1/13/06

SCOPING DOCUMENT FOR AMENDMENT 27 TO THE REEF FISH FMP AND AMENDMENT 14 TO THE SHRIMP FMP

INTRODUCTION

The importance of red snapper as a commercial and recreational commodity, and the considerable influence of the shrimp trawl fishery on the status of the red snapper stock, has challenged managers to balance competing interests and goals in managing this resource since the late 1980s. The relatively poor performance of bycatch reduction devices (BRDs) used in shrimp trawl gear, coupled with attrition from the shrimp fishery and recent hurricanes in the Gulf of Mexico, have further complicated management decisions by making it difficult to assess current and short-term expectations for shrimp trawl effort and bycatch.

Amendment 1 to the Reef Fish Fishery Management Plan (FMP) established the first rebuilding plan for red snapper in 1990, which was designed to rebuild the stock by the year 2000. This plan has been revised several times following changing scientific advice, new information on red snapper biology (e.g., recommended rebuilding timeframe, maximum age), and several new stock assessments. The most recent red snapper rebuilding plan, implemented in 2004 through Amendment 22 to the Reef Fish FMP, is expected to end overfishing of red snapper by 2009 or 2010, and rebuild the stock by 2032. The plan allows catch to remain constant at 9.12 million pounds (MP), assuming BRDs and a reduction in effort will reduce shrimp trawl bycatch by 60-70 percent. The plan requires periodic review of rebuilding progress and provides for needed adjustments should rebuilding occur more slowly or rapidly than predicted.

The 1999 assessment on which the current plan is based (Schirripa and Legault 1999) linked the fishing mortality rates associated with the directed and shrimp trawl bycatch component of the red snapper fishery, and required both rates be reduced proportionally to maximize yield. The estimates of biomass at maximum sustainable yield (MSY) produced by the assessment were highly uncertain and much higher than historical yields (GMFMC 2004). The assessment's conclusions of stock status were greatly affected by assumptions about the stock-recruitment relationship, juvenile natural mortality rates, and fishery selectivity. Because of these uncertainties, the assessment recommended a range of stock status values linked to stock productivity, acknowledging future changes in fishery selectivity assumptions would allow more realistic estimates of MSY to be developed.

The most recent red snapper stock assessment, conducted in 2005, was based on a different model than that employed in the 1999 assessment. This new model (CATCHEM) was a generalization of the previous approach, and allowed for more flexibility and greater mathematical rigor (SEDAR7 AS 2004). However, modelers involved in the 2005 assessment updated and re-ran the 1999 assessment model (ASAP) for purposes of comparison. The updated ASAP model was determined to be instable

and sensitive to various model parameters. In contrast, the CATCHEM model was much less sensitive to changes in model parameters, such as steepness of the spawner-recruit function and natural mortality of age-0 and age-1 fish. Overall, the CATCHEM model used in the 2005 assessment fit most data well, and produced stock productivity estimates which were much less sensitive than those provided by past assessments (SEDAR7 AS 2004).

Several other key changes made in the 2005 assessment resulted in significant differences in red snapper stock status parameter estimates. These included incorporation of an ultra-historic time series of landings data, higher assumed natural mortality rates for age-0 and age-1 red snapper, higher estimates of discard mortality in the directed fishery, and de-linked directed and shrimp trawl fishing mortality selectivities. The use of an ultra-historic landings time series allowed for greater data contrast and better fitting of model parameters. Increased natural mortality rates for juvenile red snapper reduced the amount of discards attributed to the shrimp trawl fishery, as more juvenile red snapper were assumed to die from natural causes rather than from bycatch mortality. Higher discard mortality estimates in the directed fishery increased the mortality rate attributed to that fishery. Finally, de-linking fishing mortality selectivities allowed for examination of a greater range of MSY estimates.

Overall, the 2005 assessment concluded the red snapper stock remains overfished and is undergoing overfishing. These conclusions are consistent with those of past assessments, despite changes in methodology and status determination criteria (SEDAR CS 2005). According to the assessment, red snapper fishing mortality rates are too high in both the directed and shrimp fisheries. While the directed fishery contributes a greater portion of fishing mortality than previously thought because of higher juvenile natural mortality estimates and directed fishery release mortality rates, shrimp trawl bycatch of red snapper remains a significant source of mortality.

The MSY estimates produced by the 2005 assessment are significantly less than those produced by the 1999 assessment, and vary greatly based on the level of directed and shrimp trawl fishery bycatch reduction. Under a scenario of no additional bycatch reduction in either the directed or shrimp fisheries, MSY is estimated to be 11.3 million pounds (MP). Conversely under the most optimistic bycatch reduction scenario, MSY is estimated to be 25.4 MP, if bycatch across all fisheries can be reduced by approximately 76%. Thus, MSY can be expressed as ranging from 11 MP to 25 MP. Estimates on the lower end of the range are undesirable and unlikely since economic factors and measures under development by the Gulf Council are expected to reduce bycatch. Conversely, estimates in the upper end of the MSY range may be unrealistic since they assume potentially impracticable levels of bycatch reduction unless effort in the shrimp fishery is substantially reduced from past years. Optimal MSY levels likely lie within this range.

Recognizing the problems inherent in managing red snapper and estimating MSY, the SEDAR report recommended fishery managers focus attention on “short term (5-10 years) directions of management advice, and how to tend toward a more desired state, without unduly emphasizing specific targets and how to attain them (SEDAR AS 2004).”

PURPOSE OF AND NEED FOR ACTION

The Magnuson-Stevens Fishery Conservation and Management Act (M-SFCMA) requires the NOAA Fisheries Service and regional fishery management councils (councils) to prevent overfishing, and achieve, on a continuing basis, the optimum yield (OY) of federally managed fish stocks. The purpose of these mandates is to ensure fishery resources are managed for the greatest overall benefit to the nation, particularly with respect to providing food production and recreational opportunities, and protecting marine ecosystems. To further this goal, the M-SFCMA also requires federal fishery managers minimize bycatch and bycatch mortality to the extent practicable.

According to a 2005 SEDAR assessment (SEDAR 7 2005), the Gulf of Mexico red snapper stock has been subject to overfishing by both the directed fishery and the shrimp trawl fishery. Excessive directed and incidental fishing mortality rates may jeopardize the success of the red snapper rebuilding plan approved in Amendment 22 to the Gulf of Mexico Reef Fish Fishery Management Plan (FMP) and, therefore, the fishery's ability to produce OY over the long term. The primary purposes of this amendment to the Gulf Council's Reef Fish and Shrimp FMPs are to address 2005 SEDAR 7 assessment recommendations related to further reducing directed and incidental fishing mortality on the red snapper stock and to manage effort in the shrimp fishery to prevent excessive bycatch of juvenile red snapper. While recognizing SEDAR advice to focus attention on needed short-term adjustments rather than specific management targets, the Council has specified a preliminary objective of rebuilding the stock to a B_{MSY} level that corresponds with a spawning potential ratio of between 20 and 35 percent.

Traditional fishery management tools, such as total allowable catch quotas (TACs) and effort controls, provide the Gulf Council with relatively straightforward alternatives to reduce directed fishing mortality in the commercial and recreational red snapper fisheries. The Council has generally controlled directed mortality in these fisheries with a TAC, which is allocated between the commercial and recreational sectors in a 51/49 split. The Council is evaluating in this amendment alternative TACs designed to end overfishing of red snapper in the directed fishery.

The Council is currently considering in Amendment 26 to the Reef Fish FMP a transferable Individual Fishing Quota (IFQ) program designed to maximize the socioeconomic benefits associated with commercial quotas in order to achieve OY from the fishery. Therefore, the Council is not considering establishing or adjusting seasonal closures or other regulations designed to manage the commercial sector's TAC allocation. However, the Council is considering establishing or adjusting regulations in the recreational fishery, as needed, to constrain recreational catches to the quotas prescribed by alternative TACs.

Catch quotas, minimum size limits, bag limits, and seasonal closures, are generally effective in limiting total fishing mortality, the type of fish targeted, the number of targeted fishing trips, and/or the time spent pursuing a species. However, these management tools have the unavoidable adverse effect of creating regulatory discards.

Discard mortality can limit the amount by which TACs reduce fishing mortality if not adequately documented and accounted for in stock assessments. Thompson (2005) reports the discard mortality rate in the commercial and recreational red snapper fisheries is higher than previously thought. The best available scientific information estimates a commercial discard mortality rate ranging from 71 percent (eastern Gulf) to 82 percent (western Gulf), and a recreational discard mortality rate ranging from 15 percent (eastern Gulf) to 40 percent (western Gulf). In response to this information, the Council is considering in this amendment alternatives to further reduce bycatch in the directed red snapper fisheries to assist in rebuilding the red snapper stock and to minimize bycatch and bycatch mortality in those fisheries to the extent practicable.

Reducing the incidental take of juvenile red snapper in the Gulf of Mexico shrimp fishery is substantially more complicated than reducing bycatch in the directed red snapper fishery because bycatch in the shrimp fishery is largely tied to the amount of effort the fleet applies in harvesting shrimp. Recent information suggests BRDs used in shrimp trawl gear have not been as effective as previously thought, and a comprehensive effort management program may be necessary to achieve the large-scale bycatch reduction needed to end overfishing of red snapper by the Gulf of Mexico shrimp fishery.

The Council is proposing in this amendment to revise the BRD certification criterion, with the goal of improving BRD performance. The current criterion considers only red snapper bycatch and is based on an outdated model, the assumptions of which are no longer considered valid. This has resulted in unrealistic expectations for BRD performance, reduced the efficiency of testing and characterizing BRD performance, and severely limited the types and numbers of BRDs approved for use in the fishery. Revising the BRD certification criterion to address shrimp trawl bycatch more comprehensively and realistically is expected to increase flexibility, promote innovation, and allow for the certification of BRDs that achieve greater reductions in red snapper bycatch than those currently realized.

Additionally, the Council is evaluating in this amendment alternatives for a target effort level to prevent excessive bycatch of juvenile red snapper. By preventing effort from exceeding an optimal level that allows for the continued rebuilding of the red snapper stock, the Council is meeting its mandate to end overfishing, while achieving a secondary purpose of improving socioeconomic conditions in the shrimp fishery.

The Council cannot evaluate at this time whether current effort in the shrimp fishery is above or below the target level given uncertainties about how poor market conditions and the 2005 hurricane season have affected fishery participants. However, establishing a maximum allowable effort target and implementing measures such as time-area closures to prevent such effort from increasing, will provide for timely address of the former problem of bycatch mortality of juvenile red snapper in shrimp trawls. Additionally, programs proposed by the Council in Shrimp FMP Amendment 13 are intended to provide needed data and information on participation, effort, and bycatch in the shrimp fishery. However, it will be difficult to understand the effects and tradeoffs of alternative effort controls and reduction programs for a number of years.

The schedule for Amendment 14/27 is driven by the need to implement any proposed TAC adjustments prior to the 2007 fishing season and the potential implementation of the Council's proposed IFQ program. The Council is concurrently considering alternatives to keep the directed fishery harvest within the specified TAC and to cap/reduce effort in the shrimp fishery that will support the existing rebuilding program for red snapper.

POSSIBLE ACTIONS

Action 1. Alternatives to set total allowable catch (TAC) for red snapper

Alternative 1. No action – TAC remains at 9.12 million pounds (MP)
Alternative 2. TAC is 7.0 MP
Alternative 3. TAC is 6.0 MP
Alternative 4. TAC is 5.0 MP
Alternative 5. TAC is 4.0 MP
Alternative 6. TAC is 3.0 MP
Alternative 7. TAC is 2.0 MP

Discussion: Amendment 22 established the current red snapper rebuilding plan. This rebuilding plan was based on projections of the 1999 red snapper assessment and established a 31-year rebuilding target; the longest time period recommended by the NMFS National Standard Guidelines (NSGs). The rebuilding plan maintained the current TAC of 9.12 mp for the directed red snapper fishery under a constant catch rebuilding strategy and required periodic reviews of the stock to ensure that rebuilding was progressing at an acceptable rate. The plan also projected overfishing would end between 2009 and 2010, and the stock would be rebuilt by 2032. In 2005, a new red snapper stock assessment was completed (SEDAR 7 2005). Therefore, as stipulated by the red snapper rebuilding plan, TAC needs to be reevaluated.

The 2005 SEDAR 7 used data through 2003 and concluded that while the red snapper stock was still overfished and undergoing overfishing, the stock was showing signs of improvement (see the discussion of the assessment in the Introduction). However, the assessment also concluded reductions in red snapper Fs in both the directed and shrimp trawl fisheries were warranted to maintain rebuilding. In selecting TAC, SEDAR 7 (2005) provided precautionary advice to the Council. Because of uncertainty in the stock-recruitment relationship and the effects of shrimp trawl bycatch, SEDAR advised not to emphasize specific rebuilding targets or how to attain them, but focus on short-term (5-10 year) goals that rebuild the stock in the desired direction. SEDAR also pointed out in the assessment workshop (SEDAR 7 [2005]) that the Council needs to determine what limitations shrimp trawl bycatch has on the red snapper stock's ultimate stock status. Thus, selecting a TAC needs to balance the tradeoff between bycatch reduction and rebuilding stock biomass to a practicable level given the extent shrimp trawl bycatch can be reduced.

Table 1 from Thompson (2005) illustrates how red snapper shrimp trawl bycatch and

directed fishery discard mortalities can effect future rebuilding. The yield stream column shows with no additional reduction in the shrimp bycatch mortality rate (0) and given a constant fishing mortality rate in the directed fishery of F_{MSY}, TAC can be set as high as 7 MP. However, even though this strategy would end overfishing, the biomass that the stock could grow to and plateau at is $B_{5\%SPR}$, a stock biomass much lower than proxies discussed in the past by the Council ($B_{20\%SPR}$ to $B_{30\%SPR}$). By increasing or reducing shrimp bycatch mortality, the stock biomass level the stock can rebuild to is either reduced or increased. For example, reducing current shrimp trawl bycatch by 60 percent allows the stock to grow to $B_{9\%SPR}$, while doubling shrimp trawl bycatch (+100 percent) reduces the stock biomass to $B_{3\%SPR}$. The stock rebuilding potential can be greatly increased if bycatch is reduced in both the shrimp trawl and directed fisheries. The equal proportional reduction rebuilding path shown in Table 1 reduces bycatch and discard mortality in the shrimp trawl and directed fisheries equally by 76 percent. If these levels could be achieved, then the stock could rebuild to a much higher biomass level of $B_{26\%SPR}$.

Table 1. Yield stream projections under different bycatch mortality rate assumptions (from Thompson 2005).

Table. Yield (mp) stream projections for F maximizing long-term yield for base age 0 model conditioned on indicated shrimp bycatch mortality rate changes and future recruitment equal to recent average.

	% change in shrimp bycatch mortality rate									
Year	0	-10	-20	-30	-40	-50	-60	+100	Equal Proportional Reduction	Equal Proportional Reduction to Achieve 30% SPR
2007	7.0	7.1	7.2	7.4	7.4	7.5	7.7	5.9	5.3	4.8
2008	7.5	7.6	7.7	7.8	7.8	8.0	8.1	6.5	6.7	6.1
2009	8.0	8.1	8.2	8.4	8.5	8.6	8.8	6.8	8.4	7.8
2010	8.4	8.6	8.9	9.2	9.4	9.7	10.1	6.7	10.4	9.7
2011	8.9	9.3	9.7	10.2	10.7	11.2	11.9	6.3	12.6	11.9
2012	9.3	9.8	10.4	11.1	11.8	12.6	13.5	5.9	14.6	14.0
2013	9.6	10.3	11.0	11.8	12.7	13.7	14.9	5.6	16.4	15.8
2014	9.9	10.6	11.5	12.4	13.4	14.6	15.9	5.4	17.8	17.2
2015	10.1	10.9	11.8	12.8	13.9	15.2	16.6	5.3	18.9	18.4
2016	10.3	11.1	12.1	13.1	14.3	15.7	17.2	5.3	19.9	19.4
2017	10.5	11.3	12.3	13.4	14.6	16.0	17.6	5.3	20.6	20.2
2018	10.6	11.5	12.5	13.7	14.9	16.4	18.0	5.3	21.3	20.9
2019	10.7	11.6	12.7	13.9	15.2	16.7	18.3	5.3	21.9	21.6
2020	10.8	11.8	12.8	14.0	15.4	16.9	18.6	5.3	22.5	22.1
2021	10.9	11.9	13.0	14.2	15.6	17.1	18.8	5.3	22.9	22.6
2022	11.0	12.0	13.1	14.3	15.7	17.3	19.0	5.3	23.3	23.0
2023	11.1	12.1	13.2	14.4	15.8	17.4	19.2	5.3	23.7	23.4
2024	11.1	12.1	13.3	14.5	15.9	17.5	19.3	5.3	24.0	23.7
2025	11.2	12.2	13.3	14.6	16.0	17.6	19.4	5.3	24.3	24.0
2026	11.2	12.2	13.4	14.7	16.1	17.7	19.5	5.3	24.5	24.3
2027	11.2	12.3	13.4	14.7	16.2	17.8	19.6	5.2	24.7	24.5
2028	11.3	12.3	13.5	14.8	16.2	17.9	19.7	5.2	24.9	24.7
2029	11.3	12.3	13.5	14.8	16.3	17.9	19.8	5.2	25.0	24.9
2030	11.3	12.4	13.5	14.9	16.3	18.0	19.8	5.2	25.2	25.0
2031	11.3	12.4	13.6	14.9	16.4	18.0	19.9	5.2	25.3	25.1
2032	11.3	12.4	13.6	14.9	16.4	18.0	19.9	5.2	25.4	25.2
Maximum Long-term Yield:	11.3	12.4	13.6	15.0	16.5	18.1	20.0	5.0	25.4	25.2
SPR in 2032	5%	6%	6%	7%	7%	8%	9%	3%	26%	30%

Given the discussion above, consideration in selecting TAC should take into account: 1) how quickly overfishing can be ended; 2) if, over the short term, the selected TAC allows the stock to rebuild in the desired direction; and 3) what levels of risk one is willing to take in making assumptions about how much reduction can occur in shrimp trawl and directed fishery bycatch mortalities. TAC alternatives provided in this scoping document range from 2 MP (Alternative 7) to 9.12 MP (Alternative 1; no action).

Alternative 1, no action, would maintain TAC at the current 9.12 MP level. Selection of this alternative could delay how rapidly overfishing would be halted. Analyses in Thompson (2005) indicate constant catches from 2007-2011 greater than 7 MP are not projected to permit the red snapper stock to attain the expected $F_{30\%SPR}$ harvest trajectory by 2012 (i.e., ending overfishing would occur after 2012). In order to rebuild the stock to $B_{30\%SPR}$, shrimp trawl bycatch reductions would have to be at least 70 percent above current levels for a 9 MP TAC to be effective (Thompson 2005).

TACs proposed by Alternatives 2-7 are less than status quo. Based on the assumption that no additional reductions in shrimp trawl bycatch mortality have occurred or will occur, reducing TAC to 7 MP (Alternative 2) would end overfishing because the F needed to harvest this TAC would be equal to F_{MSY}. Because TACs presented in Alternatives 3-7 are less than 7 MP, these alternatives would also end overfishing immediately. All the alternatives do provide for some short term rebuilding of the stock, but the degree that the stock increases in size is dependent on what level of TAC is

selected. A lower TAC yields a greater increase in SPR (Table 2). SPR could be tripled from 2007 to 2012 if a 2 MP TAC were selected, while the selection of a 6 MP TAC would double SPR.

Table 2. Projected increases in SPR from 2007 to 2012 of red snapper in the Gulf of Mexico assuming shrimp trawl bycatch and constant catch. Estimates of SPR were derived from constant catch phase plots provided by Thompson (2005).

TAC (MP)	SPR in 2007	SPR in 2012
9	2.4	3.0
7	2.4	4.2
6	2.4	4.8
5	2.4	5.4
4	2.4	6.0
3	2.4	6.6
2	2.4	7.2

Risk for rebuilding the stock can be further minimized if shrimp trawl bycatch and directed fishery discard mortalities can be reduced below pre-2005 levels. As described in the introduction, shrimp trawl bycatch has been a major source of fishing mortality and discard mortality from the directed fishery has been determined to contribute more to total F than previously thought. Therefore, any reductions in bycatch through other actions discussed in this document, and any reductions in bycatch due to changes in the shrimp and directed fishery effort as result of changing economic conditions and hurricanes, need to be considered in balancing rebuilding requirements and TAC.

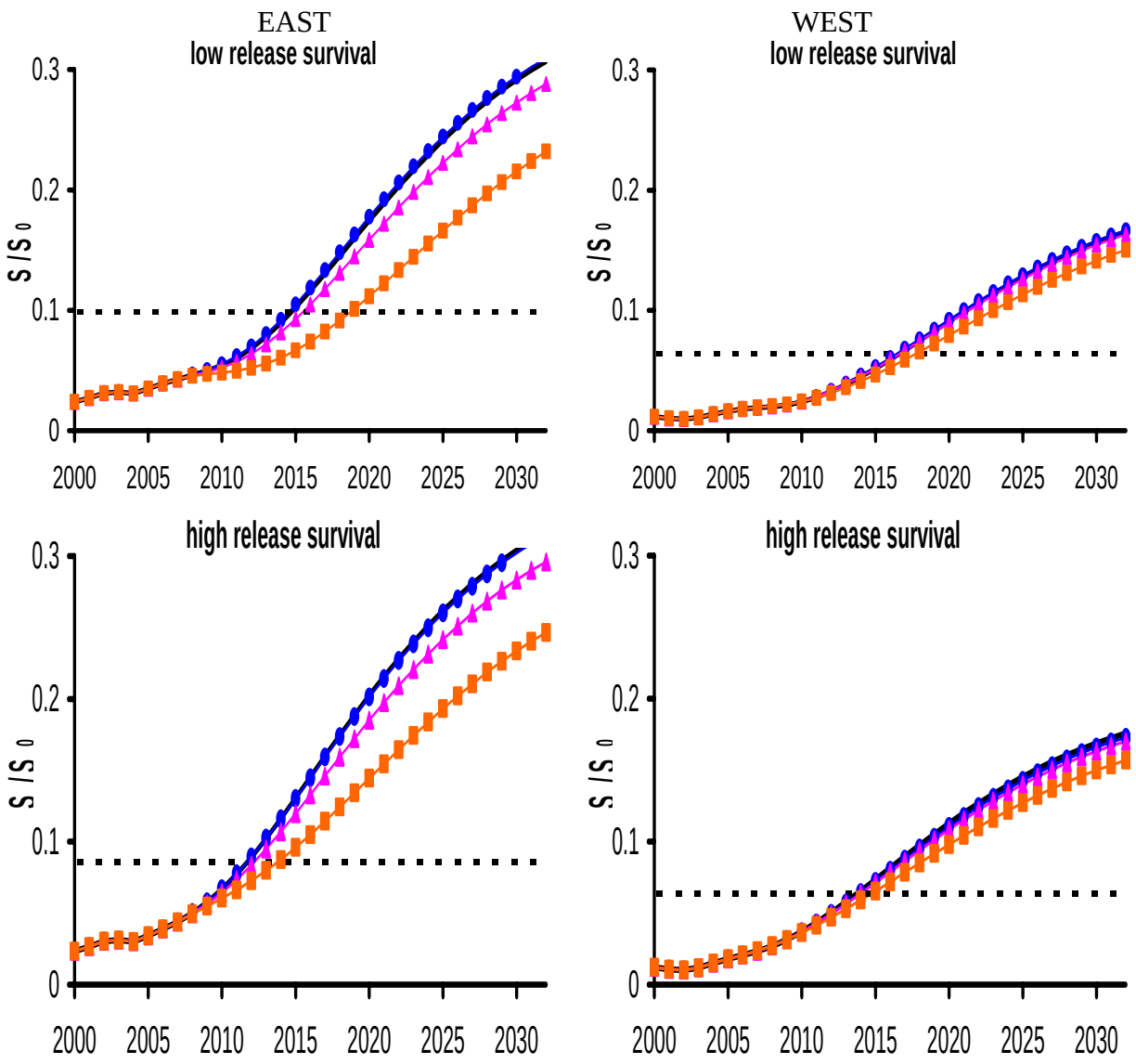
Action 2. Alternatives to set the minimum size limit for red snapper

Alternative 1. The minimum size limit for commercially caught red snapper is:
Option a. No action – the minimum size limit remains at 15 inches total length (TL)
Option b. The minimum size limit is 14 inches TL
Option c. The minimum size limit is 13 inches TL
Option d. The minimum size limit is 12 inches TL
Option e. Eliminate the minimum size limit

Alternative 2. The minimum size limit for recreationally caught red snapper is:
Option a. No action – the minimum size limit remains at 16 inches total length (TL)
Option b. The minimum size limit is 15 inches TL
Option c. The minimum size limit is 14 inches TL
Option d. The minimum size limit is 13 inches TL
Option e. The minimum size limit is 12 inches TL
Option f. Eliminate the minimum size limit

Discussion: Both commercial and recreational fishermen have asked that a reduction or elimination of the red snapper minimum size limit be considered in order to prevent waste from the mortality of undersized discards. If, theoretically, all released red snapper were to survive, then there is some size limit that maximizes the yield per recruit and the rate of stock rebuilding. However, if some of the released fish die, then the benefit is reduced and occurs at a smaller minimum size limit. The higher the discard mortality rate, the smaller the benefit from having a minimum size limit, and the smaller the size limit that results in that benefit. At some point, the benefit from having a minimum size limit disappears completely, resulting in forgone yield.

The current red snapper minimum size limits of 15 inches TL for the commercial fishery and 16 inches TL for the recreational fishery were adopted under assumed release mortalities of 33 percent commercial and 20 percent recreational. Based on more recent release mortality data, the 2005 stock assessment used recreational release mortality rates of 15 percent (eastern Gulf) and 40 percent (western Gulf), and commercial release mortality rates of 71 percent (eastern Gulf) and 88 percent (western Gulf) (Table 6.5 in the SEDAR 7 Red Snapper Data Workshop Report). At the request of the Council the National Marine Fisheries Service's Southeast Fisheries Science Center (NMFS/SEFSC) analyzed a range of size limits for their potential effects on TAC and on bycatch mortality reduction. Specifically, the NMFS/SEFSC examined the rate of stock recovery under the current size limits compared with no commercial size limit and status quo on the recreational size limit; a 13-inch commercial and recreational limit; and no size limit for commercial or recreational. The findings indicated that, for the commercial sector, there was virtually no benefit to having any size limit, and possibly a slight benefit to eliminating the size limit (black line and blue circles on graphs below). However, a 13-inch recreational and commercial size limit would slow the rebuilding (purple triangles in the graph below), and eliminating the size limit for both sectors would slow the rebuilding even more (orange squares in the following graph).



The figure above shows projected trends in spawning potential relative to unfished levels (S/S_0) for East (left panels) and West (right panels) Gulf red snapper based on the age-0 model with future recruitment set at 1984-2003 average levels, constant harvest of 9 MP and an additional 40 percent reduction in shrimp bycatch mortality rate. The top panels refer to the current base case, which has relatively low discard survival rates, and the bottom panels refer to the same model run with the relatively higher discard survival rates used during the 1999 assessment. The four scenarios run are status-quo (heavy black line), no commercial limit (blue circles, which is generally very close to and sometimes obscures the status-quo projection), 13-inch commercial and recreational limit (pink triangles) and no limit for commercial or recreational (orange squares). The dashed line in this case is the equilibrium spawning potential at marginal long-term maximum yield assuming an additional 40 percent reduction in shrimp bycatch mortality rate.

Alternative 1, Option a – This status quo option leaves the commercial minimum size limit at 15 inches TL. There is little if any difference in rebuilding rate between this and no size limit, but this alternative would produce the greatest amount of discard mortality of all the options.

Alternative 1, Option b – This option reduces the commercial minimum size limit to 14 inches TL. This size limit was not evaluated by the NMFS/SEFSC. However, since the analyses found little difference in rebuilding between 16 inches and no size limit, it is reasonable to conclude any size limit in between would also have little impact on rebuilding. This alternative would produce less discard mortality than status quo. Historically, there has been a higher market demand by restaurants for smaller plate-size fish, with a market premium of $0.25 per pound for 1 to 2 pound fish, so this alternative could increase market value of the red snapper by allowing a more desirable size to be marketed, resulting in a potential increase in industry revenues of approximately $23,650 (NMFS 1996). A higher market value for smaller fish could result in fishermen changing their fishing patterns, which could skew the results of the analyses.

Alternative 1, Option c – This option reduces the commercial minimum size limit to 13 inches TL. This alternative was not evaluated by NMFS/SEFSC except in combination with a recreational 13-inch size limit. For the commercial sector, the analyses found little difference in rebuilding between 16 inches and no size limit. It is reasonable to conclude that any commercial size limit in between would also have little impact on rebuilding. This alternative would produce less discard mortality than either status quo or Alternative 1b. As with option b, this alternative could increase market value of the red snapper by allowing a more desirable size to be marketed, but could also result in fishermen changing their fishing patterns to target the smaller fish.

Alternative 1, Option d – This option reduces the commercial minimum size limit to 12 inches TL. This was considered in the NMFS/SEFSC analyses to be the smallest size fish that would be commonly caught by the commercial fishery, although early red snapper stock assessments made before size limits were imposed reported catches to include sizes as small as 9 inches. If the assumption that this is the smallest size that will be caught by commercial fishermen is correct, then there is no difference in rebuilding rate between this and the other size limit options or no size limit. This alternative would produce less discard mortality than status quo, a 14-inch size limit, or a 13-inch size limit. As with options b and c, this alternative could increase market value of the red snapper by allowing a more desirable size to be marketed, but could also result in fishermen changing their fishing patterns to target the smaller fish.

Alternative 1, Option e – This option eliminates the commercial minimum size limit. The NMFS/SEFSC analyses indicate there is little if any difference in rebuilding rate between no size limits and size limits up to the status quo 15 inches. The analyses assumed that fish smaller than 12 inches would not be caught. A 1988 red snapper stock assessment, which was conducted before size limits were imposed, indicated catches in the bandit rig fishery as small as 9 inches between 1983-1987, although red snapper under 12 inches were caught in relatively small quantities. The 1988 assessment also indicated that the

modal length of red snapper caught with bandit gear was 20 inches. This alternative would eliminate bycatch mortality due to regulatory discards. However, if there is a higher market value for smaller fish, fishermen may change their fishing patterns to target the smaller fish.

Alternative 2, Option a - This status quo option leaves the recreational minimum size limit at 16 inches TL. The 16-inch minimum size limit was reported in Amendment 5 to be the size that would maximize yield per recruit at 33 percent release mortality. However, both the release mortality assumptions and knowledge of red snapper biology have changed since Amendment 5 was published in 1993, so it can no longer be stated with certainty that this is the size that produces maximum yield per recruit. Although this size limit produces a significant amount of discards and discard mortality, the NMFS/SEFSC analyses concluded that, due to the lower discard mortality rate of the recreational sector versus the commercial sector, stock rebuilding would still occur more rapidly than with size limits of 13 inches or less.

Alternative 2, Option b - This option reduces the recreational minimum size limit to 15 inches TL. Minimum size limits between 16 and 13 inches were not evaluated by NMFS/SEFSC. Although a 13-inch recreational minimum size limit was found to slow the rebuilding, it is possible that a size limit between 13 and 16 inches could either increase or decrease rebuilding rates. However, any change from status quo would likely be very small.

Alternative 2, Option c - This option reduces the recreational minimum size limit to 14 inches TL. Minimum size limits between 16 and 13 inches were not evaluated by NMFS/SEFSC. Similar to option b, it is possible that a size limit between 13 and 16 inches could either increase or decrease rebuilding rates.

Alternative 2, Option d - This option reduces the recreational minimum size limit to 13 inches TL. Although a reduction in the size limit would reduce discard mortality by allowing a larger proportion of the catch to be retained, the NMFS/SEFSC analyses indicated that this size limit would slow the rebuilding of the red snapper stock.

Alternative 2, Option e - This option reduces the recreational minimum size limit to 12 inches TL. This size limit was not evaluated by NMFS/SEFSC, but it falls within the range of recreational size limits that were found to slow down rebuilding (13 inches to no size limit). Although a 12-inch size limit would reduce discard mortality by allowing a larger proportion of the catch to be retained, it is reasonable to conclude that any size limit between 13 inches and no size limit would also slow rebuilding.

Alternative 2, Option f - This option eliminates the recreational minimum size limit. This would eliminate discard mortality due to regulatory discards, although there could be some discard mortality from high grading (i.e., throwing back smaller fish when larger fish are caught). The NMFS/SEFSC analyses indicated that, due to lower release mortality in the recreational fishery, eliminating the minimum size limit would slow rebuilding.

Action 3. Alternatives to change the beginning and ending dates of the recreational fishing season for red snapper

Alternative 1. No action – The recreational fishing season for red snapper remains as April 21 through October 31 of each year

Alternative 2. The fishing season shall be continuous, ending on October 31, and the start date shall correspond to the level of TAC selected

Alternative 3. The fishing season is set at 10 (or 15) days per month and the number of months that the season is open shall correspond to the level of TAC selected

Alternative 4. The fishing season is a combination of Alternatives 2 and 3, wherein it is continuous for 2 or 3 months, and other months have a 10- (or 15-) day season

Discussion: The Council may choose to shorten the existing season, shift the open season to a different part of the year, have the season be open for X days per month, or split it into two open seasons in order to allow both a summer and winter fishery. In order to analyze options for alternative seasons, it is necessary to know what the pattern of landings was prior to implementation of closed seasons. Table 3 is from Schirripa and Legault (1999), and shows the mean recreational red snapper landings by wave for the years 1993-1997. These were years when there was no quota or fixed season closure in the recreational fishery and thus represent the normal year-round fishing pattern.

Table 3. Mean red snapper landings by wave, 1993-1997. Landings are in 1,000's of fish.

Wave	Kept	% of Annual Landings
1 (Jan-Feb)	259	24%
2 (Mar-Apr)	173	16%
3 (May-Jun)	115	11%
4 (Jul-Aug)	116	11%
5 (Sep-Oct)	180	16%
6 (Nov-Dec)	248	23%

From the above table, it can be seen that the current April 21 to October 31 season represents a period when 41 percent of the landings occurred during 1993-1997; years when there was no closed season (for partial waves, the percent of landings for that wave is divided by the number of days in the wave to get an average daily percentage). If TAC is reduced (see Action 1) and the bag limit remains unchanged, then the open season would need to be reduced. However, other management measures could be modified or implemented (e.g., bag limits, captain and crew restrictions) to possibly maintain or extend the existing open season or at least accommodate a longer open season than would be allowed if no other management measures were considered.

Reef Fish Amendment 26, which will create an individual fishing quota (IFQ) system for the commercial red snapper fishery is being considered for implementation concurrent with development of this amendment. Under the IFQ system, commercial vessels will each be allocated a share of the quota which they will be allowed to catch at any time during the year, eliminating commercial closed seasons. Eliminating the commercial closed season while increasing the recreational closed season may increase user conflicts and a perception of unfair management even though the difference is simply the result of different management approaches for the commercial and recreational sectors (i.e., limiting commercial vessel harvests vs. limiting recreational fishing days). Adoption of a combination of management measures that will provide the longest feasible recreational fishing season at a given TAC will help to reduce such conflicts.

Alternative 1 leaves the recreational season at its current April 21 through October 31 dates. Depending upon the impact of bag limit reductions, it may be possible to leave the season as is even if the TAC is reduced. However, it is not possible to retain both the current season and current bag limit if TAC is reduced.

Alternative 2 adjusts the recreational season by shortening the existing season. This can be done either by opening the season later, closing it earlier, or a combination of the two. At the lowest levels of TAC being considered, this could result in a very short recreational fishing season, unless bag limits are also reduced. Depending upon the results of the bag limit analyses, at a moderate reduction in TAC, with reduced bag limits it may be possible retain or even lengthen the recreational fishing season.

Alternative 3 creates two recreational seasons, a summer season and a winter season. Winter is tourist season in south Texas, and this would allow some recreational red snapper fishing to occur during that period. However, this would result in a shorter summer season, which would impact the tourist season along the northern and central Gulf where tourism is greatest during summer months).

Alternative 4 opens the recreational season for a certain number of days each month, similar to the monthly openings of the commercial red snapper fishery. This could allow some red snapper fishing to occur year round. However, as with the commercial fishery, opening the recreational fishery for just a few days each month could create a derby mentality, as large numbers of fishermen seek to take advantage of small windows of opportunity. In addition to creating a pulse fishing that could locally deplete fishing areas that are better known and closer to port, this could compromise vessel safety and create conflicts between vessels due to having a large number of vessels out at once rather than spread out over the entire month.

Action 4. Alternatives to set the recreational bag limit for red snapper

Alternative 1. No action – the bag limit remains at 4 fish per person per day
Alternative 2. The bag limit is 3 fish per person per day
Alternative 3. The bag limit is 2 fish per person per day
Alternative 4. The bag limit is 1 fish per person per day

Discussion: Amendment 1 to the Reef Fish Fishery Management Plan (FMP) implemented a seven fish bag limit for red snapper in 1990. A 1995 regulatory amendment reduced the bag limit to five-fish and increased the minimum size limit to 15 inches in order to reduce recreational harvest. The bag limit was again reduced to four fish through interim regulations on December 31, 1998. This four fish bag limit was later continued through implementation of a regulatory amendment on October 1, 1999. The daily bag limit was reduced from five to four red snapper per person in order to extend the recreational fishing season. During implementation of this rule, industry participants indicated four fish was the minimum bag limit that would continue to attract for-hire customers.

Alternative 1 would maintain the four red snapper daily bag limit. If TAC is reduced and the four-fish bag limit is maintained, additional management measures (e.g., longer seasonal closure) would be necessary to reduce recreational landings to the TAC levels specified in Alternatives 2-7 of Action 1.

Alternatives 2-4 would reduce the red snapper daily bag limit from four to three, two, or one fish per angler. Actual reductions in harvest for each of these bag limits are not yet available, however, the lower the bag limit the greater the reduction in red snapper harvest. The amount the bag limit is reduced is contingent on the amount TAC is reduced (see Action 1) and whether or not other management measures are considered in combination with reductions to the bag limit (i.e., captain and crew restrictions, seasonal closures, or other measures).

Action 5. Alternatives to establish restrictions on the amount and type of directed fishery gear that may be used to harvest red snapper from the EEZ of the Gulf of Mexico

Alternative 1. No action – Do not establish additional restrictions on the amount and type of directed fishery gear that may be used to harvest red snapper from the EEZ of the Gulf of Mexico

Alternative 2. Require or encourage fishermen to use circle hooks, corrodible hooks, venting tools, and dehooking devices

Alternative 3. Specify the only allowable commercial gear for directed harvest of red snapper is vertical hook and line

Alternative 4. Limit the number of hooks on commercial hook and line gear to:
- Option a. 10 hooks
- Option b. 15 hooks
- Option c. 20 hooks

Discussion: Alternative 1 would not change the amount or type of gear allowed in the directed red snapper fishery. The primary gears used in the commercial red snapper fishery are hook-and-line, bandit rigs, and longlines. Hook-and-line and spears are the

primary gears used by recreational anglers. Table 4 summarizes the percent of commercial landings accounted for by various gears during 2002-2003. Similar information for the recreational fishery is not available, but hook-and-line is the predominant gear used by recreational anglers to harvest red snapper.

Table 4. Red snapper commercial landings by gear type, 2002-03. Data are from SEDAR 7 DW Report (2004).

Geartype	2002-03 Average Landings (lbs X 1000)	Percent Landings
Bandit Rig	2315	50.2%
Hook-and-line	2120	45.5%
Longline	166	3.6%
Other	33	0.7%
Unknown	1	0.0%

There are few restrictions on the type and quantity of gears used to harvest red snapper (see 50 CFR Part 622, Sections 30, 33, 34, 35, and 41). Allowable gears include longlines, handlines, bandit gear, buoy gear, fish traps, spears, powerheads, cast nets, and trawls. Fish traps are prohibited from being used within the reef fish stressed area and west of 85º 30' west longitude, and will be prohibited completely in the Gulf EEZ after February 7, 2007. Longlines are prohibited from being used inshore of approximately the 50 fathom boundary in the western Gulf of Mexico (west of Cape San Blas, Florida) and the 20 fathom boundary in the eastern Gulf of Mexico. Roller frame trawls and powerheads are prohibited from being used within the reef fish stressed area. Commercial vessels possessing a reef fish permit and operating trawl gear or entangling nets are limited to the red snapper recreational bag and possession limits.

Alternatives 2-4 would modify the existing gear restrictions described above. These alternatives are intended to reduce discard mortality resulting from the capture and release of fish. Alternative 2 would require or encourage fishermen to use circle hooks, corrodible hooks, venting tools, and dehooking devices. In 1999, the Council began encouraging the use of circle hooks when fishing for red snapper and other reef fish (Gulf Fishery News, Vol 21, No. 5, Oct-Dec 1999). Circle hooks, unlike 'J' hooks, require the fish and not the angler to set the hook. Because red snapper are aggressive feeders they often ingest or swallow hooks, which can result in hook-related injuries and bleeding. In general, circle hooks result in consistently lower release mortality rates for most species and fish are more often caught hooked in the jaw when using circle hooks. However, several factors reduce the effectiveness of circle hooks, including hook size, hook shape (offset or not offset), fishing style, and mouth morphology. Requiring fishermen to use circle hooks while targeting red snapper would also be difficult to enforce.

In the Gulf of Mexico, only one study has examined survival rates of red snapper caught on circle versus 'J' hooks. This tagging study concluded there was no apparent difference in the number of red snapper recaptured by hook type.

In the Gulf of Mexico, Mote Marine Laboratory is conducting ongoing studies evaluating factors affecting reef fish survival. Preliminary results from their circle hook study suggest there is no apparent difference in the percentage of red snapper captured by hook type, however, the results of their study were affected by the volunteer participants using their own hooks or modifying the offset of hooks provided by the study (Burns et al. 2004). During 2003, a comparison of release mortality of circle and "J" hooks was conducted as part of a long-term tag-recapture study off Alabama. Preliminary data indicates release mortality was reduced by approximately 50 percent by capture with circle hooks (Shipp, personal communication to GMFMC 2004).

Depth of capture can also affect mortality of red snapper. Several research studies have observed increasing discard mortality rates with depth (e.g., Dorf 2000, Koenig 2001, Burns et al. 2002, Wilson and Nieland 2004). Depth-related injuries may include ruptured gas bladders, eversion of the stomach, and distended abdomens. Alternative 2 would require or encourage the use of dehooking-devices and venting tools. These devices would assist anglers in releasing fish more quickly, thereby reducing handling time and stress for the captured fish. Venting tools allow anglers to remove excess gas from the gas bladders of red snapper, thereby increasing the chance the captured fish will swim down once released. Requiring or encouraging the use of corrodible hooks would help to reduce any potential long-term effects associated with not successfully removing a hook after capture. However, differences in the corrosion behavior of hooks make it difficult to define what is meant by a corrodible hook. Factors affecting corrodibility include water temperature, water pollutants/constituents, alterations to the hook surface, dissolved oxygen in the water, and water velocity. Stainless steel hooks can and do rust, given enough time and the right conditions. However, there are different grades of stainless steels, and a high grade stainless steel hook may last 10 to 20 times the lifetime of a poor grade stainless steel hook. Plated hooks may last until the plating is worn down or breached. In industry tests, the highest corrosion resistance was found to occur with high grade stainless steel hooks, followed by tin-plated, cadmium/tin plate, and low grade stainless steel. Relatively low corrosion resistance was found with nickel-plated, gold-plated, brass-plated, and bronzed hooks (Wilson 1990).

Alternative 3 would prohibit all fishing gears except vertical hook-and-line in the directed commercial red snapper fishery. Hook and line gear is defined as automatic reel, bandit gear, buoy gear, handline, longline, and rod and reel (50 CFR 622.2). Vertical hook-and-line therefore includes all of these gears except for bottom longlines. As mentioned above, handlines and bandit rigs account for greater than 95 percent of the annual red snapper landings. The primary gears used other than hook-and-line are longlines, fish traps, and spears. There are no records of buoy gear being used since 1991.

Prohibiting the use of longline gear may reduce discards to a small extent. Longlines, unlike vertical hook-and-line gear, allow red snapper and other reef fish to be retained on hooks for long periods of time while the longline is deployed and then reeled back in. However, because longlines account for a small percentage of the overall landings, are already restricted to waters deeper than 50 fathoms, and typically select for older, larger red snapper than other gear types (Allman et al. 2002), reduction in discards is expected

to be small. Prohibiting fish traps would have no affect on reducing discard mortality since fish traps are currently prohibited from being fished west of Cape San Blas, Florida, and will be phased out of the reef fish fishery on February 7, 2007. The actions contained within this amendment would not likely be implemented until 2007. Prohibiting spears would likely have no affect on reducing discard mortality. Spears are fished by sight allowing fishermen to harvest larger, legal-sized fish. There is no bycatch associated with spears unless undersized red snapper are incidentally speared.

Alternative 4 would limit the number of hooks that could be used on commercial hook-and-line gear to 10, 15, or 20 hooks. Limiting the number of hooks would reduce the amount of fish caught, thereby reducing release mortality by reducing the time spent handling and releasing fish brought on board the vessel. The reduced number of hooks could also increase survival rates of captured fish by reducing the amount of time red snapper spend on hook-and-line before being reeled to the surface.

Table 5. Number of hooks-per-line by gear type used on commercial red snapper fishing trips, 2003-2004. Data source: SEFSC logbook data file (last updated June 15, 2005).

Geartype	Number of Hooks per Line	Percentage of Trips		
		2003	2004	2003-04 avg
Handline	=< 10	88%	94%	91%
	=< 15	93%	97%	95%
	=< 20	96%	97%	96%
Bandit	=< 10	35%	41%	38%
	=< 15	69%	73%	71%
	=< 20	82%	82%	82%

Table 5 shows the number of hooks per line for the percentage of trips in 2003-04. Alternative 4a would affect 9 percent of commercial handline fishing trips and 62 percent of commercial bandit rig fishing trips. Alternative 4b would affect 5 percent of handline trips and 29 percent of bandit rig trips. Alternative 4c would affect the least number of commercial red snapper trips; only 4 percent of handline trips and 18 percent of bandit rig trips used more than 20 hooks-per-line during 2003-2004.

If the commercial minimum size limit is eliminated (see Action 2, Amendment 27/14), Alternatives 4a-c would not be necessary. Eliminating the commercial minimum size limit and requiring all red snapper to be landed would eliminate discards of red snapper making it unnecessary to establish restrictions on the number of hooks-per-line.

Action 6. Alternatives to restrict commercial red snapper fishing to waters in excess of:

Alternative 1. No action – Do not restrict commercial red snapper fishing by depth

Alternative 2. 10 fathoms

Alternative 3. 15 fathoms

Alternative 4. 20 fathoms

Alternative 5. Some other boundary line

Discussion: Differences in minimum size limits and season closures between commercial and recreational fisheries have resulted in conflicts between sectors. The minimum size limit for the commercial fishery is 15 inches TL while the minimum size limit for the recreational fishery is 16 inches TL. The commercial fishing season is divided between a spring (starting in February) and fall (starting in October) subquota where harvest is allowed for the first 10 days of each month until the subquotas are landed. These regulatory differences have caused anglers to allege commercial fishermen are fishing out favorite fishing areas prior to the opening of the recreational season. This user conflict could be further exacerbated should the minimum size limit for the commercial fishery be eliminated (see Action 2 in the scoping document for Amendment 27/14). Thus, restricting commercial fishermen to deeper depths could reduce user conflicts between the sectors.

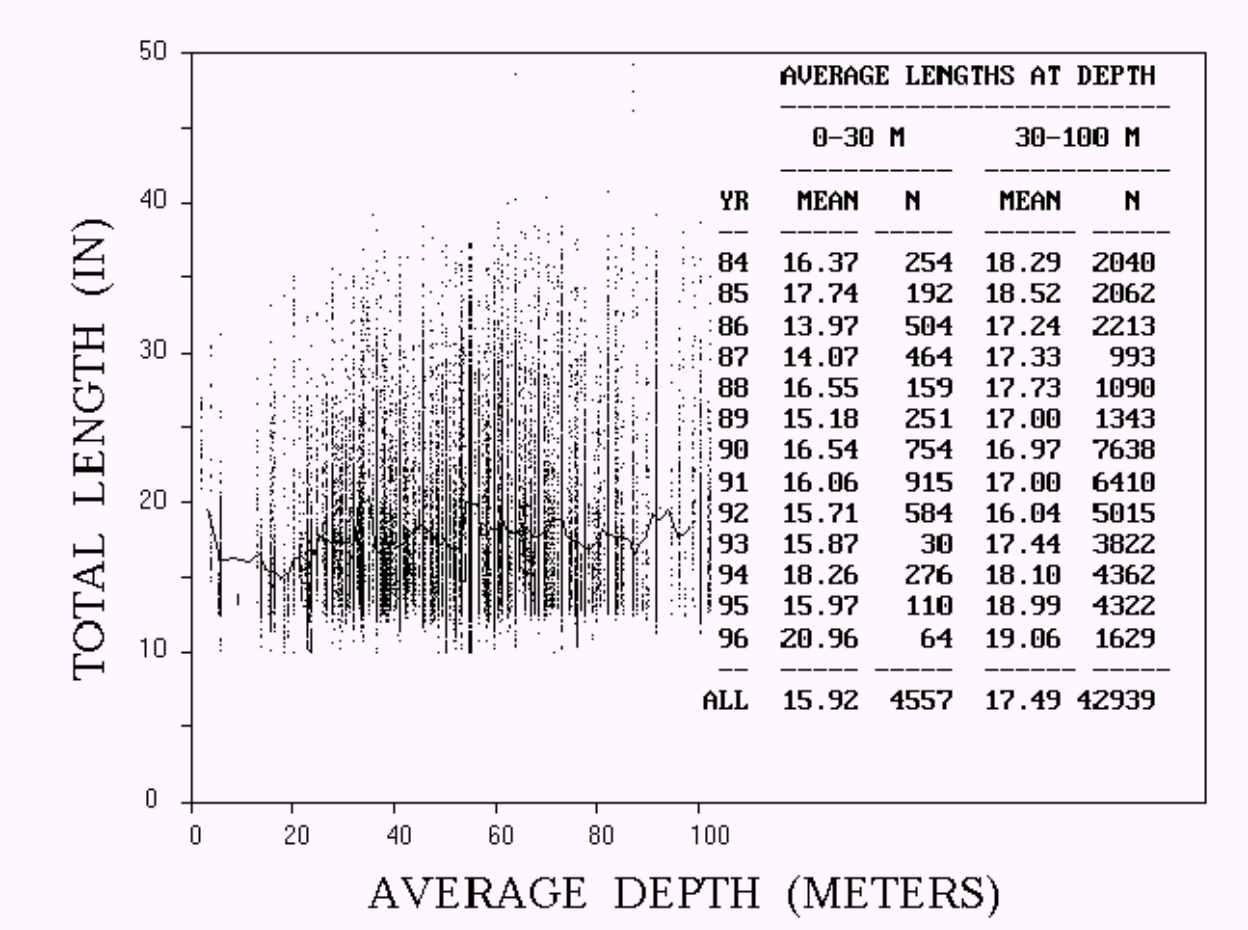
This type of user conflict was the rationale for establishing Alabama's Special Management Zones (SMZs). Recreational fishermen had been building artificial reefs for red snapper in the EEZ off the Alabama coastline. However, these reefs were targeted by commercial bandit-rig fishermen once the derby fishery began in the 1990s, causing anglers to complain "their fish" were in essence being stolen. To alleviate this problem, the Council, working with the state of Alabama, developed the SMZs in Amendment 5. Fishermen were limited to gear with no more than three hooks per line and spearfishing gear, effectively eliminating bandit gear from within these areas.

For some species such as red grouper, there is a positive relationship between size and depth. For these species, moving some types of fishing gear to deeper waters is an effective tool to protect smaller fish from capture and reduce discard mortality rates. However, for red snapper, there does not appear to be a similar correlation between size and depth. Goodyear (1995) and Schirripa and Legault (1999) examined the size of fish caught by commercial hand-lines (Figure 1). While they found the average length at depth increased in the shallowest waters, a closer examination of the data indicated this trend was not due to smaller fish occurring primarily in shallower depths, but rather larger red snapper not being found in shallower depths. Smaller fish were found throughout the depth range, thus eliminating some gears from shallower waters will not protect smaller fish from being caught. This relationship is still present in the fishery as reported by Strelcheck (Figure 2; pers. comm.).

Even though there does not appear to be a relationship between red snapper size and depth, moving commercial fishermen to deeper waters and encouraging recreational fishermen to fish in shallower waters could reduce discard mortality. In the most recent stock assessment, estimated discard mortality rates of red snapper caught by the recreational fishery were estimated to be 15 percent in the eastern Gulf, and 40 percent in the western Gulf (SEDAR, 2005). This discard mortality rate is much lower than found

in the commercial fishery, 82 and 71 percent, respectfully. Additionally, survivorship of red snapper is negatively correlated with depth (SEDAR, 2005; Wilson et al., 2004). For commercial fishermen, particularly if they are required to land all fish caught (see Action 2 in the scoping document for Amendment 27/14), the fate of caught red snapper would become moot.

For scoping purposes, three alternative depth limits for the commercial fishery are proposed (10, 15, and 20 fathoms), as well as a status quo alternative and some other depth limit yet to be defined. Input from the public is requested on whether these depth restrictions would be useful, and if so, what the depth limit should be. Figure 3 is provided to show what areas would be affected for depth zones between 10 and 30 fathoms.



AVERAGE LENGTHS AT DEPTH

YR	0-30 M MEAN	0-30 M N	30-100 M MEAN	30-100 M N
84	16.37	254	18.29	2040
85	17.74	192	18.52	2062
86	13.97	504	17.24	2213
87	14.07	464	17.33	993
88	16.55	159	17.73	1090
89	15.18	251	17.00	1343
90	16.54	754	16.97	7638
91	16.06	915	17.00	6410
92	15.71	584	16.04	5015
93	15.87	30	17.44	3822
94	18.26	276	18.10	4362
95	15.97	110	18.99	4322
96	20.96	64	19.06	1629
ALL	15.92	4557	17.49	42939

Figure 1. Total length (in) by average depth (m) for red snapper caught by handline in the Gulf of Mexico. From Schirripa and Legault (1999).

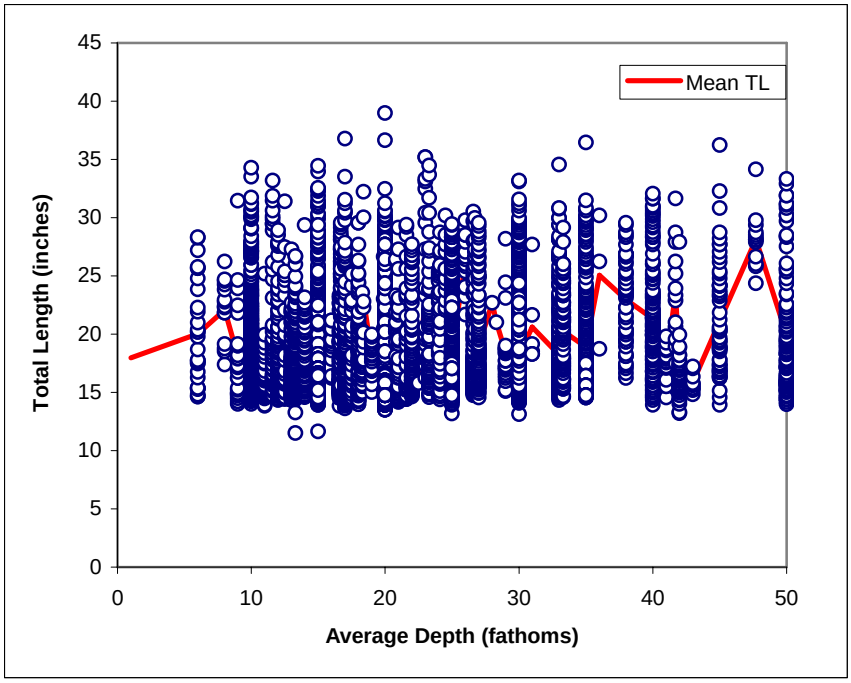


Figure 2. Total length (in) by average depth (fathom) for red snapper commercially caught in the Gulf of Mexico (Strelcheck, pers. comm.). Data from the Trip Interview Program.

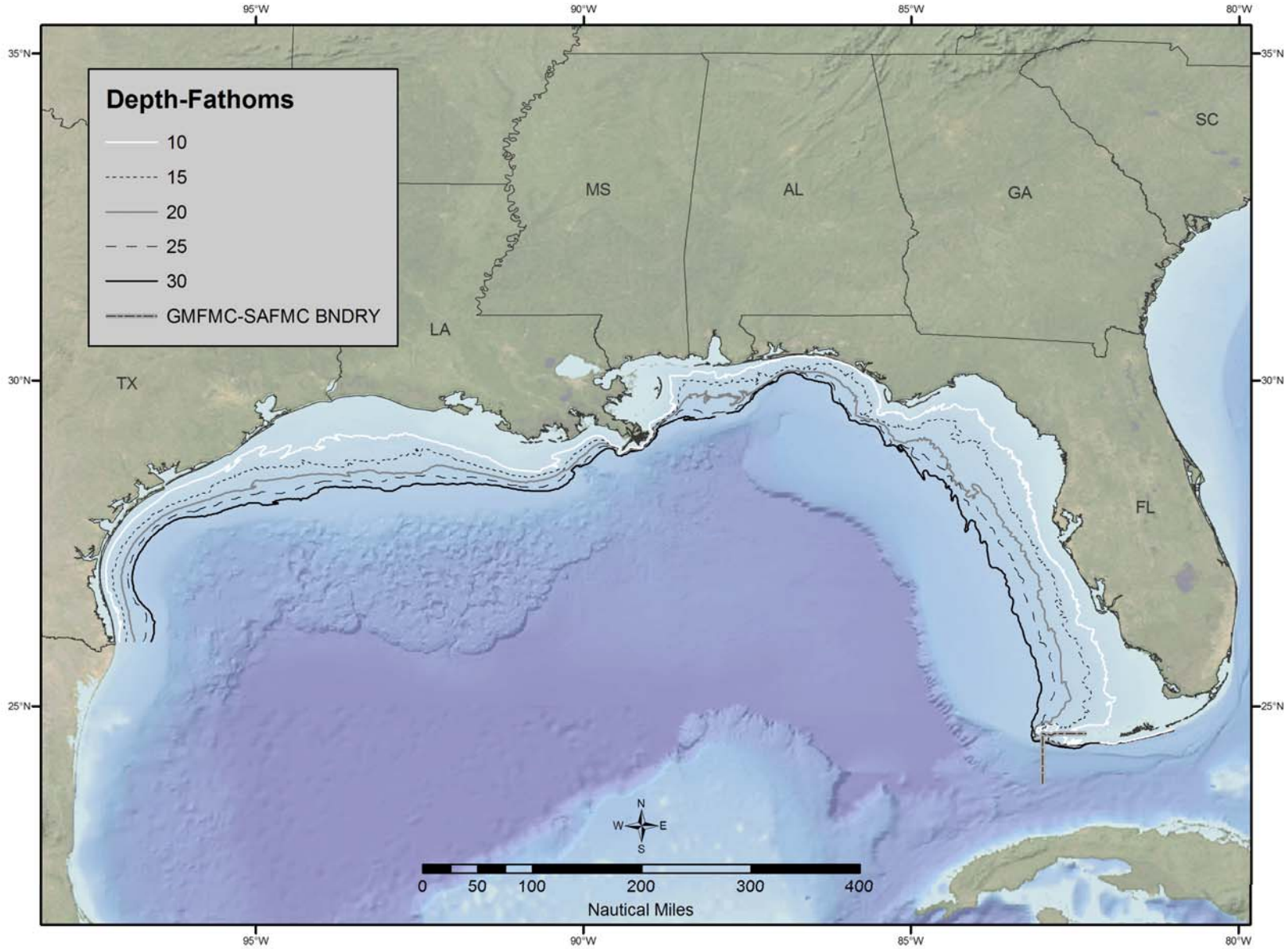


Figure 3. Depth contours (fathoms) between 10 and 30 fathoms in the Gulf of Mexico.

Action 7. Alternatives to reduce bycatch in the directed commercial and/or recreational red snapper fisheries

Alternative 1. No action – Do not implement additional measures to reduce bycatch in the directed commercial and/or recreations red snapper fisheries

Alternative 2. If size limits and/or closed seasons are maintained, provide a set- aside allocation for bycatch mortality of regulatory discards and incidental catches of red snapper when setting TAC based on such size limits and length of closures

Alternative 3. Establish additional closed areas where red snapper fishing is prohibited

Discussion: The alternatives in this section would reduce bycatch in the directed red snapper fishery. All of these alternatives, except No Action, would probably result in some decrease in bycatch. A decrease in bycatch of red snapper in the directed fishery is needed to reduce fishing mortality that will allow recovery of this overfished stock and to allow viable commercial and recreational fisheries to continue. A reduction in bycatch to the extent practicable is also a requirement of the M-SFCMA.

Alternative 1 is the no action alternative. For the commercial sector, if size limits are reduced or eliminated, then regulatory discards will also be reduced or eliminated during open season. A red snapper IFQ system currently being considered in Reef Fish Amendment 26 would eliminate commercial closed seasons and thus further reduce regulatory discards. There could still be economic discards from highgrading if the ex-vessel value of red snapper varies by size (as was the case when the size limit was 13 inches) and fishermen with limited IFQ shares discard the less valuable sizes in order to concentrate on catching the higher value sizes. A rule that prohibits discard of any red snapper that are legal to keep would, on paper, reduce economic discards, but would be difficult if not impossible to enforce. The recreational sector will continue to operate under bag limits, and may continue to have closed seasons and size limits. All of these regulations can lead to regulatory discards. However, the recreational sector has a lower discard mortality rate (15% to 40%) than the commercial sector (71% to 88%), and the impact of regulatory discard mortality will therefore be less than in the commercial sector.

Alternative 2 effectively creates a bycatch quota. Bycatch mortality from regulatory discards occurs as a result of size limits, closed seasons, and limited access. Currently, bycatch mortality from all sources is estimated and incorporated in the total mortality when conducting stock assessments. In other words, this mortality has already been removed from the directed fishery ABC and TAC. If a separate set-aside for bycatch is created, it would come from the total mortality rather than from reducing directed fishing mortality. This would provide no benefits compared to status quo unless an effective real-time bycatch mortality monitoring system could be developed and fisheries closed when the bycatch quota is reached. Such real-time bycatch monitoring is not currently feasible.

Alternative 3 would establish closed areas to reduce directed bycatch mortality of red snapper. In order to be effective, such areas would need to be set where there is a preponderance of undersized red snapper. However, the size distribution of red snapper is not stratified by depth, and it may not be possible to define areas that tend to have high regulatory discards. Further, if

areas are closed to red snapper fishing, they would also need to be closed to fishing for species that occur in proximity to red snapper such as vermilion snapper, or to all fishing, in order to prevent an increase in bycatch mortality from vessels fishing for other species.

Action 8. Alternatives to modify the bycatch reduction criterion for red snapper/finfish caught in shrimp trawls fishing in the EEZ

Alternative 1: No Action - maintain the existing bycatch reduction criterion of a minimum of 44 percent from the average level of mortality on age 0 and age 1 red snapper during the years 1984-1989.

Alternative 2: Change the bycatch reduction criterion for red snapper from "a minimum of 44 percent from the average level of mortality on age 0 and age 1 red snapper during the years 1984-1989" to an expected percent reduction in CPUE on age 0 and age 1 red snapper of:

Option a. 10%
Option b. 20%
Option c. 30%
Option d. 40%

Alternative 3: Change the bycatch reduction criterion for red snapper from "a minimum of 44 percent from the average level of mortality on age 0 and age 1 red snapper during the years 1984-1989" to a reduction in the bycatch of total finfish by:

Option a. 20% by weight.
Option b. 30% by weight
Option c. 40% by weight

Discussion: As discussed in Amendment 9 to the Shrimp FMP, the 1995 stock assessment for red snapper noted that there needed to be a 50% reduction in fishing mortality on age 0 and age 1 red snapper from the average mortalities during the 1984 to 1989 period. This reduction would have to be accomplished by 1997 in order to meet the then rebuilding goal of 20% SPR by 2019. This assessment also noted that a 10% reduction in effort had occurred; consequently, only an additional 44% reduction in bycatch mortality from BRDs was required to meet the rebuilding goal. Over the past 10 years, the red snapper directed fishery has changed due to additional regulations and fishing practices. Furthermore, BRDs have been required in the major spawning areas for red snapper since 1998 and in the rest of the Gulf since 2004; thus fishing mortality on age 0 and age 1 red snapper has been reduced. Finally, the rebuilding plan for red snapper and the time to rebuild have changed with the target now being 2032. The recent stock assessment for red snapper has updated bycatch estimates, and recent data on the currently certified BRDs that are being used shows that they may not be meeting the requirement of Section 303 (a) (11) of the M-SFCMA to reduce bycatch to the extent practicable. For these reasons, it is prudent that the Council reevaluate the bycatch reduction criterion for the shrimp fishery and modify it as appropriate. The need for additional bycatch reduction and methods to achieve it, if needed, can then be evaluated against this new standard.

Action 9. Alternatives to control/reduce effort in the penaeid shrimp fishery to reduce bycatch of red snapper and achieve OY in the shrimp and red snapper fisheries

Alternative 1. No action - Do not establish measures to control/reduce effort in the shrimp fishery

Alternative 2. Cap the annual effort expended by the brown/penaeid shrimp fishery by establishing a maximum level of effort and fishing mortality on the shrimp stocks as required to achieve optimum yield, where the effort cap is:

a. W net days
b. X net days
c. Y net days
d. Z 24 hour days fished

Note: Calculation of net days or simply 24 hour days of effort could be based on averages over various years prior to 2005.

Action 10. Alternatives to restrict shrimp fishing if the target maximum level of effort is projected to be met in a given year

Alternative 1. No action – do not restrict shrimp fishing if the target maximum level of effort is projected to be reached

Alternative 2. Prohibit all fishing for shrimp in the EEZ of the Gulf inside of 100 fathoms when the target maximum level of effort is projected to be reached

Alternative 3. Prohibit all fishing for shrimp in the EEZ of the Gulf inside of 100 fathoms and west of Cape San Blas, Florida when the target maximum level of effort is projected to be reached

Alternative 4. Prohibit all fishing for shrimp in the EEZ of the Gulf inside of 100 fathoms between 10 and 25 fathoms and west of Cape San Blas, Florida when the target maximum level of effort is projected to be reached

Discussion: Current bycatch reduction requirements for the penaeid shrimp fishery in the EEZ include the use of approved BRDs. Recent evidence of BRD performance indicates that the primary BRD in use (Fisheye) is not performing at a level that would allow the red snapper stock in the Gulf to recover from its overfished state. Consequently, additional measures, particularly reductions in effort, are being considered. According to Nance (2005) and Travis (2004), effort in the shrimp fishery exceeded the amount required to harvest the available crop prior to 2005. Excess effort results in economic inefficiency from increased fuel costs, days at sea, and reduced catch per unit effort. Setting limits on total annual effort would reduce bycatch through a direct reduction in effort.

Based on the economic situation that the shrimp industry has been experiencing since

approximately 2001 from large increases in shrimp imports and high fuel costs, effort may already be reduced by over one third from the 1984-89 average. This statement is supported by the fact that there are currently approximately 2,500 valid shrimp vessel permits as compared with previous estimates using the shrimp landings files (SLF) and vessel operating units file (VOUF) of nearly 4,000 vessels. Although a reduction in the number of permits does not directly relate to a decrease in effort, anecdotal information indicates that a large number of vessels are not operating due to high fuel costs and low shrimp prices that make shrimping unprofitable. If this information is correct, additional bycatch reduction may have already occurred. Amendment 13 also estimates that the number of vessels participating in the offshore shrimp fishery will continue to decline until approximately 2012. Furthermore, the impacts of Hurricanes Katrina and Rita on the number of vessels that will likely be fishing in the near future is unknown, but it is expected to drastically reduce the number of active vessels at least in the short term.

Depending on the amount of effort allowed under a cap, there could be a change in the fishing behavior of the shrimp fleet. If the effort cap is truly restrictive, compared to the current levels of effort, shrimp fishermen might opt to maximize their fishing effort during times when shrimp (especially brown shrimp) are most abundant and at a larger size, resulting in a greater return for unit effort. This could move fishing effort into areas where larger brown shrimp are more common, which is also the depth range and areas where juvenile red snapper are common. Such a shift could negate the intended effect to reduce red snapper bycatch. On the other hand, if such a cap is not in effect in state waters, shrimping operations may simply move to state waters if a cap is implemented or expected to be implemented. This is particularly true off Louisiana and east Texas where white shrimp (that occur closer to shore) are dominant in the fall and early winter months and after the high shrimping effort period of July and August. Finally, the impacts of Hurricanes Katrina and Rita may have reduced effort to the extent that any reasonable cap that is implemented to maintain the rebuilding program for red snapper and continue the stock's recovery will not be reached.

Because of the relatively high bycatch of juvenile red snapper in the shrimp trawl fishery, the Council has, on several occasions, considered alternatives to minimize bycatch through area and seasonal closures. Closed areas would only be effective if they were large (for enforceability and to effectively address the broad distribution of red snapper in the northern and western Gulf) because juvenile red snapper are associated with the shrimping grounds for 14 months or longer. They would also need to include areas of high juvenile red snapper abundance. Such areas are likely to include areas of high shrimp abundance as well. Closing the entire EEZ of the western Gulf would have additional impacts to those fishermen targeting white shrimp in nearshore waters. The Council rejected time-area closures and bycatch reduction options for the shrimp fishery in Amendment 1 to the Reef Fish FMP in 1990. In Amendments 9 and 10 to the Shrimp FMP, the Council evaluated and rejected the use of time-area closures as a method to reduce bycatch in the shrimp fishery as an alternative to the use of BRDs.

Alternative 2 would set a time-area closure of the entire EEZ once a target maximum effort level is projected. This measure would provide the greatest potential for bycatch reduction by restricting effort. On the other hand, red snapper are rarely encountered in the EEZ off Florida and east of Cap San Blas. Consequently, this additional closed area would not result in positive impacts to red snapper, but would likely severely impact the pink shrimp fishery off Florida that

primarily occurs in the winter and early spring months at which time an effort cap would be most likely to be reached. Alternative 4 would be the least restrictive because it would only apply a time-area closure to the area between 10 and 25 fathoms, west of Cape San Blas, Florida when a target effort level is projected. Recent evaluations of catch and bycatch data (Gallaway et al. 1998; Gallaway et al. 1999) indicate substantial portions of the total juvenile red snapper catch occurs in shrimp trawls fished in the mid-shelf depth zones of the western Gulf of Mexico (west of Cape San Blas, Florida). Juvenile red snapper occur infrequently inside of 10 fathoms (Gulf and South Atlantic Fisheries Foundation, 1997; Gallaway et al. 1998). Gallaway et al (1998, 1999) found the greatest densities of juvenile red snapper catches occurred in the areas between 10 and 25 fathoms. The impacts of Alternative 3 would be between Alternatives 2 and 4.

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