

## **Option Package 2: 20% Fleet Decommissioning and the Natural Attrition Modified Baseline**



### **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 Package 2: 20% Fleet Decommissioning and the Natural Attrition Modified Baseline**

### **Option Package 2: 20% Fleet Decommissioning and the Natural Attrition Modified Baseline**

**In addition to analysing the impact of different options ‘in isolation’ the bio-economic model can also be used to look at combinations of options. Package 2 is an interesting combination as it combines a 20% decommissioning of the UK fleet in conjunction with the natural attrition ‘modified baseline’ scenario. In the natural attrition scenario boats that are unprofitable are removed from the fleet. This is useful as it can be used to provide a direct comparison with the previous option 2 outcomes with the standard baseline model.**

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

- ❖ The level of spawning stocks (Demersal, Pelagic and Crustacea/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.

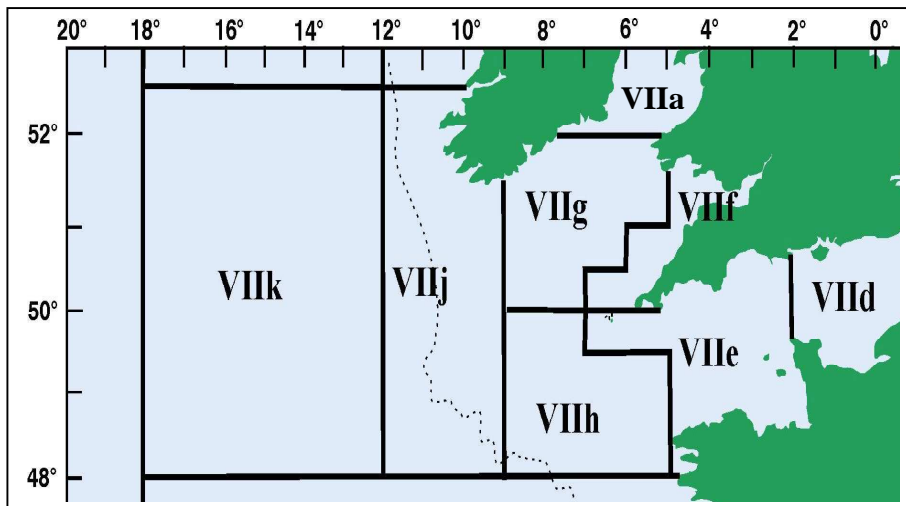
It is important to recognise that the option outcomes are based upon a number of key assumptions;

- ❖ In all cases (except where specified) options are applied ‘unilaterally in the model’ (thus most options are applied only to the UK fleet over which DEFRA has jurisdiction). It is therefore assumed that the effort of other EU fleets will remain at the level modelled in the baseline. The impact of the foreign fleet is modelled in terms of its effect on fish mortality/catch and this impact may be altered within the model as ‘reduced effort’ or days at sea (see option 3i), but technical changes cannot be applied to this fleet.
- ❖ 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

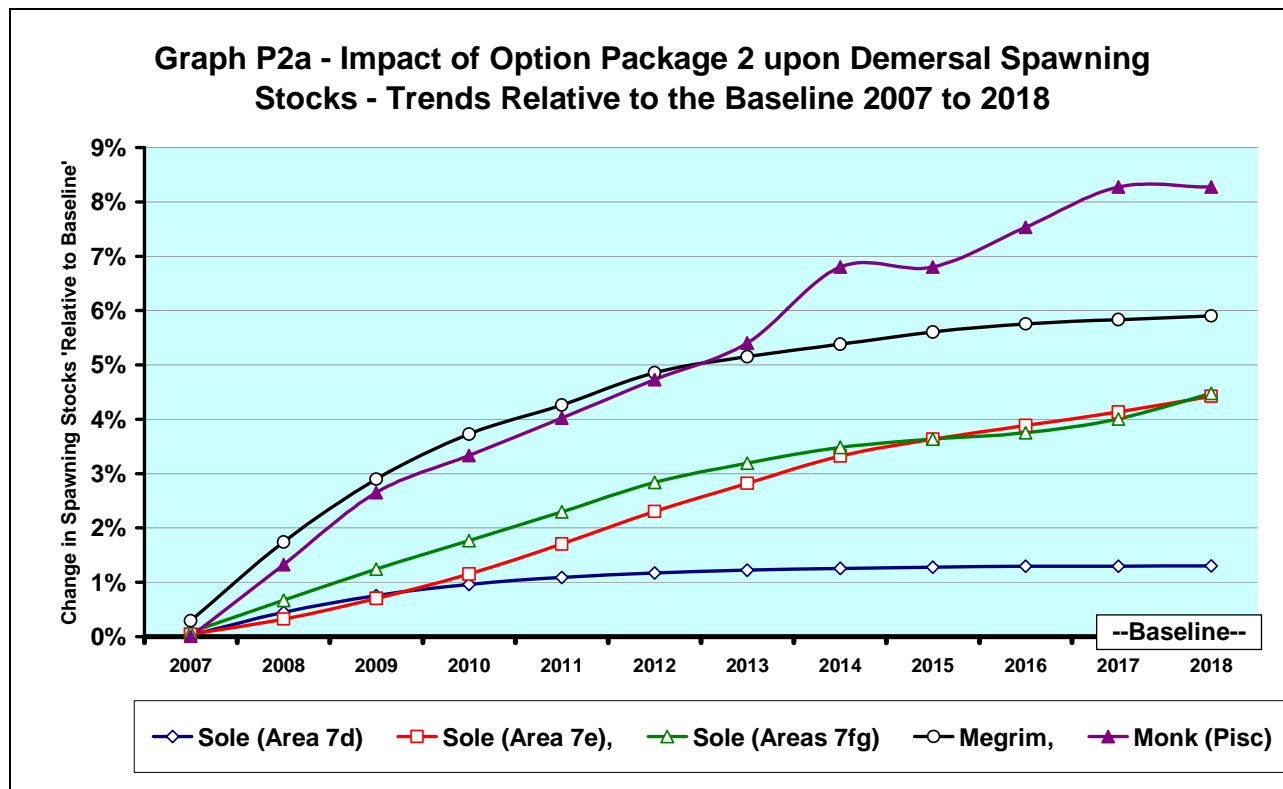
The following graphs show how level of spawning stocks are forecast to change within the IIF Bio-Economic model if the size of the fishing fleet is reduced by 10% (UK only). For a number of species the volume of spawning stocks is shown for specific fishing areas (metiers) within the South West region.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

**Figure 1 – ICES Fishing Areas Modelled**



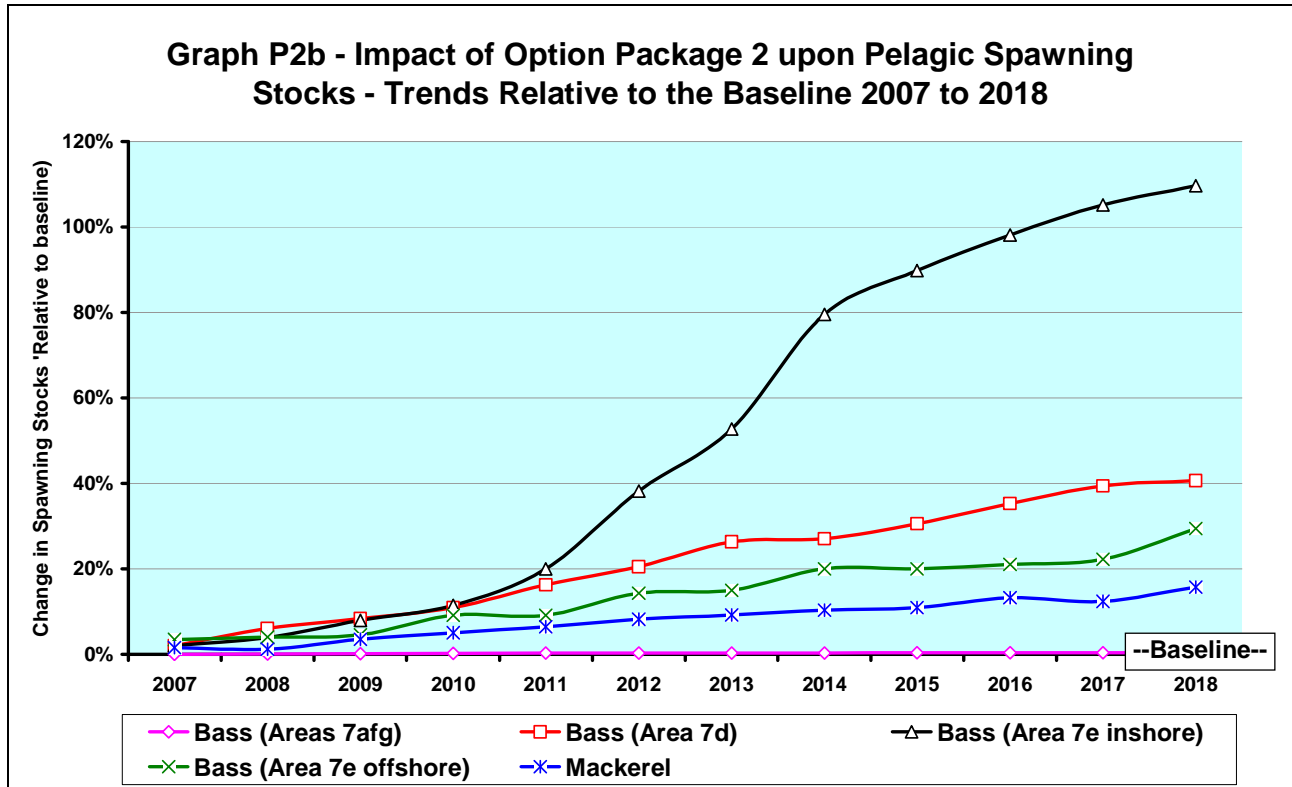
## Spawning Stocks – Demersal Fisheries

Graph P2a shows that spawning stocks in demersal fisheries are forecast to increase ‘relative to the baseline’ as a result of package 2. Spawning stocks are forecast to increase by between 1% and 8% ‘relative to the baseline’. The relative increases in stocks of monkfish and megrim would be slightly higher (between 6 and 8%) than for sole (between 1% and 5%).

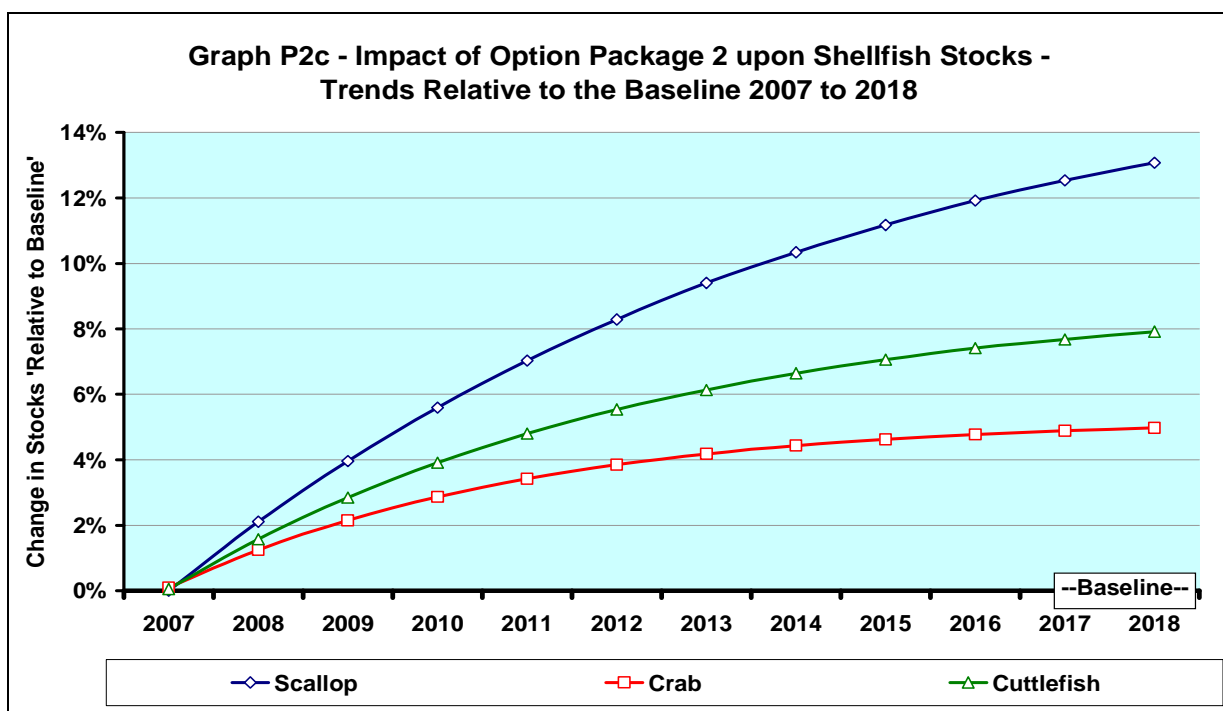


## Spawning Stocks – Pelagic Fisheries

Graph P2b provides a summary of the impact of option package 2 fleet upon pelagic spawning stocks. The graph shows that most stocks are expected to increase ‘relative to the baseline’ as a result of this option. The range of increase is between 0% and 110%. The largest increases ‘relative to the baseline’ are in bass stocks in areas 7d and 7e (eventually increasing to between 12% and 18% above baseline levels). Bass stocks in areas 7a,f and g are forecast to be relatively unaffected, whilst mackerel stocks are forecast to increase to just under 20% above baseline levels.



**Stocks – Shellfish** Graph P2c provides a summary of the impact of option package 2 upon stocks of crustacean and shellfish. 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 5% (crabs) and 13% (scallops).



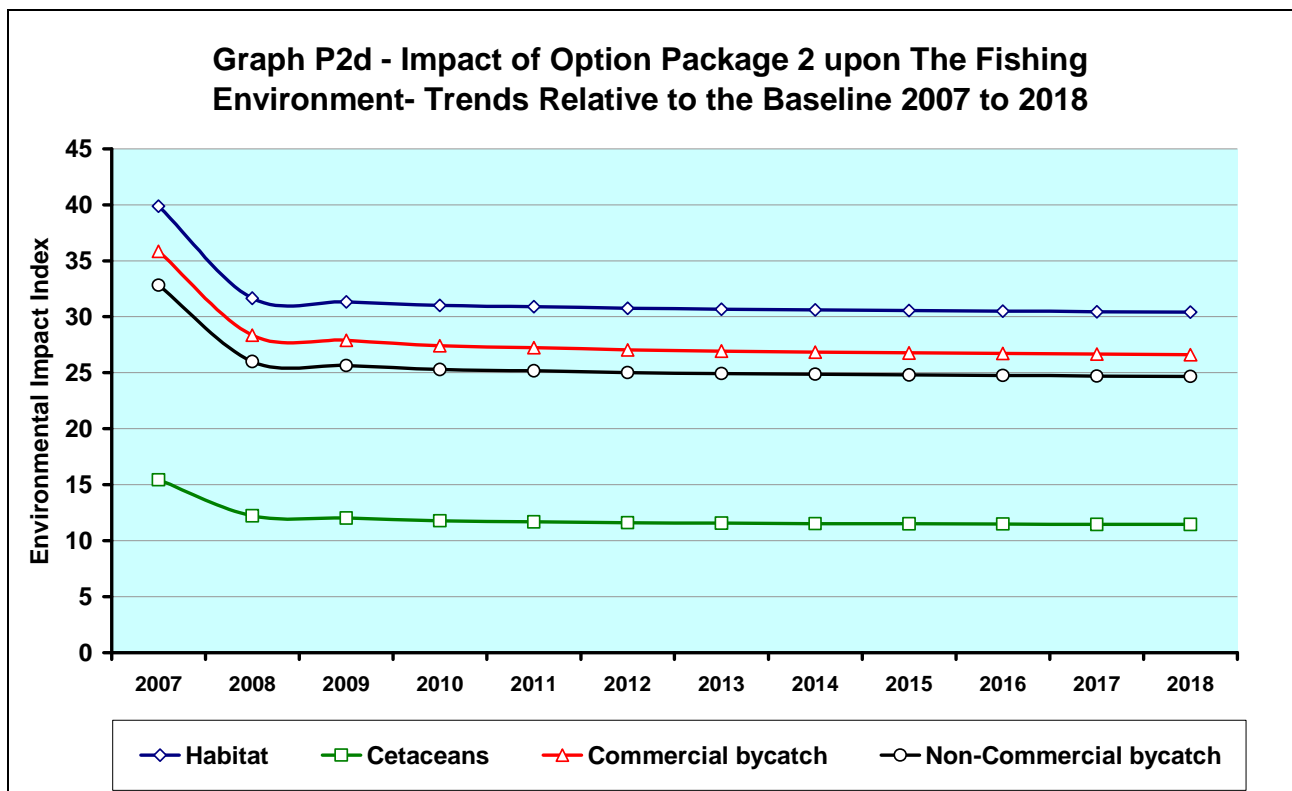
## Environmental Impact Index

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 P2d shows that option package 2, a combination of 20% decommissioning and natural attrition would have some 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. The reduction in fleet size is ‘across the board’ and it may be that certain ‘methods’ of fishing may be more damaging to the environment than others.



# **Comments/Questions on the impact of Option 1 on Spawning Stocks and Environmental Impacts**

## **Demersal Stocks**

## **Pelagic Stocks**

## **Shellfish Stocks**

## **General Comments on Spawning Stocks and Environmental Impacts**

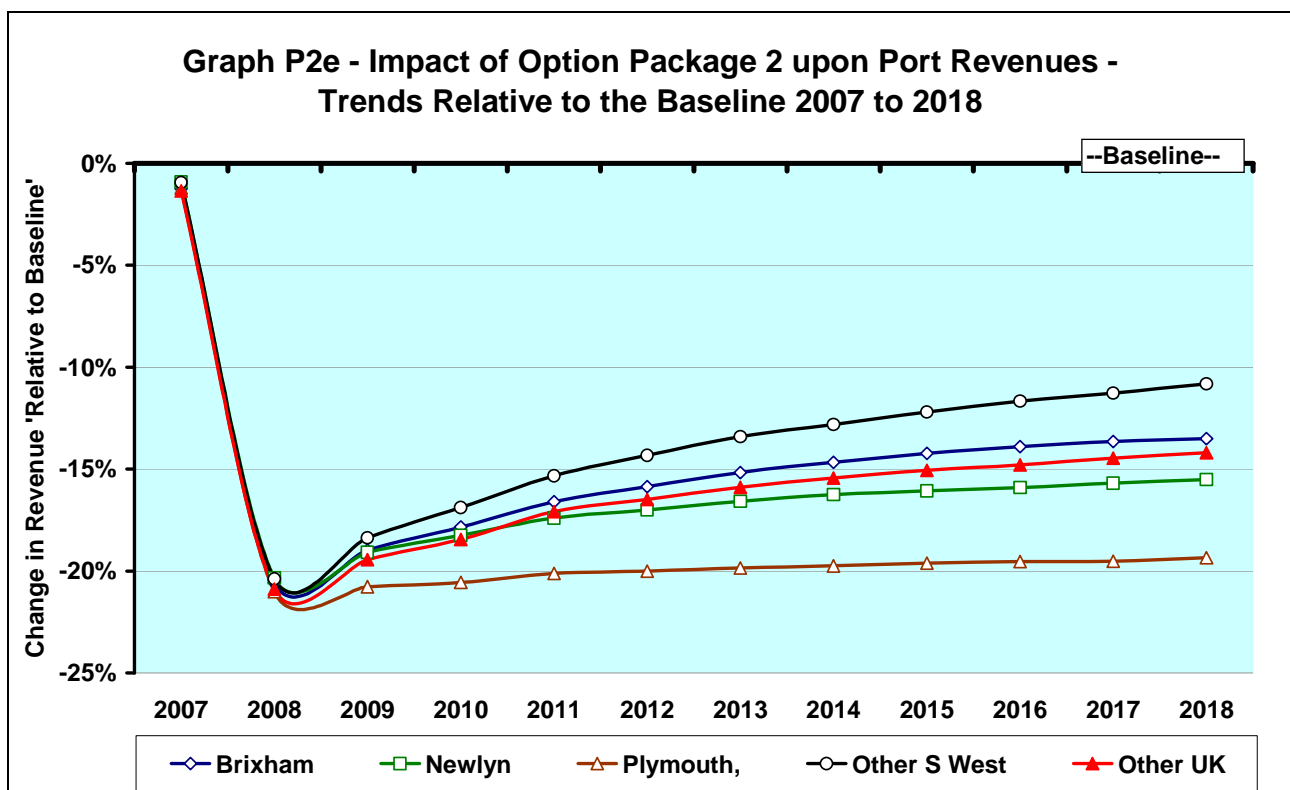
## Revenue by Port – Baseline Trend

Graph P2e shows the effect of option package 2 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 relative to the baseline future revenues will decline at all ports. However, although initially revenues are forecast to fall by 20%, the same as the reduction in fleet numbers, they slowly pick up over time as stocks and thus catch start to recover ‘relative to the baseline’. The amount of revenue reduction is similar for all ports ending up at around 11% to 18% below the baseline forecast. The graph shows that the revenues taken in Plymouth would fall slightly more than those in Newlyn and Brixham.

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 decommissioning, this should result in higher ‘average revenue per boat’ for those left in the fleet and hopefully higher profit margins.

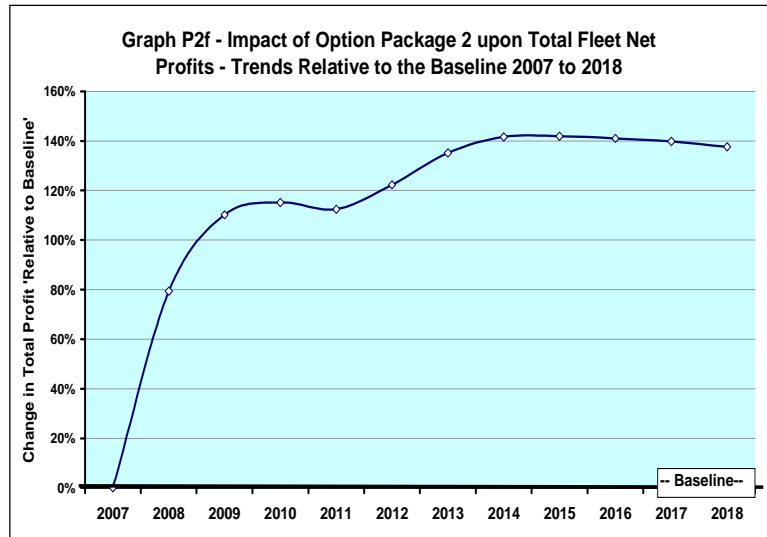
### Important Notes:

- ❖ *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.*
- ❖ *Revenues in this option are slightly lower than those in option 2 alone as the natural attrition modified baseline means that unprofitable boats leave the fleet reducing its overall size even further than in option 2 resulting in less total revenue.*



## Profitability by Fleet and Gear Activity

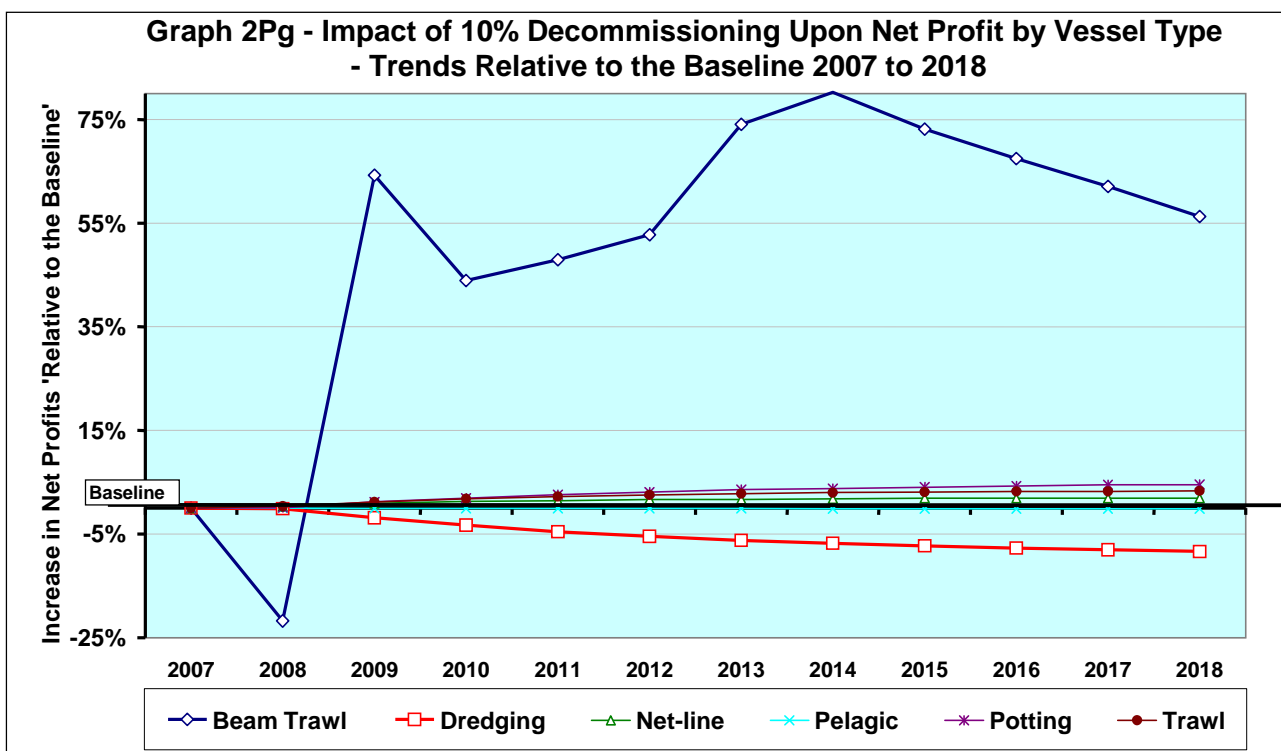
Graphs P2f and P2g show how option package 2 is estimated to affect fleet profits, both in terms of total profits and profit by type of fishing vessel. The graphs show that overall total net profit for the fleet as a whole are expected to increase dramatically in the year of implementation eventually reaching a level some 140% higher than the baseline'. This outcome which is higher than in option 2 alone reflects the fact that natural attrition reduces the size of the fleet even further meaning more profits for those boats that remain 'active'



Looking at profits by type of activity Graph P2g shows some differentiation. Whilst the net profits of beam trawlers are forecast to eventually settle at a level around 50% higher than baseline levels, profits of the remainder of the fleet remain around or slightly above/below baseline levels.

### 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 1 profits would increase).*
- ❖ *The apparent difference in the relative increase in profits of beam trawlers as against the remainder of the fleet is due to the structure of beam costs and profits in the bio-economic model. In the model baseline profits of beam trawlers were relatively low compared to the rest of the fleet due to high fuel costs and the significance of this cost within beam trawl operation. This means that even a small increase in profitability of beam trawlers is results in a large percentage increase.*



# **Comments/Questions on the impact of Option Package 2 on Port Revenues and Boat Profitability**

## **Port Revenues**

## **Fleet Profits**

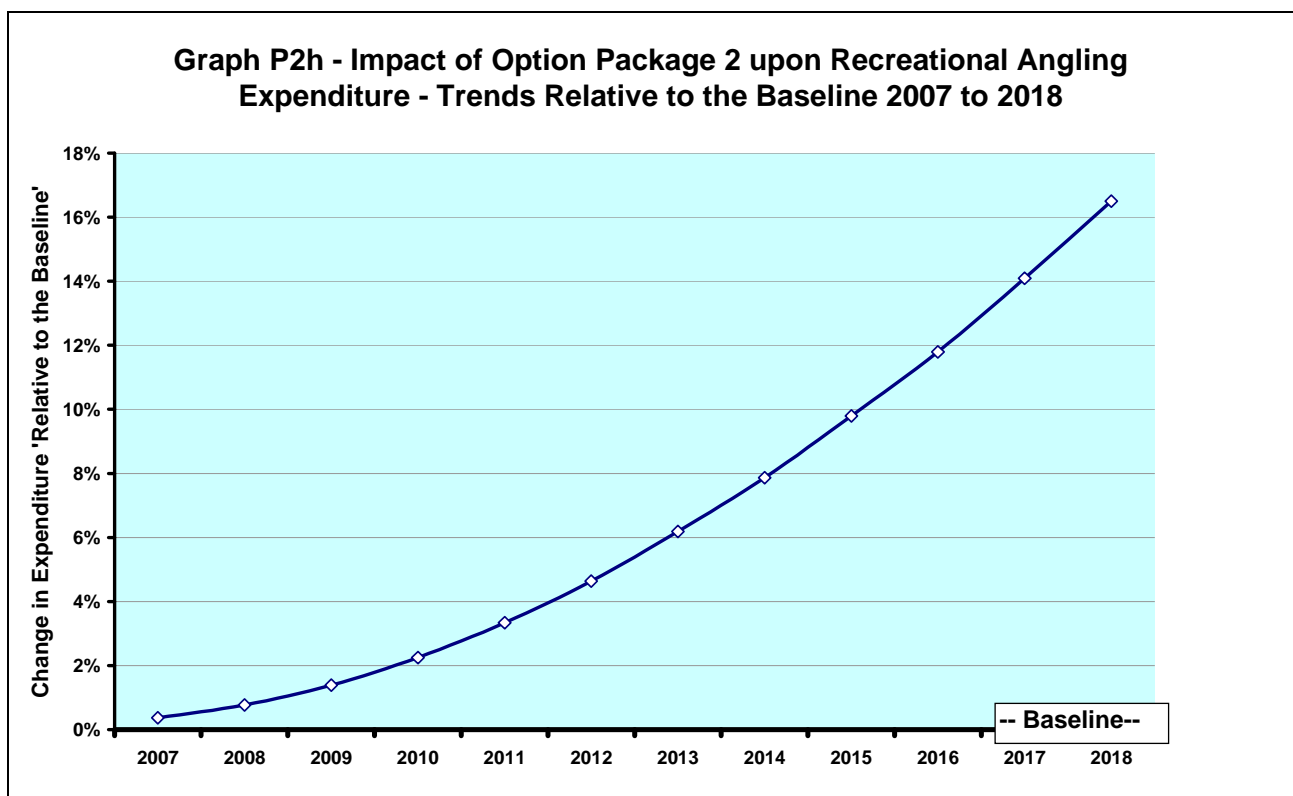
## **Profitability by Boat Type**

## **General Comments on Revenues and Profitability**

## Recreational Angling

Graph P2h shows the impact that option package 2 is estimated to have upon recreational angling expenditure. The graph shows that expenditure increases gradually *'relative to the baseline'* reaching a level around 17% above the baseline forecast. The reason for this relative increase 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 option package 2 is that although *'relative to the baseline'* stocks do improve slightly, the degree of improvement is not maybe as great as one might wish for.

The likely reasons to explain this are twofold. Firstly, as the option is only directed at the UK fleet, foreign vessels are assumed continue to catching at current levels thus continuing to deplete fish stocks and secondly the option does not have a significant enough impact in itself to substantially improve fish stocks to a level that would impact upon the demand for recreational angling.



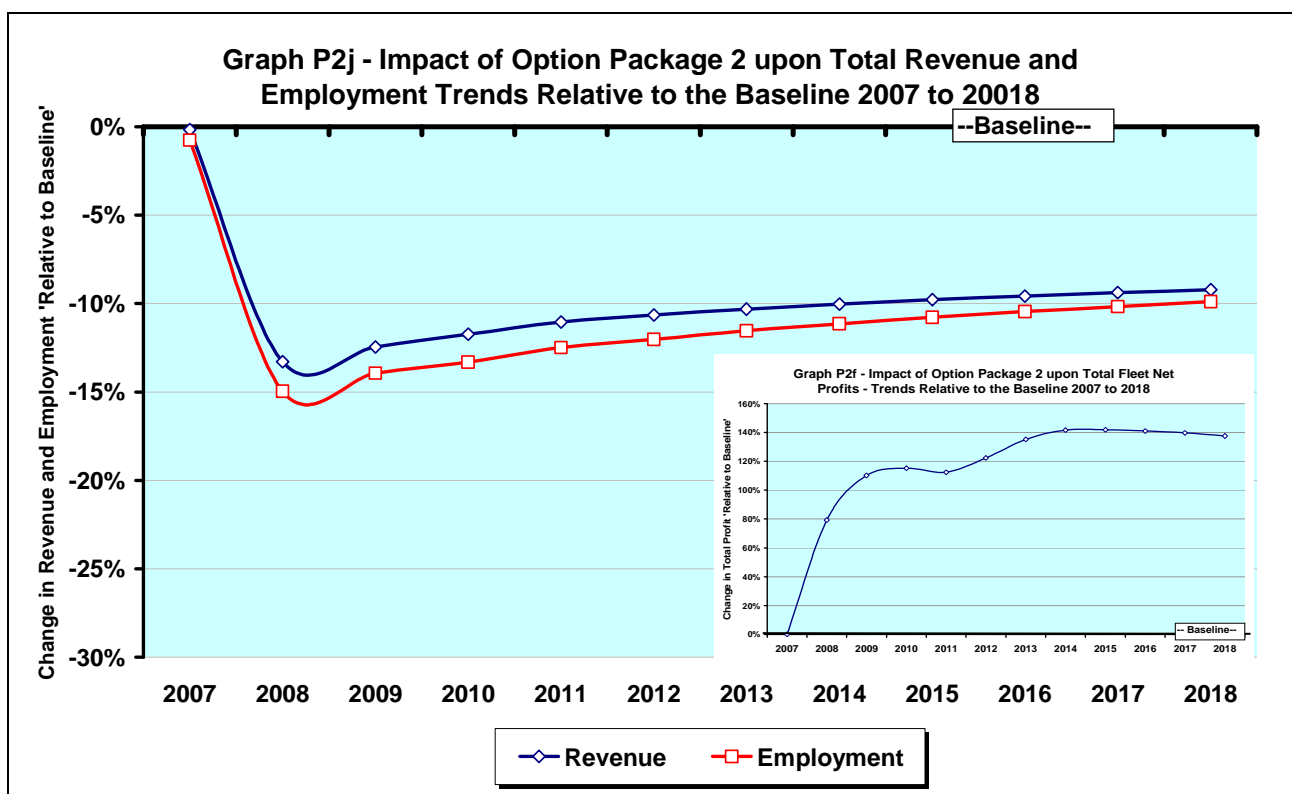
## Regional Output and Employment

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 includes 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 P2j shows that option package 2 will lead to a loss of both revenue and employment relative to the baseline scenario. However, it is important to recognise that the reduction in output and employment is not of the same scale as the reduction in the number of vessels. Those vessels that remain ‘active’ in the fleet increase their catch relative to the baseline and this is reflected in the increase in net profits that would accrue to these vessels as shown in the superimposed graph. Decommissioning and natural attrition will inevitably lead to a loss of output and jobs as fewer boats operating will mean less jobs. In addition to the direct jobs lost on boats there will also be an impact on the wider regional economy as suppliers, merchants and processors are affected by reduced landings. It is difficult to be precise about the extent of these impacts as they are subject to external factors such as fuel costs, productivity changes, improvements in technology etc. What the graph shows is that ‘relative to the baseline scenario’ output and employment would initially fall to about 15% below the baseline level and end up at around 10% below the baseline.

### Important Note:

- ❖ *It is important to recognise that the graph shows that the impact of this option is an initial 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 Package 2 on Recreational Angling and Regional Output and Employment**

## **Recreational Angling**

## **Regional Output and Employment**