An Assessment of the New England Fisheries Management Council's Economic Impact Report

The New England Fisheries Management Council's ("NEFMC") Economic Impact Study of the allocation alternatives presented under Framework 21 to the Fisheries Management Plan("FW21") gives too much weight to the "estimated" long-term economic benefits projected for each alternative. NEFMC's benefit calculations do not adequately take into account the uncertainty associated with the assumptions that underlie its projections.

There is considerable risk that the NEFMC's assumptions about future values of scallop allotments, fishing mortality, ex-vessel prices, and trip costs, which form the foundation of the NEFMC's projections, will not be realized. Because the uncertainty associated with these projections grows exponentially over time, the comparison of the economic benefits of the allocation alternatives given in FW21[1] should be made over a shorter period. The three-year period from 2010 to 2012 is the longest timeframe for comparison that is economically meaningful. Alternately, the projections of economic benefits after 2012 can be re-weighted in the present value benefit calculations so as to adequately reflect the uncertainty of the calculations made for later years.[2] A short term comparison shows that the No Closure F=.24

[1] FW21 presents four allocation alternatives for the scallop fishery, namely, the No Closure F=.24 option, the No Closure F=.20 option, the Closure F=.20 option and the Closure F=.18 option. The closure of the Great South channel was voted down, after which the economic report was used to compare the economic benefit of the two "No Closure" options. This report refers exclusively to the comparison of the benefits of the to "No Closure" options.

[2] That is, a suitably high discount rate can be used to compute the present discounted value of the economic impacts of each alternative. A higher discount rate for a projection means that one is less certain that a predicted value will be realized and thus the projections value should be reduced in the present value calculation to reflect that there is a chance that that projection will not occur. A present value calculation adds up predicted future benefits over the prediction period.

option ("NCLF24") gives a higher cumulative present value of producer profits than the No Closure F=.20 option ("NCLF20").

The assumptions about the target fishing mortality rates that will be enforced for 2010 to 2016 drive the NEFMC's projections of the economic benefit of each allocation considered by the Council. In its projections of biomass, landings, landings per unit effort ("LPUE"), and days at sea ("DAS"), the Council takes as given that each allocation alternative will have a different allowable mortality rate in 2010, but from 2011-2016 all alternatives are projected to have a F target of .24, identical area rotations, and identical DAS schedules.[3] As is true in all economic forecasts, the likelihood that the projected benefits for the scallop fishery will be realized becomes less certain the further into the future that predictions are made. However, the Economic Report does not take this uncertainty adequately into account.

FW21 sets allocations only for 2010.[4] After 2010, another framework will set allocations and specifications in the scallop fishery for 2011 and 2012.[5] Since FW21 only directly affects the fishery in 2010, it may be argued that the proper timeframe for judging the effects of FW21 is to look at only 2010 economic benefits.[6] Because the details of the next framework are not yet known, the model forecasts about allocations for succeeding year's benefits are uncertain.

The NEFMC may reasonably expect that, because the specification process for 2011 will start soon in the future, the Council may have some insight into the outcome of the allocation

[3] Except for the closure of the south channel under the CLF20 and CLF18 options. Framework 21 to the Atlantic Sea Scallop FMP, November 19, 2009 (Hereafter "FW21"), p. 116.

[4] FW21, p 15.

[5] Id., p.15. (" the Council decided to develop this action for 2010 only and a subsequent framework will set measures for 2011 and 2012.")

[6] While it is not possible to judge the effects of the "Closure" options in 2010, since the positive effects of the channel closure will not be manifested until 2013, the effects of the "No Closure" options come fully into effect in 2010.

process for 2011 and 2012.[7] Thus, the allocation can be predicted with some degree of accuracy for 2011 and 2012. However, such an argument a cannot be made for predictions about the allocations for 2013 and beyond, because the framework which will govern those years will be set in 2012. No justification is given as to why it is reasonable to assume that allocations from 2013 to 2016 will stay constant across all options.

Assuming that the allocation holds constant from 2011 to 2016 might be considered reasonable if allocations had been unchanging in the past. However, the regulatory history of the scallop fishery shows that allocations and area management systems have changed frequently and significantly in recent history.[8] For example, there have been four frameworks, and several amendments and adjustments in the last four years, each of which has changed allocations. If history is a guide, it is unlikely that the allocation will remain fixed from 2011 to 2016.

The likelihood that area allotments and area management will change over the next several years adds another level of uncertainty to NEFMC's projections. The 45th Scientific Assessment Workshop Report ("SAW45") explains that:

> "Because of the sedentary nature of sea scallops, fishing mortality of sea scallops can vary considerably even in the absence of area specific management. Area management, such as rotational and long term closures can make variation even more extreme.

[7] Id, p116. The Council's indicates this insight by reporting that, "Access area trip allocations are expected to return to five per year after 2010."
[8] See Framework 19 to the Atlantic Sea Scallop FMP(Hereafter "FW19"), December 19, 2007, p. 2-6.

> Projections that ignore such variation might be unrealistic and misleading."[9]

The Council's calculations of economic benefits do not account for the variation in the projections of biomass. One way to account for this would be to apply a suitable discount rate to the future benefits because the likelihood of those benefits are not certain. The Economic Report also does not consider the considerable variation in the projections of landings.[10] To account for this variation requires an even higher discount rate to be used in present value calculations.

In addition to the uncertainties that accompany the Council's biomass and landings projections, NEFMC's predictions of scallop ex-vessel price and trip cost also rely on assumptions that involve considerable uncertainties. The model of the ex-vessel price of scallops assumes that many of the variables which NEFMC uses in its ex-vessel price prediction model remain constant from 2010 to 2016. For example, the model assumes that the U.S. disposable per-capita income and ex-vessel prices of imported scallops will stay constant at their 2008 inflation adjusted levels. NEFMC also assumes that scallop exports will constitute 45% of the domestic landings from 2010 to 2016.[11] Similarly, it is assumed that trip costs-per-day remain constant over the prediction period. In the short term these assumptions may be reasonable, but over long term the assumptions about the predicted import prices, trip costs, and percentage of exports weaken. The assumption that these variables will hold at their present value from 2010 to 2016 adjusted for inflation involves considerable uncertainty because the NEFMC admits that

[9] 45th Scientific Assessment Workshop Report, p 163.

[10] SAW45 states that, "Simulated landings are more variable than biomass, because the landings stream is more dependant on the abundances of a few areas…"Id. P. 165.

[11] Economic Impacts Report, p. 5.

that it is not possible to predict the changes in the future values of these explanatory variables accurately.

It may be argued that the NEFMC's long term projections are the best that can be made given the difficulty of forecasting macroeconomic and biological variables. However, no long term forecasts were needed to compare the benefits of the two "No Closure" options. The FW21 alternatives are evaluated in using a six year projection because "If the Channel is closed in 2010, it will likely remain closed until 2013, and would be a controlled access area for about three years (until 2016), those are the years that the impacts of a new closure would be apparent."[12] To accomplish a seven-year comparison, a tradeoff was made. Reasonable short-term assumptions were extended past their point of plausibility in order to facilitate a comparison of all four alternatives. However, once the decision was made that the great south channel would not be closed, there was no longer a reason to compare the remaining alternatives over such a long term time frame at the loss of modeling accuracy.

The NEFMC argues that its models attempt to show the economic consequences of the allocation alternatives *ceteris paribus*.[13] The Council argues that to perform such a comparison it is correct to hold fishing mortality, import prices, per capita income, and trip cost constant. This may be true, but the present value calculations used must account for the low likelihood that these forecasts will be realized by using a suitable discount value in its present value calculations.

[12] FW21, p. 116.

[13] all other factors held constant

The longest period that is economically meaningful to make a comparison between the two "No Closure" options is three years. If a comparison of the economic benefits is made over the 2010 to 2012 period, the present value of revenues is greater for the NCLF24 option than for the NCLF20 option.[14] The revenue streams of the two "No Closure" options over the 2010 to 2012 period are given in the table below.

Cumulative Present Discounted Value - Revenues (7% Discount Rate)			
Year	NCLF20 (A)	NCLF24 (B)	Difference (A)-(B)
2010	$303,358,538	$343,614,951	$40,256,413
2011	$720,879,725	$749,721,498	$28,841,773
2012	$1,148,475,534	$1,161,366,577	$12,891,043

Source: Framework 21 and The Economic Impact report

Similarly, the present value of profits over the 2010 to 2012 period is higher under the NCLF24 option than under the NCLF20. The year to year present value for profits to the two "No Closure" options are shown in the table below.

Cumulative Present Discounted Value- Profits (Assuming 7% Discount Rate)			
Year	NCLF20 (A)	NCLF24 (B)	Difference (A)-(B)
2010	$268,073,738	$302,430,951	$34,357,213
2011	$638,460,720	$662,666,844	$24,206,124
2012	$1,016,775,019	$1,026,447,480	$9,672,461

Source: Framework 21 and The Economic Impact report

The key to a reasonable assessment of economic benefits is the use of reasonable assumptions and a discount rate that is appropriately adjusted to reflect the uncertainties associated with assumptions and forecasts about the future.[15] The Council's economic report did not adequately take the uncertainty of its projections, especially it long term projections into account when computing the long term benefit of the allocation alternatives. The uncertainty of

[14] A seven percent discount rate is used to reflect the greater likelihood that these forecasts will be realized. The results presented are based on calculations performed by the author.

[15] Richard Razgaitis. Valuation and pricing of technology-based intellectual property. John Wiley& Sons, 2003. p. 181.

NEFMC's projections can be reduced if the comparison of economic benefits is made over the three year period from 2010 to 2012. It is arguable that, since FW21 only sets allocations for 2010, a comparison of the effects of the FW21 allocation alternatives should be made only for 2010. In either case, the present value of profits over 2010 or the 2010 to 2012 period is higher under the NCLF24 option than under the NCLF20.