

**ECONOMIC IMPACT ASSESSMENT OF THE 2006 FISHERIES MANAGEMENT REGIME
ON THE NORTH SEA AND WEST OF SCOTLAND WHITEFISH TRAWL SEGMENT**

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ABSTRACT

The financial success of the Scottish whitefish fleet is directly affected by the outcome of the December 2005 EU fisheries council where the fisheries management measures are decided.

To assist government, vessel owners and industry bodies at the December council negotiations, the Seafish economics team has developed a cost and earnings model over a number of years to provide forecasts of fleet profitability.

The Seafish forecasting model is updated through the year to take into consideration changes to the fishery management measures. The model uses the latest landings data from the UK Fishery Departments to estimate volume and value of landings along with the days at sea for all active vessels in the segment. Forecast average earnings are calculated per vessel using the predicted volume caught of each species. This is based on UK quota, % UK uptake and each vessel's actual catch in the previous year. The predicted price for each species is assumed to be the same as actual prices received by the vessel in the previous year.

The model also considers other factors affecting profitability. Originally developed to produce profit forecasts for given levels of total allowable catch (TAC), the model has, over time, been adapted to incorporate changes in other parameters that affect profits. These include fuel price, fish prices and other management measures.

This paper outlines the development of the model and the economic viability of the Scottish whitefish fleet in 2006.

MODEL BACKGROUND

The impetus behind this financial model was to provide advice for both the UK Fisheries Administrations and industry in the run up to the EU December council negotiations. This allowed them to understand the economic impact of the proposed total allowable catch (TAC) would have on the UK fleet.

Continual change within the UK fishing industry in the form of days at sea limits, lower TACs, minimum mesh sizes, increasing fuel costs and increasing quota trading costs meant that we could no longer predict future fishing activity based solely on previous cost and earnings data. Seafish economics have therefore had to ensure that this model continually evolves to reflect changing industry practices. Over the last few years the model has been improved and now has the flexibility to analyse the effects of changes in TACs, fish prices, the fuel price and other management measures.

The primary focus of this model is to be of practical value to both the UK government and industry. To generate our forecasts we use cost and earnings data collected in the most recent Seafish survey of the particular segment of the fleet we are dealing with. We also use the landings data for the most recent year available and apply a number of assumptions, such as 100% uptake of quota.

We prepare an economic impact analysis using the proposed TACs for use in discussions between the UK industry and government before the EU negotiations. We provide the Fisheries Administrations with a copy of the model for use during the negotiations and prepare a report post December council based on the agreed TACs.

ASSUMPTIONS UNDERPINNING THE MODEL

Forecasts generated by the model are based on the following assumptions:

- The *UK fleet lands* 100% of the proposed 2006 UK quotas. A forecast based on 90% uptake of all main species in 2006 is also presented.
- *Official landings* from September 2004 to August 2005 are used as a baseline, to compute the expected volumes caught per vessel in 2006. Forecast landings are then adjusted by the expected change in the quota from that period to 2006.
- *Days at sea per vessel* in 2006 are assumed to be the same as the actual number for each vessel in the September 2004 to August 2005 period. This means the rate of catch per day remains the same for the forecast year.
- 2006 predicted *average fish prices* are assumed to be the same as the average price for each vessel from September 2004 to August 2005.
- The majority of *fishing and vessel owner costs* are calculated based on recent Seafish surveys [1,2,3,4,5] and adjusted for inflation using the Consumer Price Index (CPI).
- *Days at sea leasing costs* are based on recent Seafish surveys [1,2], and actual days leased in 2005 (data from SEERAD).
- *Quota leasing costs* are based on information collected in recent Seafish research^a and consultations with vessel owners and agents (December 2005).
- The forecast uses the current *price of fuel*, excluding duty, as at February 2006. Vessels are classed as small, medium or large depending on VCUs and allocated different levels of daily fuel consumption. The final fuel cost for each vessel is calculated by multiplying actual days at sea by daily fuel use and an assumed fuel price of 30p per litre.

MODEL PARAMETERS

- The model is based on the agreed 2006 UK quota as shown in table I. These quota volumes will be caught by other segments of the fleet in addition to these two segments.
- Each vessel can spend 175 days at sea before leasing costs are applied.
- Forecast average days at sea in 2006: 258 days for >24m vessels and 223 days for <24m vessels.
- The forecast number of active vessels in 2006 in each segment are: 66 vessels >24m and 143 vessels <24m, assuming 100% uptake of quotas. This may change if the TAC or the % uptake of quota changes.
- Forecast prices are based on 2004/2005 actual prices of each vessel in the segment. Forecast 2006 prices per tonne for main species for both segments are shown in table I below.

Table I: Agreed 2006 UK Quota and forecast 2006 prices per tonne for main species caught by this fleet

Species	Agreed 2006 UK Quota	Forecast 2006 prices per tonne	
		Over 24m Segment	Under 24m Segment
Anglerfish	14,591 tonnes	£2,356	£2,125
Cod	10,371 tonnes	£1,881	£1,342
Haddock	42,501 tonnes	£835	£597
Hake	4,702 tonnes	£1,128	£829
Lemon Sole	3,773 tonnes	£2,706	£1,872
Megrim	5,204 tonnes	£1,819	£1,374
Nephrops	48,689 tonnes	£2,711	£2,740
Plaice	18,509 tonnes	£941	£675
Saithe	14,214 tonnes	£423	£316
Skates & Rays	1,770 tonnes	£806	£659
Whiting	12,251 tonnes	£843	£541
Other species ^b	N/A	£1,483	£1,593

The forecast aims to show average performance of active vessels, rather than the average of the entire segment. To do this the following minimum rules, shown in table II, are applied and the vessels that did not meet these rules and are excluded from our calculations of average segment performance. The vessels that did not meet these minimum rules were excluded from our calculations. We feel this is justified because in reality each year a number of vessels do not fish to their full capacity (they may be sold or they may suffer breakdowns).

Table II: Minimum Rules for the >24m and <24m demersal trawl segments

Fleet Segment	Minimum Rules
>24m demersal trawl sector	min days at sea: 100 min earnings: £300,000 min earnings per day: £1,000
<24m demersal trawl sector	min days at sea: 75 min earnings: £100,000 min earnings per day: £750

When the assumed catch levels change, the individual vessels that fall below the minimum rules may vary, which will affect averages reported for active vessels in the segment.

FORECAST RESULTS

This section presents the key results of the forecast model for both the over and under 24m segments of the North Sea and West of Scotland whitefish fleet. The model forecasts relate to the financial performance of the segment under 100% and 90% quota uptake levels. Forecasts are also provided to examine the impact of changing the fuel price can have on the financial performance of the fleet with unchanged quota levels and 100% quota uptake.

100% Quota Uptake Results

Tables III and IV below shows a summary of Seafish survey findings [1,2,3,4,5] from 1998 to 2002 and forecasts* for 2003, 2004, 2005 and 2006 for the over 24m and under 24m whitefish fleet when there is 100% uptake of quota. The forecast predicts that 2006 gross vessel earnings are forecast to be higher than in 2005; trawlers over 24m could expect to receive gross earnings of, on average, £780,000 in 2006 and under 24m trawlers could expect to receive gross earnings of, on average, £420,000. The increase in earnings has been driven by price increases for some species. More specifically, the increase in vessel earnings for the under 24m vessels is driven by an increase in nephrops quota (which constitutes a significant share of catch for many vessels in this sector).

Table III: NS & WoS Demersal Trawl >24m – Average Vessel Financial Performance with 100% quota uptake

	1998 Average £	2001 Average £	2002 Average £	2003* Average £	2004 * Average £	2005* Average £	2006* Average £
Gross Earnings	772,399	615,450	696,353	680,000	780,000	750,000	780,000
Total Fishing Expenses							
Fuel & oil	50,006	114,941	121,325	125,000	160,000	200,000	235,000
Crew share	276,488	168,812	203,164	195,000	215,000	178,000	155,000
Total Fishing Expenses	476,786	400,152	467,299	460,000	585,000	572,000	592,000
Total Vessel Owner Expenses	136,882	166,734	193,384	190,000	190,000	187,000	188,000
Net Profit (before depreciation & interest)	158,731	48,565	35,670	30,000	5,000	-9,000	0

Table IV: NS & WoS Demersal Trawl <24m – Average Vessel Financial Performance with 100% quota uptake

	1998 Average £	2001 Average £	2002 Average £	2003* Average £	2004* Average £	2005* Average £	2006 * Average £
Gross Earnings	380,580	251,546	310,500	306,000	361,000	380,000	420,000
Total Fishing Expenses							
Fuel & oil	27,851	35,343	37,162	42,000	54,000	85,000	97,000
Crew share	130,739	69,099	92,645	91,000	111,000	102,000	106,000
Total Fishing Expenses	225,624	155,369	192,500	197,000	250,000	278,000	295,000
Total Vessel Owner Expenses	88,190	76,220	81,658	94,000	94,000	93,000	88,000
Net Profit (before depreciation & interest)	66,766	19,957	36,342	15,000	17,000	9,000	37,000

Higher costs are expected to reduce net profit significantly in 2006. Despite the increase in gross earnings, over 24m demersal trawlers are only expected to break even in 2006. The increase in Nephrops quota in 2006 for under 24m trawlers should help generate a healthier average profit when compared to previous years.

Fuel costs have dramatically increased over the last 2 years. In January 2004, the average fuel price was 16p per litre compared to 30p per litre in February 2006, an increase of 88%. The increase in fuel price has seen fuel costs rise to £235,000 for over 24m vessels and £97,000 for under 24m vessels. This has resulted in a significant impact on both crew share and net profits.

Increasing fishing costs will also restrict crew share. Some vessels have now reduced the percentage paid to the crew after deduction of fishing costs from gross earnings. As a result, many vessels are having

problems with crew retention and may also often go to sea with fewer men than required, which has implications for safety and quality.

More detailed forecast results for the over 24m segment are shown in Appendix I and for the under 24m segment in Appendix II. The 2006 forecasts for the average of the top 25% and bottom 25% of both segments is shown in Appendix III.

The above scenarios are based on 100% uptake of the quota. We also ran other scenarios using the same quota levels but adjusting the fuel price and the uptake of UK quota in 2006.

90% Quota Uptake Results^c

This forecast concerns both segments when there is 90% uptake of the UK quota. A summary of Seafish findings [1,2,3,4,5] from 1998 to 2002 and 100% uptake forecasts* for 2003, 2004, 2005 and 90%** uptake for 2006 on all species are shown in tables V and VI below.

The forecast predicts trawlers over 24 metres to earn on average £722,000 and make average loss of £24,000 in 2006. The under 24m trawlers could expect to earn an average of £382,000 with an average profit of £22,000. This shows that when vessels do not catch the available quota average earnings for the over 24m trawlers fall by £58,000 and average profits fall by £24,000. While the under 24m trawlers will see average earnings fall by £38,000 and average profit fall by £15,000. Because the forecast averages exclude vessels which fall below the minimum rules, some individual vessels may be excluded in the 90% uptake scenario which were included in the 100% uptake scenario. This gives higher average costs for days-related costs for the remaining (active) vessels.

Table V: NS & WoS Demersal Trawl >24m – Average Vessel Financial Performance with 90% quota uptake in 2006

	1998 Average £	2001 Average £	2002 Average £	2003* Average £	2004 * Average £	2005* Average £	2006** Average £
Gross Earnings	772,399	615,450	696,353	680,000	780,000	750,000	722,000
Total Fishing Expenses							
Fuel & oil	50,006	114,941	121,325	125,000	160,000	200,000	237,000
Crew share	276,488	168,812	203,164	195,000	215,000	178,000	133,000
Total Fishing Expenses	476,786	400,152	467,299	460,000	585,000	572,000	559,000
Total Vessel Owner Expenses	136,882	166,734	193,384	190,000	190,000	187,000	187,000
Net Profit (before depreciation & interest)	158,731	48,565	35,670	30,000	5,000	-9,000	-24,000

Table VI: NS & WoS Demersal Trawl <24m – Average Vessel Financial Performance with 90% quota uptake in 2006

	1998 Average £	2001 Average £	2002 Average £	2003* Average £	2004* Average £	2005* Average £	2006 ** Average £
Gross Earnings	380,580	251,546	310,500	306,000	361,000	380,000	382,000
Total Fishing Expenses							
Fuel & oil	27,851	35,343	37,162	42,000	54,000	85,000	97,000
Crew share	130,739	69,099	92,645	91,000	111,000	102,000	92,000
Total Fishing Expenses	225,624	155,369	192,500	197,000	250,000	278,000	275,000
Total Vessel Owner Expenses	88,190	76,220	81,658	94,000	94,000	93,000	85,000
Net Profit (before depreciation & interest)	66,766	19,957	36,342	15,000	17,000	9,000	22,000

Fuel price change

This forecast concerns the impact that changing the fuel price would have on the over 24m and under 24m segments. A summary of Seafish findings [1,2,3,4,5] for 2002 and forecasts* for 2003, 2004, 2005 and 2006 using 100% uptake of quota are shown for both segments in tables VII and VIII below.

The impact of an increasing fuel price can be seen by allowing quota levels to remain constant. The two scenarios which were examined were 2p per litre above and below our base case of 30p. This 4p per litre shift shows how dramatically the fuel price can affect the viability of vessels. The forecast predicts that net profit for over 24m vessels will decrease from £10,000 when fuel is 28p per litre to a net loss of £7,000 when fuel is 32p per litre. The under 24m trawlers could expect to see net profits rise to £41,000 or fall to £34,000 if the fuel price is 28p or 32p per litre respectively.

Changes to the price of fuel also impact on crew share. Any increase in the price of fuel will be partially absorbed by crew share. If we continue to see increases to the fuel price then industry may have to change how crew share is determined to enable higher levels of crew retention. On average the crew share of an over 24m trawler would increase by £7,000 if the fuel price was 28p rather than 30p per litre. The crew share of the under 24m trawlers would see an increase of £3,000 if fuel price fell to 28p per litre.

Table VII: NS & WoS Demersal Trawl >24m – Average Vessel Financial Performance, a comparison when the 2006 fuel price is altered

	2002 Average £	2003* Average £	2004 * Average £	2005* Average £	2006* Average £		
					28p per litre scenario	30p per litre scenario	32p per litre scenario
Gross Earnings	696,353	680,000	780,000	750,000	780,000	780,000	780,000
Total Fishing Expenses							
Fuel & oil	121,325	125,000	160,000	200,000	220,000	235,000	251,000
Crew share	203,164	195,000	215,000	178,000	162,000	155,000	148,000
Total Fishing Expenses	467,299	460,000	585,000	572,000	582,000	592,000	599,000
Total Vessel Owner Expenses	193,384	190,000	190,000	187,000	188,000	188,000	188,000
Net Profit (before depreciation & interest)	35,670	30,000	5,000	-9,000	10,000	0	-7,000

Table VIII: NS & WoS Demersal Trawl <24m – Average Vessel Financial Performance, a comparison when the 2006 fuel price is altered

	2002 Average £	2003* Average £	2004* Average £	2005* Average £	2006 * Average £		
					28p per litre scenario	30p per litre scenario	32p per litre scenario
Gross Earnings	310,500	306,000	361,000	380,000	420,000	420,000	420,000
Total Fishing Expenses							
Fuel & oil	37,162	42,000	54,000	85,000	90,000	97,000	103,000
Crew share	92,645	91,000	111,000	102,000	109,000	106,000	103,000
Total Fishing Expenses	192,500	197,000	250,000	278,000	291,000	295,000	298,000
Total Vessel Owner Expenses	81,658	94,000	94,000	93,000	88,000	88,000	88,000
Net Profit (before depreciation & interest)	36,342	15,000	17,000	9,000	41,000	37,000	34,000

MODEL TESTING

To test the earnings forecast by the model, a top down approach was used to estimate the expected average earnings based on 100% uptake of the 2006 TAC for the main species relevant to the over 24m segment. This involved taking the volume of the main species landed by the segment in 04/05 as a proportion of UK quota and applying these proportions to the 2006 quota. These volumes were multiplied by the actual average prices received by the segment and divided by the number of vessels in the segment to produce earnings per vessel.

Using the top down approach and the 100% uptake scenario the expected average earnings per vessel figure is close to the model forecast at £796,000. There is a 2% difference between the estimates. This information was analysed in line with previous Seafish estimates [1,2,3,4] and figure 3 shows estimated tonnage and revenues per vessel in recent years.

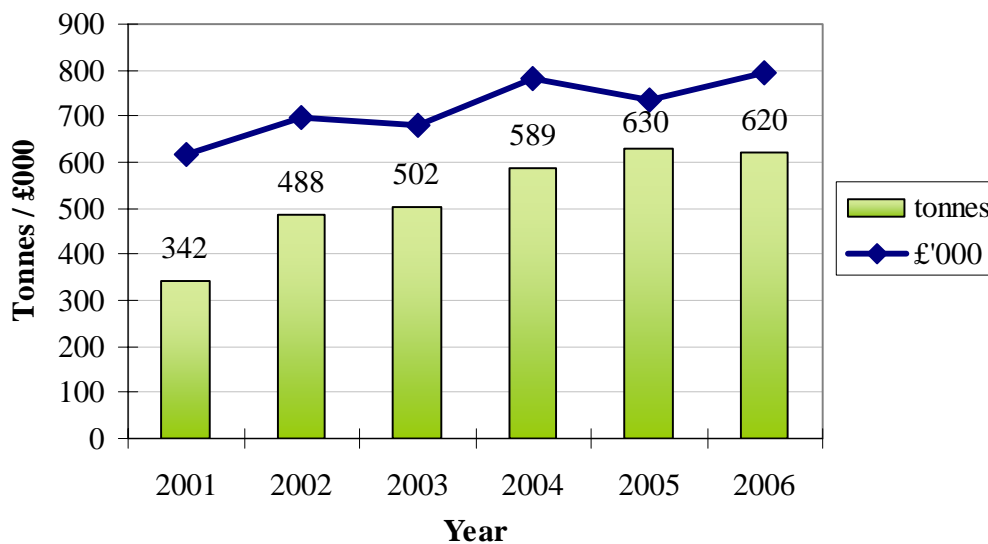


Fig. 3. Declared landings and estimated average earnings per vessel for the >24m segment as the number of vessels has declined.

CONCLUSIONS

The model forecasts suggest the North Sea and West of Scotland whitefish trawlers are likely to face another year of low profits during 2006, with the most significant costs being fuel and quota leasing. The increasing fuel costs are also impacting on crew share, and this has implications for crew retention. Under the 100% uptake scenario the over 24m vessels are forecast to breakeven before interest and depreciation and the under 24m vessels are forecast to make a net profit of £37,000. The reduction in quota uptake by 10% suggests a reduction in earnings of £58,000 and a loss of £24,000 for the over 24m vessels and for the under 24m segment a reduction in earnings of £38,000 and a £15,000 reduction in net profits is predicted. The increase in the price of fuel from 28p to 32p per litre would result in a £17,000 reduction in the profits of the over 24m vessels and a £7,000 reduction in the under 24m profits showing how

dramatically the fuel price can affect vessel viability. The comparison with the top down approach for estimating earnings found that there was only a 2% difference in results, showing that the model is a good estimate of earnings.

This model is continually evolving to meet the needs of the UK industry and policy makers in practical decision making exercises. To do this Seafish will be updating some aspects of the model prior to the 2007 pre December council economic impact assessment is produced. These improvements include:

- Updating the cost and earnings figures with the results of our 2005 Survey of the UK fishing fleet [3]. This will enable us to improve our calculation of baseline costs.
- Improving the way fuel price per vessel will be calculated. Our survey of the UK fishing fleet will be used to further split the vessels in the segment based on the vessels VCU's and the number of litres of fuel used per day.

The model can also be adapted to run scenarios for other segments of the UK fleet, such as South West beam trawlers. Seafish can also run additional scenarios for these segments on request, using alternative scenarios such as different levels of TAC scenarios, quota uptake and fuel price.

REFERENCES

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5. Curtis, H. and J. Watson. 2004. Scottish Fleet Financial Performance 2004 Mid Year Review, Seafish Report.

^a 2003 Economic Survey of the North Sea and West of Scotland Whitefish Fleet and the Scottish Fleet Financial Performance 2005 Mid Year Review.

^b Based on all other fish species not listed.

^c Due to minimum rules, detailed on page 3, a few vessels may be removed from the forecast resulting in a rise in the average costs which are dependant on number of days at sea.

APPENDICIES

Appendix 1: Over 24m whitefish costs and earnings table

Table AI: NS & WoS > 24m Demersal Trawl 2006 Average Vessel Performance

	Average (£)	As a % of average sales
Total Earnings	780,000	
Costs		
Fishing Costs		
Commission	38,000	4.9%
Harbour Dues	34,000	4.4%
Subscriptions & Levies	6,000	0.8%
Shore Labour	1,000	0.1%
Fuel & Oil	235,000	30.1%
Boxes	12,000	1.5%
Ice	11,000	1.4%
Crew Travel	2,000	0.3%
Food & Stores	24,000	3.1%
Quota Leasing	52,000	6.7%
Days Leasing	6,000	0.8%
Other Expenses	16,000	2.1%
Crew Share	155,000	19.9%
Total Fishing Expenses	592,000	75.9%
Vessel Owner Expenses		
Insurance	52,000	6.7%
Repairs	59,000	7.6%
Gear	38,000	4.9%
Hire & Maintenance	15,000	1.9%
Other Vessel Owner Expenses	24,000	3.1%
Total Vessel Owner Expenses	188,000	24.1%
Total Expenses	780,000	100.0%
Net Profit (before depreciation & interest)	0	0.0%

Appendix 2: Under 24m whitefish costs and earnings

Table AII: NS & WoS < 24m Demersal Trawl 2006 Average Vessel Performance

	Average (£)	As a % of average sales
Total Earnings	420,000	
Costs		
Fishing Costs		
Commission	19,000	4.5%
Harbour Dues	14,000	3.3%
Subscriptions & Levies	3,000	0.7%
Shore Labour	1,000	0.2%
Fuel & Oil	97,000	23.1%
Boxes	4,000	1.0%
Ice	5,000	1.2%
Crew Travel	2,000	0.5%
Food & Stores	10,000	2.4%
Quota Leasing	23,000	5.5%
Days Leasing	5,000	1.2%
Other Expenses	6,000	1.4%
Crew Share	106,000	25.2%
Total Fishing Expenses	295,000	70.2%
Vessel Owner Expenses		
Insurance	26,000	6.2%
Repairs	27,000	6.4%
Gear	17,000	4.0%
Hire & Maintenance	7,000	1.7%
Other Vessel Owner Expenses	11,000	2.6%
Total Vessel Owner Expenses	88,000	21.0%
Total Expenses	383,000	91.2%
Net Profit (before depreciation & interest)	37,000	8.8%

Appendix 3 – 2006 Forecasts for the average of the top 25% and bottom 25% of the segments – assuming 100% uptake of UK quota

Table AIII: NS & WoS Demersal Trawl >24m – Top & Bottom 25% vessel performance

	Top 25% Average £	Segment Average £	Bottom 25% Average £
Gross Earnings	1,287,000	780,000	445,000
Total Fishing Expenses			
Fuel & oil	310,000	235,000	183,000
Crew share	291,000	155,000	67,000
Total Fishing Expenses	929,500	592,000	363,500
Total Vessel Owner Expenses	304,000	188,000	115,000
Net Profit (exclude depreciation & interest)	53,500	0	-33,500

Table AIV: NS & WoS Demersal Trawl <24m – Top & Bottom 25% vessel performance

	Top 25% Average £	Segment Average £	Bottom 25% Average £
Gross Earnings	764,000	420,000	178,000
Total Fishing Expenses			
Fuel & oil	180,000	97,000	60,000
Crew share	192,000	106,000	36,000
Total Fishing Expenses	532,500	295,000	131,500
Total Vessel Owner Expenses	155,000	88,000	39,000
Net Profit (exclude depreciation & interest)	76,500	37,000	7,500