The use of artificially placed shell habitat by young red snapper, Lutjanus campechanus.

Dr. Stephen T. Szedlmayer
Marine Fish Laboratory
Department of Fisheries and Allied Aquacultures
Auburn University
8300 State Highway 104
Fairhope, AL 36532

Phone: 334-990-4858
Email: sszedlma@acesag.auburn.edu

In 1998 and 1999, we built 30 4m^2 reefs of shell and 30 4m^2 reefs of shell/concrete blocks at depths of 17 to 21 m, in the Gulf of Mexico, 14 to 25 km south of Dauphin Island, Alabama. Each year there were 3 sites, 20 reefs each, placed at 20 m intervals. Sites 1 and 2 were centered around gas platforms. Total mean counts for all red snapper, Lutjanus campechanus, were significantly different between reef types and years: 14 fish/block, 19 fish/shell in 1998; 20 fish/block, 22 fish/shell in 1999 ($P < 0.05$). Separated into age-0 and age-1 year classes, few age-0 red snapper were observed in July, while age-1 were common. In August 1998, age-0 red snapper reached counts up to 113 fish/reef and 216 fish/reef in August 1999. In 1998, age-0 fish were significantly more abundant on shell reefs, but in 1999 age-0 fish showed no significant differences between reef types. In 1998 and 1999, age-1 fish were significantly more abundant on block reefs. In 1998, fish were significantly more abundant at site 1, but in 1999 fish were significantly more abundant at site 2. These results suggest that artificial shell reefs may attract young red snapper away from areas of intensive trawl fishing, e.g., gas platforms, thus enhancing survival.

Reef size study.

In the first two years (1998-99) we observed high numbers (up to mean = 43 fish per m^2) of age-0 red snapper on the 2x2 m shell reefs. The main objective in year 2000, was to determine if scaling up to 3x3 m size reefs would produce a linear increase in age-0 red snapper, or would fish spread out with little increase in actual numbers. To examine this aspect in 2000, we built ten 3x3 m shell reefs, and ten 2x2 m shell reefs. These new reefs were placed over open substrate, i.e, away from gas platforms to avoid predation effects. These reefs were placed in a grid pattern, 20 m between reefs, alternating between 2x2 and 3x3 m sizes. Each reef was surveyed at least 3 times by SCUBA visual counting.

We observed very high concentrations of age-0 red snapper on all of these new (2000) shell reefs. Total counts reached up to 73 fish m^2, with fish showing maximum concentrations in August, however by October few fish were observed. There was no significant difference in fish per m^2 between the two different sized reefs. In October 2000, we surveyed new reefs (2000), but also were able to survey old reefs. The smallest new recruits were no longer observed, however we did observe substantial numbers of larger age-0 fish on the 1999 block reefs. We suggest that these larger age-0 fish observed on the block reefs can be used to estimate mortality for the early life history of age-0 red snapper. The mortality rate from peak numbers (mean = 38 fish per m^2) in Aug 2000 on shell reefs, to low numbers (maximum mean = 6.7 fish per m^2) on

block reefs in Oct 2000 was high Z = 1.7. We suggest that this estimate of Z is probably the most accurate estimate of mortality for red snapper to date. It is difficult to separate natural from trawl bycatch mortality, however we did not observe any evidence of trawl damage to our shell reefs.