Updated Economic Analysis of Proposed Management Alternatives in Amendment 17B for the Commercial Snapper-Grouper Fishery

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Introduction

Amendment 17B to the snapper-grouper fishery management plan establishes annual catch limits for the commercial and/or recreational sectors for nine species in the management unit for which overfishing is occurring. These species are vermilion snapper (*Rhomboplites aurorubens*), gag (*Mycteroperca microlepis*), black grouper (*M. bonaci*), red grouper (*Epinephelus morio*), snowy grouper (*E. niveatus*), speckled hind (*E. drummondhayi*), warsaw grouper (*E. nigritus*), (golden) tilefish (*Lopholatilus chamaeleonticeps*) and black sea bass (*Centropristis striata*).

This report uses a simulation model to examine the economic effects of proposed commercial catch limits for: (a) speckled hind and warsaw grouper; (b) tilefish; and (c) red grouper and black grouper. Catch limits for vermilion snapper and gag were established in Amendment 16 for the commercial fishery, and in Amendment 13C for snowy grouper and black sea bass. This report includes results for new and revised management alternatives that were proposed at the September meeting of the South Atlantic Fishery Management Council (hereafter referred to as the Council). These results are preliminary and could change if the proposed management alternatives evolve during the development of Amendment 17B.

Method of Analyzing Economic Effects of Proposed Management Alternatives

Fishermen with permits to fish in federal waters for species in the snapper-grouper fishery have been required since 1993 to submit trip reports of their landings by species. Logbook trip reports from 2005-2008 constitute the source of data used in this analysis. Data prior to 2005 were not used in the analysis because they did not include information about the depth of water where fish were caught. One of the proposed alternatives in Amendment 17B would regulate fishing activity by water depth.

The simulation model uses logbook trip reports to predict the short-term economic effects of proposed management alternatives. The general method of analysis is to hypothetically impose proposed regulations on individual fishing trips as reported to the logbook database, and then calculate their effects on trip catches, revenues and costs. Trip-level results are totaled by year for 2005-2008, and the four-year average of simulated results is interpreted as the expected annual outcome of proposed regulations. The four-year average is used so that short-term anomalies that may have affected fishing success in any one year will be averaged out. The average annual simulated fishing incomes net of trip costs (also referred to as *net operating revenues*) for the proposed alternatives are compared to the no-action alternative to estimate the expected economic effects on commercial fishermen.

Net operating revenues for trip j in year t were calculated as trip revenues from all species minus predicted trip costs, which include fuel, oil, bait, ice, and other supplies, and exclude fixed costs

and labor costs. Therefore, net operating revenues represent the return to fixed factors of production, boat owner and crew. Net operating revenues were adjusted to constant 2008 dollars with the consumer price index for all items and all urban consumers.

The simulation model examines the effects of proposed management alternatives on trip revenues and trip costs. If trip revenues remain greater than trip costs plus opportunity cost of labor after accounting for the likely effects of proposed restrictions, then the trip is recorded as taken in the simulation model, and the economic effect of the proposed restriction is measured as the loss in revenues associated with the expected reduction in landings per trip. On the other hand, if the proposed alternatives would cause trip revenues to fall below the sum of trip costs and opportunity cost for labor after accounting for the likely effects of proposed restrictions on trip-level harvests, then the trip is recorded as not taken in the simulation model, and losses are measured as a reduction in net operating revenues, which included the loss in revenues from all species minus the savings of trip costs not incurred.

This method of analysis has advantages and disadvantages. The advantages are that logbook data are reported by fishermen, and are available in sufficient detail to analyze and compare the proposed alternatives. The disadvantage is that logbook data reflect fishing patterns and strategies given regulations that will no longer apply. Fishermen will modify their fishing patterns and strategies to minimize the effects of new regulations, but the simulation model does not account for these changes. Therefore, it can only approximate the true, but unknown, outcomes of proposed regulations. Nevertheless, the approach provides useful insights about the relative magnitudes of change due to proposed alternatives and the distribution of effects among subgroups within the fishery.

The No-Action Alternative

The objective of this analysis is to predict the extra economic effects associated with implementation of Amendment 17B. It accomplishes this objective by comparing the predicted outcomes of simulations given proposed regulations for Amendment 17B with the predicted outcome of simulations for the no-action alternative. For purposes of this analysis, the no-action alternative is defined by the predicted outcomes of rules specified in Amendments 13C and 16.

The effects of proposed regulations in Amendment 17B are compared to the simulated effects of Amendments 13C and 16 rather than to observed fishery landings and revenues because historical data for 2005-2008 do not reflect the effects of regulations recently implemented by these amendments. Amendment 13C to the Snapper-Grouper Fishery Management Plan was implemented in October 2006, and primarily regulates the harvest of deep water groupers, tilefish and black sea bass. Amendment 16 was implemented at the end of July 2009 and imposes limits on the harvest of vermilion snapper, gag and other shallow water groupers. Landings of other species, such as red snapper, in the snapper-grouper management unit could change if they are indirectly affected by regulations in Amendments 13C and 16.

Figure 1. Predicted percentage change in pounds landed compared to the No-Action alternative for Amendment 13C after accounting for the expected effects of regulations implemented by Amendments 13C and 16.

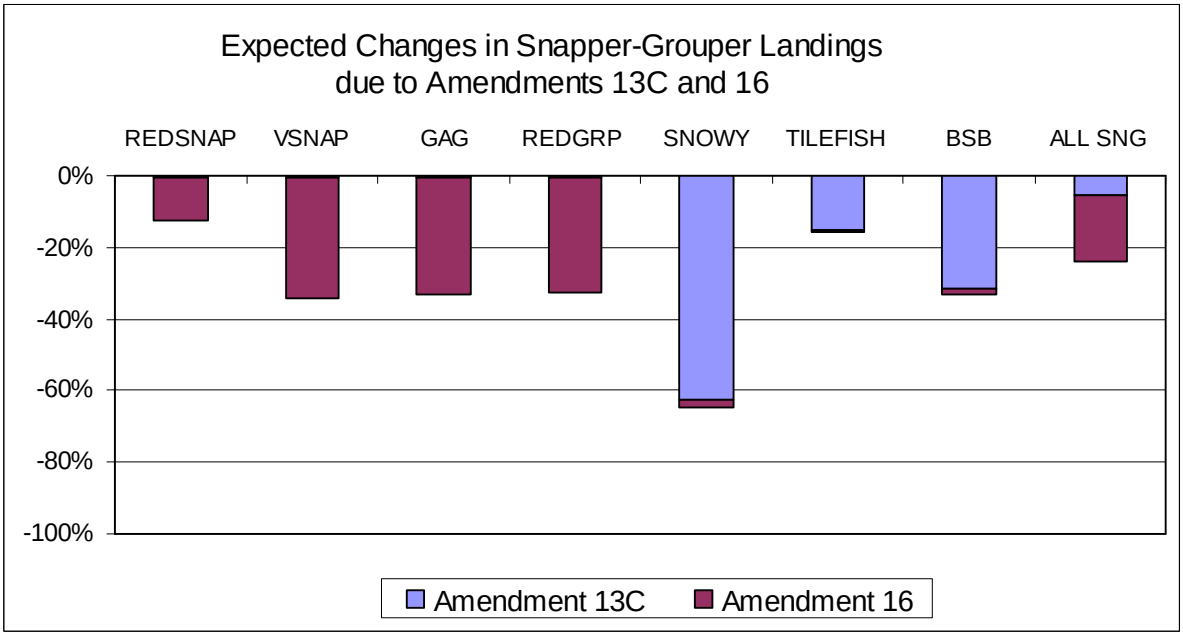


Figure 1 illustrates the differences between the simulated fishery landings for the regulatory period prior to Amendment 13C and the simulated landings that comprise the no-action alternative for Amendment 17B. The light shading in Figure 1 illustrates that Amendment 13C is expected to affect landings of snowy grouper, golden tilefish and black sea bass. The dark shading in Figure 1 illustrates that Amendment 16 is expected to affect landings of mid-shelf species such as vermilion snapper, gag and red grouper, and to a lesser extent, red snapper. The cumulative effects on landings are illustrated by the total length of each bar in Figure 1. Amendments 13C and 16 are predicted to reduce landings of: red snapper by approximately 13 percent; vermilion snapper and black sea bass by approximately 34 percent; gag and red grouper by approximately 33 percent; snowy grouper by approximately 65 percent; and (golden) tilefish by approximately 15 percent. The right-most bar in Figure 1 (labeled ALL SNG) illustrates that Amendments 13C and 16 are expected to reduce the aggregate landings of all species (including species not shown in Figure 1) in the snapper-grouper management unit by approximately 25 percent compared to expected annual landings for the regulatory environment prior to Amendment 13C.

Management Alternatives for Speckled Hind and Warsaw Grouper

Speckled hind and warsaw grouper are relatively rare, and all proposed alternatives in this Action would prohibit their harvest, possession and sale. The alternatives differ in their restrictions on the harvest of other species so as to reduce the incidental catch and discard of speckled hind and warsaw grouper. Alternative 5 was added at the Council meeting in September 2009. Alternative 4 is the Council's preferred alternative. See Table 1.

Table 1. Proposed alternatives in Amendment 17B for the management of speckled hind and warsaw grouper. (Table 1 paraphrases rather than includes a verbatim statement of alternatives from Amendment 17B.)

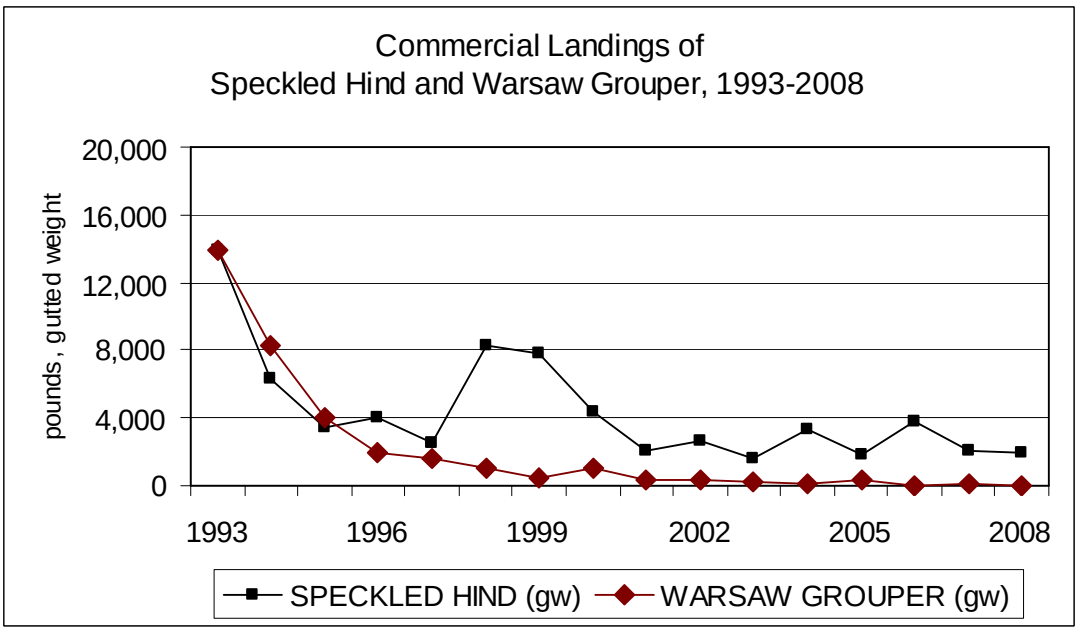
Model Name	*Description*
A17b_NO_ACTION	*Alternative 1*: No Action. Retain existing regulations for speckled hind and warsaw grouper. Prohibit purchase and sale of speckled hind and warsaw grouper. Allow one speckled hind and one warsaw grouper per vessel per trip as part of the 3-fish recreational bag limit for groupers.
A17b_SpHind_ALT2	*Alternative 2*: Establish an ACL = 0 for speckled hind and warsaw grouper. Prohibit all commercial and recreational fishing for, possession, and retention of speckled hind and warsaw grouper.
A17b_SpHind_ALT3	*Alternative 3*: Establish an ACL = 0 for speckled hind and warsaw grouper. Prohibit all commercial and recreational fishing for, possession, and retention of the following deepwater species: speckled hind, warsaw grouper, snowy grouper, yellowedge grouper, misty grouper, blueline tilefish, queen snapper, and silk snapper.
A17b_SpHind_ALT4**	*Alternative 4 (Preferred)*: Establish an ACL = 0 for speckled hind and warsaw grouper. Prohibit all commercial and recreational fishing for, possession, and retention of speckled hind and warsaw grouper. Prohibit all fishing for, possession, and retention of snowy grouper, yellowedge grouper, misty grouper, blueline tilefish, queen snapper, and silk snapper beyond a depth of 240 feet (40 fathoms; 73 m).
A17b_SpHind_ALT5	*Alternative 5:* Establish an ACL = 0 for speckled hind and warsaw grouper. Prohibit all commercial and recreational fishing for, possession, and retention of speckled hind and warsaw grouper. Prohibit all fishing for, possession, and retention of snowy grouper, yellowedge grouper, misty grouper, blueline tilefish, queen snapper, and silk snapper) beyond a depth of 300 feet (50 fathoms; 92 m).

** denotes the Council's preferred alternative.

In 1993, commercial fishermen landed 13,900 pounds (gutted weight) of speckled hind and 14,000 pounds of warsaw grouper on fishing trips in federal waters, as recorded in the logbook

database (Figure 2). Landings of both species have declined since then, as Amendment 6 to the Snapper-Grouper FMP prohibited their sale in mid-1994. There is a one fish possession limit for each species since these deep water groupers probably would not survive if released after being caught.

Figure 2. Commercial landings in federal waters: speckled hind and warsaw grouper, 1993-2008.



Source: SEFSC logbook database as of June 29, 2009.

Alternative 1 (i.e., No Action) is the least restrictive management choice because it allows one fish per vessel per trip to be retained as part of the recreational aggregate bag limit for groupers. Despite the existing no-sale provision, small quantities of both species are reported. On average for 2005-2008, commercial fishermen on trips in federal waters landed 2,400 pounds (gutted weight) of speckled hind worth approximately $6,400 and 100 pounds of warsaw grouper worth $260.[1]

Alternative 2 differs from the no-action alternative in that the one fish possession limit would be eliminated. Because of the existing no-sale provision, few speckled hind or warsaw grouper are landed. Hence, the economic effect of Alternative 2 is expected to be small. The simulation analysis predicts an average annual loss of approximately $6,000, or about one-tenth of one percent of predicted net operating revenues for the commercial fishery with the no-action alternative for Amendment 17B.[2] The expected reduction in net operating revenues is less than the average annual dockside value of speckled hind and warsaw grouper landed during 2005-

[1] The logbook database does not collect prices or revenues for landed fish. Trip revenues were approximated as reported landings multiplied by average prices, by species, from the NMFS Accumulated Landings System.
[2] The commercial fishery is defined in this analysis as consisting of all trips in the logbook database that reported landing at least one pound of any species in the snapper-grouper management unit.

2008 because the no-action alternative for Amendment 17B includes the expected reductions in landings due to Amendments 13C and 16.

Alternative 3 is the most restrictive management choice because it prohibits the harvest and sale of all major deepwater species in the snapper-grouper management unit, including snowy grouper, yellowedge grouper, blueline tilefish, silk snapper and other species. Overall, Alternative 3 is expected to reduce net operating revenues in the snapper-grouper fishery by approximately $365,000, or by 4.2 percent compared to the no-action alternative (Figures 3a and 3b). The effects of this alternative are expected to be incurred primarily by boats that fish with vertical lines (Figure 3a), although boats with longlines would incur greater losses in percentage terms (Figure 3b) because Alternative 3 would prohibit the harvest of snowy grouper and yellowedge grouper. Vessels that use bottom longline gear are expected to incur losses that average approximately 12.2 percent of base net operating revenues. Boats in North Carolina and the Florida Keys would incur the greatest reductions in net operating revenues (Figures 4a and 4b), primarily due to the prohibition on the harvest of snowy grouper and blueline tilefish. Net operating revenues for boats in North Carolina are predicted to decline by an average of 8.7 percent per year, while net operating revenues for boats in the Keys are predicted to decline by approximately 4.2 percent per year compared to the no-action alternative.

Alternative 4 is less restrictive than Alternative 3 because it excludes from the prohibition the harvest of deep water species in waters shallower than 240 feet. However, it is only slightly less restrictive because most deepwater species are landed in waters of 240 feet or deeper. Overall, Alternative 4 is expected to reduce net operating revenues in the snapper-grouper fishery by about $292,000 or by 3.3 percent (Figures 3a and 3b). The effects of this alternative are expected to be slightly smaller than those of Alternative 3. The expected reductions in net operating revenues would be incurred primarily by boats that fish with vertical lines (Figure 3a), although boats with longlines would incur greater losses in percentage terms (Figure 3b). Vessels that use bottom longline gear are expected to incur losses that average approximately 11.5 percent of base net operating revenues. Net operating revenues for boats in North Carolina are predicted to decline by an average of 7.2 percent per year, while net operating revenues for boats in the Keys are predicted to decline by approximately 3.9 percent per year compared to the no-action alternative.

Alternative 5 is less restrictive than Alternative 4 because it excludes from the prohibition the harvest of deep water species in waters shallower than 300 feet. Overall, Alternative 5 is expected to reduce net operating revenues in the snapper-grouper fishery by about $225,000 or by 2.6 percent (Figures 3a and 3b). The effects of Alternative 5 by gear (Figures 3a and 3b) and state (Figures 4a and 4b) are expected to be smaller than those of Alternatives 3 and 4. Vessels that use bottom longline gear are expected to incur losses that average approximately 8.2 percent of base net operating revenues. Net operating revenues for boats in North Carolina are predicted to decline by an average of 4.9 percent per year, while net operating revenues for boats in the Keys are predicted to decline by approximately 3.6 percent per year compared to the no-action alternative.

*Figure 3a. Predicted change in commercial net operating revenues by gear type for speckled hind-warsaw grouper alternatives compared to the No-Action alternative for Amendment 17B. (** denotes the Council's preferred alternative.)*

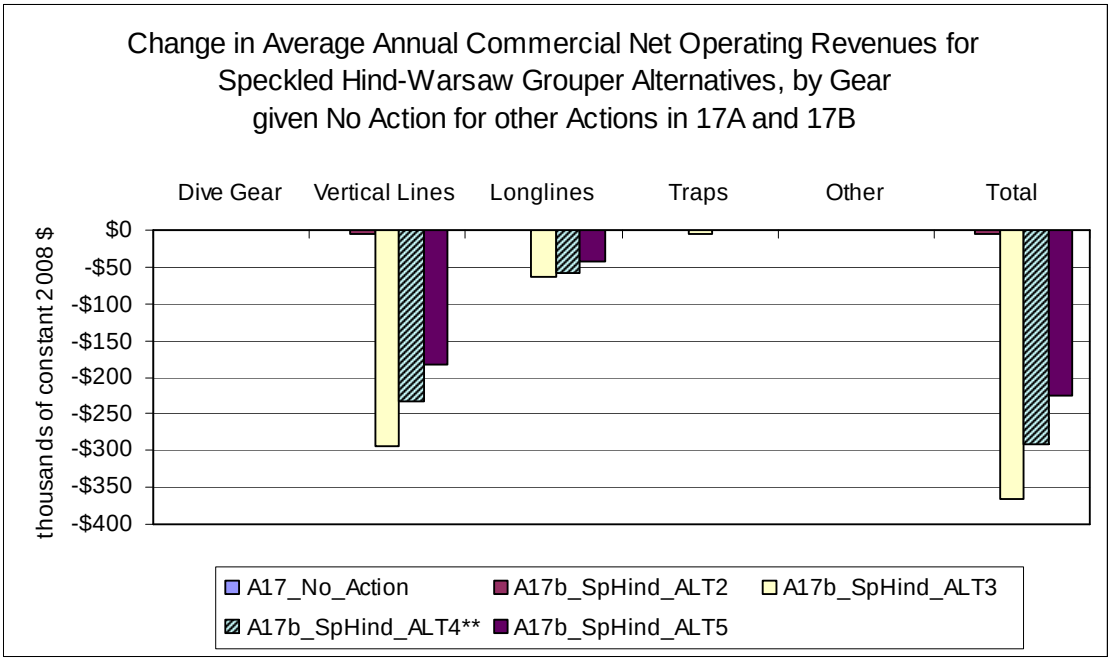


*Figure 3b. Predicted percentage change in commercial net operating revenues by gear type for speckled hind-warsaw grouper alternatives compared to the No-Action alternative for Amendment 17B. (** denotes the Council's preferred alternative.)*

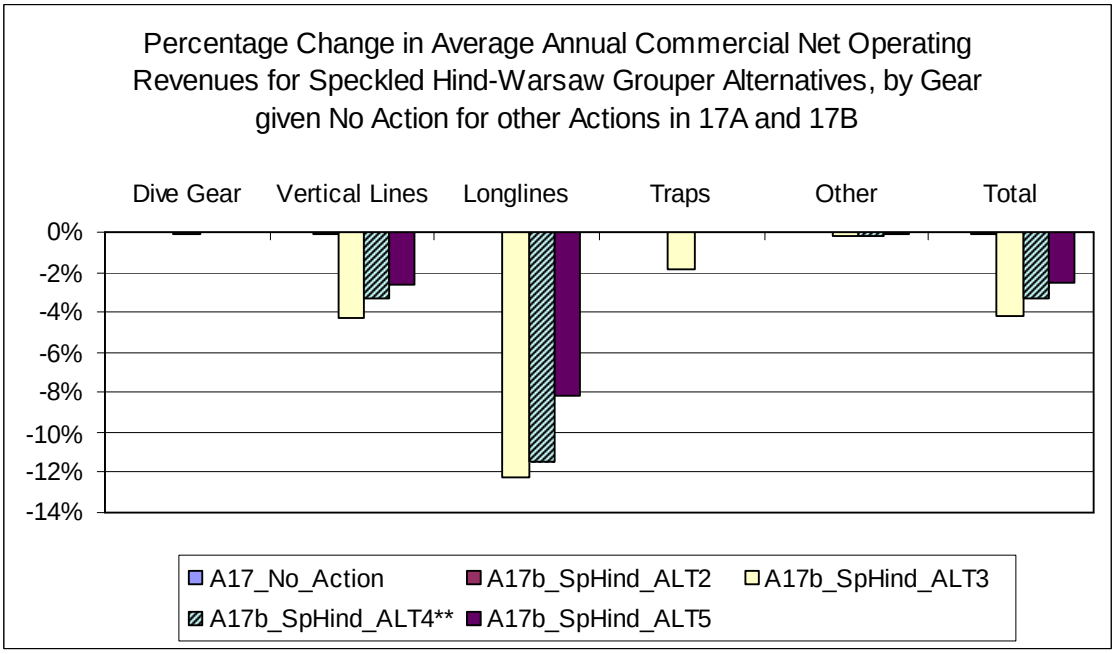


*Figure 4a. Predicted change in commercial net operating revenues by state of landing for speckled hind-warsaw grouper alternatives compared to the No-Action alternative for Amendment 17B. (** denotes the Council's preferred alternative.)*

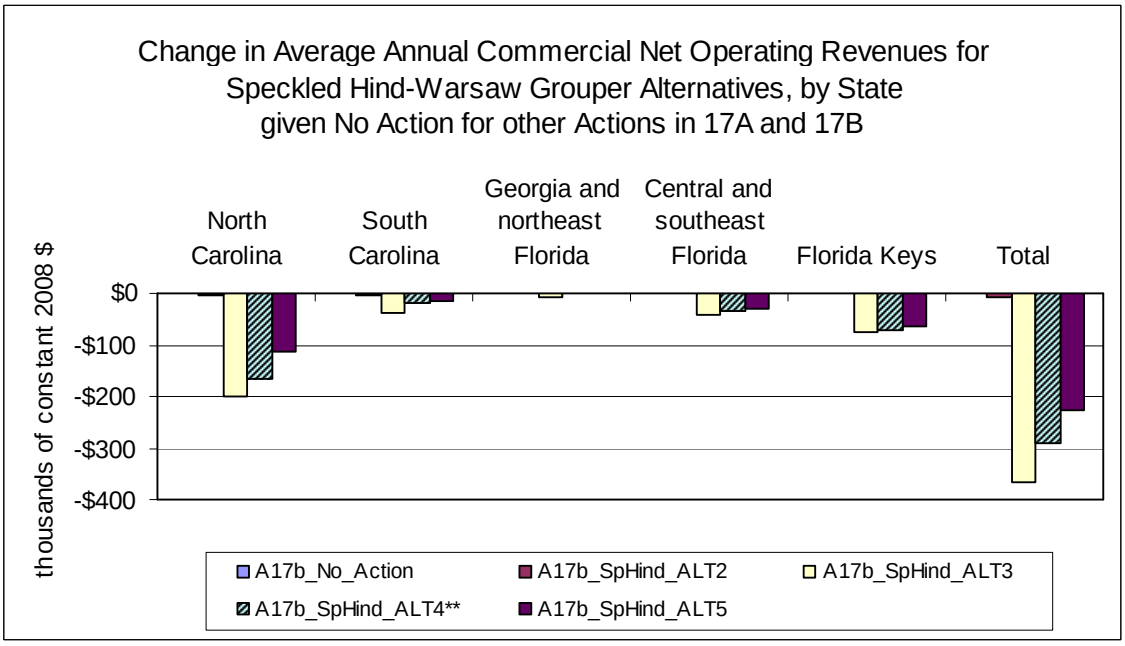
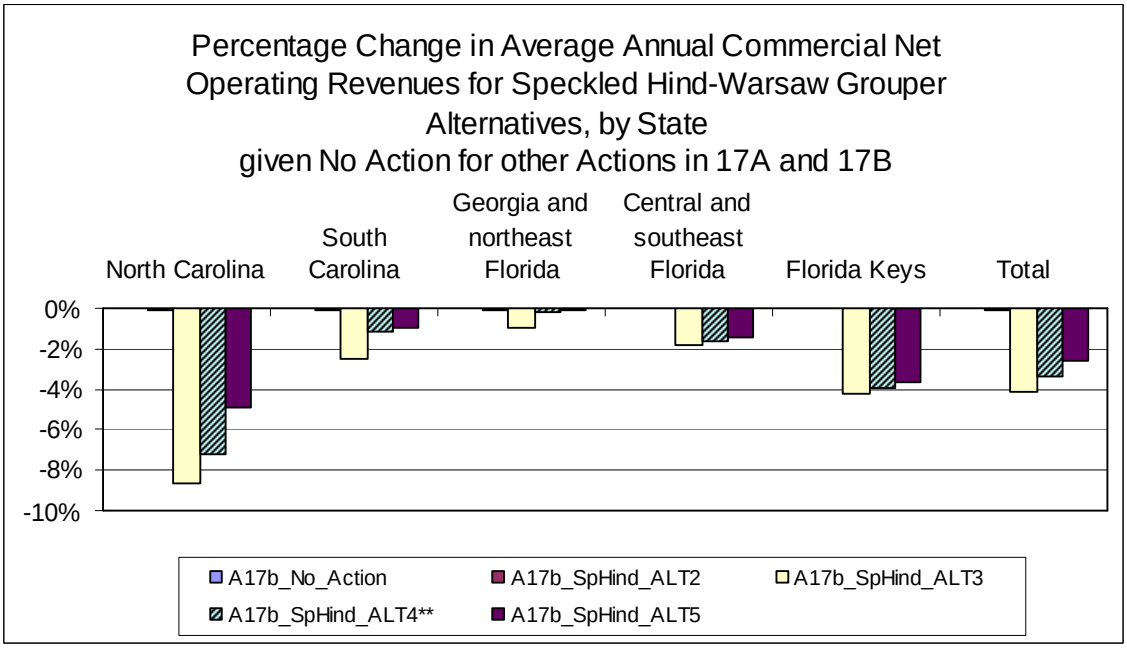


*Figure 4b. Predicted percentage change in commercial net operating revenues by state of landing for speckled hind-warsaw grouper alternatives compared to the No-Action alternative for Amendment 17B. (** denotes the Council's preferred alternative.)*



Management Alternatives for Golden Tilefish

Amendment 17B proposes two management actions for tilefish, including an action to specify the total allowable catch and an action to specify the allocation of that catch between the commercial and recreational sectors. Both actions affect the annual catch limit available to the commercial sector. Hence, they are evaluated jointly.

While the allowable catch action has five management alternatives and the allocation action has four alternatives, they reflect two management choices for total allowable catch and four management choices for allocation. The no-action alternative for total allowable catch for the commercial and recreational sectors combined is 300,380 pounds gutted weight, and all other alternatives are based on an allowable catch of 291,566 pounds gutted weight. Allocation Alternative 2 specifies a commercial share of 96 percent of total allowable catch, while allocation Alternative 3 specifies a commercial share of 97 percent of total allowable catch and Alternative 4 specifies a commercial share of 50 percent of total allowable catch. The implied commercial share for the no-action allocation alternative was calculated as 98.2 percent of total allowable catch based on the ratio of the existing commercial quota (295,000 pounds gutted weight) to the existing total allowable catch (300,380 pounds gutted weight). The management scenario with a commercial allocation of 97 percent (allocation alternative 3) and the lower total allowable catch (ACL alternative 2) reflects the Council's preferred alternatives for tilefish.

From a modeling perspective, eight management scenarios were evaluated for golden tilefish, with each scenario representing a different combination of total allowable catch and commercial share of the allowable catch. See Table 2.[3] All scenarios retain the existing commercial trip limits of 4,000 pounds gutted weight until 75% of the commercial ACL is taken. The trip limit is reduced to 300 pounds after 75% of the quota is taken, but only if this occurs on or before September 1.

Table 2. Scenarios that were evaluated for management of golden tilefish. (Table 2 paraphrases rather than includes a verbatim statement of management scenarios from Amendment 17B.)

Model Name	*Description*
A17b_NO_ACTION	*Allocation Alternative 1 and ACL Alternative 1*: No Action. Retain existing regulations for golden tilefish based on a total allowable catch of 300,380 lbs gw and an implied commercial allocation of 98.2 percent. The commercial ACL equals the existing quota of 295,000 lbs gw. Prohibit harvest, possession, retention and sale of golden tilefish when the quota is met. The trip limit is 4,000 lbs (gw) until 75% of the quota is taken. The trip limit is reduced to 300 pounds after 75% of the quota is taken, but only if this occurs on or before September 1.
A17b_Tilefish_alloc2_ACL1	*Allocation Alternative 2 and ACL Alternative 1*: The total allowable catch would remain at 300,380 lbs gw. The commercial ACL would be

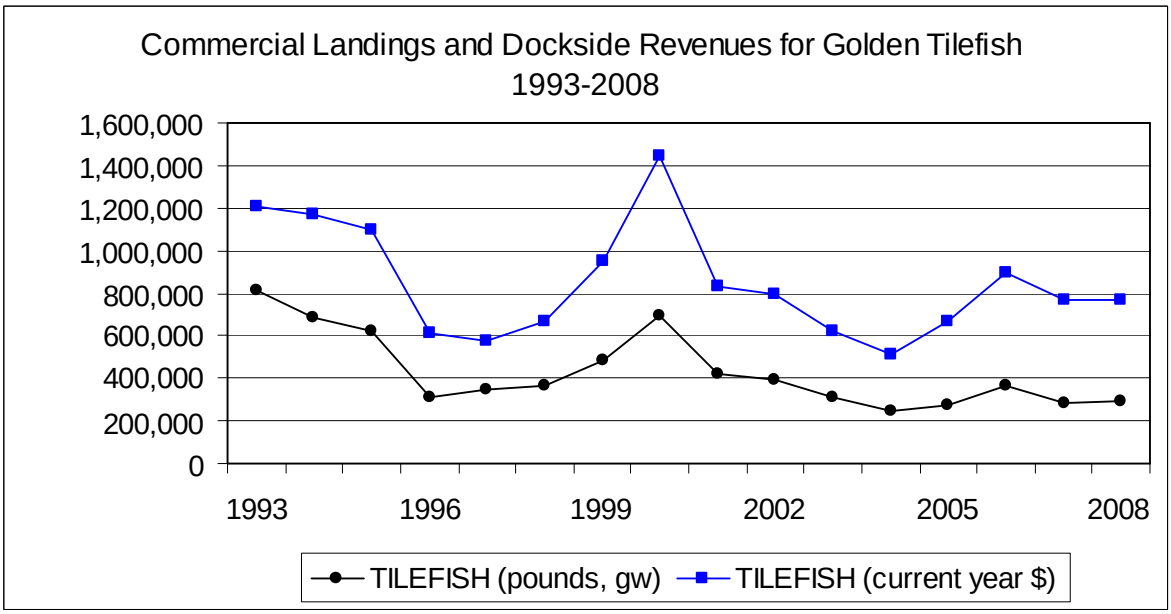
[3] Table 2 reflects new numbering for the management scenarios based on recent decisions at the Council's September meeting.

Model Name	*Description*
	288,365 lbs gw based on a commercial allocation of 96 percent. Prohibit harvest, possession, retention and sale of golden tilefish when the quota is met. Retain existing trip limits.
A17b_Tilefish_alloc3_ACL1	*Allocation Alternative 3 and ACL Alternative 1*: The total allowable catch would remain at 300,380 lbs gw. The commercial ACL would be 291,369 lbs gw based on a commercial allocation of 97 percent. Prohibit harvest, possession, retention and sale of golden tilefish when the quota is met. Retain existing trip limits.
A17b_Tilefish_alloc4_ACL1	*Allocation Alternative 4 and ACL Alternative 1*: The total allowable catch would remain at 300,380 lbs gw. The commercial ACL would be 150,190 lbs gw based on a commercial allocation of 50 percent. Prohibit harvest, possession, retention and sale of golden tilefish when the quota is met. Retain existing trip limits.
A17b_Tilefish_alloc1_ACL2	*Allocation Alternative 1 and ACL Alternative 2*: The total allowable catch would be determined at the Foy level of 291,566 lbs gw. The commercial ACL would be 286,344 lbs gw based on the implied existing commercial allocation of 98.2 percent. Prohibit harvest, possession, retention and sale of golden tilefish when the quota is met. Retain existing trip limits.
A17b_Tilefish_alloc2_ACL2	*Allocation Alternative 2 and ACL Alternative 2*: The total allowable catch would be determined at the Foy level of 291,566 lbs gw. The commercial ACL would be 279,903 lbs gw based on a commercial allocation of 96 percent. Prohibit harvest, possession, retention and sale of golden tilefish when the quota is met. Retain existing trip limits.
A17b_Tilefish_alloc3_ACL2**	*Allocation Alternative 3 and ACL Alternative 2 (Preferred)*: The total allowable catch would be determined at the Foy level of 291,566 lbs gw. The commercial ACL would be 282,819 lbs gw based on a commercial allocation of 97 percent. Prohibit harvest, possession, retention and sale of golden tilefish when the quota is met. Retain existing trip limits.
A17b_Tilefish_alloc4_ACL2	*Allocation Alternative 4 and ACL Alternative 2*: The total allowable catch would be determined at the Foy level of 291,566 lbs gw. The commercial ACL would be 145,783 lbs gw based on a commercial allocation of 50 percent. Prohibit harvest, possession, retention and sale of golden tilefish when the quota is met. Retain existing trip limits.

** denotes the Council's preferred alternatives.

Commercial landings of tilefish have fluctuated widely, with an historical peak of nearly 3.4 million pounds (gutted weight) in 1983. More recently, the commercial fishery landed 815,100 pounds (gutted weight) worth $1.2 million in 1993 and 692,700 pounds worth $1.4 million in 2000 (Figure 5).[4] The fishery also landed only 314,300 pounds worth $574,100 in 1996 and 243,200 pounds worth $510,200 in 2004. Landings averaged 305,300 pounds worth $772,700 from 2005-2008. Dockside revenues and pounds landed fluctuate in the same direction (Figure 5), which suggests that ex-vessel demand is price elastic. The policy implication is that regulations that reduce industry landings in the short-term are expected to reduce dockside revenues in the short-term. Conversely, dockside revenues are expected to increase over time if regulation successfully increases biomass and landings.

Figure 5. Commercial landings in federal waters: golden tilefish, 1993-2008.



Source: SEFSC logbook database as of June 29, 2009.

A commercial quota and trip limit were first implemented in 1994 by Amendment 6.[5] More restrictive management was implemented in October 2006 by Amendment 13C, including a commercial quota of 295,000 pounds gutted weight and the present tiered system of trip limits.

The allocation and allowable catch alternatives in Amendment 17B are modeled as additional reductions in the commercial quota. The reductions are approximately 5 percent or less for most management scenarios not involving allocation Alternative 4, and range from 3,600 pounds (1.2 percent) for the scenario with allocation Alternative 3 and the no-action ACL alternative to a 15,100 pound reduction (5.1 percent) for allocation Alternative 2 and ACL Alternative 2. The

[4] Revenues are presented as current year dollars and have not been adjusted for inflation over time. Trip revenues were approximated as reported landings from the logbook database multiplied by average prices from the NMFS Accumulated Landings System.

[5] Amendment 6 specified a commercial quota in 1994 of more than 1.4 million lbs (gutted weight), and a trip limit of 5,000 lbs until the quota was filled and 300 lbs after the quota was filled. The quota declined to 1.2 million lbs in 1995 and 1.0 million lbs in 1996. The quotas were not filled (Figure 5).

simulation model predicts that these reductions in commercial catch limits would generate an overall reduction in net operating revenues that ranges from approximately $3,500 to $12,500 or less than 0.15 percent to the entire snapper-grouper fishery (Figures 6a and 6b).

Larger reductions in the commercial catch limit are associated with allocation Alternative 4, which specifies a 50 percent commercial share of the total allowable catch. The commercial catch limit would decline by 144,800 pounds (49 percent) with ACL Alternative 1 and by 149,200 pounds (50.6 percent) with ACL Alternative 2. Net operating revenues for the entire commercial snapper-grouper fishery are predicted to decline by approximately $200,000 or 2.3 percent and $207,000 or 2.4 percent for these scenarios (Figures 6a and 6b). Boats that use bottom longlines are predicted to lose 35 percent and 36 percent of baseline net operating revenues, respectively. Although commercial landings of tilefish would decline by approximately 50 percent, the expected reductions in dockside revenues would be partially offset by lower operating costs as fewer trips would be taken. Losses would be incurred primarily by longline boats in central Florida and South Carolina (Figures 7a and 7b).

The economic effects of the tilefish alternatives differ due to differences in the magnitude of the commercial catch limit and the timing of the adjustment in the trip limit from 4000 pounds to 300 pounds. Not surprisingly, the smaller the commercial catch limit, the greater the expected reductions in net operating revenues for commercial fishermen. In addition, the simulation model predicts that lower commercial catch limits would trigger the smaller trip limit at an earlier date each year.

Interestingly, the simulation model predicts that the system of trip limits will prevent the quota from being filled and the fishery from being closed, except for the scenarios with allocation alternative 4. This contrasts with actual experience because the tilefish fishery was closed on October 23, 2006, October 3, 2007 and August 17, 2008. The fishery did not close in 2005 because Amendment 13C was not implemented until 2006. Although the simulation analysis did not use data for 2009, we note that the commercial fishery for tilefish was closed on July 15, 2009. The reason for this discrepancy between the observed closures and the simulation model's predictions is that landings as reported to the logbook database sum approximately to the commercial quota for 2006, 2007 and 2008, and that landings in 2005 were below average and below the quota specified by Amendment 13C. Therefore, the 4-year average for landings of tilefish falls short of the existing commercial quota. When combined with the effects of the trip limits, simulated landings fall short of the proposed quotas, except for the management scenarios with a 50% commercial allocation.

A weakness of the simulation model is its reliance on historical fishery data to predict future fishing patterns when fishermen adjust to regulation over time. The failure of the model to predict closures for the tilefish fishery reflects the willingness and ability of fishermen to change their fishing patterns and strategies in response to regulation. In this case, fishermen are harvesting tilefish earlier in the fishing year. As a result, the model may underpredict actual losses to the snapper-grouper fishery due to a smaller commercial quota for tilefish, but probably by only a small amount because the landings of tilefish are underpredicted in the simulation of the no-action alternative as well as in the simulation of the proposed management scenarios.

Changes in the fishery due to the proposed alternatives in Amendment 17B are calculated as the difference between the outcomes of the proposed alternative and the no-action alternative.

*Figure 6a. Predicted change in commercial net operating revenues by gear type for golden tilefish alternatives compared to the No-Action alternative for Amendment 17B. (** denotes the Council's preferred alternative.)*

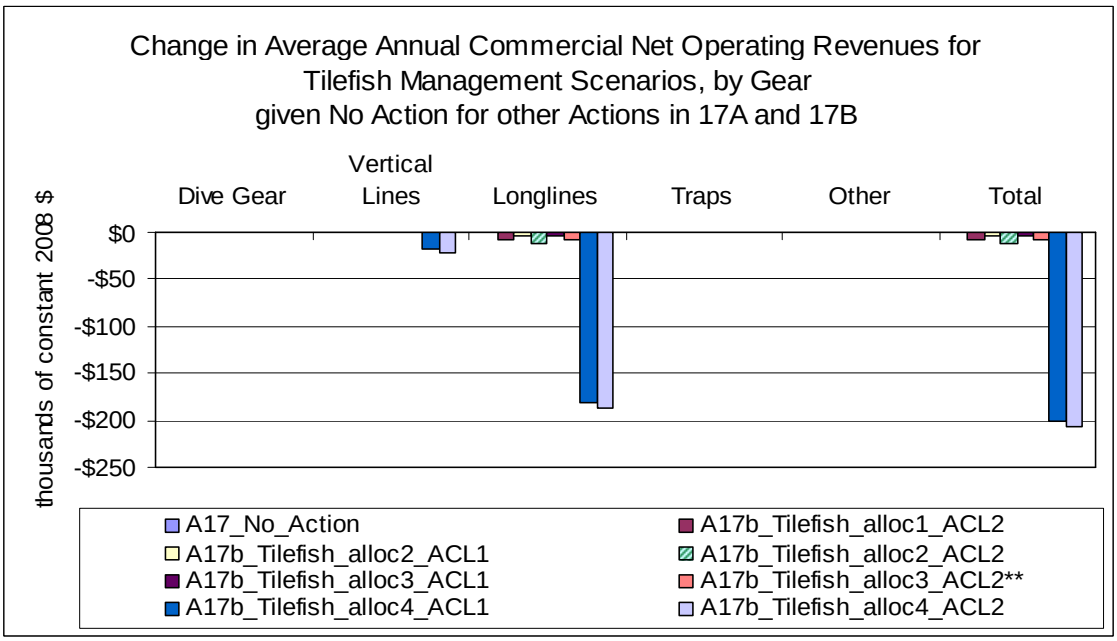


*Figure 6b. Predicted percentage change in commercial net operating revenues by gear type for golden tilefish alternatives compared to the No-Action alternative for Amendment 17B. (** denotes the Council's preferred alternative.)*

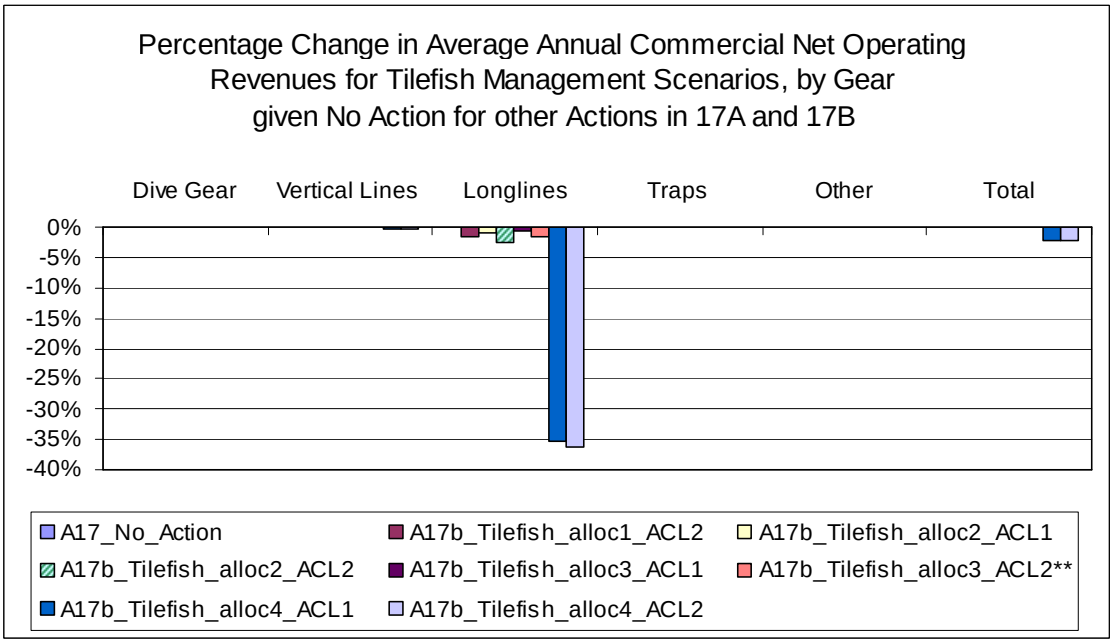


*Figure 7a. Predicted change in commercial net operating revenues by state of landing for golden tilefish alternatives compared to the No-Action alternative for Amendment 17B. (** denotes the Council's preferred alternative.)*

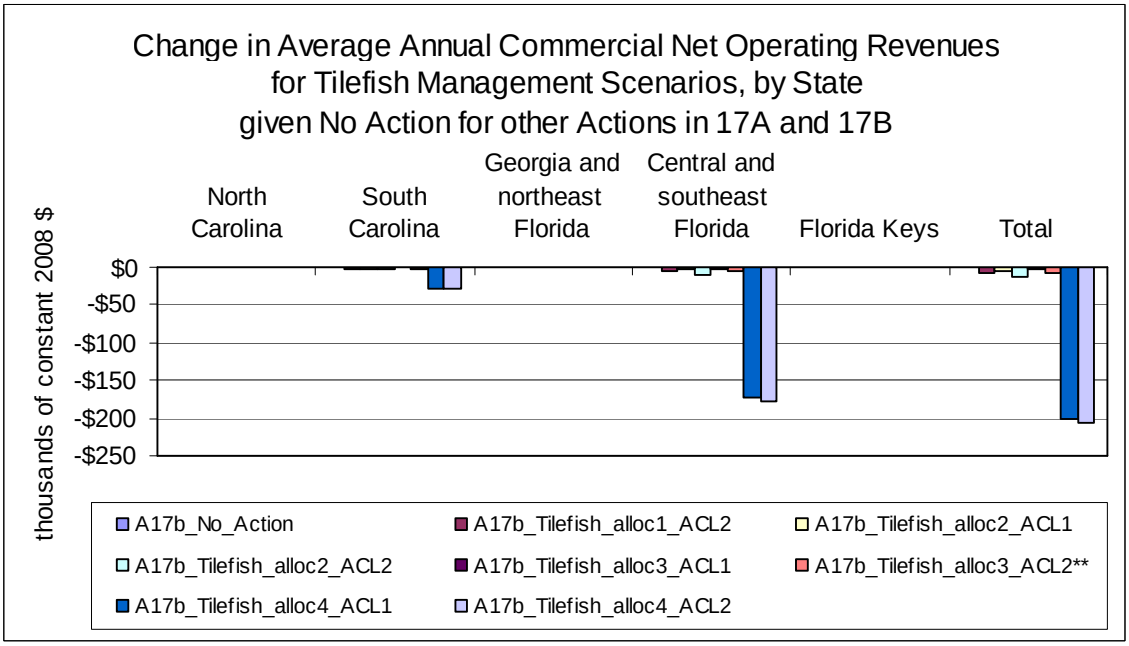
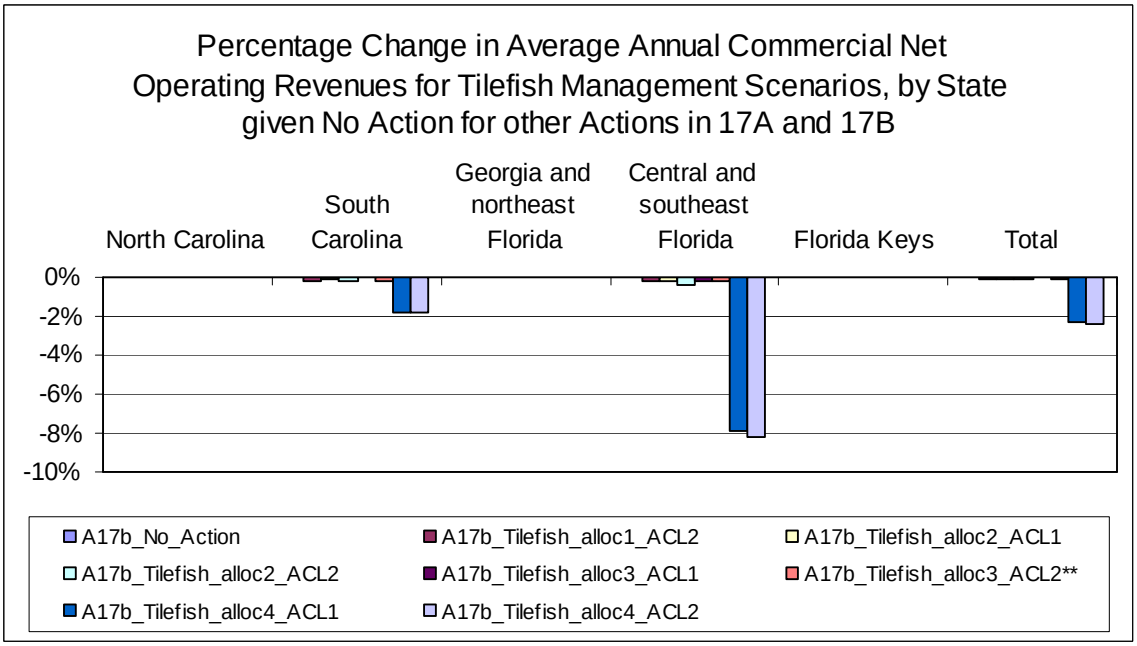


*Figure 7b. Predicted percentage change in commercial net operating revenues by state of landing for golden tilefish alternatives compared to the No-Action alternative for Amendment 17B. (** denotes the Council's preferred alternative.)*



Management Alternatives for Red Grouper and Black Grouper

Amendment 17B considers three methods of establishing commercial catch limits for red grouper and black grouper. Alternative 1 is the no-action alternative in which no catch limits are specified. However beginning in mid-2009, Amendment 16 indirectly limits the commercial catch of red grouper and black grouper. The commercial fishery for shallow water groupers, including red grouper and black grouper, is closed from January through April and when the commercial ACL for gag of 353,940 lbs (gutted weight) is filled. Alternative 2a in Amendment 17B would specify individual catch limits for each species: 221,577 pounds (gutted weight) for red grouper and 86,886 pounds (gutted weight) for black grouper. Alternative 2b would specify an aggregate commercial catch limit of 662,403 pounds (gutted weight) for gag, red grouper and black grouper. Alternative 2b is the Council's preferred alternative. See Table 3.

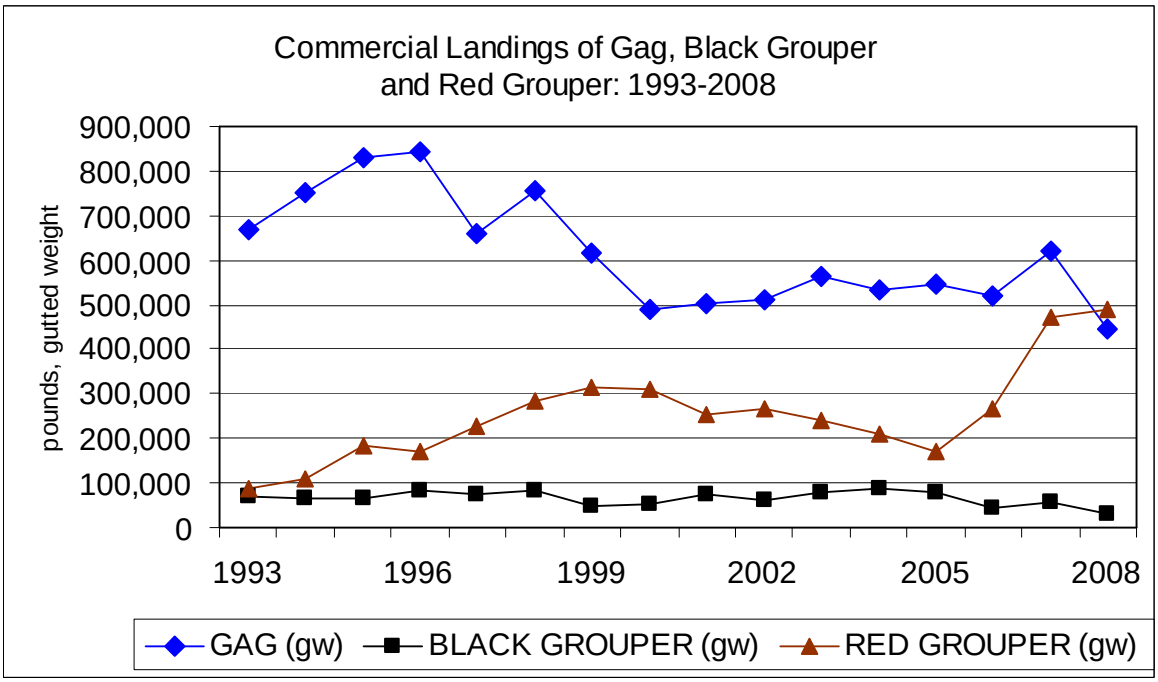
Table 3. Proposed alternatives in Amendment 17B for the management of red grouper and black grouper. (Table 3 paraphrases rather than includes a verbatim statement of alternatives from Amendment 17B.)

Model Name	*Description*
A17b_NO_ACTION	*Alternative 1*: No Action. Retain existing regulations for red grouper and black grouper. The commercial fishery for shallow water groupers, including red grouper and black grouper, is closed from January through April and when the commercial ACL for gag of 353,940 lbs gw is filled. Retain the existing 12 inch minimum size limit for red grouper and 24 inch minimum size limit for black grouper.
A17b_RedGrouperACL_Alt2a	*Alternative 2a*: The commercial ACL for red grouper is 221,577 lbs gw. Close the commercial fishery for red grouper when its ACL is filled. The commercial ACL for black grouper is 86,886 lbs gw. Close the commercial fishery for black grouper when its ACL is filled. The commercial fishery for shallow water groupers, including red grouper and black grouper, is closed from January through April and when the commercial ACL for gag of 353,940 lbs gw is filled, even if the individual ACLs for red grouper and/or black grouper have not been filled. Retain the existing 12 inch minimum size limit for red grouper and 24 inch minimum size limit for black grouper.
A17b_RedGrouperACL_Alt2b**	*Alternative 2b (Preferred)*: Retain the current commercial ACL for gag of 353,940 lbs gw and establish an aggregate commercial ACL for gag, red grouper and black grouper of 662,403 lbs gw. The commercial fishery for shallow water groupers, including red grouper and black grouper, is closed from January through April and when the commercial ACL for gag is filled or when the aggregate ACL for gag, red grouper and black grouper is filled. Retain the existing 12 inch minimum size limit for red grouper and 24 inch minimum size limit for black grouper.

** denotes the Council's preferred alternative.

Commercial landings of red grouper in federal waters increased from approximately 87,700 pounds (gutted weight) worth $171,500 in 1993 to 316,000 pounds worth $742,200 in 1999 and then declined through 2005 (Figure 8).[6] The sharp increase in landings from 171,200 pounds worth $471,200 in 2005 to 491,300 pounds worth more than $1.61 million in 2008 could reflect an adjustment by fishermen to regulations on other species that were imposed in 2006 by Amendment 13C and/or a larger biomass of red grouper available for capture. Commercial landings of black grouper in federal waters averaged 52,400 pounds (gutted weight) worth $183,700 from 2005-2008. Commercial landings of gag in federal waters averaged 533,100 pounds (gutted weight) worth more than $2.1 million from 2005-2008, but, as already noted, Amendment 16 implemented a commercial quota of 353,940 pounds in 2009.

Figure 8. Commercial landings in federal waters: gag, red grouper, and black grouper, 1993-2008.



Source: SEFSC logbook database as of June 29, 2009.

Alternative 2a proposes a commercial catch limit that is less than one-half of the quantities of red grouper that were landed from federal waters in 2007 and 2008, as reported in the logbook database. Nevertheless, the simulation model predicts that commercial net operating revenues would decline by an average of approximately $162,000 per year, or only 1.8 percent of the predicted base net operating revenues for Amendment 17B (Figures 9a and 9b). This seemingly unexpected result occurs because the simulation model calculates expected economic outcomes based on average results when proposed regulations are imposed on logbook data for 2005-2008.

[6] Revenues are presented as current year dollars and have not been adjusted for inflation over time. Trip revenues were approximated as reported landings multiplied by average prices from the NMFS Accumulated Landings System.

The problem is that regulatory conditions during 2005 and 2006, before Amendment 13C was implemented, are not as relevant for the red grouper fishery as are conditions during 2007 and 2008, and larger losses would have been predicted if the analysis had been based on data for 2007 and 2008 only. If fishing and regulatory conditions in the near future closely resemble conditions in 2007, then the simulation model predicts that net operating revenues would decline by about $244,000 or 2.7 percent compared to baseline conditions. If conditions in the near future were similar to conditions in 2008, then the model predicts that net operating revenues would decline by $404,000 or 4.1 percent. These effects would primarily affect fishermen in North Carolina and South Carolina (Figures 10a and 10b).[7] The commercial catch limit proposed for black grouper in Alternative 2a is expected to have no effect on net operating revenues of commercial fishermen because average landings of black grouper in federal waters were less than the proposed catch limit.

The aggregate catch limit for gag, red grouper and black grouper in Alternative 2b is expected to reduce commercial net operating revenues by slightly more than $100,000 per year, or only 1.2 percent of the predicted base net operating revenues for Amendment 17B (Figures 9a, 9b). These results are expectations based on the four-year average with data from 2005-2008. If fishing and regulatory conditions in the near future closely resemble conditions in 2007, then the simulation model predicts that net operating revenues would decline by about $177,000 or 2.0 percent compared to baseline conditions. If conditions in the near future were similar to conditions in 2008, then the model predicts that net operating revenues would decline by $236,000 or 2.4 percent.

While the aggregate catch limit of Alternative 2b equals the sum of the individual catch limits in Alternative 2a for gag, red grouper and black grouper, it would function differently in terms of closing the commercial fisheries. With Alternative 2b and given fishing conditions similar to 2007 and 2008, landings of red grouper could exceed the individual catch limit specified in Alternative 2a, yet in this case the fishery would not close because the aggregate quota was not filled until a later date. The simulation model would have closed the red grouper fishery with Alternative 2a in these instances.

[7] Figures 10a and 10b display the four-year averages of simulated results.

*Figure 9a. Predicted change in commercial net operating revenues by year for red grouper and black grouper alternatives compared to the No-Action alternative for Amendment 17B. (** denotes the Council's preferred alternative.)*

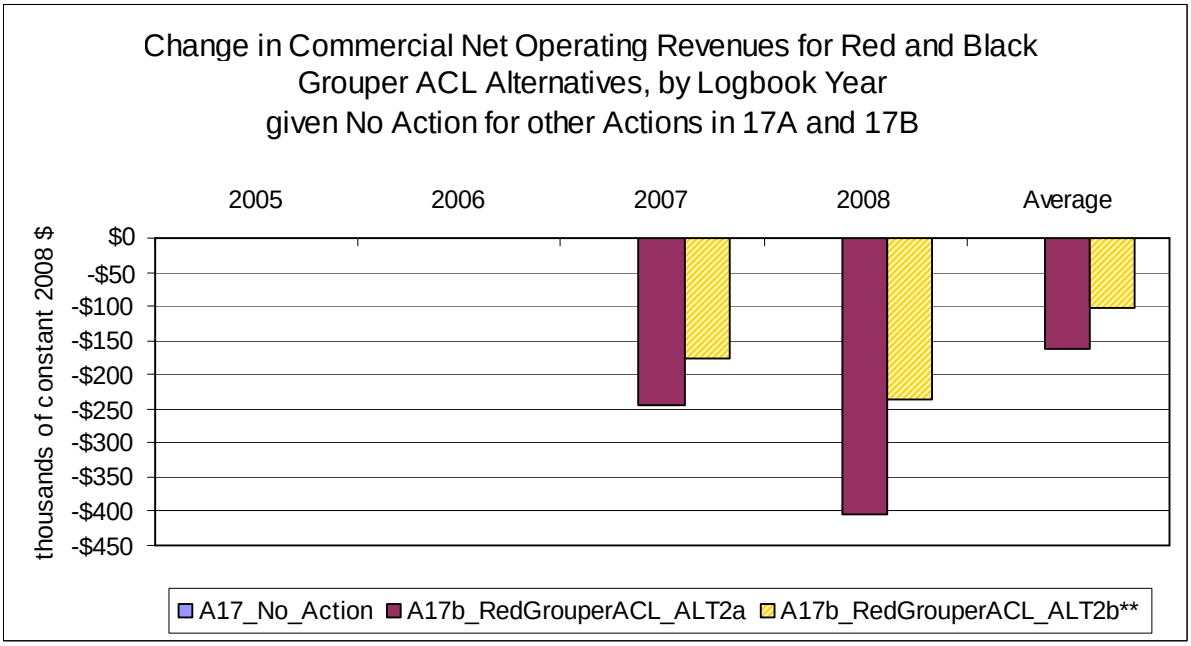


*Figure 9b. Predicted percentage change in commercial net operating revenues by year for red grouper and black grouper alternatives compared to the No-Action alternative for Amendment 17B. (** denotes the Council's preferred alternative.)*

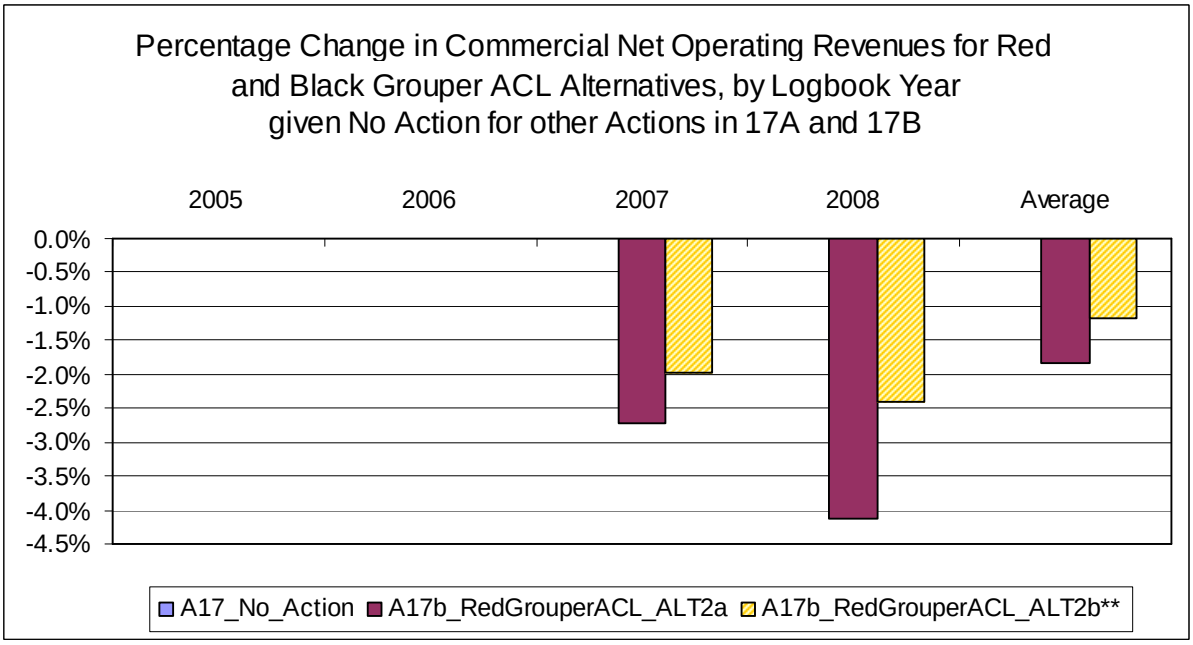


*Figure 10a. Predicted change in commercial net operating revenues by state of landing for red grouper and black grouper alternatives compared to the No-Action alternative for Amendment 17B. (** denotes the Council's preferred alternative.)*

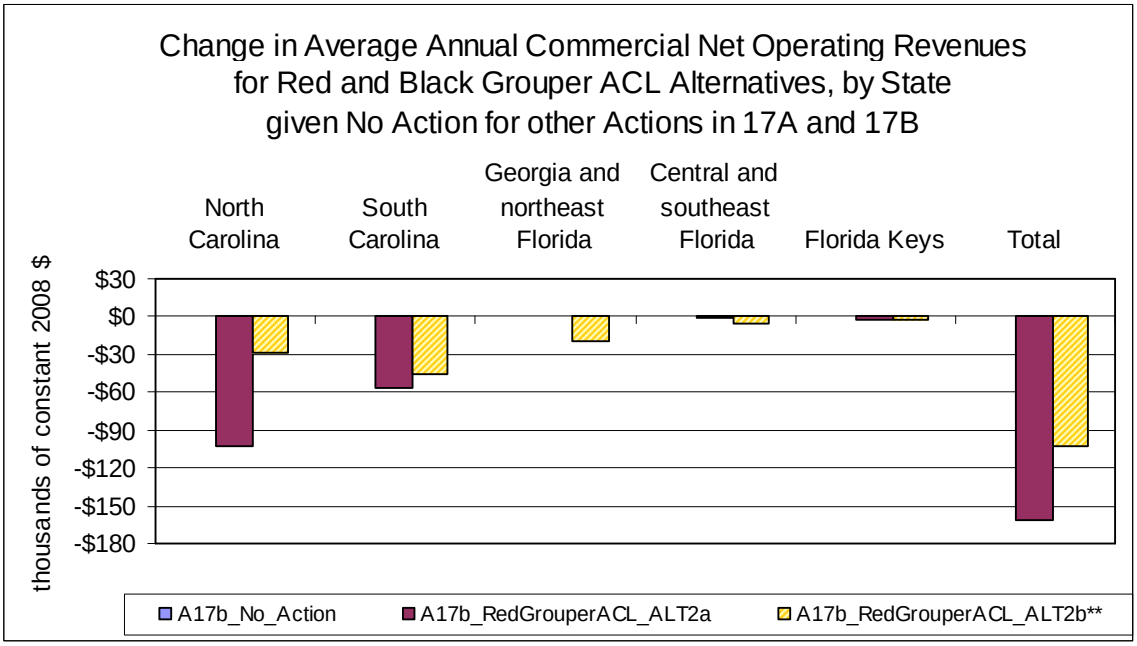
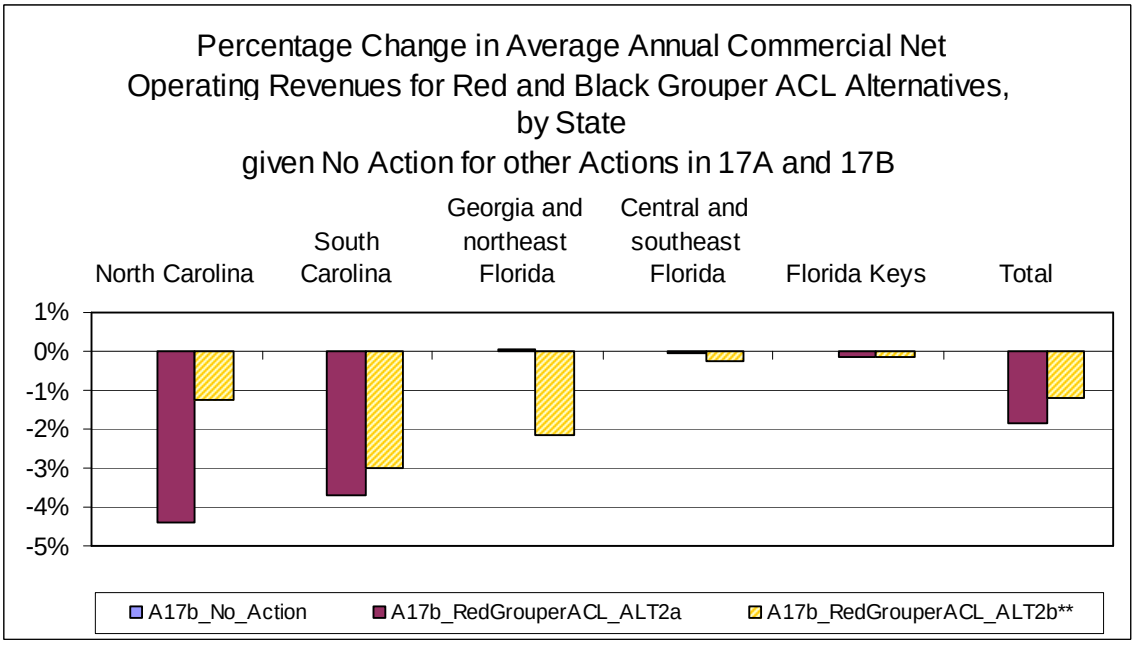


*Figure 10b. Predicted percentage change in commercial net operating revenues by state of landing for red grouper and black grouper alternatives compared to the No-Action alternative for Amendment 17B. (** denotes the Council's preferred alternative.)*



Simultaneous Evaluation of Preferred Alternatives

Previous sections compared the effects of proposed alternatives within each Action by assuming the No-Action alternative for other Actions. This section compares the joint effects of the Council's preferred alternatives for all Actions with the No-Action alternative for Amendment 17B. At the conclusion of the Council's meeting in September 2009, the preferred alternatives included Alternative 4 for speckled hind and warsaw grouper, Alternative 3 for tilefish allocation, Alternative 2 for tilefish total allowable catch, and Alternative 2b for the red grouper and black grouper ACL. The No-Action alternative includes the simulated effects on the commercial fishery of Amendments 13C and 16. See Table 4.

Table 4. Preferred alternatives in Amendment 17B after the Council's meeting in September 2009. (Table 4 paraphrases rather than includes a verbatim statement of alternatives from Amendment 17B.)

Model Name	*Description*
A17b_NO_ACTION	*No Action.* Retain existing regulations for speckled hind and warsaw grouper. Prohibit purchase and sale of speckled hind and warsaw grouper. Allow one speckled hind and one warsaw grouper per vessel per trip as part of the 3-fish recreational bag limit for groupers. Retain existing regulations for golden tilefish based on a total allowable catch of 300,380 lbs gw and an implied commercial allocation of 98.2 percent. The commercial ACL equals the existing quota of 295,000 lbs gw. Prohibit harvest, possession, retention and sale of golden tilefish when the quota is met. The trip limit is 4,000 lbs (gw) until 75% of the quota is taken. The trip limit is reduced to 300 pounds after 75% of the quota is taken, but only if this occurs on or before September 1. Retain existing regulations for red grouper and black grouper. The commercial fishery for shallow water groupers, including red grouper and black grouper, is closed from January through April and when the commercial ACL for gag of 353,940 lbs gw is filled. Retain the existing 12 inch minimum size limit for red grouper and 24 inch minimum size limit for black grouper.
A17b_Preferred_ALTS	*Speckled Hind and Warsaw Grouper Alternative 4*: Establish an ACL=0 for speckled hind and warsaw grouper. Prohibit all commercial and recreational fishing for, possession, and retention of speckled hind and warsaw grouper. Prohibit all fishing for, possession, and retention of snowy grouper, yellowedge grouper, misty grouper, blueline tilefish, queen snapper, and silk snapper beyond a depth of 240 feet (40 fathoms; 73 m). *Tilefish Allocation Alternative 3 and ACL Alternative 2*: The total allowable catch would be determined at the Foy level of 291,566 lbs

	gw. The commercial ACL would be 282,819 lbs gw based on a commercial allocation of 97 percent. Prohibit harvest, possession, retention and sale of golden tilefish when the quota is met. Retain existing trip limits. *Red Grouper-Black Grouper ACL Alternative 2b*: Retain the current commercial ACL for gag of 353,940 lbs gw and establish an aggregate commercial ACL for gag, red grouper and black grouper of 662,403 lbs gw. The commercial fishery for shallow water groupers, including red grouper and black grouper, is closed from January through April and when the commercial ACL for gag is filled or when the aggregate ACL for gag, red grouper and black grouper is filled. Retain the existing 12 inch minimum size limit for red grouper and 24 inch minimum size limit for black grouper.

An important characteristic of the commercial snapper-grouper fishery is that fishermen usually catch more than one species on the same trip. If two or more proposed regulations affect different species that generally are landed on the same trips, then it is possible that their joint effects could differ from the sum of the effects for each regulation considered separately.

This is not the case for Amendment 17B, which considers additional management for three relatively distinct portions of the snapper-grouper fishery. The proposed management alternatives for speckled hind and warsaw grouper primarily would affect deepwater species and have little effect on trips that land shallow water groupers or tilefish. The proposed alternatives for red grouper and black grouper primarily would affect trips with shallow water groupers and have little effect on trips that land deep water species or tilefish. Similarly, the proposed alternatives for tilefish primarily would affect trips for tilefish and have little effect on trips that land shallow water groupers or the deep water species. As a result, the effect of the preferred alternatives when evaluated simultaneously is approximately equal to the sum of the effects of each preferred alternative when evaluated separately.

Average annual net operating revenues to boat owners and crew after deducting trip costs would decline from $8.78 million in constant 2008 dollars to approximately $8.38 million with the preferred management alternatives for speckled hind, warsaw grouper, tilefish, red grouper and black grouper. The average annual difference of -$0.40 million between the No Action and Preferred management scenarios represents a 4.6% average annual short-term economic loss that would be incurred by the commercial snapper-grouper fishery. Actual losses would vary annually depending on economic, biological and environmental conditions. For example, the expected losses of $0.80 million (an 8.2% loss compared to No Action) with fishing conditions as characterized in 2008 would be approximately twice the average annual loss of $0.40 million, whereas the predicted losses of approximately $0.15 million (a 1.9% loss compared to No Action) with fishing conditions as characterized in 2005 would be approximately half the average (Figures 11a and 11b).

Figure 11a. Predicted change in commercial net operating revenues by year for all preferred alternatives combined compared to the No-Action alternative for Amendment 17B.

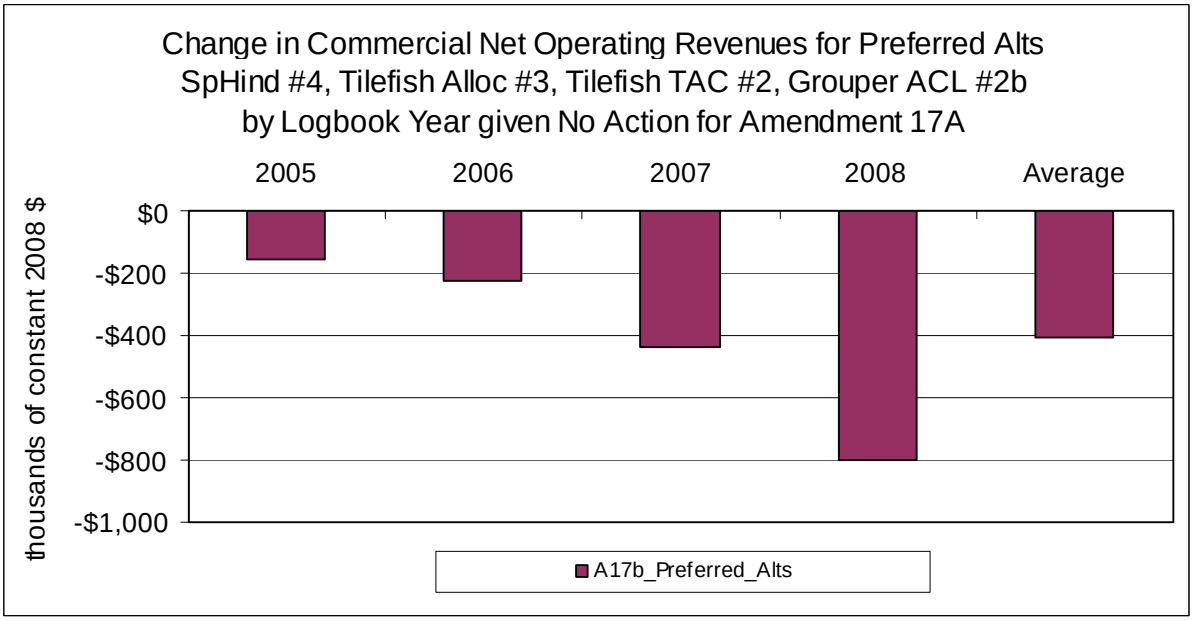


Figure 11b. Predicted percentage change in commercial net operating revenues by year for all preferred alternatives combined compared to the No-Action alternative for Amendment 17B.

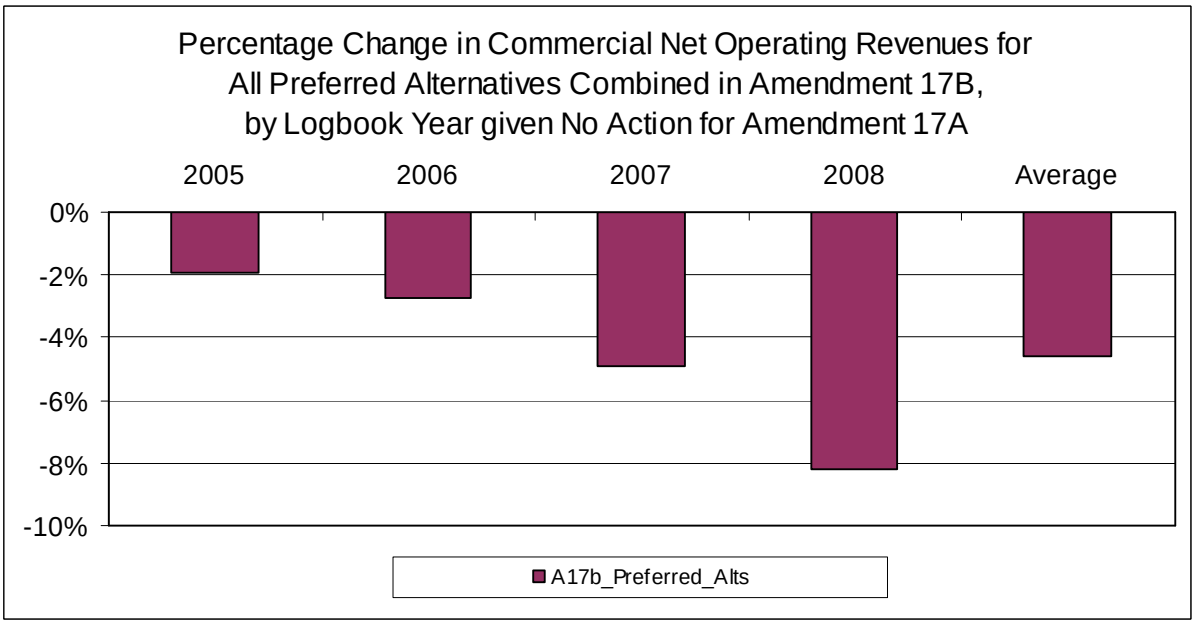


Figure 12a. Predicted change in commercial net operating revenues by gear for all preferred alternatives combined compared to the No-Action alternative for Amendment 17B.

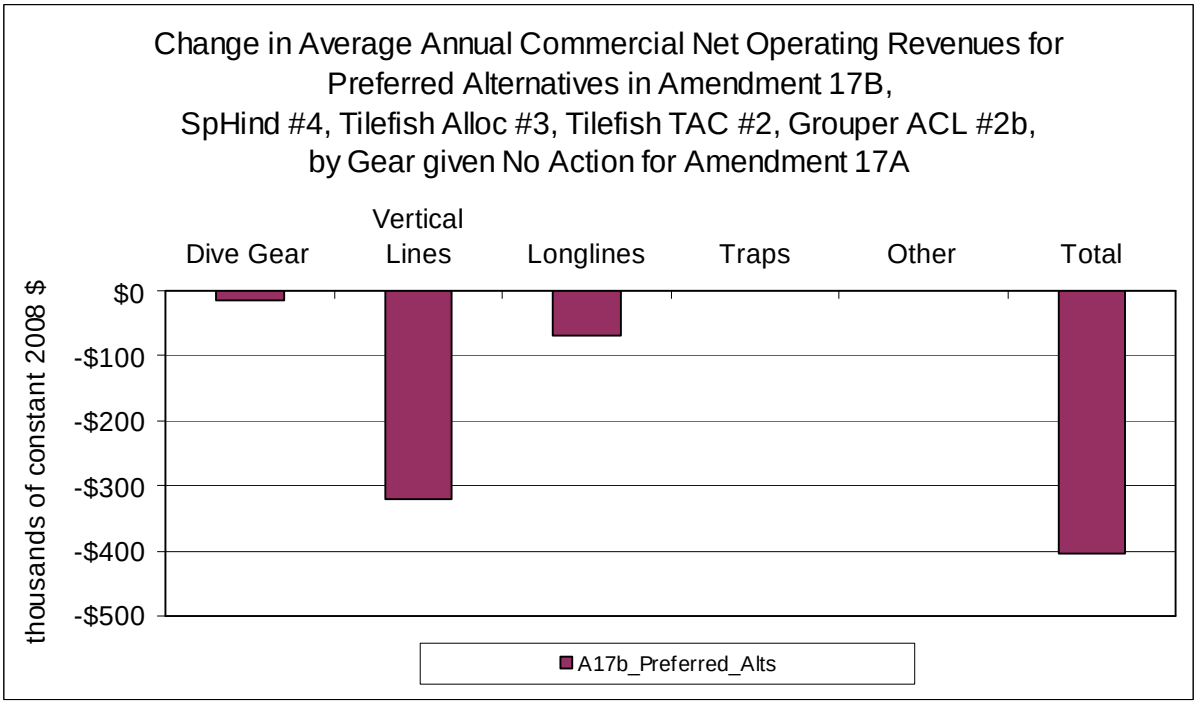
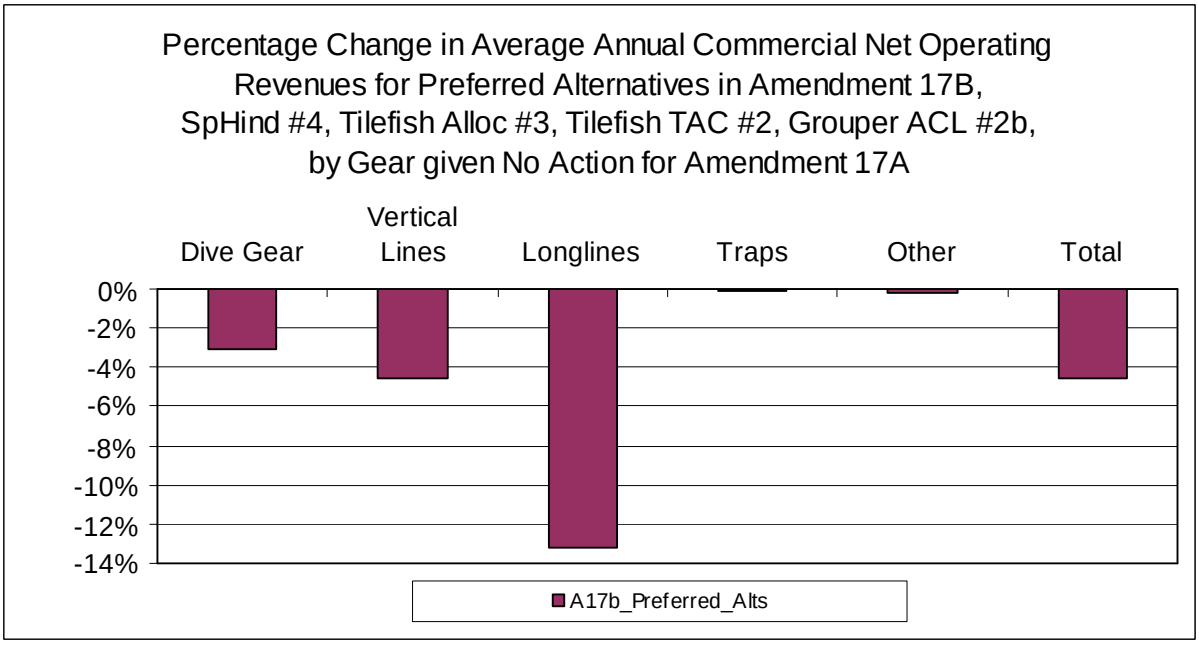


Figure 12b. Predicted percentage change in commercial net operating revenues by gear for all preferred alternatives combined compared to the No-Action alternative for Amendment 17B.



The expected economic losses differ by gear. Most of the losses in dollars would be incurred by boats on trips with vertical line gear because that is the predominant gear in the fishery. Fishermen on trips with longlines represent a smaller component of the snapper-grouper fishery, but would incur greater percentage losses because the prohibition on the harvest of deep water species in waters deeper than 240 feet would eliminate most of the longline fishery for snowy grouper and yellowedge grouper. Fishermen on trips with vertical line gear are expected to lose an annual average of slightly more than $320,000 per year in constant 2008 dollars, or about 4.6% compared to No Action, while fishermen on trips with bottom longlines are expected to lose an average of $68,000 per year, or about 13.2% compared to their earnings with No Action (Figures 12a and 12b).

The economic effects of Amendment 17B also are expected to differ by state of landing. Fishermen from North Carolina, South Carolina, and the Florida Keys would incur the greatest losses in terms of both dollars and percentages, whereas fishermen from Georgia through southeast Florida would be affected to a lesser extent (Figures 13a and 13b). The geographic distribution of expected reductions in net operating revenues primarily reflects the location of fishing activities for the species whose harvest would be prohibited in waters deeper than 240 feet.

Most vessels would not be affected by the preferred alternatives. The logbook database includes trip reports for 776 vessels in 2005, 765 vessels in 2006, 760 vessels in 2007 and 791 vessels in 2008. Over the 4-year period, approximately 77.3 percent of vessels would not be affected by the preferred alternatives in Amendment 17B. Approximately 13.5 percent would be expected to incur losses of less than $1,000 per vessel. Another 6.3 percent would be expected to incur losses between $1,000 and $5,000 per vessel, and 2.2 percent would be expected to incur losses of more than $5,000. Approximately 0.7 percent would be expected to realize a gain in net operating revenues. Based on logbook data for 2005-2008, the maximum loss per vessel would be approximately $131,000 given conditions in 2008, and the maximum gain per vessel would be approximately $3,000 given conditions in 2006.

Figure 13a. Predicted change in commercial net operating revenues by state of landing for all preferred alternatives combined compared to the No-Action alternative for Amendment 17B.

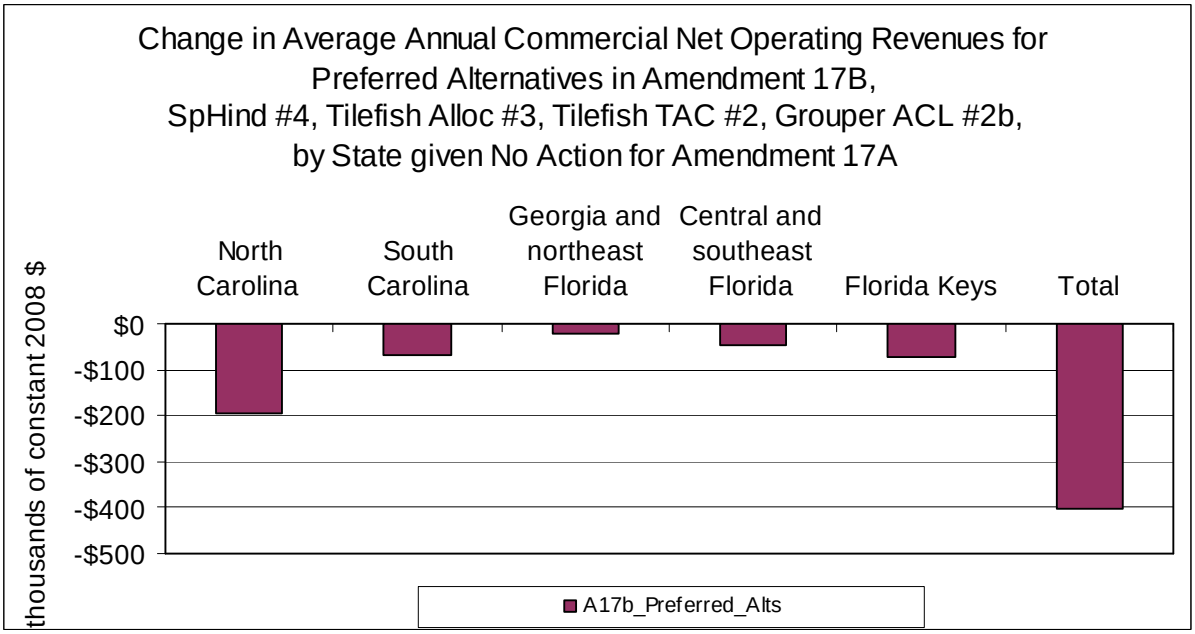
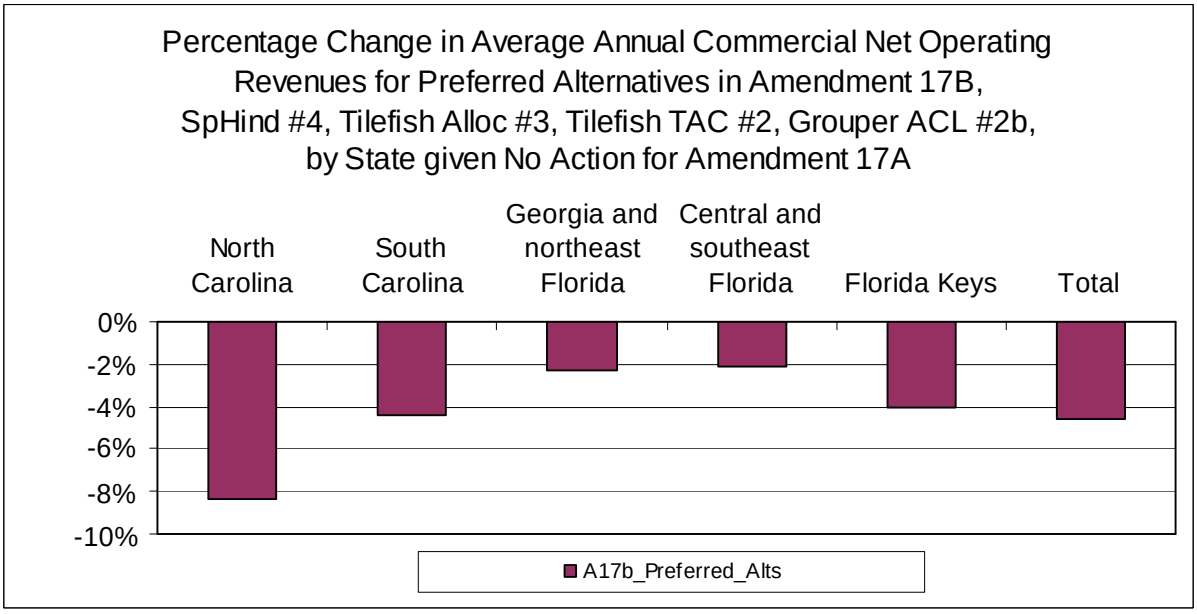


Figure 13b. Predicted percentage change in commercial net operating revenues by state of landing for all preferred alternatives combined compared to the No-Action alternative for Amendment 17B.



Summary

This report described the results of a simulation model that calculated the expected economic effects of management alternatives proposed in Amendment 17B for the commercial snapper-grouper fishery. Alternatives were evaluated that would establish annual catch limits for speckled hind, warsaw grouper, golden tilefish, red grouper and black grouper. The results were compared to a baseline scenario defined by management conditions that were implemented recently by Amendments 13C and 16.

The simulation results suggest that most of the proposed management alternatives that were evaluated would not have major *additional* economic effects when compared to the no-action alternative for the entire commercial snapper-grouper fishery, *after accounting for the expected effects of Amendments 13C and 16.* This is because Amendment 17B would not impose additional regulations for the commercial harvest of high-volume species such as vermilion snapper, yellowtail snapper and gag.

Average annual net operating revenues to boat owners and crew after deducting trip costs would decline from $8.78 million in constant 2008 dollars to approximately $8.38 million with the preferred management alternatives for speckled hind, warsaw grouper, tilefish, red grouper and black grouper. The average annual difference of -$0.40 million between the No Action and Preferred management scenarios represents a 4.6% average annual short-term economic loss that would be incurred by the commercial snapper-grouper fishery. On average, approximately 72% of the overall, expected annual reduction in net operating revenues would occur in response to the prohibition on the harvest and landing of deep water groupers and snappers and blueline tilefish in waters deeper than 240 feet. Approximately 26% of the expected annual reduction would occur in response to the aggregate ACL for red grouper, black grouper and gag, and the remaining 2% reduction is expected in response to a lower ACL for tilefish.

The analysis evaluated the economic effects of proposed alternatives for each management action given the No-Action alternative for other actions, as well as the simultaneous effects of all preferred alternatives for the various actions in Amendment 17B. In addition, the management alternatives in Amendment 17B could interact with additional alternatives that are simultaneously being developed in Amendment 17A to manage fishing activity in areas with large concentrations of red snapper. The simultaneous evaluation of preferred alternatives from the two amendments can occur later when preferred alternatives are specified for all Actions in both amendments.