The potential for using the sea bass pot fishery to assess changes in abundance of Black Sea Bass (*Centropristis striata*) in the South Atlantic Region

Prepared by

Captain Jimmy Hull
F/V Denise Ann
(hullsseafood@aol.com)

And

Frank J. Hester, PhD
Sustainable Seas, Inc.
(fhester52@aol.com)

Abstract

Black sea bass occurs throughout the range managed by the South Atlantic Fishery Management Council. They are structure oriented and readily enter baited traps. For years they have been targeted off North and South Carolina in the black sea bass pot fishery, but by only one boat off east Florida prior to 2008. Today off Florida with numerous regulatory effects closing many traditional fisheries part or all the time in recent years, there is shifting in effort from hook and line for the Snapper/Grouper species with some affected boats entering the black sea bass pot fishery and the number of participants in the southern area pot fishery is likely to increase in the near future.

The pot fishery report trips on state trip tickets or equivalent and on logbooks. Data on size and weight and collection of otoliths is done by the Trip Intercept Program (TIP). Available for analysis are calendar date, area fished, depth fished, trap mesh size, number of traps set, soak time and catch in pounds. The TIP data are keyed to the individual trip and provide sampled fish length.

A nominal catch rate analysis for the one Florida boat shows year to year fluctuations in catch-per-pot-hour over the period from 1992 to 2011. There is an increasing trend of apparent abundance over time from 1992 through 2006 when a 2-inch mesh size requirement for the pots was mandated. The regulation change resulted in new gear selectivity and a marked drop in nominal catch rate followed by four years with no apparent trend. We recommend adjusting to the regulatory change in catchability by splitting the index in 2006.

Several sources of uncertainty with the use of pot data are identified and explored. These include the vessel effect and pot soak time together with their interaction.

Introduction

Black sea bass occurs throughout the range managed by the South Atlantic Fishery Management Council. The species inhabits the coastal and shelf waters offshore to depths greater than 300 feet, and prefer so-called "live bottom" with low relief, structured habitats such as limestone ledges. They are structure oriented and enter baited traps readily. They also are apparently fairly aggressive carnivores and readily take baited hooks. They are not considered to be schooling fish *per se* but aggregate sufficiently to make trawl fishing profitable.

In the past they were targeted to a degree off North Carolina in the trawl fishery and with hook gear in the vermilion snapper fishery there and off South Carolina. They appear not to have been targeted further south in the region but were incidental catch in the snapper-grouper reef fish fisheries. As management regulations in federal waters were implemented and became more restrictive after the passage of the Magnuson-Stevens Fishery Conservation and Management Act, the species increased in its commercial importance. Today off Florida with the red snapper ban there is shifting in effort from hook and line for red snapper to pot fishing black sea bass.

Surprisingly, black sea bass was of sufficient importance to the SAFMC to receive attention along with vermilion snapper at the second SEDAR Assessment despite being of major commercial importance only to North Carolina and suffering a certain obscurity in data collection and scientific circles that relegate it to one of the so-called "data poorer" species for the rest of its range. What we are trying to do is use what data that does exist – in this case commercial pot landings data from trip tickets (TT) and reef fish logbooks mandated by federal regulations and the Trip Intercept Program (TIP)– to see if these data sources support treating this stock as a single homogenous stock, and whether the data sources may prove useful in estimating trends in abundance over time.

The Fishery

Reported black sea bass landings from the private recreational sector dominate the landings data and fairly evenly distributed among the four states. The commercial catch, which is taken chiefly by hook and line and pots, the overwhelming majority of the landings took place in North and South Carolina. With Georgia and Florida producing only minor amounts (Fig. 1). Virtually all of the catch in Florida and presumably Georgia was by hook and line incidental with the snapper grouper fishery. It was not until the early 1990's that a pot fishery for black sea bass developed in Florida. Originally the pot fishing ran simultaneously with bottom fishing whereby the parts would be set and then the boat with fish for red snapper which was the more desirable species.

At present in Florida the boats range in size from 26 feet to over 40 feet. The smallest boat, which has been pot fishing since 1993, makes day trips. Typically it leaves early morning, runs to its fishing area which is fairly close by and set its string of pots. These are allowed to soak for 1 to 2 hours and then retrieved, rebaited and reset. The larger Florida boats may make overnight trips and perhaps allow a

string of pots to set overnight. They also are able to travel farther from port and work in heavier weather.

The North and South Carolina sea bass pot fishing operations likely operate in a similar fashion. In almost all operations north and south the pots are typically baited with menhaden and the fish are landed in the round weighed and sometimes separated by size grade.

The Data

We have access to three sources of data. These are the Florida trip ticket (TT), the federally mandated reef fish logbook (LB) and the trip intercept program data (TIP). For our purposes the trip tickets and logbooks together provide calendar date, area fished, and depth fished, trap mesh size, number of traps set, soak time and catch in pounds.

The TIP data are keyed to the individual TT from which the sample was taken and provide additional information on sample size fish length. Unfortunately sexing black sea bass is a difficult process for most of the specimens and sex data to go along with length data is lacking. The tip datasheet also reports the otoliths collected, which will allow matching age data with the length samples.

All of these data sources are regarded as confidential and access is denied to unauthorized personnel. In order to access the data permission has to be granted by the vessel owner. In this case the data sheets themselves where in possession of the owners who also gave us information on the vessel size. We have five cooperating boats, only one of which has been in the fishery long enough to offer a trend and analysis. The other four vessels entered the fishery in 2008 (1) and 2009 (3). Somewhat arbitrarily we have divided the pot fishery vessel into three size classes based on length:

Class 1 <31ft,
Class 2 31ft to 40ft,
Class 3 >40ft.

We did this because it was obvious from the recent records that the large vessels were reporting a higher catch rate (see Table 1. right hand columns). We lacked information to proceed further with attempting to define fishing power, but it is apparent this should not be treated as a random factor in any future analyses.

The Results and Discussion

Table 1 summarizes 288 trips made by a Class 1 Florida fishing vessel between 1992 and the end of 2010. The nominal CPUE – pounds per trap hour is shown in Fig. 2a and 2b. There is an increasing trend over time from 1972 through 2006 when a 2-inch mesh size requirement for the pots was mandated. The regulation change resulted in new gear selectivity and a marked drop in nominal catch rate followed by four years with no apparent trend. We decided to handle the regulatory change in catchability by splitting the index at 2006. We have requested but have not been given access to the logbooks and trip

tickets of three Florida Class 3 boats that entered the pot fishery in 2008. We do have data for one Class 2 boat but only for two years 2009 and 2010.

Factors: We have not attempted to standardize the index but there are a number of factors to consider in any case. These are:

Fixed factors:

1. Date – month and year
2. Date – spawning season
3. Vessel and captain
4. Location
5. Depth
6. Construction – mesh size and panel +/-
7. # pots
8. Soak Time
9. Bait is constant menhaden?
10. TIP length frequency and age

Random Factors:

11. Soak Time – perhaps a random factor?
12. Landings weight

For our current analysis we ignore factors 3 (one boat same captain for entire period), and 4 and 5 since the small boat was limited in it range. Factor 9 was assumed constant. Soak time as the most troublesome. That is due to several causes, one being that number of sets of the gear on a day trip ranged from 1 to 5 (Fig. 3) but the trip ticket and logbook forms only have room to report one soak time. We assumed that time was applied to all the sets made on that trip. However, soak time is also a random variable tied to the captain's method of setting and retrieving his gear and differ from boat to boat.

The other factor that appears important is the season, (Fig.4) which suggests that the weight per pot hour increases in the autumn and winter. We currently lack the data to distinguish the cause: more fish or heavier fish?

The pot fishery offers several useful features for stock assessment. The gear is defined better, the area fished is determined better and deployment is less affected by weather than is the case with hook and line fishing. The biggest drawback is that effort (soak time) is not well defined. The nominal results do have a high coefficient of variation (CV), perhaps in part due to uncertainties with effort reporting. However, SEDAR has hosted a number of indices with high CVs. It is really a matter of signal to noise ratio and the pot fishery seems to offer a reasonable signal.

Another objection may be that the pots are not set randomly in time or space. This is true, but there is no evidence to indicate black sea bass are randomly distributed in nature, and perhaps the fishery dependent data will provide a more precise abundance index for this very reason. At present we have no evidence to show that the fish vulnerable to the Florida boats are the same homogeneous group vulnerable to North Carolina.

RECOMMENDATIONS:

Aside from working with the Florida fishery as it develops there are three obvious needs to improve the information base for the sea bass pot fishery.

Consider improving the trip reporting by requesting individual set records with time start, time set ends, time retrieval starts and ends or if the pots are serviced continuously. This could be a voluntary reporting supplemented by on board observers.

Conduct an experiment to estimate the relation between soak time and catch. This may have been done for North or South Carolina but we are unaware of it.

Use MARMAP data to investigate the relation between depth and distance offshore and fish size and catch rate.

Year	Pot Type	CPUE	S.D	C.V.	N	Split at 2006	Class 2 (30-40ft) CPUE	Class 2 CPUE/mean
1992	1	6.22	2.78	0.45	16	0.61		
1993	1	4.27	1.56	0.37	28	0.42		
1994	1	5.55	2.65	0.48	17	0.55		
1995	1	6.53	2.92	0.45	8	0.64		
1996	1	6.66	2.02	0.30	13	0.66		
1997	1	10.68	3.13	0.29	18	1.05		
1998	1	9.52	3.6	0.38	24	0.94		
1999	1	11.98	4.05	0.34	11	1.18		
2000	1	10.31	2.21	0.21	2	1.02		
2001	1	13.83	2.89	0.21	8	1.37		
2002	1	8.69	4.61	0.53	10	0.86		
2003	1	13.81	3.02	0.22	6	1.36		
2004	1	13.89	2.55	0.18	10	1.37		
2005	1	14.64	5.34	0.36	13	1.45		
2006	1&2	15.39	3.68	0.24	19	1.52		
2007	2	9.22	5.14	0.56	24	1.20		
2008	2	7.02	3.09	0.44	16	0.92		
2009	3	7.73	2.82	0.36	25	1.01	14.19	1.06
2010	3	6.66	1.29	0.19	20	0.87	12.66	0.94

Table 1. Summary sheet for single Class 1 vessel. Note: change in pot mesh occurred in mid-2006

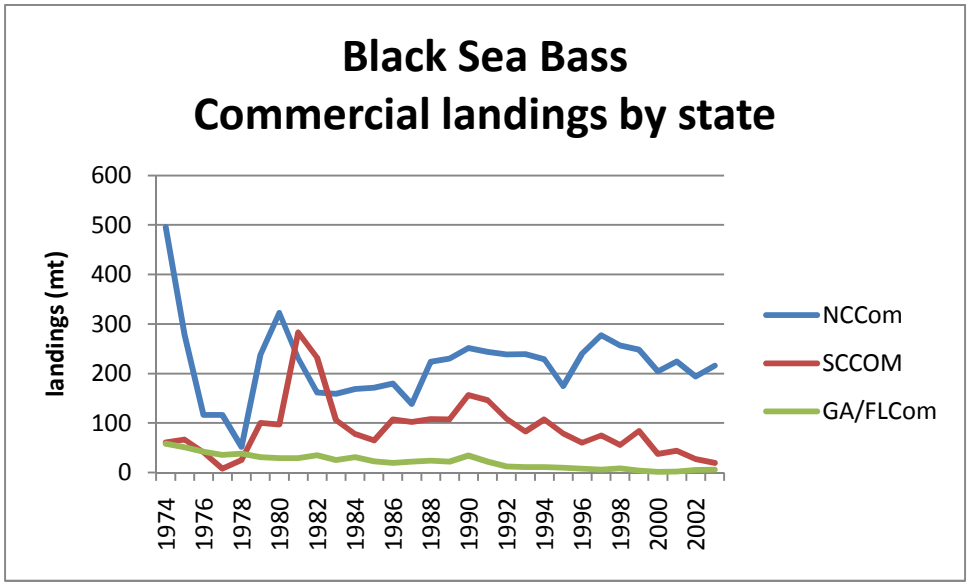

Figure 1. Commercial landings by state. Only landings through 2002 were available to us. Note the very minor roll Georgia and Florida played in the commercial black sea bass fishery. This is expected to have changed beginning in 2008 as the catches for the snapper/grouper complex were restricted.

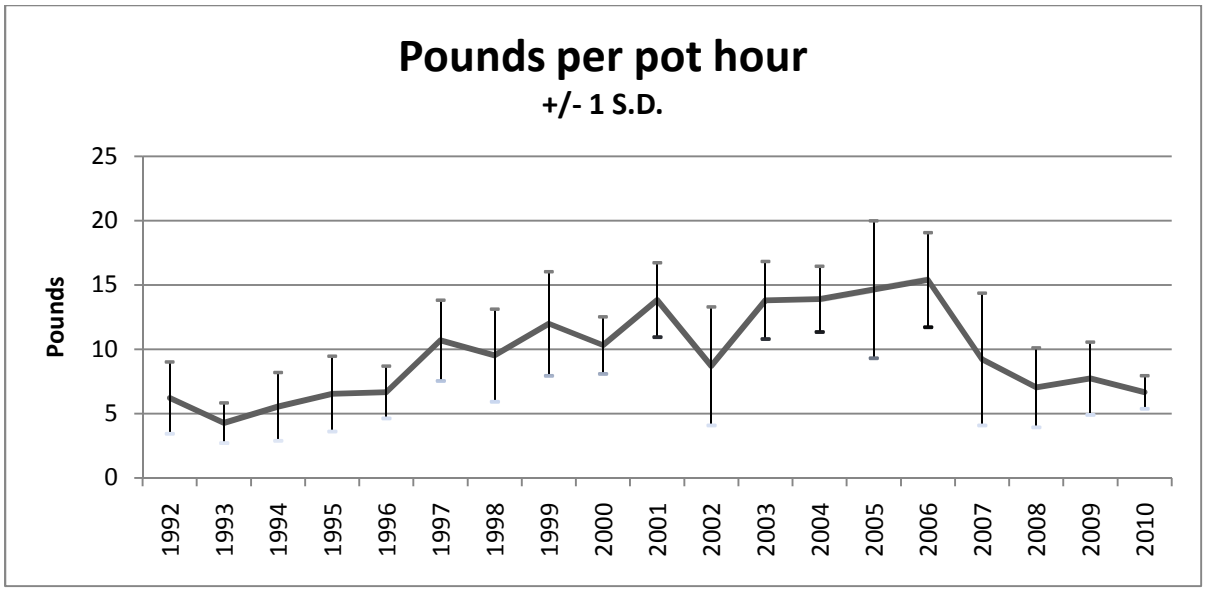

Figure 2a. Nominal CPUE for entire reporting period.

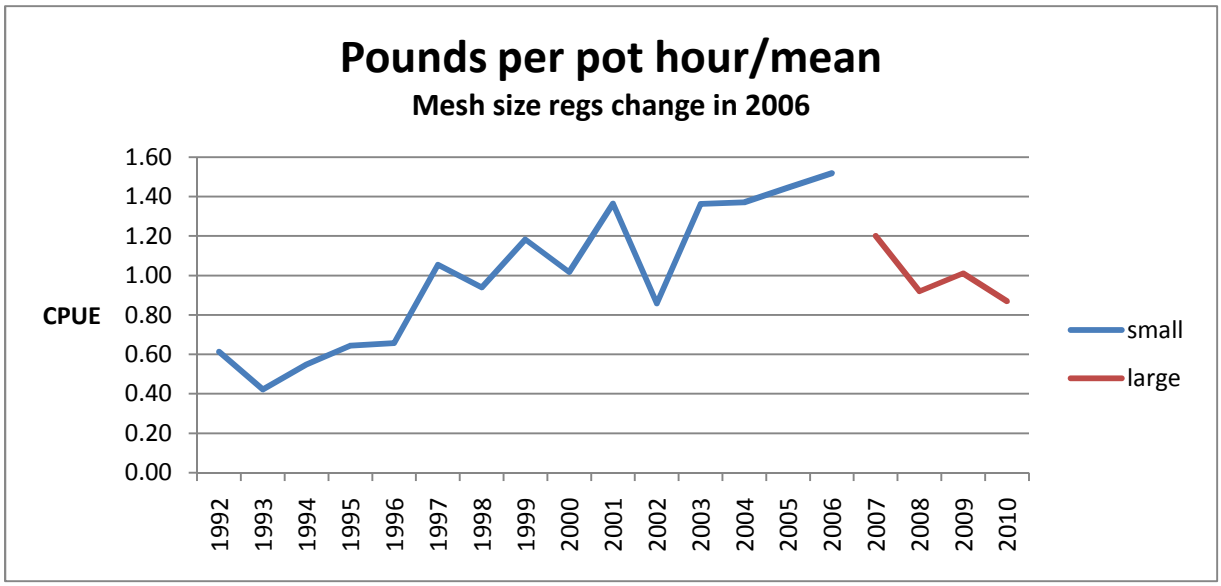

Figure 2b. Nominal CPUE split at 2006. Values are normalized to the means.

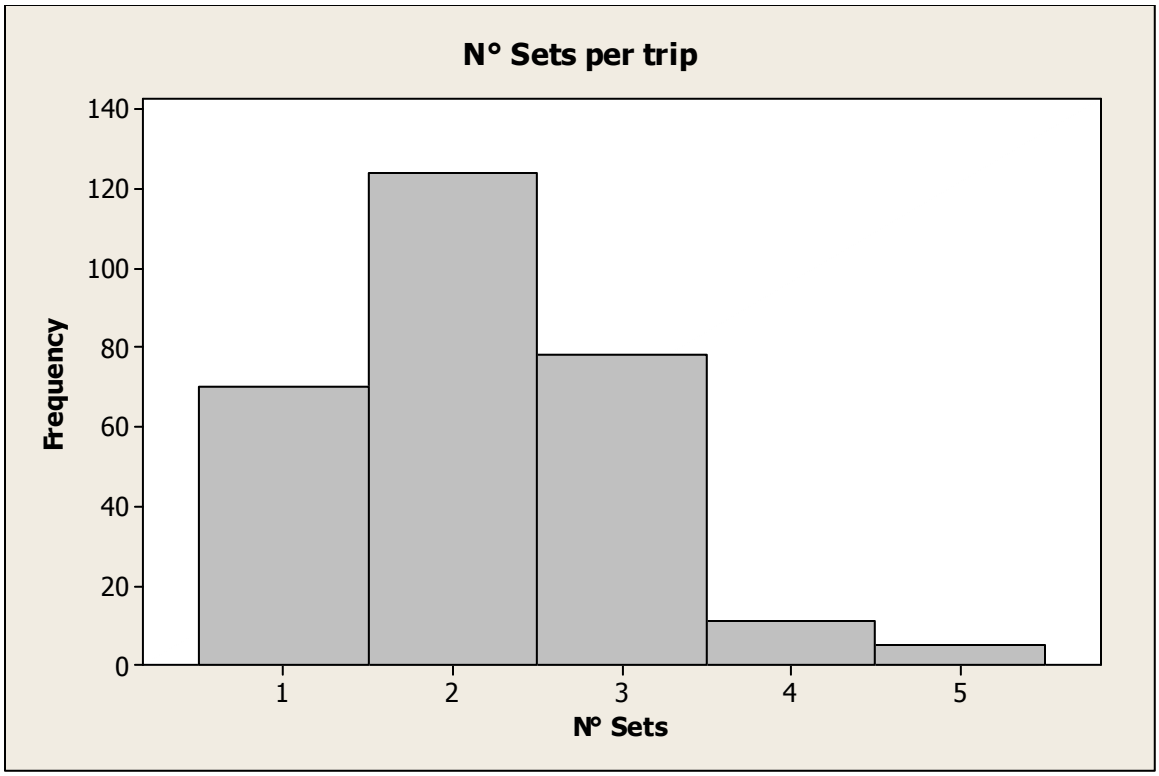

Figure 3. Frequency of number of sets per trip from logbook and trip ticket.

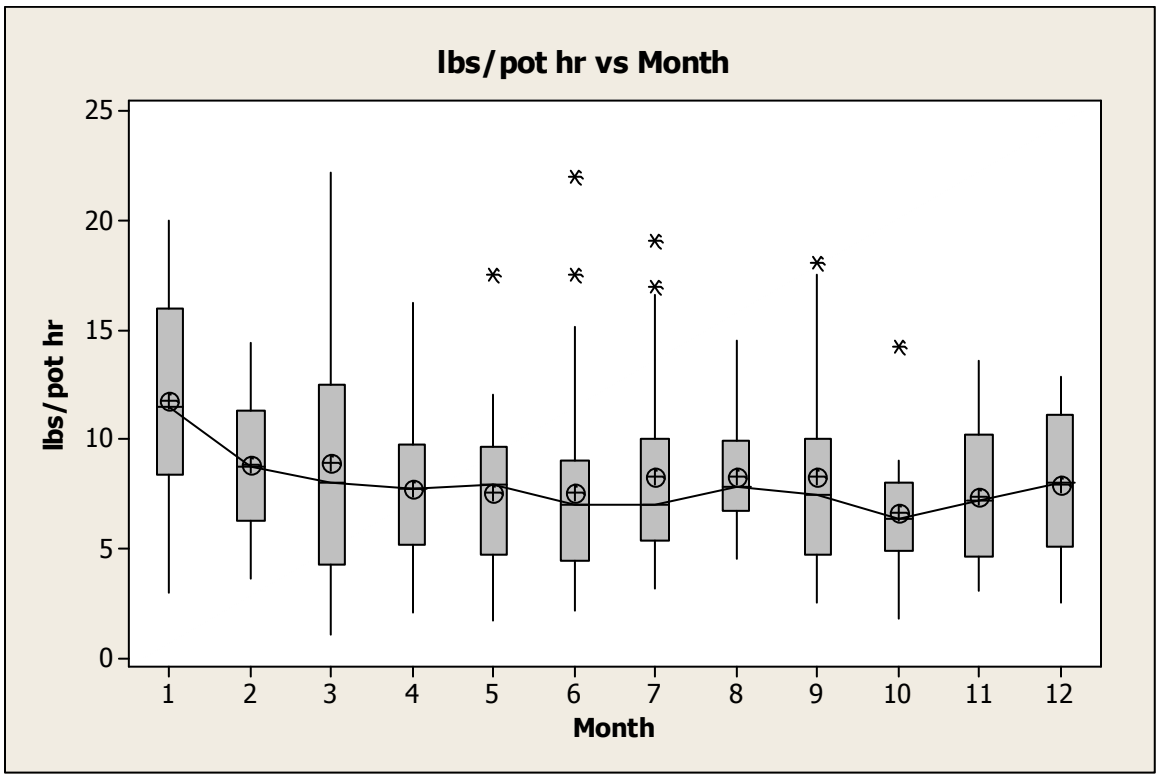

Figure 4. Catch rate by month, all years combined (1992-2010)