

Table 13. Alternatives considered to reduce fishing mortality of managed species in the U.S. Caribbean, and their subsequent reductions in mortality.

Fishable habitat consists of waters from 0-100 fathoms, of which there is a total of 2,467 nm² in the U.S. Caribbean. The EEZ includes 355 nm² or 14.39% of the total fishable habitat. There are 116 nm² or 32.6% of the total fishable habitat in the EEZ off Puerto Rico, and 240 nm² or 67.4% of the total fishable habitat in the EEZ off the USVI. There are 510 nm² of fishable habitat off St. Thomas/St. Johns, with 43% (218 nm²) of that habitat in the EEZ. There are 120 nm² of fishable habitat off St. Croix, with 18% (21 nm²) of that habitat in the EEZ.

The first two columns are the percent reductions in fishing mortality from each alternative, as it pertains to a particular complex (i.e., FMU sub-unit) or for all managed species. For example, alternatives 2a - 2e pertain to a specific complex, thus the reduction in fishing mortality would only be applied to that complex. The next two columns refer to where the percent reduction in fishing mortality occurs (i.e., EEZ waters off Puerto Rico or USVI), which is primarily included to assist the analysis of Alternative 3. The last column lists the potential economic impact (in dollars) resulting from each alternative. Due to a lack of discrete economic data, the economic impact estimates do not include the potential impact to the recreational sector. However, based on input from the Caribbean Council Advisory Panels, these alternatives are not likely to have a significant impact to recreational fishers in the EEZ since the majority of recreational activity in the EEZ is focused on species that are not under Council management (e.g., HMS, dolphin, wahoo).

¹ Actions which have already been implemented, but have only been implemented recently; their contribution to the reduction of overall fishing mortality is therefore included.

² Annual average values are based on Puerto Rico data, 1995-2002. Species-specific economic data is not available for USVI. More information on economic impacts can be found in Section 6.3.1 (Tables 6.3.1.2a-f). Economic impacts were modified from landings and modified by the amount of fishable habitat in the EEZ (i.e., 14%); alternative 2b was modified by the amount of fishable habitat off the west coast of Puerto Rico, which is approximately 6.3% (of total Puerto Rico fishable habitat).

³ Values were determined using commercial landings in Table 5, and multiplied by \$1.99351/pound, as utilized from Puerto Rico trip ticket data for reef fish species, 1995-2002; \$2.285/pound, as utilized from Matos-Caraballo (2002) for Puerto Rican queen conch, 1998-2001; and \$5.265/pound, as utilized from Matos-Caraballo (2002), for Puerto Rican spiny lobster, 1998-2001. The impact resulting from the prohibition of fish traps and nets is based on the expected reduction in fishing mortality (i.e., bounded by 22% for total Puerto Rico commercial landings and 67% for the USVI reef fish fishery, based on Scharer *et al.* (2002) and Valle-Esquivel and Diaz (2003), respectively; and by 10% for total Puerto Rico commercial reef fish landings and 6.34% for the USVI reef fish fishery, based on 2002 Puerto Rico trip ticket data and Valle-Esquivel and Diaz (2003), respectively) from total commercial reef fish landings in Table 5, as modified by the amount of fishable habitat in the EEZ (i.e., 14%). When considering seasonal closures for all species, queen conch was excluded from the 3- and 6-month closures, since the preferred alternative for the rebuilding of queen conch is the prohibition of catch from the EEZ with the exception of Lang Bank off St. Croix.

⁴ Values for the Puerto Rico closed areas in Alternative 3a were derived by first averaging the annual dockside value for west coast Puerto Rico landings for the 1998-2001 (i.e., four years) and then using an expansion factor of 1.28 to estimate total west coast landings. Based upon estimated fishable area in the EEZ relative to total fishable area on the west coast, the estimate of total landings was then multiplied by 0.20 (i.e., 20% of the total fishable area on the west coast is in the EEZ). Finally, this number was adjusted based on the size of each proposed closure relative to total fishable area in the EEZ off the west coast of Puerto Rico.

⁵ Please see footnote 6 below for a discussion pertaining to estimating the economic impact north of St. Thomas (where TNW is the relevant grid). To determine the economic impact northeast of Puerto Rico, the estimate of economic impact of north of St. Thomas was reduced based upon the estimated size of the proposed closure northeast of Puerto Rico in relation to the estimated size of the proposed closure north of St. Thomas.

⁶ Economic impacts associated with east of St. Croix on Lang Bank and south of St. John were estimated by first determining average annual reported catch in the associated grid for each of these two regions (e.g. C4 for east of St. Croix) in Federal waters. St. Croix area landings were modified by 0.40 (i.e., 40% of the total fishable area on the east coast is in the closed area). St. John area landings were modified by 0.50 (i.e., 50% of the total fishable area south of St. John is in the closed area). St. Thomas landings were modified by 0.65 (i.e., 65% of the total fishable area north of St. Thomas is in the closed area). This was conducted for the four-year fishing period during 1998-2001. Since price per pound is not reported, corresponding prices for Puerto Rico, by primary species (e.g., lobster, conch, grouper, snapper, and other) were used to estimate dockside value (note: since fishers in the USVI often sell their catch directly, prices for Puerto Rico may underestimate the price received by fishers in the USVI). This step provides an estimate of total dockside value of landings from Federal waters from the respective grid (the estimate is given in the "all catch" column). Finally, these estimates were adjusted to account for (a) under-reporting, which is relatively minor, and (b) estimated fishable area in the proposed closed area relative to fishable area in grid.

⁷ Since this proposed closed area alternative is only seasonal, the reduction in fishing mortality would be reduced due to the periodic nature of the closure (i.e., the potential reduction in fishing mortality is multiplied by 0.25, since the closed area is only in effect four months out of the year.

Actions that are shaded relate to actions applicable only in State waters. The percent reduction was calculated using the area of fishable habitat in each state's jurisdiction; for the USVI closures, the St. Thomas/St. John area, or St. Croix area, was used as applicable.

MANAGEMENT ACTION	PERCENT REDUCTION						IMPACT (\$)
	TOTAL SIZE (NM ₂)	FISHABLE HABITAT (NM ₂)	COMPLEX	ALL SPECIES	PR	USVI	
Alternative 1: No action. Do not adopt additional management measures at this time.			-	-	-	-	-
Alternative 2: Establish seasonal closures.							
Alternative 2a. Close the U.S. EEZ to the possession of species in Grouper Unit 4, excluding misty grouper (i.e., red, black, tiger, yellowfin, and yellowedge grouper), from February 1 through April 30.	-	-	24		-	-	716 ²
Alternative 2b. Close the U.S. EEZ off the west coast of Puerto Rico to the possession of red hind from December 1 through February 28.	-	-	33		-	-	2,588 ²
Alternative 2c. Close the U.S. EEZ to the possession of species in Snapper Unit 1 (including the black, blackfin, vermilion, and silk snapper) from October 1 through December 31.	-	-	23		-	-	24,677 ²
Alternative 2d. Close the U.S. EEZ to the possession of yellowtail snapper from April 1 through June 30.	-	-	26		-	-	21,699 ²
Alternative 2e. Close the U.S. EEZ to the possession of mutton snapper and lane snapper from April 1 through June 30.	-	-	29		-	-	24,255 ²
Alternative 2f. Close the U.S. EEZ to the possession of all Caribbean Council-managed species each year from January 1 to March 31 (3-month closure).	-	-		25	-	-	228,018 ³
Alternative 2g. Close the U.S. EEZ to the possession of all Caribbean Council-managed species each year from January 1 to March 31 and from July 1 to September 30 (6-month closure).	-	-		50	-	-	456,037 ³
Alternative 2h. Close the U.S. EEZ to the possession of all Caribbean Council-managed species year round (total closure).	-	-		100	-	-	1,004,001 ³
Alternative 3: Establish area closures.							
Hind Bank MCD (south of St. Thomas) ¹	13	11		3		100	

Grammanik Bank preferred alternative (February 1 - April 30) ⁷	<1 (0.44)	<1 (0.44)		<1 (0.001)			100
Buck Island Reef National Monument (St. Croix) ¹	28	9		<1 (0.09)			100
Virgin Islands Coral Reef National Monument (St. John) ¹	20	20		<1 (0.07)			100
St. Croix East End Marine Park ¹	5	5		<1 (0.05)			100
Luis Peña Channel Marine Natural Reserve ¹	2	2		<1 (0.001)		100	
Desecheo Marine Reserve ¹	2	2		<1 (0.001)		100	
Alternative 3a(1). West of Puerto Rico (PRW)	51	32		9	100		196,161 ⁴
Alternative 3a(6). West of Puerto Rico #2 (PRW2)	16	11		3	100		65,019 ⁴
Alternative 3a(7). West of Puerto Rico #3 (PRW3)	33	28		8	100		174,202 ⁴
Alternative 3a(2). Northeast of Puerto Rico (PRN)	23	20		4	70	30	54,470 ⁵
Alternative 3a(8). Combined Northeast of Puerto Rico and North of St. Thomas (CARIB)	40	38		11	36	64	102,305 ⁵
Alternative 3a(3). East of St. Croix on Lang Bank (CRX)	12	7		2		100	53,089 ⁶
Alternative 3a(4). South of St. John (JOS)	15	13		4		100	73,144 ⁶
Alternative 3a(5). North of St. Thomas (THN)	66	55		17		100	147,706 ⁶
Alternative 3b. Close the EEZ off Puerto Rico, and establish a closed area off the USVI.	-	171		50	66	34	511,414 ²
Alternative 4: Eliminate the use of fish traps in the U.S. EEZ.	-	-		22 - 67	-	-	140,517 - 427,939 ³
Alternative 5: Eliminate the use of gill and trammel nets in the U.S. EEZ.	-	-		6 - 10	-	-	38,323 - 63,872 ³
Alternative 6: Request that the Secretary of Commerce/NOAA Fisheries develop a memorandum of understanding (MOU) with the State governments of Puerto Rico and the U.S. Virgin Islands to develop compatible regulations to achieve the management objectives set forth in all Caribbean Council fishery management plans in State	-	-	-	-	-	-	-