Appendix H.

1 Bycatch Practicability Analysis

1.1 Population Effects for the Bycatch Species

Background

Comprehensive Ecosystem-Based Amendment 3 (CE-BA 3) includes actions that could modify data reporting for "for-hire" and commercial vessels, and modify bycatch and discard reporting. Actions in CE-BA 3 apply to amendments to the Fishery Management Plan (FMP) for the Snapper Grouper Fishery of the South Atlantic Region (Snapper Grouper FMP), FMP for the Dolphin and Wahoo Fishery of the Atlantic (Dolphin Wahoo FMP), FMP for the Coastal Migratory Pelagics (CMP) Resources in the Gulf of Mexico and South Atlantic Region (CMP FMP), and FMP for the Golden Crab Fishery of the South Atlantic Region (Golden Crab FMP).

The majority of species in the snapper grouper fishery management unit (FMU) are taken with hook and line gear (see **Chapter 3**). Black sea bass are predominantly taken with pots; whereas, longline gear has been the predominant gear type used to capture golden tilefish. In the CMP FMP, most king mackerel and cobia are taken with hook and line gear; however, gillnets and castnets are the predominant gear type used to harvest Spanish mackerel (see **Chapter 3**).

Total landings (including all sectors) during 2007-2011 for species in the FMPs included in CE-BA 3 were dominated by those in the FMPs for Snapper Grouper, followed by CMP, Dolphin Wahoo, and Golden Crab (see **Table 1** below). Total discards followed this trend, except that discards in the CMP FMP were higher than the Dolphin Wahoo FMP (**Table 1**). This is probably due to the fact that there are more regulations in place for the CMP FMP when compared with the Dolphin Wahoo FMP (see **Appendix I** for the history of management).

Commercial Sector

During 2007-2011, regulations (50 C.F.R. § 622.5) required participants in the South Atlantic snapper grouper fishery who were selected by the Science and Research Director (SRD) to maintain and submit a fishing record on forms provided by the SRD. Fishermen in the golden crab, coastal migratory pelagic, and dolphin/wahoo fisheries were also required to submit logbooks. Trip and effort information were included in the same logbook for snapper grouper, coastal migratory pelagic, and dolphin/wahoo (**Appendix M**). Trip and effort logbooks were also completed for the golden crab fishery (Harper et al. 2000). Commercial landings were highest for species in the CMP FMP (8,078,826 pounds whole weight, lbs ww), followed by Snapper Grouper FMP (7,141,657 lbs ww), Dolphin Wahoo FMP (914,426 lbs ww), and Golden Crab FMP (529,777 ww) (**Table 1**). In the Snapper Grouper FMP, landings during 2007-2011 were dominated by vermilion snapper (1,086,090 lbs ww), yellowtail snapper (949,257 lbs ww), greater amberjack (796,063 lbs ww), gag (592,108 lbs ww), black sea bass (489,471 lbs ww), red grouper (480,195 lbs ww), gray triggerfish (427,642 lbs ww), and golden tilefish (372,466 lbs ww) (**Table 1**). Commercial discards during 2007-2011 were highest for yellowtail snapper (128,323 lbs ww), followed by golden tilefish (74,887 lbs ww), vermilion snapper (36,825 lbs ww), red porgy (27,671 lbs ww), and black sea bass (20,132 lbs ww) (**Table 1**). During 2007-2011, commercial landings were predominant for dolphin (866,625 lbs ww) and the two mackerel species (king mackerel, 4,172,817 lbs ww; Spanish mackerel, 3,773,688 lbs ww), in the

FMPs for Dolphin Wahoo and CMP, respectively (**Table 1**). Landings for golden crab during 2007-2011 were 529,777 lbs ww, there is no recreational sector for golden crab (**Table 1**). Discard information was not reported during 2007-2011 for the commercial sector for Dolphin Wahoo, CMP, and Golden Crab FMPs (**Table 1**).

Currently, discard data are collected using a supplemental form that is sent to a 20% stratified random sample of the active permit holders in fisheries for snapper grouper, CMP, and dolphin and wahoo. On October 28, 1996, the Golden Crab Trip Report Logbook program became mandatory, requiring reporting of discarded species. However, in the absence of any observer data, there are concerns about the accuracy of logbook data in collecting bycatch information. Biases associated with logbooks primarily result from inaccuracy in reporting of species that are caught in large numbers or are of little economic interest (particularly of bycatch species), and from low compliance rates. Actions in CE-BA 3 could help resolve some of these issues.

Recreational Sector

For the recreational fishery during 2007-2011, estimates of the number of recreational discards were available from Marine Recreational Fisheries Statistical Survey (MRFSS) and the NMFS headboat survey. The MRFSS system classifies recreational catch into three categories:

- Type A - Fishes that were caught, landed whole, and available for identification and enumeration by the interviewers.
- Type B - Fishes that were caught but were either not kept or not available for identification:
    - Type B1 - Fishes that were caught and filleted, released dead, given away, or disposed of in some way other than Types A or B2.
    - Type B2 - Fishes that were caught and released alive.

The recreational sector can be further categorized into “private” and “for-hire” (headboat/charterboat) categories. During 2007-2011, recreational landings were highest for species in the Snapper Grouper FMP, followed by CMP FMP, Dolphin Wahoo FMP, and Golden Crab FMP (**Table 1**). In the Snapper Grouper FMP, private recreational landings were dominated by blue runner (690,337 lbs ww), followed by gray snapper (397,987 lbs ww), black sea bass (335,481 lbs ww), yellowtail snapper (190,098 lbs ww), white grunt (178,805 lbs ww), and Atlantic spadefish (163,363 lbs ww) (**Table 1**). During 2007-2011, discards (numbers of fish) for snapper grouper species in the private recreational sector were highest for black sea bass (2,751597), followed by gray snapper (1,549,311), blue runner (810,073), tomtate (350,684), and white grunt (214,034). For the same time period, the “for-hire” category (headboat/charterboat) targeted slightly different species in the snapper grouper FMU. Landings (headboat/charterboat) were highest for vermilion snapper/black sea bass (253,588/74,955), followed by white grunt/tomtate (163,281/11,666), and yellowtail snapper (95,947/26,675) (**Table 1**). Discards were highest for black sea bass (333,521/159,193), followed by vermilion snapper (114,683/38,111), tomtate/blue runner (73,439/14,949), and yellowtail snapper/white grunt (32,646/12,722) (**Table 1**).

In the Dolphin Wahoo FMP during 2007-2011, dolphin landings and resulting discards were higher than those for wahoo, with the private recreational landings and discards for dolphin (614,558 and 163,237) higher than the headboat/charter boat category (3,920 and 366/311,653 and 7,926) (**Table 1**).

For the CMP FMP during 2007-2011, the private recreational landings and discards for CMP species were also higher than those in the headboat/charterboat category (**Table 1**). Landings and subsequent discards for the private recreational category were higher for Spanish mackerel (1,032,869 and 617,309), followed by king mackerel (358,361 and 134,260), and cobia (38,460 and 36,074) (**Table 1**). A similar trend was seen for the charterboat category, with landings and discards for Spanish mackerel (122,242 and 28,555) higher than king mackerel (68,013 and 10,174), and cobia (5,975 and 4,333) (**Table 1**). However, in the headboat category , landings and discards were higher for king mackerel (19,805 and 2,019), followed by Spanish mackerel (8,843 and 1,433), and cobia (1,542 and 772) (**Table 1**).

There is no recreational sector for golden crab.

During 2007-2011, "for-hire" vessels for snapper grouper, coastal migratory pelagic and dolphin/wahoo fisheries were selected to report by the SRD to maintain a fishing record for each trip, or a portion of such trips as specified by the SRD, and on forms provided by the SRD. Furthermore, the owner or operator of a vessel for which a charter vessel/headboat permit for South Atlantic snapper-grouper has been issued, who was selected to report by the SRD must participate in the NMFS-sponsored electronic logbook and/or video monitoring reporting program as directed by the SRD. Harvest and bycatch information was monitored by MRFSS. Since 2000, a 10% sample of charter vessel captains were called weekly to obtain trip level information. In addition, the standard dockside intercept data were collected from charter vessels and charter vessel clients were sampled through the standard random digital dialing of coastal households. Precision of charter vessel effort estimates has improved by more than 50% due to these changes (Van Voorhees *et al.* 2000).

Harvest from headboats was monitored by NOAA Fisheries at the Southeast Fisheries Science Center's (SEFSC) Beaufort Laboratory. Collection of discard data began in 2004. Daily catch records (trip records) were filled out by the headboat operators, or in some cases by NOAA Fisheries approved headboat samplers based on personal communication with the captain or crew. Headboat trips were subsampled for data on species lengths and weights. Biological samples (scales, otoliths, spines, reproductive tissues, and stomachs) were obtained as time allowed. Lengths of discarded fish were occasionally obtained but these data were not part of the headboat database.

Recent improvements have been made to the MRFSS program, and the program is now called Marine Recreational Information Program (MRIP). Samples will now be drawn from a known universe of fishermen rather than randomly dialing coastal households. Other improvements have been and will be made that should result in better estimating recreational catches and the variances around those catch estimates. Actions in CE-BA 3 could help get more timely landings, discard, and bycatch information from the recreational sector.

Table 1. Mean headboat, MRFSS charter and private, and commercial estimates of landings and discards in the U.S. southern Atlantic Ocean (2007-2011). Headboat, MRFSS charter and private landings are in numbers of fish (N); commercial landings are in pounds whole weight (lbs ww). Discards represent numbers of fish that were caught and released alive (B2).

Snapper Grouper FMP	HEADBOAT				MRFSS CHARTER				MRFSS PRIVATE				COMMERCIAL	
	Catch (N)	Landings (N)	Discards (N)	Discards (%)	Catch (N)	Landings (N)	Discards (N)	Discards (%)	Catch (N)	Landings (N)	Discards (N)	Discards (%)	Landings (lbs ww)	Discards (N)
Almaco jack	4,162	3,806	356	9%	3,499	2,986	513	15%	8,722	4,817	3,905	45%	204,945	106
Atlantic spadefish	162	133	29	18%	678	273	406	60%	328,703	163,363	165,339	50%	27,280	0
Banded rudderfish	18,992	16,771	2,221	12%	5,551	3,565	1,986	36%	16,725	5,536	11,189	67%	53,262	739
Bank sea bass	9,502	6,009	3,492	37%	2,287	717	1,570	69%	14,333	3,760	10,574	74%	431	0
Bar jack	235	188	47	20%	271	177	94	35%	12,766	1,943	10,823	85%	4,661	9
Black grouper	1,551	464	1,086	70%	437	265	171	39%	19,373	3,506	15,867	82%	59,427	3,031
Black sea bass	511,148	177,627	333,521	65%	234,148	74,955	159,193	68%	3,087,078	335,481	2,751,597	89%	489,471	20,132
Black snapper	0				0				0				147	32
Blackfin snapper	124	60	63	51%	179	179	0	0%	2,155	2,155	0	0%	1,567	1
Blue runner	15,984	13,091	2,893	18%	27,402	12,454	14,949	55%	1,500,410	690,337	810,073	54%	208,772	1,155
Blueline tilefish	1,732	1,709	23	1%	31,470	29,863	1,607	5%	13,288	11,065	2,224	17%	309,825	2
Coney	172	102	70	41%	120	39	82	68%	2,322	1,447	875	38%	48	4
Cottonwick	28	17	11	38%	0				133	133	0	0%	0	0
Cubera snapper	452	425	28	6%	11	11	0	0%	2,812	2,569	243	9%	5,774	0
Dog snapper	89	60	29	32%	71	71	0	0%	4,338	3,958	380	9%	431	0
Gag	8,633	3,736	4,897	57%	7,583	3,659	3,924	52%	152,690	24,732	127,958	84%	592,108	9,185
Golden tilefish	0				884	884	0	0%	5,252	5,252	0	0%	372,466	16
Gray snapper	43,494	38,141	5,353	12%	19,449	9,960	9,488	49%	1,947,298	397,987	1,549,311	80%	109,225	74,887
Gray triggerfish*	68,648	58,654	9,995	15%	44,964	36,040	8,924	20%	261,349	120,534	140,815	54%	427,642	2,091
Graysby	4,414	3,642	772	17%	562	493	68	12%	9,560	3,788	5,771	60%	239	13

Greater amberjack	6,232	4,239	1,994	32%	25,109	18,298	6,811	27%	62,809	24,011	38,798	62%	796,063	3,692
Hogfish	354	264	91	26%	72	66	6	8%	39,954	35,049	4,904	12%	50,396	265
Jolthead porgy	7,739	7,577	161	2%	1,657	1,657	0	0%	12,912	12,327	585	5%	2,586	4
Knobbed porgy	6,280	6,193	87	1%	1,036	1,036	0	0%	10,871	2,251	8,620	79%	26,042	0
Lane snapper	22,610	19,297	3,313	15%	4,591	3,724	867	19%	259,324	78,984	180,340	70%	4,105	697
Lesser amberjack	216	211	5	2%	20	20	0	0%	370	370	0	0%	15,268	110
Longspine porgy	24	18	6	25%	950	950	0	0%	358	358	0	0%	13	0
Mahogany snapper	26	24	2	7%	0				308	308	0	0%	38	819
Margate	1,240	822	419	34%	96	25	71	74%	24,086	13,289	10,797	45%	3,494	29
Misty grouper	1	1	0	0%	0				0				1,765	0
Mutton snapper	17,572	13,984	3,588	20%	21,030	11,240	9,791	47%	311,784	121,604	190,181	61%	77,400	4,089
Ocean triggerfish	214	202	12	6%	319	289	29	9%	5,643	2,462	3,181	56%	0	0
Queen snapper	0				8	8	0	0%	0				5,080	2
Red grouper	11,109	2,374	8,735	79%	11,246	5,308	5,938	53%	87,491	34,356	53,136	61%	480,195	6,793
Red hind	667	600	67	10%	76	45	31	40%	3,478	1,525	1,953	56%	11,883	147
Red porgy	56,191	34,003	22,189	39%	19,240	13,138	6,102	32%	26,949	16,922	10,027	37%	179,256	27,671
Rock hind	2,820	2,312	508	18%	104	88	16	16%	4,726	1,592	3,134	66%	20,289	7
Rock sea bass	6	0	6	100%	546	213	333	61%	11,434	4,502	6,932	61%	648	0
Sailors choice	72	67	5	7%	1,106	106	1,000	90%	44,277	20,098	24,180	55%	0	0
Sand tilefish	1,348	903	444	33%	6,496	803	5,693	88%	30,030	6,524	23,506	78%	813	227
Saucereye porgy	324	323	1	0%	42	42	0	0%	197	197	0	0%	0	0
Scamp	9,333	6,084	3,249	35%	3,770	2,363	1,407	37%	14,391	7,714	6,676	46%	281,807	2,723
Schoolmaster	404	326	78	19%	5	5	0	0%	11,192	4,764	6,428	57%	231	0
Scup	12,284	10,176	2,109	17%	110	48	62	57%	1,023	690	333	33%	0	0
Silk Snapper	1,187	1,080	107	9%	1,619	1,404	215	13%	445	133	312	70%	12,559	1

Snowy grouper	139	95	44	32%	1,615	1,344	271	17%	1,188	945	243	20%	93,418	270
Tomtate	122,805	49,366	73,439	60%	23,747	11,666	12,081	51%	472,666	121,982	350,684	74%	511	2,622
Vermilion snapper	368,271	253,588	114,683	31%	101,627	63,516	38,111	38%	220,406	93,319	127,087	58%	1,086,090	36,825
White grunt*	193,622	163,281	30,341	16%	44,894	32,172	12,722	28%	392,839	178,805	214,034	54%	149,521	564
Whitebone porgy	5,064	4,809	256	5%	1,699	1,638	61	4%	12,377	10,923	1,454	12%	18	17
Yellowedge grouper	7	5	3	38%	30	30	0	0%	116	116	0	0%	19,438	0
Yellowfin grouper	72	59	13	18%	0				0				5,701	6
Yellowmouth grouper	69	62	7	10%	57	57	0	0%	246	246	0	0%	54	0
Yellowtail snapper	128,593	95,947	32,646	25%	33,793	26,675	7,119	21%	418,591	190,098	228,494	55%	949,257	128,323
Total	**1,666,419**	**1,002,925**	**663,494**		**686,277**	**374,565**	**311,712**		**9,871,788**	**2,768,826**	**7,102,961**		**7,141,657**	**327,308**
Dolphin Wahoo FMP	**HEADBOAT**				**MRFSS CHARTER**				**MRFSS PRIVATE**				**COMMERCIAL**	
	Catch (N)	**Landings (N)**	**Discards (N)**	**Discards (%)**	**Catch (N)**	**Landings (N)**	**Discards (N)**	**Discards (%)**	**Catch (N)**	**Landings (N)**	**Discards (N)**	**Discards (%)**	**Landings (lbs ww)**	**Discards (N)**
Dolphin	4,285	3,920	366	9%	319,579	311,653	7,926	2%	777,795	614,558	163,237	21%	866,625	0
Wahoo	135	124	12	9%	9,962	9,922	39	0%	30,213	27,828	2,385	8%	47,801	0
Total	**4,421**	**4,043**	**377**		**329,541**	**321,575**	**7,965**		**808,007**	**642,386**	**165,622**		**914,426**	
Coastal Migratory Pelagics FMP	**HEADBOAT**				**MRFSS CHARTER**				**MRFSS PRIVATE**				**COMMERCIAL**	
	Catch (N)	**Landings (N)**	**Discards (N)**	**Discards (%)**	**Catch (N)**	**Landings (N)**	**Discards (N)**	**Discards (%)**	**Catch (N)**	**Landings (N)**	**Discards (N)**	**Discards (%)**	**Landings (lbs ww)**	**Discards (N)**
Cobia	2,314	1,542	772	33%	10,309	5,975	4,333	42%	74,534	38,460	36,074	48%	132,321	0
King mackerel*	21,823	19,805	2,019	9%	78,187	68,013	10,174	13%	492,521	358,261	134,260	27%	4,172,817	0
Spanish mackerel	10,276	8,843	1,433	14%	150,797	122,242	28,555	19%	1,650,178	1,032,869	617,309	37%	3,773,688	0
Total	**34,414**	**30,189**	**4,224**		**239,292**	**196,230**	**43,062**		**2,217,233**	**1,429,590**	**787,643**		**8,078,826**	**0**
Golden Crab FMP	**HEADBOAT**				**MRFSS CHARTER**				**MRFSS PRIVATE**				**COMMERCIAL**	
	Catch (N)	**Landings (N)**	**Discards (N)**	**Discards (%)**	**Catch (N)**	**Landings (N)**	**Discards (N)**	**Discards (%)**	**Catch (N)**	**Landings (N)**	**Discards (N)**	**Discards (%)**	**Landings (lbs ww)**	**Discards (N)**
Golden crab	N/A				N/A				N/A				529,777	0
Total	**N/A**				**N/A**				**N/A**				**529,777**	**0**

Sources: MRFSS data from SEFSC Recreational annual catch limit (ACL) Dataset (July 2012), Headboat data from SEFSC Headboat Logbook CRNF files (expanded; July 2012), Commercial landings data from SEFSC Commercial ACL Dataset (July 2012), with discard estimates from expanded SEFSC Commercial Discard Logbook (July 2012).
Note: Commercial discard estimates are for vertical line gear only. The use of MRFSS data has been recommended until ACLs are recomputed using recalibrated MRFSS->MRIP data.
Goliath grouper, Nassau grouper, Warsaw grouper, Speckled hind, and Red snapper are excluded from **Table 1** since they are prohibited species, and landings records are not available for all the years 2007-2011). Wreckfish landings are confidential.
*Commercial king mackerel includes "king and cero mackerel" category; commercial gray triggerfish includes "triggerfishes, unclassified" category; commercial white grunt includes "grunts, unclassified" category.

Finfish Bycatch Mortality

Release mortality rates are unknown for most managed species. Recent SEDAR assessments include estimates of release mortality rates based on published studies. Stock assessment reports can be found at http://www.sefsc.noaa.gov/sedar/.

SEDAR 17 (2008) recommended a release mortality rate for vermilion snapper of 38% for both the commercial and recreational fisheries. SEDAR 10 (2006) estimated release mortality rates of 40% and 25% for gag taken by commercial and recreational fishermen, respectively. SEDAR 24 (2010) used release mortality rates of 48% commercial; 41% for-hire, and 39% private recreational for red snapper. Release mortality rates were estimated as 20% for black grouper and red grouper in SEDAR 19 (2010). SEDAR 15 (2008) estimated a 20% release mortality rate for greater amberjack. In the Gulf of Mexico, SEDAR 9 (2006) assumes a 0% release mortality rate for gray triggerfish. Snowy grouper are primarily caught in water deeper than 300 feet and golden tilefish are taken at depths greater than 540 feet; therefore, release mortality of the species are probably near 100% (SEDAR 4 2004, SEDAR 25 2011). Release mortality of black sea bass is considered to be low (7% for the recreational sector and 1% for the commercial sector) (SEDAR 25; 2011) indicating minimum size limits are probably an effective management tool for black sea bass. Collins et al. (1999) reported venting of the swim bladder yielded reductions in release mortality of black sea bass, and the benefits of venting increased with capture depth. The same study was analyzed by Wilde (2009) to suggest that venting increased the survival of black sea bass, although this was an exception to the general findings of Wilde's (2009) study.

SEDAR 16 (2009) provided a 20% release mortality to the MRFSS fishery where king mackerel are released alive and a 33% mortality to the headboat fishery where fish were released both dead and alive. For Spanish mackerel, SEDAR 17 (2008) used the following discard mortality rates: gillnets 100%, shrimp trawls 100%, trolling 98%, hook and line 80%, and trolling/hook and line combined 88%. SEDAR 28 is currently underway, assessing Spanish mackerel and cobia stocks in the South Atlantic and the Gulf of Mexico.

Estimates of bycatch mortality for dolphin and wahoo are unknown. It is likely that most mortality is a function of hooking and handling of the fish when the hook is being removed. Release mortality of golden crab is presumed to be very low. Regulations do not allow for the retention of females, and it is assumed they survive the trauma of capture.

Practicability of Management Measures in Directed Fisheries Relative to their Impact on Bycatch and Bycatch Mortality

Actions in CE-BA 3 would change data collection methods to better verify dealer reports, and modify commercial and charter/headboat vessel reporting requirements and bycatch requirements to enhance data collection. Bycatch information is currently being collected in the snapper grouper, coastal migratory pelagic, dolphin/wahoo, and golden crab fisheries. **Figure 4-1** in CE-BA 3 describes the Atlantic Coastal Cooperative Statistics Program (ACCSP) bycatch data collection methods for commercial, recreational, and for-hire fisheries, that could be adopted if CE-BA 3 is implemented. **Table 4-5** in the document summarizes the degree that the ACCSP

bycatch requirements have been met in the South Atlantic in terms of bycatch reporting for the snapper grouper, coastal migratory pelagic, and dolphin/wahoo fisheries. There would be positive indirect biological effects associated with improving bycatch reporting. Better bycatch and discard data would provide a better understanding of the composition and magnitude of catch and bycatch, enhance the quality of data provided for stock assessments, increase the quality of assessment output, provide better estimates of interactions with protected species, and lead to better decisions regarding additional measures to reduce bycatch. Management measures that affect gear and effort for a target species can influence fishing mortality in other species. Therefore, enhanced catch and bycatch monitoring would provide better data that could be used in multi-species assessments.

CE-BA 2 (SAFMC 2011g) included actions that could modify management of octocorals through the establishment of an ACL; modified management of special management zones (SMZs) off South Carolina; revised sea turtle release gear requirements for the snapper grouper fishery; and designated new essential fish habitat (EFH) and EFH-Habitat Areas of Particular Concern (HAPCs) in the South Atlantic. Since the octocorals are almost exclusively harvested one at a time by divers, there is very little bycatch. CE-BA 2 also included an action that limited harvest and possession of snapper grouper and CMP species to the bag limit in SMZs off South Carolina. This action could reduce bycatch of regulatory discards around SMZs by restricting commercial harvest in the area, but it would probably have very little effect on the magnitude of overall bycatch of snapper grouper and coastal migratory species in the South Atlantic.

Regulations implemented by CE-BA 1 (SAFMC 2009) could reduce bycatch as well as protect deepwater coral habitat. CE-BA 1 (SAFMC 2009) created allowable gear areas for the golden crab fishery and shrimp fishery access areas for the deepwater shrimp fishery. The establishment of these areas allows for the continuation of these fisheries in their historical fishing grounds with little or no negative impacts to protected deepwater coral habitat.

Other actions have been taken in recently implemented amendments that could reduce the magnitudes of species addressed in CE-BA 3. Amendment 13C to the Snapper Grouper FMP (SAFMC 2006) required the use of 2” mesh in the back panel of black sea bass pots, which has likely reduced the magnitude of regulatory discards. Amendment 15B to the Snapper Grouper FMP (SAFMC 2008b) implemented an action that could reduce the impacts from incidental bycatch of sea turtles and smalltooth sawfish. Amendment 16 to the Snapper Grouper FMP (SAFMC 2009a) required the use of dehooking devices, which could help reduce bycatch mortality of vermilion snapper, black sea bass, gag, red grouper, black grouper, and red snapper. Dehooking devices can allow fishermen to remove hooks with greater ease and more quickly from snapper grouper species without removing the fish from the water. If a fish does need to be removed from the water, dehookers could still reduce handling time in removing hooks, thus increasing survival (Cooke et al. 2001). Furthermore, Amendment 17A to the Snapper Grouper FMP (SAFMC 2010a) required circle hooks for snapper-grouper species north of 28 degrees latitude, which is expected to reduce bycatch mortality of snapper grouper species. Amendment 17B to the Snapper Grouper FMP (Amendment 17B; SAFMC 2010b) established ACLs and accountability measures (AMs) and address overfishing for eight species in the snapper grouper management complex currently listed as undergoing overfishing: golden tilefish, snowy

grouper, speckled hind, Warsaw grouper, black sea bass, gag, red grouper, and vermilion snapper, in addition to black grouper.

The Comprehensive ACL Amendment (SAFMC 2011c) implemented ACLs and AMs for species not undergoing overfishing in the FMPs for snapper grouper, dolphin and wahoo, golden crab and *Sargassum*, in addition to other actions such as allocations and establishing annual catch targets for the recreational sector. The Comprehensive ACL Amendment (SAFMC 2011 c) also established additional measures to reduce bycatch in the snapper grouper fishery with the establishment of species complexes based on biological, geographic, economic, taxonomic, technical, social, and ecological factors. ACLs were assigned to these species complexes, and when the ACL for the complex is met or projected to be met, fishing for species included in the entire species complex is prohibited for the fishing year. ACLs and AMs will likely reduce bycatch of target species and species complexes as well as incidentally caught species.

Amendment 18A to the Snapper Grouper FMP (SAFMC 2011f), included actions that could reduce bycatch of black sea bass and the potential for interactions with protected species. Actions in Amendment 18A will limit the number of participants in the black sea bass pot sector, require fishermen bring pots back to port at the completion of a trip, and limit the number of pots a fishermen can deploy. Amendment 24 to the Snapper Grouper FMP (SAFMC 2011h) established a rebuilding plan for red grouper, which is overfished and undergoing overfishing. Amendment 24 (SAFMC 2011h) also established ACLs and AMs for red grouper, which could help to reduce bycatch of red grouper and co-occurring species

According to the bycatch information for mackerel gill nets, menhaden, smooth dogfish sharks, and spiny dogfish sharks were the three most frequently discarded species (SAFMC 2004). There were no interactions of sea turtles or marine mammals reported (Poffenberger 2004). The Southeast Region Current Bycatch Priorities and Implementation Plan FY04 and FY05 reported that 26 species of fish are caught as bycatch in the Gulf king mackerel gillnet fishery. Of these, 34% are reported to be released dead, 59% released alive, and 6% undetermined. Bycatch was not reported for the Gulf Spanish mackerel fishery. The South Atlantic Spanish mackerel fishery has 51 species reported as bycatch with approximately 81% reported as released alive. For the South Atlantic king mackerel fishery 92.7% are reported as released alive with 6% undetermined. Bycatch was not reported separately for gill nets and hook-and-line gear. Additionally, the supplementary discard program to the logbook reporting requirement shows no interactions of gill-net gear with marine mammals or birds.

Additional information on fishery related actions from the past, present, and future considerations can be found in **Chapter 5** (Cumulative effects) of this document.

1.2 Ecological Effects Due to Changes in the Bycatch

The ecological effects of bycatch mortality are the same as fishing mortality from directed fishing efforts. If not properly managed and accounted for, either form of mortality could potentially reduce stock biomass to an unsustainable level. As mentioned in the above section, CE-BA 3 includes actions to improve data collection methods to better verify dealer reports,

modify commercial and charter/headboat vessel reporting requirements and bycatch requirements to enhance data collection. Better bycatch and discard data would provide a better understanding of the composition and magnitude of catch and bycatch, enhance the quality of data provided for stock assessments, increase the quality of assessment output, provide better estimates of interactions with protected species, and lead to better decisions regarding additional measures to reduce bycatch. Management measures that affect gear and effort for a target species can influence fishing mortality in other species. Therefore, enhanced catch and bycatch monitoring would provide better data that could be used in multi-species assessments.

Ecosystem interactions among CMP species in the marine environment is poorly known. Most species are migratory, interacting in various combinations of species groups at different levels on a seasonal basis. With the current state of knowledge, it is not possible to evaluate the potential ecosystem wide impacts of these species interactions, or the ecosystem impacts from the limited mortality estimated to occur from mackerel fishing effort.

1.3 Changes in the Bycatch of Other Fish Species and Resulting Population and Ecosystem Effects

CE-BA 3 is not expected to affect major changes in bycatch of other fish species. Measures proposed in the CE-BA 3 are intended to improve data collection methods to better verify dealer reports to help ensure overages do not occur. CE-BA 3 would modify commercial and charter/headboat vessel reporting requirements and bycatch requirements to enhance data collection. These actions would improve data collection methods, limit overages in ACLs, and improve bycatch reporting for species included in the FMPs for snapper grouper, dolphin and wahoo, CMP, and golden crab.

1.4 Effects on Marine Mammals and Birds

Under Section 118 of the Marine Mammal Protection Act (MMPA), NOAA Fisheries must publish, at least annually, a List of Fisheries (LOF) that places all U.S. commercial fisheries into one of three categories based on the level of incidental serious injury and mortality of marine mammals that occurs in each fishery. Of the gear utilized within the snapper-grouper fishery, only the black sea bass pot is considered to pose an entanglement risk to marine mammals. The southeast U.S. Atlantic black sea bass pot fishery is included in the grouping of the Atlantic mixed species trap/pot fisheries, which the 2012 LOF classifies as a Category II (76 FR 73912; November 26, 2011). Gear types used in these fisheries are determined to have occasional incidental mortality and serious injury of marine mammals. For the South Atlantic snapper grouper fishery, the best available data on protected species interactions are from the SEFSC Supplementary Discard Data Program (SDDP) initiated in July of 200. The SDDP sub-samples 20% of the vessels with an active permit. Since August 2001, only three interactions with marine mammals have been documented; each was taken by handline gear and each released alive (McCarthy SEFSC database). The longline and hook-and-line gear components of the snapper-grouper in the South Atlantic are classified in the 2012 LOF (76 FR 73912; November 26, 2011) as Category III fisheries.

Although the black sea bass pot fishery can pose an entanglement risk to large whales due to their distribution and occurrence, sperm, fin, sei, and blue whales are unlikely to overlap with the black sea bass pot fishery operated within the snapper grouper fishery since it is executed primarily off North Carolina and South Carolina in waters ranging from 70-120 feet deep (21.3-36.6 meters). There are no known interactions between the black sea bass pot fishery and large whales. NOAA Fisheries's biological opinion on the continued operation of the South Atlantic snapper grouper fishery determined the possible adverse effects resulting from the fishery are extremely unlikely. Thus, the continued operation of the snapper grouper fishery in the southeast U.S. Atlantic EEZ is not likely to adversely affect sperm, fin, sei, and blue whales (NMFS 2006).

North Atlantic right and humpback whales may overlap both spatially and temporally with the black sea bass pot fishery. Recent revisions to the Atlantic Large Whale Take Reduction Plan have folded the Atlantic mixed species trap/pot fisheries into the plan (72 FR 193; October 5, 2007). The new requirements will help further reduce the likelihood of North Atlantic right and humpback whale entanglement in black sea bass pot gear.

Observer data and vessel logbooks indicate that pelagic longline fishing for Atlantic swordfish and tunas results in catch of non-target finfish species such as bluefin tuna, billfish, and undersized swordfish, and of protected species, including threatened and endangered sea turtles. Also, this fishing gear incidentally hooks marine mammals and sea birds during tuna and swordfish operations. **Appendix C** of the Dolphin Wahoo FMP (Final Supplemental Environmental Impact Statement for Highly Migratory Species (HMS) Regulatory Amendment 1) contains data on dolphin wahoo pelagic longline fishery analysis. The data presented on page C-66 and in **Table C-4** indicate that pelagic longlines targeting dolphin do result in a bycatch of HMS species. Implementation of regulations by the Dolphin Wahoo FMP addressed the Magnuson-Stevens Fishery Conservation and Management Act (Magnuson-Stevens Act) requirements to reduce bycatch and the mortality of bycatch.

Of the gear used in the CMP fishery only the gillnet gear components pose entanglement risks to Northern right, fin, and humpback whales. However, there are no documented interactions between CMP gillnets and large whales. Large whale entanglements have been documented in other gillnet fisheries. Both the Southeast Atlantic gillnet fishery and the Gulf of Mexico gillnet fishery are listed as category II fisheries (72 FR 14466, March 28, 2007). Neither fishery has any documented interactions with large whales or any other marine mammal species, but NOAA Fisheries classifies these fisheries as Category I1 based on analogy (is., similar risk to marine mammals) with other gillnet fisheries.

The Bermuda petrel and roseate tern occur within the action area. Bermuda petrels are occasionally seen in the waters of the Gulf Stream off the coasts of North Carolina and South Carolina during the summer. Sightings are considered rare and only occurring in low numbers (Alsop 2001). Roseate terns occur widely along the Atlantic coast during the summer but in the southeast region, they are found mainly off the Florida Keys (unpublished USFWS data). Interaction with fisheries has not been reported as a concern for either of these species.

Fishing effort reductions have the potential to reduce the amount of interactions between the fishery and marine mammals and birds. Although, the Bermuda petrel and roseate tern occur

within the action area, these species are not commonly found and neither has been described as associating with vessels or having had interactions with the snapper grouper fishery. Thus, it is believed that the snapper grouper or coastal migratory pelagic fisheries are not likely to negatively affect the Bermuda petrel and the roseate tern.

Additionally, the establishment of commercial and recreational ACLs for species in the FMPs for snapper grouper, dolphin and wahoo, CMP, and golden crab in April 2012, through the Comprehensive ACL Amendment (SAFMC 2011c) could reduce or cap bycatch mortality on protected species, including marine mammals and birds.

1.5 Changes in Fishing, Processing, Disposal, and Marketing Costs

Actions in CE-BA 3 could change data collection methods to better verify dealer reports, and modify commercial and charter/headboat vessel reporting requirements and bycatch requirements to enhance data collection. Therefore, there could be costs related to fishing, processing, disposal, and marketing of the species affected by CE-BA 3 (see economic effects in **Chapter 4** and **Appendix E** for the Regulatory Impact Review). Economic effects of actions proposed in CE-BA 3 are addressed in **Chapter 4**, as well as the Initial Regulatory Flexibility Act Analysis (**Appendix D**).

1.6 Changes in Fishing Practices and Behavior of Fishermen

Actions proposed in CE-BA 3 could result in a modification of fishing practices by commercial and recreational fishermen, but are likely to have little effect on the magnitude of discards. In fact, actions in CE-BA 3 would improve data collection methods, limit overages in ACLs, and improve bycatch reporting, thereby making the process more efficient. There could be an increase in the potential economic return for businesses due to more timely reporting of their catch. Electronic data collection, in theory, leads to more timely monitoring of ACLs and could reduce the potential for overrunning an ACL and triggering an accountability measure (AM) that might include future paybacks (such as reducing future fishing opportunities). Social effects of actions proposed in CE-BA 3 are addressed in **Chapter 4** of this document.

1.7 Changes in Research, Administration, and Enforcement Costs and Management Effectiveness

Research and monitoring is needed for proposed measures in CE-BA 3 and other recently implemented amendments in reducing bycatch. Additional work is needed to determine the effectiveness of measures in the Comprehensive ACL Amendment (SAFMC 2011c), recently implemented amendments, and by future actions being proposed by the Council to reduce bycatch. Amendment 18A to the Snapper Grouper FMP (SAFMC 2011f), required all vessels with a Federal for-hire permit to report landings electronically, if selected. Some observer information has recently been provided by MARFIN and Cooperative Research Programs ,but more is needed. Approximately 20% of commercial fishermen are asked to fill out discard

information in logbooks; however, a greater percentage of fishermen could be selected with emphasis on individuals that dominate landings. The use of electronic logbooks could be enhanced to enable fishery managers to obtain information on species composition, size distribution, geographic range, disposition, and depth of fishes that are released. Additional administrative and enforcement efforts will be needed to implement and enforce these regulations. NOAA Fisheries established the South East Fishery-Independent Survey in 2010 to strengthen fishery-independent sampling efforts in southeast US waters, addressing both immediate and long-term fishery-independent data needs, with an overarching goal of improving fishery-independent data utility for stock assessments. Meeting these data needs is critical to improving scientific advice to the management process, ensuring overfishing does not occur, and successfully rebuilding overfished stocks on schedule.

1.8 Changes in the Economic, Social, or Cultural Value of Fishing Activities and Non-Consumptive Uses of Fishery Resources

Preferred management measures, and any changes in economic, social, or cultural values are discussed in **Chapter 4**.

1.9 Changes in the Distribution of Benefits and Costs

The distribution of benefits and costs expected from actions in CE-BA 3 are discussed in **Chapter 3**. Actions in CE-BA 3 would improve data collection methods, limit overages in ACLs, and improve bycatch reporting, thereby making the process more efficient. There could be an increase in the potential economic return for businesses due to more timely reporting of their catch. Electronic data collection, in theory, leads to more timely monitoring of ACLs and could reduce the potential for overrunning an ACL and triggering an AM that might include future paybacks (such as reducing future fishing opportunities). Economic and social effects of actions proposed in CE-BA 3 are addressed in **Chapter 4** of this document.

1.10 Social Effects

The social effects of all the measures are described in **Chapter 4** of this document.

1.11 Conclusion

This section evaluates the practicability of taking additional action to minimize bycatch and bycatch mortality using the ten factors provided at 50 CFR 600.350(d)(3)(i). In summary, measures proposed in the CE-BA 3 are intended to improve data collection methods to better verify dealer reports, modify commercial and charter/headboat vessel reporting requirements and bycatch requirements to enhance data collection. These measures could help prevent overages to the ACLs for species in the FMPs for snapper grouper, dolphin and wahoo, CMP, and golden crab do not occur. The long-term positive effect of better reporting quality defined as accuracy

and timeliness of the reports would be to provide better information for scientific advice used in stock assessments and management decisions. There could also be positive indirect biological effects associated with improving bycatch reporting. Better bycatch and discard data would provide a better understanding of the composition and magnitude of catch and bycatch, enhance the quality of data provided for stock assessments, increase the quality of assessment output, provide better estimates of interactions with protected species, and lead to better decisions regarding additional measures to reduce bycatch. Management measures that affect gear and effort for a target species can influence fishing mortality in other species. Therefore, enhanced catch and bycatch monitoring would provide better data that could be used in multi-species assessments.