RED PORGY ADVISORY REPORT
JUNE 2002

Status of Stock: The stock is overfished but overfishing is not occurring. The current index of spawning stock biomass is low; the 2001 spawning stock size is estimated at about 43% of SSBmsy and 55% of MSST. The 2001 fishing mortality rate is estimated at about 45% of Fmsy. Recruitment, as measured by the model, has trended down from 1972 with an upturn in 2001. The size structure of the stock has been reduced after a period of high fishing mortality.

Management Advice: Fishing mortality should not be increased. Although overfishing is not currently taking place, in the future fishing mortality may need to be reduced to meet the 2016 rebuilding requirement. However, there is very little information associated with the effects of the current management regime (Amendment 12 initiated in 1999) with which to project rebuilding.

Forecast: There is considerable uncertainty in future rates of recovery due to: uncertainty about the biology of the species, model uncertainty, and quality of the data available.

Projections simulating current fishing mortality (Amendment 12 regulations) show less than 50% probability of achieving SSBmsy in 2016 which is the last year of the Council's 18 year rebuilding program. See Figure 4. The projections show a 50% probability of exceeding the MSST in 2011. Projections simulating no directed fishing or by-catch (F = 0) would achieve SSBmsy in 2009 but the mortality from discards would increase.

Landings (metric tons) and Stock Status Table

Year	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	Max*	Min*	Mean*
Commercial	234	213	198	196	195	193	144	48	12	30	729	12	294
Headboat	50	46	40	42	37	34	31	22	6	23	340	6	117
Recreational	54	30	21	48	53	8	6	31	12	25	109	3	41
Total	338	290	258	286	285	236	181	101	30	77	929	30	452
SSB	960	908	880	879	820	807	833	933	1132	1326	9580	807	3652
Abundance	4661	4428	4491	4537	4276	4624	4450	4065	3907	4307	18215	3907	9069
Recruits (1000)	1301	1212	1403	1342	1085	1646	1119	787	796	1226	3349	787	2015
F	0.72	0.62	0.56	0.63	0.68	0.56	0.37	0.21	0.04	0.09	0.83	0.04	0.35
F/FMSY	3.81	3.27	2.96	3.30	3.57	2.96	1.95	1.09	0.24	0.45	4.37	0.24	1.86

*Maximum, minimum and mean based on period 1972-2001

Stock Identification and Distribution: Red porgy have an extensive range in warm waters of the Atlantic Ocean and adjacent seas. The management unit analyzed includes fish from U.S. Atlantic waters of North Carolina (NC) south of Cape Hatteras, South Carolina (SC), Georgia (GA), and the east coast of Florida (FL), including the Atlantic side of the Florida Keys (Monroe County). Within that stock definition, red porgy have been most abundant in NC and SC waters. Tagging studies show neither long-range migrations nor extensive local movements of adult red porgy, and there is no circumstantial or anecdotal information to suggest such movements.

Catches: (Figure 1) Three major fisheries catch this stock of red porgy: commercial, recreational, and headboat. The most common commercial gear has been hook and line, with occasional commercial landings also from trawls and traps. Trawling for red porgy has been banned since January 12, 1989. Total landings increased during the 1970s and early 1980s as the commercial fishery expanded, rising from about 335 mt in 1972 to over 900 mt in 1982. Except for a brief spike in 1988-1990, landings declined steadily from the 1982 peak to the low of under 30 mt in 2000.

The headboat fishery was predominant, 1972-1977, accounting for 64% on average of landings in weight. From 1978, onward the commercial fishery predominated, representing 53-82% of annual landings. Recreational fisheries seldom landed more than 10% of the total until 1999-2001, when they represented 34% of total weight landed. Commercial landings increased during the 1970s, from 47 mt in 1972 to 729 mt in 1982.

Data and Assessment: A Data Workshop was held March 11-14, 2002, and a series of Stock Assessment Workshops took place between April 8 - May 6, 2002. Two models were used to assess stock status: Age structured model and Production model. The age structured model used catch, length composition (Figure 2), age composition, and abundance indices (Figure 3). The production model used catch and abundance indices.

In all analyses, the value of natural mortality used was 0.225.

Biological Reference Points: Three sets of Biological Reference Points are presented: 1) the current definitions using the last assessment's results, 2) the current definitions using results from the 2002 assessment and 3) a proposed set.

Council's Current Definitions (Proxies) from Amendment 12:

    A. Maximum fishing mortality threshold (MFMT). A fishing mortality rate (F) corresponding to a 35% Static SPR (previously estimated as F=0.43; estimated in the 2002 assessment as 0.49) based on a 14" TL minimum size limit.

B. Minimum stock size threshold (MSST). The minimum stock size threshold is defined as the maximum of either 0.5 or 1-M (M = natural mortality = previously defined as 0.28; currently defined as 0.225) times SSBmsy proxy. The Council is specifying the minimum stock size associated with 35% Static SPR which was previously estimated as 3,328 metric tons (MSST=(1-0.28)*4,622=3,328 mt) or 7.34 million pounds. The SSBmsy proxy associated with 35% Static SPR estimated in the 2002 assessment was 859 mt.

C. Rebuilding timeframe. Red porgy cannot be rebuilt in less than 10 years (see NMFS SEFSC results as shown in Figure 4) and a generation time is estimated as 8 years. Therefore, the rebuilding timeframe for red porgy is 18 years with 1999 being Year 1 given the emergency closure was implemented on September 8, 1999.

The SARC recommends using the following biological reference points:
The Council's definition of MSST = (1-M) * SSBmsy; MSST was estimated in this assessment to be 2,364 mt.

Fmsy used as per Amendment 12 to determine overfishing; Fmsy was estimated in this assessment to be 0.19.

Amendment 12 defines the rebuilding time period as 18 years with 1999 as Year 1. The rebuilt state was defined as the stock's reaching SSBmsy = 3,049.5 mt. The minimum stock size threshold (MSST) is used to measure whether the stock is overfished.

Fishing Mortality: F from model had an increasing trend from 1972 through 1990 and generally declined until 2000. F exceeds Fmsy from the late 1970s through the late 1990s (Figure 5). Relative fishing mortality rates from the age structure and production models showed similar patterns.

Recruitment: Estimated recruitment generally declined throughout the time series. See Figure 6.

Stock Biomass: The Total SSB (males and females) declined through 1990 with a slight increase in 1999 and 2000. The relative SSB/SSBmsy from the Age-structured and Production models were in agreement (Figure 7). The SSB estimates from the Age-structured model were divided into male and female components (Figure 8). The male SSB declined more than female SSB.

Special Comments:
Red porgy switch sex from females to males. The analytical tools and biological reference points do not take this into consideration. Implications of this are unknown and could have important affects on reference points and estimates of recovery.

Concern was expressed that important information on the status of larger red porgy derived from deeper waters was not available as a separate index for inclusion in the assessment. It is recommended that further consideration be given to developing such indices from commercial and fishery independent data.

Effective monitoring of stock recovery, especially under further fishing mortality reductions, will require information on discards.

Source of Information:
Report of Red Porgy Stock Assessment Workshop, April 8 - May 6, 2002.

In addition, a Data Workshop was held March 11-14, 2002. All data, reports, and results are included on a CD available from the NMFS Beaufort Lab.

Figure 1. History of catches with management events superimposed.
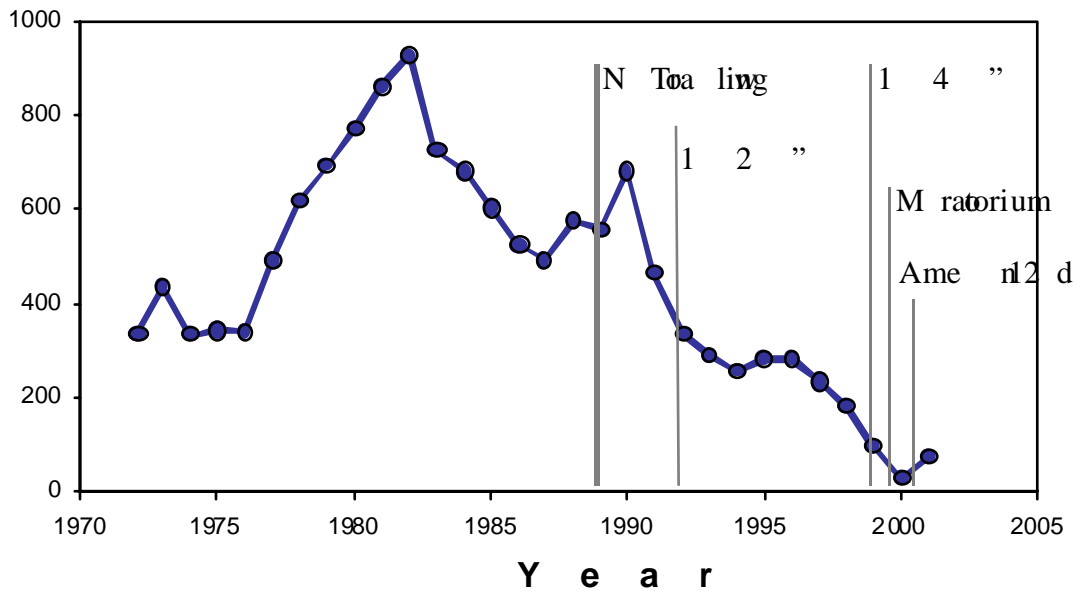
Figure 2. Commercial (hand line) and Headboat length frequency data from selected years (1976, 1986, 1996 and 2001).
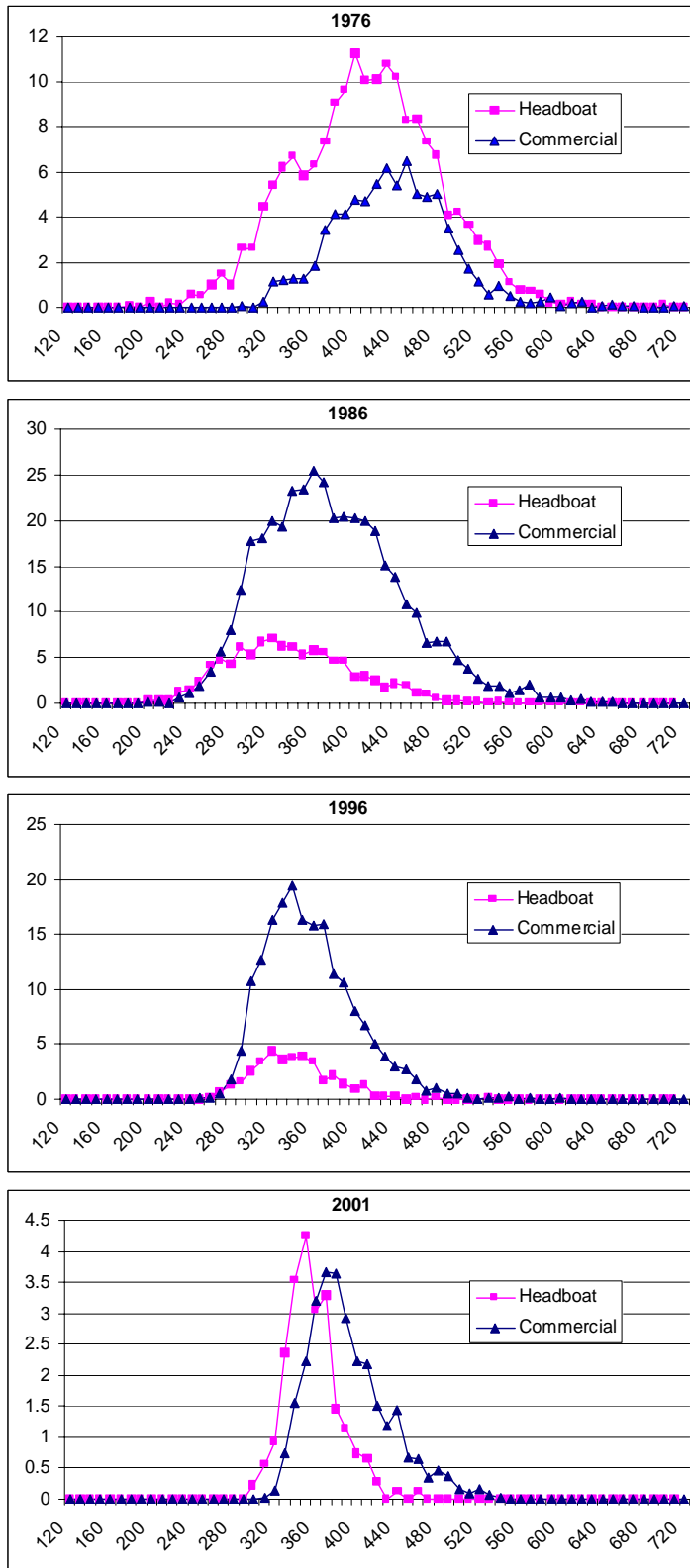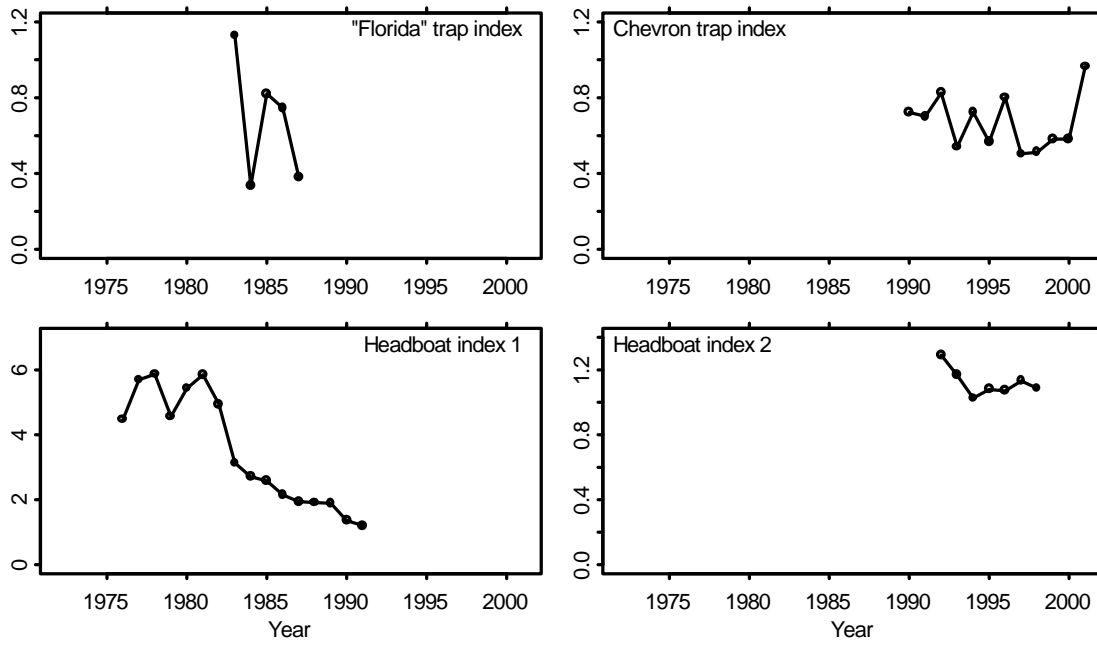
Figure 3. Abundance indices.

Figure 4. Rebuilding projections under two scenarios no fishing or by-catch (F = 0) and simulating Amendment 12. The horizontal line is BMSY and the dashed line in the upper plot is the MSST and the vertical line as 2016 is the Amendment 12 date for rebuilding.
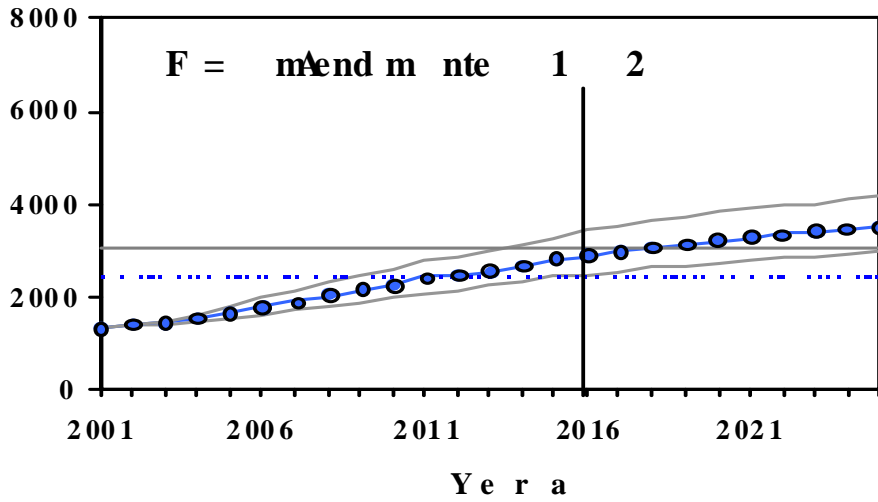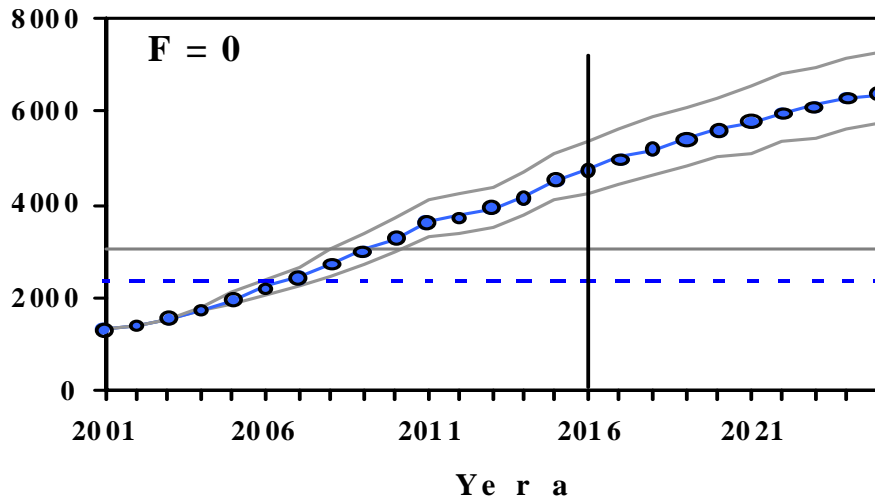
Figure 5. Relative Fishing Mortality Rates (F/FMSY). Solid line is the Age-structured model, line with dots is Production model.
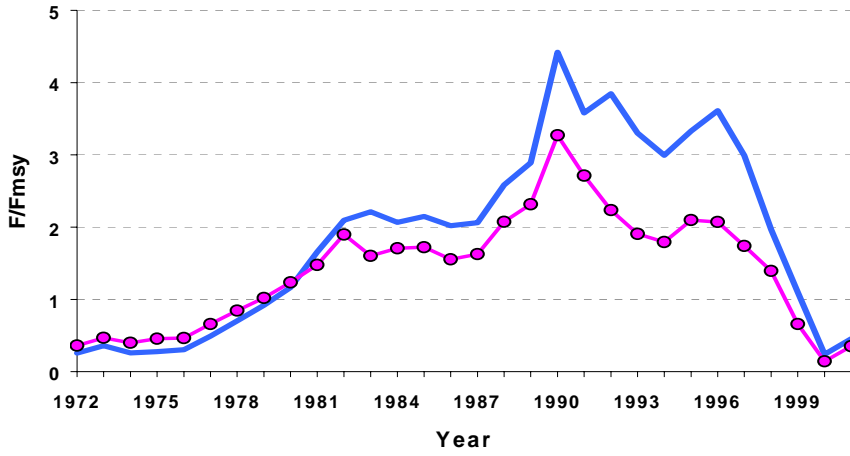

Figure 6. Stock SSB and Recruitment from Age-structured model .
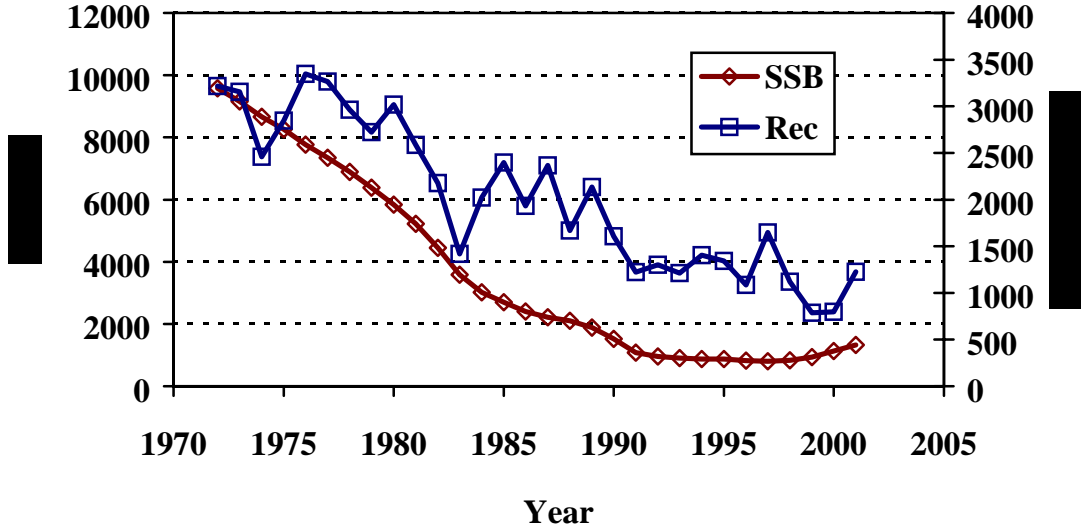
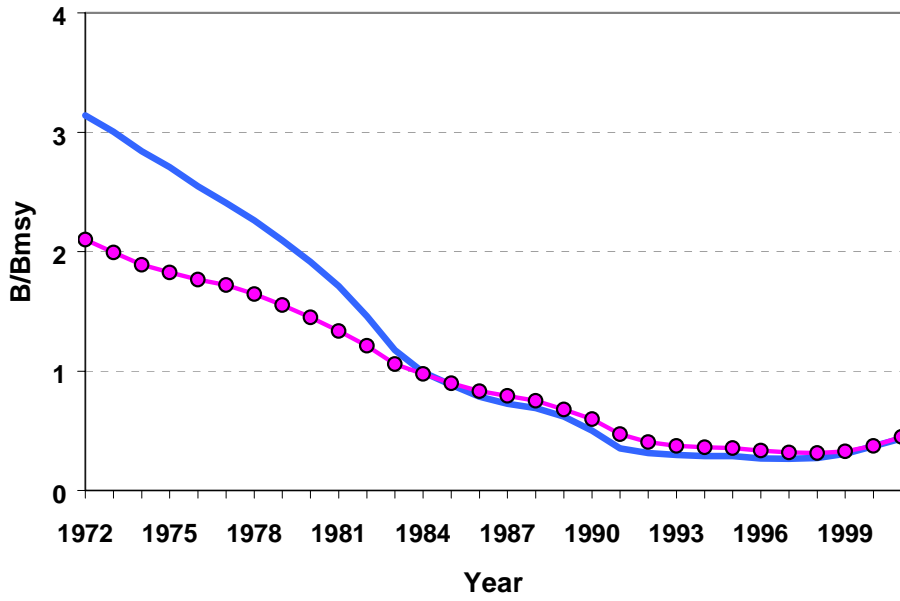**Figure 7. Relative biomass estimates. Solid line is the Age-structured model (SSB/SSBMSY), line with dots is Production model (B/BMSY).**

Figure 8. Male and Female SSB