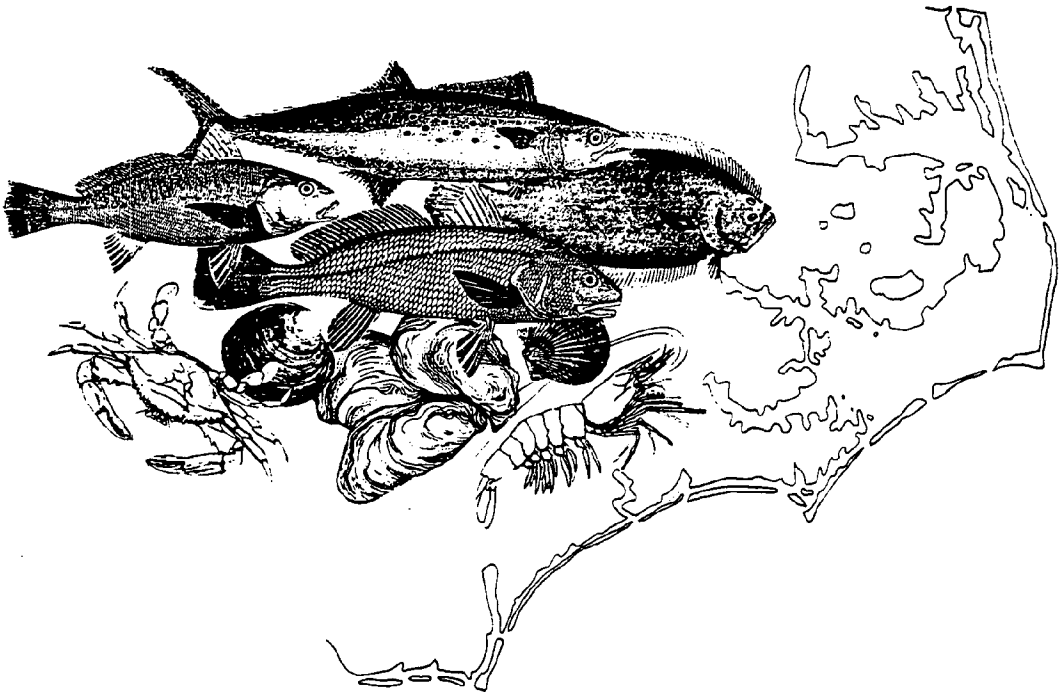
UTILIZATION OF NATURAL AND ARTIFICIAL REEFS BY JUVENILE GAG



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Division of Marine Fisheries
Morehead City, NC 28557

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UTILIZATION OF NATURAL AND ARTIFICIAL REEFS BY JUVENILE GAG

By

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Completion Report Project F-41, Study 2

August 1993

North Carolina Department of Environment,
Health, and Natural Resources

Division of Marine Fisheries
Morehead City, NC 28557

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STATE: North Carolina

PROJECT NUMBER: F-41

SEGMENTS: 1-2

STUDY TITLE: UTILIZATION OF NATURAL AND ARTIFICIAL REEFS BY JUVENILE GAG (STUDY 2)

STUDY PERIOD: 1991-1992

INVESTIGATOR: Kurtis Gregg

NEED: High catch rates of juvenile gag (*Mycteroperca microlepis*) were observed on near-shore patch and artificial reefs off North Carolina. Concerns regarding growth overfishing and the role artificial reefs play in the early life cycle of gag prompted an investigation of the migration patterns, factors influencing occupancy of reefs, and relative abundance of gag on artificial and natural hard substrates.

PRIOR KNOWLEDGE: Gag are presently classified overfished by the South Atlantic Marine Fishery Management Council (SAFMC 1991). Management of this species includes a five fish daily bag limit and a minimum size of 20 inches TL (508 mm). Anecdotal data indicated high catch rates of juvenile gag on near shore patch and artificial reefs off North Carolina in the fall, however no quantitative data were available to document these observations. Large numbers of juvenile gag have been documented in inshore estuarine and high salinity (>20 ppt) riverine waters of the Carolinas and are considered estuarine dependant (Keener et al. 1988; Ross and Moser 1989).

OBJECTIVE: To delineate the estuarine emigration patterns of juvenile gag and the factors influencing occupancy of near shore patch and artificial reefs

APPROACH: Young of the year (YOY) gag captured by commercial channel net fishermen were tagged by Division of Marine Fisheries (DMF) staff in New River (Figure 1) in 1991 and 1992. Length frequency of YOY gag was documented from the tagging data. Recaptures would document the directions and distances traveled by YOY gag. One commercial fisherman maintained a log book to document the number of gag and other groupers captured each night his net was set. This log book was analyzed to

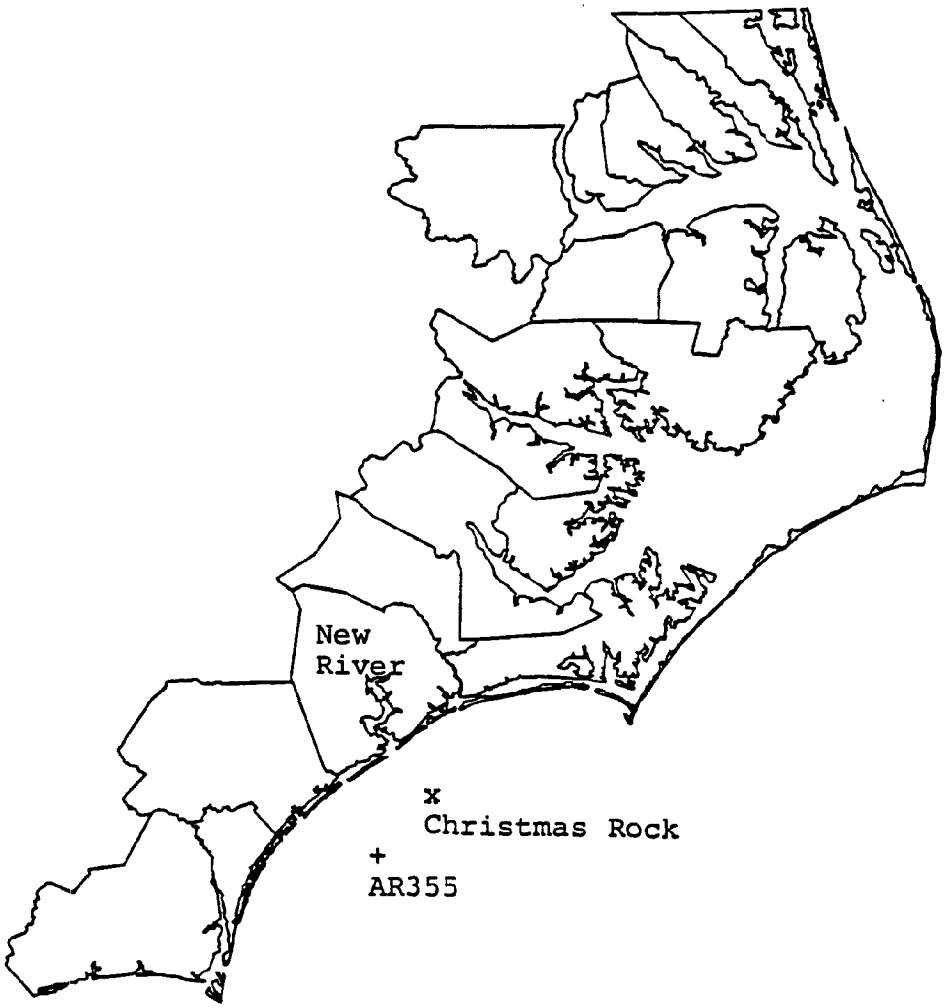

Figure 1. Two study sites, AR355 and Christmas Rock, off New River, North Carolina, 1991-1992.

document mean catch per unit effort for channel nets in New River, and to estimate relative abundance of each species of grouper observed in these catches. Channel net catch rates were analyzed to determine if relationships existed between high catch rates and water temperature, salinity, lunar phase, and weather fronts.

Relative abundance of gag on an artificial and a natural reef were assessed by conducting visual transects with SCUBA. The two study sites were 17 km from New River Inlet at 18 to 22 m depths (Figure 1). Three 20 m transects were marked at each site. Sampling was conducted monthly from August through November 1991 and May through November 1992. Relative abundance of three size classes was quantified. Young of the year, sublegal (< 20 in), and legal (> 20 in) gag were counted on each transect by the lead diver of the buddy pair. Relative abundance of all gag and each size class was compared between sites and between seasons on the same site. Recruitment of YOY gag and geographical distribution of year classes was also assessed from the transects.

FINDINGS: Tag returns showed YOY gag remained in estuarine waters through the fall, however results were inconclusive due to lower than expected numbers of fish tagged (N = 1181) and a low recapture rate (2.6%). Distance traveled by recaptured fish ranged from 0.5 to 32.0 km with a mean of 3.4 ± 1.4 km. Most fish were recaptured in the New River area however two were recaptured 32 km northeast at Browns Inlet. Catch per unit effort was quantified for one channel net from 1 August through 20 October 1991. This net fished a total of 260.25 hours. Mean gag per net hour was 3.81 ± 0.38. Mean grouper per net hour was 3.91 ± 0.38 including gag, black grouper (*Mycteroperca bonaci*) and red grouper (*Epinephelus morio*). Periods with high catch rates were compared to water temperature, salinity, lunar phase, and weather fronts. No correlation was found between high catch rates and these environmental variables.

Relative abundance of gag was lower at AR355 (3.77/transect) than at Christmas Rock (5.16/transect). YOY gag made up 5.9% of all gag at AR355 and 3.2% of gag at Christmas Rock. Sublegal gag made up 52.9% of all gag at AR355 and 57.4% of

gag at Christmas Rock. Legal size gag represented 41.8% at AR355 and 39.4% of all gag at Christmas Rock. The proportion of all gag represented by each size class was similar at both habitats. Sublegal gag comprised the largest proportion (>50%) of the gag populations at the two sites.

The sampling period was divided into four seasons for analysis: spring (May, June), summer (July, August), early fall (September) and late fall (October, November). Data from both years were combined for seasonal analysis. Young-of-the Year (YOY) gag were observed at AR355 only in late fall. YOY gag were observed at Christmas Rock in early fall, and in late fall. Relative abundance of YOY gag was 83.5% higher at AR355 than at Christmas Rock in late fall. Sublegal and legal size gag were observed at AR355 and at Christmas Rock in spring, summer, early fall and late fall .

Recruitment of YOY gag to near shore patch and artificial reefs appears to occur in late fall and early winter. Rate of recruitment was beyond the scope of this study due to low numbers of tag returns. Sublegal gag were observed throughout the sampling periods at the two sites which are 17 km from New River Inlet.

RECOMMENDATIONS: These results support the use of minimum size limits to manage gag off North Carolina. Protecting sublegal gag on near shore patch and artificial reefs should be possible because of the shallow depths of these reefs. Recommendations have also been made to increase interstitial spaces in artificial reef construction to provide habitat for juvenile gag on near shore artificial reefs.

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ACKNOWLEDGEMENTS

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