Option 3i: 20% Effort Reduction by the EU Fleet

The Invest in Fish Bio-Economic Model

The IIF Bio-Economic model is designed to simulate the interactions between fish stocks, the size and effort of the fishing fleet and regional output and employment within the South West. The aim of the model is to provide a means of comparing the effects of different policy options for the management of the region's fisheries relative to the baseline of what is expected to happen if no action is taken.

It is important to recognise that the model is an 'OPTION COMPARISON' model NOT a forecasting model. The aim of the model is to compare what happens if a 'management' decision is taken to implement a particular policy and all other factors are assumed to stay the same. Thus the impacts of policies are examined 'relative to this FIXED baseline' where all variables are held constant over time.

IIF Bio-Economic Model of South West Fisheries
Option 3i: 20% Effort Reduction by the EU Fleet

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This option models what would happen if the 20% effort reduction option was applied to the whole of the EU fleet and not just UK vessels. The purpose of this option run is to provide a direct comparison between the impact of an option applied multilaterally rather than just unilaterally. Within the model effort reduction is modelled as the number of days 'spent at sea'. This means that the size of the EU fleet is assumed to stay at its current levels but reduce the number of days at sea to 80% of the current level across all metiers.

The likely effects of this option are evaluated against a number of key measures as follows:

- The level of spawning stocks (Demersal, Pelagic and Shellfish)
- Overall impact on the environment
- The value of revenue by port
- Boat profitability (overall and by gear activity)
- The value of recreational angling expenditure
- Regional output and employment.

The graphs show the outcomes of each alternative option. The outcomes are shown '***relative to the baseline***'. This means that rather than showing actual values year by year, the graphs show how each different option impacts upon outcomes compared to what would have happened if nothing had been done (i.e. the baseline). This means that if the values are positive, the outcome is better than the baseline and if negative worse than the baseline.

It is important to recognise that the option outcomes are based upon a number of key assumptions;

- Whilst most options are applied 'unilaterally in the model' (thus most options are applied only to the UK fleet over which DEFRA has jurisdiction). However, this option examines the impact of a 20% effort reduction across the EU fleet as a whole and how this would impact relative to the baseline scenario.

- Prices of all fish species caught and landed are 'fixed' so that changes in revenue are 'real' changes (due to catch size) rather than 'apparent' changes due to alterations in prices at sale.

- Estimates of spawning stock biomass are based on ICES data of recruitment observations over the past 20 to 30 years, which may be considered by some to be precautionary or pessimistic.

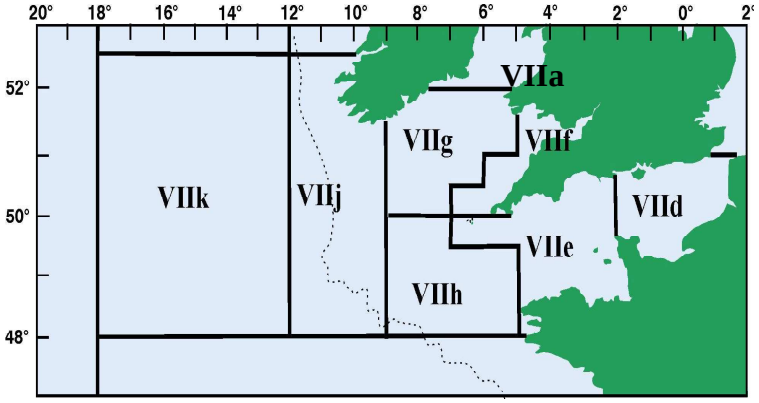
- Unless specifically stated as part of the option being considered, the size of the fleet is assumed to remain at its current level, with vessels continuing to fish even if they are unprofitable. (this assumption is modified in the 'natural attrition' modified baseline where unprofitable boats are assumed to leave the fleet.).

- Spawning stock to recruitment relationships were analysed in conjunction with CEFAS in order to determine the appropriate stock-recruitment relationships for the model.

Fish Spawning Stocks

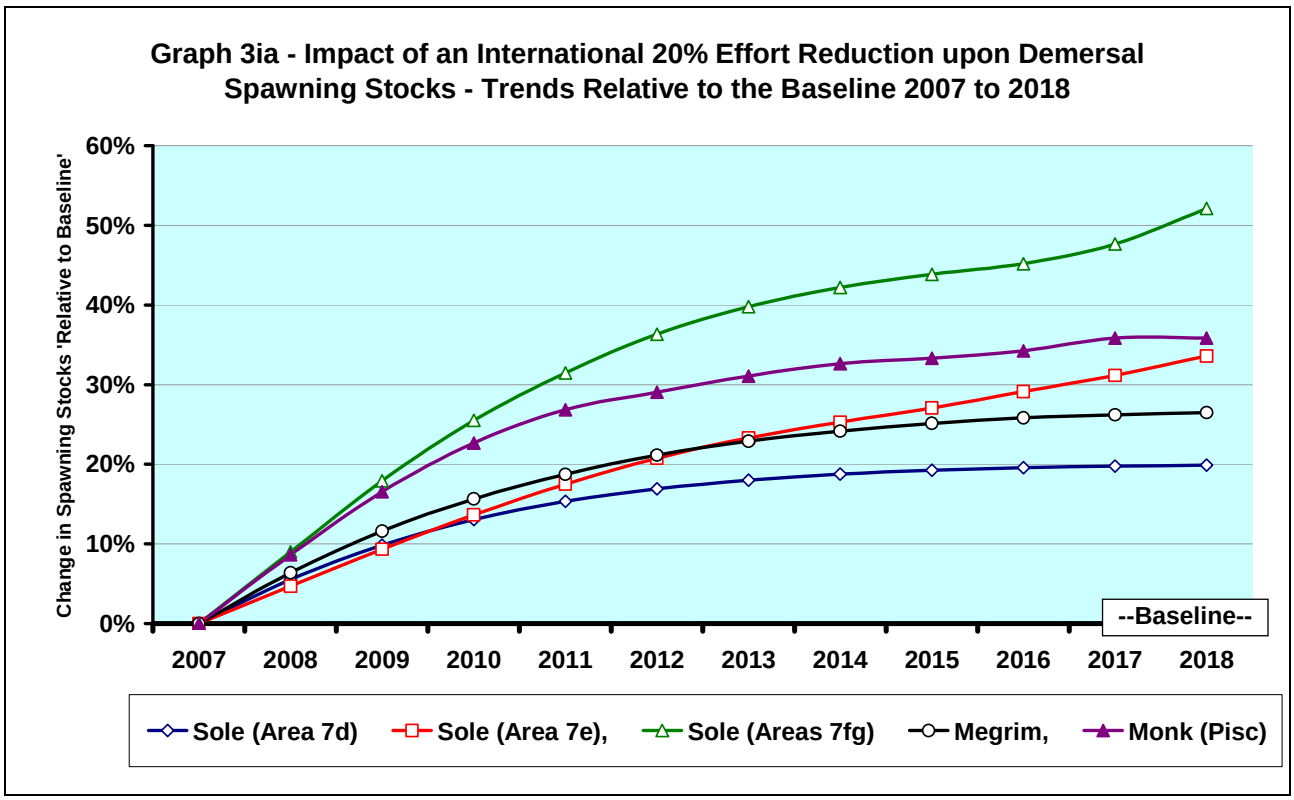
The following graphs show how level of spawning stocks are forecast to change within the IIF Bio-Economic model if the size of the fishing fleet is reduced by 10% (UK only). For a number of species the volume of spawning stocks is shown for specific fishing areas (metiers) within the South West region. These areas are referenced as 7a to 7g as shown in Figure 1 below:

Figure 1 – ICES Fishing Areas Modelled

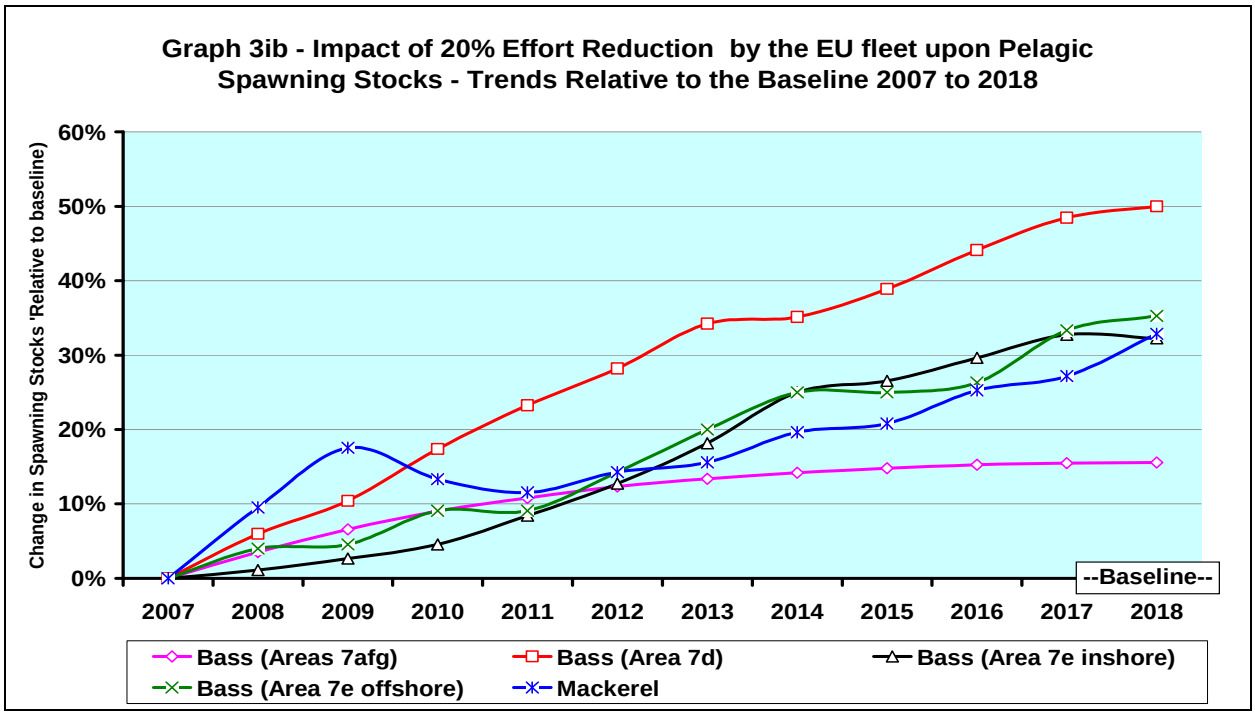


Spawning Stocks – Demersal Fisheries

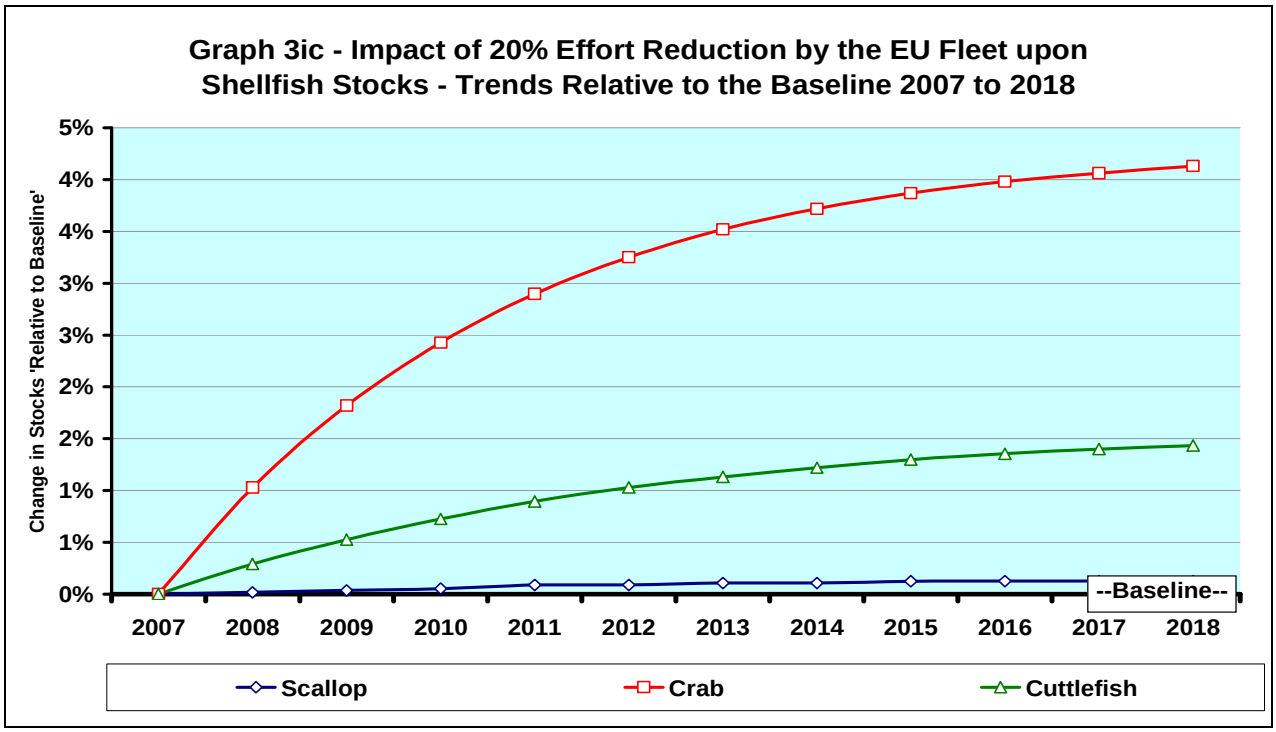
Graph 3ia shows how spawning stocks in demersal fisheries are forecast to increase 'relative to the baseline' as a result of a 20% effort reduction by the EU fleet. Spawning stocks are forecast to increase by between 20% and 50% 'relative to the baseline'. The highest relative increases would be in stocks of monkfish and sole in area 7. Comparing these figures to those of a unilateral reduction applied only to the UK fleet the differences are apparent. Unilaterally, the range of increase is only between 1% and 5%, whereas applied multilaterally the increase is up to 10 times larger. The differences in the species which increase the most reflects the type of catch taken by the EU fleet as a whole as compared to that of the UK fleet by itself.



Spawning Stocks – Pelagic Fisheries
Graph 3ib provides a summary of the impact of a 20% effort reduction by the EU fleet as a whole upon pelagic spawning stocks. The graph shows that these stocks are expected to increase 'relative to the baseline' as a result of this option. The range of increase is between 15% and 50%. The largest increases 'relative to the baseline' are in bass stocks in areas 7d and 7e (eventually increasing to between 30% and 50% above baseline levels). Comparing these impacts to a unilateral policy, the effects are much more noticeable particularly in areas 7afg and 7e offshore, where stocks increase relative to the baseline whereas before there was little discernible impact.



Stocks – Shellfish Graph 3ic provides a summary of the impact of option 3i upon stocks of crustacean and shellfish. The graph shows that there is little difference between the impact of unilateral and multilateral upon shellfish stocks, which reflects the fact that this stock is not targeted by the EU fleet.

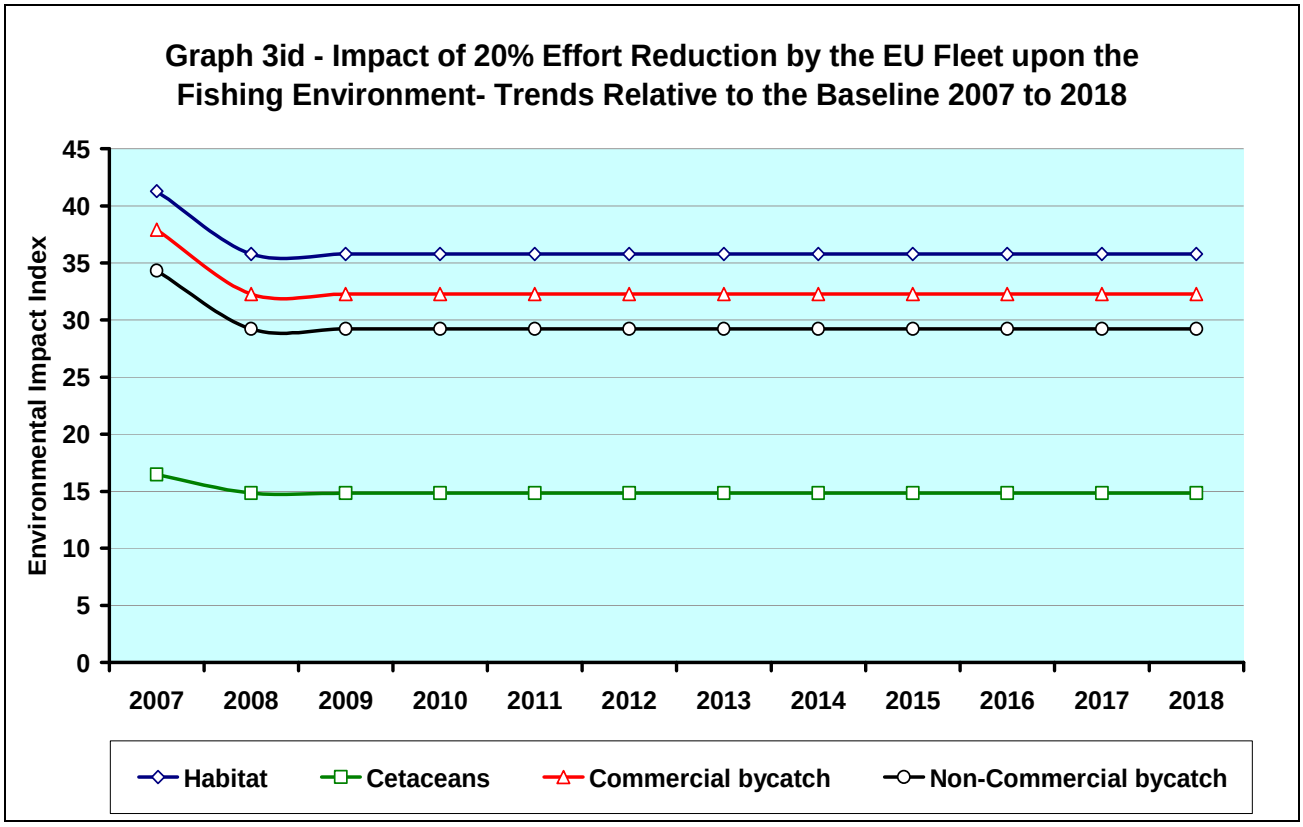


Environmental Impact Index
In addition to the impact of commercial and recreational fishing upon spawning stocks and the fish biomass, there are also impacts upon other aspects of the fishing environment. The four main measures analysed within the Environmental Impact Index (EIA) are:

1. **Environmental Impact upon Habitat**
2. **Environmental Impact upon Cetaceans**
3 **Environmental Impact upon Commercial bycatch**
3 **Environmental Impact upon Non – Commercial bycatch**

Graph 3id shows that a 20% effort reduction by the EU fleet as a whole would have a positive impact upon the environmental measures tracked within the model. The graph shows that the effect of the option upon all measures would be a reduction in the degree of impact in the year of implementation. The impact would then remain at the reduced level throughout the observation period.

This outcome suggests that environmental impact is, in part, a function of the number of vessels fishing within the area. It is important to recognise that this option does not lead to a reduction in the number of foreign vessels fishing in the area and it does not differentiate between different types of fishing activity. A reduction in fleet effort means that the same number of vessels are fishing in the area but on less days. Although this does reduce the impact upon the fishing environment the gain may not be as great as would happen if the number of vessels was reduced.



Comments/Questions on the impact of Option 3i on Spawning Stocks and Environmental Impacts

Demersal Stocks

Pelagic Stocks

Shellfish Stocks

General Comments on Spawning Stocks and Environmental Impacts

Revenue by Port – Baseline Trend

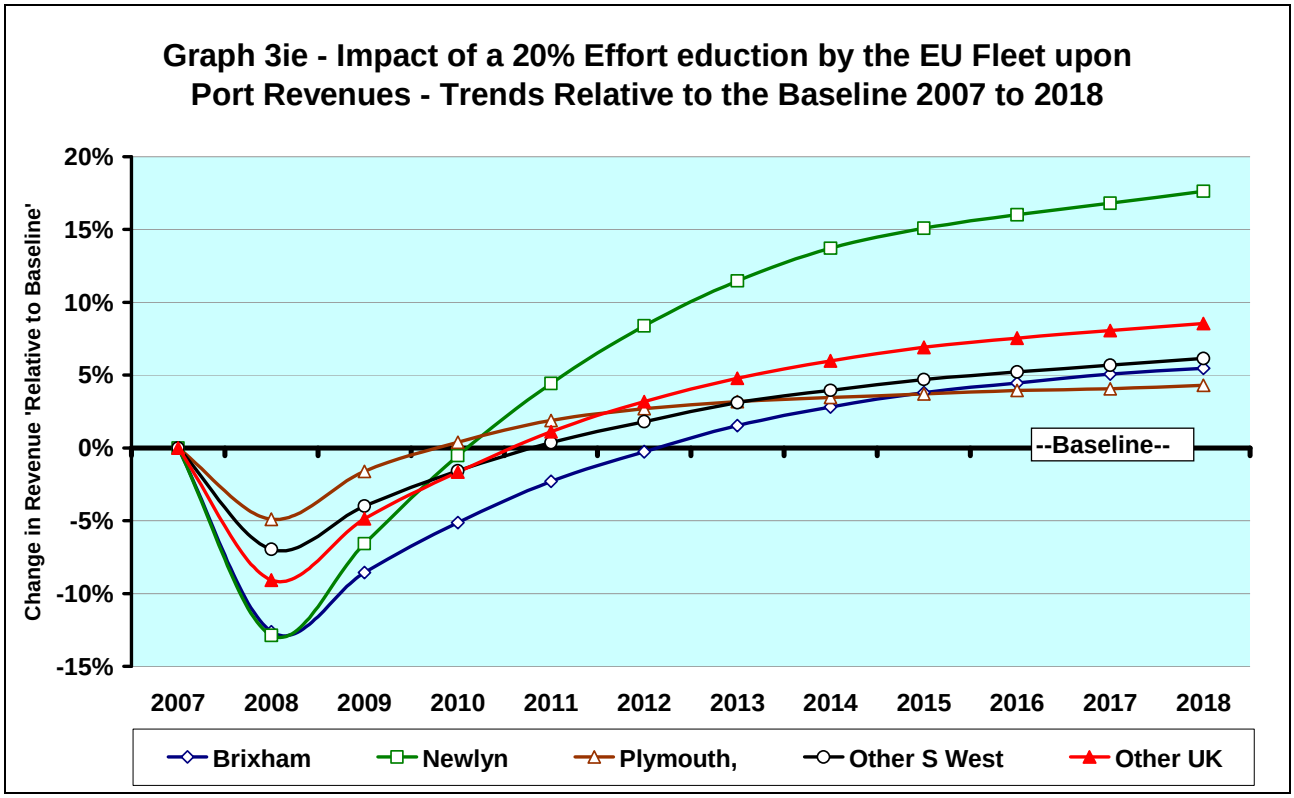
Graph 3ie shows the effect of a 20% effort reduction by the EU fleet upon the value of revenue from landings generated at each of the main ports throughout the South West region 'relative to the baseline'. The graph shows that although relative to the baseline future revenues decline initially at all ports (as in the unilateral policy), improved stock recovery means that after about 4 to 5 years the value of revenues earned increases at all ports. The graph shows that the revenues taken in Newlyn are forecast to increase to around 15% above the baseline whilst revenues in Plymouth and Brixham improve to around 5% above baseline. This outcome is significant as it highlights the fact that a more stringent policy with long term improvements in stock is forecast to lead to improved revenues even with a 20% reduction in effort. This reflects the nature of the relationships between fleet size, effort and the fish biomass.

The outcomes shown below are to be expected given a reduction in the number of vessels in the fleet. As revenues pick up slightly after the initial drop due to effort reduction, this should result in higher 'average revenue per boat' for those left in the fleet and hopefully higher profit margins.

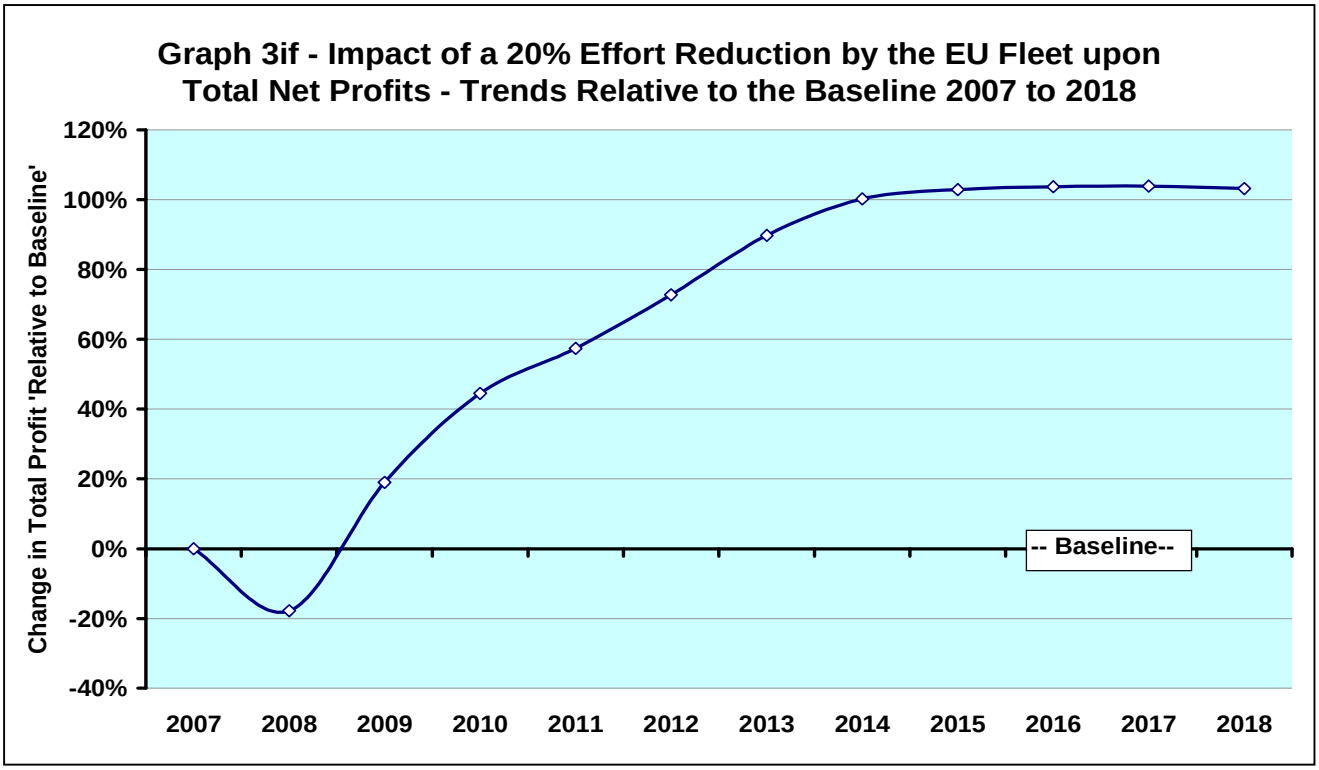
Important Notes:

- *These figures are estimated 'relative to the baseline' and assume fixed prices and costs. IF the sale prices of catch increase, the actual amount of revenue would of course increase. However, this would NOT affect revenue levels 'relative' to the baseline(e.g. if prices increased by 10% BOTH baseline and option 1 revenues would increase)*

- *The reason for the differences in the impact upon the various ports is a reflection of the catch landed at different ports. As different species recover at different rates over time so the catch landed by the vessels operating out of the various ports will reflect this resulting in some differences in revenues taken at the ports.*



Profitability by Fleet



Graph 3if shows the estimated impact of a 20% effort reduction by the EU fleet upon the total amount of net profit made by the South West fleet. The graph shows that although initially effort reduction leads to a decline in profits, the benefits of the option soon kick in with profits increasing as stocks and catch improve.

With regard to vessel profits, beam trawlers are expected to see the greatest gain in profits due to their size and efficiency. However, it is likely that all vessels operators would gain to some extent from this option as stocks recover. Any increase in profits would also be improved if unprofitable boats were to leave the fleet through 'natural attrition' or decommissioning.

Important Notes:

- *As with revenues these figures are 'relative to the baseline' and assume fixed prices and costs. IF the sale prices of catch increase and/or costs (e.g. fuel) decrease, net profits would of course increase, however, this would NOT affect future profit levels 'relative' to the baseline(e.g. if prices increased by 10% BOTH baseline and option profits would increase).*

Comments/Questions on the impact of Option 3i on Port Revenues and Boat Profitability

Port Revenues

Fleet Profits

Profitability by Boat Type

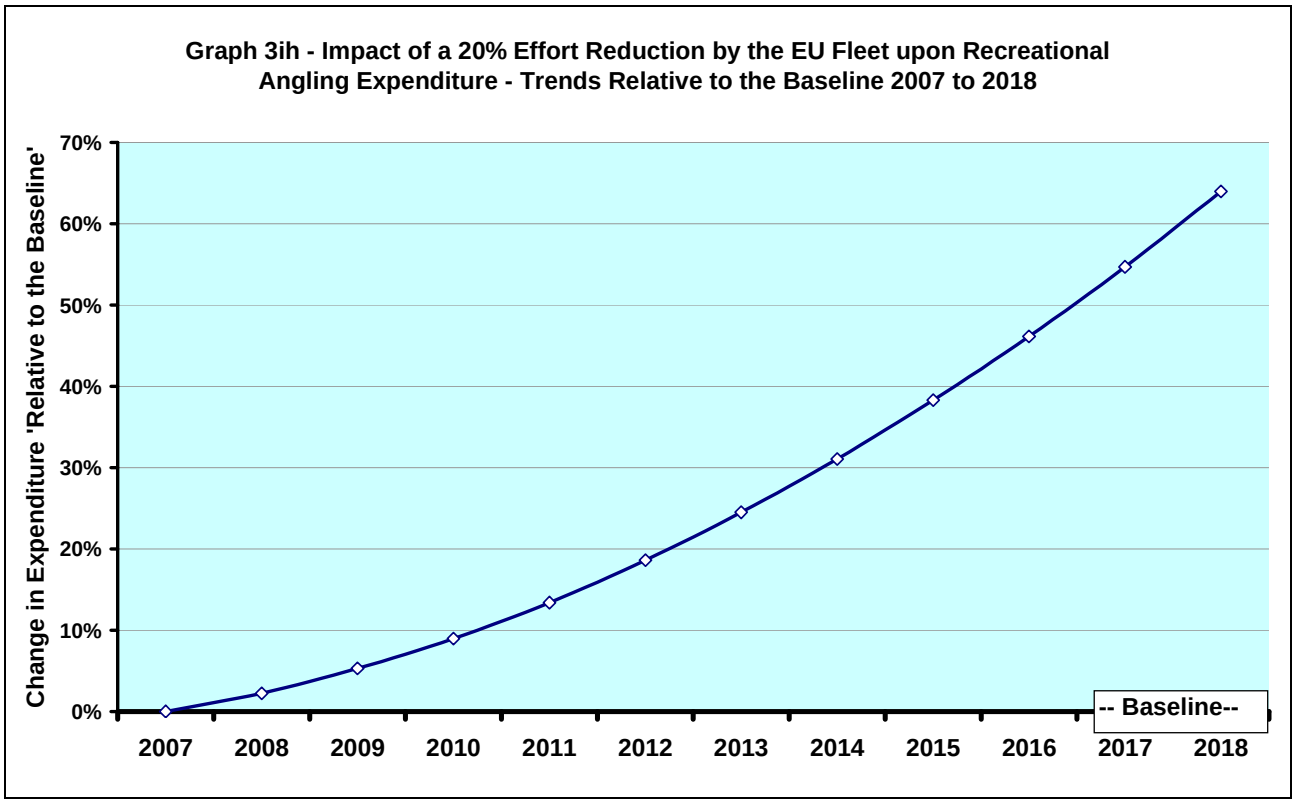
General Comments on Revenues and Profitablity

Recreational Angling

Graph 3ih shows the potential impact of a 20% effort reduction by the EU fleet as a whole upon recreational angling expenditure. The graph shows that as stocks improve over time 'relative to the baseline' this leads to an eventual increase in recreational angling expenditure around 65% higher then the baseline estimate. The reason for this significant increase relative to the baseline is that recreational angling is assumed to be a function of the fish biomass. As per the findings of the Nautilus report the model assumes that more and bigger fish will attract more demand for recreational angling. The outcome of a 20% effort reduction by the EU fleet is that stocks improve leading to a significant pick up in demand for recreational angling relative to the baseline.

Important Note:

- This outcome is important as it highlights, as per the Nautilus report, the significance of the fish biomass in determining demand for recreational angling. This result therefore emphasises the fact that any policy designed to encourage or sustain recreational angling must be geared towards effective improvements in the fish biomass



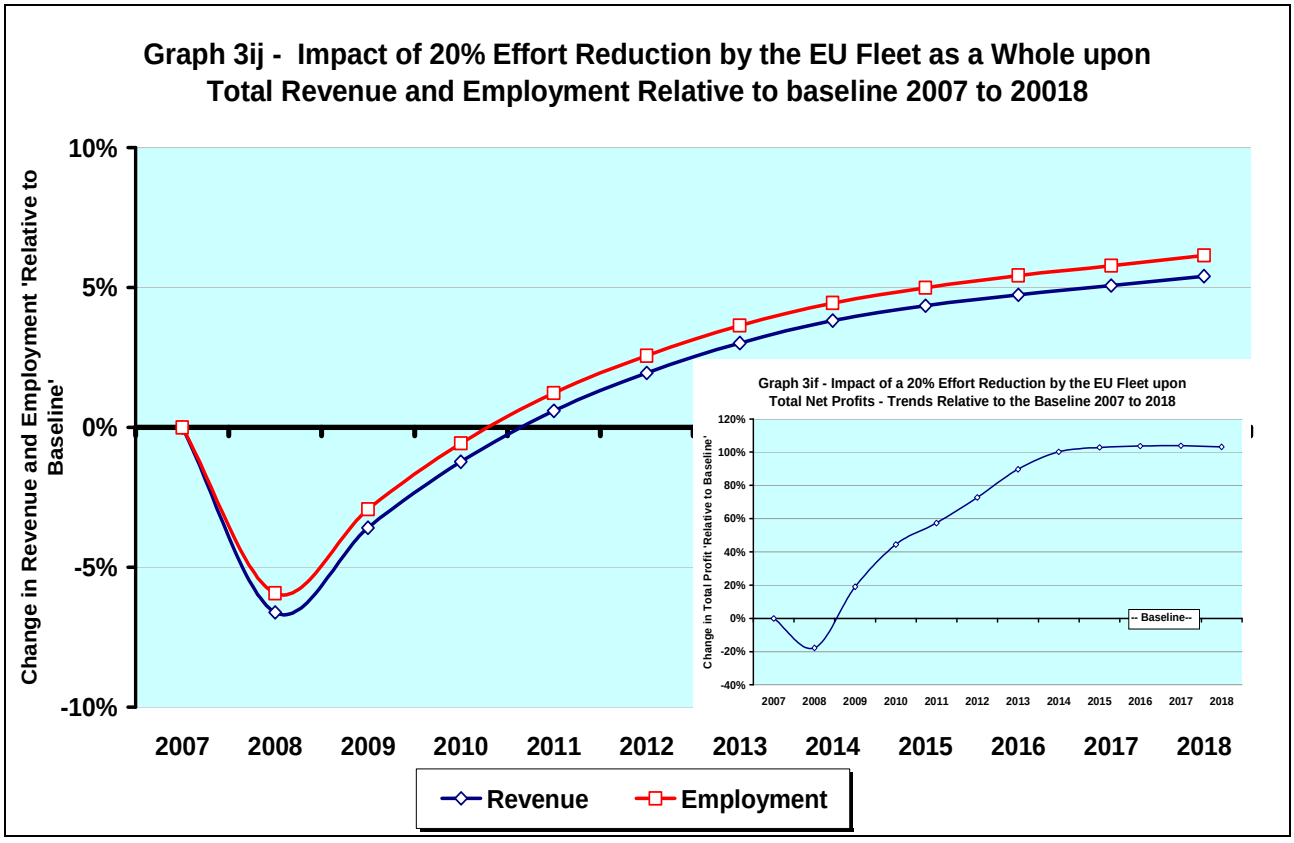
Regional Output and Employment

Commercial and Recreational fishing both create and support output and employment throughout the South West Region. In addition to the 'direct' jobs on fishing vessels, there are also many 'indirect' jobs in supporting industries up and down the industry supply chain. This would include jobs in sectors such as fish processing, boat repair, retail etc. As vessel catches change over time these will be translated into changes in direct and indirect revenue and jobs.

Graph 3ij shows that a 20% effort reduction by the EU fleet as a whole provides a very interesting outcome. The graph shows that whilst in the short term the effort reduction would initially lead to a loss of revenue and jobs relative to the baseline, in the medium to long term the outcome would actually be increased output and employment relative to the baseline and significantly improved profits. The reasoning behind this is that multilateral application of this option would lead to stock improvements which would eventually funnel into increased catch and revenues for the UK fleet. What the graph shows is that 'relative to the baseline scenario' output and employment would initially fall to about 6 to 7% below the baseline level but eventually and end up at around 5 to 6% above the baseline.

Important Note:

- *It is important to recognise that the graph shows that the impact of this option is a 'one off' hit on revenue and employment. It is possible that some vessel owners may be able to withstand this impact and pick up employment in future years as catch revenues and profits recover. In addition, if sale prices for catch increase and costs decline, this may be translated into further increases in profits and possibly employment.*



Comments/Questions on the impact of Option 3i on Recreational Angling and Regional Output and Employment

Recreational Angling

Regional Output and Employment