Evaluating a Size-Sorting Grate during the 2017 RSA Northern Shrimp Program in the Gulf of Maine — Preliminary Results

Introduction

Although the Nordmore grate, used in the Gulf of Maine (GOM) northern shrimp trawl fishery, is effective in excluding finfish from shrimp catches, it does not exclude the smallest shrimp (often 1-2-year-old male *Pandalus borealis*). Several researchers and shrimp fishermen from New Hampshire and Maine have identified two promising methods of excluding small shrimp from trawl catches: a compound single grate, and a double grate (or "double Nordmore or "dual grate"). The performance of the double grate system was evaluated by He & Balzano (2007, 2012), but the compound grate had not been thoroughly evaluated, although about 20 were distributed for use in the GOM.

The 2017 RSA Project

During the 2017 GOM Northern Shrimp RSA program, 10 trawlers used the compound grate or alternated its use weekly with a standard Nordmore grate (control). One Portland trawler fished the two gears side-by-side with the use of a trouser trawl[1]. Another Portland trawler with two net reels fished the two gears on alternating tows. Two Port Clyde trawlers fished on the same days with opposite gears, and then switched gears each trip. Two of the three midcoast Maine boats fished one of the gears one week while the third midcoast boat fished the other gear, and then they all switched for the next week and so on. The other three participants either fished the compound grate or alternated trips with the compound and the Nordmore.

The Nordmore grate is designed to exclude finfish by allowing small animals, like shrimp, to pass between the grate's bars to be caught in the codend, while larger fish escape. The compound grate has two sections: one with Nordmore-like bar spacing to exclude finfish, and the other with smaller bar spacing, sometimes tapered, to allow the escape of small shrimp and fish.

Compound grate on the November Gale.

Trouser trawl on the North Star. *Photos by Mike Kersula, ME DMR*

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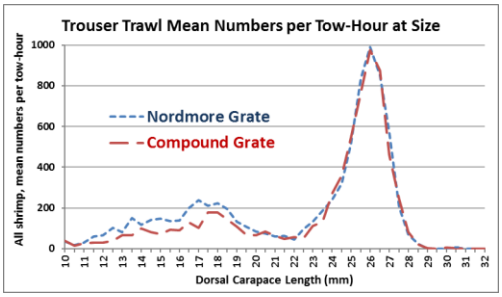
The goal of the project was to evaluate the performance of the compound grate in three areas: escape of small shrimp, retention of large shrimp, and escape of other species (bycatch).

Preliminary Results



The trouser trawl made 29 tows with both the compound grate and the standard Nordmore grate[1]. The mean size of shrimp (of all species) was higher, and the count per pound was lower, in the compound grate samples than in the nordmore grate samples in 20 of 29 tows (statistically highly significant). The mean count per pound was 44.3 for the compound grate and 48.1 for the Nordmore. The mean number of small (less than 22 mm carapace length) shrimp of all species in the compound grate samples was 32% lower than in the nordmore grate standardized samples. The number of small *P. borealis* was 25% lower in the compound grate samples than in the nordmore grate samples, also statistically significant.

The number of larger, more desirable shrimp (carapace length greater than or equal to 22 mm) was not significantly different between the Nordmore grate (mean = 5085 per hour) and the compound grate (mean=4957 per hour, a 2.5% reduction). The mean catch rate (all shrimp) for the Nordmore grate was 167 lbs/hr and for the compound grate it was 158 lbs/hr, a 5.5% reduction but not a significant difference statistically.

The two captains from Port Clyde fished on the same days with different grates, each alternating weekly between the compound grate and the nordmore grate. They each made seven trips, and one shrimp sample was collected each trip. Generally, the compound grate performed better on 5 out of 7 days, but not enough, or with too much variability, to be significant with this small sample size. However, the mean count (of all shrimp species) per pound was higher in the nordmore grate samples on 6 out of 7 days and this was statistically significant. The mean count per pound was 48.4 for the Nordmore grate and 36.2 for the compound grate.

Commented [HM1]: Note these are averages of daily averages, and are different than the pooled average given in Table 2 of RSA rpt.

The midcoast boats had similar results, with the boat(s) using the compound grate performing better than the boat(s) using the Nordmore grate during 5 out of 8 weeks, but this was not statistically significant. The data were confounded by a general lack of small shrimp in the first four weeks of the project, and two of the boats out-performing the third boat (in terms of count per pound and mean shrimp size) regardless of the grate they used, in 7 out of 8 weeks. The mean count per pound was 40.7 for the Nordmore grate trips and 38.8 for the compound grate trips, but the difference was not statistically significant with this small sample size and high variability among boats and weeks.

Commented [HM2]: Note these are averages of daily averages, and are different than the pooled average given in Table 2 of RSA rpt.

Bycatch of finfish and other invertebrates was sampled by observers during 14 trips, 2 for each of 7 vessels, 1 trip for each vessel when it was using the compound grate and 1 trip using the Nordmore grate. All statistical test results found that the compound grate was either no different from, or better than, the Nordmore grate in terms of reducing non-shrimp bycatch, in this admittedly limited sampling.

1 Note that in the trouser trawl, the grates were never switched from side to side, that is, each one was always fished in the same trouser pant-leg. Until the experiment can be repeated, with the grates switched from one side to the other between tows, we cannot rule out whether the sides influenced the results.