5.5 Economic Factors

5.5.1 Economic Model: Estimation of ex-vessel Price and fishing Costs

The economic costs and benefits of the days-at-sea allocations and area access options are analyzed in Section 5.5.2 with a bio-economic simulation model. This section describes the economic component of the bio-economic model, which is composed of an ex-vessel price model and variable and fixed cost equations. The price model included in this report is a revised version of the model described in SAFE-1999 document. The cost equations have been adequately described in the appendix to Amendment 7. This document, however, reproduces the cost model to provide a complete picture of the economic component in one section.

The economic theory postulates that the demand for a commodity is determined by its own price, the price of its substitutes, and the disposable income of the consumers. In the case of scallops, the size also has an impact on prices, and the scallop price model employs 'meat count' as a proxy for size. The price of scallops is expected to be inversely related to the landings but to vary in the same direction with the price of its substitutes. The main substitutes of sea scallops are the imports from Canada, which are almost identical to the domestic product, and imports from other countries, which are generally smaller in size and less expensive than the domestic scallops, An exception is the Japanese imports which have a price close to the Canadian imports, and could be a close substitute for the domestic scallops as well (see Section 3.4.4). An increase in disposable income, however, is expected to increase the demand, therefore the price of scallops.

The historical observation for the period 1982-99 indicates that annual ex-vessel prices in fact varied in response to changes in domestic landings, in import prices, and in the composition of imports. The analysis also verifies that the changes in meat count had an impact on the average ex-vessel prices (Section 5.5.1.3). The first two Sections 5.5.1.1 and 5.5.1.2 provide a review of historical landings, imports, and ex-vessel and import prices. Section 5.5.1.4 describes the ex-vessel price model with a discussion of the empirical results. Section 5.5.1.5 presents the variable and fixed cost functions.

5.5.1.1 Historical background: Scallop landings, imports and composition of supply

The trends in domestic landings, imports, ex-vessel and import prices in relation to each other were examined in SAFE 1999 report for the period 1982-1998. This section provides a summary of these trends, updated to include the 1999 data (See Figure 49, Figure 50, and Table 185). According to the preliminary estimates, the landings from the Northeast sea scallop fishery almost doubled in 1999, from 12.2 million pounds in 1998 to 22.4 million pounds in 1999. This increase was a result of both the recovery in the scallop stock during the recent years and of access to the highly productive Closed Area II during the fishing year 1999. Consequently, the revenues form the sea scallop fishery increased from $75.6 million in 1998 to $123 million in 1999, while the ex-vessel prices declined from $6.20 to $5.49 per pound in the those years. This change in prices confirms the conclusion that ex-vessel prices vary inversely with the quantity of landings. The preliminary estimates for the scallop imports to the Northeast region for 1999 show almost no change, however, from their level in 1998.

As Figure 49 shows, the total supply of scallops fluctuated from 40 to 60 million pounds and its composition in terms of domestic landings versus imports has changed during the period 1982-1999.

Table 185 summarizes these changes for two periods, 1982-93, and 1994-99, the second one representing the post Amendment 4 period.

The share of domestic landings declined from 50 percent in period 1982-93 to 32.5 percent in the second period along with a decline in real prices, from $6.3 to $5.8 per pound. During the same periods, the share of Canadian imports in total supply remained almost constant at about 30 percent and their prices at $6.5 per pound of scallops. The average proportion of annual imports in total supply from countries other than Canada increased from 20 percent for the period 1982-93 to 37 percent for the period 1994-98. The prices of these imports followed a decreasing trend, however, declining from $4.3 in the first period (annual average) to $2.8 in the second period (annual average).

Being different in quality and size, the imports from countries other than Canada are imperfect substitutes for the domestic product. The annual fluctuations in these imports clearly exhibit, however, an inverse relation to the domestic landings, as they are substituted for the domestic product during the periods when the demand could not be met with US landings and/or Canadian imports.

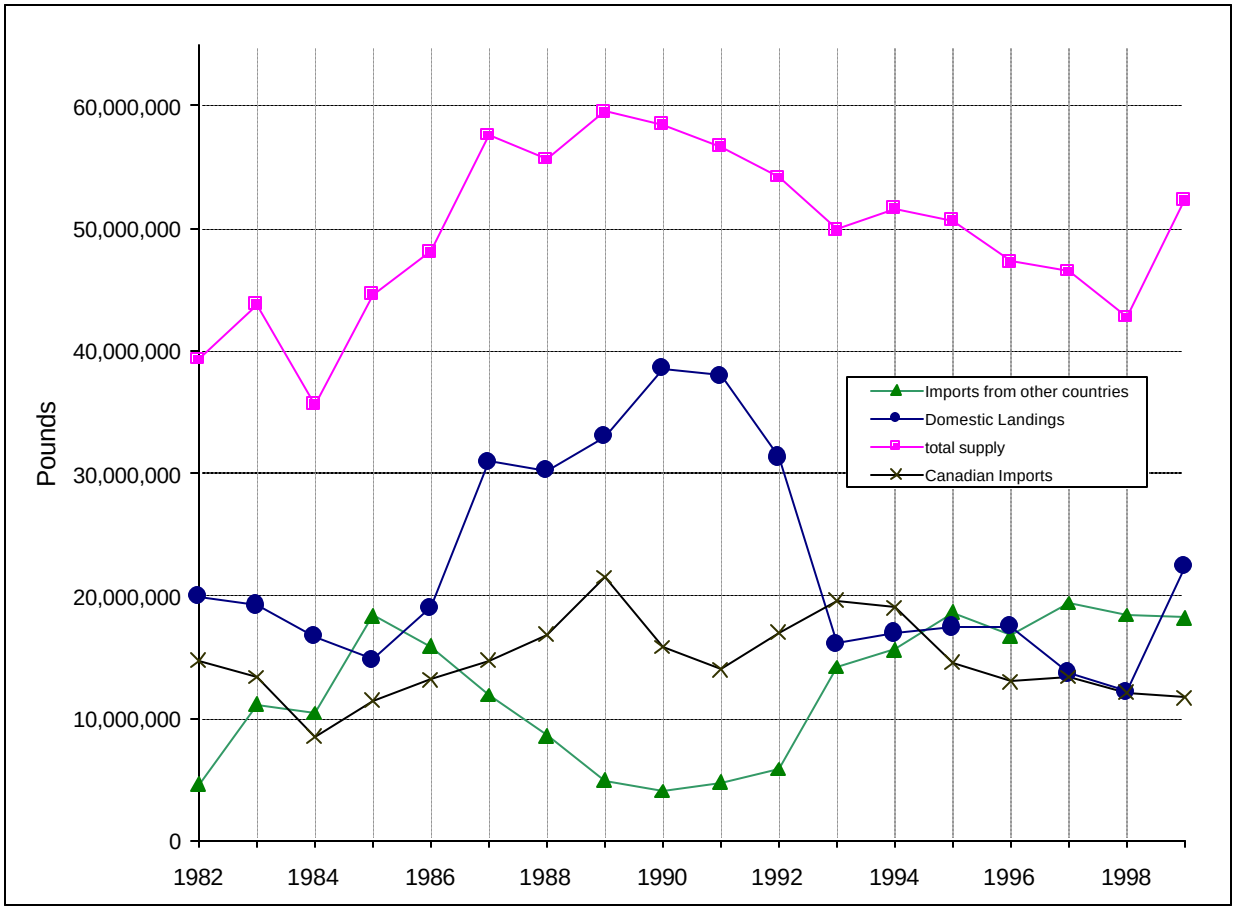

Figure 49. Sea scallop landings, imports and total supply in the Northeast.

5.5.1.2 Ex-vessel and import prices

Figure 50 shows the real values of ex-vessel and import prices, corrected for inflation and expressed in 1997 dollars for the period 1982-1999. Comparison shows that the ex-vessel prices with

domestic landings (Figure 49 usually decline during the periods of high scallop landings and increase after 1994 with the decline in domestic landings. In other words, the empirical observation shows that ex-vessel prices are negatively related to the quantity of landed scallops.

The ex-vessel prices also varied with the change in the price of imports:

- As an example, the price increase in the last four to five years would probably be higher if there has not been such a large increase of imports from countries other than Canada at prices $3 per pound or less. For example, the influx of these inexpensive imports in 1994 was the main factor behind the decrease in ex-vessel price of domestic scallops from approximately $6.75 in 1993 to $5.45 in 1994 although the landings increased slightly from 16 million pounds in 1993 to 16.9 million pounds in 1994.
- The price of Canadian imports mirrored the changes in domestic prices with a price premium in most years, except in 1983 and 1993, when the Canadian imports were slightly cheaper than the domestic scallops (Figure 50).

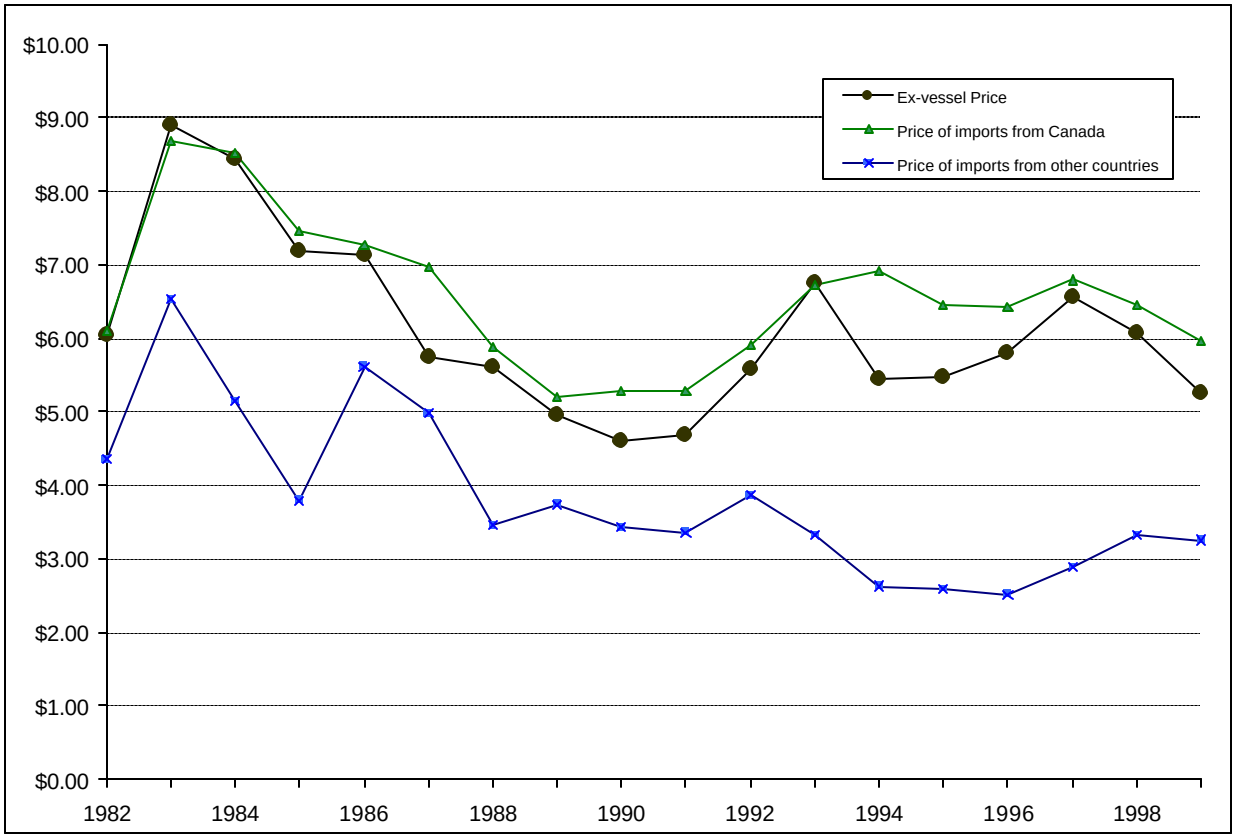

Figure 50. Ex-vessel and import price per pound of sea scallops, real prices in 1997 dollars.

5.5.1.3 Meat Count

Since the ex-vessel price of scallops is estimated as an average price per pound for all sizes of scallops, it is also necessary to determine how the change in average meat count affects the average price for scallops. In general, the price per pound of scallops is expected to increase as the meats per pound decrease. The monthly price data collected from the Fulton Fish market from January 1997 to December 1999 indicated the presence of price premium for larger scallops (Figure 51). Although price differentials

between meat count categories fluctuated from month to month, the differences were larger between the 30/40 count scallops and the 20/30 count scallops, averaging about 79 cents per pound during this period. In contrast, the price differentials between 20/30 and 10/20 count scallops averaged 52 cents per pound. The monthly price model presented below takes into account the change in meat count by including an estimate of annual meat count for commercial scallops in the open areas. For the price differentials on a finer scale for meat count see Section 3.4.4.

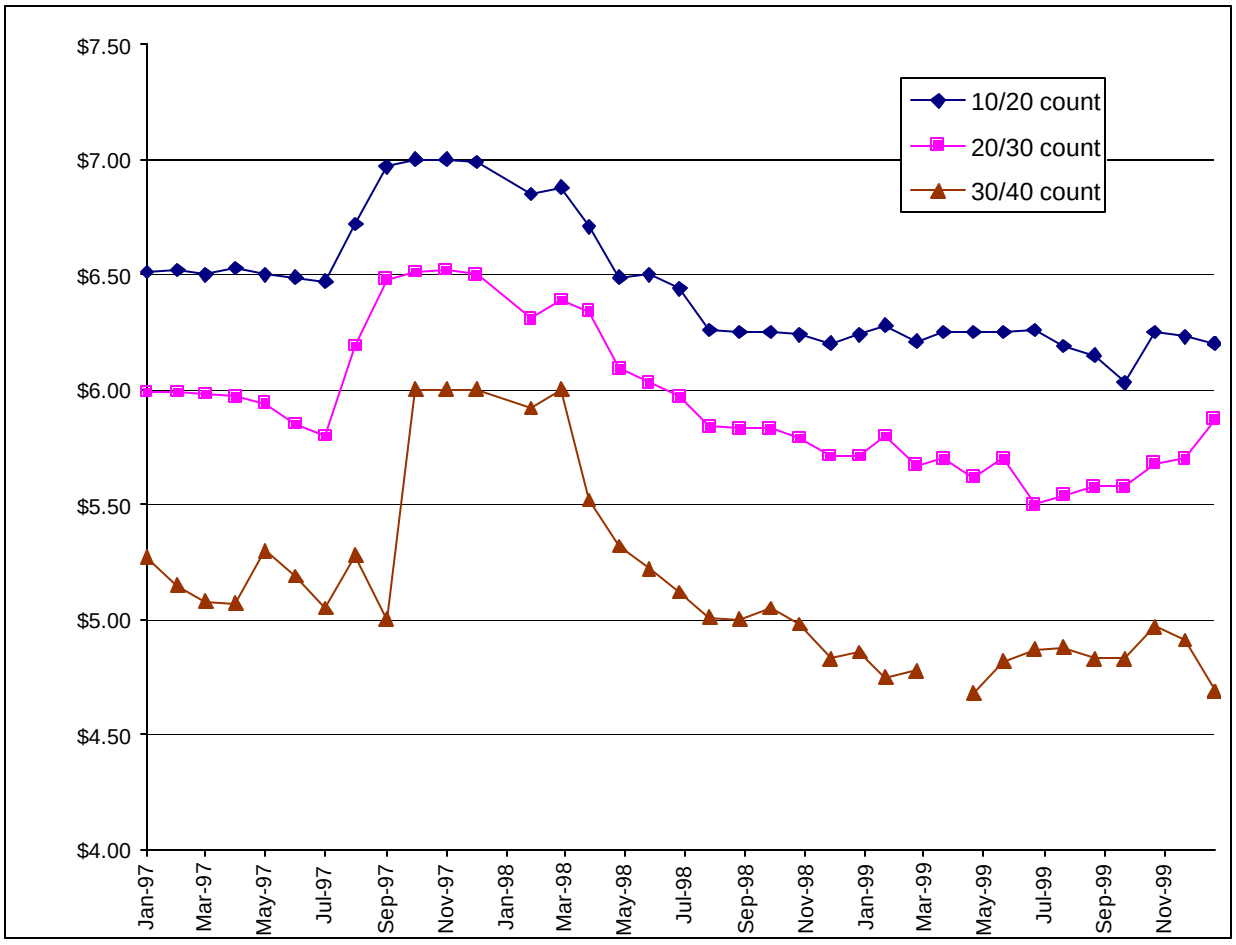

Figure 51. Monthly price per pound by meat-count categories (Fulton Fish Market, New Bedford Scallops, Nominal Prices, wet scallops).

The meat count variable is estimated from the research survey for the exploitable biomass and corrected for differences in performance of the survey and commercial dredges. Table 185 shows these estimates for two periods:

- Period 1982-93 includes those years during which a meat count standard was in effect.
- The first FMP for Atlantic sea scallops implemented on May 15, 1982 included a meat count standard of 30 meats per pound for shocked scallops. These measures remained in effect during a one-year phase period, after which the measures were to be adjusted to 30 meats per pound.
- In June 1983, the Regional Director invoked the Plan's temporary adjustment provision and set the meat count at 35 meats per pound. Amendment 2 was approved in June 1988 to provide a

10% increase in the meat count standard during October through January (33 meats per pound) when spawning causes a reduction in individual meat weight.

- Period 1994-98 during which the meat count standard was eliminated with the implementation of Amendment 4 to the Sea Scallop FMP.

The estimates given in Table 185 measure the average annual meat count of the scallop resource that was vulnerable to commercial fishing, and therefore approximate the changes in annual meat count composition of the scallop landings. During the first period, the meat count averaged 32.4 meats per pound, increasing in the second period to 37.5 meats per pound. It is possible for the estimated meat count to exceed the actual values in the first period, however, because of the meat count standard that limited average meat count to 30 meats per pound until 1988, and 33 meats per pounds starting in 1988. For the second period, however, the estimated meat counts probably reflect the actual values more accurately since no limit was set on the meat count of the landed scallops.

Table 185. Changes in landings, imports, prices and meat count.

	1982-93	1994-99
	Components of supply (Annual averages, pounds)	
Sea Scallop landings	25,639,473	16,697,797
Imports from Canada62	15,066,121	13,956,369
Imports from other countries*	9,553,004	17,837,347
Total Supply	**50,258,597**	48,491,512
	Percentage composition of supply (in %)	
Sea Scallop landings	50.1	34.4
Imports from Canada*	30.0	28.8
Imports from other countries*	20.0	36.8
Total	**100.0**	100.0
	Average price per pound in 1997 prices	
Ex-vessel	6.30	5.77
Price of Canadian imports	6.60	6.50
Price of other imports	4.30	2.87
Price of all imports	5.67	4.48
Average annual meat count in the open areas (meats per pounds)	32.4	37.5

5.5.1.4 Ex-vessel price model

The estimation of an ex-vessel price model constitutes an integral part of the economic analysis for the sea scallop management options. Scallop ex-vessel prices change in response landings and determine largely how the fishery revenues, profits, crew shares, and consumer and producer surpluses would respond to management actions. The estimation is based on the annual data for the period from 1982 to 1998, except that year 1989 could not be included since no data on meat count for exploitable biomass was available for that year.

The ex-vessel price model estimated below includes the price, rather than the quantity of imports as an explanatory variable, based on the assumption that the prices of imports are, in general, determined

62 The imports show the sea scallop imports to the Northeast region only.

exogenously to the changes in domestic supply. This is equivalent to assuming that the US market conditions have little impact on the import prices. An alternative model would be estimating the price of imports with a world supply and demand for scallops, separating the impacts of Canadian imports from other imports since US and Canadian markets for scallops, being in close proximity, are highly connected. The data limitations, i.e., availability of only 16 years of annual data, and time constraints preclude, however, such a simultaneous estimation of import prices at this time. In addition, the usefulness of a simultaneous equation model is limited for our present purposes since it would be almost impossible to predict how the landings, market demand, and other factors such as fishing costs or regulations in Canada, and in other exporting countries to USA would change in the future years.

In addition, the data for period 1982-98 showed that average import prices were not correlated in any significant degree with the level of domestic landings (with a correlation coefficient equal to –0.04). For example, the average annual price of imports from all countries declined from $5.67 in 1982-93 to $4.51 in 1994-98, despite a decline in domestic landings from an average of 25 million in the first to 15 million in the second period (Table 185). The average price of imports should have increased in response to such a decline in domestic supply if they were not, in general, exogenously determined by a variety of other factors that affect the supply and demand in the exporting and importing countries.

Since the average import price is equivalent to a weighted average of import prices from all countries weighted by their respective quantities, the import price variable takes into account the change in composition of imports --from Canadian scallops to less expensive smaller scallops imported from other countries. This specification also prevents the problem of multi-collinearity among the explanatory variables, i.e., prices of imports from individual countries, and domestic landings. In terms of prediction of future ex-vessel prices, the model has an advantage over some other models considered by the PDT. It only requires assignment of a value for the average price of imports, without assuming anything about the composition of imports, or the prices and the level of imports from individual countries. The economic impact analyses of the fishery management actions usually evaluate the impact on ex-vessel prices by holding the average price of imports constant. The sensitivity of the results for a declining (or increasing) import prices could also be examined, however, using the price model presented in this section.

The real ex-vessel price (PEXVES) is estimated using ordinary least squares and as a function of:

- Domestic landings of sea scallops (DOMLAN),
- Average price of all imports to the Northeast (PIMPAL),
- Disposable income (DPI) in billions of dollars,
- Average annual meat count (MCOUNT).

All the price variables are corrected for inflation and expressed in 1997 prices by deflating current levels by consumer price index (CPI) for food. Disposable income is also expressed in 1997 dollars by deflating nominal values with the GDP implicit deflator.

The estimated model is a revised version of the price model described in SAFE 1999 document. One important change was the use of semi-log form to restrict estimated price to positive values only. The model was a also estimated with revised values of average meat count of the exploitable biomass. In contrast, SAFE 1999 model used average meat for all biomass. In addition, the dummy variable which was included in the previous model as a proxy for the changes in policy after 1993, such as the elimination of the meat count standard in 1994, was dropped from the current price model because its coefficient was statistically insignificant. Possibly, the inclusion of the meat count variable for the exploitable biomass only already reflected the size of scallops commercial fishermen mostly target regardless of the meat count standard.

Table 186 shows that the estimated model provides a good fit to the actual data for annual ex-vessel prices. The F-test shows that the overall relation is statistically significant (P<0.0001), meaning that the explanatory variables as a whole have a significant influence on ex-vessel price. Adjusted R2 indicates that changes in domestic landings, average price of all imports, disposable income, average meat count, and policy changes jointly explain 92 percent of the variation in ex-vessel prices. Figure 52 also verifies that the estimated values of ex-vessel prices closely trace the actual values.

As Table 187 shows, that all of coefficients of the explanatory variables have the expected sign, and they are statistically significant at least at 5% level of significance, except for DPI variable, which was kept in the model for theoretical reasons. Durbin-Watson test for autocorrelation is inconclusive however.

Table 186. Regression statistics and significance: 1982-1988, 1990-1998.

	df	*SS*	*MS*	*F*	*Significance F*
Model	4	0.47722	0.1193	40.11	0.0001
Error	11	0.03272	0.00297		
Total	15	0.50993			

Regression Statistics	
Multiple R	0.94
Adjusted R Square	0.92
DW	1.76
Observations	16

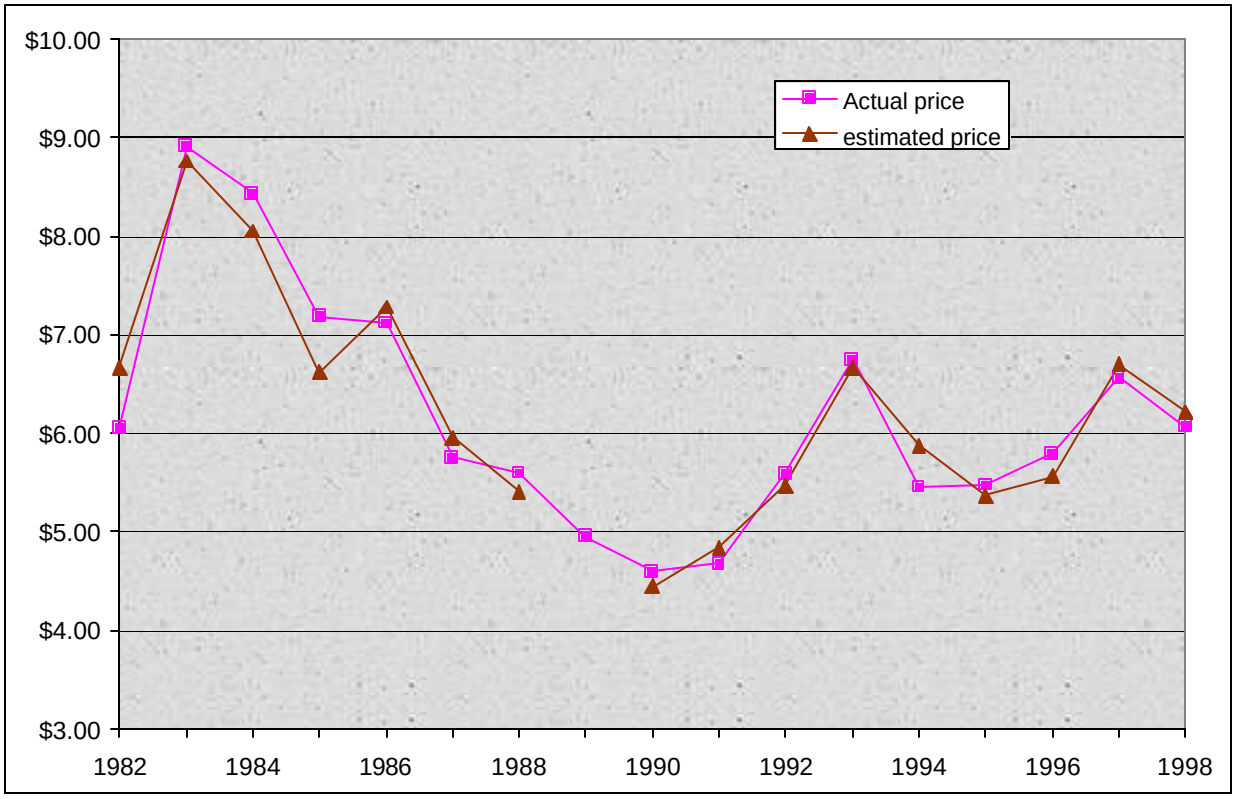

Figure 52. Actual and estimated ex-vessel scallop price (in real 1997 prices).63

Table 187. Explanatory variables, their coefficients and t-values.

	Coefficients	Standard Error	t- Statistics	P-value
INTERCEPT	1.558788	0.313661	4.97	0.0004
PIMPAL	0.118139	0.026341	4.485	0.0009
DOMLAN	-1.06E-08	0.00	-5.403	0.0002
DPI	1.09E-05	0.0000098	1.113	0.2895
EMCOUNT	-0.01036	0.003897	-2.659	0.0222

In conclusion, the empirical results verify that the ex-vessel price of scallops is related inversely to the domestic supply, and increase as landings decrease or decrease as landings increase. The results also show that import prices, domestic landings, and meat count have a significant impact on ex-vessel prices. These numerical results should be interpreted with caution, however, since the analysis covers only 17 years of annual data from a period during which the scallop fishery underwent major changes in management policy including area closures, and meat count standards.

5.5.1.5 Estimation of Costs

Fishery management measures not only affect the level of landings and prices of fish, but also have an impact on the trip and operating costs of fishing. The restrictions on the number of days-at-sea vessels can fish in a given year, or on the number of trips they can take to certain areas, and/or the restrictions on the number of crew they can employ are examples of measures that can reduce or increase those expenses. Since costs constitute a fundamental part of the producer surplus, crew shares and profits, the evaluation of net national benefits and the analysis of economic impacts on vessels require an estimation of these costs.

Variable costs for a scallop vessel are defined as those expenses that increase or decrease with the level of fishing activity. Usually, the number of days-at-sea is assumed to reflect the level of actual inputs used in production such as fuel, ice, oil, food and water, since these inputs would increase with time spent for fishing. These expenses also change with the number of crew, and the size of vessels.

The variable costs are estimated in two categories below, for trip costs and operating expenses. The trip costs include food, ice, water and fuel, and are usually paid by crew in the scallop fishery out of their shares from the gross stock. Operating expenses include trip costs, expenses on gear and supplies, and half of the repair expenses. Because the quantity of food would increase not only with DAS, but also by the number of crew per trip, crew was also included among the explanatory variables in estimating both the trip and the operating expenses.

The fixed costs include those expenses that are not usually related to the level of fishing activity or output. These are insurance, license, half of repairs, office expenses, professional fees, dues, utility, interest, dock expenses, bank, rent, store, auto, travel, and employee benefits. The fixed costs are estimated as a function of vessel size, since some of these expense items such as insurance, and interest payments are related to the value of a vessel, and bigger vessels usually has a larger value.

63 The price for 1989 was not estimated due to the lack of data on meat count for exploitable biomass.

The cost equations shown in Table 188 through Table 190 are used in simulating costs for the break-even and the cost/benefit analysis. The regressions were originally estimated in 1996 prices, but later converted to 1997 prices. Although, most of the t-statistics for the coefficients of the cost equations are statistically significant, adjusted R2 values are not high, around 0.56-0.58 for the trip and operating expenses and 0.21 for the fixed costs. This is not surprising since these costs correspond to highly aggregated expense items ranging from food to fuel for trip costs, and from repairs to insurance for the fixed costs. The data items used in the cost analysis are obtained from Northeast Fisheries Science Center, Woods Hole, Economic Analysis Division. For a detailed information on the cost /earnings data and analysis see Gautam and Kitts (1996) and Steve Edwards (1997).

Table 188. Estimation of annual operating costs: Coefficients, regression statistics and significance.

Dependent Variable: Operating Costs (LNOPCOSR)

Parameter Estimates

Variable	DF	Parameter Estimate	Standard Error	T for H0: Parameter=0	Prob > |T|
INTERCEP	1	4.934197	0.78257200	6.305	0.0001
LNCREW	1	0.189969	0.07532762	2.522	0.0141
LNGRT	1	0.262179	0.07920749	3.310	0.0015
LNDAS	1	1.094273	0.12287816	8.905	0.0001

OPCOSR= Annual operating costs (in 1996 prices)
CREW= number of crew per trip
GRT=gross tonnage
DAS=Annual days-at-sea used
LN=logarithm

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Value	Prob>F
Model	3	2.98020	0.99340	32.266	0.0001
Error	66	2.03197	0.03079		
C Total	69	5.01217			

Root MSE	0.17546	R-square	0.5946
Dep Mean	12.53517	Adj R-sq	0.5762
C.V.	1.39977		

Table 185. Estimation of annual trip costs: Coefficients, regression statistics and significance.

Dependent Variable: Trip costs (LNTRPEXR)

Parameter Estimates

Variable	DF	Parameter Estimate	Standard Error	T for H0: Parameter=0	Prob > |T|

INTERCEP	1	5.522928	0.78632499	7.024	0.0001
LNCREW	1	0.094377	0.06328239	1.491	0.1409
LNGRT	1	0.118418	0.06709444	1.765	0.0824
LNHP	1	0.175532	0.10586720	1.658	0.1023
LNDAYABS	1	0.861253	0.11067551	7.782	0.0001

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Value	Prob>F
Model	4	1.96280	0.49070	22.812	0.0001
Error	63	1.35515	0.02151		
C Total	67	3.31795;			

Root MSE	0.14666	R-square	0.5916
Dep Mean	12.10463	Adj R-sq	0.5656
C.V.	1.21164		

LN before each variable indicates that the logarithm.
TRPEXR= Trip costs (in 1996 prices)
CREW= Crew size
HP=Horsepower
GRT= Gross tonnage
DAYABS= days-at-sea

Table 190. Estimation of annual fixed costs: Coefficients, regression statistics and significance.

Dependent Variable: Annual fixed costs (FIXNEW)

Parameter Estimates

Variable	DF	Parameter Estimate	Standard Error	T for H0: Parameter=0	Prob > |T|
INTERCEP	1	61410	24831.389619	2.473	0.0161
HSPR	1	86.691664	23.13975399	3.746	0.0004
GRT	1	137.180355	127.99944537	1.072	0.2880

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Value	Prob>F
Model	2	15418653326	7709326662.9	9.236	0.0003
Error	62	51751084542	834694911.97		
C Total	64	67169737868;			

Root MSE	28891.08707	R-square	0.2295
Dep Mean	154911.10871	Adj R-sq	0.2047
C.V.	18.65011;		

FIXNEW: Fixed Costs (in 1996 prices)

5.5.2 Cost benefit analysis: Status quo management vs. adjusting days-at-sea

5.5.2.1 Introduction

The economic impacts of the status quo days-at-sea schedule (Amendment 7) and the proposed days-at-sea adjustments were analyzed using the biological projections discussed in Section 5.1. The analysis examines four management scenarios that include different area access and fishing mortality options:

Status quo management: Implementation of Amendment 7 DAS schedule with 49 DAS for full-time vessels (19 for part-time and 4 DAS for occasional vessels) in year 2000 with access to Hudson Canyon and Virginia Beach areas in Mid-Atlantic. The Georges Bank closed areas, however, are assumed to stay closed in year 2001 and the following years. It was further assumed that there would be no controls on fishing in the open areas. Since the most profitable areas will be those with the highest biomass and LPUE, it is assumed that vessels will spend their limited number of days-at-sea to fish solely in the most productive areas of Mid-Atlantic, the Hudson Canyon and Virginia Beach areas, to maximize their profits.

Proposed management adjustment to 120 DAS: Continuation of the 1999-2000 DAS schedule in year 2001, i.e., 120 DAS for full-time vessels (48 for part-time and 10 DAS for the occasional vessels) with three different fishing mortality rates (F) and area options as follows (For a more complete description of these scenarios see Sections 5.1.2, 5.1.3, and 5.4.

Scenario 2A (Low F). In this scenario, it is assumed that Mid-Atlantic closed areas are fished at approximately F=0.2. Georges Bank closed areas would remain closed, and open areas elsewhere would be fished at 25,000 days-at-sea, after accounting for a proportional days-at-sea trade-off of 1,400 lbs./days-at-sea in Mid-Atlantic closed areas (see Section 5.2 for a description of the tradeoffs assumed in the projections).

Scenario 2B (High F). Same as Scenario 2A, except that Mid-Atlantic closed areas are assumed to be fished at a higher rate, approximately at F=0.3.

Scenario 2C (New closures). Same as low F (2A) scenario, except that this scenario assumes some additional areas of the Mid-Atlantic (Delmarva), and Georges Bank (in addition to the Closed Area 1, II and Nantucket Lightship area, part of South Channel and Southeastern Part of Georges Bank) will be closed to fishing.

Based on these assumptions, the analysis provides an assessment of the economic impacts both on individual vessel operations, and on the economic costs and benefits to the nation. These results are preliminary, however, and will change as new data arrives:

- The biological projections for the status quo (Scenario 1), and Scenarios 2A and 2B were based on the 1999 survey results. The recent surveys showed, however, that the biomass projections for these three scenarios for the Hudson Canyon area could be overestimated, by about 34 percent (for Scenarios 1, 2A, and 2B), and the biomass in Virginia Beach by 27 percent. For these reasons, the projection model's landings were adjusted to correct for this potential overestimate.

- Scenario 2C is projected by taking into account some of these changes based on July 2000 survey preliminary results. The results of this scenario are therefore expected to be approximately comparable to the status quo (Scenario 1) and Scenarios 2A and 2B. The landings with Scenario 2C are reduced by only 18 percent for the Hudson Canyon area.

Therefore, the results of this analysis could be useful in showing the direction of change from the status quo levels, rather than in the prediction of the absolute values of the landings, revenues and economic benefits in the future years for each scenario. The results cover a relatively short period starting from year 2001 and ending in year 2003. Although, the management options that maximize landings in the short-term result in higher economic benefits, in the long-term, they would reduce the scallop biomass, and therefore, the sustainable level of landings. In other words, the longer-term economic benefits may differ from those estimated in this section. The extent and the direction of this difference, however, could not be quantified at this time.

5.5.2.2 Summary of results

Table 187. Short- and long-term economic benefits

	Status Quo		**Proposed Management Adjustment**	
	(Scenario 1) Amendment 7 Days-at-sea Schedule	**(Scenario 2A) MA closed Areas fished at F=0.2**	**(Scenario 2B) MA closed Areas fished at F=0.3**	**(Scenario 2C) New Closed Areas in Georges Bank and Mid-Atlantic areas**
	Short-term benefits (for year 2001)			
DAS per full-time vessel	**49**	**120**	**120**	**120**
Total Fleet DAS-used	11,176	21,276	20,371	20,026
Landings (million pounds)	**28.3**	**38.1**	**39.4**	**35.8**
Ex-vessel price per pound (Inflation adjusted,1997 prices)	6.18	5.48	5.44	5.56
Total Revenue (million $)	175	209	214	199
Change from status quo level	-	34	39	25
Variable costs (million $)	12	25	24	23
Producer Surplus (million $)	154	168	175	161
Change from status level	0	14	21	7
Consumer Surplus (million $)	62	97	101	89
Change from status level	0	35	39	27
Economic Benefits (million $)	**216**	**265**	**276**	**251**
Net Economic Benefits (Change from status quo levels)	**0**	**49**	**60**	**35**
Employment (1000 CREW*days-at-sea)	78	148	143	140
Change in Employment	**0**	**70**	**64**	**62**
	Net benefits for 2001-2003			
Cumulative change in discounted net benefits (change from status quo levels, million $)	**0**	**208**	**252**	**125**

- The proposed increase in DAS allocations for year 2001, to 120 DAS for full-time (48 for part-time, and 10 for occasional vessels) is estimated to have positive economic impacts on the sea scallop industry and net national benefits. The net national benefits are estimated to increase by $35 to $60 million compared to the status quo levels if the DAS allocations were reduced to 49 DAS for full-time (19 DAS for part-time, and 4 for occasional vessels) in accordance with original Amendment 7 schedule (Table 187).

- From the perspective of the vessel economics, adjustment of the allocations to 120 days-at-sea will contribute to the stability of the operations by keeping the effort at the present levels. A more stable production over years would benefit the primary industry (sea scallop fishing firms, wholesalers and retailers) in its planning of production and marketing activities in a more orderly fashion (versus a boom-bust cycle). As a result, the industry can increase its efficiency by reducing production and marketing costs, improving its competition with imports and increasing its economic returns (profits). A more stable production would also benefit the related industries in the same way as it benefits the primary industry.

- The price per pound of scallops is expected to decline from $6.20 for the status quo option to about $5.40 to $5.60 per pound for the three options (Scenarios 2A to 2C) as the estimated scallop landings increase to 36 to 39 million pounds with the proposed increase in allocations.

- The adjustment of days-at-sea with the area access options is estimated to increase the consumer benefits, as measured by consumer surplus, by $27 million (Scenario 2C) to $39 million (Scenario 2B) in year 2001.

- The scallop revenues of the fleet are expected to increase by $25 (Scenario 2C) to $39 (Scenario 2B) million and the producer surplus (revenues minus variable costs) by $7 (Scenario 2C) to $21 (Scenario 2B) million with the proposed management adjustments. The results for the "Low F" (Scenario 2A) scenario are within this range.

- The employment in the sea scallop fishery as measured by CREW*DAS will almost double with the proposed management adjustments due to the estimated increase in total fleet days-at-sea.

- The net economic benefits for the three-year period from 2001 to 2003 (as measured by the present value of net benefits at a discount rate of 7%) will be positive and exceed $200 million for the low and high- F scenarios (2A and 2B) and will be around $125 with the new closures (Scenario 2C).

- Although, the Scenarios 2A and 2B maximize landings in the short-term as compared to the new closures scenario (2C) and result in higher economic benefits for the period 2001-2003, the economic impacts in the longer-term may be different. Because of the new proposed closures with Scenario 2C, the annual landings will be less in years 2001-2003 compared to Scenarios 2A and 2B. As a result, the scallop biomass at the end of year 2003 will be higher with new closures, i.e. Scenario 2C (see Section 5.1.3 for the biomass estimates by the end of year 2003). If the closed areas are opened after year 2003, the level of sustainable landings with this scenario (2C) will exceed the level of landings for the other two scenarios (2A and 2B) after year 2003. In other words, the economic benefits will be higher after year 2003 with Scenario 2C. If this increase in economic benefits is significantly large and exceed the short-term economic benefits for years 2001-2003, then the overall long-term benefits with this option may exceed the benefits from Scenarios 2A and 2B. On the other hand, discounting process weights short-term benefits more heavily then the longer-term benefits. Because of this reason, it is still possible for the present value of net benefits for Scenarios 2A and 2B to exceed the present value of benefits for scenario 2C over the long-term. As a result, the extent and the direction

of this difference over the long- versus the short-term could only be quantified if the biological projections for these scenarios are conducted for a long-term, usually for a period of 10 years or more.

- The 120 DAS that would be allocated to full-time vessels under the proposed management adjustments will be in excess of the break-even DAS point and the vessels will be able to fully cover their fixed and variable costs and make some profits (Table 192).

5.5.2.3 Assumptions and methodology

The economic impacts are examined using a biological-economic simulation model that combines landings and landings per days-at-sea (LPUE) of the biological model with an annual price model and vessel cost equations. The biological component of this model is described in Section 5.1 and the economic component in Section 5.5.1. The assumptions of the economic model and the analysis can be summarized as follows:

- The vessel costs are estimated for an average scallop vessel that has a GRT, HP, and crew size equivalent to the fleet average. Trip and variable costs are estimated in 1997 prices as a function of days-at-sea, GRT, HP and crew. The fixed costs are estimated as a function of GRT. The fixed costs also include the transponder costs, which are estimated to be about $2,500 to $2,700 including the message costs based on a five-year amortization of equipment costs.

- Landings in the open areas under each scenario are estimated from the biological model.

- The scallop revenues are estimated from projected landings and the annual price model in 1997 real prices.

- Import prices, and the disposable income are held constant at a 1998 level, but in 1997 constant prices when estimating ex-vessel prices.

- The maximum crew size is restricted at seven men.

- Crew shares are estimated using a 40/60 lay-system according to which crew receives 60% of the gross stock and pays for the trip expenses.

- The opportunity costs of labor are assumed to be equal to average wage rate for 1998-99 for production and non-supervisory workers on private non-farm payrolls. The seasonally adjusted value is $13.07 per hour.

- The results from the proposed management adjustment options (120 DAS per full-time vessel) are compared to the results for status quo management that assumes a continuation of the Amendment 7 DAS schedule (with 49 DAS per full-time vessel).

5.5.2.4 Landings and effort projections

The landings for Amendment 7 (49 DAS per full-time vessel) and proposed management adjustments (120 DAS per full-time vessel) scenarios are estimated from the biological simulation model presented in Section 5.1. Table 188 shows that total sea scallop landings are estimated to be 28 million

pounds with Amendment 7 DAS schedule (49 DAS). With proposed adjustments (120 DAS), however, the landings are projected to reach approximately36 to 39 million pounds in 2001 respectively for three scenarios analyzed in Table 188.

It must be emphasized, however, that that these results are preliminary and subject to change in the near future. More accurate estimates of biomass and landings will be obtained after the summer 2000 survey is completed. Although, the Scenarios 2A and 2B maximize landings in the short-term as compared to the new closures scenario (2C), the scallop biomass at the end of year 2003 will be higher with new closures, i.e. Scenario 2C (see Section 5.1.3 for the biomass estimates by the end of year 2003). If the closed areas are opened after year 2003, the level of sustainable landings with this scenario (2C) will exceed the level of landings for the other two scenarios (2A and 2B) after year 2003.

The total days-at-sea-used projections for status quo management and for the proposed adjustments assume that all active and inactive vessels (except the ones with history permits) will fully participate in the scallop fishery in years 2001-2003 (see Sections 4.1.4 for effort projections and explanation). These estimates also take into account the DAS trade-offs for fishing in the closed areas that reduces the DAS available to fish in the open areas.

Table 188. **Landings and effort**

	Year	(Scenario 1) Amendment 7 Days-at-sea Schedule (Full-time days-at-sea=49)	(Scenario 2A) MA closed Areas fished at F=0.2 (Full-time Days-at-sea=120)	(Scenario 2B) MA closed Areas fished at F=0.3 (Full-time days-at-sea=120)	(Scenario 2C) New Closed Areas in Georges Bank and Mid-Atlantic areas (Full-time days-at-sea=120)
Total Landings	2001	28,296,041	38,119,055	39,373,495	35,863,331
(lb)	2002	27,273,107	41,215,813	43,629,938	37,970,928
	2003	25,379,355	42,276,358	44,928,006	34,291,451
Total effort estimates					
Fleet days-at-sea-used	2001	11,176	21,276	20,371	20,026
Fleet days-at-sea-used	2002	10,305	20,968	20,882	21,063
Fleet days-at-sea-used	2003	10,030	20,622	20,771	19,540

5.5.2.5 Ex-vessel price and revenue projections

The price per pound of scallops and scallop revenues are estimated for the status quo management (original amendment 7) and proposed DAS adjustment (full-time days-at-sea=120) scenarios, using the annual price model presented in Section 5.5.1.4. The price model takes into account the price premium for larger scallops. The scallop revenues for these management options are calculated from the estimated prices and landings. The results are shown in Table 189 below, and could be summarized as follows:

- The ex-vessel price is expected to be highest for Amendment 7 (status quo) scenario compared to the proposed days-at-sea adjustment scenarios and reach $6.20 per pound of scallops (in 1997 real prices) in year 2001. This is because the level of landings is estimated to be lower, and the average size of landed scallops is expected to be larger for the status quo (see the average meat count in Table 189). Since the vessels have only 49 days-at-sea to fish under this option they direct their fishing to the highly productive areas of Hudson Canyon with the largest scallops. The expected revenues for this alternative are $175 million for the same year (Table 189, Scenario 1).

- With the proposed days-at-sea adjustment alternatives, the ex-vessel price is estimated decline to approximately $5.50 per pound for because of higher landings under these scenarios.

- The revenues will be higher, and range from $199 to $214 million, because of the estimated increase in landings for the days-at-sea adjustment scenarios (Table 189). The net increase in the revenues of the scallop fishery from the status quo levels is estimated to range $25 to $39 million for the proposed adjustments.

The overall impacts on regional revenues and incomes, however, will be higher than these estimates because of the indirect and induced multiplier impacts. Indirect impacts include the impacts on sales, income, employment and value-added of industries that supply commercial harvesters, such as the impacts on marine service stations that sell gasoline and oil to scallop vessels. The induced impacts represent the sales, income and employment resulting from expenditures by crew and employees of the indirect sectors. An input/output analysis conducted by NMFS (1998) estimated that sales, income and employment multipliers for the sea scallop fishery in the Northeast Region. The sales multiplier for the coastal counties in Northeast was estimated to be approximately 1.8 in 1997 for the scallop dredge and trawls. If this multiplier is applied to determine overall impacts, the increase in overall sales in the Northeast region will range from $44 to $71 million in 2001 (see Appendix 6, volume II of the Amendment 7 document for the input/output analysis).

Table 189: Meat count, Ex-vessel prices and Fleet Revenues (in 1997 real prices).

	Year	(Scenario 1) Amendment 7 Days-at-sea Schedule (Full-time days-at-sea=49)	(Scenario 2A) MA closed Areas fished at F=0.2 (Full-time Days-at-sea=120)	(Scenario 2B) MA closed Areas fished at F=0.3 (Full-time days-at-sea=120)	(Scenario 2C) New Closed Areas in Georges Bank and Mid-Atlantic areas (Full-time days-at-sea=120)
Meat Count	2001	22.84	24.27	23.77	25.21
(for exploitable biomass, and as an average of all open areas)	2002	18.89	20.88	20.27	21.64
	2003	17.95	19.04	18.52	19.60
Ex-vessel Prices	2001	6.18	5.48	5.44	5.56
($/pound, 1997 prices)	2002	6.50	5.49	5.39	5.64
	2003	6.70	5.54	5.41	5.99
Fleet Revenues	2001	174,728,968	208,952,860	214,085,189	199,412,333
($, 1997 prices)	2002	177,364,035	226,442,132	235,126,571	214,219,826
	2003	170,050,880	234,078,830	243,158,286	205,473,384

These estimates should be interpreted cautiously, however, for the following reasons:

- The ex-vessel price equation estimates that there will be 5 to 8 cents price premium per unit of meat count on larger scallops depending on overall level of landings. This estimation is based on an annual average price, and the short-term market prices could deviate from this average.

- It is possible, in the short-term, for the price premium on larger scallops to disappear or even become negative because of their relative abundance on the market as a result of the access to the Closed Areas that have a high density of larger scallops. If the large scallops are priced lower over the long-

term, however, the average ex-vessel prices will be lower than estimated in Table 189. As a result, the ex-vessel revenues will be overestimates of actual values.

- In estimating ex-vessel prices, it was assumed that the average import prices would stay constant in 2001 to 2003. The ex-vessel prices and revenues would be lower (higher) than predicted in Table 190, if import prices declined (increased) compared to their 1998 levels.

- The sales and income multipliers were estimated for 1997 including only the backward linkages associated with the harvest of sea scallops.

5.5.2.6 Variable cost projections

The vessel costs are estimated for an average scallop vessel that has a GRT, HP, and crew size equivalent to the fleet average in 1997 real prices (for a complete list of cost equations, Section 5.5.1.5). The variable costs, as defined here, include trip expenses such as food, fuel, oil, water and ice, as well as half of repair expenses, which generally are considered as semi-variable costs.

The variable costs are expected to be higher for the proposed adjustment scenarios, about $23 to $25 million, compared to the status quo (Amendment 7 schedule), $12 million, because of higher days-at-sea allocations under the adjustment (120 DAS per full-time) scenarios compared to the no-action (49 DAS) scenario (Table 190). These levels will also change with the future fuel costs. The variable costs were estimated in 1997 prices. The latest statistics (for January 2000) indicated that the fuel costs were 6 percent higher as compared to year 1997. If the variable costs were adjusted with this percentage, the operating costs would increase by about $0.7 million for the status quo and by $1.5 million for the days-at-sea adjustment scenarios. The actual increase will be less, since variable costs also include non-fuel costs such as water, ice, oil, food and half-of repair expenses. Since the net benefits were estimated by comparing the days-at-sea adjustment options with the status quo, the impacts of any such adjustment would therefore be very small. It is also possible, however, for the fuel costs to decrease in the next three years from their present level. Because the fuel prices could not be predicted for the coming years at this time, no adjustments were made to the estimated variable costs in the cost/benefit analysis presented in this section.

Table 190: Variable cost projections (in 1997 real prices).

	Year	(Scenario 1) Amendment 7 Days-at-sea Schedule (Full-time days-at-sea=49)	(Scenario 2A) MA closed Areas fished at F=0.2 (Full-time days-at-sea=120)	(Scenario 2B) MA closed Areas fished at F=0.3 (Full-time days-at-sea=120)	(Scenario 2C) New Closed Areas in Georges Bank and Mid-Atlantic areas (Full-time days-at-sea=120)
Variable costs for the	2001	12,373,701	24,961,792	23,806,744	23,367,758
Fleet ($)	2002	11,326,502	24,567,448	24,457,387	24,689,347
	2003	10,996,869	24,126,480	24,316,717	22,750,165

5.5.2.7 Producer and consumer surpluses, net national benefits and employment

The producer surplus is measured by the difference in revenues and variable costs, and it includes profits and crew shares. The opportunity costs of labor, measured by the average earnings for production and non-supervisory workers on private non-farm payrolls, were deducted from the producer surplus. For the proposed adjustments (120 DAS), the producer surplus in scallop fishery is estimated to range

approximately from $161 (Scenario 2C) to 175 million (Scenario 2B) in year 2001. With implementation of Amendment 7 schedule (49 DAS), however, producer surplus is estimated to be around $ 152 million (Table 191). Overall, continuation of the 1999 DAS schedule will increase the producer surplus by $7 to $21 million in year 2001 compared to the status quo days-at-sea schedule (Amendment 7 scenario).

The proposed adjustments in DAS (120 DAS) are estimated to have positive impacts on the consumers, both by increasing the quantity of scallops and by reducing their prices. The consumer surplus, which is measured as the difference of what consumers are willing to spend and what they actually pay, is expected to range between $90 to $100 million with the proposed DAS adjustment scenarios (Scenario 2A and 2B), as compared to $62 million for Amendment 7 schedule in year 2001 (Table 191).

The net national benefits are estimated as the sum of producer and consumer surpluses, and for the proposed management adjustments (120 DAS) they are expected to increase by $35 (Scenario 2C) to $60 million (Scenario 2B) in year 2001. Overall, the proposed increase in days-at-sea will increase net benefits by $125 (Scenario 2C) to $252 (Scenario 2B) million over the period 2001-2003.

These results are preliminary, however, and may change with new data. The management options that maximize landings in the short-term usually result in higher economic benefits, but in the long-term, they may reduce the scallop biomass, and therefore, the sustainable level of landings.

Although, the Scenarios 2A and 2B maximize landings in the short-term as compared to the new closures scenario (2C) and result in higher economic benefits for the period 2001-2003, the economic impacts in the longer-term may be different. Because of the new proposed closures with Scenario 2C, the annual landings will be less in years 2001-2003 compared to Scenarios 2A and 2B. As a result, the scallop biomass at the end of year 2003 will be higher with new closures, i.e. Scenario 2C (see Section 5.1.3 for the biomass estimates by the end of year 2003). When the new closed areas are re-opened after year 2003, the level of sustainable landings with this scenario (2C) will exceed the level of landings for the other two scenarios (2A and 2B) after year 2003. In other words, the economic benefits will be higher after year 2003 with Scenario 2C. If this increase in economic benefits is significantly large and exceed the short-term economic benefits for years 2001-2003, then the overall long-term benefits with this option may exceed the benefits from Scenarios 2A and 2B.

On the other hand, discounting process weights short-term benefits more heavily then the longer-term benefits. Because of this reason, it is still possible for the present value of net benefits for Scenarios 2A and 2B to exceed the present value of benefits for scenario 2C over the long-term. As a result, the extent and the direction of this difference over the long- versus the short-term, could only be quantified if the biological projections for these scenarios are conducted for a long-term, usually for a period of 10 years or more. Table 191 also indicates that the employment as measured by CREW*DAS will increase by 80 to 90 percent with the proposed DAS adjustments.

Table 191: Net benefits (in 1997 real prices) and employment.

	Year	(Scenario 1) Amendment 7 Days-at-sea Schedule (Full-time days-at-sea=49)	(Scenario 2A) MA closed Areas fished at F=0.2 (Low F) (Full-time days-at-sea=120)	(Scenario 2B) MA closed Areas fished at F=0.3 (High F) (Full-time days-at-sea=120)	(Scenario 2C) New Closed Areas in Georges Bank and Mid-Atlantic areas (Full-time days-at-sea=120)
Producer Surplus ($)	2001	154,175,915	168,419,583	175,369,283	161,387,826
	2002	158,495,541	186,529,032	195,386,614	174,114,986
	2003	151,713,634	194,859,586	203,639,660	168,422,243

	Year	(Scenario 1) Amendment 7 Days-at-sea Schedule (Full-time days-at-sea=49)	(Scenario 2A) MA closed Areas fished at F=0.2 (Low F) (Full-time days-at-sea=120)	(Scenario 2B) MA closed Areas fished at F=0.3 (High F) (Full-time days-at-sea=120)	(Scenario 2C) New Closed Areas in Georges Bank and Mid-Atlantic areas (Full-time days-at-sea=120)
Consumer Surplus ($)	2001	62,130,010	96,915,307	100,976,635	89,768,058
	2002	55,408,078	104,531,554	112,943,713	93,499,235
	2003	49,059,532	106,316,307	115,785,850	78,432,930
Economic Benefits ($)	2001	216,305,925	265,334,890	276,345,918	251,155,884
	2002	213,903,620	291,060,585	308,330,327	267,614,220
	2003	200,773,166	301,175,893	319,425,510	246,855,173
Net economic Benefits	2001	49,028,965	60,039,993	34,849,960	49,028,965
Change from Status quo	2002	77,156,965	94,426,707	53,710,601	77,156,965
($)	2003	100,402,728	118,652,344	46,082,008	100,402,728
Present value of benefits (Cumulative value for 2001-2003 (7% discount rate)		591,578,908	800,412,818	843,503,712	716,875,501
Change in cumulative net benefits ($, 2001-2003)			208,833,909	251,924,804	125,296,593
Employment	2001	78,232	148,934	142,599	140,185
(Crew*days-at-sea)	2002	72,136	146,774	146,171	147,442
	2003	70,207	144,356	145,399	136,782

5.5.2.8 Economic impacts on vessels

Table 192 summarizes the estimated revenues, costs, crew shares, and profits per vessel for the status quo schedule and days-at-sea adjustment alternatives. The days-at-sea-used show the actual time spent for fishing including the steam time after the days-at-sea trade-offs for fishing in the close areas are taken into account. Although annual operational and trip costs per vessel will be higher for the proposed adjustments with Scenarios 2A-2C (120 DAS), the increase in revenues under these options more than offsets higher annual costs of fishing. As a result, both the profits per vessel and crew shares are estimated to exceed the Amendment 7 levels.

The financial viability of the scallop vessels is examined by break-even concept, which estimates the number of DAS necessary to cover total variable and fixed costs of a vessel. The preliminary results indicate that at the given days-at-sea allocations, and average vessel in the sea scallop fishery will be able to break-even and make profits. The revenue estimates do not include monkfish revenues. Almost all full-time vessels earned, however, some portion of their income from monkfish as a bycatch, which averaged about $250 per days-at-sea in 1998. Including the monkfish revenues will improve the break-even points shown in Table 192. Further information on vessels and small businesses in the scallop fishery is provided in Section 5.5.3.

Table 192. Economic impacts on vessels for 2001-2003.

Scenarios	Variables[64]	2001	2002	2003
Scenario 1:	Days-at-sea-used/vessel	47	44	42
Status quo	Ex-vessel price	6.18	6.50	6.70
(49 days-at-sea	LPUE (Average of all areas)	2,532	2,647	2,530

[64] LPUE shows average landings per days-at-sea from all open areas.

Scenarios	Variables[64]	2001	2002	2003
per full-time vessel)	Revenue per vessel	740,377	751,543	720,555
	Operating costs per vessel	52,431	47,994	46,597
	Crew Shares	396,457	406,376	388,809
	Profits per vessel	179,486	181,969	168,924
	Break-even DAS	26	23	24
Scenario 2A: Low -F (120 days-at-sea per full-time vessel)	Days-at-sea-used/vessel	90	89	87
	Ex-vessel price	5.48	5.49	5.54
	LPUE (Average of all areas)	1,792	1,966	2,050
	Revenue per vessel	885,393	959,501	991,859
	Operating costs per vessel	105,770	104,099	102,231
	Crew Shares	448,134	493,636	514,215
	Profits per vessel	254,605	283,850	296,341
	Break-even DAS	44	39	37
Scenario 2B: High-F (120 days-at-sea per full-time vessel)	Days-at-sea-used/vessel	86	88	88
	Ex-vessel price	5.44	5.39	5.41
	LPUE (Average of all areas)	1,933	2,089	2,163
	Revenue per vessel	907,141	996,299	1,030,332
	Operating costs per vessel	100,876	103,633	103,037
	Crew Shares	464,231	516,005	536,796
	Profits per vessel	262,119	298,457	311,926
	Break-even DAS	40	38	36
Scenario 2C: New Closures (120 days-at-sea per full-time vessel)	Days-at-sea-used/vessel	85	89	83
	Ex-vessel price	5.56	5.64	5.99
	LPUE (Average of all areas)	1,791	1,803	1,755
	Revenue per vessel	844,968	907,711	870,650
	Operating costs per vessel	99,016	104,616	96,399
	Crew Shares	428,094	462,241	445,153
	Profits per vessel	236,784	263,258	246,385
	Break-even DAS	43	42	40

5.5.2.9 Enforcement costs

The cost-benefit analysis assumes that there will be no significant change in the costs to administer, monitor and enforce DAS from the proposed adjustment to allocations. The basis for this assumption is that under the proposed action, the costs associated with setting up a monitoring and enforcement system have already been covered under the mandates of Amendment 4 and Amendment 7 to the sea scallop plan.

The enforcement costs for the closed area access were not quantified at this time, however. Although the proposed access to some areas and closures in other areas will increase the enforcement requirements and administrative burden, they may not change the monetary costs for the government to a significant degree as long as the budgetary allocations for enforcement do not allow any such increase. Allocation of the existing resources for the enforcement of these resources may result in reduced enforcement of other management actions. In other words, the enforcement of the new measures is likely to reduce the overall efficiency of the enforcement unless there is an increase in the budgetary allocations for these measures.

5.5.2.10 Sources of uncertainty in the analysis

The economic benefits were estimated for a four-year period from year 2001 to year 2003 (inclusive), and the longer-term results may differ from these preliminary biological projections, based on the 1999 Albatross survey. The management options that maximize landings in the short-term usually result in higher economic benefits, but in the long-term, they may reduce the scallop biomass, and therefore, the sustainable level of landings. The extent of the difference between the short- and long-term results could not be quantified at this time, however.

Furthermore, the economic impacts of the status quo management versus the proposed management adjustments were analyzed based on the available information about the vessel costs and characteristics, crew shares, prices, and revenues of the scallop vessels. Therefore, these numerical results of this analysis should be interpreted with caution due to uncertainties about the likely changes in:

- Factors affecting scallop resource abundance and landings
- Fishing behavior
- Fixed costs
- Variable costs including the price of fuel
- Import prices
- Bycatch and revenues from other fisheries
- The share system
- The number of active vessels
- Structural changes in ownership
- The composition of fleet in terms of tonnage, HP and crew size of the active vessels
- Disposable income and preferences of consumers for scallops
- Price differences and premium on small versus large scallops
- Enforcement costs

5.5.3 Impacts on Small Businesses

The Regulatory Flexibility Act (RFA) requires government agencies to evaluate the financial impacts of its regulations on small businesses. The NMFS Guidelines are currently being revised, but criteria will involve the populations of affected parties and the impacts of regulations on harvesting revenues and compliance costs, including geographic incidence.

This section of the SAFE Report is not an Initial RFA analysis of Framework Adjustment 14, which will address whether to adjust days-at-sea, how to open the two Mid-Atlantic scallop closed areas, and whether to close new areas to promote scallop growth, or of Amendment 10, which is widely known as the area rotation amendment. Both regulatory actions are in formative stages. The Scallop PDT analyzed, however, three scenarios with DAS adjustments, controlled area access and closures. The preliminary economic analysis for these scenarios was presented in Section 5.5.2, including potential impacts on vessels. These preliminary results show that both net national benefits and the impacts on vessels would be positive compared to the status quo (Amendment 7 measures) if DAS allocations were increased form the levels set in Amendment 7 (i.e., 49 DAS for full-time vessels), coupled with controlled access to some areas in Georges Bank and Mid-Atlantic.

This section provides further information on small businesses in the scallop fishery, enumerates the populations of scallopers and dealers, highlights their geographic distribution, and reports on their dependence on the scallop fishery for annual revenues and product.

Counts of fishing permits: Regulations can affect fishermen differentially. Therefore, it is important to know the populations of potentially affected groups.

The population of fishermen who land Atlantic sea scallops can be grouped according to their permit classification and effort and gear assignments (Table 193). Fishermen who participate in the open access sector of the fishery apply for a General Category permit. In contrast, the Limited Access component of the fishery has eight categories that designate effort allocation (full-time, part-time, occasional) and gear (large dredge, small dredge, net trawl). Limited Access scallopers who do not apply for a fishing permit - called Permit Holders - can maintain their qualification by applying for a "Confirmation History" permit.

The permit counts in Table 193 should be considered estimates because it is difficult to follow all changes in the data tables such as transfers. Permits were not double-counted when it appeared more than once in the permit files due to cancellations. A limited access permit was counted as a Confirmation-History Permit only if it had this status during the entire fishing season. Data for the 2000 season are preliminary.

About two thousand General Category permits were issued each year during 1998-2000 (Table 193). These figures include small numbers of vessels with Limited Access as well as General Category permits: 11 in 1998, 18 in 1999, and 8 thus far in 2000.

The total number of identified Limited Access permits in the fishery ranged from 332 in 2000 to 337 in 1999, including more than 40 Confirmation-History permits each year (Table 193). There appears

to be a decline in the number of permit holders from 295 in 1998 to 284 in 2000, but the year 2000 data are preliminary.

Approximately 74% to 80% of the nearly 300 Permit Holders each year were large dredge scallopers (Table 193). The proportion of net trawl scallopers declined from an estimated 23% in 1998 to 19% in 1999 and 2000. The relatively small number of small dredge permits also declined after 1998 to four. Confirmation-History permits are not classified by gear.

Permit holders with full-time effort allocations dominate the dredge categories[65] (Table 193). The number of full-time dredge permits exceeded 200 each year and increased after 1998 to 213 in 1999 and 209 in 2000. In contrast, the number of Limited Access Permit Holders in the net trawl categories has been more evenly distributed among effort allocations, although the number of full-time and part-time net trawl permits declined after 1998. Among the Confirmation-History group, most permits would qualify for full-time allocations.

Geographic distribution of fishing permits: The geography of closed areas an affect fishermen differentially depending on homeport and traditional fishing grounds.

Table 194 summarizes the number of permits by state based on the principal port provided by fishermen on their 2000 season permit applications. There is little difference between 1999 and 2000, therefore, the only the most recent season is reported. The geographic distribution of Confirmation-History permits is unknown because these fishermen do not submit permit applications.

Whereas the number of limited access permit holders is slightly greater in New England, the vast majority of net trawls are from the Mid-Atlantic. In the scallop dredge grouping, MA leads with 97 permits followed by Virginia with 59, NJ with 36, and NC with 13. In contrast, nearly all net trawls are found in NC with 21 and VA with 18. There are only three net trawls in New England.

Three-quarters of the General Category permits are from New England. MA and ME each have more General Category permits than all of the Mid-Atlantic combined. However, most states have nearly 50 General Category permits.

Dependence on revenues from sea scallop trips: Revenues are a metric used to measure impacts of regulations on small businesses.

The percentage contributions of sea scallop landings to total trip returns (all species landed on scallop trips) and of scallop trip revenues to total vessel revenues for the year (all fisheries that the vessel participates in) are profiled in Table 195 for the most recent complete season, 1999. Data are from dealer reports submitted to NMFS which summarize purchases from fishermen. Although mandatory reporting was implemented in the Northeast Region in 1994, a vessel's total annual activity could be underestimated if it is active in fisheries outside the region or if its landings from other fisheries are reported in aggregate form by states in the General Canvas (especially inshore shellfish such as lobsters).

[65] The part-time small dredge category receives full-time days-at-sea allocations, and the occasional small dredge group gets part-time effort.

Overall, the vast majority of Limited Access Permit Holders fished for sea scallop during the 1999 season. This result is due to activity by full-time category vessels where 196 out of 213 large dredge vessels and 14 out of 15 net trawlers were active. Sea scallops comprised at least 90% of total scallop trip revenues except for 4% of the full-time large dredge vessels.

As expected, scallopers with full-time permits are more dependent on the scallop fishery for total annual fishing revenues than the other Limited Access permit categories. Specifically, 29% of the full-time dredge vessels and 14% of the full-time net boats earned less than 90% of their annual revenues from the sea scallop fishery. The part-time and occasional permit holders are substantially less dependent on the sea scallop fishery.

Only 190, or nine percent, of the General Category permit holders could be identified from dealer reports as landing sea scallops. This result could be low, however, because General Category landings reported via the canvas are not identifiable at the vessel or dealer levels. For example, one-third of the reported sea scallop landings from Maine came from the canvas. For these 190 vessels, sea scallops comprised less than 50% of total trip revenues on trips that landed less than 400 pounds. This result could also be biased (high), though, because the 400-pound cut-off could include trips that caught small amounts of sea scallops incidentally.

A much higher proportion of the General Category permits - 1306 out of 2095 - landed some kind of finfish or shellfish during the 1999 season. Revenues on trips that landed sea scallops comprised very little of these vessels= annual revenues as found in the dealer reports.

Dealers: Information similar to that just covered for sea scallop harvesters is reported above for dealers that have Federal permits to purchase sea scallops. Only 119 out of 187 dealers who purchased sea scallops from fishermen appear in the NMFS dealer data.[66] Logbook data do not include revenues; therefore, an economic evaluation of dependence of the sea scallop fishery is limited to the sub-sample of 119.

Sea scallop purchases accounted for more than half of total expenditures on finfish and shellfish by 40 of the 119 dealers. Thirty-four dealers spent 70% or more on sea scallops, and 28 dealers paid at least 90% of their total outlay for sea scallops. The more numerous New England dealers (77 out of 119) were somewhat more dependent on sea scallop products. For example, 27 out of 77 dealers in New England (35%) spent at least 50% of total raw fish outlays on sea scallop compared to 13 out of 42 dealers in the Mid-Atlantic (31%).

[66] The remainder were identified from logbook data.

Table 193. Number of permits in the U.S. Atlantic sea scallop fisheries during the 1998, 1999, and 2000 fishing seasons. Fishing seasons run from March 1 to the end of February of the next year.

Fishing Sector	Permit Group	Permit Category	Fishing Season		
			1998	1999	2000
Open Access	Total	General	1939	2095	1995
Limited Access	Total	n.a.	336	337	331
	Permit Holders	Full-time/large dredge	202	213	208
		Part-time/large dredge	12	12	13
		Occasional/large dredge	3	5	4
		Part-time/small dredge	2	1	1
		Occasional/small dredge	7	3	3
		Full-time/net trawl	23	15	17
		Part-time/net trawl	27	22	18
		Occasional/net trawl	19	19	19
		Total	295	290	283
	Confirmation-History permits (held all year)	Full-time	25	28	26
		Part-time	13	17	20
		Occasional	3	2	2
		Total	41	47	48

Table 194. Distribution of sea scallop fishery permits by state during the 2000 fishing season (March 1, 2000 to February 28, 2001). Data are preliminary. Assignment to state is based on the principal port information provided by fishermen on their permit applications. Port information for Confirmation-History permits is not available in permit files.

Region	State	Type of Permit			
		Limited Access Permit Holders			
		Dredge (large and small)	Net Trawl	Total	General Category Permits
New England	Total	117	3	120	1536
	ME	7	1	8	463
	NH	0	0	0	96
	MA	97	1	98	786
	RI	8	1	9	164
	CT	5	0	5	27
Mid-Atlantic	Total	110	50	160	452
	NY	0	0	0	155
	NJ	36	9	45	180
	PA	2	0	2	1
	DE	0	0	0	7
	MD	0	2	2	13
	VA	59	18	77	46
	NC	13	21	34	50
Outside Northeast Region		2	1	3	3
Unknown		0	0	0	4
Grand total		229	54	283	1995

Table 195. Revenue dependence on the sea scallop fishery during the 1999 fishing season (March 1, 1999 to February 28, 2000). Values are the percentage of permits that received less 50%, 70% and 90% revenues from either scallops on scallop trips or scallop trips throughout the season. Data are summaries by permit as reported to NMFS by dealers. Scallop trips for the Limited Access sector of the fishery were assumed to be trips that landed more than 400 pounds. Scallop trips for the General Category fishery were assumed to be trips that landed 400 pounds of sea scallops or less. N is the number of permits used in the analysis. N is less than the total number of permits because not all permits show landings in the dealer report (compare N to Table 193). The number of permits on scallop trips is less than for all fisheries because some scallop permits were not fished in 1999.

Fishing Sector	Permit Category	Fishing Activity							
		Percentage of revenues due to sea scallop landings on sea scallop trips				Percentage of total season revenues (all fisheries) due to sea scallop trips			
		N	<50%	<70%	<90%	N	<50%	<70%	<90%
Limited Access (does not include Confirmation-History permits)	Full-time, large dredge	196	0%	0%	4%	200	4%	10%	29%
	Part-time, large dredge	7	0%	0%	0%	12	75%	100%	100%
	Occasional, large dredge	0	insufficient data			3	100%	100%	100%
	Part-time, small dredge	0	insufficient data			1	insufficient data		
	Occasional, small dredge	3	0%	0%	0%	3	100%	100%	100%
	Full-time, net trawl	14	0%	0%	0%	14	0%	7%	14%
	Part-time, net trawl	16	0%	0%	0%	20	50%	55%	70%
	Occasional, net trawl	2	insufficient data			13	100%	100%	100%
General Category		190	54%	55%	55%	1306	98%	98%	99%