

Further Evaluation of the Relationship of Cobbles and Rocks to Surfclams

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Introduction and Methods

A request was made at the September, 2018, PDT meeting to examine the distribution of surfclams relative to rocks and cobbles within the regions demarcated as supporting the recent history of fishing. Michelle Bachman identified the stations occupied during the Nantucket survey that fell within these demarcated regions: these were E5, E6, E7, F3, F6, G2, G3, G4, H2, H3, F2, I2, J1, J2, J3, I1, J4, K4, and K5. These stations fell within the depth range of 49 to 104 m. Accordingly, a comparison was made using all stations that fell within this depth range. Nineteen stations fell within the demarcated regions, hereafter termed the IN group. Nineteen stations fell outside the demarcated regions, hereafter termed the OUT group. This constitutes 38 of the total of 63 stations occupied during the survey.

Two nested ANOVAs were run using the catch of cobbles and the catch of rocks as dependent variables, respectively. Independent variables included the main effect of region (IN or OUT) and the covariate of the catch of small surfclams (all surfclams <150 mm) nested within region. Variables passed tests of heteroscedasticity, but failed tests of normality. Consequently, ANOVAs using ranked variables were also conducted.

Results

For cobbles, the main effect of region was not significant ($P \gg 0.05$). Cobbles were no more or less abundant within the demarcated regions or outside of the demarcated regions within the designated depth range. The covariate, surfclam catch, was modestly significant ($P = 0.06$). A Pearson correlation test showed a significant positive relationship between surfclam catch and cobble catch ($r = 0.45$; $P = 0.0048$). This relationship was not driven by the correlation between surfclam catch and cobble catch inside or outside of the demarcated regions. Inside, the correlation was not significant ($r = 0.39$, $P = 0.10$). Outside, the correlation was also

non-significant ($r = 0.42$, $P = 0.07$). However, the catch of surfclams was much higher inside the demarcated region and the catch of cobbles was modestly higher inside the demarcated regions, leading to the significant positive correlation overall and the modestly significant covariate in the nested ANOVA. An ANOVA using ranked variables did not materially change the outcome.

For rocks, the main effect of group was not significant ($P \gg 0.05$). Rocks were no more or less abundant within the demarcated regions or outside of the demarcated regions within the designated depth range. The covariate, surfclam catch, was significant ($P = 0.026$). A Pearson correlation test showed a non-significant relationship between surfclam catch and rock catch ($r = 0.31$; $P = 0.06$). Inside, the correlation was not significant ($r = 0.35$, $P > 0.10$). Outside, the correlation was positive and significant ($r = 0.59$, $P = 0.0076$), explaining the significant covariate in the nested ANOVA. Rocks were about as common inside and outside of the demarcated region, whereas surfclams were more abundant inside. An ANOVA using ranked variables did not materially change the outcome.

Discussion

Surfclam catch was higher for stations within the demarcated regions than at stations within the same depth range but outside of the demarcated regions. Cobbles and rocks were present in about the same proportions inside and outside of the demarcated regions. As a consequence, the main effect of region was not significant. The covariate of surfclam catch was significant and this originated from the higher surfclam catch in the IN region. The correlations between surfclam catch and the catch of rocks was weak and primarily originated from the relationship between the two in the OUT region, wherein surfclams were not abundant. A stronger correlation existed between the catch of cobbles and surfclams overall, but this was primarily due to the tendency for both to be more common in the IN region. Within region, no strong correlation existed.

Overall, surfclams and cobbles or rocks were not obviously associated positively or negatively. Relationships within the demarcated areas were, on the whole, similar to those outside of the demarcated areas with the exception that surfclams were more abundant inside the demarcated areas. Thus, the catch of surfclams was essentially independent of the commonness of rocks and cobbles within the restricted depth range of the analysis. Note however, that the non-normality of the original data indicates substantial station-to-station variability in the catch

of cobbles and rocks; thus some stations sampled inside the demarcated area may have been deemed unfishable due to the presence of cobbles and rocks, had the regions of demarcation been defined at a finer scale.