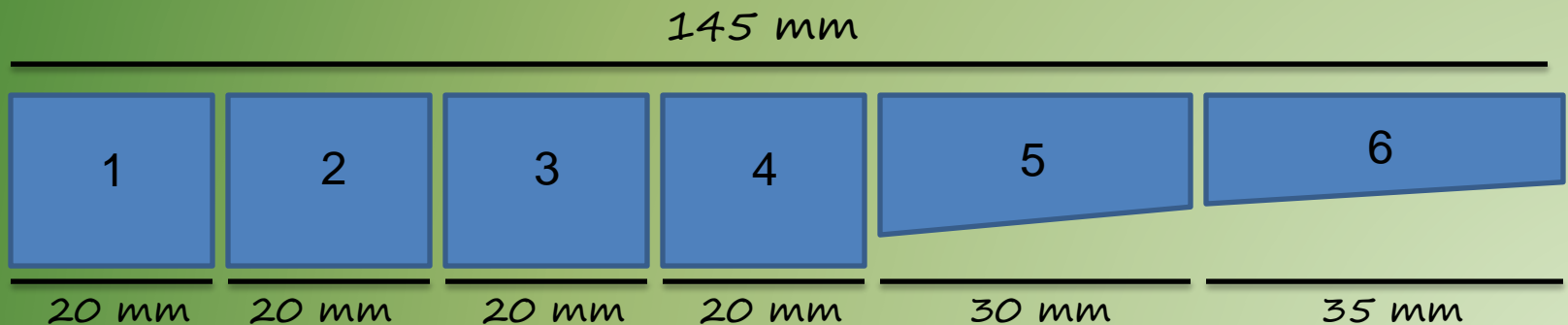
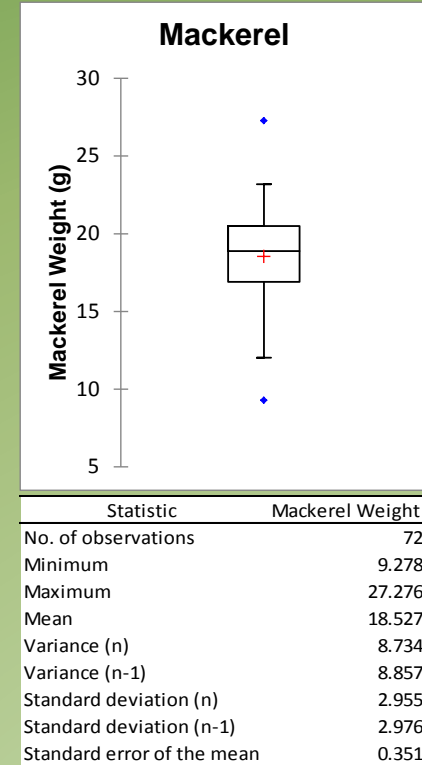
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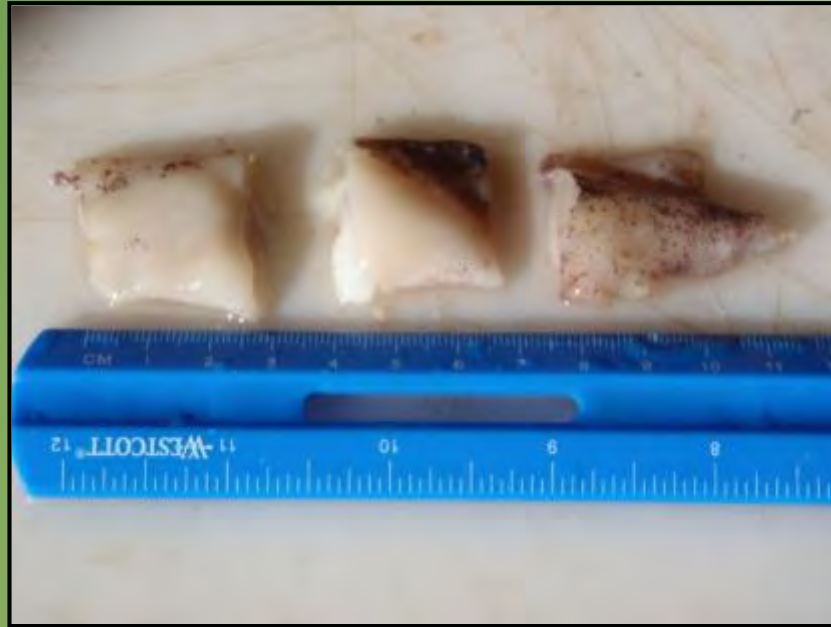
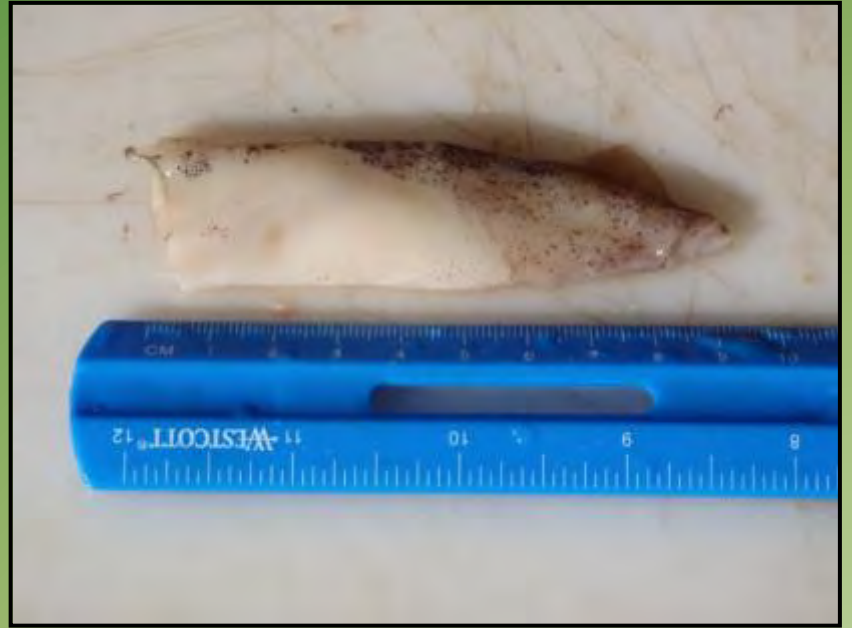
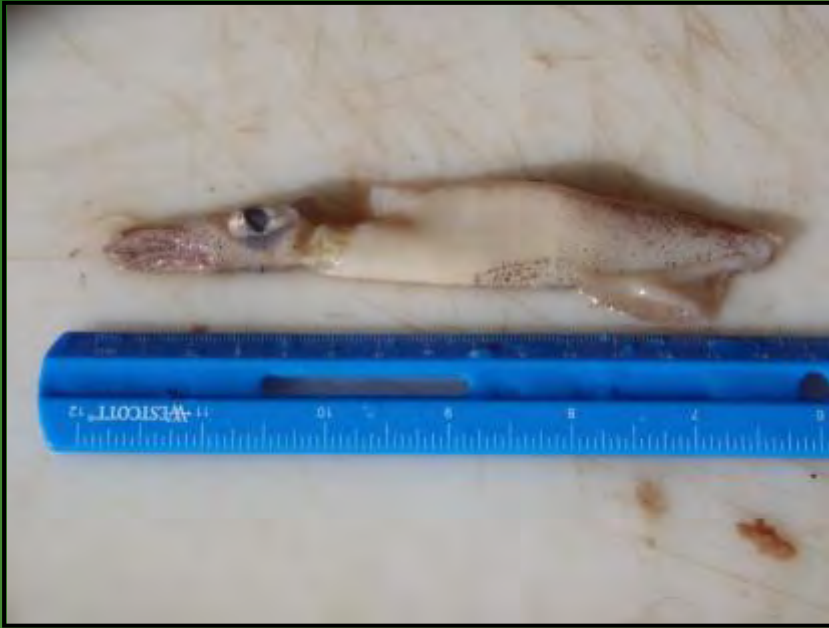




Mackerel

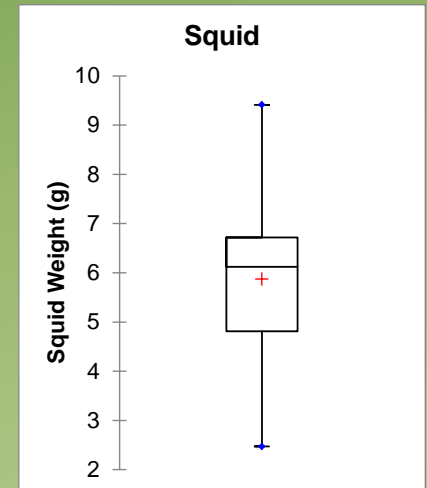
- Head removed just behind gill operculum
- Tail removed so body is 145 mm in length
- Body sectioned into 6 pieces
- Pieces 1-4 are 20 mm in length
- Piece 5 is 30 mm in length, piece 6 is 35 mm in length
- Pieces 5 and 6 are longer to account for the tapering of the fish's body
- Average weight of piece is $18.527 \text{ g} \pm 2.967 \text{ g}$
 $N=12 \text{ fish}, 72 \text{ pieces}$



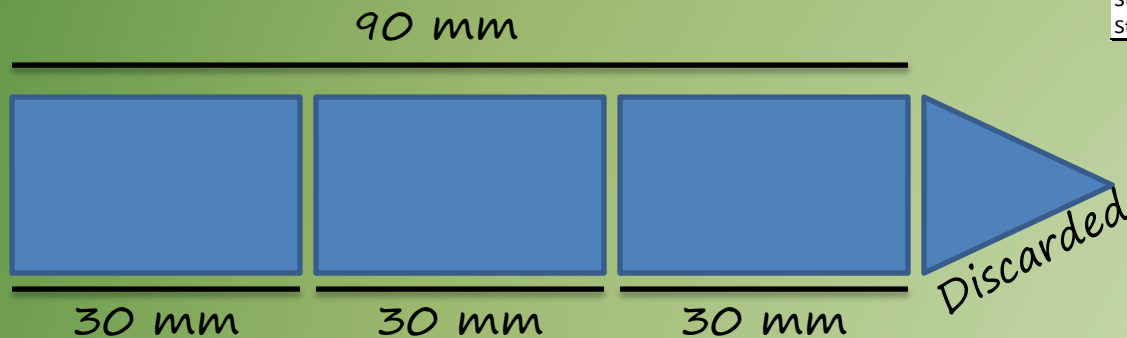


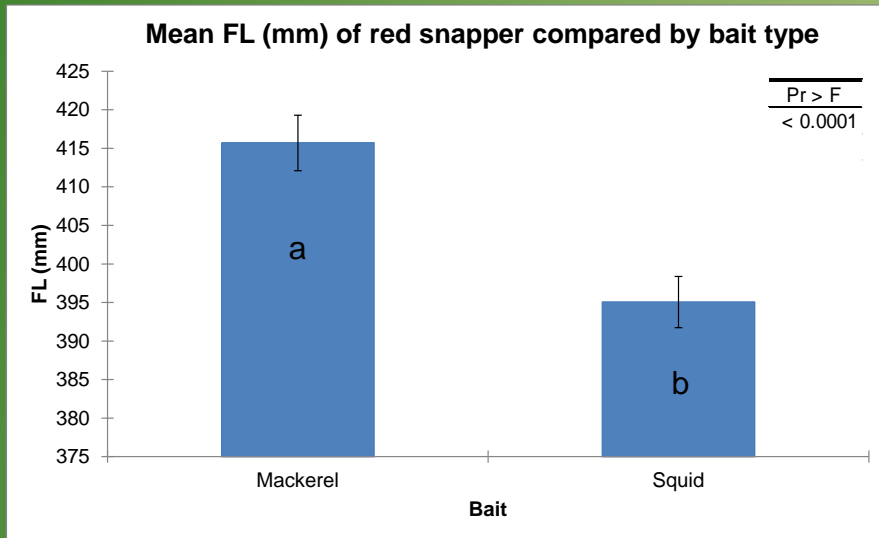
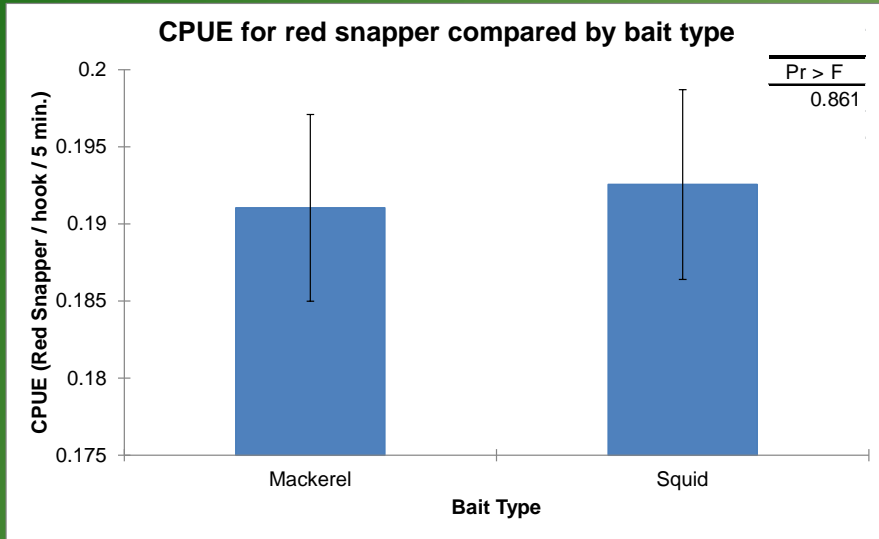
Squid

- Tentacles are removed—only mantle is used
- 30 mm sections are cut from the mantle—anything leftover is discarded
- Average weight of piece is 5.869 g \pm 1.387 g N= 12 squid, 36 pieces



Statistic	Squid Weight
No. of observations	36
Minimum	2.471
Maximum	9.411
Mean	5.869
Variance (n)	1.870
Variance (n-1)	1.923
Standard deviation (n)	1.367
Standard deviation (n-1)	1.387
Standard error of the mean	0.231





Summary

- Similar catch across hook sizes (3/0, 8/0, 11/0), with 11/0 sampling significantly larger fish
- Time trials show increasing catch with soak time up to five minutes, with plateauing/declining catch suggesting saturation
- CPUE is similar per replicate, yet variability stabilizes between drops 2 and 3, suggesting optimal effort at 2
- Bait size has been quantified and standardized, and while CPUE is the same between bait types, hooks baited with mackerel catch larger red snapper than hooks baited with squid
- While seemingly trivial, this pilot work is a necessary and often overlooked aspect of constructing a well-designed, long term fishery-independent monitoring program

Acknowledgements

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Kate Nixon

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