

**OPTIONS PAPER
FOR THE
COMPREHENSIVE ANNUAL CATCH LIMIT (ACL) AMENDMENT
FOR THE U.S. CARIBBEAN**

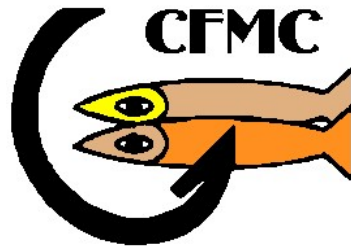
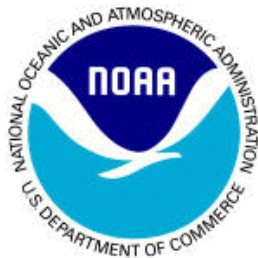
**Amendment 6 to the Reef Fish Fishery Management Plan of Puerto Rico
and the U.S. Virgin Islands**

**Amendment 2 to the Fishery Management Plan for Corals and Reef
Associated Plants and Invertebrates of Puerto Rico and the U.S. Virgin
Islands**

**Amendment 5 to the Fishery Management Plan for the Spiny Lobster
Fishery of Puerto Rico and the U.S. Virgin Islands**

**Amendment 3 to the Fishery Management Plan for the Queen Conch
Fishery of Puerto Rico and the U.S. Virgin Islands**

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INTRODUCTION

Purpose and Need

The **purpose** of this options paper is to describe and discuss the variety of alternatives available for establishing annual catch limits (ACLs) and accountability measures (AMs) for commercial and recreational harvest of U.S. Caribbean (Puerto Rico and the U.S. Virgin Islands) species contained within the Spiny Lobster, Reef Fish, Queen Conch, and Corals and Reef Associated Plants and Invertebrates Fishery Management Plans (FMPs) that have not been identified as undergoing overfishing (Table 1). Amendments to these FMPs follow Amendment 2 to the Fishery Management Plan for the Queen Conch Fishery of Puerto Rico and the U.S. Virgin Islands and Amendment 5 to the Reef Fish Fishery Management Plan of Puerto Rico and the U.S. Virgin Islands (2010 Caribbean ACL Amendment), which (among other things) established ACLs and AMs for those U.S. Caribbean species that have been designated as undergoing overfishing. Species or species groups included in the 2010 Caribbean ACL Amendment include queen conch, snappers, groupers, and parrotfish. The present initiative is undertaken to complete the process of establishing ACLs and AMs for all federally managed species in the U.S. Caribbean. Also included in this initiative are alternative revised framework measures for the Spiny Lobster and Coral and Reef Associated Plant and Invertebrate FMPs designed to address future changes to ACLs and AMs as needed to respond to changing fishery and environmental conditions. Revised framework measures for the Reef Fish and Queen Conch FMPs were included in the 2010 Caribbean ACL Amendment and therefore do not require additional consideration in the present amendment.

Alternative ACLs are designed to set harvest levels that will provide for food security and cultural satisfaction while maintaining the long-term health and sustainability of U.S. Caribbean marine resources. Alternatives address a variety of year-sequence baselines to be used to establish average catch levels, from which an estimate of the maximum sustainable yield (MSY) or its proxy can be derived. Various averages can be calculated and each expresses inherent characteristics that reflect the inter-annual variability in landings among years, changes in harvest practices and the socioeconomic factors investing the fishery, biological and environmental dynamics influencing harvested populations, and other factors that occur within the unique series of years chosen to calculate the average. Alternative AMs are designed to respond to annual harvest levels that exceed the established ACL for each species or species group governed by these amendments. Alternatives include for example shortening subsequent fishing seasons, reducing quotas to account for overages, and/or changing capacity in the fishery (e.g., by altering gear or vessel options). Essentially, these amendments respond to requirements of the Magnuson-Stevens Fishery Conservation and Management Act as reauthorized in 2007 (MSRA). Note that the Caribbean Fishery Management Council (Council) may designate more than one preferred alternative for each of the actions presented within this document.

Table 1. Preferred biological reference points and stock status determination criteria for member species of the Corals, Spiny Lobster, Conch, and Reef Fish Fishery Management Units (FMUs) as described in the Comprehensive Sustainable Fisheries Act (SFA) Amendment and for which ACLs were not established in the 2010 Caribbean ACL Amendment. The listed Aquarium Trade species are those included in the Reef Fish FMP. A list of prohibited corals and marine plants, as well as a list of Aquarium Trade species in the Coral FMP, are available in Table 8 of the Comprehensive SFA Amendment.

FMU/Sub-Unit	MSY (1,000 lbs)	OY (1,000 lbs)	B _{MSY} (1,000 lbs)	B _{CURR} / B _{MSY}	MSST (1,000 lbs)	B _{CURR} / MSST	F _{MSY}	F _{CURR} / F _{MSY}	M
Spiny Lobster	547	513	2,217	1.00	1.463	4.52	0.34	1.00	0.34
Lobster, Spiny									
Conch									
Conch, Other	-	-	-	-	-	-	-	-	-
Coral									
Prohibited Corals	0	0	-	-	-	-	-	-	-
Marine Plants	0	0	-	-	-	-	-	-	-
Grunts	195	183	739	1.00	462	1.60	0.38	1.00	0.32
Grunt, White									
Margate									
Tomtate									
Grunt, Bluestriped									
Grunt, French									
Porkfish									
Goatfishes	24	23	58	1.00	29	2.00	0.89	1.00	0.89
Goatfish, Spotted									
Goatfish, Yellow									
Porgies	45	42	118	1.00	59	2.00	0.72	1.00	0.72
Porgy, Jolthead									
Sea Bream									
Porgy, Sheepshead									
Pluma									
Squirrelfishes	27	25	75	1.00	37	2.00	0.64	1.00	0.64
Soldierfish, Blackbar									
Bigeye									
Squirrelfish, Longspined									
Squirrelfish									
Tilefish	3	3	11	1.00	6	1.72	0.42	1.00	0.42
Tilefish, Blackline									
Tilefish, Sand									
Jacks	310	291	1,283	1.00	860	1.49	0.33	1.00	0.33
Blue Runner									
Jack, Horse-Eye									
Jack, Black									
Jack, Almaco									
Jack, Bar									
Amberjack, Greater									
Jack, Yellow									

Table 1 (continued). Preferred biological reference points and stock status determination criteria for member species of the Corals, Spiny Lobster, Conch, and Reef Fish Fishery Management Units (FMUs) as described in the Comprehensive Sustainable Fisheries Act (SFA) Amendment and for which ACLs were not established in the 2010 Caribbean ACL Amendment. The listed Aquarium Trade species are those included in the Reef Fish FMP. A list of prohibited corals and marine plants, as well as a list of Aquarium Trade species in the Coral FMP, are available in Table 8 of the Comprehensive SFA Amendment.

FMU/Sub-Unit	MSY (1,000 lbs)	OY (1,000 lbs)	B _{MSY} (1,000 lbs)	B _{CURR} / B _{MSY}	MSST (1,000 lbs)	B _{CURR} / MSST	F _{MSY}	F _{CURR} / F _{MSY}	M
Surgeonfish	36	34	152	1.00	104	1.47	0.32	1.00	0.32
Tang, Blue									
Surgeonfish, Ocean									
Doctorfish									
Triggerfish and Filefish	196	184	939	1.00	686	1.37	0.27	1.00	0.27
Triggerfish, Ocean									
Triggerfish, Queen									
Triggerfish, Sargassum									
Filefish, Scrawled									
Filefish, Whitespotted									
Durgon, Black									
Boxfish	113	106	386	1.00	216	1.79	0.44	1.00	0.44
Cowfish, Honeycomb									
Cowfish, Scrawled									
Trunkfish									
Trunkfish, Spotted									
Trunkfish, Smooth									
Wrasses	67	63	341	1.00	255	1.33	0.25	1.00	0.25
Hogfish									
Puddingwife									
Hogfish, Spanish									
Angelfish	8	8	28	1.00	16	1.72	0.42	1.00	0.42
Angelfish, Queen									
Angelfish, Gray									
Angelfish, French									
Aquarium Trade	-	-	-	-	-	-	-	-	-
<p>Aquarium Trade species in the Reef Fish FMP include: frogfish, flamefish, conchfish, redlip blenny, peacock flounder, longsnout butterflyfish, foureye butterflyfish, spotfin butterflyfish, banded butterflyfish, redspotted hawkfish, flying gurnard, atlantic spadefish, neon goby, rusty goby, royal gramma, creole wrasse, yellowcheek wrasse, clown wrasse, pearly razorfish, green razorfish, bluehead wrasse, chain moray, green moray, goldentail moray, batfish, goldspotted eel, yellowhead jawfish, dusky jawfish, cherubfish, rock beauty, sargeant major, blue chromis, sunshinefish, yellowtail damselfish, ducky damselfish, beaugregory, bicolor damselfish, threespot damselfish, glasseye snapper, high-hat, jackknife-fish, spotted drum, scorpionfish, butter hamlet, swissguard basslet, greater soapfish, orangeback bass, lantern bass, tobacconfish, harlequin bass, chalk bass, Caribbean tonguefish, seahorses, pipefishes, sand diver, sharpnose puffer, porcupinefish. Conch, other includes: Atlantic triton's trumpet, cameo helmet, green star shell, hawkwing conch, milk conch, roostertail conch, true tulip, and West Indian fighting conch.</p>									

The ACL is the level of annual catch of a stock or stock complex that serves as the basis for invoking AMs. With few exceptions, the MSRA requires that an ACL be set for all stocks or stock complexes, even for data poor stocks. Because catch is considered to include all sources of fishing mortality, an ACL should be set even in situations where retention is prohibited in order to account for discard mortality. This is particularly pertinent for the Aquarium Trade species, which are classified into the 'data collection only' category per the Comprehensive Sustainable Fisheries Act Amendment of 2005. Thus, a primary purpose of this document is to provide options for establishing ACLs for all federally managed species and species groups that are caught in U.S. Caribbean waters, but that have not been identified as undergoing overfishing in the 3rd Quarter 2010 Stock Status Report to Congress:

http://www.nmfs.noaa.gov/sfa/statusoffisheries/2010/third/q3_2010_fssi_nonfssi_stock_status.pdf.

Setting ACLs for the U.S. Caribbean will be a multi-step process. The first step in the process is to establish an Overfishing Limit (OFL). For the U.S. Caribbean, as for the North Pacific ((SEDAR 2009, page 169), the OFL can be set to the average catch for a specified period of time. The Acceptable Biological Catch (ABC) is then established by multiplying the OFL by an uncertainty factor that addresses data and model limitations in the scientific process and procedural limitations in the management process.

Uncertainty is inherent in the analysis and management of marine fisheries and stems from a variety of sources including but not necessarily limited to estimates of abundance, developing descriptive population models and parameterizing those models, predicting future environmental conditions that affect fish populations, predicting the response of the fishing sector to changes in harvest regulations and to changes in relative abundance of targeted populations, and anticipating future economic, political, and social conditions (Hilborn and Peterman 1996). The National Standards guidelines emphasize the need to incorporate both scientific and management uncertainty. Management uncertainty occurs because of the lack of sufficient information about catch (e.g., late reporting, underreporting, and misreporting of landings or bycatch). Scientific uncertainty includes uncertainty around the estimate of a stock's biomass and its maximum fishing mortality threshold (MFMT); therefore, any estimate of the OFL has uncertainty (74 FR 3181). Management uncertainty also exists because of the lack of management precision in many fisheries due to lack of in-season fisheries landings data, lack of in-season closure authority, or lack of sufficient in-season management in some FMPs when in-season fisheries data are available. Uncertainty by definition is difficult to quantify, but estimating and accounting for uncertainty with respect to the scientific and management components of the regulatory process is essential to sustainability.

The MSRA requires that, if established ACLs are exceeded, AMs are in place *a priori* that allow timely redress of overages. There are two types of AMs, those that apply preventive in-season management actions (e.g., in-season fishery closure if the target catch limit has been reached) and those that apply corrective post-season management actions (e.g., overage payback in a following fishing year). Accountability measures must be established for each fishery/stock and can be established for each sector of the

fishery/stock. Both in-season and post-season AM options are available for application in the U.S. Caribbean, the former being more suitable for data-rich stocks with relatively rapid tracking of landings.

To respond more quickly to changes in the fisheries considered in this options paper, it is advisable to establish framework measures for modifying ACLs, AMs, and other management measures in response to future changes in each fishery. Framework actions can be implemented in a shorter period of time than plan amendments because the level of review and public participation is not as extensive. Council and public involvement will remain, but the framework procedure will facilitate an efficient response to changes in resource abundance, new scientific information, and changes in fishing patterns among user groups.

There is a **need** to modify rules and regulations regarding the spiny lobster, gastropods other than queen conch which are included in the Queen Conch FMP, reef fish, and coral and reef associated plants and invertebrates fisheries of the U.S. Caribbean in response to the MSRA. That act provides ten national standards as guidance for the effective conservation and management of fishery resources. Primary among those standards is the requirement to prevent overfishing while achieving, on a continuing basis, the optimum yield (OY) from each fishery for the United States fishing industry (MSRA , Section 301(a)(1)). To meet the obligations of these ten national standards requires establishment of stock abundance estimates that can be used to determine whether each stock or stock complex is overfished, as well as, harvest estimates suitable for the determination of rates of harvest relative to sustainable yield. The harvest activities of all fishing sectors that comprise the commercial and recreational fisheries must be documented to the greatest degree possible to assure the goals of the MSRA are met. Additionally, it is necessary to define actions that will be implemented if harvest levels are exceeded. Finally, it is advantageous to define a framework for modification of harvest regulations in response to changing conditions. To achieve these goals, it would be beneficial for regulations governing fisheries harvest in federal waters to be compatible with regulations governing fisheries harvest in territorial and commonwealth waters.

Data Overview

The commercial and recreational fishery data available for the US Caribbean is limited and these limitations have been thoroughly described in various documents including: SFA (2005) available at <http://www.caribbeanfmc.com>; SEDAR (2009); SEDAR 04 (2003-2004):

http://www.sefsc.noaa.gov/sedar/Sedar_Workshops.jsp?WorkshopNum=04

SEDAR 08A (2005):

http://www.sefsc.noaa.gov/sedar/Sedar_Workshops.jsp?WorkshopNum=08%20A

and SEDAR 14 (2007):

http://www.sefsc.noaa.gov/sedar/Sedar_Workshops.jsp?WorkshopNum=14

and numerous other reports by the Puerto Rico Department of Natural and Environmental Resources' (PR-DNER) Fisheries Research Laboratory:

<http://www.drna.gobierno.pr/oficinas/arn/recursosvivos/negociado-de-pesca-y-vida-silvestre/laboratorio-de-investigaciones-pesqueras-1/publicaciones>).

Among the primary concerns regarding the data are the scarce information on fishing effort, the lack of spatial/geographic information, missing information on life history parameters, and spatially and temporally limited fishery independent data (SEDAR 2009).

Commercial fisheries landings data have been collected since 1974 from St. Thomas/St. John, since 1975 from St. Croix, and since 1967 (but in electronic format since 1983) from Puerto Rico. The United States Virgin Islands (USVI) landings data were not recorded to species with adequate reliability until 1998 (St. Croix) and 2000 (St. Thomas/St. John). At the time of preparation of this document, complete and verified landings data were available through 2007 for the USVI and through 2008 for Puerto Rico. Thus, the range of years available for calculating average landings estimates, for the purpose of setting ACLs for the pertinent commercial fisheries, include 2000-2007 for St. Thomas/St. John (Table 2), 1998-2007 for St. Croix (Table 3), and 1983-2008 for Puerto Rico (Table 4).

During the years of record for both St. Croix and St. Thomas/St. John, landings were reported at the level of species group or family, for example grunts, triggerfish, spiny lobster, etc. (Tables 2 and 3). The USVI landings data cannot be resolved to the level of individual species. Additionally, two reporting categories (finfishes, unclassified, for food and finfishes, unclassified, bait, animal food) may include landings of some species that belong in one of the FMUs considered in this amendment, but also may include species not included in the pertinent FMUs. Because the relative distribution of landings among FMUs within these two unclassified finfish categories cannot be determined, these unclassified landings are not included in the plots and tables contained within this options paper. Those landings are not trivial. For St. Thomas/St. John, from 2000-2007 landings for the first category averaged 2,385 pounds per year and for the second category averaged 25,491 pounds per year. For St. Croix, from 1998-2007 landings for the first category averaged 1,172 pounds per year and for the second category averaged 15,651 pounds per year.

For the sake of consistency in setting ACLs for each island or island group, available landings data for the individual species contained within each FMU have been grouped for Puerto Rico commercial and recreational landings data. Those groupings are described in Table 4 and 5, respectively.

The recreational fishery data available from Puerto Rico has been collected since 2000 (Table 5) under the Marine Recreational Fisheries Statistic Survey (MRFSS), but complementary data are not available for the USVI. These data have been reviewed in the documents cited above and also have been discussed at meetings of working groups designated by the Council such as the Technical and Monitoring Compliance Team (TMCT), the Annual Catch Limit Working Group (ACLG 2007, 2008, 2009), the

Scientific and Statistical Committee (SSC 2007, 2008, 2009) and at Council meetings (including but not limited to meetings number 127 through 132).

The Trip Interview Program (TIP), implemented in Puerto Rico and the USVI since 1985, was thought to provide enough information to obtain species specific data from the commercial landings. A complete assessment of the data collected (SEDAR 2009) revealed the difficulty of such an approach. It was determined that the samples represented less than 5% (in the best of cases) of the total landings thus making it impossible to assess the contribution of the species of interest to the total catches. Additionally, only in limited cases was there a large enough sample size (e.g., by island, gear) to be usable in an assessment of the fishery and the impact of regulations on the fishery (SEDAR 2009).

Table 2. St. Thomas/St. John commercial landings during 2000-2008. Also included are averages for 2000-2005 (the longest time period prior to implementation of the Comprehensive Sustainable Fisheries Act Amendment), 2000-2008 (for the entire sequence of years), 2003-2007 (last five years, as used in the 2010 Caribbean ACL Amendment), and 2006-2008 (the most recent three years following implementation of the Comprehensive Sustainable Fisheries Act Amendment). All numbers are in pounds of whole animals. Note that 2008 landings are complete only through June.

Year	Angelfish	Boxfish	Goatfish	Grunts	Hogfish	Jacks	Scups and Porgies	Spiny Lobster	Squirrelfish	Surgeonfish	Triggerfish
2000	8,022	25,613	726	32,656	57	50,941	19,386	76,153	5,585	31,215	72,090
2001	8,553	29,852	722	41,031	207	67,018	24,809	89,711	7,956	36,550	82,688
2002	10,956	31,127	295	43,668	50	69,862	24,487	115,972	5,357	41,305	97,543
2003	9,600	32,260	265	45,236	215	58,464	26,263	135,292	2,514	42,121	101,523
2004	13,133	33,974	196	48,885	708	53,988	27,074	133,982	5,004	45,806	87,420
2005	12,648	33,204	291	44,947	897	38,434	25,857	124,643	5,159	40,076	76,462
2006	13,342	31,650	423	42,152	1,679	73,407	24,279	134,966	4,628	38,530	70,015
2007	10,312	28,327	205	38,333	1,444	53,657	23,873	120,163	2,401	37,753	72,785
Avg. 00-05	10,485	31,005	416	42,737	356	56,451	24,646	112,625	5,263	39,512	86,287
Avg. 00-07	10,820	30,751	390	42,113	657	58,221	24,503	116,360	4,826	39,169	82,565
Avg. 03-07	11,807	31,883	276	43,910	989	55,590	25,469	129,809	3,941	40,857	81,641
Avg. 06-07	11,827	29,988	314	40,242	1,562	63,532	24,076	127,564	3,515	38,141	71,400

Table 3. St. Croix commercial landings during 1998-2008. Also included are averages for 1998-2005 (the longest time period prior to implementation of the Comprehensive Sustainable Fisheries Act Amendment), 1998-2008 (for the entire sequence of years), 2003-2007 (most recent five years, as used in the 2010 Caribbean ACL Amendment), and 2006-2008 (the most recent three years following implementation of the Comprehensive Sustainable Fisheries Act Amendment). All numbers are in pounds of whole animals. Note that 2008 landings are complete only through June.

Year	Angelfish	Boxfish	Goatfish	Grunts	Hogfish	Jacks	Scups and Porgies	Spiny Lobster	Squirrelfish	Surgeonfish	Triggerfish
1998	6,971	6,317	4,096	32,563	NR	14,600		42,718	6	41,020	24,900
1999	3,247	7,461	4,273	30,203	NR	22,271	1,752	53,329	26	34,596	23,647
2000	242	6,724	3,719	30,767	NR	23,074	3,547	89,020	104	36,992	22,815
2001		9,643	3,359	38,380	NR	33,728	6,349	116,619	6	44,249	29,522
2002	76	10,901	6,971	44,075	NR	20,199	9,746	116,273	31	54,632	33,906
2003		12,722	5,904	40,615	NR	12,135	5,311	106,039	45	42,039	26,902
2004		10,581	4,391	45,479	NR	13,438	3,941	125,415	49	47,570	27,334
2005	47	8,795	4,417	44,261	NR	8,180	4,538	120,929	6	48,853	26,717
2006	12	7,668	3,842	41,478	NR	7,684	4,861	132,014	802	47,701	23,313
2007	3	6,750	2,502	38,896	NR	18,301	3,533	130,283	174	34,721	21,410
Avg. 99-05	903	9,546	4,719	39,111	NR	19,003	5,026	103,946	38	44,133	27,263
Avg. 98-07	1,514	8,756	4,347	38,672	NR	17,361	4,437	103,264	125	43,237	26,046
Avg. 03-07	21	9,303	4,211	42,146	NR	11,947	4,437	122,936	215	44,177	25,135
Avg. 06-07	8	7,209	3,172	40,187	NR	12,992	4,197	131,148	488	41,211	22,361

Table 4. Puerto Rico commercial landings during 1983-2008. Also included are averages for 1999-2005 (consistent with the 2010 ACL Amendment), 1998-2008 (complimentary with the longest landing year sequence for any U.S. Caribbean island [St. Croix]), 2003-2007 (most recent five years, as used in the 2010 ACL Amendment), 2006-2008 (the most recent three years following implementation of the Comprehensive SFA Amendment), and 1983-2008 (the full extent of Puerto Rico commercial landings data). All numbers are in pounds of whole animals. The text table lists the individual species included within each of the FMU categories.

Year	Aquarium Trade	Angelfish	Boxfish	Goatfish	Grunts	Wrasses	Jacks	Scups and Porgies	Lobster	Tilefish	Squirrelfish	Surgeonfish	Triggerfish and Filefish
1983	11		66,241	267,247	664,025	119,183	69,740	137,097	448,769	0	31,420		147,428
1984	0		65,339	212,890	560,097	120,313	50,841	113,397	420,337	0	21,256		123,612
1985	0		60,934	104,898	491,166	74,694	61,999	39,432	377,106	0	28,649		82,813
1986	5		48,237	26,483	242,965	50,228	59,492	24,101	280,150	0	16,657		41,384
1987	8,401		48,201	13,267	211,833	48,743	61,310	14,214	204,867	59	5,270	39	51,233
1988	5,058		66,155	12,585	161,723	53,867	50,194	16,395	252,939	169	8,144		51,484
1989	5,148	161	98,236	18,705	157,889	50,137	77,584	19,123	364,739	60	11,378		65,782
1990	9,178		93,201	26,644	236,047	42,633	63,078	18,404	331,428	103	13,087		56,086
1991	11,021		96,718	30,847	285,584	60,805	87,212	25,516	415,657	356	18,452	471	61,144
1992	2,776		66,893	12,477	198,776	35,301	51,036	16,756	267,855	58	10,760	173	46,271
1993	4,848		93,056	13,560	271,511	35,313	69,216	18,632	281,931	150	13,105		63,841
1994	8,481	44	83,748	15,711	227,229	50,579	81,338	17,364	301,135	407	14,081		73,200
1995	9,430		96,476	20,442	206,556	69,631	99,073	26,348	393,578	475	20,383	10	97,669
1996	3,440		94,892	29,589	246,152	85,242	85,461	43,196	395,646	451	22,900	317	90,330
1997	3,381		105,040	24,131	215,310	87,939	107,309	36,512	363,953	774	27,812		95,574
1998	3,537	10	116,575	19,249	148,240	63,582	94,990	34,056	383,342	796	24,467	5	82,769
1999	6,311		107,652	33,602	151,602	59,516	100,359	44,337	419,962	1,292	18,868	17	64,156
2000	4,155	611	147,348	36,452	208,025	103,169	150,005	52,088	455,386	417	28,347		74,171
2001	6,385		112,340	32,586	225,210	99,864	142,900	53,617	414,401	154	25,777	28	88,067
2002	15,422	15	91,896	22,062	171,270	79,685	119,301	43,960	350,031	51	18,571	7	62,451
2003	8,128		102,472	17,859	185,526	67,858	122,894	31,427	396,835	87	17,665	39	69,666
2004	6,388		114,361	19,782	212,171	87,436	114,601	48,812	479,459	37	21,678		97,808
2005	2,142		196,613	48,414	298,239	131,236	156,929	81,697	776,017	2,163	32,604		122,437
2006	1,250		60,211	10,609	92,944	52,530	59,924	19,551	278,731	269	11,008		44,237
2007	279		50,529	7,775	66,615	57,917	46,106	16,964	272,116	0	7,418		33,405
2008	285		51,235	5,206	72,305	54,985	106,621	28,625	329,208	0	21,316		56,736

Table 4 (continued). Puerto Rico commercial landings during 1983-2008. Also included are averages for 1999-2005 (consistent with the 2010 ACL Amendment), 1998-2008 (complimentary with the longest landing year sequence for any U.S. Caribbean island [St. Croix]), 2003-2007 (most recent five years, as used in the 2010 ACL Amendment), 2006-2008 (the most recent three years following implementation of the Comprehensive SFA Amendment), and 1983-2008 (the full extent of Puerto Rico commercial landings data). All numbers are in pounds of whole animals. The text table lists the individual species included within each of the FMU categories.

Year	Aquarium Trade	Angelfish	Boxfish	Goatfish	Grunts	Wrasses	Jacks	Scups and Porgies	Lobster	Tilefish	Squirrelfish	Surgeonfish	Triggerfish and Filefish
Avg. 99-05	6,990	313	124,669	30,108	207,435	89,823	129,570	50,848	470,299	600	23,359	23	82,679
Avg. 98-08	4,935	212	104,657	23,054	166,559	77,980	110,421	41,376	414,135	479	20,702	19	72,355
Avg. 03-07	3,637		104,837	20,888	171,099	79,395	100,091	39,690	440,632	511	18,075	39	73,511
Avg. 06-08	605		53,992	7,863	77,288	55,144	70,884	21,713	293,352	90	13,247		44,793
Avg. 83-08	4,825	168	89,792	41,657	238,808	70,874	88,058	39,293	371,368	320	18,881	111	74,760

Aquarium Trade: Butterfly fish, drums, unclassified eels, jackknife fish, puffers, spadefish, moray eels, glasseye snapper. **Angelfish:** angelfishes. **Boxfish:** boxfish. **Goatfish:** goatfishes. **Grunts:** bluestriped grunt, French grunt, white grunt, porkfish, margate, tomtate grunt, grunts. **Jacks:** almaco jack, greater amberjack, horse-eye jack, yellow jack, bar jack, black jack, jacks. **Scups and Porgies:** jolthead porgy, unclassified scups and porgies. **Squirrelfish:** bigeye, squirrelfishes. **Surgeonfish:** surgeonfishes. **Tilefish:** blackline tilefish, sand tilefish, unclassified tilefishes. **Triggerfish and Filefish:** ocean triggerfish, queen triggerfish, triggerfishes, filefish. **Wrasses:** hogfish, puddingwife. **Lobster:** spiny lobster, slipper (bulldozer) lobster.

Table 5. Puerto Rico recreational landings during 2000-2008. Also included are averages for 2000-2005 (the longest time period prior to implementation of the Comprehensive Sustainable Fisheries Act Amendment), 2000-2008 (for the entire sequence of years), 2003-2007 (most recent five years, as used in the 2010 Caribbean ACL Amendment), and 2006-2008 (the most recent three years following implementation of the Comprehensive Sustainable Fisheries Act Amendment). All numbers are in pounds of whole animals. The text table lists the individual species included within each of the FMU categories.

Year	Aquarium Fish	Angelfish	Boxfish	Goatfish	Grunts	Hogfish	Jacks	Scups and Porgies	Tilefish	Squirrelfish	Surgeonfish	Triggerfish and Filefish
2000	27,964	0	5,119	628	19,945	8,249	175,631	4,236	147	7,859	975	83,373
2001	8,624	2,556	9,643	2,021	14,815	15,100	233,198	1,426	3,382	6,332	4,786	77,090
2002	4,626	0	3,500	387	5,535	4,156	94,988	769	517	2,810	0	9,905
2003	12,676	5,989	24,091	0	7,439	7,066	119,477	12,443	5,423	8,907	122	71,815
2004	12,356	0	20,895	1,241	3,366	906	51,173	4,733	2,143	2,881	0	14,911
2005	328	0	2,141	0	3,978	1,410	52,327	2,916	576	686	0	30,893
2006	1,359	0	5,140	0	1,018	0	25,723	803	0	345	0	2,633
2007	7,214	0	1,363	417	4,353	2,792	24,172	2,809	0	5,765	0	2,548
2008	1,898	0	5,443	0	6,669	15,406	48,899	2,927	0	15,470	193	62,567
Avg. 00-05	11,096	1,424	10,898	713	9,180	6,148	121,132	4,420	2,031	4,912	981	47,998
Avg. 00-08	8,561	949	8,593	522	7,458	6,121	91,732	3,673	1,354	5,673	675	39,526
Avg. 03-07	6,787	1,198	10,726	332	4,031	2,435	54,574	4,741	1,628	3,717	24	24,560
Avg. 06-08	3,490	0	3,982	139	4,013	6,066	32,931	2,180	0	7,194	64	22,583

Table 5 (continued). Puerto Rico recreational landings during 2000-2008. Also included are averages for 2000-2005 (the longest time period prior to implementation of the Comprehensive Sustainable Fisheries Act Amendment), 2000-2008 (for the entire sequence of years), 2003-2007 (most recent five years, as used in the 2010 Caribbean ACL Amendment), and 2006-2008 (the most recent three years following implementation of the Comprehensive Sustainable Fisheries Act Amendment). All numbers are in pounds of whole animals. The text table lists the individual species included within each of the FMU categories.

Year	Wrasse Family	Drum Family
2000	9,961	67,157
2001	3,000	0
2002	0	3,451
2003	0	1,315
2004	2,679	7,176
2005	0	0
2006	0	1,339
2007	0	0
2008	0	535
Avg. 00-05	3,910	15,820
Avg. 00-08	3,910	11,567
Avg. 03-07	1,339	2,457
Avg. 06-08	0	937

Aquarium Fish: Atlantic spadefish, banded butterflyfish, blue chromis, bluehead, chain moray, clown wrasse, damselfish family, dusky damselfish, glasseye snapper, goby family, goldspotted eel, green moray, jackknife fish, lefteye flounder family, moray family, peacock flounder, porcupine fish, sand diver, scorpionfish family, sargeant major, snake eel, yellowtail damselfish. **Angelfish:** French angelfish, gray angelfish. **Boxfish:** boxfish genus, honeycomb cowfish, scrawled cowfish, smooth trunkfish, spotted trunkfish, trunkfish. **Goatfish:** goatfish family, spotted goatfish, yellow goatfish. **Grunts:** bluestriped grunt, French grunt, grunt family, grunt genus, margate, porkfish, tomtate, white grunt. **Jacks:** almaco jack, amberjack genus, bar jack, black jack, blue runner, greater amberjack, horse-eye jack, jack family, jack genus, yellow jack. **Scups and Porgies:** jolthead porgy, pluma porgy, porgy family, sea bream. **Squirrelfish:** bigeye, longspine squirrelfish, squirrelfish, squirrelfish family, squirelfish genus. **Surgeonfish:** blue tang, doctorfish, ocean surgeon, surgeonfish genus. **Tilefish:** blackline tilefish, sand tilefish. **Triggerfish and Filefish:** black durgon, leatherjacket family, ocean triggerfish, queen triggerfish. **Hogfish:** hogfish, puddingwife, Spanish hogfish.

Recorded annual landings vary, sometimes substantially, among years for all species groups within each of the island groups (Figures 1-4). For example, there is a large increase in the commercial landings of lobster in Puerto Rico waters during 2005 (Figure 3). In general, however, landings of most species on most islands tend to decrease after 2005 (Figures 1-4). This may be an outcome of measures included in the Comprehensive SFA amendment, which went into effect in 2005 and which therefore would be expected to affect U.S. Caribbean fisheries beginning in 2006.

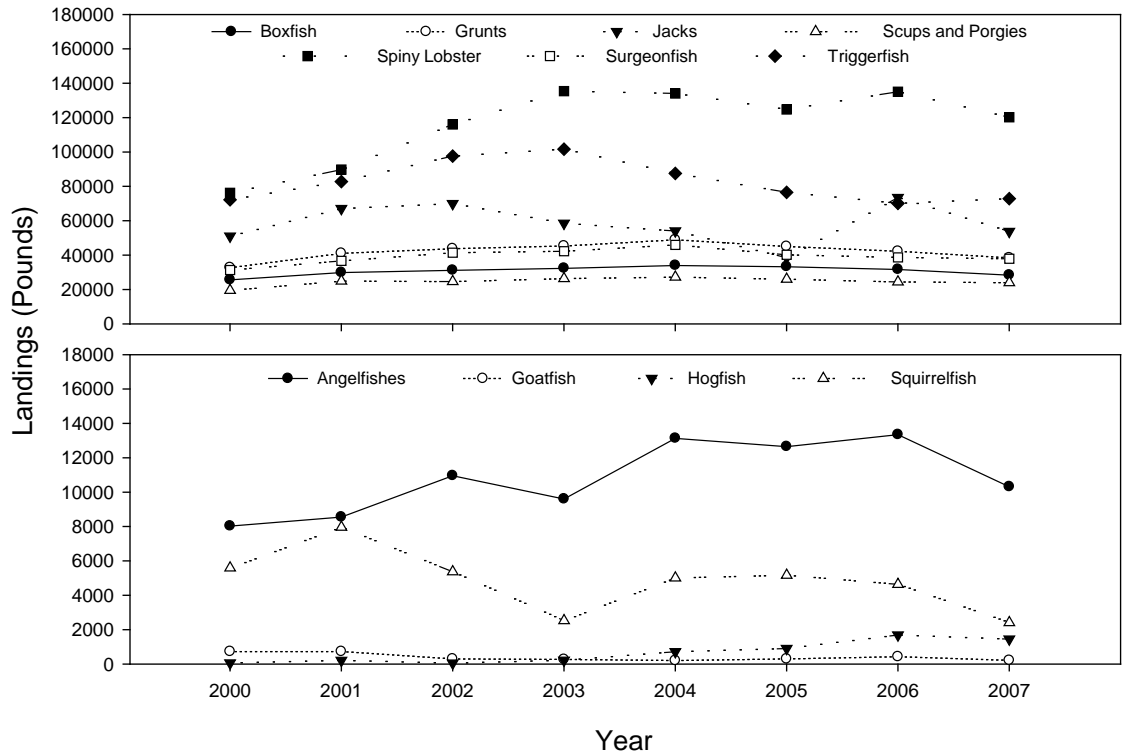


Figure 1. Commercial landings patterns for various species groups contained within the landings reports for the St. Thomas and St. John island group. Note the difference in y-axis scaling between the top and bottom panels, with the landings range in the top panel being 10 times the landing range of the bottom panel.

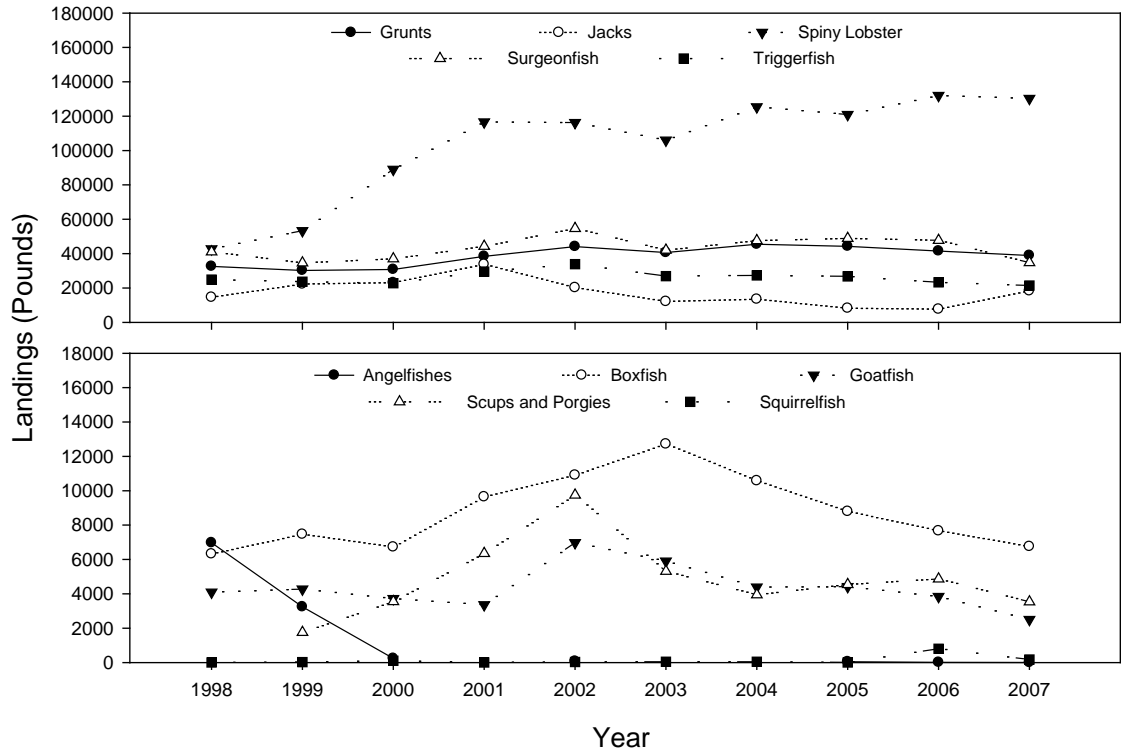


Figure 2. Commercial landings patterns for various species groups contained within the landings reports for St. Croix. Note the difference in y-axis scaling between the top and bottom panels, with the landings range in the top panel being 10 times the landing range of the bottom panel.

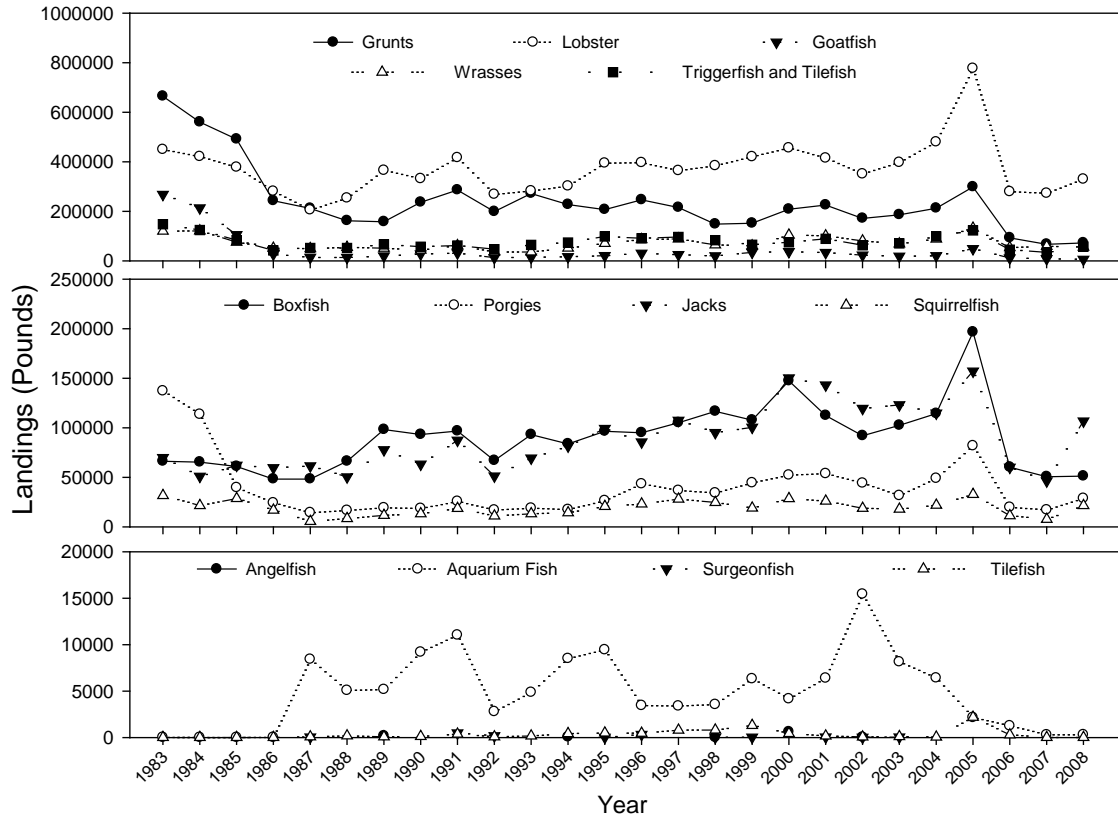


Figure 3. Commercial landings patterns for various species groups contained within the landings reports for Puerto Rico. Note the difference in y-axis scaling between the three panels.

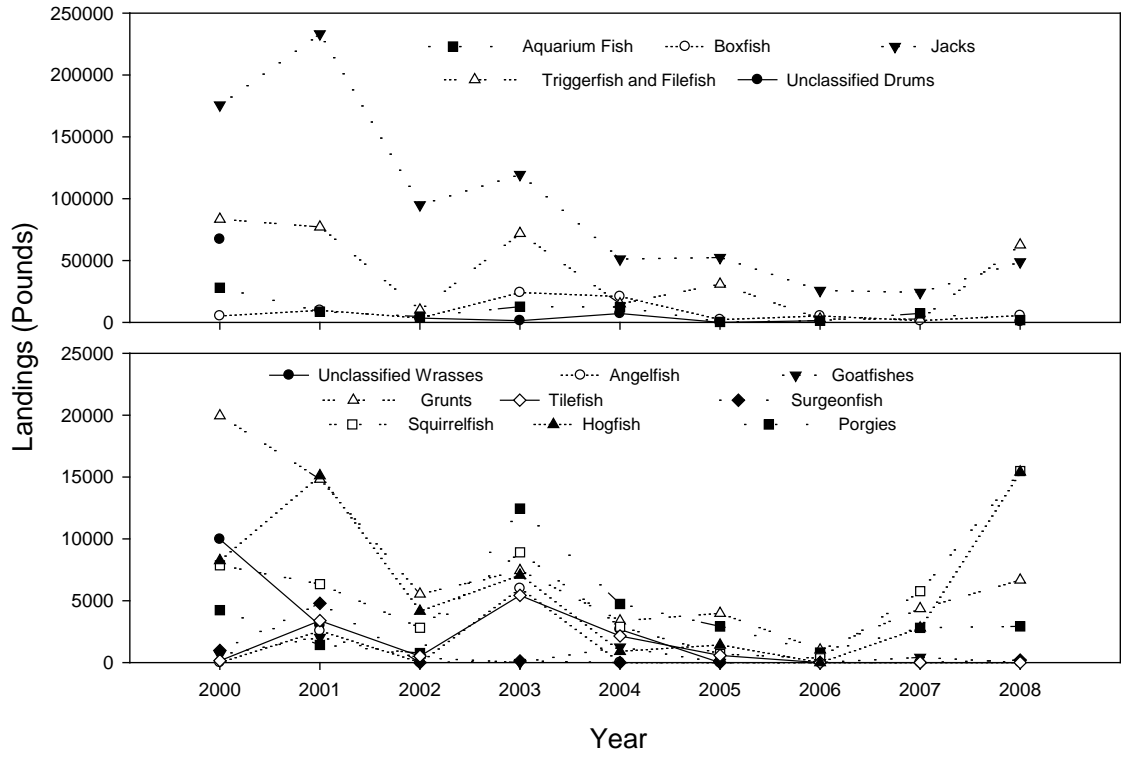


Figure 4. Recreational landings patterns for various species groups contained within the landings reports for Puerto Rico. Note the difference in y-axis scaling between the top and bottom panels, with the landings range in the top panel being 10 times the landing range of the bottom panel.

PROPOSED MANAGEMENT ALTERNATIVES

Action 1: Establish a year sequence for determining average annual landings that can be applied to each island group for both the commercial and recreational sectors.

Alternative 1: No action. Retain current management reference points or proxies for species/species groups within the reef fish, queen conch, lobster, and corals FMUs.

Alternative 2: Establish a year sequence for determining average annual landings for each species or species group within Puerto Rico.

Sub-Alternative A: Establish a start year for the year sequence.

Sub-sub-Alternative i: Use 1983 as the start date for determining average annual landings for each species or species group within Puerto Rico.

Sub-sub-Alternative ii: Use 1998 as the start date for determining average annual landings for each species or species group within Puerto Rico.

Sub-sub-Alternative iii: Use 1999 as the start date for determining average annual landings for each species or species group within Puerto Rico.

Sub-sub-Alternative iv: Use 2000 as the start date for determining average annual landings for each species or species group within Puerto Rico.

Sub-sub-Alternative v: Use 2003 as the start date for determining average annual landings for each species or species group within Puerto Rico.

Sub-sub-Alternative vi: Use 2004 as the start date for determining average annual landings for each species or species group within Puerto Rico.

Sub-Alternative B: Establish an end year for the year sequence.

Sub-sub-Alternative i: Use 2005 as the end date for determining average annual landings for each species or species group within Puerto Rico.

Sub-sub-Alternative ii: Use 2007 as the end date for determining average annual landings for each species or species group within Puerto Rico.

Sub-sub-Alternative iii: Use 2008 as the end date for determining average annual landings for each species or species group within Puerto Rico.

Alternative 3: Establish a year sequence for determining average annual landings for each species or species group within St. Thomas and St. John.

Sub-Alternative A: Establish a start year for the year sequence.

Sub-sub-Alternative i: Use 2000 as the start date for determining average annual landings for each species or species group within St. Thomas and St. John.

Sub-sub-Alternative ii: Use 2003 as the start date for determining average annual landings for each species or species group within St. Thomas and St. John.

Sub-Alternative B: Establish an end year for the year sequence.

Sub-sub-Alternative i: Use 2005 as the end date for determining average annual landings for each species or species group within St. Thomas and St. John.

Sub-sub-Alternative ii: Use 2007 as the end date for determining average annual landings for each species or species group within St. Thomas and St. John.

Alternative 4: Establish a year sequence for determining average annual landings for each species or species group within St. Croix.

Sub-Alternative A: Establish a start year for the year sequence.

Sub-sub-Alternative i: Use 1998 as the start date for determining average annual landings for each species or species group within St. Croix.

Sub-sub-Alternative ii: Use 1999 as the start date for determining average annual landings for each species or species group within St. Croix.

Sub-sub-Alternative iii: Use 2000 as the start date for determining average annual landings for each species or species group within St. Croix.

Sub-sub-Alternative iv: Use 2003 as the start date for determining average annual landings for each species or species group within St. Croix.

Sub-Alternative B: Establish an end year for the year sequence.

Sub-sub-Alternative i: Use 2005 as the end date for determining average annual landings for each species or species group within St. Croix.

Sub-sub-Alternative ii: Use 2007 as the end date for determining average annual landings for each species or species group within St. Croix.

Discussion

Action 1 of the present amendment transitions fisheries management in the U.S. Caribbean from that established by the Comprehensive SFA Amendment to that mandated by the MSRA. The former provided a valuable and comprehensive format for fisheries management in the U.S. Caribbean, but was dependent upon data sources of variable accuracy and precision. Moreover, the Comprehensive SFA Amendment is not fully compliant with the mandates of the MSRA. Action 1 herein reiterates the management reference points established in the Comprehensive SFA Amendment as **Alternative 1** of each sub-action (Table 1). Unfortunately, the U.S. Caribbean is considered to be data poor with regard to fisheries landings information, severely compromising the Council's ability to establish quantitative benchmarks for those reference points. Thus, alternatives are proposed that use average landings during various year sequences to establish proxies for MSY and, from those MSY proxies, estimates of OFL and OY. The alternative sequences included above were chosen to respond to data availability, consistency with year sequences considered and chosen by the Council for the 2010 Caribbean ACL Amendment, and various motions or guidance provided by the Council or its subcommittees.

The year 1983 is considered as a start date, for Puerto Rico only, because that is the first year for which species-specific commercial harvest data were collected from Puerto Rico commonwealth and contiguous EEZ waters.

Species-group level commercial harvest data are available for both St. Croix and Puerto Rico beginning in 1998. For Puerto Rico, the data collected during 1998 are similar in nature and quality to those data collected in the years before 1998. For St. Croix, data recorded at the level of the species group (e.g., angelfish, grunts) first became available for a full calendar year in 1998.

The ACLG recommended 1999 as the most representative start date for analysis of “recent” catch, and the Council and the government of the U.S. Virgin Islands requested that average landings estimates be based upon recent catch.

Not until 2000 did species-group level commercial harvest data become available for the St. Thomas and St. John island group, so this is the first year for which species-group level commercial harvest data are available for all three island groups.

During deliberations for the 2010 Caribbean ACL Amendment, local governments requested that an option be included that considers only the most recent five years of available commercial harvest data (2003-2007) when calculating average catch. For consistency with that amendment, a start year of 2003 is included here as an option. Similarly, for Puerto Rico only, 2004 is included as a start year to allow for consideration of the most recent five-year period (2004-2008) for which commercial harvest data are available.

The earliest end date included as an alternative for all three island groups is 2005, corresponding to the last year prior to implementation of the Comprehensive SFA Amendment in the U.S. Caribbean. Provisions of that Act implemented important changes to the spatial and temporal patterns of harvest activity of U.S. Caribbean fisheries, particularly reef fish fisheries. As a result of those changes, the Council chose to not include any years more recent than 2005 when determining average annual catch for the 2010 Caribbean ACL Amendment. A similar end date is included here to provide an opportunity for consistency in calculations of average annual catch between the 2010 Caribbean ACL Amendment and the present amendments.

During preparation of the 2010 Caribbean ACL Amendment, the most recent year for which commercial harvest data were available for all three island groups was 2007. At the time of preparation of this options paper, 2008 is the most recent year for which commercial harvest data are available for Puerto Rico.

With the exception of some data obtained during 2000 in the USVI, recreational harvest data are available only for Puerto Rico and only for the time period beginning in 2000 and ending in 2008.

Action 2: Accountability Measures.

Action 2a: Triggering Accountability Measures.

Alternative 1: No Action. Do not trigger AMs.

Alternative 2: Trigger AMs if the Annual Catch Limit is exceeded based upon:

- A. A single year of landings beginning with landings from 2011.

- B. A single year of landings beginning with landings from 2011, then a 2-year running average of landings in 2012 (average of 2011+2012) and thereafter (i.e., 2011, 2011-2012, 2012-2013, etc.).
- C. A single year of landings beginning with landings from 2011, a 2-year average of landings in 2012 (average of 2011+2012), then a 3-year running average of landings in 2013 (average of 2011+2012+2013) and thereafter (i.e., 2011, 2011-2012, 2011-2013, 2012-2014, etc.).

Alternative 3. Trigger AMs if the annual catch limit is exceeded as defined below and NMFS' SEFSC (in consultation with the Caribbean Fishery Management Council and its Scientific and Statistical Committee) determines the overage occurred because catches increased versus data collection/monitoring improved:

- A. A single year of landings effective beginning 2011.
- B. A single year of landings effective beginning 2011, then a 2-year running average of landings effective 2012 and thereafter (i.e., 2011, 2011-2012, 2012-2013, etc.).
- C. A single year of landings effective beginning 2011, a 2-year running average of landings effective 2012, then a 3-year running average of landings effective 2013 and thereafter (i.e., 2011, 2011-2012, 2011-2013, 2012-2014, etc.).

Action 2b: Apply Accountability Measures.

Alternative 1. No Action. Do not apply AMs.

Alternative 2. If AMs are triggered, then reduce the length of the fishing season for that species or species group the year following the trigger determination by the amount needed to prevent such an overage from occurring again. The needed changes will remain in effect until modified.

Alternative 3. If AMs are triggered, then reduce the length of the fishing season for that species or species group the year following the trigger determination by the amount needed to prevent such an overage from occurring again and to pay back the overage. The needed changes will remain in effect until modified.

Discussion

Accountability measures (AMs) are management controls to prevent ACLs from being exceeded and to correct overages of ACLs if they occur. Examples of in-season AMs are

quota closures, trip or bag limit changes, or gear restrictions. Examples of post-season AMs are seasonal closures, reduced trip or bag limits, or shortening of the fishing season implemented in a subsequent year. Accountability measures are necessary because they implement action to correct the cause of the ACL overage as well as any resulting biological consequences, thus enhancing the effectiveness of the ACLs.

The Council may choose to use variations of any of these alternatives for each species or species groups considered in this amendment depending on the reliability and timeliness of the data reported for each fishery. If this is the case, additional alternatives would be developed in order to enable the Council to consider those additional alternatives. At present, data suitable for evaluating catch levels may not become available for 1-2 years following the end of the fishing year, so any AMs will not be applicable for one or more years following the overage. By that time, it may be irrelevant or even counter-productive to institute a pre-determined response. Instead, a deliberative approach that includes evaluation of the data and any changes in fishing activity that may have influenced changes in catch may provide a more suitable and effective response to the apparent overage.

Action 3: Framework Measures.

Action 3a: Establish Framework Measures for the Spiny Lobster FMP.

Alternative 1: No Action. Do not amend the framework measures for the Spiny Lobster FMP.

Alternative 2: Amend the framework procedures for the Spiny Lobster FMP to provide a mechanism to expeditiously adjust the following reference points and management measures through framework action:

- a. Quota Requirements
- b. Seasonal Closures
- c. Area Closures
- d. Fishing Year
- e. Trip/Bag Limit
- f. Size Limits
- g. Gear Restrictions or Prohibitions
- h. Total Allowable Catch (TAC)
- i. Annual Catch Limits (ACLs)
- j. Accountability Measures (AMs)
- k. Annual Catch Targets (ACTs)
- l. Maximum Sustainable Yield (MSY)
- m. Optimum Yield (OY)
- n. Minimum Stock Size Threshold (MSST)
- o. Maximum Fishing Mortality Threshold (MFMT)
- p. Overfishing Limit (OFL)
- q. Acceptable Biological Catch (ABC) control rules

- r. Actions to Minimize the Interaction of Fishing Gear with Endangered Species or Marine Mammals

Alternative 3: Amend the framework procedures for the Spiny Lobster FMP to provide the Council with a mechanism to expeditiously adjust a subset of management measures outlined in **Alternative 2**.

Action 3b: Establish Framework Measures for the Corals and Reef Associated Plants and Invertebrates FMP.

Alternative 1: No Action. Do not amend the framework measures for the Corals and Reef Associated Plants and Invertebrates FMP.

Alternative 2: Amend the framework procedures for the Corals and Reef Associated Plants and Invertebrates FMP to provide a mechanism to expeditiously adjust the following reference points and management measures through framework action:

- a. Quota Requirements
- b. Seasonal Closures
- c. Area Closures
- d. Fishing Year
- e. Trip/Bag Limit
- f. Size Limits
- g. Gear Restrictions or Prohibitions
- h. Fishery Management Units (FMUs)
- i. Total Allowable Catch (TAC)
- j. Annual Catch Limits (ACLs)
- k. Accountability Measures (AMs)
- l. Annual Catch Targets (ACTs)
- m. Maximum Sustainable Yield (MSY)
- n. Optimum Yield (OY)
- o. Minimum Stock Size Threshold (MSST)
- p. Maximum Fishing Mortality Threshold (MFMT)
- q. Overfishing Limit (OFL)
- r. Acceptable Biological Catch (ABC) control rules
- s. Actions to Minimize the Interaction of Fishing Gear with Endangered Species or Marine Mammals

Alternative 3: Amend the framework procedures for the Corals and Reef Associated Plants and Invertebrates FMP to provide the Council with a mechanism to expeditiously adjust a subset of management measures outlined in **Alternative 2**.

Discussion

In order to modify regulations, the Council generally must follow the amendment process, a process that requires an investment of considerable time and resources. However, it is possible for the Council to make changes in a more expeditious manner via a regulatory action. In order to complete a regulatory action, a framework must be established for the FMP to which changes will be made.

The Spiny Lobster FMP currently has a framework established. However, this framework only allows adjustments to size limits, closed seasons or areas, fish trap mesh size, and the level of Spawning Stock Biomass Ratio (SSBR) necessary to rebuild an overfished stock (CFMC, 1990). That framework does not take into account ACLs and AMs or many of the reference points upon which they may be based. A revised list of framework options is included in the present amendment that will allow for regulatory modifications which are sensitive to ACLs, AMs, and the reference points upon which those actions most appropriately are based.

While not specifically identified as framework provisions, the FMP for Corals and Reef Associated Plants and Invertebrates did include as Section 7.2 a procedure for adjusting management measures. Those procedures may be invoked in response to information contained within Stock Assessment and Fishery Evaluation (SAFE) reports or to other new scientific reports or information. That section includes provisions for considering and acting upon that new information. Concerns that may trigger such adjustments include recognition of an overfished condition of a pertinent resource, a need to establish Marine Conservation Districts, significant changes in fishery practices, environmental disasters, and other events. Adjustments that may be made by this procedure include changes to the fishery management unit, changes to the list of prohibited species, harvest limitations including quotas, trip limits, gear restrictions and closed seasons or areas, changes to the list of species specifically excluded from the FMU, and establishment of Marine Conservation Districts. That framework does not take into account ACLs and AMs. A revised list of framework options is included in the present amendment that will allow for regulatory modifications which are sensitive to ACLs, AMs, and the reference points upon which those actions most appropriately are based.

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