Appendix H. Notes about the Economic Effects of Preliminary Management Alternatives In Snapper-Grouper Regulatory Amendment 10 On the Commercial Snapper-Grouper Fishery

National Marine Fisheries Service
Southeast Fisheries Science Center

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Notes about the Economic Effects of Preliminary Management Alternatives
In Snapper-Grouper Regulatory Amendment 10
On the Commercial Snapper-Grouper Fishery

Deliverables

Deliverables include this Word file plus four Excel spreadsheets with results from the simulation analysis of preliminary management alternatives for Regulatory Amendment 10. Spreadsheets are named:

- **RegA10 base17A comm econ 3yr NOR tables 112310** includes tabulations of simulated net operating revenues given the closures to be implemented by Snapper-Grouper Amendment 17A as the No Action alternative;
- **RegA10 base17A comm econ 3yr REV tables 112310** includes tabulations of simulated gross dockside revenues given the closures to be implemented by Snapper-Grouper Amendment 17A as the No Action alternative;
- **RegA10 base17AB comm econ 3yr NOR tables 112110** includes tabulations of simulated net operating revenues given the closures to be implemented by Snapper-Grouper Amendments 17A and 17B as the No Action alternative;
- **RegA10 base17AB comm econ 3yr REV tables 112110** includes tabulations of simulated gross dockside revenues given the closures to be implemented by Snapper-Grouper Amendments 17A and 17B as the No Action alternatives.

Each spreadsheet includes five basic worksheets.

- **LogYear** presents results for the three years (2007-2009) of logbook data used in the analysis.
- **State** presents results organized by region within the jurisdiction of the South Atlantic Fishery Management Council. Regions are defined as North Carolina, South Carolina, Georgia and northeast Florida, central and southeast Florida, and the Florida Keys. Northeast Florida is defined as the three northeastern counties of Nassau, Duval and St Johns. Central and southeast Florida is defined as the remaining east coast counties from Flagler County through Miami-Dade County. The Florida Keys region is defined by water body code to include waters to the south and east of the Keys.
- **Gear** presents results organized by the primary gear used on each trip as reported to the logbook program. If more than one gear was used on a trip, the primary gear was defined as the gear that accounted for a plurality of trip revenues. Gears include vertical lines (gear codes H, E, and TR), longlines (L), pots/traps (T), dive gear (S, P), and all other gears.
- **Month** presents results organized by month and calendar quarter.
- **Alternatives** defines the preliminary alternatives to be examined for Regulatory Amendment 10 and the set of existing regulations from Amendments 13C, 15A, 16, 17A and 17B that define the No Action alternative.

The preliminary alternatives for Regulatory Amendment 10 were examined with:

- Gear exemptions for black sea bass pots and dive gear;
- Gear exemption for dive gear only;
- Gear exemption for black sea bass pots only;

- No gear exemptions.

The spreadsheets with results in terms of net operating revenues include worksheets named **Exempt_Spears** and **Exempt_Pots** that compare the simulated results with and without exemptions for spearfishing and black sea bass pots. An exemption for spearfishing is evaluated by subtracting simulated results for scenarios with

- (a) both gear exemptions minus (b) an exemption for pots only, and
- (a) an exemption for spears only minus (b) no gear exemptions.

Both comparisons yield identical results.

Similarly, the exemption for black sea bass pots is evaluated by subtracting simulated results for scenarios with

- (a) both gear exemptions minus (b) an exemption for spears only, and
- (a) an exemption for pots only minus (b) no gear exemptions.

Both comparisons yield identical results.

Additional worksheets in spreadsheet **RegA10 base17A comm econ 3yr NOR tables 112310** include the figures and underlying data that appear later in this set of notes.

- **LogYearFigures**
- **StateFigures**
- **GearFigures**
- **MonthFigures**

The discussion about the information in each figure compares the expected outcome of closures to be implemented by Amendment 17A with the expected outcomes for the preliminary alternatives for Regulatory Amendment 10. However, although Amendment 17A represents the No Action alternative for Regulatory Amendment 10, the figures are organized to display expected deviations from a baseline defined by Amendment 16, which is the No Action alternative for Amendment 17A and is identified as alternative 0 in the accompanying Excel spreadsheets. Figures are displayed in this way to illustrate that Regulatory Amendment 10 is expected to benefit the commercial fishery, but that the benefits would accrue as smaller reductions in net operating revenues rather than actual increases in net operating revenues. In other words, the benefits are depicted in the figures as smaller (in absolute value) negative numbers rather than as positive numbers. Recall that Amendment 17A has not been implemented, so that net operating revenues are expected to decline for commercial fishermen regardless of whether the closures associated with Amendment 17A or one of the alternatives from Regulatory Amendment 10 is implemented.

Background

Amendment 17A was developed to reduce overfishing on red snapper, and will prohibit the landing and sale of red snapper throughout the jurisdiction of the SAFMC. Other management actions in Amendment 17A are designed to reduce the incidental bycatch and discard of red snapper by vessels when fishing for other species in the snapper-grouper management unit. These management actions include a prohibition on the landing and sale of any species in the

snapper-grouper management unit within 98-240 water depths in areas defined by latitude-longitude grids 2880, 2980 and 3080. Fishing with black sea bass pots or spearfishing gear is exempt from this closure, although red snapper may not be landed or sold if caught with the exempted gears. Amendment 17A has been approved by the Secretary of Commerce and awaits implementation.

A new biological stock assessment was slightly more optimistic about the status of the red snapper stock, although it still found the stock to be overfished and that overfishing still is occurring. As a result, Regulatory Amendment 10 will consider management actions for red snapper that are less restrictive. Most of the preliminary alternatives for Regulatory Amendment 10 would maintain the prohibition on fishing within 98-240 foot depths for all snapper-grouper species, but specify smaller geographic limits for the closed areas and shorter seasonal closures rather than a year-round closure.

Table 1. Preliminary management alternatives for Regulatory Amendment 10.

Preliminary Alternatives for Regulatory Amendment 10	Alternative Label	Areas Closed	Depth (ft) Closed	Months Closed
1-no action (regulations to be implemented by Amendment 17A)	1	2880, 2980, 3080	98-240	year-round
2 (2011 and onwards)	2	2880, 2980	98-240	May-October
3 (2011 and onwards)	3	2880, 2980, 3080	98-240	May-August
4 (2011 and onwards)	4	2880, 2980, 3080	98-240	July-December
5 (2011 and onwards)	5	2880, 2980, 3080	98-240	May-December
6 (2011)	6a	2880, 2980, 3080	66-240	May-December
6 (2012 and onwards)	6b	2880, 2980	98-240	May-October
7 (2011)	7a	2880, 2980	98-240	May-October
7 (2012 and onwards)	7b	2980	98-240	June-July
8 (2011)	8a	2880, 2980	98-240	May-October
8 (2012 and onwards)	8b	2880, 2980	98-240	July
9 (2011)	9a	2880, 2980, 3080	98-240	July-December
9 (2012 and onwards)	9b	2880, 2980	98-240	Jan-April
10 (2011)	10a	2880, 2980, 3080	98-240	May-December
10 (2012 and onwards)	10b	2880, 2980	98-240	Jan-April

Method of Analysis

The economic analysis of the preliminary management alternatives for Regulatory Amendment 10 consists of a comparison of their expected economic outcomes with the expected outcome for the closures that have been approved but not yet implemented for Amendment 17A.

A simulation model was employed to calculate the expected economic outcomes for the No Action management scenario and each of the preliminary alternatives. The model hypothetically

imposes the proposed restrictions on commercial fishing activities as defined by logbook trip reports that were submitted to the NMFS during 2007-2009. This is the same model and procedure that were used to examine the expected economic effects of management alternatives that were proposed for Amendment 17A. However, the analysis for Amendment 17A used data for 2006-2008 because data for 2009 were unavailable at that time. Therefore, the results presented here for the expected outcome of Amendment 17A, which is the No Action alternative for Regulatory Amendment 10, are based on updated logbook data from 2007-2009 and will differ from the results that appear in Amendment 17A.

The advantages and disadvantages of the simulation model were discussed in Amendment 17A. Briefly, the advantages are:

- The analysis uses data about actual fishing activities as reported by fishermen;
- The analysis considers the effects of the preliminary management alternatives on trip revenues and trip costs, and allows for the possibility that the restrictions may make some individual trips unprofitable;
- The analysis considers the interaction of preliminary management alternatives with existing regulations.

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 simulation model uses information from the recent past (in this analysis, 2007-2009) as a predictor of the near future. Because the future is unknown and because economic and environmental conditions vary over time, we do not know which year is the best predictor of the near future. Therefore, the 3-year average of simulated results from 2007-2009 is used as the expected predictor of the effects for each preliminary management alternative. The model is most appropriately applied to short-term evaluations because information from the recent past is a more reliable predictor of the near-future than of the distant future.

Results are presented in terms of net operating revenues, defined as commercial dockside revenues minus trip costs which include fuel, oil, bait, ice, and other supplies, and exclude fixed costs and labor costs. Therefore, net operating revenues represent the incomes for labor (including crew) plus the gross income for boat owners who must pay fixed costs and other non-trip costs related to owning and operating the vessel.[1] Net operating revenues were adjusted to constant 2008 dollars with the consumer price index for all items and all urban consumers.

All alternatives are evaluated from January through December each year.

[1] The logbook database does not collect prices or revenues for landed fish. Trip revenues were calculated as reported landings multiplied by average prices, by species, from the NMFS Accumulated Landings System. Trip costs were calculated from sample data as a function of trip characteristics such as type of gear and amount of gear used, crew size, duration of trip, and pounds landed.

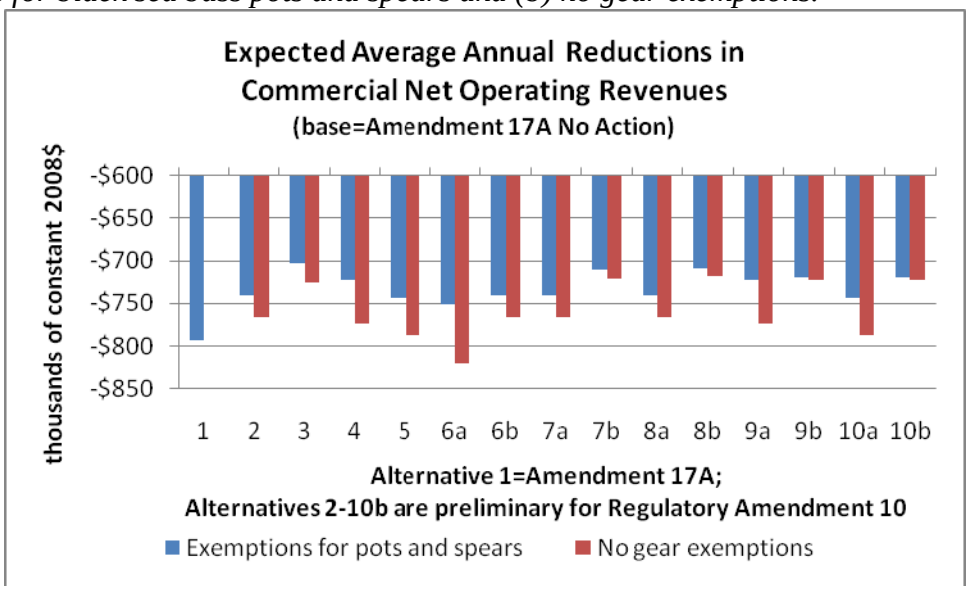
Results

There are five primary conclusions from the economic analysis of preliminary management alternatives for Regulatory Amendment 10.

1. The potential economic benefit of Regulatory Amendment 10 occurs in the form of smaller losses in net operating revenues due to regulation rather than an actual increase in net operating revenues.
2. In aggregate, the potential benefit of Regulatory Amendment 10 is small compared to total net operating revenues for the entire snapper-grouper fishery.
3. However, the potential benefit is large for fishermen in Georgia and northeast Florida, where the management alternatives associated with Amendment 17A would be most restrictive.
4. The smaller and shorter closures associated with Regulatory Amendment 10 would allow the snapper-grouper fleet to fill the existing commercial quotas for gag and vermilion snapper more quickly, which sometimes yielded counterintuitive, but plausible, results.
5. The gear exemption for spearfishing matters.

(1)Potential benefits equate to smaller reductions in net operating revenues.
The closures to be implemented by Amendment 17A are defined as the No Action alternative for Regulatory Amendment 10 because they represent the restrictions that will be implemented if not superseded by any of the alternatives in Regulatory Amendment 10. In most of the preliminary management scenarios, Regulatory Amendment 10 would be less restrictive than Amendment 17A, and hence there usually would be a benefit to commercial fishermen. However, the benefit takes the form of smaller losses in net operating revenues due to regulation rather than an actual increase in net operating revenues. Smaller losses are depicted in Figure 1 and all subsequent figures by vertical bars that are shorter than the bar for Alternative 1 (Amendment 17A).

Figure 1. Expected average annual reductions in commercial net operating revenues, given (a) exemptions for black sea bass pots and spears and (b) no gear exemptions.



Amendment 17A is expected to reduce net operating revenues by approximately $794,000 (Figure 1) based on average simulated outcomes with data for 2007-2009. The least costly preliminary alternative in Regulatory Amendment 10 (alternative 3 with an exemption for spearfishing gear) is expected to reduce net operating revenues by an average of approximately $703,000 (see the left bar for alternative 3 in Figure 1) compared to No Action for Amendment 17A. In this scenario, alternative 3 with an exemption for spearfishing gear would yield an expected benefit of approximately $91,000 per year in the form of smaller losses in net operating revenues due to regulation.

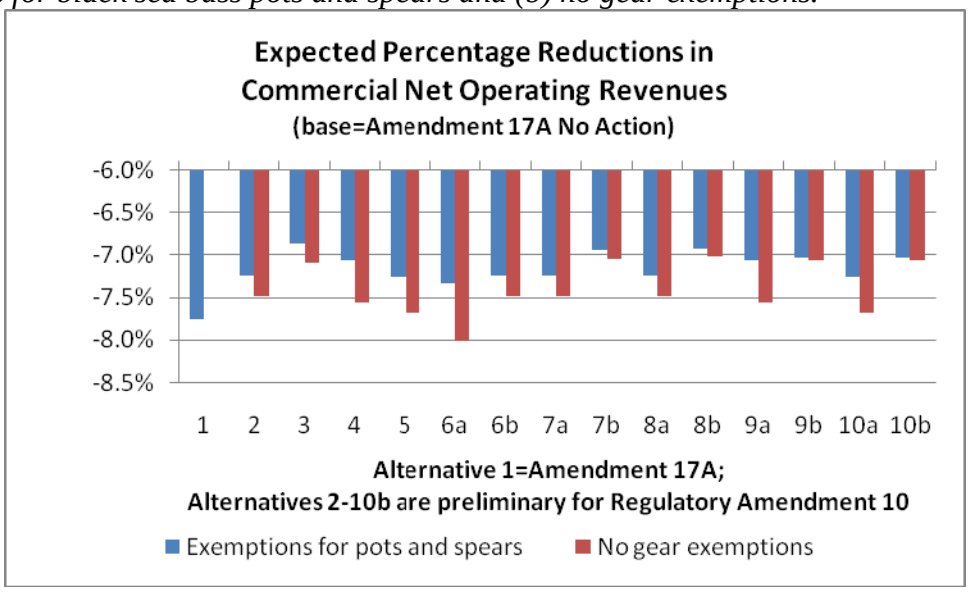
Two preliminary management scenarios in Regulatory Amendment 10 are expected to make fishermen worse off than with Amendment 17A. Both outcomes occurred with preliminary management alternative 6a without a gear exemption for spearfishing. Alternative 6a is the only alternative that would close the snapper-grouper fishery in the shallower water depths from 66-240 feet where spearfishing is more likely to occur, whereas Amendment 17A and all other preliminary alternatives for Regulatory Amendment 10 would close the snapper-grouper fishery in water depths from 98-240 feet. Hence, an elimination of the exemption for spearfishing would generate extra losses for commercial fishermen. The most costly preliminary alternative in Regulatory Amendment 10 (alternative 6a without any gear exemptions) is expected to reduce net operating revenues by an average of approximately $820,000 (see the right bar for alternative 6a in Figure 1) compared to No Action for Amendment 17A. Thus, alternative 6a without any gear exemptions is expected to be approximately $27,000 more costly than the closures that would be implemented by Amendment 17A. Preliminary alternative 6a with an exemption for black sea bass pots and without an exemption for spearfishing is expected to reduce net operating revenues by an average of approximately $818,000 compared to No Action for Amendment 17A.

(2)Potential benefits are small relative to the entire snapper-grouper fishery.
In the simulation model, the average annual net operating revenues are approximately $10.2 million (in constant 2008 dollars) for all trips that landed at least one pound of any species in the snapper-grouper management unit. This includes trips that targeted species in the snapper-grouper management unit as well as trips that landed snapper-grouper species as secondary sources of revenue while fishing primarily for non-snapper-grouper species. The closures to be implemented by Amendment 17A are expected to reduce net operating revenues to approximately $9.4 million, or by approximately $794,000 per year (7.8 percent) (see Figures 1 and 2).

The closures for Amendment 17A include gear exemptions from the closed areas for fishing activities with spears and black sea bass pots. Given the same gear exemptions, the preliminary management alternatives in Regulatory Amendment 10 are expected to reduce net operating revenues in a range from $703,000 (6.9 percent) per year for alternative 3 to $751,000 (7.3 percent) for alternative 6a (Figures 1 and 2). The resulting potential benefits from the less restrictive alternatives in Regulatory Amendment 10 are relatively small in aggregate, and range from 1.0 percent ($91,000) per year for alternative 3 to 0.4 percent ($42,000) for alternative 6a. The potential benefits associated with Regulatory Amendment 10 are smaller without any gear

exemptions, and range from approximately $72,000 (0.8 percent) per year for alternative 7b to an additional loss of $27,000 (-0.3 percent) for alternative 6a (Figures 1 and 2).

Figure 2. Expected percentage reductions in commercial net operating revenues given (a) exemptions for black sea bass pots and spears and (b) no gear exemptions.



(3)Potential benefits are large for fishermen in Georgia and northeast Florida.
Amendment 17A would close the snapper-grouper fishery where red snapper are most abundant; i.e., in water depths from 98-240 feet in areas from southeast Georgia through east-central Florida defined by latitude-longitude grids 3080, 2980 and 2880. As a result, net operating revenues for fishermen in Georgia and northeast Florida are expected to decline by an average of approximately $770,000 per year (64 percent) with Amendment 17A (Figures 3 and 4).

With Regulatory Amendment 10, however, net operating revenues for fishermen in Georgia and northeast Florida are expected to decline by approximately $416,000-$433,000 per year (35-36 percent) by removing grid 3080 from the list of closed areas for preliminary alternatives 2, 6b, 7a, 7b, 8a, 8b, 9b and 10b (Figures 3 and 4). Although a 35 percent decline in net operating revenues would be substantial, fishermen in Georgia and northeast Florida would benefit by approximately $354,000-$337,000 (29-28 percent) compared to Amendment 17A.

Among the preliminary alternatives in Regulatory Amendment 10, alternatives 5, 6a and 10a include closures that are most similar to those of Amendment 17A, and hence have the smallest potential benefit for commercial fishermen. Net operating revenues for fishermen in Georgia and northeast Florida would decline by approximately $635,000 per year (53 percent) (Figures 3 and 4) for a potential benefit of approximately $135,000 per year (11 percent) compared to Amendment 17A.

Figure 3. Expected average annual reductions in commercial net operating revenues, by region, given exemptions for black sea bass pots and spears.

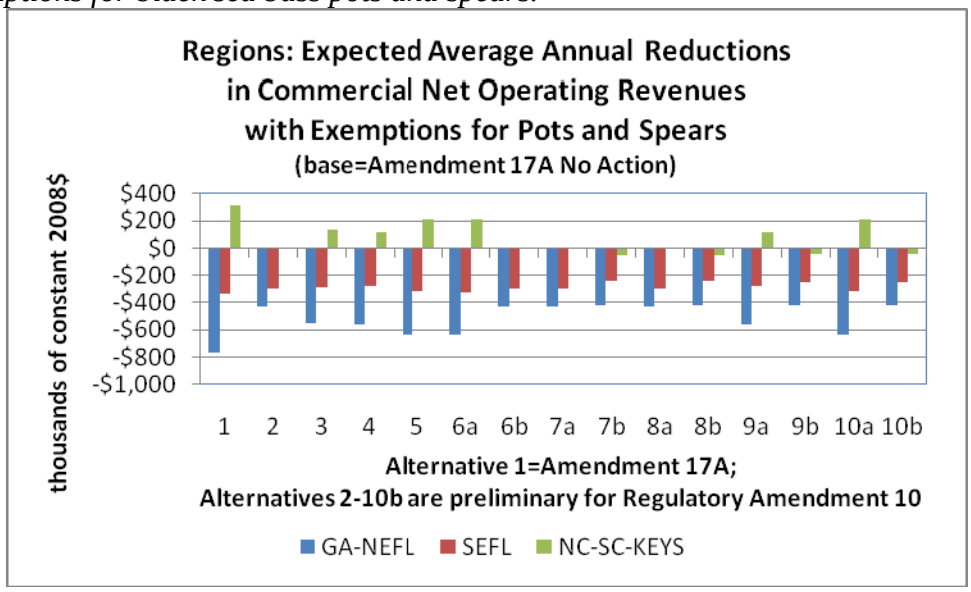
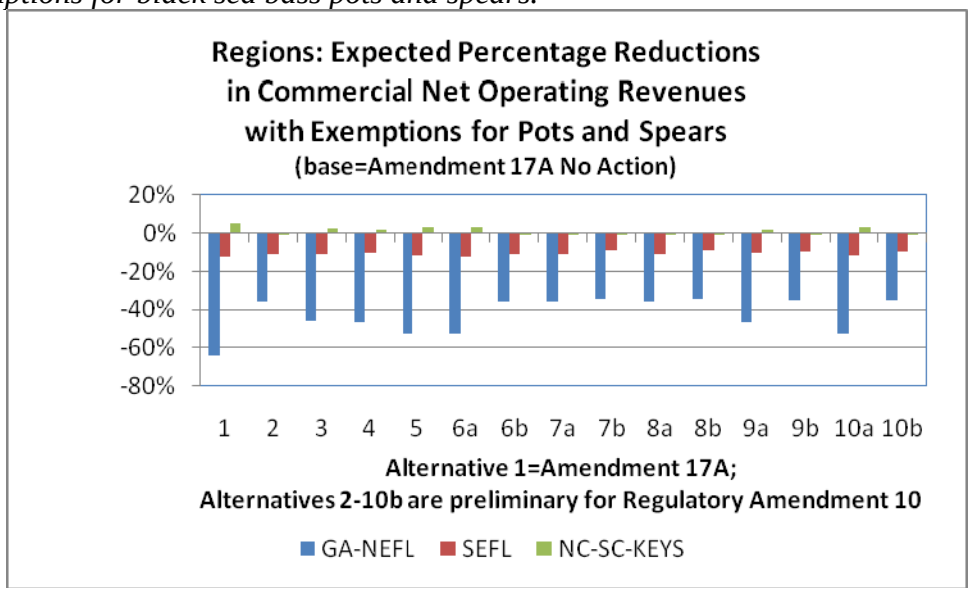


Figure 4. Expected percentage reductions in commercial net operating revenues, by region, given exemptions for black sea bass pots and spears.



The preliminary alternatives for Regulatory Amendment 10 are expected to generate minimal benefits for commercial fishermen in southeast Florida. From the perspective of fishermen in southeast Florida, the most favorable preliminary alternatives (7b, 8b, 9b and 10b) in Regulatory Amendment 10 are expected to reduce net operating revenues by approximately $250,000 per year, or 9 percent (Figures 3 and 4). With Amendment 17A, net operating revenues are expected to decline by approximately $334,000 per year, or 13 percent (Figures 3 and 4). The resulting difference between the two outcomes represents a potential benefit of approximately $84,000 per year, or 4 percent, with Regulatory Amendment 10 rather than Amendment 17A.

(4)Smaller and shorter closures increase the rate of filling quotas for other species.
Other areas within the jurisdiction of the South Atlantic Council would not be closed under Amendment 17A, and net operating revenues for fishermen in these areas (including North Carolina, South Carolina and the Florida Keys) are expected to increase by approximately 5 percent (Figures 3 and 4). The closures off the coasts of Georgia and Florida associated with Amendment 17A are expected to slow the rate at which the quota for gag is filled, which would establish a longer open season for shallow water groupers and enable fishermen in North Carolina and South Carolina to land greater quantities of red grouper and other shallow water groupers. The preliminary alternatives in Regulatory Amendment 10 would reverse this redistribution of fishery benefits, with smaller and shorter closed areas off the coasts of Georgia and Florida resulting in shorter open seasons for shallow water groupers and less opportunity for fishermen in North Carolina and South Carolina to land greater quantities of red grouper and other shallow water groupers.

Figures 5 and 6 illustrate that the preliminary management alternatives in Regulatory Amendment 10 would shift harvests and net operating revenues from later in the calendar year with Amendment 17A to earlier in the year with Regulatory Amendment 10. The closures associated with Amendment 17A are expected to reduce net operating revenues by approximately 16 percent during the first quarter, by 8 percent during the second quarter, and by 10 percent during the third quarter (Figure 6). Net operating revenues are expected to increase by approximately 4 percent during the fourth quarter due to the slower rate of filling the commercial quota for gag and the resulting longer open season for shallow water groupers. By virtue of the smaller and shorter closures associated with the preliminary alternatives for Regulatory Amendment 10, fishermen would land larger quantities of gag and vermilion snapper during the first half of the year and incur smaller reductions in net operating revenues, which equates to a benefit for commercial fishermen (Figures 5 and 6). The quotas for gag and vermilion snapper are expected to be filled earlier than with Amendment 17A, and hence net operating revenues would decline during the fourth quarter compared to the expected outcome for Amendment 17A. The comparison of net operating revenues for the preliminary alternatives with Amendment 17A is mixed during the third quarter. Net operating revenues during the third quarter for preliminary alternatives 4, 5, 6a, 9a and 10a are expected to be approximately the same as with Amendment 17A. Commercial fishermen are expected to incur smaller reductions in net operating revenues with the other preliminary alternatives when compared to the expected outcome for Amendment 17A.

Figure 5. Expected average annual reductions in commercial net operating revenues, by quarter, given exemptions for black sea bass pots and spears.

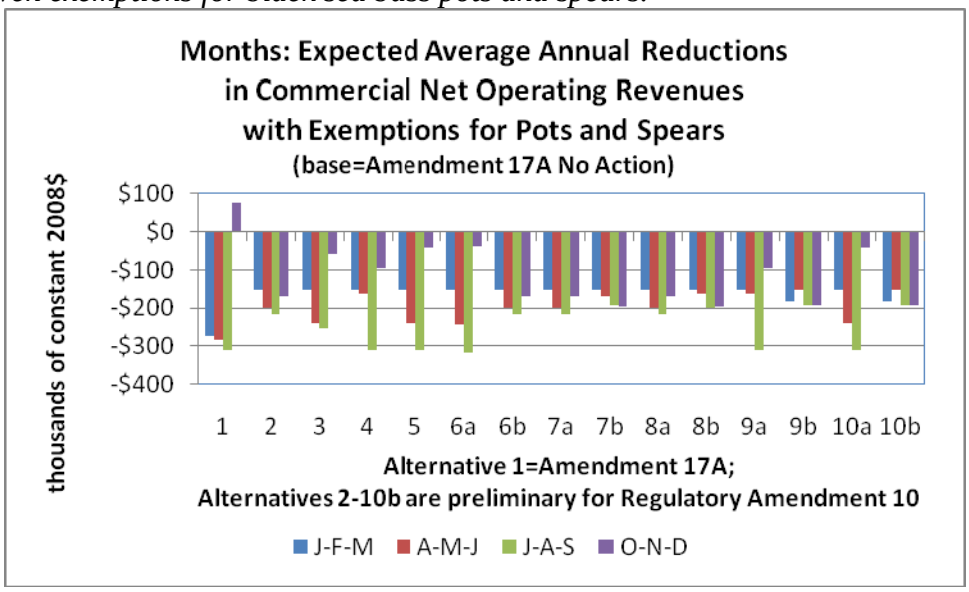
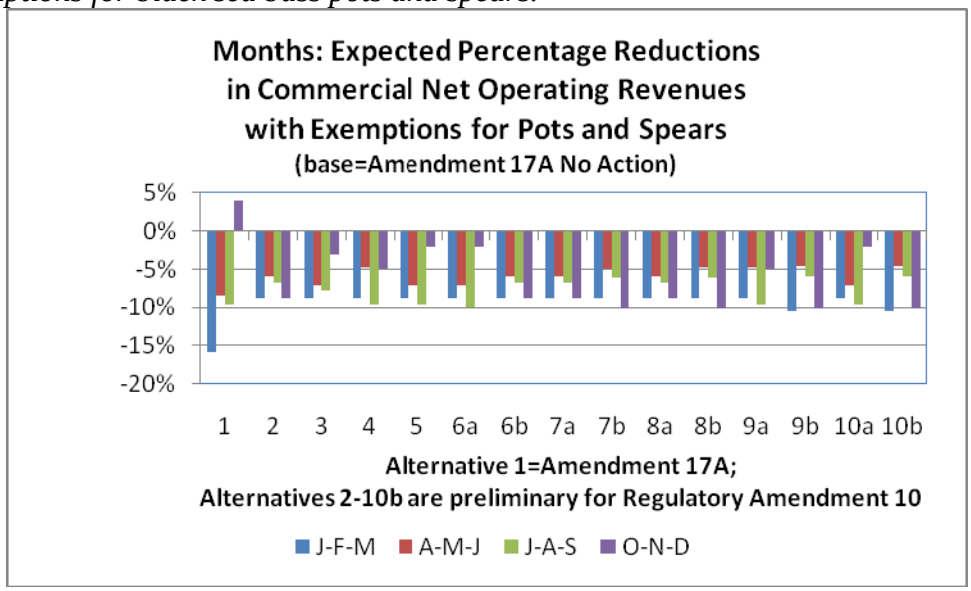


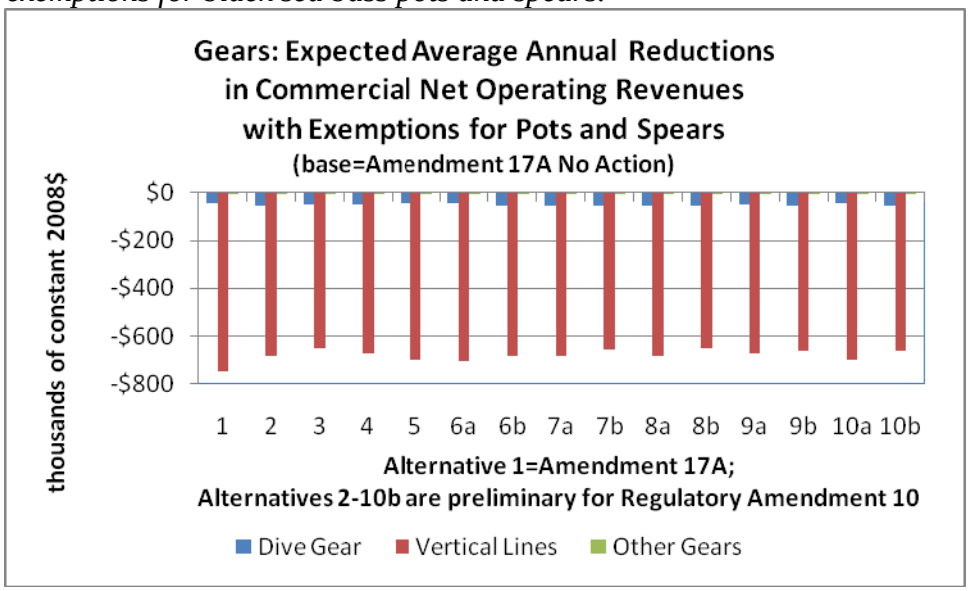
Figure 6. Expected percentage reductions in commercial net operating revenues, by quarter, given exemptions for black sea bass pots and spears.



(5)The gear exemption for spearfishing matters.
Vertical lines are the dominant gear used in the commercial snapper-grouper fishery and account for approximately 79 percent of net operating revenues. Trips with diving gear account for slightly more than 5 percent of the total net operating revenues generated by the commercial fishery. Other sources of net operating revenues include trips with longlines (7 percent), trips with black sea bass pots (3 percent) and trips with other gears (6 percent).

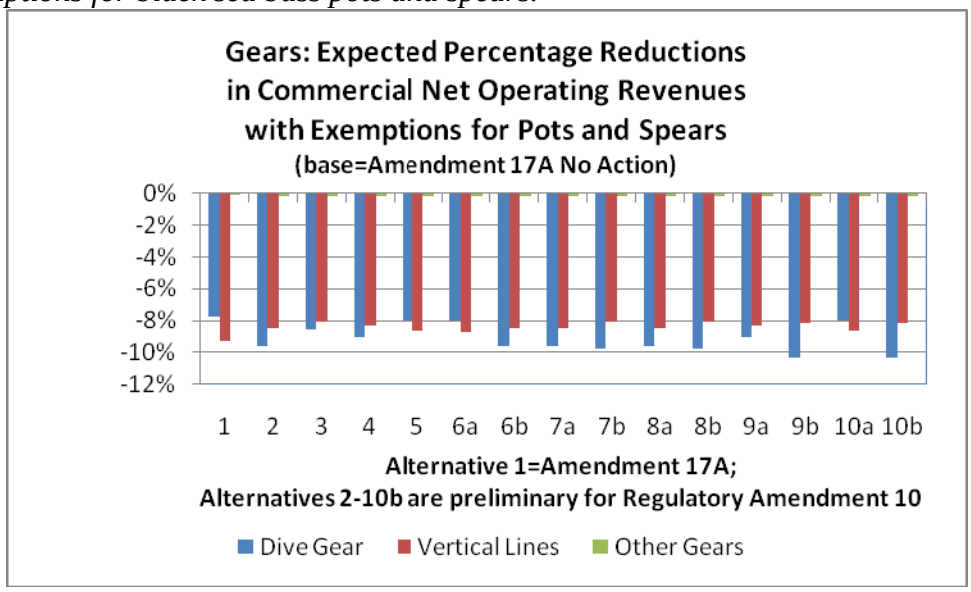
Because trips with vertical lines generate such a large share of net operating revenues, the closures associated with Amendment 17A and Regulatory Amendment 10 are expected to reduce net operating revenues by a correspondingly large amount in constant 2008 dollars (Figure 7).

Figure 7. Expected average annual reductions in commercial net operating revenues, by gear type, given exemptions for black sea bass pots and spears.



However, the relative effect of the closures on net operating revenues is similar for trips with diving gear and trips with vertical lines (Figure 8). The smaller and shorter closures associated with Regulatory Amendment 10 are expected to enable trips with vertical lines to account for slightly larger shares of overall landings and net operating revenues in the fishery. As a result, net operating revenues for trips with vertical lines are expected to decline by approximately 1 percent less than with Amendment 17A (Figure 8). If spearfishing gear is exempt from the closures, then the additional landings by trips with vertical lines are expected to result in slightly larger reductions in net operating revenues of 1-2 percent for trips with spears (Figure 8).

Figure 8. Expected percentage reductions in commercial net operating revenues, by gear type, given exemptions for black sea bass pots and spears.



On the other hand, if spearfishing gear is not exempt from the closures, then the preliminary alternatives for Regulatory Amendment 10 are expected to create additional losses for trips with spears in terms of both constant 2008 dollars (Figure 9) and as a percent of baseline net operating revenues (Figure 10). Amendment 17A is expected to reduce net operating revenues for spearfishing trips by approximately $43,000 per year, or 7.8 percent (Figures 9 and 10). Without gear exemptions, the worst preliminary alternative (6a) for trips with spears is expected to reduce net operating revenues by approximately $200,000 per year, or by 36 percent.

Figure 9. Expected average annual reductions in commercial net operating revenues without any gear exemptions, by gear type.

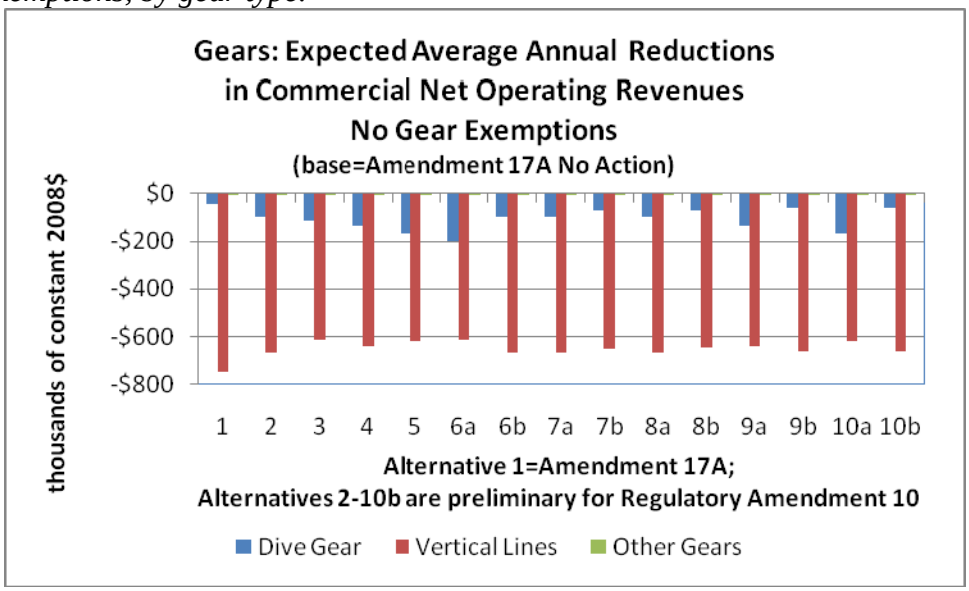
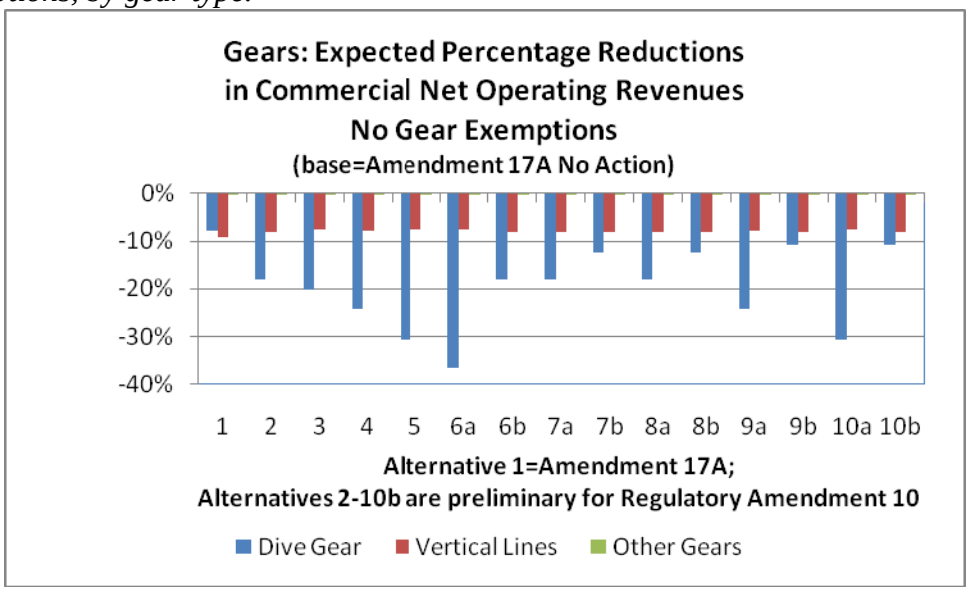


Figure 10. Expected percentage reductions in commercial net operating revenues without any gear exemptions, by gear type.



The exemption for spearfishing would benefit fishermen when they can fish in closed areas or during closed seasons when trips with other gears are prohibited. The potential benefit in extra net operating revenues generated by the exemption for spearfishing is expected to be greatest (with an average of approximately $66,000 per year) with preliminary alternative 6a because it would close the snapper-grouper fishery in water depths from 66-240 feet from May through December in grid areas 2880, 2980 and 3080, which is the longest and most comprehensive closure from among the preliminary alternatives for Regulatory Amendment 10. The potential benefit in extra net operating revenues due to an exemption for spearfishing is expected to be smallest (with an average of approximately $3000) with preliminary alternatives 9b and 10b because they would close the snapper-grouper fishery from January through April. Fishermen with spearfishing gear would hardly be able to take advantage of their exemption because the shallow water grouper fishery already is closed during these months.

An exemption for spearfishing is expected to benefit fishermen with dive gear in Georgia and northeast Florida because that is where the closures to protect red snapper would occur. Fishermen in North Carolina and South Carolina are expected to lose net operating revenues because the exemption for spearfishing is expected to result in a shorter open season for shallow water groupers. As a reflection of the shorter open season for shallow water groupers, net operating revenues are expected to increase during the second and third quarters, and decline during the fourth quarter compared to the same preliminary management alternatives without the gear exemption. The exemption is not expected to change net operating revenues during the first quarter because the shallow water grouper fishery already is closed from January through April.

The exemption for black sea bass pots did not suggest similar benefits. Almost no commercial fishing with pots was reported in the proposed closed areas during 2007 or 2008. Some pot fishing occurred in the proposed closed areas during 2009.