



# Developing Compatible Regulations for Three Seasonally Closed Areas off Puerto Rico: Abrir La Sierra Bank, Bajo de Sico, and Tourmaline Bank

## Options Paper



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# Chapter 1. Introduction

## 1.1 What is Scoping?

Scoping is the process the National Marine Fisheries Service (NMFS) and the Caribbean Fishery Management Council (Council) use to request feedback from the public on actions they may undertake that will result in changes to the management of federal fisheries in the U.S. Caribbean. During scoping, NMFS and the Council identify possible fishery issues and their potential impacts and receive public input regarding management options to address these issues. Scoping is the first opportunity for the public to make suggestions or raise issues to the Council before a fishery management plan (FMP) or an amendment to an existing plan is developed.

## 1.2 How does scoping affect fisheries management?

The Council uses public comments provided through scoping in the development of management options. Once they develop the management options, the public hearing process will begin, and the public will have the opportunity to comment on the management measures included as options. The Council will consider public input as it deliberates and chooses the most appropriate management options.

### *Caribbean Fishery Management Council*

- Responsible for conservation and management of fish stocks
- Consists of seven voting members
  - Four voting members appointed by the Secretary of Commerce
  - One voting member appointed by each of the Governors of Puerto Rico and the U.S. Virgin Islands (2 total)
  - The Regional Administrator of NMFS for the Southeast Region
- Manages the area is from 3 to 200 nautical miles (nm) off the coasts of the U.S. Virgin Islands and 9 to 200 nm off the coast of Puerto Rico
- Develops fishery management plans and recommends regulations to NMFS and the Secretary of Commerce for implementation



### 1.3 How to get involved?

There are many ways you can help the Council. One way is to identify fishery management needs and recommend reasonable management options. The first step to getting involved is to become familiar with the management process by visiting <http://www.caribbeanfmc.com/>. Contact the Council members and staff to discuss your questions or concerns. The public may also attend meetings and serve on panels and committees that advise the Council on fishery issues. For more information on how to participate, please call 787-766-5926.

### 1.4 What actions are being proposed?

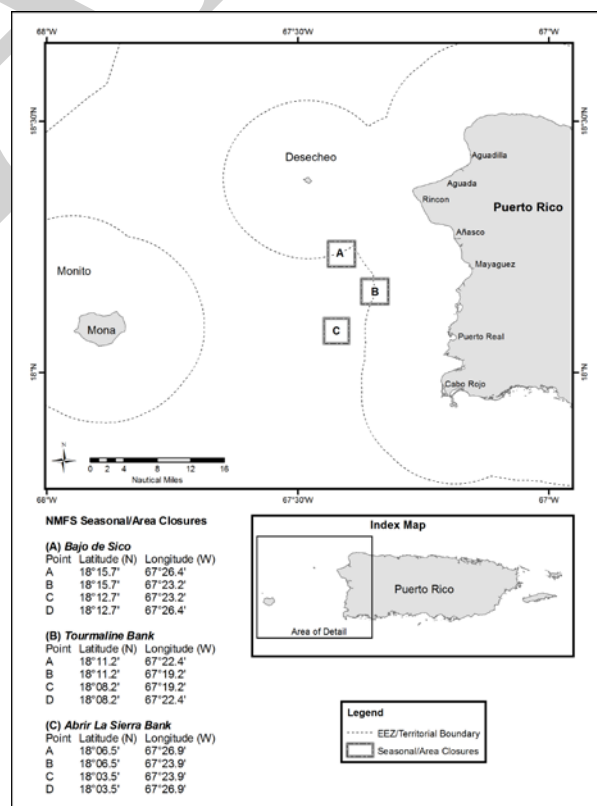
The Council is considering modifying the seasonal closures of Abrir La Sierra, Bajo de Sico, and Tourmaline Bank. The goal of modifying the closures is to protect the red hind spawning aggregations and large individuals of snappers and groupers from directed fishing pressure to achieve a more natural sex ratio, age, and size structure, while minimizing adverse social and economic effects. The areas are also known to be composed of pristine coral habitats (García-Sais et al., 2007; García-Sais et al., 2010). The Council wants to ensure adequate protection of these areas in order to preserve the current spawning fish populations and habitat conditions.

In December 2010, the Council increased from three months to six months the seasonal closure of Bajo de Sico to provide greater protection of commercially important reef fish. Additional modifications allowed the harvest of spiny lobster and Highly Migratory Species within the Bajo de Sico closed area. Since then, the desire

to make all three closed areas compatible has been expressed to the Council in order to avoid confusion among fishers, enforcement agents, and other user groups.

### 1.5 Where is the project located?

The three areas for which modifications are being proposed are located off the west coast of Puerto Rico (Figure 1). Tourmaline Bank was first established in 1993 through Amendment 2 to the Fishery Management Plan for the Reef Fish Fishery of Puerto Rico and the U.S. Virgin Islands (Reef Fish FMP; CFMC 1993). In 1996, Regulatory Amendment 2 to the Reef Fish FMP (CFMC 1996) modified the size of the Tourmaline Bank closed area and established closed areas surrounding Abrir La Sierra and Bajo de Sico.



**Figure 1.** Three seasonally closed areas on the west coast of Puerto Rico: Bajo de Sico, Tourmaline Bank and Abrir La Sierra Bank

## 1.6 Why is the Council considering these actions?

The closures were originally implemented in 1996 to protect spawning populations of red hind. Since then, red hind stocks have increased in size and abundance, ostensibly due to protection of these spawning aggregations. But, scientists have recently discovered spawning populations of snappers and other groupers, as well as nearly pristine deep-water (i.e., mesophotic) coral reef formations, within these closed areas (García-Sais et al., 2007; García-Sais et al. 2010). Mesophotic reef systems, such as those found within the Abrir La Sierra and Bajo de Sico closed areas, serve as recruitment, residential, foraging, and spawning aggregation habitats for a variety of commercially important reef fishes and shellfish, as well as sea turtles. For example, reef tops in Bajo de Sico appear to be the main residential habitat for a healthy population of Nassau groupers, schoolmaster, yellowtail, dog and cubera snappers, large adult spiny lobsters, and hawksbill turtles (García-Sais et al., 2010). Similarly, evidence suggests that deep rhodolith reefs provide foraging habitats for queen triggerfish and residential habitats for red hind and an assemblage of small reef fishes that are important in the aquarium trade (García-Sais et al., 2010). Fish populations inhabiting these seamounts may also contribute larvae for distribution to other areas in the U.S. Caribbean. For example, during the mutton snapper spawning aggregation event at Abrir La Sierra in May 2009, García-Sais et al. (2010) measured water currents that could transport and disperse fertilized eggs and early larvae towards the west-northwest coast of Puerto Rico and Mona Passage.

### *Purpose and Need*

- The purpose of the proposed action is to protect the red hind spawning aggregations and large individuals of snappers and groupers from directed fishing pressure to achieve a more natural sex ratio, age, and size structure, while minimizing adverse social and economic effects, within these three seamount areas. The areas are also known to be composed of pristine coral habitats. The Council wants to ensure adequate protection of these areas in order to preserve the current spawning fish populations and habitat conditions.
- There is a need to modify the seasonal closures because they provide important ecological services, such as recruitment, residential, foraging, and spawning aggregation habitats, to commercially important reef fish and shellfish, as well as sea turtles. There is also a need to establish compatibility between the three closed areas to ensure compliance and avoid confusion among constituents.

Investigations by García-Sais *et al.* (2007) described Bajo de Sico populations of snapper and groupers as composed of relatively large individuals, many of which exhibit behaviors indicating they are approaching a spawning condition (i.e., sexual dimorphic color patterns and aggressive behaviors normally associated with spawning). Red hinds, yellowfin, yellowmouth, Nassau, and black groupers were observed to be common in both Bajo de Sico and Abrir La Sierra (García-Sais *et al.*, 2007; García-Sais *et al.*, 2010). Herbivores were not highly abundant, but were represented by a species rich assemblage that included parrotfishes, doctorfishes, and damselfishes within sample transects. Top predators included yellowtail, dog, and mutton snappers, as well as queen

triggerfish (García-Sais *et al.*, 2010). García-Sais *et al.* (2010) also observed a species-rich assemblage of wrasses, basses, grunts, gobies, puffers, hawkfishes, hogfishes, squirrelfishes, morays, triggerfishes and small groupers such as coney, graysbys, rock hind and red hind. The high concentration of schooling zooplanktivorous fish species associated with mesophotic reefs attract large pelagic reef predators, including the great barracuda, king and cero mackerels, and large jacks. Pelagic migratory fish predators, such as the wahoo, dorado, blackfin, skipjack and yellowfin tunas, and marlins, also forage upon schooling reef fishes and their smaller pelagic predators (García-Sais *et al.* 2010).

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# Chapter 2. Potential Actions

## Action 1: Modify the length of the closed season for Abrir La Sierra.

**Option 1:** No Action - do not modify the seasonal closure of Abrir La Sierra.

**Option 2:** Modify the seasonal closure of Abrir La Sierra to a 6 month closure from October 1 – March 31.

**Option 3:** Modify the seasonal closure of Abrir La Sierra to a 6 month closure from December 1 – May 31.

**Option 4:** Modify the closure of Abrir La Sierra to 12 months.

**Discussion:** **Option 1** would maintain the status quo. Abrir La Sierra would remain closed to fishing activities defined in Action 4 from December 1 to the last day of February, in addition to the current year-round restrictions on bottom-tending gear (pots, traps, bottom longlines, gillnets, and trammel nets). Maintaining the current 3-month closure would allow harvest for 9-months of the year and render populations more vulnerable to fishing relative to the present situation on Bajo de Sico. However, there are also closures for red, black, tiger, yellowfin, and yellowedge grouper from February 1 through April 30 for the entire EEZ, which includes Abrir La Sierra (Figure 1). There is also a closure of the EEZ to harvest of vermilion, black, silk, and blackfin snapper during October 1 through December 31. There is a third closure from April 1 to June 30 for lane and mutton snapper in the EEZ (Table 2.1). These management measures combined result in closures for one or more snapper and grouper species within Abrir La Sierra running from October 1 through June 30. Since there is a high probability of catching prohibited species incidentally when targeting other reef fish species, fishers may tend to avoid areas where such species comingle. Consequently, under current species-specific closures, areas such as Abrir La Sierra may not be an ideal place to target allowable species because of the high probability of catching prohibited species, thus increasing mortality on species needing protection and the costs (i.e. fuel, bait, time) associated with those activities, and potentially risking prosecution for possession of prohibited species.

**Table 2.1:** Species-Specific Closures in the U.S. Caribbean EEZ

Species/Species Group	Seasonal Closure
Red, black, tiger, yellowfin, and yellowedge grouper	February 1 – April 30
Red Hind	December 1-end of February*
Vermilion, black, silk, or blackfin snapper	October 1-December 31
Lane or mutton snapper	April 1-June 30

\*Only applies to the Caribbean EEZ west of 67°10' W. longitude.

When fishing activities are allowed, important coral habitat may also be in danger by anchoring vessels and possible gear interactions. García-Sais et al. (2007) describes incidents of monofilament fishing line wrapped around corals, indicating unintended but adverse fishermen-coral interactions. Among the gears still allowed in Abrir La Sierra are the vertical longlines, bandit type gear, hook and line and spearfishing, as well as the harvest by hand. By prohibiting certain fishing activities, coral populations are better protected from such gear interactions and entanglements.

**Option 2** would establish a seasonal closure to prohibit certain fishing activities from October 1 through March 31. This option is compatible with the current length of the Bajo de Sico seasonal closure. In addition to spanning the time frame of the original seasonal closure for Abrir La Sierra (i.e., December through the end of February), **Option 2** would span the seasonal closure for vermilion, black, silk, and blackfin snapper, which occurs from October 1 through December 31. Additionally, there is a closure from December 1 through the end of February which prohibits the harvest of red hind from the Caribbean EEZ west of 67°10' W longitude, which includes the entirety of Bajo de Sico, Abrir La Sierra, and Tourmaline Bank (Figure 1). Finally, harvest of red, black, tiger, yellowfin, and yellowedge grouper is prohibited from February 1 through April 30. All of these species occur in surrounding waters year-round and are part of the commercial and recreational catch (Erdman, 1976; Boardman and Weiler, 1979; Kimmel, 1985). Also, **Option 2** expands the protection to all reef fish, encompassing not only those species for which no closed seasons are established but also those species with closed seasons outside of the current seasonally closed areas.

Under **Option 2**, Abrir La Sierra would be closed to specified fishing activities during all the applicable species-specific EEZ seasonal closures, with the exception of the April-June closure for mutton and lane snapper. As a result of the additional seasonal closures, **Option 2** will have an added positive impact on the species protected outside of their already established closed seasons. Lane and mutton snapper fisheries are currently closed, from April 1 through June 30, within the areas for which additional closures are proposed. **Option 2** will extend the time when fishing for those species is prohibited, within the designated areas, potentially providing greater protection by reducing fishing mortality. In addition to the current closure, harvest of lane and mutton snapper will be prohibited from October 1 through March 31, creating a harvest closure for those two species of October 1 through June 30 within Abrir La Sierra. These species occur in surrounding waters year-round and are part of the commercial and recreational catch (Erdman, 1976; Boardman and Weiler, 1978; Kimmel, 1985). Similarly, **Option 2** coupled with the current closure of fisheries for red, black, tiger, yellowfin, and yellowedge grouper would provide two more months (October and November) of protection for those species, essentially prohibiting harvest from October 1 through April 30 within the Abrir La Sierra management area. In terms of spawning aggregations, **Option 2** prohibits fishing with gear likely to result in the harvest of any potentially aggregating snapper or grouper species during the months aggregations are known or predicted to be present.

Other than the No Action option, **Option 2** is expected to have the least amount of impact on fishers, due to historical weather patterns and sea conditions in the Mona Passage. October marks the beginning of



deteriorating weather for the area, which lasts until March or April. Persistently high winds and associated sea conditions often create unsafe sea conditions which affect the amount of time available to fish and dive. Under **Option 2**, the modified closure would be in effect during that time, allowing access during periods of more favorable weather.

**Option 3** would establish a modified closure from December 1 through May 31. In addition to the original seasonal closure of Abrir La Sierra (i.e., December through the end of February), **Option 3** closure would overlap with seasonal closures already established in the EEZ for various snapper and grouper species (Table 2.1). Harvest and possession is prohibited during February 1 through April 30 for red, black, tiger, yellowfin, and yellowedge grouper, during April 1 through June 30 for lane and mutton snapper, and during December 1 through the last day of February for red hind in the Caribbean EEZ west of 67°10' W longitude. **Option 3** would be incompatible with the current regulations in Bajo de Sico. While Bajo de Sico is closed to fishing for and possession of reef fish for 6 months, the closure is October 1 through March 31. With differing closure dates, enforcement would be difficult. Similarly, it would be difficult for fishers to distinguish which area is closed and when.

**Option 3** would have a greater impact on fishers as May through July are the busiest months for the commercial fishery and March through August are busiest for recreational fishing in Puerto Rico. October and November bring a large decrease in recreational fishing (Griffith et al., 2007).

**Option 4** would establish a year-round closure of Abrir La Sierra thereby providing the greatest protection to included species. However, it is also the most restrictive and results in the most substantial negative economic and social impacts to the fishermen and their communities.

## Action 2: Modify the length of the closed season for Tourmaline Bank.

**Option 1:** No Action - do not modify the seasonal closure of Tourmaline Bank.

**Option 2:** Modify the seasonal closure of Tourmaline Bank to a 6 month closure from October 1 – March 31.

**Option 3:** Modify the seasonal closure of Tourmaline Bank to a 6 month closure from December 1 – May 31.

**Option 4:** Modify the closure of Tourmaline Bank to 12 months.

**Discussion: Option 1** would maintain the status quo. Tourmaline Bank would remain closed to fishing activities defined in Action 5 from December 1 to the last day of February, in addition to the current year-round restrictions on bottom-tending gear (pots, traps, bottom longlines, gillnets, and trammel nets).

Maintaining the current 3-month closure would allow harvest for 9-months of the year and render populations more vulnerable to fishing relative to the present situation on Bajo de Sico. However, there are also closures for red, black, tiger, yellowfin, and yellowedge grouper from February 1 through April 30 for the entire EEZ, which includes a portion of Tourmaline Bank (Figure 1). There is also a closure of the EEZ to harvest of vermilion, black, silk, and blackfin snapper during October 1 through December 31. There is a third closure from April 1 to June 30 for lane and mutton snapper in the EEZ (Table 2.1). These management measures combined result in closures for one or more snapper and grouper species within Tourmaline Bank running from October 1 through June 30. Since there is a high probability of catching prohibited species incidentally when targeting other reef fish species, fishers may tend to avoid areas where such species congregate. Consequently, under current species-specific closures, areas such as Tourmaline Bank may not be an ideal place to target allowable species because of the high probability of catching prohibited species, thus increasing mortality on species needing protection and the costs (i.e. fuel, bait, time) associated with those activities, and potentially risking prosecution for possession of prohibited species.

When fishing activities are allowed, important coral habitat may also be in danger by anchoring vessels and possible gear interactions. García-Sais et al. (2007) describes incidents of monofilament fishing line wrapped around corals, indicating unintended but adverse fishermen-coral interactions. Among the gears still allowed in Tourmaline Bank are the vertical longlines, bandit type gear, hook and line and spearfishing, as well as the harvest by hand. By prohibiting certain fishing activities, coral populations are better protected from such gear interactions and entanglements.

**Option 2** would establish a seasonal closure to prohibit certain fishing activities from October 1 through March 31. This option is compatible with the current length of the Bajo de Sico seasonal closure. In addition to spanning the time frame of the original seasonal closure for Tourmaline Bank (i.e., December through the end of February), **Option 2** would span the seasonal closure for vermilion, black, silk, and blackfin snapper, which occurs from October 1 through December 31. Additionally, there is a closure from December 1 through the end of February which prohibits the harvest of red hind from the Caribbean EEZ west of 67°10' W longitude, which includes the entirety of Bajo de Sico, Abrir La Sierra, and Tourmaline Bank (Figure 1). Finally, harvest of red, black, tiger, yellowfin, and yellowedge grouper is prohibited from February 1 through April 30. All of these species occur in surrounding waters year-round and are part of the commercial and recreational catch (Erdman, 1976; Boardman and Weiler, 1979; Kimmel, 1985). Also, **Option 2** expands the protection to all reef fish, encompassing not only those species for which no closed seasons are established but also those species with closed seasons outside of the current seasonally closed areas.

Under **Option 2**, Tourmaline Bank would be closed to specified fishing activities during all the applicable species-specific EEZ seasonal closures, with the exception of the April-June closure for mutton and lane snapper. As a result of the additional seasonal closures, **Option 2** will have an added positive impact on the species protected outside of their already established closed seasons. Lane and mutton snapper fisheries are currently closed from April 1 through June 30 within the areas for which additional closures

are proposed. **Option 2** will extend the time when fishing for those species is prohibited, within the designated areas, potentially providing greater protection by reducing fishing mortality. In addition to the current closure, harvest of lane and mutton snapper will be prohibited from October 1 through March 31, creating a harvest closure for these two species of October 1 through June 30 within Tourmaline Bank. These species occur in surrounding waters year-round and are part of the commercial and recreational catch (Erdman, 1976; Boardman and Weiler, 1978; Kimmel, 1985). Similarly, **Option 2** coupled with the current closure of fisheries for red, black, tiger, yellowfin, and yellowedge grouper would provide two more months (October and November) of protection for those species, essentially prohibiting harvest from October 1 through April 30 within the Tourmaline Bank management area. In terms of spawning aggregations, **Option 2** prohibits fishing with gear likely to result in the harvest of any potentially aggregating snapper or grouper species during the months aggregations are known or predicted to be present.

Other than the No Action option, **Option 2** is expected to have the least amount of impact on fishers, due to historical weather patterns and sea conditions in the Mona Passage. October marks the beginning of deteriorating weather for the area, which lasts until March or April. Persistently high winds and associated sea conditions often create unsafe sea conditions which affect the amount of time available to fish and dive. Under **Option 2**, the modified closure would be in effect during that time, allowing access during periods of more favorable weather.

**Option 3** would establish a modified closure from December 1 through May 31. In addition to the original seasonal closure of Tourmaline Bank (i.e., December through the end of February), **Option 3** closure would overlap with seasonal closures already established in the EEZ for various snapper and grouper species (Table 2.1). Harvest and possession is prohibited during February 1 through April 30 for red, black, tiger, yellowfin, and yellowedge grouper, during April 1 through June 30 for lane and mutton snapper, and during December 1 through the last day of February for red hind in the Caribbean EEZ west of 67°10' W longitude. **Option 3** would be incompatible with the current regulations in Bajo de Sico. While Bajo de Sico is closed to fishing for and possession of reef fish for 6 months, the closure is October 1 through March 31. With differing closure dates, enforcement would be difficult. Similarly, it would be difficult for fishers to distinguish which area is closed and when.

**Option 3** would have a greater impact on fishers as May through July are the busiest months for the commercial fishery and March through August are busiest for recreational fishing in Puerto Rico. October and November bring a large decrease in recreational fishing (Griffith et al., 2007).

**Option 4** would establish a year-round closure of Tourmaline Bank thereby providing the greatest protection to included species. However, it is also the most restrictive and results in the most substantial negative economic and social impacts to the fishermen and their communities.

### Action 3: Modify the length of the closed season for Bajo de Sico.

**Option 1:** No Action - do not modify the seasonal closure of Bajo de Sico.

**Option 2:** Modify the seasonal closure of Bajo de Sico to a 3 month closure from December 1 – End of February.

**Option 3:** Modify the seasonal closure of Bajo de Sico to a 6 month closure from December 1 – May 31.

**Option 4:** Modify the closure of Bajo de Sico to 12 months.

**Discussion:** **Option 1** would maintain the status quo. The area would remain closed to fishing for species specified in Action 6 from October 1 through March 31, each year, in addition to the current year-round bottom-tending gear restrictions (pots, traps, bottom longlines, gillnets, and trammel nets). In 1996, Bajo de Sico was originally closed to all fishing activities, including HMS, from December 1 through the end of February, each year. In 2010, the seasonal closure was extended to October 1 through March 31, however, the new seasonal closure only prohibited the harvest and possession of Council-managed reef fish. Under the current regulations, harvest of spiny lobster, coastal migratory pelagics (dolphin, wahoo, jacks, and mackerel), and HMS species is allowed.

In addition to the seasonal closure for Bajo de Sico, (i.e., October 1 through March 31), current regulations include an October 1 through December 31 seasonal closure for vermilion, black, silk, and blackfin snapper, a December 1 through the end of February prohibition on the harvest of red hind from the Caribbean EEZ west of 67°10' W longitude, and a February 1 through April 30 prohibition on harvest of red, black, tiger, yellowfin, and yellowedge grouper. Under the status quo, Bajo de Sico would be closed to fishing activities specified in Action 4 during all the overlapping species-specific seasonal closures, with the exception of the April closure period for red, black, tiger, yellowfin, and yellowedge grouper.

**Option 2** would establish a seasonal closure to prohibit certain fishing activities from December 1 through the end of February, each year. Establishing a 3-month closure would allow capture of species specified in Action 4 for nine months of the year and cause these populations to be more vulnerable to harvest. However, there are also closures for red, black, tiger, yellowfin, and yellowedge grouper from February 1 through April 30 for the entire EEZ, which includes a portion of Bajo de Sico. There is also a closure of the EEZ, including portions of Bajo de Sico, to harvest of vermilion, black, silk, and blackfin snapper during October 1 through December 31. There is a third closure from April 1 to June 30 for lane and mutton snapper in the EEZ. These management measures combined result in closures for one or more snapper and grouper species within Bajo de Sico from October 1 through June 30.

**Option 3** would set the seasonal closure at Bajo de Sico to be six months (December 1 through May 31), each year, for species defined in Action 4. **Option 3** would encompass already existing seasonal closures for other snapper and grouper species, including the February 1 through April 30 closed season for red, black, tiger, yellowfin, and yellowedge groupers, and the closure that applies to red hind harvest in the Caribbean EEZ west of 67°10' W longitude from December 1 through the end of February. The closure proposed in Option 3 also encompasses the April 1 through June 30 closed seasons for lane and mutton snapper, species reported to occur in surrounding waters year-round and that are part of the commercial and recreational catch (Erdman, 1976; Boardman and Weiler, 1978; Kimmel, 1985).

Since there is a high probability of catching prohibited species incidentally when targeting other reef fish species, fishers may tend to avoid areas where such species come in. Consequently, under current species-specific closures, the Bajo de Sico area may not be a desirable place to target allowable species because of the high probability of catching prohibited species, thus increasing mortality on species needing protection and the costs (i.e. fuel, bait, time) associated with those activities, and potentially risking prosecution for possession of prohibited species.

**Option 3** would have a greater impact on fishers utilizing the area because May through July are the busiest months for the commercial fishery and March through August are busiest for recreational fishing in Puerto Rico. October and November bring a large decrease in recreational fishing effort (Griffith et al., 2007).

**Option 4** would establish a year-round closure of Bajo de Sico, thus creating a marine protected area for species defined in Action 4. **Option 4** would provide the greatest protection to red hind spawning aggregations, larger snapper and grouper individuals, and their habitat. However, it is also the most restrictive and results in the most negative economic and social impacts to the fishermen and their communities.

## Action 4: Prohibit Fishing Activities in Abrir La Sierra.

**Option 1:** No Action – Do not modify the species prohibited during the seasonal closure of Abrir La Sierra.

**Option 2:** During the seasonal closure of Abrir La Sierra specified in Action 1, prohibit fishing for council-managed reef fish.

**Option 3:** During the seasonal closure of Abrir La Sierra specified in Action 1, prohibit fishing for and possession of council-managed reef fish species.

**Option 4:** During the seasonal closure of Abrir La Sierra specified in Action 1, prohibit fishing for spiny lobster.

**Option 5:** During the seasonal closure of Abrir La Sierra specified in Action 1, prohibit fishing for and possession of spiny lobster.

**Option 6:** During the seasonal closure of Tourmaline Bank specified in Action 1, prohibit fishing for and possession of all species.

**Discussion: Option 1** would maintain the status quo. Abrir La Sierra would remain closed to all fishing activities, including coastal migratory pelagics (dolphin, wahoo, jacks, and mackerel) and highly migratory species (HMS), during the time specified in Action 1. Additionally, the current year-round bottom-tending gear restrictions (pots, traps, bottom longlines, gillnets, and trammel nets) would still apply. The closure was originally implemented in 1996 to protect spawning populations of red hind. Since then, red hind stocks have increased in size and abundance but scientists have recently discovered spawning populations of snappers and other groupers as well as nearly pristine coral reef formations. There is a closure for red, black, tiger, yellowfin, and yellowedge grouper from February 1 through April 30 for the entire EEZ, which includes Abrir La Sierra (Figure 1). There is also a closure of the EEZ to harvest of vermilion, black, silk, and blackfin snapper during October 1 through December 31. There is a third closure from April 1 to June 30 for lane and mutton snapper in the EEZ. These management measures combined result in closures for one or more snapper and grouper species within Abrir La Sierra from October 1 through June 30. Since there is a high probability of catching prohibited species incidentally when targeting other reef fish species, fishers may tend to avoid areas where such species come. Consequently, under current species-specific closures, areas such as Abrir La Sierra would not be an ideal place to target species that are allowed because of the high probability of capturing a prohibited species, thus increasing mortality on species needing protection. Also, if the area is fished, there will be costs associated with the purchase of bait and fuel, as well as time spent fishing to capture species that would have to be discarded due to regulatory requirements.

**Option 2** would prohibit fishers from fishing for reef fish managed under the Council's Reef Fish Fishery Management Plan (FMP; Appendix A) within the limits of Abrir La Sierra for the duration of the closure. Unlike **Option 3** discussed below, **Option 2** would allow fishers to travel through the closed areas with reef fish harvested at other locations. However, if fishers are to transit through the area, fishing gear used to harvest reef fish must be properly stowed. If the Council selects **Options 2** or **3**, spiny lobster will not be prohibited and thus will remain open year-round. The harvesting of spiny lobster by hand is not expected to result in further mortality to grouper or snapper species. However, traps and/or trap lines can adversely affect coral via fragmentation or abrasion. The deployment of spiny lobster traps may adversely affect coral as traps drop toward the sea floor or when traps are retrieved and pulled to the surface. Abrasion may occur when traps or trap lines contact coral during fishing activities.

**Option 3** would prohibit the harvest and possession of all Council-managed reef fish. This option is compatible with the current prohibitions within the Bajo de Sico seasonal closure. Under this option,

fishers would be prohibited from transiting through Abrir La Sierra while they have reef fish onboard, even if they were harvested from other areas. Similar to **Option 2**, spiny lobster will not be managed under these options.

**Option 4** would prevent fishers from fishing for spiny lobster in Abrir La Sierra for the duration of the closure as defined in Action 1. **Option 4** would allow fishers to travel through the closed area with spiny lobster harvested at different locations. Under **Option 4**, Council-managed reef fish may not be prohibited and thus may remain open all year.

**Option 5** would prohibit the harvest and possession of spiny lobster inside Abrir La Sierra. This option prohibits fishers from transiting through the closed area while they have spiny lobster onboard, even if they were harvested from other areas. Similar to **Option 4**, Council-managed reef fish may not be prohibited under these regulations and thus will remain open year-round.

**Options 2** through **5** would allow fishers to harvest species not managed by the Council, including HMS or other coastal migratory pelagics not part of HMS or managed by the Council. The Council heard testimony from HMS fishers who stated the gear they use (trolling gear designed to catch pelagic fishes) is pulled behind a moving vessel and fishes the upper portion of the water column where pelagic species occur. Such fishing activity is not expected to result in a significantly higher mortality for the demersal fish species, like snappers and grouper. However, some snappers and groupers may form spawning aggregations up in the water column. As such, incidental catch of large individuals of snappers or groupers, possibly in or near spawning condition, could occur and thus contribute to their mortality. The fishing practices described for pelagics and HMS are not expected to present any threat to the coral reef resources or to other habitat structures.

**Option 6** would prohibit fishing for and possession of any species, including reef fish, spiny lobster, coastal migratory pelagics, or HMS within Abrir La Sierra. Under this option, fishers may not target or have any species on their vessel if they are transiting through Abrir La Sierra, even if the species were harvested elsewhere.

**Table 2.2:** Summary of species allowed under options specified in Action 4.

Option	Species and Activities Allowed							
	Reef Fish		Spiny Lobster		HMS Species		Coastal Migratory Pelagic Species	
	Harvest	Possession	Harvest	Possession	Harvest	Possession	Harvest	Possession
1	No	Yes	No	Yes	No	Yes	No	Yes
2	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes
3	No	No	Yes	Yes	Yes	Yes	Yes	Yes
4	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes
5	Yes	Yes	No	No	Yes	Yes	Yes	Yes
6	No	No	No	No	No	No	No	No

## Action 5: Prohibit Fishing Activities in Tourmaline Bank.

- Option 1:** No Action – Do not modify the species prohibited during the seasonal closure of Tourmaline Bank.
- Option 2:** During the seasonal closure of Tourmaline Bank specified in Action 2, prohibit fishing for council-managed reef fish.
- Option 3:** During the seasonal closure of Tourmaline Bank specified in Action 2, prohibit fishing for and possession of council-managed reef fish species.
- Option 4:** During the seasonal closure of Tourmaline Bank specified in Action 2, prohibit fishing for spiny lobster.
- Option 5:** During the seasonal closure of Tourmaline Bank specified in Action 2, prohibit fishing for and possession of spiny lobster.
- Option 6:** During the seasonal closure of Tourmaline Bank specified in Action 2, prohibit fishing for and possession of all species.

**Discussion:** **Option 1** would maintain the status quo. Tourmaline Bank would remain closed to all fishing activities, including coastal migratory pelagics (dolphin, wahoo, jacks, and mackerel) and HMS, during the time specified in Action 2. Additionally, the current year-round bottom-tending gear



restrictions (pots, traps, bottom longlines, gillnets, and trammel nets) would still apply. The closure was originally implemented in 1993 to protect spawning populations of red hind. Since then, red hind stocks have increased in size and abundance but scientists have recently discovered spawning populations of snappers and other groupers as well as nearly pristine coral reef formations. There is a closure for red, black, tiger, yellowfin, and yellowedge grouper from February 1 through April 30 for the entire EEZ, which includes a portion of Tourmaline Bank (Figure 1). There is also a closure of the EEZ to harvest of vermilion, black, silk, and blackfin snapper during October 1 through December 31. There is a third closure from April 1 to June 30 for lane and mutton snapper in the EEZ. These management measures combined result in closures for one or more snapper and grouper species within Tourmaline Bank from October 1 through June 30. Since there is a high probability of catching prohibited species incidentally when targeting other reef fish species, fishers may tend to avoid areas where such species comele. Consequently, under current species-specific closures, areas such as Tourmaline Bank would not be an ideal place to target species that are allowed because of the high probability of capturing a prohibited species, thus increasing mortality on species needing protection. Also, if the area is fished, there will be costs associated with the purchase of bait and fuel, as well as time spent fishing to capture species that would have to be discarded due to regulatory requirements.

**Option 2** would prohibit fishers from fishing for reef fish managed under the Council's Reef Fish FMP (Appendix A) within the limits of Tourmaline Bank for the duration of the closure. Unlike **Option 3** discussed below, **Option 2** would allow fishers to travel through the closed areas with reef fish harvested at other locations. However, if fishers are to transit through the area, fishing gear used to harvest reef fish must be properly stowed. If the Council selects **Options 2** or **3**, spiny lobster will not be prohibited and thus will remain open year-round. The harvesting of spiny lobster by hand is not expected to result in further mortality to grouper or snapper species. However, traps and/or trap lines can adversely affect coral via fragmentation or abrasion. The deployment of spiny lobster traps may adversely affect coral as traps drop toward the sea floor or when traps are retrieved and pulled to the surface. Abrasion may occur when traps or trap lines contact coral during fishing activities.

**Option 3** would prohibit the harvest and possession of all Council-managed reef fish. This option is compatible with the current prohibitions within the Bajo de Sico seasonal closure. Under this option, fishers would be prohibited from transiting through Tourmaline Bank while they have reef fish onboard, even if they were harvested from other areas. Similar to **Option 2**, spiny lobster may not be managed under these options.

**Option 4** would prevent fishers from fishing for spiny lobster in Tourmaline Bank for the duration of the closure as defined in Action 2. **Option 4** would allow fishers to travel through the closed areas with spiny lobster harvested at different locations. Under **Option 4**, Council-managed reef fish may not be prohibited and thus may remain open all year.

**Option 5** would prohibit the harvest and possession of spiny lobster inside Tourmaline Bank. This option prohibits fishers from transiting through the two closed areas while they have spiny lobster onboard, even

if they were harvested from other areas. Similar to **Option 4**, Council-managed reef fish may not be prohibited under these regulations and thus will remain open year-round.

**Options 2 through 5** would allow fishers to harvest species not managed by the Council, including HMS or other coastal migratory pelagics not part of HMS or managed by the Council. The Council heard testimony from HMS fishers who stated the gear they use (trolling gear designed to catch pelagic fishes) is pulled behind a moving vessel and fishes the upper portion of the water column where pelagic species occur. Such fishing activity is not expected to result in a significantly higher mortality for the demersal fish species, like snappers and grouper. However, some snappers and groupers may form spawning aggregations up in the water column. As such, incidental catch of large individuals of snappers or groupers, possibly in or near spawning condition, could occur and thus contribute to their mortality. The fishing practices described for pelagics and HMS are not expected to present any threat to the coral reef resources or to other habitat structures.

**Option 6** would prohibit fishing for and possession of any species, including reef fish, spiny lobster, coastal migratory pelagics, or HMS within Tourmaline Bank. Under this option, fishers may not target or have any species on their vessel if they are transiting through Tourmaline Bank, even if the species were harvested elsewhere.

**Table 2.3:** Summary of species allowed under options specified in Action 5.

Option	Species and Activities Allowed							
	Reef Fish		Spiny Lobster		HMS Species		Coastal Migratory Pelagic Species	
	Harvest	Possession	Harvest	Possession	Harvest	Possession	Harvest	Possession
1	No	Yes	No	Yes	No	Yes	No	Yes
2	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes
3	No	No	Yes	Yes	Yes	Yes	Yes	Yes
4	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes
5	Yes	Yes	No	No	Yes	Yes	Yes	Yes
6	No	No	No	No	No	No	No	No

## Action 6: Prohibit Fishing Activities in Bajo de Sico.

- Option 1:** No Action – Do not modify the prohibition on fishing for or possession of Council-managed reef fish during the seasonal closure of Bajo de Sico.
- Option 2:** During the seasonal closure of Bajo de Sico specified in Action 3, prohibit fishing for Council-managed reef fish.
- Option 3:** During the seasonal closure of Bajo de Sico specified in Action 3, prohibit fishing for spiny lobster.
- Option 4:** During the seasonal closure of Bajo de Sico specified in Action 3, prohibit fishing for and possession of spiny lobster.
- Option 5:** During the seasonal closure of Bajo de Sico specified in Action 3, prohibit fishing for all species.
- Option 6:** During the seasonal closure of Bajo de Sico specified in Action 3, prohibit fishing for and possession of all species.

**Discussion:** **Option 1** would maintain the status quo. Bajo de Sico would remain closed to harvest and possession of all Council-managed reef fish during the time specified in Action 3. Additionally, the current year-round bottom-tending gear restrictions (pots, traps, bottom longlines, gillnets, and trammel nets) would still apply. Maintaining the current regulations would preclude fishers from transiting through Bajo de Sico while they have reef fish onboard, even if they were harvested from other areas. Spiny Lobster would still not be prohibited and thus will remain open year-round. The harvesting of spiny lobster by hand is not expected to result in further mortality to grouper or snapper species.

**Option 2** would prohibit fishing for Council-managed reef fish. Unlike Option 1, however, fishers would be allowed to possess reef fish if they were harvested from an area other than Bajo de Sico. Similar to Option 1, spiny lobster may not be prohibited and thus will remain open year-round if the Council so chooses.

**Option 3** would prevent fishers from fishing for spiny lobster in Bajo de Sico for the duration of the closure as defined in Action 3. **Option 2** would allow fishers to travel through the closed area with spiny lobster, as long as they were harvested at a different location. Under **Option 2**, Council-managed reef fish may not be prohibited and thus will remain open year-round.

**Option 4** would prohibit the harvest and possession of spiny lobster inside Bajo de Sico limits. This option prohibits fishers from transiting through the closed area while they have spiny lobster onboard, even if they were harvested from other areas. Similar to **Option 3**, Council-managed reef fish may not be prohibited under these regulations and thus will remain open year-round.

**Options 1** through **4** would allow fishers to harvest species not managed by the Council, including HMS or other coastal migratory pelagics not part of HMS or managed by the Council. The Council heard testimony from HMS fishers who stated the gear they use (trolling gear designed to catch pelagic fishes) is pulled behind a moving vessel and fishes the upper portion of the water column where pelagic species occur. Such fishing activity is not expected to result in a significantly higher mortality for the demersal fish species, like snappers and grouper. During this period, however, incidental catch of large individuals of snappers or groupers, possibly in or near spawning condition, could occur and thus contribute to their mortality. The fishing practices described for pelagics and HMS are not expected to present any threat to the coral reef resources or to other habitat structures.

**Option 5** would prohibit fishing for all species within Bajo de Sico. This option would return Bajo de Sico to the previous fishing prohibitions before they were modified in 2010. Under this option, fishers may not target any species, including reef fish, spiny lobster, coastal migratory pelagics, or HMS. If fishers were to transit through Bajo de Sico, all fishing gear must be stowed to ensure no fishing activities take place.

**Option 6** would prohibit fishing for and possession of any species, including reef fish, spiny lobster, coastal migratory pelagics, or HMS within Bajo de Sico. Under this option, fishers may not target or have any species on their vessel if they are transiting through Bajo de Sico, even if the species were harvested elsewhere.

**Table 2.4:** Summary of species allowed under options specified in Action 6.

Option	Species and Activities Allowed							
	Reef Fish		Spiny Lobster		HMS Species		Coastal Migratory Pelagic Species	
	Harvest	Possession	Harvest	Possession	Harvest	Possession	Harvest	Possession
1	No	No	Yes	Yes	Yes	Yes	Yes	Yes
2	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes
3	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes
4	Yes	Yes	No	No	Yes	Yes	Yes	Yes
5	No	Yes	No	Yes	No	Yes	No	Yes
6	No	No	No	No	No	No	No	No

## Action 7: Prohibit Anchoring in Abrir La Sierra.

**Option 1:** No Action - do not prohibit anchoring by vessels in Abrir La Sierra.

**Option 2:** Prohibit anchoring for 3 months in Abrir La Sierra. The 3-month closure will coincide with the closure period chosen in Action 1.

**Option 3:** Prohibit anchoring for 6 months in Abrir La Sierra. The 6-month closure will coincide with the closure period chosen in Action 1.

**Option 4:** Prohibit anchoring year-round in Abrir La Sierra.

**Discussion:** Scientists agree that anchoring causes substantial and long lasting damage to coral populations (Tratalos and Austin, 2001). Not only is setting anchors harmful to coral populations, but retrieval of the anchors and the movement of the anchor or anchor chain while on the ocean floor can cause damage as well (Dinsdale and Harriott, 2004). Each time a vessel drops their anchor onto a coral reef, or an anchor strikes against corals, there is a risk of coral fracture, abrasion to surface tissue and carbonate skeletons, removal of colonies from the substratum, or even death of the coral colony (Dinsdale and Harriott, 2004).

Anchoring can also indirectly impact the long-term growth of coral populations. As corals are damaged, they must divert energy from growth to repair (Dinsdale and Harriott, 2004). If coral populations, an essential part of the ecology of reef environments, decrease, fish populations could be indirectly impacted by lack of available habitat. Data indicates that reefs damaged by anchoring activities may take more than 50 years to recover, if they are ever able to do so (Allen, 1992).

In December 2010, the Council implemented regulations to prohibit anchoring year-round in Bajo de Sico. However, there are currently no restrictions on anchoring within Abrir La Sierra. Without additional regulations, no change in the biological environments would be expected, therefore the coral reef populations would continue to be vulnerable to damage caused by anchors. Queen conch populations would also be vulnerable to illegal harvest. Although harvest and possession of queen conch is prohibited in the U.S. Caribbean exclusive economic zone, other than Lang Bank off St. Croix, García-Sais et al. (2010) found discarded, recently opened queen conch shells within Abrir La Sierra. However, if the Council chooses to allow the harvest of spiny lobster, vessels would need to drop anchors in order to allow divers to harvest the lobster. Enforcement would be difficult because vessels would be allowed to anchor, thus providing them the opportunity to harvest illegal queen conch.

Maintaining the current regulations would not benefit the physical environments and may in fact lead to declines if important reef processes are interrupted due to interactions with anchors, as previously discussed. The coral reef's ability to survive and replenish degraded habitat may be compromised by interruptions in these processes. Without healthy coral populations, reef ecosystems may begin to decline, affecting important habitat areas, which ultimately impacts the biological and ecological environment by reducing biodiversity and further limiting habitat.

**Option 1** would maintain the status quo. Under **Option 1**, vessels would be allowed to anchor in Abrir La Sierra. This option would provide the least amount of protection to the habitats in the closed area because it would permit anchoring, thus increasing the possibility of damage to important habitat, including coral.

**Option 2** would prohibit vessels from anchoring in Abrir La Sierra for three months. The anchoring prohibition would coincide with the three-month closure period if the Council chooses Option 1 from Action 1. For instance, if the Council chooses Option 1 Action 1 and Option 2 in Action 7, anchoring will be prohibited from December 1 through the end of February. This option would provide increased protection to the benthic habitat relative to Option 1 because vessels would only be able to anchor part of the year, but it would provide less protection than would Options 3 or 4.

**Option 3** would prohibit vessels from anchoring in Abrir La Sierra for six months. The anchoring prohibition would coincide with the six-month closure period if the Council chooses Option 2 or Option 3 from Action 1. For instance, if the Council chooses **Option 3** in both Action 1 and 7, anchoring will be prohibited from December 1 through May 31. This option would provide increased protection to the benthic habitat relative to Option 1 because vessels would only be able to anchor half of the year, but it would provide less protection than would Option 4.

**Option 4** would prohibit anchoring for the entire year. Under **Option 4**, vessels would not be allowed to anchor in Abrir La Sierra. This would provide year-round benefits to the corals and other benthic habitat found within Abrir La Sierra.

## Action 8: Prohibit Anchoring in Tourmaline Bank.

**Option 1:** No Action - do not prohibit anchoring by vessels in Tourmaline Bank.

**Option 2:** Prohibit anchoring for 3 months in Tourmaline Bank. The 3-month closure will coincide with the closure period chosen in Action 2.

**Option 3:** Prohibit anchoring for 6 months in Tourmaline Bank. The 6-month closure will coincide with the closure period chosen in Action 2.

**Option 4:** Prohibit anchoring year-round in Tourmaline Bank.

**Discussion:** In December 2010, the Council implemented regulations to prohibit anchoring year-round in Bajo de Sico. However, there are currently no restrictions on anchoring within Tourmaline Bank.

Without additional regulations, no change in the biological environments would be expected, therefore the coral reef populations would continue to be vulnerable to damage caused by anchors.

**Option 1** would maintain the status quo. Under **Option 1**, vessels would be allowed to anchor in Tourmaline Bank. This option would provide the least amount of protection to the habitats in the closed area because it would permit anchoring, thus increasing the possibility of damage to important habitat, including coral.

**Option 2** would prohibit vessels from anchoring in Tourmaline Bank for three months. The anchoring prohibition would coincide with the three-month closure period if the Council chooses Option 1 from Action 2. For instance, if the Council chooses Option 1 in Action 2 and Option 2 in Action 8, anchoring will be prohibited from December 1 through the end of February. This option would provide increased protection to the benthic habitat relative to Option 1 because vessels would only be able to anchor part of the year, but it would provide less protection than would Options 3 or 4.

**Option 3** would prohibit vessels from anchoring in Tourmaline Bank for six months. The anchoring prohibition would coincide with the six-month closure period if the Council chooses Option 2 or Option 3 from Action 2. For instance, if the Council chooses **Option 3** in both Action 1 and 8, anchoring will be prohibited from December 1 through May 31. This option would provide increased protection to the benthic habitat relative to Option 1 because vessels would only be able to anchor half of the year, but it would provide less protection than would Option 4.

**Option 4** would prohibit anchoring for the entire year. Under **Option 4**, vessels would not be allowed to anchor in Tourmaline Bank. This would provide year-round benefits to the corals and other benthic habitat found within the area.

## Action 9: Prohibit Anchoring in Bajo de Sico.

**Option 1:** No Action – maintain the year-round prohibition on anchoring by vessels in Bajo de Sico.

**Option 2:** Prohibit anchoring for 6 months in Bajo de Sico. The 6-month closure will coincide with the closure period chosen in Action 2.

**Option 3:** Prohibit anchoring for 3 months (December 1 through the end of February) in Bajo de Sico.

**Option 4:** Do not prohibit anchoring in Bajo de Sico.

**Discussion:** In December 2010, the Council implemented regulations to prohibit anchoring year-round in Bajo de Sico. However, if the Council chooses to allow harvest of reef fish and spiny lobster (Action 6), vessels may need to anchor in order to harvest such species. This proposed action would allow the Council to lift portions of the anchoring prohibition to allow vessels the opportunity to fish for reef fish and/or spiny lobster.

**Option 1** would maintain the status quo. Under **Option 1**, vessels would not be allowed to anchor in Bajo de Sico any time during the year. This option would provide the greatest benefit to corals and habitat within Bajo de Sico because it would prohibit anchoring activities that may impact corals and other benthic habitats.

**Option 2** would prohibit anchoring in Bajo de Sico for 6 months. The anchoring prohibition would coincide with the 6-month closure period if the Council chooses **Option 1** or **3** from Action 3. The benefit to the benthic habitats, including corals, would be decreased from current protection under the status quo (**Option 1**). Under Option 2, important habitat areas may be subjected to interaction with anchors, thus resulting in, possibly irreparable damage.

**Option 3** would prohibit anchoring for 3 months. Similar to **Option 2**, the anchoring prohibition would coincide with the 3-month closure period (December 1 through the end of February) if the Council chooses **Option 2** from Action 3. After Option 4, this option would provide the least amount of protection to the habitats in Bajo de Sico because it would permit more anchoring than what is currently allowed.

**Option 4** would not prohibit anchoring within Bajo de Sico at all. Under **Option 4**, vessels would be allowed to anchor in Bajo de Sico any time during the year. This option would provide the greatest threat to corals and habitat within Bajo de Sico because it would allow anchoring activities that may impact corals and other benthic habitats.



## Action 10: Prohibit Spearfishing in Abrir La Sierra.

**Option 1:** No Action - do not prohibit spearfishing in Abrir La Sierra.

**Option 2:** Prohibit spearfishing in Abrir La Sierra for 3 months. The 3-month closure will coincide with the closure period chosen in Action 1.

**Option 3:** Prohibit spearfishing in Abrir La Sierra for 6 months. The 6-month closure will coincide with the closure period chosen in Action 1.

**Option 4:** Prohibit spearfishing year-round in Abrir La Sierra.

**Discussion:** Although spear is a selective gear, and there is a low probability of bycatch, spearfishing may have chronic negative effects on the fish populations located within an area. Studies demonstrate that areas protected from spearfishing have higher abundance and larger sizes of certain individuals than those areas where spear is allowed (Lloret et al., 2008). Common practice among spear fishers is to target the largest individual of a prized species thus causing a potential decrease in the average size of that species (Sluka and Sullivan, 1998). The desire for larger individuals is also evidenced by the number of documented record holders for large individuals harvested by spear (<http://iusarecords.com/index.html> and <http://freedive.net/ibsrc/index.htm>). By removing the larger fish, only smaller individuals are left to spawn, resulting in a decrease in size and age at sexual maturation, as well the average size of the population as a whole (Sluka and Sullivan, 1998). Groupers, in particular, are especially vulnerable because many species are protogynous hermaphrodites, changing from females to males as they mature (Sluka and Sullivan, 1998). If larger fish are preferentially targeted, fertilization rate may be reduced and spawning success compromised. Because the Bajo de Sico, Tourmaline Bank, and Abrir La Sierra Bank are designated to serve as spawner refuges, such effects on spawning success are contrary to the stated goals of these closed areas.

**Option 1** would maintain the status quo. Under **Option 1**, fishers would be permitted to use spear inside Abrir La Sierra. This would provide no additional protection to the biological resources than what they currently have. Without regulations on spearfishing, the largest individuals of each species are vulnerable to harvest. As discussed above, such removal of large individuals can be detrimental to the overall population.

**Option 2** would prohibit spearfishing for any species within Abrir La Sierra for 3 months. If the Council chooses Option 1 from Action 1, spearfishing would be prohibited during the same 3 month closure period. This would allow fishers to use spear to harvest reef fish and spiny lobster during the open

season. While providing some protection from harvest, larger individuals would still be vulnerable to harvest for 9 months of the year.

**Option 3** would prohibit the use of spear to harvest any species from Abrir La Sierra for 6 months. Similar to Option 2, the prohibition of spearfishing would coincide with the 6 month closure period if the Council chooses Option 2 or Option 3 from Action 1. For instance, if the Council chooses Option 2 in Action 1 and **Option 3** in Action 10, spearfishing will be prohibited from October 1 through March 31. This option would provide even more protection to reef fish and spiny lobster than the current regulations and **Option 2**. Under this option, large individuals would be protected from selective harvest for half of the year, leaving 6 months available to potentially spawn.

**Option 4** would prohibit the use of spear for the entire year. Under **Option 4**, vessels would not be allowed to harvest any species using spear in Abrir La Sierra. Of all the options, **Option 4** provides the greatest benefit to the biological resources within the area. With a year-round prohibition on spearfishing, large individuals in particular would not be targeted and would otherwise be provided the same seasonal closure protection as smaller individuals.

## Action 11: Prohibit Spearfishing in Tourmaline Bank.

**Option 1:** No Action - do not prohibit spearfishing in Tourmaline Bank.

**Option 2:** Prohibit spearfishing in Tourmaline Bank for 3 months. The 3-month closure will coincide with the closure period chosen in Action 2.

**Option 3:** Prohibit spearfishing in Tourmaline Bank for 6 months. The 6-month closure will coincide with the closure period chosen in Action 2.

**Option 4:** Prohibit spearfishing year-round in Tourmaline Bank.

**Discussion:** **Option 1** would maintain the status quo. Under **Option 1**, fishers would be permitted to use spear inside Tourmaline Bank. This would provide no additional protection to the biological resources than what they currently have. Without regulations on spearfishing, the largest individuals of each species are vulnerable to harvest. As previously discussed, such removal of large individuals can be detrimental to the overall population.

**Option 2** would prohibit spearfishing for any species within Tourmaline Bank for 3 months. If the Council chooses Option 1 in Action 2, spearfishing would be prohibited during the same 3 month closure period. This would allow fishers to use spear to harvest reef fish and spiny lobster during the open season. While providing some protection from harvest, larger individuals would still be vulnerable to harvest for 9 months of the year.

**Option 3** would prohibit the use of spear to harvest any species from Tourmaline Bank for 6 months. Similar to Option 2, the prohibition of spearfishing would coincide with the 6 month closure period if the Council chooses Option 2 or Option 3 from Action 2. For instance, if the Council chooses Option 2 in Action 2 and **Option 3** in Action 11, spearfishing will be prohibited from October 1 through March 31. This option would provide even more protection to reef fish and spiny lobster than the current regulations and **Option 2**. Under this option, large individuals would be protected from selective harvest for half of the year, leaving 6 months available to potentially spawn.

**Option 4** would prohibit the use of spear for the entire year. Under **Option 4**, vessels would not be allowed to harvest any species using spear in Tourmaline Bank. Of all the options, **Option 4** provides the greatest benefit to the biological resources within the area. With a year-round prohibition on spearfishing, large individuals in particular would not be targeted and would otherwise be provided the same seasonal closure protection as smaller individuals.

## Action 12: Prohibit Spearfishing in Bajo de Sico.

**Option 1:** No Action - do not prohibit spearfishing in Bajo de Sico.

**Option 2:** Prohibit spearfishing in Bajo de Sico for 3 months. The 3-month closure will coincide with the closure period chosen in Action 3.

**Option 3:** Prohibit spearfishing in Bajo de Sico for 6 months. The 6-month closure will coincide with the closure period chosen in Action 3.

**Option 4:** Prohibit spearfishing year-round in Bajo de Sico.

**Discussion:** **Option 1** would maintain the status quo. Under **Option 1**, fishers would be permitted to use spear inside Bajo de Sico. This would provide no additional protection to the biological resources than what they currently have. Without regulations on spearfishing, the largest individuals of each species are vulnerable to harvest. As previously discussed, such removal of large individuals can be detrimental to the overall population.

**Option 2** would prohibit spearfishing for any species within Bajo de Sico for 3 months. If the Council chooses Option 2 from Action 3, spearfishing would be prohibited during the same 3 month closure period. This would allow fishers to use spear to harvest reef fish and spiny lobster during the open season. While providing some protection from harvest, larger individuals would still be vulnerable to harvest for 9 months of the year.

**Option 3** would prohibit the use of spear to harvest any species from Bajo de Sico for 6 months. Similar to Option 2, the prohibition of spearfishing would coincide with the 6 month closure period if the Council chooses Option 1 or Option 3 from Action 3. For instance, if the Council chooses Option 1 in Action 3 and **Option 3** in Action 12, spearfishing will be prohibited from October 1 through March 31. This option would provide even more protection to reef fish and spiny lobster than the current regulations and **Option 2**. Under this option, large individuals would be protected from selective harvest for half of the year, leaving 6 months available to potentially spawn.

**Option 4** would prohibit the use of spear for the entire year. Under **Option 4**, vessels would not be allowed to harvest any species using spear in Bajo de Sico. Of all the options, **Option 4** provides the greatest benefit to the biological resources within the area. With a year-round prohibition on spearfishing, large individuals in particular would not be targeted and would otherwise be provided the same seasonal closure protection as smaller individuals.

## Summary

The scoping process is designed to obtain input from fishers, the general public, and the local agencies representatives on these and other action and alternatives considered by the Council. For example, the scoping process will allow the Council to share with the public the extent of actions, the range of alternatives, and types of impacts to be evaluated when developing compatible regulations between the three closed areas. There will also be further opportunities for the public to submit comments and suggestions. Based on the public participation and input in the development amendment, the Council will identify and eliminate issues determined to be insignificant or that could be addressed in other documents.

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# Appendix A: List of Reef Fish Species

## Lutjanidae--Snappers

### Unit 1

Black snapper, *Apsilus dentatus*  
Blackfin snapper, *Lutjanus buccanella*  
Silk snapper, *Lutjanus vivanus*  
Vermilion snapper, *Rhomboplites aurorubens*  
Wenchman, *Pristipomoides aquilonaris*

### Unit 2

Cardinal, *Pristipomoides macrophthalmus*  
Queen snapper, *Etelis oculatus*

### Unit 3

Gray snapper, *Lutjanus griseus*  
Lane snapper, *Lutjanus synagris*  
Mutton snapper, *Lutjanus analis*  
Dog snapper, *Lutjanus jocu*  
Schoolmaster, *Lutjanus apodus*  
Mahogany snapper, *Lutjanus mahogoni*

### Unit 4

Yellowtail snapper, *Ocyurus chrysurus*

## Serranidae--Sea basses and Groupers

### Unit 1

Nassau Grouper, *Epinephelus striatus*

### Unit 2

Goliath grouper, *Epinephelus itajara*

### Unit 3

Coney, *Epinephelus fulvus*  
Graysby, *Epinephelus cruentatus*  
Red hind, *Epinephelus guttatus*  
Rock hind, *Epinephelus adscensionis*

### Unit 4

Black grouper, *Mycteroperca bonaci*  
Red grouper, *Epinephelus morio*  
Tiger grouper, *Mycteroperca tigris*  
Yellowfin grouper, *Mycteroperca venenosa*

### Unit 5

Misty grouper, *Epinephelus mystacinus*  
Yellowedge grouper, *Epinephelus flavolimbatus*

Haemulidae--Grunts

White grunt, *Haemulon plumierii*  
Margate, *Haemulon album*  
Tomtate, *Haemulon aurolineatum*  
Bluestriped grunt, *Haemulon sciurus*  
French grunt, *Haemulon flavolineatum*  
Porkfish, *Anisotremus virginicus*

Mullidae--Goatfishes

Spotted goatfish, *Pseudupeneus maculatus*  
Yellow goatfish, *Mulloidichthys martinicus*

Sparidae--Porgies

Jolthead porgy, *Calamus bajonado*  
Sea bream, *Archosargus rhomboidalis*  
Sheepshead porgy, *Calamus penna*  
Pluma, *Calamus pennatula*

Holocentridae--Squirrelfishes

Blackbar soldierfish, *Myripristis jacobus*  
Bigeye, *Priacanthus arenatus*  
Longspine squirrelfish, *Holocentrus rufus*  
Squirrelfish, *Holocentrus adscensionis*

Malacanthidae--Tilefishes

Blackline tilefish, *Caulolatilus cyanops*  
Sand tilefish, *Malacanthus plumieri*

Carangidae--Jacks

Blue runner, *Caranx crysos*  
Horse-eye jack, *Caranx latus*  
Black jack, *Caranx lugubris*  
Almaco jack, *Seriola rivoliana*  
Bar jack, *Caranx ruber*  
Greater amberjack, *Seriola dumerili*  
Yellow jack, *Caranx bartholomaei*

Scaridae--Parrotfishes

Blue parrotfish, *Scarus coeruleus*  
Midnight parrotfish, *Scarus coelestinus*  
Princess parrotfish, *Scarus taeniopterus*  
Queen parrotfish, *Scarus vetula*  
Rainbow parrotfish, *Scarus guacamaia*  
Redfin parrotfish, *Sparisoma rubripinne*  
Redtail parrotfish, *Sparisoma chrysopteron*  
Stoptlight parrotfish, *Sparisoma viride*  
Redband parrotfish, *Sparisoma aurofrenatum*  
Striped parrotfish, *Scarus croicensis*



Acanthuridae--Surgeonfishes

- Blue tang, *Acanthurus coeruleus*
- Ocean surgeonfish, *Acanthurus bahianus*
- Doctorfish, *Acanthurus chirurgus*

Balistidae--Triggerfishes

- Ocean triggerfish, *Canthidermis sufflamen*
- Queen triggerfish, *Balistes vetula*
- Sargassum triggerfish, *Xanthichthys ringens*

Monacanthidae--Filefishes

- Scrawled filefish, *Aluterus scriptus*
- Whitespotted filefish, *Cantherhines macrocerus*
- Black durgon, *Melichthys niger*

Ostraciidae--Boxfishes

- Honeycomb cowfish, *Lactophrys polygona*
- Scrawled cowfish, *Lactophrys quadricornis*
- Trunkfish, *Lactophrys trigonus*
- Spotted trunkfish, *Lactophrys bicaudalis*
- Smooth trunkfish, *Lactophrys triqueter*

Labridae--Wrasses

- Hogfish, *Lachnolaimus maximus*
- Puddingwife, *Halichoeres radiatus*
- Spanish hogfish, *Bodianus rufus*

Pomacanthidae--Angelfishes

- Queen angelfish, *Holacanthus ciliaris*
- Gray angelfish, *Pomacanthus arcuatus*
- French angelfish, *Pomacanthus paru*

Aquarium Trade Species in the Caribbean Reef Fish FMP:

- Frogfish, *Antennarius spp.*
- Flamefish, *Apogon maculatus*
- Conchfish, *Astrapogon stellatus*
- Redlip blenny, *Ophioblennius atlanticus*
- Peacock flounder, *Bothus lunatus*
- Longsnout butterflyfish, *Chaetodon aculeatus*
- Foureye butterflyfish, *Chaetodon capistratus*
- Spotfin butterflyfish, *Chaetodon ocellatus*
- Banded butterflyfish, *Chaetodon striatus*
- Redspotted hawkfish, *Amblycirrhitus pinos*
- Flying gurnard, *Dactylopterus volitans*
- Atlantic spadefish, *Chaetodipterus faber*
- Neon goby, *Gobiosoma oceanops*

Rusty goby, *Priolepis hipoliti*  
Royal gramma, *Gramma loreto*  
Creole wrasse, *Clepticus parrae*  
Yellowcheek wrasse, *Halichoeres cyanocephalus*  
Yellowhead wrasse, *Halichoeres garnoti*  
Clown wrasse, *Halichoeres maculipinna*  
Pearly razorfish, *Hemipteronotus novacula*  
Green razorfish, *Hemipteronotus splendens*  
Bluehead wrasse, *Thalassoma bifasciatum*  
Chain moray, *Echidna catenata*  
Green moray, *Gymnothorax funebris*  
Goldentail moray, *Gymnothorax miliaris*  
Batfish, *Ogcocephalus spp.*  
Goldspotted eel, *Myrichthys ocellatus*  
Yellowhead jawfish, *Opistognathus aurifrons*  
Dusky jawfish, *Opistognathus*  
Cherubfish, *Centropyge argi*  
Rock beauty, *Holacanthus tricolor*  
Sergeant major, *Abudefduf saxatilis*  
Blue chromis, *Chromis cyanea*  
Sunshinefish, *Chromis insolata*  
Yellowtail damselfish, *Microspathodon chrysurus*  
Dusky damselfish, *Pomacentrus fuscus*  
Beaugregory, *Pomacentrus leucostictus*  
Bicolor damselfish, *Pomacentrus partitus*  
Threespot damselfish, *Pomacentrus planifrons*  
Glasseye snapper, *Priacanthus cruentatus*  
High-hat, *Equetus acuminatus*  
Jackknife-fish, *Equetus lanceolatus*  
Spotted drum, *Equetus punctatus*  
Scorpaenidae--*Scorpionfishes*  
Butter hamlet, *Hypoplectrus unicolor*  
Swissguard basslet, *Liopropoma rubre*  
Greater soapfish, *Rypticus saponaceus*  
Orangeback bass, *Serranus annularis*  
Lantern bass, *Serranus baldwini*  
Tobaccofish, *Serranus tabacarius*  
Harlequin bass, *Serranus tigrinus*  
Chalk bass, *Serranus tortugarum*  
Caribbean tonguefish, *Symphurus arawak*  
Seahorses, *Hippocampus spp.*  
Pipefishes, *Syngnathus spp.*  
Sand diver, *Synodus intermedius*  
Sharpnose puffer, *Canthigaster rostrata*  
Porcupinefish, *Diodon hystrix*