

Annual Indices of Abundance of Mutton Snapper for Florida Keys

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Juvenile Snapper Seining Program

Purpose of Study

The intent of this program is to describe the distribution and abundance, species composition, size structure, and habitat usage of juvenile snapper species in the middle Florida Keys and to establish recruitment signals, which may be used as tuning indices for stock assessment and management of these economically important snappers in the Keys.

Sampling Intensity-Time Series

From 1994-1997 a bonefish life history study was conducted using seines at six fixed stations in the middle and lower Keys. During this study, a total of 433 juvenile snapper were also collected, 11 of which were *Lutjanus analis* (mutton snapper). Based on the promising number of snapper collected during this study we conducted a six-month pilot project from June through November 2003 in order to determine the feasibility of collecting early life stages of snappers in shallow mixed-species seagrass beds adjacent to sandy beaches. Sampling was conducted in the middle Keys from Long Key to Bahia Honda Key. Twelve randomly selected sites were sampled each month. During this pilot study, we were successful in collecting relatively high numbers of snappers during 72 hauls.

Due to the encouraging results of the initial pilot project, we conducted a year-round study in the middle Keys from April 2005 through April 2006. A total of 30 randomly selected sites were sampled each month for a total of 342 hauls. Seines were not conducted during October 2005 due to damage to facilities and logistical constraints following Hurricane Wilma.

In June 2006 we began a long-term seine monitoring project that continues to this day. Sampling is conducted in the middle Keys from Grassy Key to Boot Key. Monitoring locations were chosen based on the sites with the highest snapper abundance from the previous two studies. Ten randomly selected sites are sampled each month, for a total of 90 hauls as of February 2007.

Methods

Sampling is conducted on the Atlantic side of the Middle Keys in shallow (<1.3m deep) mixed-species seagrass beds consisting of *Halodule wrightii*, *Thalassia testudinum*, *Syringodium filiforme*, and mixed algae. Sites are selected by a habitat-based, stratified-random-sampling procedure based upon the “Benthic Habitats of the Florida Keys” Geographical Information System (GIS) (FDEP and NOAA, 1998) (Figure 1). One seine haul is conducted at each site during daylight hours using a 21.3m center-bag drag offshore seine, constructed of knotless 3.2mm #35 Delta nylon-mesh and a 183cm x 183cm x 183cm bag. The net coverage area is approximately 140 m²/haul. All snappers collected are counted and measured to the nearest mm (with the exception of snapper collected during the first two seine projects which were only measured if < 100mm). Young juvenile snapper are defined as ≤ 100 mm standard length (SL),

settlement-stage snapper as $\leq 40\text{mm SL}$, early-stage juveniles as $> 20\text{mm}$ to $\leq 40\text{mm SL}$, and new recruits as $\leq 20\text{mm SL}$.

Results

Since seine sampling began in 2003, we have collected a total of 1,291 snapper and measured a total of 1,224 snapper. Mutton snapper constitute 12% ($n=161$) of the total number of snapper species collected (Table 1). During 2003, a total of 363 snapper were caught and 313 were measured in 72 seines from June through November. The most abundant snapper was the gray snapper, *Lutjanus griseus* ($n=156$). A total of 62 mutton snapper were collected, with a mean size of 36mm SL. The majority of these (68%) were settlement-stage individuals. During 2005-06 a total of 630 snapper were collected and 613 were measured in 342 seines from April 2005 through April 2006. *Lutjanus griseus* was the most abundant snapper measured ($n = 248$). A total of 51 mutton snapper were measured with a mean size of 30mm SL, 82% of which were settlement stage individuals. During June 2006 we began a long-term seine monitoring project in the middle Keys. A total of 298 snapper have been collected and measured in 90 seines through February 2007. *Lutjanus griseus* has been the most abundant snapper collected to date ($n = 86$). A total of 48 mutton snapper have been collected, with a mean size of 42mm SL. Of these, 58% are settlement stage individuals.

Mutton snapper mean density varies between sampling years. Annual mean density was highest during the 2003 project with 0.6 snapper/100m², and lowest during the 2005-06 sampling period with only 0.1 snapper/100m² (Figure 2). The majority of mutton snapper were collected from June through November, but the peak months varied between years. During 2003, the highest number of mutton snapper was collected during the month of August followed by a second peak in October. The majority (85%) of the August snapper were split evenly between new recruits ($\leq 20\text{mm SL}$), and young juveniles (41-100mm SL), while 47% of the October snapper were early juveniles (21-40mm SL) (Figure 3). During the 2005-06 sampling project, mutton snapper numbers were highest during September followed by a second peak in November. The majority (78%) of the September snapper were early juveniles, while 64% of the November snapper were new recruits (Figure 3). During the 2006-07 monitoring project, mutton snapper numbers were highest in June followed by a second peak in November. Early juveniles were the most abundant snapper collected during both months at 80% and 64%, respectively (Figure 3).

Mutton snapper length frequencies were fairly consistent from year to year, with 70% of the snapper collected being settlement stage individuals (Figure 4). During 2003, 68% of the mutton collected were settlement stage, during 2005-06, 82% of the mutton collected were settlement stage, and during 2006-07, 58% were settlement stage. Greater numbers of new recruits were collected during 2003 than during 2005-06, and there were no new recruits collected during 2006-07.

	Total number of mutton snapper collected			
	<20mm	21-40mm	>40mm	Total
2003	20	22	20	62
2005-06	12	30	9	51
2006-07	0	28	20	48
				161

Table 1. Total number of mutton snapper collected during study period.

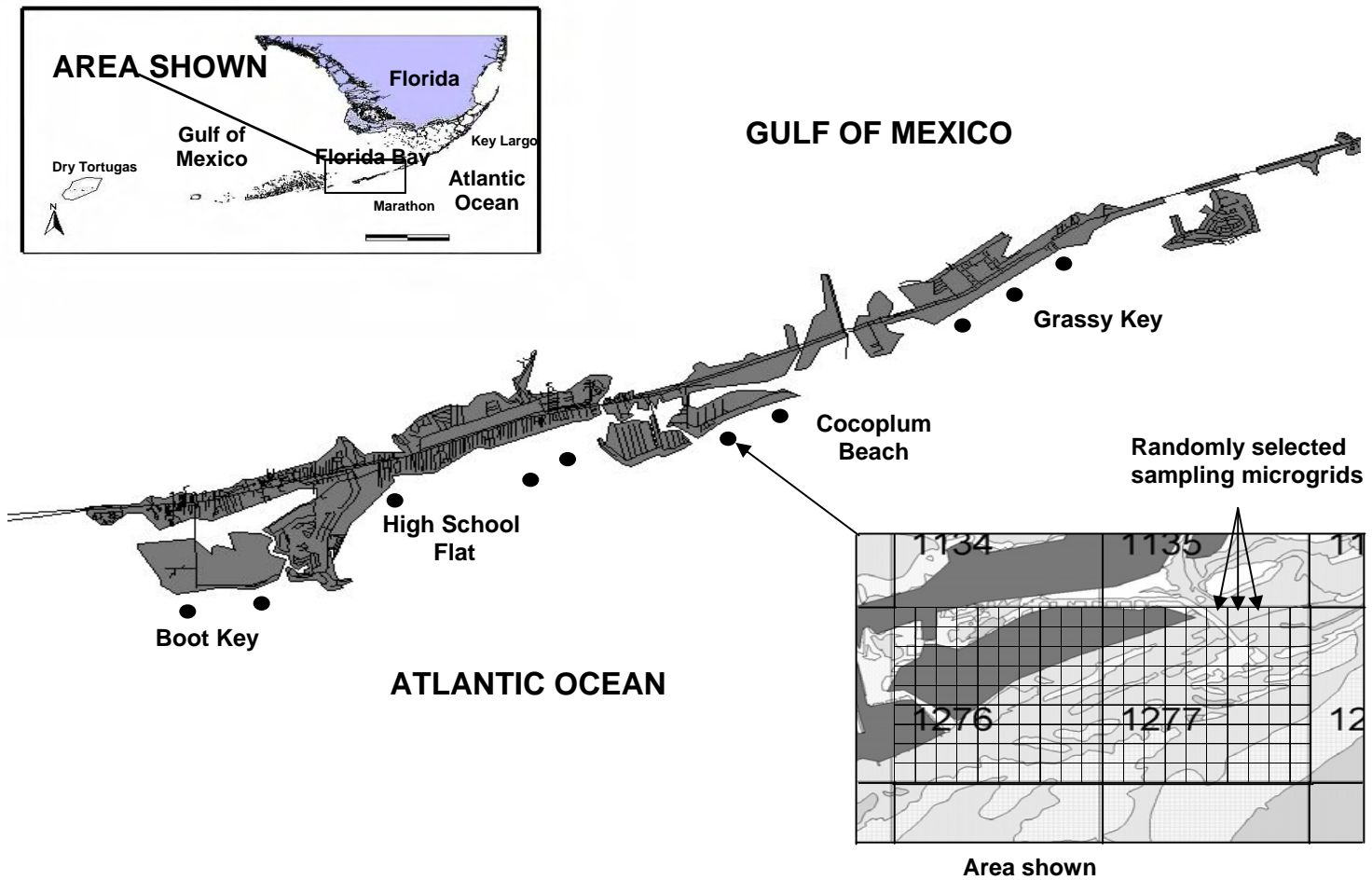


Figure 1. Map of sampling area in the middle Florida Keys showing location of sampling microgrids

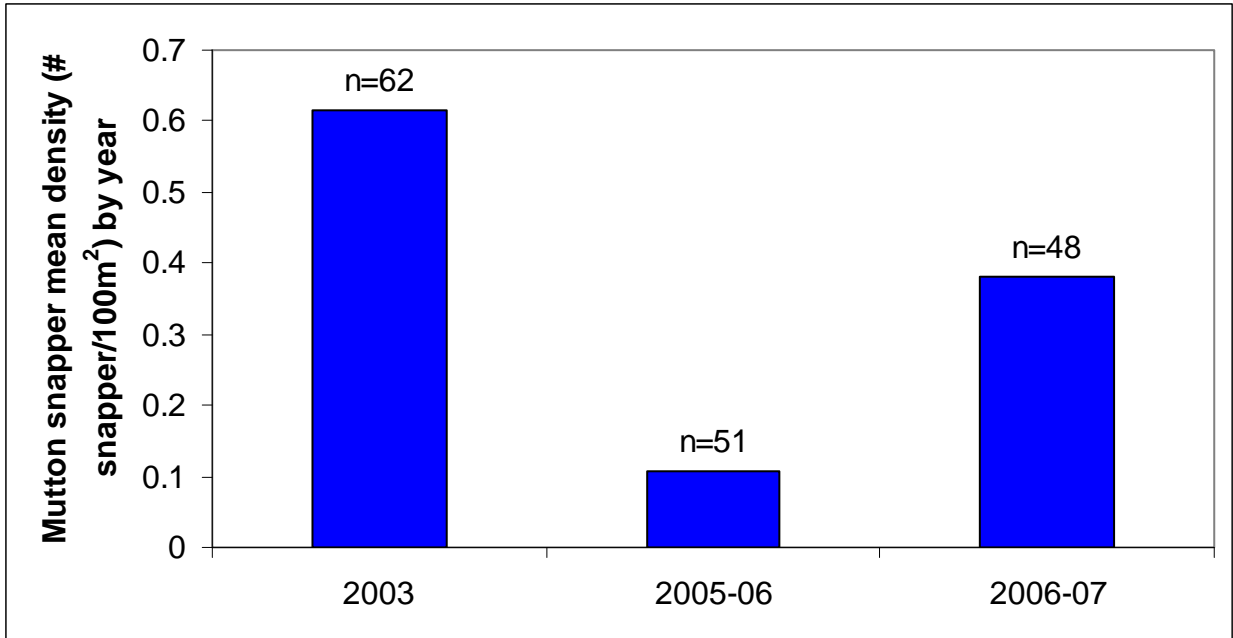


Figure 2. Mutton snapper mean density (# snapper/100m²) by year.

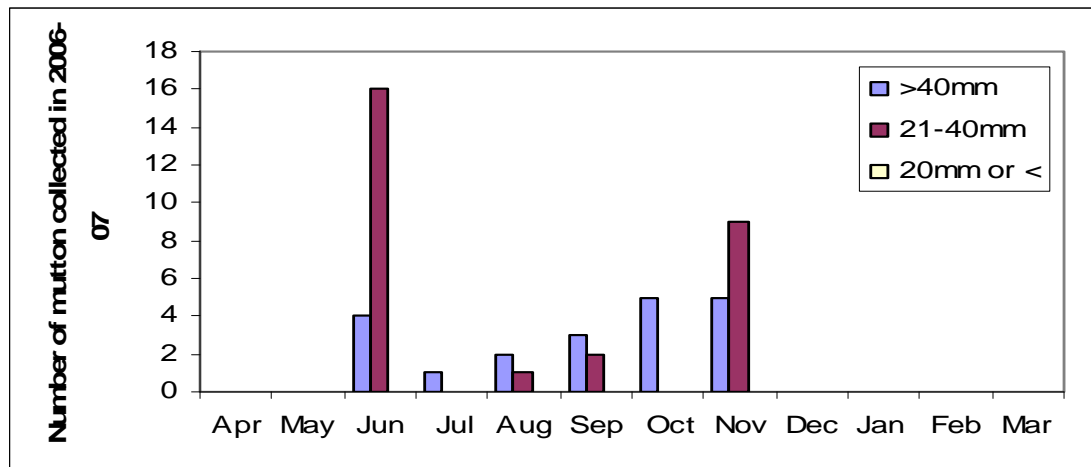
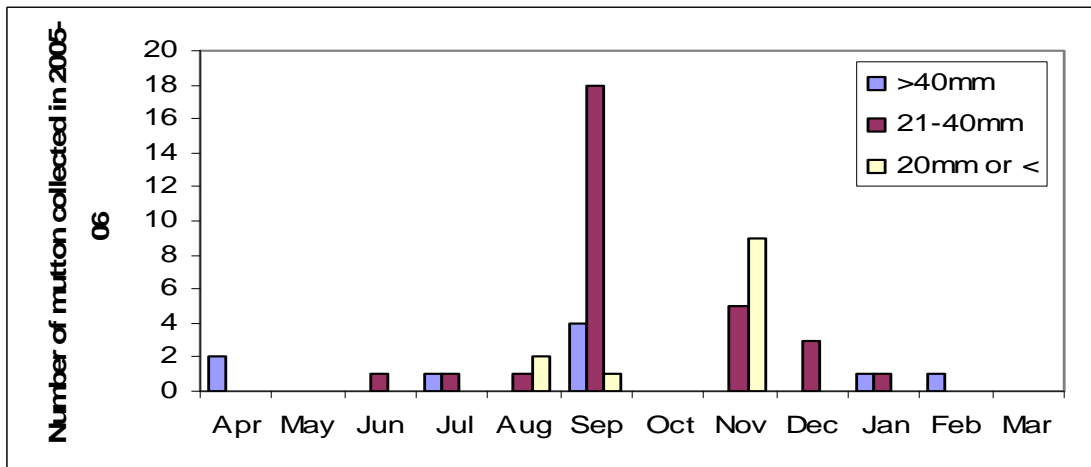
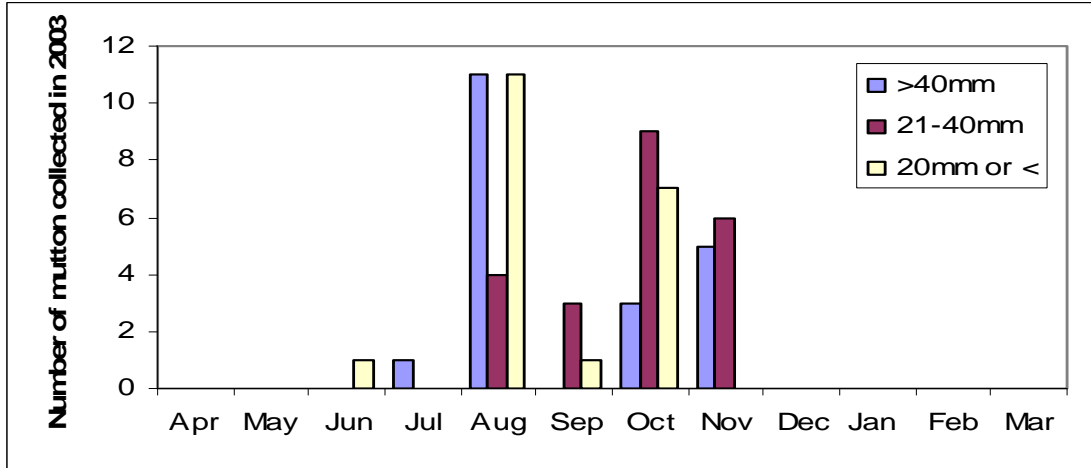


Figure 3. Number of mutton snapper collected per month.

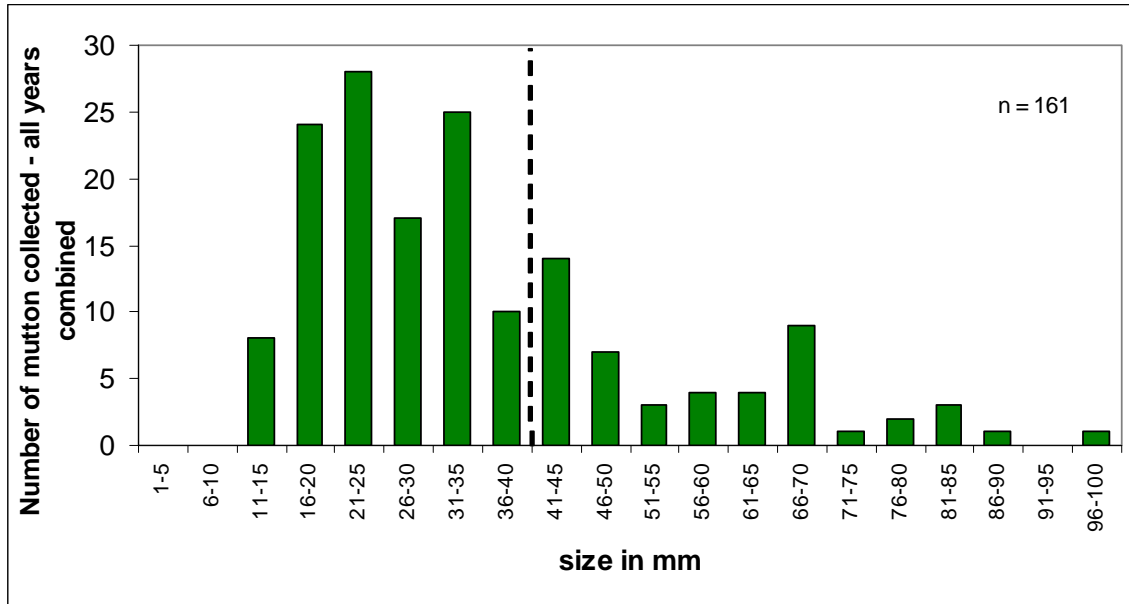


Figure 4. Mutton snapper length frequencies, all years combined. Dashed line indicated settlement stage individuals

References

FDEP and NOAA (Florida Department of Environmental Protection and National Oceanic and Atmospheric Administration) 1998. Benthic Habitats of the Florida Keys. Florida Marine research Institute. Technical report. TR-4.