

Determine Methods to Reduce By-Catch of Juvenile Atlantic Croaker (*Micropogonias undulates*)  
in Haul Seines.

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## Introduction

The juvenile Atlantic Croaker *Micropogonias undulatus* population is being severely cut down by haul seines in the Chesapeake Bay during the summer months (May-September). On more than one occasion haul seine crews return to the fish houses with upwards of 10,000 pounds of fish. These juvenile fish are composed of mostly but not limited to croaker. Other species of fish include Spot *Leiostomus xanthurus*, Spotted Seatrout *Cynoscion nebulosus*, and Weakfish *Cynoscion regalis*. Out of these fish it is not uncommon for over seventy-five percent to be deemed too small. Juvenile croaker and other species under a quarter pound are only sellable for the bait market, which is of low value. Further, the amount of bait fish that is harvested annually would be worth a much greater value in the years to come if they are left to grow larger.

Previous projects have tried to reduce by-catch of juvenile fish by adding an "escape panel" to the pocket. The issue faced with the escape panels is that once fish are herded into the pocket they begin schooling. Once the Fish begin to school they avoid the walls of the pocket at all costs completely avoiding the escape panels.

The main objective of this project was to cut down on by-catch of juvenile croaker harvested during the summer months in haul seines throughout the Chesapeake Bay.

## Method

Traditional haul seines were composed of 1000 yards of three inch mesh haul seine with a smaller mesh landing seine which is used to herd fish into a holding pen (pocket). The experimental haul seine cut down on the amount of three inch mesh net. In this modified seine, there was 200 yards of six inch mesh net directly behind the boat followed by 300 yards of four inch mesh. Behind the larger mesh was 500 yards of traditional three inch mesh that was used to herd the fish into a traditional pocket. All mesh sizes reported were in stretched inches. The hope of the larger mesh net was to allow a percentage of the juvenile fish to swim freely out of the net and avoid being caught. Over the course of the summer 2016, I fished both haul seine rigs in hopes of catching fewer juvenile croakers in the modified rig.



six successful trips, a total of 77,714 lbs. of fish were landed in this study (Table 1). The overall catch with the modified seine was lower than in the standard seine by 17,165 lbs. Out of the six successful comparisons there was relatively little difference in the size of the croaker caught. Over all trials, the modified seine caught less bait fish than the standard (control) seine, while also catching more of the small (more marketable) croaker (Figure 2). Four out of the 6 comparison trials (July 1, 6, August 2, 12, 2016) showed a significant reduction in bait fish caught in the modified seine, ranging from 33-71% decrease in bait caught. Statistical significance of catch differences between seines was conducted using the two-sample t-test assuming equal variances. This testing showed no significant difference (alpha 0.05) observed between the tested haul seines in bait caught (p-value = 0.15) or in the catch of small croakers (p-value= 0.38). Small sample size led to high variance that did not indicate a statistical significance. The data from this study suggests that a larger study with more sampling may show significant reductions in juvenile fish by-catch using the larger mesh seine.

Table 1. Catch by gear type, specie, and fish size.

Date	Gear type	Bait	small croaker	medium croaker	large croaker	small spot	total
1-Jul-16	control	11000	6842	0	0	85	17927
1-Jul-16	experimental	4600	5345	0	10	550	10505
6-Jul-16	control	4640	5050	0	200	226	10116
6-Jul-16	experimental	1350	1450	0	0	22	2822
28-Jul-16	control	855	800	0	0	56	1711
28-Jul-16	experimental	1350	1122	162	0	11	2645
2-Aug-16	control	10430	3875	180	0	181	14666
2-Aug-16	experimental	5900	6068	225	0	139	12332
12-Aug-16	control	1400	895	50	0	370	2715
12-Aug-16	experimental	760	576	130	0	34	1500
29-Aug-16	control	85	400	275	0	15	775
29-Aug-16	experimental	100	491	350	0	0	941

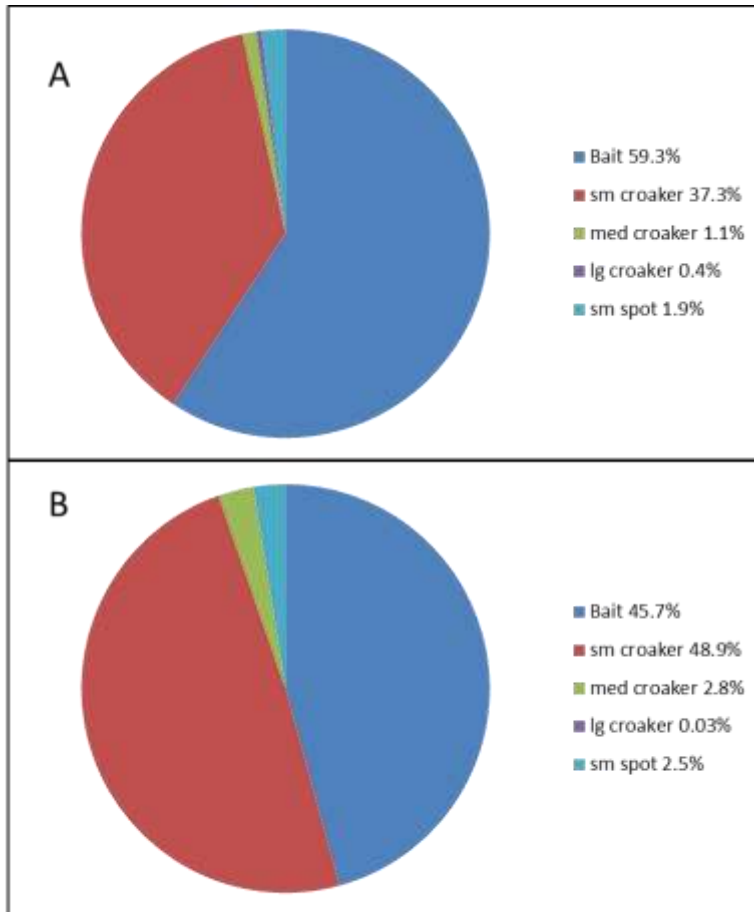


Figure 2. Percent fish caught by specie and grade by Control (A) and Experimental (B) haul seines.

### Summary

The modified gear was found easier to pull through the water than the smaller mesh standard gear. This also reduced fuel consumption while towing the net. Out of the eight times the gear was fished both standard and modified “spun up” once. These spins happened on different comparisons making only six comparisons valid. Extra fishing would have done to compensate for these days but because of an injury I was unable to do so. Even though the first comparison shown otherwise, catch differences in those hauls were likely due to different class of fish moving through the area, which is typically seen in haul seining.

Using larger-meshed net sounds like a good idea on paper but when put to use the disturbance of the net moving through the water was shown to be what herded the fish instead of mesh size. The only time when mesh size was shown to make a difference is when the fish were pulled tight. Once the fish were pulled tight all of the fish would either gill or go through

the large mesh. That is why they must be pressed with a very small-meshed landing seine. As far as using a large mesh net to release juvenile croaker this project showed that a reduction was observed in most trials but statistically the reductions were not significant.

#### Recommendation

The best way to limit the amount of juvenile croakers being harvested would be by using a culling table onboard the fishing boat. When using a culling table as soon as the juvenile fish come out of the water they would slip through a grate and drop back into the water. This would also force the fish onto the grate of the culling table instead of giving them the option of swimming away which they have when in the seine.