SUPPLEMENT TO THE REGULATORY IMPACT REVIEW ANALYSIS FOR 2006, 2007, and 2008 SUMMER FLOUNDER and 2006 SCUP AND BLACK SEA BASS SPECIFICATIONS
(10 November 2005)

The Mid-Atlantic Fishery Management Council has prepared this supplement to the Council submission of the 2006, 2007, and 2008 Summer Flounder and 2006 Scup and Black Sea Bass Specifications. In the original submission the Council recommended a total allowable landing limit (TAL) of 26.00 million pounds for 2006, 2007, and 2008 for summer flounder as the preferred alternative (similar to the first rebuilding option presented below). The NMFS requested this supplemental analysis in order to compare the present value of the stream of revenues (ex-vessel revenues) associated with various combinations of summer flounder TALs for the entire 2006 to 2008 period.

Present value refers to the present value of a sum of money to be received in the future. This concept is useful when comparing money generated at different points in time. In order to find the present value of a future sum of money, the future sum of money is discounted back to the present to find its current or present value. This process is known as discounting. The future sum of money is discounted because a sum of money to be received in the future has a lower present value due to the time difference.

Three rebuilding options were analyzed in order to make the comparison. The first rebuilding option consists of a constant harvest level of 26.00 million pounds. Projections indicate that a constant harvest of 26.00 million pounds for the years 2006 to 2009 would result in rebuilding to the biomass target (B_{msy}) of 204 million pounds by January 1, 2010, the target end date for stock rebuilding. This rebuilding option is expected to have a 25, 60, and 90 percent probability of achieving the F target in 2006, 2007, and 2008, respectively. Over the three year time period, the average probability would be about 58%. The second rebuilding option consists of setting a harvest level that would achieve a 50% probability of achieving the F target each year from 2006 to 2009. Projections indicate that the second rebuilding option would result in a biomass level of 192.6 million pounds by January 1, 2010. The resulting biomass associated with the second option does not meet the rebuilding target by 2010. The third option consists of a constant harvest level of 30.30 million pounds (current TAL level). Projections indicate that a 30.30 million pounds harvest level will have a 2 percent probability of achieving the achieving the F target in 2006. While a long-term projection associated with a constant 30.30 million pounds harvest level was not conducted, it is expected that as time progresses (i.e. years 2007-2009), the probability of achieving the F target for those years will decrease and the resulting biomass associated with the third option is not expected to meet the rebuilding target by 2010.

The following assumptions were used when comparing the stream of revenues (ex-vessel revenues) associated with the three options presented above. First, it was assumed that the research set-asides for years 2007 and 2008 were equal to the highest research set-aside since the program was first implemented. Therefore, a value of 355,762 pounds (2006 research set-aside value) was also assumed for 2007 and 2008. Second, it was

assumed that entire summer flounder commercial quota would be landed but not exceeded in 2005, 2006, 2007, and 2008.

Table 1 summarizes the TALs and adjusted commercial quotas under the three options described above. The projections in commercial landings represent 60% of the TAL for those years. The commercial quota is adjusted to account for the commercial portion of the research set-aside (213,457 pounds; 60% of the total research set-aside).

Table 1. Summer flounder TALs and adjusted commercial quotas (million pounds) associated with the various rebuilding options.

	Year		
	2006	**2007**	**2008**
Option 1			
TAL	26.00	26.00	26.00
Comm. quota	15.60	15.60	15.60
Adj. comm. quota	15.39	15.39	15.39
Option 2			
TAL	23.59	27.50	30.92
Comm. quota	14.15	16.50	18.55
Adj. comm. quota	13.94	16.29	18.34
Option 3			
TAL	30.30	30.30	30.30
Comm. quota	18.18	18.18	18.18
Adj. comm. quota	17.97	17.97	17.97

Changes in Landings

The first step in this analysis was to estimate the changes in yearly landings from 2006 to 2008 associated with each option (Table 2). For example, commercial landings for option 1 are projected to decrease by 14% from 2005 to 2006 and then to remain constant from 2007 to 2008. Note that the adjusted commercial quota for 2005 was 17.90 million pounds.

Table 2. Projected percentage changes in summer flounder landings associated with each option, 2006 - 2008.

	Year		
	2006	**2007**	**2008**
Option 1	-14.04	0.00	0.00
Option 2	-22.12	16.83	12.60
Option 3	0.37	0.00	0.00

Changes in Prices

As a general rule, restrictions in supply when everything else is held constant usually imply that prices will increase. In order to estimate the changes in summer flounder prices associated with changes in supply a price-quantity equation was used[1]. The price-quantity equation was specified in log-log form, and the price flexibility coefficient provides a direct estimate of the percentage change in prices given a 1% change in landings. Based on the price-quantity relationship, the price flexibility coefficient for summer flounder was estimated to be -0.2941. The result shows that a 10% decline in landings of summer flounder would potentially increase average annual ex-vessel price by approximately 3 percent.

The estimated percentage changes in ex-vessel price associated with changes in commercial landings from 2006 to 2008 is shown in Table 3. Table 4 indicates the expected ex-vessel price (dollars per pound) for summer flounder taking into consideration the estimated percentage price changes calculated in Table 3. (The average ex-vessel price for summer flounder in 2004 is $1.59 per pound.)

Table 3. Estimated percentage changes in summer flounder ex-vessel price (increase/decrease), 2006 - 2008.

	Year		
	2006	**2007**	**2008**
Option 1	4.13	0	0
Option 2	6.51	-4.95	-3.71
Option 3	-0.11	0	0

Table 4. Expected ex-vessel price for summer flounder ($/lb), 2006 - 2008.

	Year		
	2006	**2007**	**2008**
Option 1	1.6557	1.6557	1.6557
Option 2	1.6935	1.6097	1.5500
Option 3	1.5883	1.5883	1.5883

Changes in Revenues

The stream of revenues associated with the projected landings from 2006 - 2008 changed with each option (Table 5). These revenues were estimated by multiplying the projected ex-vessel prices (Table 4) by the projected commercial landings (Table 1; adjusted commercial quota). The present value of the stream of revenues (Table 7) was determined by multiplying the projected stream of revenues (Table 5) by a discount factor (Table 6). The discount factor was calculated as $1/(1+i)^t$. Where i is the interest rate and t is the year. Typically, constant-dollar analyses of proposed investment and regulations should report present value and other outcomes determined using a real

[1] Regression estimates of ex-vessel price-quantity relationship are presented in Framework 7 for the Fishery Management Plan for the Summer Flounder fishery.

discount rate of 7 percent. In this analysis, an interest rate of 10 percent was employed to account for the fact that ex-vessel prices in the price-quantity equation were specified in nominal terms (not adjusted).

Table 5. Projected stream of revenues (million $) associated with each summer flounder option, 2006 - 2008.

	Year		
	2006	**2007**	**2008**
Option 1	25.47	25.47	25.47
Option 2	23.61	26.22	28.42
Option 3	28.54	28.54	28.54

Table 6. Discount factors for a discount rate of 10 percent.

Year	Discount factor for 10%
1 (2006)	0.909091
2 (2007)	0.826446
3 (2008)	0.751315

Table 7 provides the sum of present value for each option from 2006 - 2008. The present values provided in Table 7 were calculated on the assumption that the revenues occur as lump-sums at year-end. When revenues occur in a steady stream, applying a mid-year discount factor is more appropriate. Table 7 also shows the sum of the mid-year present revenues.

Table 7. Present value (million $) of the stream of revenues, the sum of the present value, and the mid-year sum of the present value associated with the various summer flounder options.

	2006	**2007**	**2008**	**Sum 2006-2008**	**Mid-year sum[a]**
Option 1	23.16	21.05	19.04	63.35	64.54
Option 2	21.46	21.67	21.36	64.48	65.70
Option 3	25.94	23.58	21.44	70.96	72.30

[a] The sum of the present value associated with the various options were converted to a mid-year discounting basis by multiplying them by 1.0488 (the square root of 1.10).

Summary

Option 3 provided the highest present value with $72.30 million, followed by option 2 ($65.70 million), and option 1($64.54 million; Table 7).

The option with the smallest change in landings from year to year (options 1 and 3) also show the larger fluctuations in the projected stream of revenues from year to year (Tables 1 and 7). Options 1 and 3 show decreasing revenue streams from 2006 to 2008. Option 2, on the other hand, has a steady revenue stream from 2006 to 2008.

Limitations

There are several limitations to the analysis conducted in this section. The present values derived in the analysis represent industry revenues. The incorporation of changes on the cost side and consumer surplus would yield a more realistic total economic value for the fishery. However, the lack of information on fishing costs creates difficulty when assessing the net effect of the proposed options on the fishery. The lack of a demand equation for summer flounder does not allow for the incorporation of consumer surplus in the analysis.

In addition, projected prices were specified in nominal terms. This implies that future real prices may be lower due to other factors such as inflation. Also, respecification of the variable accounting for summer flounder substitutes in the price quantity model presented in Framework 7 could yield more realistic results.

Finally, it is assumed that the results provided above are not affected by other factors significant in the price determination of this analysis. However, it is possible that fluctuations in landings and prices of other fisheries, such as the groundfish fishery, would affect prices in the summer flounder fishery.

Conclusions

Option 3 provides the highest present value ($72.30 million), while options 1 ($64.64 million) and 2 ($65.70 million) had lower but very similar present values. However, options 2 and 3 do not achieve the long-term stock biomass target by January 1, 2010. The resulting biomass associated with option 1 meets the rebuilding target. The results provided in this analysis greatly rely on the validity of the price-quantity model previously specified and the accuracy of projected landings. Nevertheless, the results can be used to make a relative comparison of the various options.