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**REPORT OF
THE SCIENTIFIC, TECHNICAL AND ECONOMIC
COMMITTEE FOR FISHERIES (STECF)**

Subgroup on Economic Assessment (SGECA)

(Brussels 27-29 October 2004)

The Potential Economic Impact on Selected Fishing Fleet Segments of TACs Proposed by ACFM for 2005 (EIAA-model calculations)

This report has been evaluated and endorsed by the Scientific, Technical and Economic Committee for Fisheries (STECF) in its plenary session of 1-5 November 2004.

It does not necessarily reflect the view of the European Commission and in no way anticipate the Commission's future policy in this area.

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I. INTRODUCTION TO THE EIAA REPORT FOR 2005

1. Introduction and list of participants

The SGECA was convened from 27 to 29 October to evaluate the short and long term economic impact of the ACFM advice. The group was expected to run the EIAA-model taking into consideration the latest ACFM advice of October 2004.

The meeting was attended by the following experts:

Angel Calvo (University of Vigo)
Hans Frost (Danish Research Institute of Food Economics), chairman
Jens Kjærsgaard (Danish Research Institute of Food Economics)
Jim Watson (Sea Fish Industry Authority)
Joacim Johannesson (The Swedish National Board of Fisheries) (from home office)
Jos Smit (LEI)
Simon Mardle (CEMARE)
Wiking Althoff (Joint Research Centre, European Commission)

STECF Secretariat

Franco Biagi (DG Fisheries, European Commission)

The model used in this Report has been developed from the one set out for the Economic Interpretation of ACFM Advice[1] under FAIR CT97-3541. Most of the data presented has been collected under the current EU funded project 'Economic Assessment of European Fisheries' (Q5CA-2001-01502) under the 5'th Framework Programme 'Quality of Life and Management of Living Resources', and provided by economist at a working group meeting in Vilnius (LT) 19-22. October 2004.

The biological information presented in section I.2-4 forms basis for the economic assessment. This information was provided by the SGRST (subgroup on Reviews on Stocks) during the assembly in Brussels 25-29 October. These contributions are greatly appreciated. Annex 1 reports the full contact details of the experts attending the SGRST-SGECA meeting..

1. The Economic Assessment

This report gives an assessment of the expected economic impact of the TACs proposed by the ACFM for 2005.

The EIAA Model used for the calculations is described in an Annex 2 which is intended to throw light on some bio-economic features of the model that will help non-economists and that dovetail with the conventional bio-economic advice.

To carry out an assessment of the financial impact of ACFM advice, the fleet segments examined need to be subject to quotas, and knowledge of the catch composition for the national fleet and each

[1] Concerted Action: Promotion of Common Methods for Economic Assessment of EU Fisheries (2001) *Economic Interpretation of ACFM Advice, Specimen Report No. 3,* LEI, Den Haag, 2001.

fleet segment is also required. The costs and earnings information is from the Annual Economic Report (AER).

The segments included are those for which necessary information is available. The economic information is generally reliable. In this report it has been possible to include segments from each EU member state as follows:

1. Belgium	1 segment
2. Denmark	5 segments
3. Finland	2 segments
4. Netherlands	2 segments
5. Sweden	6 segments
6. United Kingdom	6 segments
7. Spain	3 segment

The assumptions for the calculations for these 7 countries are:

- The TACs for each species are caught adjusted with an up-take-ratio calculated from the base period's landings relative to the allocated quotas.

- Future prices are base period prices adjusted with a flexibility rate of 0.2 based on the whole TAC for the EU for the relevant species.

- The stock-catch flexibility rate is 0.6 for demersal species, reflecting their spatial density, and 0.1 for pelagic species owing to their shoaling behaviour. Hence, an increase in stock abundance lowers the amount of effort.

- The change in effort is proportional to the change in the quotas for the relevant segment.

- Costs are calculated at fixed prices (base period) but adjusted proportionally with the change in effort for future years.

- For the United Kingdom fleet segments, landings have been valued at the national average price reigning in each year.

The format of the analysis presented includes text, tables and diagrammatic information. A glossary and explanation of the indicators used are set out in Sections 2 and 3 of the Annex 2.

The calculation about the long term economic consequences use information about spawning stock biomasses and long term yield. The members of the SGRST working group have provided that information, which is greatly appreciated.

The EIAA-model is constructed to work with a list of TACs for the management areas as complete as possible. For the member states and the included fleet segments this list should be as complete as possible as well implying that if the landing value is composed of a large share of non-quota species or no information is available about the quota species for the pertinent fleet segment, the model will produce very little or no change in the economic results because landings of non-quota species are assumed constant in the model.

2. TAC proposals for 2005.

The group has evaluated the potential economic impact of three sets of TAC proposals for 2005, see table I.1, based on the following criteria:

1. Single species TACs. As far as possible, TACs for 2005 were taken directly from the ICES advice for single species exploitation boundaries. These were used to demonstrate the economic performance of the fishing fleets in 2005 relative to the 2001-2003 baseline run if TACs were set according to the single species advice and ignoring any interactions between stocks and fisheries. For some stocks, the single species advice is for zero catch in 2005 and in such cases the TAC input to the EIAA was therefore zero. For other stocks, ICES was unable to provide quantitative assessments and advice on catch options for 2005 and in such cases the TAC for 2005 was set equal to the 2004 TAC.

2. TACs set in line with ICES' mixed fishery advice. This scenario was undertaken to evaluate the economic performance of the fleets the interactions between stocks and fisheries are taken into consideration. This represents a worst-case scenario, since it implies zero catch for a large number of demersal stocks that are caught in mixed fisheries. For example, for the North Sea mixed fisheries, the ICES advice states:

Fisheries in Division IIIa (Skagerrak-Kattegat), in subarea IV (North Sea) and in Division VIId (Eastern Channel) should in 2005 be managed according to the following rules, which should be applied simultaneously:

- With minimal bycatch or discards of cod;
- Implement TACs or other restrictions that will curtail fishing mortality for those stocks for which reduction in fishing pressure is advised;
- Within the precautionary exploitation limits for all other stocks (see text table above).
- Where stocks extent beyond this area, e.g. into Division VI (saithe and anglerfish) or is widely migratory (Northern hake) taking into account the exploitation of the stocks in these areas so that the overall exploitation remains within precautionary limits;

The group has interpreted the wording "with minimal by-catch or discards of cod" as meaning a zero TAC for cod and for those species caught together with cod. Hence for example in this case, the catch of haddock, whiting plaice and sole was also be set to zero.

3. TACs set in line with existing management agreements and proposed management plans. For several stocks management agreements exist. For such stocks, the group selected the TAC consistent with such agreements. For other stocks not subject to management agreements the 2005 TAC was set in line with single stock exploitation boundaries, unless they were stocks associated with the stocks subject to the management agreement. For example, The management plan for Northern hake calls for a 25% reduction in fishing mortality on hake. Hence the group chose to estimate a TAC consistent with a 25% reduction in fishing mortality on anglerfish and megrim stocks that are associated with the fisheries exploiting hake. Pelagic stock TACs were set according to single stock exploitation

boundaries, since there is no significant interaction with demersal stocks in the fisheries exploiting pelagic species.

For many stocks the assessment area encompasses more than one management area. In such cases the TAC for the stock was partitioned according to the allocation of the 2004 TACs to the different management areas.

In the absence of SSB estimates in the ICES advice, SSB for 2005 was assumed to be the same as that for 2004.

3. Long-term TACs and SSBs

The long term TAC's were calculated by taking the long-term equilibrium yield per recruit (Y/R) at the precautionary fishing mortality ($\mathbf{F}_{pa}$) and multiplying this by the average (arithmetic) recruitment for the assessment time series as it appears in the ICES summary table. This figure was then adjusted to reflect the likely EU share by applying the 2003 total TAC to EU share ratio [EU $share_{long\ term}=TAC_{long\ term}*(EU\ Share_{2003}/TAC_{2003})$]. In some cases (e.g. blue whiting) these were then further subdivided into TACs for each sub-division by applying the 2003 TAC to sub-division ratio. The long term SSB's were calculated by taking the SSB per recruit (SSB/R) at the precautionary fishing mortality ($\mathbf{F}_{pa}$) and multiplying this by the average (arithmetic) recruitment for the assessment time series as it appears in the ACFM summary table. In most cases, values of Y/R and SSB/R were derived by eye from the plots in the ACFM report; this is clearly not very precise, but essential in the absence of the comprehensive data. In cases where information was missing from the ACFM report (e.g. yield per recruit plots) data were taken from either working group reports, or from previous ACFM reports. In cases were $\mathbf{F}_{pa}$ was not available, an appropriate fishing mortality (e.g. $\mathbf{F}_{sq}$) was chosen.

Since the long-term equilibrium estimates of TAC and SSB should be largely unaffected from one year to the next, the long-term calculations presented in this report are based on the ICES advice for 2004.

Table I.1. TAC proposals for 2005. Metric tonnes.

	2004[1]	2005 Single species	2005 Mixed	2005 Manage-ment plan
Herring				
I,II	71,542	76,658	76,658	76,658
IIIa	60,164	79,245	79,245	79,245
IIIbcd (EC zone)	78,770	92,000	92,000	92,000
IIIbcd, Management Unit 3	61,200	61,200	61,200	61,200
IIa,IVab	260,502	388,622	388,622	388,622
IVc,VIId	66,098	132,132	132,132	132,132
Vb,VIaNb	29,340	30,100	30,100	30,100
VIa S,VIIbc	14,000	14,000	14,000	14,000
VIaClyde	1,000	1,000	1,000	1,000
VIIa	4,800	4,800	4,800	4,800
VIIef	1,000	1,000	1,000	1,000
VIIghjk	13,000	11,000	11,000	11,000
Anchovy				
VIII	33,000	5,000	5,000	5,000
IX,,X,CECAF	8,000	4,700	4,700	4,700
Cod				
I,IIb	18,322	15,855	16,975	16,975
IIIa Skagerrak	3,773	0	0	3,773
IIIa Kattegat	1,363	0	0	1,000
IIIbcd (EC zone)	47,125	18,648	14,742	23,751
IIa,IV	22,659	0	0	30,283
Vb,VI,XII,XIV	848	900	0	1,100
VIIa	2,150	0	0	2,170
VIIb-k,VIII,IX,X,CECAF34.1.1	5,700	5,200	5,200	5,200
Megrim				
IIa (EU),IV	1,890	1,890	0	945
Vb,VI,XII,XIV	3,600	2,200	0	1,650
VII	18,099	19,264	14,448	14,448
VIIIabde	2,101	2,236	2,236	1,677
VIIIc,IX,,X,CECAF	1,336	1,050	0	788
Anglerfish				
IIa (EU zone),IV	7,000	7,000	0	7,000
Vb,VI,XII,XIV	3,180	3,180	0	2,385
VII	20,902	26,617	21,528	21,528
VIIIabde	5,798	7,383	5,972	5,972
VIIIc,IX,,X,CECAF	2,300	2,300	0	2,300
Haddock				
IIIa,IIIbcd	2,143	4,142	0	900
IIa,IV (EU zone)	66,256	66,365	0	14,427
Vb,VI,XII,XIV	7,205	12,928	0	4,860
VII,VIII,IX,X,CECAF34.1.1	9,600	46,350	0	35,120
VIIa	0	0	0	0
Whiting				
IIIa	723	723	0	360
IIa,IV (EU zone)	12,924	12,924	0	6,500
Vb,VI,XII,XIV	1,600	1,600	0	500

TACs (cont.)	2004	2005 Single species	2005 Mixed	2005 Manage-ment plan
Whiting (cont.)				
VIIa	514	0	0	400
VIIb-k	16,000	10,600	7,000	7,000
VIIIabde	2,242	2,242	1,800	1,800
VIIIc,IX,,X,CECAF	1,020	1,020	0	750
Hake				
IIIa,IIIbcd	1,178	1,003	0	1,003
IIa,IV (EU zone)	1,373	1,169	0	1,169
Vb,VI,VII,XII,XIV	21,926	18,674	0	18,674
VIIIabde	14,623	12,454	0	12,454
VIIIc,IX,,X,CECAF	5,950	0	0	6,200
Blue Whiting				
IIa,IV	53,934	62,563	62,563	62,563
Vb,VI,VII	209,653	243,197	243,197	243,197
VIIIabd	14,654	16,999	16,999	16,999
VIIIe	0	0	0	0
VIIIc,IX,,X,CECAF	30,415	35,281	35,281	35,281
Nephrops				
IIIa,IIIbcd	4,600	4,600	4,600	4,600
IIa,IV (EU zone)	18,987	18,987	0	9,494
Vb,VI	11,300	11,300	0	11,300
VII	17,450	17,450	0	17,450
VIIIab	3,150	3,150	3,150	2,934
VIIIc	180	0	0	162
VIIIde	0	0	0	0
IX,,X,CECAF	600	600	0	540
Northern Prawn				
IIIa, IIa,IV	10,599	10,599	10,599	10,599
Plaice				
IIIa Skagerrak	9,310	7,448	0	7,448
IIIa Kattegat	1,863	1,900	0	1,900
IIIbcd (EU zone)	3,766	2,400	2,400	2,400
IIa,IV (EU zone)	55,523	58,700	0	35,000
Vb,VI,XII,XIV	1,227	1,227	0	1,227
VIIa	1,340	2,970	0	2,970
VIIbc	160	77	77	77
VIIde	6,060	4,580	4,580	4,580
VIIfg	560	250	250	250
VIIhjk	466	271	271	271
VIII,IX,,X,CECAF	448	448	448	448
Pollack				
Vb,VI,XII,XIV	704	704	0	704
VII	17,000	17,000	0	17,000
VIIIab	1,680	1,680	1,680	1,680
VIIIc	410	410	0	410
VIIId	0	0	0	0
VIIIe	0	0	0	0
IX,,X,CECAF	360	360	360	360

TACs (cont.)	2004	2005 Single species	2005 Mixed	2005 Manage-ment plan
Saithe				
IIa,IIIabcd,IV	92,182	59,954	0	29,977
Vb,VI,XII,XIV	19,713	12,821	0	6,411
VII,VIII,IX,X,CECAF34.1.1	6,968	6,968	6,968	6,968
Mackerel				
IIa (EU),IIIabcd,IV	21,381	25,381	25,381	25,381
IIa,Vb,VI,VII,VIIIabde,XII,XIV	297,595	353,270	353,270	353,270
VIIIc,IX,,X,CECAF	32,305	38,349	38,349	38,349
Sole				
IIIa,IIIbcd	470	370	370	370
II,IV	17,000	17,300	0	17,300
Vb,VI,XII,XIV	85	85	85	85
VIIa	664	1,000	0	1,000
VIIbc	65	62	62	62
VIId	4,525	5,700	5,700	5,700
VIIe	197	230	230	230
VIIfg	1,050	840	840	840
VIIhjk	390	335	335	335
VIIIab	3,600	4,100	4,100	4,100
VIIIcde,IX,,X,CECAF	1,520	1,520	0	1,520
Sprat				
IIIa	46,250	46,250	46,250	46,250
IIIbcd (EC zone)	152,376	152,376	152,376	152,376
Iia,IV(part n/a)	238,000	238,000	238,000	238,000
VIIde	9,600	9,600	9,600	9,600
Horse Mackerel				
Iia(EU),IV(EU)	46,788	15,336	15,336	15,336
VI,VII, VIIIabde,XII,XIV,Vb(EU)	131,879	142,950	142,950	142,950
VIIIc,IX	55,000	25,000	25,000	25,000
X,CECAF	3,200	3,200	3,200	3,200
Turbot				
Iia(EU),IV	4,590	3,443	3,443	3,443
Lemon Sole and brill				
Iia(EU),IV	6,610	6,610	6,610	6,610
Dab and flounder				
Iia(EU),IV	18,401	18,401	18,401	18,401
Skates and rays				
Iia(EU),IV	3,297	3,297	3,297	3,297
Norway Pout				
Iia,IV(n/a)	173,000	0	0	173,000
Sand eel				
Iia,IV	902,200	173,900	173,900	173,900
Salmon (in number of fish)				
LIIbcd (EC zone). except sub-division 32 of IBSFC	346,918	346,918	346,918	346,918

1. As decided by the Council, Council Regulation (EC) No. 2287/2003 of 19. December 2003. The list of TAC/management areas in the table is not fully complete.

4. EIAA parameter sensitivity with regards to price and stock

Parameter sensitivity is an important issue in any model. In the case of fisheries bioeconomic modelling, the two key areas of uncertainty in future advice produced relate to changing prices of fish species as quantity changes and the changing nature of stocks. The EIAA model includes both of these factors. Accordingly, a sensitivity analysis has been conducted using data prepared for the advice produced for 2004. It should be noted that this analysis has been conducted with data from 'last year' for Danish fleet segments. The Danish fleet segmentation has been changed in 2004, but that will not influence the results. As it is the sensitivity of results that is under investigation, the change in year should not affect the conclusions regarding sensitivity of the EIAA model, assuming the situation for 'next year' remains relatively consistent. However, if catches were severely reduced (or increased) in line with quota change, then the analysis with respect to price flexibility in particular would be likely to be affected considerably.

The aim of this sensitivity analysis is to assess the robustness of the model to the results produced in relation to uncertainty in the parameters of price and stock used. For the year analysed (2004), the results are shown to be stable in response to these parameters.

4.1 Price flexibility sensitivity analysis

In the EIAA model, a standard price flexibility of 0.2 is assumed for all species. That is, for a 1% change in landings there can be expected to be a 0.2% change in price in response. For several of the main targeted species this is a modest assumption. In extreme situations, where for example a quota is reduced dramatically, then such a price flexibility could be considered unrealistic. In published studies that consider own price flexibilities of fish species, in the short run, the analyses suggest that flexibilities are typically in the range 0.1 to 0.4.

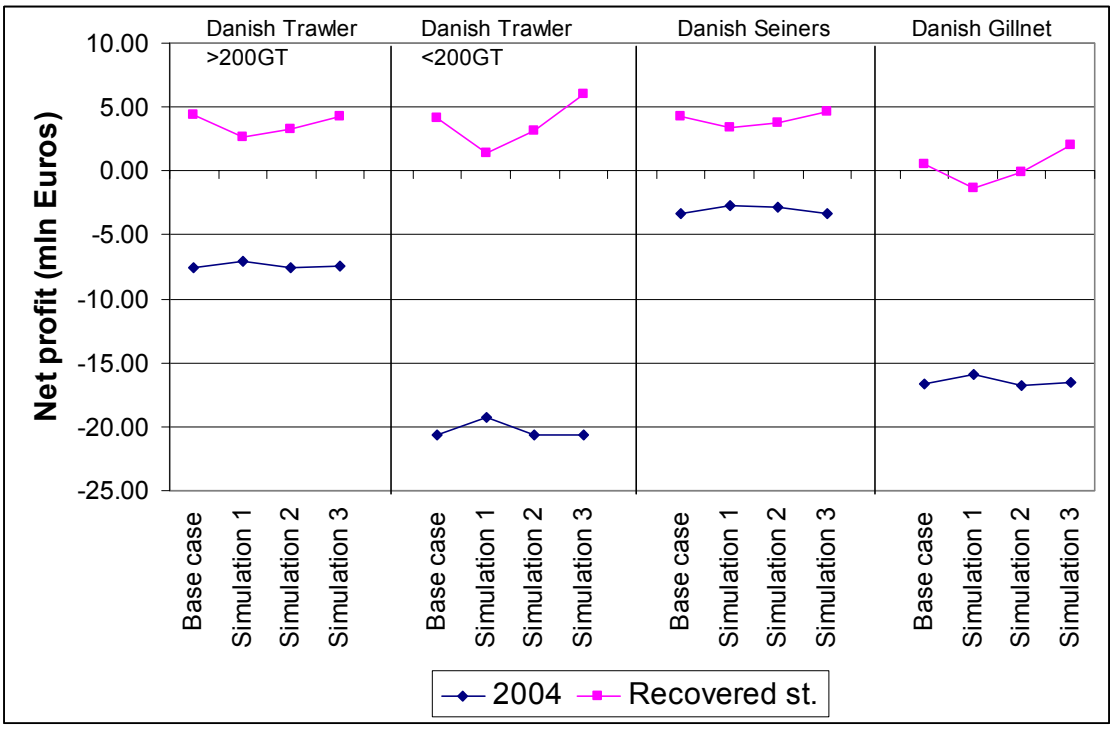
In order to estimate the effects of the price flexibility parameter given this, four simulations have been compared to the Base Case for data of selected Danish fleet segments projecting for 2004 and the situation of recovered stocks. The three cases are:

- Base case - All price flexibilities set equal to 0.2
- Simulation 1 - All price flexibilities set equal to 0.4
- Simulation 2 - All price flexibilities random in the range [0.1,0.4]
- Simulation 3 - All price flexibilities random in the range [0.2,0.4]

Indicative results for the effects of the price flexibility parameter on net profit are presented in Figure I.1. It can be seen that for the selected Danish fleets that the results of the short run projection (2004) are stable. For the most part, proposed TACs of these fleets are also relatively stable for this period. It is also evident that in the 2004 Base Case, with price flexibility 0.2, the results are slightly pessimistic over the simulations with on average higher price flexibilities. It should be noted that price flexibility also affects effort allocation in response to changing catch (quotas) and therefore costs and net profit. For the recovered situation projection, results are more uncertain. This would be expected in the long run case given such a modest price flexibility and the knowledge of the current status of many of the main targeted stocks. For all given fleets, a price

flexibility of 0.4 projects a decreasing net profit. However, where flexibilities are randomised by species (Simulations 3 and 4), the projected effects are also more uncertain.

Figure I.1. Sensitivity of results to changes in the price flexibility parameter for selected Danish fleet segments.



4.2 Stock flexibility sensitivity analysis

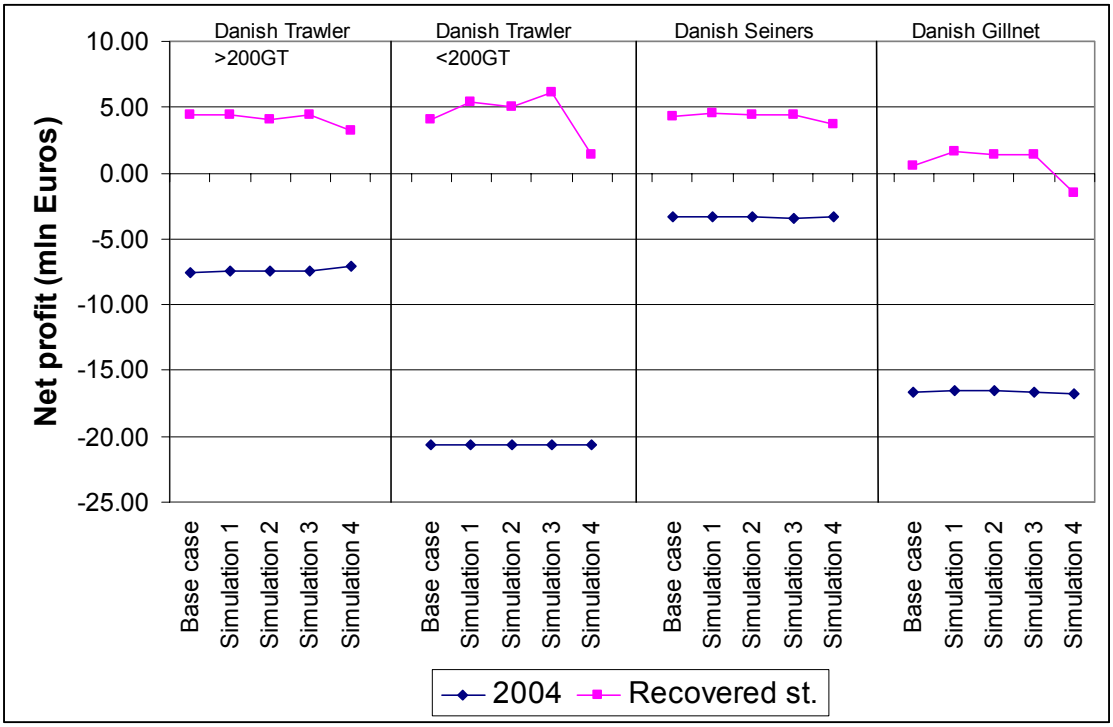
In the EIAA model, the stock flexibility of the relationship between stock and catch used is assumed to be 0.1 for pelagic species and 0.6 for demersal species. A value of zero would imply that no stock effect exists whilst a value of one implies full stock effect (i.e. analogous to a fish finding or schooling effect). A second flexibility parameter relating catch and effort is assumed to be equal to 1 for all species, implying a constant catch per unit effort that in the short run is an acceptable assumption. This second parameter is not evaluated here.

In order to estimate the effects of the stock-catch flexibility parameter given this, four simulations have been compared to the Base Case for data of selected Danish fleets projecting for 2004 and the situation of recovered stocks. The five cases are:

- Base case - flexibility: pelagics = 0.1; demersals = 0.6
- Simulation 1 - flexibility: pelagics = 0.25; demersals = 0.75
- Simulation 2 - random stock flexibility: pelagics [0.1,0.4]; demersals [0.6,0.9]
- Simulation 3 - random species' flexibility: pelagics [0.1,0.4]; demersals [0.6,0.9]
- Simulation 4 - random stock flexibility: all stocks in the range [0,1]

Indicative results for the effects of the stock-catch flexibility parameter on net profit are presented in Figure I.2. It can be seen that for the selected Danish fleets that the results of the short run projection (2004) are stable in all cases. Even in the case where this parameter is randomised between zero and one for all stocks (i.e. Simulation 4), the results for the 2004 cases are stable. In the long run, more variation would be expected in the results which is evident. However, Simulation 4 does not take account of any assumed relationship for the stock-catch flexibility parameter and certain species/stocks and can be regarded as an extreme case.

Figure I.2. Sensitivity of results to changes in the stock-catch flexibility parameter for selected Danish fleets.



II. ASSESSMENT OF THE ECONOMIC IMPACT OF PROPOSED 2005 TACs BY FLEET SEGMENTS

The economic consequences of the three scenarios described above are presented in this chapter. The chapter is organised in the following way. First summary results for the three scenarios are presented for all the included segments. The selected economic indicator is the operating profit margin defined as the net profit relative to the value of landings. Theoretically, net profit relative to the value of the invested capital would be a more appropriate measure, but because of the uncertainty about the estimated value of the invested capital it is concluded that this economic indicator is not so useful.

The net profit is defined as the value of landings minus all costs. If the net profit is negative the operating profit margin is negative. In the summary table the profit margin for the three scenarios for 2005 is related verbally to the profit margin for 2004 in the following way:

'Impact' = Impact of 2005 TAC on operating profit margin compared to 2004

- 'Worsened' = Segment was making losses, losses now greater
- 'Improved' = Segment was making losses, losses now smaller
- 'Lower' = Segment was making profits, profits now lower.
- 'Higher' = Segment was making profits, profits now higher
- ' – ' = No significant change.

The situation of the included segments of each country is the described by the characteristics of the segments followed by the the economic results of the three scenarios relative to the base line 2001-2003 and 2004. The results are presented in tables, and in the end of the chapter figures are included showing the short term projections and the long run projection with 'recovered' stocks.

SUMMARY. Economic impact of three scenarios for 2005

Segment	Single species		Mixed		Management plan	
	Operating Profit Margin	Impact	Operating Profit Margin	Impact	Operating Profit Margin	Impact
Belgium						
Beam trawlers ≥ 24m	**-0.9%**	L	**-18.9%**	L	**-0.3%**	L
Denmark						
Purse seiners and trawlers ≥ 40 m	**-2.4%**	L	**-2.4%**	L	**-2.4%**	L
Trawlers 24 - 40 m	**-36.5%**	W	**-46.5%**	W	**-38.9%**	W
Trawlers < 24 m	**-31.4%**	W	**-38.9%**	W	**-29.6%**	W
Danish Seiners	**-17.3%**	W	**-97.1%**	W	**-17.0%**	W
Gill Net	**-49.2%**	W	**-107.0%**	W	**-35.5%**	W
Finland						
Trawlers ≥ 24	**-16.5%**	W	**-16.5%**	W	**-16.5%**	W
Trawlers < 24	**-10.6%**	I	**-10.6%**	I	**-10.6%**	I
Netherlands						
Beam trawlers ≥ 24m	**1.1%**	L	**-266.9%**	L	**1.0%**	L
Beam trawlers < 24m	**2.3%**	L	**-26.4%**	L	**3.1%**	L

Sweden[1]						
Pelagic trawlers/purse seiners ≥ 24	**26.5%**	H	**26.5%**	H	**26.5%**	H
Shrimp trawlers	**24.8%**	-	**25.5%**	-	**24.9%**	-
Trawlers ≥ 24	**11.7%**	L	**-15.2%**	L	**8.0%**	L
Trawlers < 24	**2,8%**	L	**1,0%**	L	**8,0%**	L
Nephrop trawlers	**15.8%**	L	**20.0%**	H	**16.5%**	L
Gill netters ≥12	**15.7%**	L	**11.2%**	L	**18.5%**	L
UK						
Scottish Demersal Trawlers ≥ 24 m	**-6.4%**	W	**-97.0%**	W	**-15.7%**	W
Scottish Demersal Trawlers < 24 m	**-10.0%**	W	**-156.8%**	W	**-21.6%**	W
Scottish Seiners	**-17.1%**	W	**-299.9%**	W	**-37.7%**	W
Beam Trawl	**-34.9%**	-	**-78.6%**	W	**-39.8%**	W
Scottish Nephrops Trawlers	**5.9%**	-	**-459.4%**	W	**-1.6%**	W
Northern Ireland Nephrops Trawlers	**11.2%**	-	**-181.8%**	L	**5.3%**	L
SPAIN						
N and NW trawlers	**-9.6%**	W	**-26.5%**	W	**-10.7%**	W
300 fleet	**5.2%**	L	**-30.3%**	L	**6.5%**	L
Galician purse seiners	**-16.3%**	W	**-16.3%**	W	**-16.3%**	W

1. Swedish figures are gross cash flow in proportion to gross revenue

1. BELGIUM

1.1 Beam Trawl ≥ 24 m

Economic performance of the large beam trawlers was stable over the 2001 - 2003 period, though loss-making in 2002 and 2003. The main target species are sole and plaice from North Sea, Channel and Irish Sea. The deterioration resulting from the mixed fisheries scenario originates from the ban for sole, plaice and cod.

Belgium – Scenario Analysis – 2005

	2001-2003	2004	Single species	Mixed	Management plan
Beam Trawlers ≥ 24 m					
Operating profit margin	**0.8%**	**1.1%**	**-0.9%**	**-18.9%**	**-0.3%**
Performance	STABLE	STABLE	STABLE	UNPROFITABLE	STABLE
Value of landings	69.4	63.5	63.6	45.9	64.6
Crew share	20.7	19.0	19.0	13.7	19.3
Gross cash flow	13.3	13.4	12.2	4.1	12.5
Net profit	0.6	0.7	-0.6	-8.7	-0.2
Gross value added	34.0	32.4	31.2	17.8	31.8

2. DENMARK

2.1 Trawlers and Purse Seiners ≥ 40 m

Apart from the purse seiners and the large trawlers on 40 m and above all Danish fleet segments are unprofitable. The purse seine fleet and the trawlers target herring, mackerel, and fish for reduction. The deterioration in 2005 relative to the current situation originates from the lower quota on sand eel in all the three scenarios.

2.2 Trawlers 24 – 40 m

For trawlers between 24 and 40 m the much worse situation in 2005 is caused by the low quota on sandeel. This segment catches almost 50% of the total sandeel catches. Sandeel together with sprat and Norway pout constitutes almost half of the segment's landing value.

2.3 Trawlers < 24 m

For trawlers < 24 m the profitability in 2001-2003 and 2004 was low, and it is expected to become even worse in 2005 not least in the mixed fishery scenario. The reason is different from that of the larger trawlers. Nephrops, cod, sole, plaice, and turbot are important for this segment. Apart from turbot these quota are subject to large cuts not least in the mixed fishery scenario. The fleet is diverse but on average the economics assessment shows that the segment is not able to cover variable costs in any of the three scenarios. In that situation the fishery will stop even in the short run.

2.4 Danish Seine

The Danish seine fleet target mainly plaice and cod that constitute more than 60 % of the landing value. In the mixed fishery assessment scenario it is proposed to introduce a ban on cod and plaice in the North Sea, Skagerrak, and the Kattegat that obviously brings this fleet segment in a situation where the cash flow (gross revenue minus variable costs) is negative and the fishery will stop even in the short run.

2.5 Gill Netters

The gill net fleet is hit hardest. In the previous period the gross cash flow was close to zero and therefore no contribution to cover fixed costs was achieved. For 2005 the situation will become much worse. Cod, plaice, and sole are all very important species, and these species are in all scenarios subject to proposals about substantial reductions, in particular in the mixed fishery assessment scenario.

Denmark – Scenario Analysis – 2005

	2001-2003	2004	Single species	Mixed	Management plan
Trawlers and Purse Seiners ≥ 40 m					
Operating profit margin	**8.7%**	**9.1%**	**-2.4%**	**-2.4%**	**-2.4%**
Performance	PROFITABLE	PROFITABLE	STABLE	STABLE	STABLE
Value of landings	86.5	86.9	69.0	69.0	69.0
Crew share	25.2	25.3	20.1	20.1	20.1
Gross cash flow	27.8	28.2	18.6	18.6	18.6
Net profit	7.5	7.9	-1.7	-1.7	-1.7
Gross value added	44.2	53.5	38.7	38.7	38.7
Trawlers 24- 40 m					
Operating profit margin	**-5.4%**	**-5.7%**	**-36.5%**	**-46.5%**	**-38.9%**
Performance	UNPROFITABLE	UNPROFITABLE	UNPROFITABLE	UNPROFITABLE	UNPROFITABLE
Value of landings	112.1	110.8	66.6	59.0	64.6
Crew share	38.6	38.1	22.9	20.3	22.2
Gross cash flow	21.2	20.9	2.9	-0.2	2.1
Net profit	-6.0	-6.4	-24.3	-27.4	-25.2
Gross value added	59.8	59.0	25.8	20.1	24.3
Trawlers < 24 m					
Operating profit margin	**-10.7%**	**-22.0%**	**-31.4%**	**-38.9%**	**-29.6%**
Performance	UNPROFITABLE	UNPROFITABLE	UNPROFITABLE	UNPROFITABLE	UNPROFITABLE
Value of landings	104.1	86.0	72.3	63.8	74.8
Crew share	50.3	41.6	35.0	30.8	36.2
Gross cash flow	9.5	1.7	-2.0	-4.1	-1.4
Net profit	-11.1	-18.9	-22.7	-24.8	-22.1
Gross value added	59.9	43.3	33.0	26.7	34.7
Danish Seiners					
Operating profit margin	**-0.5%**	**-5.8%**	**-17.3%**	**-97.1%**	**-17.0%**
Performance	STABLE	UNPROFITABLE	UNPROFITABLE	UNPROFITABLE	UNPROFITABLE
Value of landings	24.5	21.5	16.6	6.7	16.6
Crew share	12.5	11.0	8.5	3.4	8.5
Gross cash flow	2.8	1.7	0.1	-3.6	0.1
Net profit	-0.1	-1.2	-2.9	-6.5	-2.8
Gross value added	15.3	12.7	8.6	-0.1	8.6
Gill Netters					
Operating profit margin	**-18.0%**	**-23.5%**	**-49.2%**	**-107.0%**	**-35.5%**
Performance	UNPROFITABLE	UNPROFITABLE	UNPROFITABLE	UNPROFITABLE	UNPROFITABLE
Value of landings	57.1	49.6	31.8	18.0	39.4
Crew share	36.2	31.5	20.1	11.4	25.0
Gross cash flow	1.0	-0.4	-4.3	-8.0	-2.7
Net profit	-10.3	-11.7	-15.6	-19.3	-14.0
Gross value added	37.1	31.1	15.8	3.4	22.2

3. FINLAND

3.1 Trawlers ≥ 24 meters

Vessels in this segment show the same pattern as is the case of trawlers < 24 m. They mainly catch herring. The scenarios show a minor overall reduction in the operating profit margin compared to 2004, but a significant drop from the base period. This is related to herring being was less important in the base period. The performance was stable in period 2001-2003, but unprofitable in 2004 and the three scenarios.

3.2 Trawlers < 24 meters

In 2003 the distribution of the total landing value on the four segments was: trawlers < 24 m accounted for about 27%, trawlers > 24 m 36%, gill netters 7% and coastal vessels 30%. The trawlers < 24 m primarily target herring. In 2003 the herring fishery accounted for more than 80% of total landing value. Compared to the TACs in 2004 the quotas on herring have increased slightly in the three scenarios, which show on the results. The overall performance is unprofitable and worsened compared to the base period 2001-2003.

Finland – Scenario Analysis – 2005

	2001-2003	2004	Single species	Mixed	Management plan
Trawlers ≥ 24					
Operating profit margin	**-3.9%**	**-15.1%**	**-16.5%**	**-16.5%**	**-16.5%**
Performance	STABLE	UNPROFITABLE	UNPROFITABLE	UNPROFITABLE	UNPROFITABLE
Value of landings	8.5	7.1	6.9	6.9	6.9
Crew share	3.2	2.7	2.6	2.6	2.6
Gross cash flow	1.4	0.5	0.5	0.5	0.5
Net profit	-0.3	-1.1	-1.1	-1.1	-1.1
Gross value added	4.5	3.2	3.1	3.1	3.1
Trawlers < 24					
Operating profit margin	**-5.7%**	**-12.5%**	**-10.6%**	**-10.6%**	**-10.6%**
Performance	UNPROFITABLE	UNPROFITABLE	UNPROFITABLE	UNPROFITABLE	UNPROFITABLE
Value of landings	5.9	5.4	5.5	5.5	5.5
Crew share	2.3	2.1	2.2	2.2	2.2
Gross cash flow	1.0	0.7	0.8	0.8	0.8
Net profit	-0.3	-0.7	-0.6	-0.6	-0.6
Gross value added	3.2	2.8	2.9	2.9	2.9

4. NETHERLANDS

4.1 Beam Trawlers ≥ 24m

Economic performance of the large beam trawlers was stable over the 2001 - 2003 period, though loss-making in 2002 and 2003. The main target species are North Sea sole and plaice. The deterioration following from the mixed fisheries scenario originates from the ban for North Sea sole and plaice. The moderate result of the Management plan results from a lower North Sea plaice TAC.

4.2 Beam Trawlers < 24 m

Economic performance of the e*urocutters* was stable over the 2001 - 2003 period. The main target species are shrimp and sole from the North Sea. The deterioration resulting from the mixed fisheries scenario originates from the ban for North Sea sole.

Netherlands – Scenario Analysis – 2005

	2001-2003	2004	Single species	Mixed	Management plan
Beam Trawlers ≥ 24 m					
Operating profit margin	**-0.1%**	**2.3%**	**1.1%**	**-266.9%**	**1.0%**
Performance	STABLE	STABLE	STABLE	UNPROFITABLE	STABLE
Value of landings	191.0	180.7	180.7	39.4	170.0
Crew share	49.4	46.7	46.7	10.2	44.0
Gross cash flow	33.8	38.2	36.0	-71.1	35.7
Net profit	-0.3	4.2	2.0	-105.1	1.7
Gross value added	83.2	85.0	82.8	-60.9	79.7
Beam Trawlers < 24 m					
Operating profit margin	**2.9%**	**3.3%**	**2.3%**	**-26.4%**	**3.1%**
Performance	STABLE	STABLE	STABLE	UNPROFITABLE	STABLE
Value of landings	61.5	60.1	58.7	40.8	60.0
Crew share	23.5	23.0	22.4	15.6	22.9
Gross cash flow	11.8	12.0	11.4	-0.7	11.9
Net profit	1.8	2.0	1.3	-10.8	1.9
Gross value added	35.1	35.0	33.8	14.8	34.8

5. SWEDEN

5.1 Pelagic Trawlers and Purse Seiners ≥ 24

In 2003 there were 55 pelagic trawlers in this segment. They comprised only 3% of the Swedish fleet by numbers, but accounted for close to 50% of total gross tonnage and 30% of the engine power. The segment provided work for 330 men at sea, which is 14% of the total employment in the Swedish marine fishing fleet. The segment contributed to almost 85% of total volume of landings and 44% of value in 2003. The value of landings reached € 41 mln in 2003, which was 23 % lower than the year before.

5.2 Shrimp Trawlers

In 2003 the segment comprised 60 vessels with a total capacity of 4.7 thousand GT and 18.4 thousand kW. The segment provided work for 150 men at sea. The fishery mainly targets northern prawn (*pandalus borealis*), but catches also include *nephrops* and cod. Northern prawn constituted 82% of total revenue in 2003. The value of landings reached € 10.9 mln in 2003, which was a reduction by 10% compared to the previous year. The main reason for the decline in revenues was lower price of northern prawn, which was a reflection of the international shellfish market and increased imports of on-board cooked northern prawn from Norway. Gross cash flow was reduced by 50% and only amounted to € 1.4 mln in 2003.

5.3 Trawlers ≥ 24 m

In 2003 there were 16 vessels in this segment with a total capacity of 3.3 thousand GT and 9.8 thousand kW. The segment provided work for 64 men at sea. The most important species is cod representing 61% of total volume and 72% of total value. Other important species are saithe and haddock. In 2003, value of landings reached € 6 mln, which was a decrease by more than 30% compared to the year before, which was due to a reduction in number of vessels and falling price of cod (-13%). The lower value of landings was also reflected in gross cash flow in 2003, amounting to € 0.9 mln, a decrease by more than 50% compared to 2002.

5.4 Trawlers < 24 m

In 2003 there were 73 vessels in the segment with a total capacity of 4.2 thousand GT and 19.9 thousand kW. The segment provided work for 182 men at sea. The most important species is cod representing 74% of total volume and 65% of landed value. Other species are nephrops, saithe and haddock. Total value of landings reached € 11 mln. Despite increased numbers of vessels total value of landings fell by 11% to € 11 mln in 2003 due to lower price of cod (-13%) and *nephrops* (-20%). Gross cash flow per vessel went down by close to 60% compared to the year before.

5.5 Nephrops Trawlers

In 2003 there were 90 vessels in this segment and total capacity was thousand GT and 20 thousand kW. The segment provided work for approximately 180 men at sea. The main species is *nephrops* accounting for 35% of total volume and 64% of total revenue. The second most important species is cod representing 31% of landings. The total value of landings fell by more than 20% compared to the year before and only reached € 6.1 mln in 2003. The fall in revenue was due to lower volume of landings and a sharp fall of the price for *nephrops* (-20%). The value of landings has been decreasing sharply during the last years.

5.6 Gill Netters ≥ 12 m

In 2003 there were 49 vessels in this segment with a total capacity of 1.3 thousand GT and 7.8 thousand kW. The segment provided work for approx. 100 men at sea. The fishing is mainly directed towards cod, constituting 75% of the total catch and revenue. Other species are turbot, salmon and herring. In 2003 total value of landings reached € 3.8 mln. Gross cash flow per vessel fell by more than 30% compared to the previous year, mainly due to higher costs.

5.7 Gill Netters < 12 m

In 2003 there were 279 vessels in this segment with a total capacity of 2.0 thousand GT and 18.8 thousand kW. The segment provided work, in various degrees, for approx. 350 men at sea. The fishing is mainly directed towards cod, constituting 96% of the total catch and revenue. Despite a fall of the price of cod by 13%, total value of landings only fell marginally to € 6.5 mln in 2003. Higher volume of landings offset the lower price.

In the subsequent Swedish table fixed costs are disregarded. Therefore ‘net profit’ is equal to ‘gross cash flow’ and ‘operating profit margin’ is equal to ‘gross cash flow/gross revenue’. The figures of ‘net profit’ and ‘gross profit margin’ are therefore not comparable to the segments of the other countries.

Sweden – Scenario Analysis – 2005

	2001-2003	2004	Single species	Mixed	Management plan
Pelagic Trawlers and Purse Seiners ≥ 24m					
Operating profit margin	**29.6%**	**24.8%**	**26.5%**	**26.5%**	**26.5%**
Performance	PROFITABLE	PROFITABLE	PROFITABLE	PROFITABLE	PROFITABLE
Value of landings	52.0	44.1	47.9	47.9	47.9
Crew share	11.8	10.0	10.9	10.9	10.9
Gross cash flow	15.4	11.0	12.7	12.7	12.7
Net profit	15.4	11.0	12.7	12.7	12.7
Gross value added	27.2	21.0	23.6	23.6	23.6
Shrimp Trawlers					
Operating profit margin	**25.8%**	**25.3%**	**24.8%**	**25.5%**	**24.9%**
Performance	PROFITABLE	PROFITABLE	PROFITABLE	PROFITABLE	PROFITABLE
Value of landings	11.6	11.0	10.7	11.2	10.8
Crew share	3.1	2.9	2.9	3.0	2.9
Gross cash flow	3.0	2.8	2.7	2.9	2.7
Net profit	3.0	2.8	2.7	2.9	2.7
Gross value added	6.1	5.7	5.5	5.8	5.6
Trawlers ≥ 24					
Operating profit margin	**24.4%**	**25.1%**	**11.7%**	**-15.2%**	**8.0%**
Performance	PROFITABLE	PROFITABLE	PROFITABLE	UNPROFITABLE	PROFITABLE
Value of landings	9.2	8.6	5.3	3.3	4.9
Crew share	2.7	2.5	1.6	1.0	1.4
Gross cash flow	2.2	2.2	0.6	-0.5	0.4
Net profit	2.2	2.2	0.6	-0.5	0.4
Gross value added	4.9	4.7	2.2	0.5	1.8
Trawlers < 24					
Operating profit margin	**22,1%**	**21,3%**	**2,8%**	**1,0%**	**8,0%**
Performance	PROFITABLE	PROFITABLE	STABLE	STABLE	PROFITABLE
Value of landings	12,1	11,0	6,9	6,8	7,7
Crew share	3,1	2,8	1,8	1,7	2,0
Gross cash flow	2,7	2,4	0,2	0,1	0,6
Net profit	2,7	2,4	0,2	0,1	0,6
Gross value added	5,7	5,2	2,0	1,8	2,6
Nephrops Trawlers					
Operating profit margin	**17.6%**	**17.3%**	**15.8%**	**20.0%**	**16.5%**
Performance	PROFITABLE	PROFITABLE	PROFITABLE	PROFITABLE	PROFITABLE
Value of landings	8.3	8.3	7.6	10.2	8.0
Crew share	2.6	2.6	2.4	3.2	2.5
Gross cash flow	1.5	1.4	1.2	2.0	1.3
Net profit	1.5	1.4	1.2	2.0	1.3
Gross value added	4.0	4.0	3.6	5.2	3.8
Gill Netters ≥ 12m					
Operating profit margin	**26.3%**	**26.5%**	**15.7%**	**11.2%**	**18.5%**
Performance	PROFITABLE	PROFITABLE	PROFITABLE	PROFITABLE	PROFITABLE
Value of landings	3.8	3.4	1.9	1.6	2.1
Crew share	1.4	1.3	0.7	0.6	0.8
Gross cash flow	1.0	0.9	0.3	0.2	0.4
Net profit	1.0	0.9	0.3	0.2	0.4
Gross value added	2.4	2.2	1.0	0.8	1.2

6. UNITED KINGDOM

The economic position for the UK fleet in 2004 and beyond is mixed. Following decommissioning in 2003, the remaining whitefish vessels have reported an upturn in volumes of the main species along with reasonable prices in 2004. Although earnings are expected to increase, quota leasing costs and an increase in fuel prices is forecast to reduce net profit in 2004. The shellfish sector is reporting a similar year to 2003, although the nephrops fleet is expected to fair better than last year. A healthy economic position for the pelagic sector has continued into 2005. The summer herring fishery found good quantities of fish on the grounds (although prices were disappointing). Good catch rates and good prices are reported for the mackerel fishery which is currently underway. Healthy stocks and ongoing vessel modernisation points to a positive future.

6.1 Scottish Demersal Trawlers ≥ 24m

In 2003 this segment consisted of 76 vessels, which represents a fall of 23.2% from 2002. Around a dozen vessels target the deepwater fishery to the west of Scotland. Over 20 vessels from this segment were decommissioned in 2003. This segment targets the main whitefish species of haddock, cod, whiting, and monkfish. Although reporting a stable average economic performance from 2001-2003, net profit fell by 22%, and revenues by 40% over this period. An increase in key whitefish species on the main fishing grounds, combined with reasonable quayside prices is expected to increase average vessel revenue by 30% from 2003 to 2004. Net losses are however expected to deteriorate to a margin of -4.0% in 2004, due to quota leasing costs and an increase in fuel prices.

The deterioration in 2005 relative to the current situation is due to the proposed cuts in quotas for the main whitefish species in all the three scenarios. Only the single species scenario provides a positive gross cash flow (gross revenue minus variable costs). The management plan scenario results in a net operating loss of 21.6%.

6.2 Scottish Demersal Trawlers < 24m

There were 165 vessels in this segment in 2003, a 25% reduction from 2001. This is due to decommissioning and vessels diversifying into the nephrops fishery. These vessels target haddock, cod, whiting, monkfish, and nephrops. Stock recovery measures and decommissioning, have resulted in a fall in the volume of landings of the main whitefish species between 1998 and 2004. An increase in quota leasing costs, and relatively high fuel and insurance costs have had an impact on vessel profitability. Reported improvements in stocks and reasonable quayside prices are expected to increase average vessel revenue from 2003 to 2004. Increasing running costs are expected to result in a worsening profit margin of -7.3% in 2004.

The deterioration in 2005 relative to the current situation is due to the proposed severe cuts in quotas for the main target whitefish species across all the three scenarios. Gross cash flow is negative for all three scenarios. A net operating loss of -10% and -21.6% is forecast for the single species and management plan scenarios respectively.

6.3 Scottish Demersal Seiners

There were 36 vessels in this segment in 2003, a 55% fall in vessel numbers from 2001. These vessels target the main whitefish species of haddock, cod, and whiting. Haddock was the most important species in 2003 accounting for over 50% of volume landed. Average vessel revenues are expected to increase from 2003 to 2004, although due to a cut in vessel numbers, total segment revenues are expected to fall by 12%. Like other whitefish sectors, quota leasing costs, and an increase in fuel prices, are expected to result in an unprofitable position in 2004.

For 2005 the situation is forecast to become much worse. The target species are all subject to proposals about substantial reduction in all scenarios, and in particular in the mixed fishery assessment scenario. A negative gross cash flow position and net operating loss is forecast for al three scenarios.

6.4 UK Beam Trawlers

The 110 UK beam trawlers (mainly operating in south west England) target high value flatfish species such as plaice, common sole, lemon sole, with monkfish, cod, scallops, and cuttlefish making an increasingly important contribution to vessel earnings. Despite reports of good quantities of fish on the main grounds, low quotas for sole and monkfish are restricting landings in 2004. Inconsistent prices, combined with increasing running costs will have a negative impact on vessel viability. This segment was unprofitable from 2001-2003, and into 2004.

For 2005 the situation is expected to deteriorate. Target species are subject to proposed reductions in all scenarios, and in particular in the mixed fishery scenario. A negative gross cash flow position and net operating loss is forecast for all three scenarios

6.5 Scottish Nephrops Trawlers

Although constraints on nephrops quota (due to the link with cod) have restricted fishing opportunities, this segments performance has been stable for some years. Nephrops comprised 85% of the total revenue in 2003 of the 296 trawlers in this segment. Revenues are expected to increase (driven by an increase in both the volume and price of tails) between 2003 and 2004. The single stock and management plan scenario is expected to produce an operating profit margin of 5.9% and -1.6% respectively.

6.6 Northern Ireland Nephrops Trawlers

The 103 remaining Northern Irish nephrops trawlers target nephrops (which comprised almost 80% of vessel revenue in 2003), with a scallops and a small whitefish by-catch. Although constraints on nephrops quota (due to the link with cod) have restricted fishing opportunities, this segment's performance has been profitable for some years. Revenues are expected to increase between 2003 and 2004. This is mainly due to an increase in the volume of tails landed and price achieved on the Northern Ireland markets in 2004. The single stock and management plan scenario produce a positive gross cash flow and healthy operating profit margin of 11.2% and 5.3% respectively.

UK – Scenario Analysis – 2005

	2001-2003	2004	Single species	Mixed	Management plan
Scottish Demersal Trawlers ≥ 24m					
Operating profit margin	**-3.1%**	**-4.0%**	**-6.4%**	**-97.0%**	**-15.7%**
Performance	STABLE	STABLE	UNPROFIT.	UNPROFIT.	UNPROFIT.
Value of landings	102.5	97.8	92.2	40.4	77.9
Crew share	29.1	27.8	26.2	11.5	22.2
Gross cash flow	5.9	5.1	3.2	-30.1	-3.1
Net profit	-3.2	-4.0	-5.9	-39.2	-12.2
Gross value added	35.0	32.9	29.4	-18.6	19.0
Scottish Demersal Trawlers < 24m					
Operating profit margin	**-6.3%**	**-7.3%**	**-10.0%**	**-156.8%**	**-21.6%**
Performance	UNPROFITABLE	UNPROFITABLE	UNPROFITABLE	UNPROFITABLE	UNPROFITABLE
Value of landings	78.0	74.9	70.6	23.0	57.9
Crew share	23.0	22.1	20.8	6.8	17.1
Gross cash flow	5.0	4.5	2.9	-26.0	-2.5
Net profit	-4.9	-5.5	-7.1	-36.0	-12.5
Gross value added	28.0	26.5	23.7	-19.3	14.5
Scottish Demersal Seiners					
Operating profit margin	**-4.4%**	**-11.2%**	**-17.1%**	**-299.9%**	**-37.7%**
Performance	STABLE	UNPROFITABLE	UNPROFITABLE	UNPROFITABLE	UNPROFITABLE
Value of landings	35.5	31.3	27.9	5.6	20.6
Crew share	10.6	9.3	8.3	1.7	6.1
Gross cash flow	2.8	0.8	-0.5	-12.4	-3.5
Net profit	-1.5	-3.5	-4.8	-16.7	-7.8
Gross value added	13.3	10.1	7.9	-10.8	2.7
United Kingdom, Beam Trawlers					
Operating profit margin	**-20.1%**	**-35.3%**	**-34.9%**	**-78.6%**	**-39.8%**
Performance	UNPROFITABLE	UNPROFITABLE	UNPROFITABLE	UNPROFITABLE	UNPROFITABLE
Value of landings	88.8	73.0	74.4	47.4	68.5
Crew share	24.0	19.7	20.1	12.8	18.5
Gross cash flow	-7.5	-15.4	-15.5	-26.8	-16.9
Net profit	-17.9	-25.8	-26.0	-37.2	-27.3
Gross value added	16.5	4.3	4.5	-14.0	1.6
Scottish Nephrops Trawlers					
Operating profit margin	**5.0%**	**6.0%**	**5.9%**	**-459.4%**	**-1.6%**
Performance	STABLE	PROFITABLE	PROFITABLE	UNPROFITABLE	STABLE
Value of landings	78.8	81.7	81.4	8.7	65.7
Crew share	27.0	28.0	27.9	3.0	22.5
Gross cash flow	10.2	11.2	11.1	-33.8	5.3
Net profit	3.9	4.9	4.8	-40.1	-1.0
Gross value added	37.2	39.2	39.0	-30.8	27.8
Northern Ireland Nephrops Trawlers					
Operating profit margin	**10.1%**	**11.3%**	**11.2%**	**-181.8%**	**5.3%**
Performance	PROFITABLE	PROFITABLE	PROFITABLE	UNPROFITABLE	PROFITABLE
Value of landings	23.1	24.1	24.1	4.9	19.9
Crew share	8.8	9.2	9.1	1.9	7.6
Gross cash flow	4.7	5.1	5.0	-6.6	3.4
Net profit	2.3	2.7	2.7	-8.9	1.1
Gross value added	13.4	14.2	14.2	-4.7	11.0

7. SPAIN

7.1 N and NW Trawlers

This is one of the most important fleets among those operating on the Spanish Atlantic continental shelf. The standard vessel has around 202 GT and 343 kW, is close to 28 m long, and has 9 crew members. The main target species are hake, megrim, anglerfish, nephrops and horse mackerel (60% of value and 51 % of total landings in 2003). This fleet is very dependent on the hake southern stock catches. The ACFM advice on this stock, recommending 0 catches for 2005, will cause a strong deterioration in the economic performance of this fleet.

7.2 300 Fleet

The 300 fleet represents the most important segment of the Spanish fleet fishing in the EU waters. The standard vessel has around 285 GT and 505 kW, has 13 crew members. The main target species are hake, megrim, anglerfish, and nephrops (around 65% of value and 51 % of total landings in 2003). The mixed scenario would imply the worst economic performance to this segment, involving a substantial reduction in the gross value added.

7.3 Galician Purse Seiners

The Galician purse seiners represent the most traditional segment of NW Spanish fishing fleet. A typical Galician purse seiner is about 17 m long, powered by an engine of 170 kW, with a capacity of 31 GT and an average crew of 8 members. The main target species are sardine and horse mackerel (around 54% of value and 63% of landings in 2003). The activity of this fleet was affected severely by Prestige oil spill in 2003. The higher depreciation and interest rates caused a fall in the average net profit per vessel.

Spain – Scenario Analysis – 2005

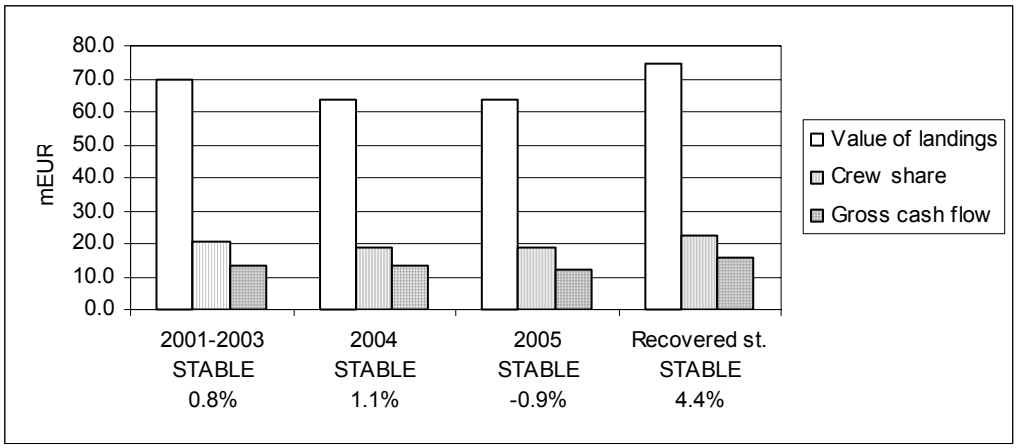
	2001-2003	2004	Single species	Mixed	Management plan
N and NW Trawlers					
Operating profit margin	**1.5%**	**-6.3%**	**-9.6%**	**-26.5%**	**-10.7%**
Performance	STABLE	UNPROFITABLE	UNPROFITABLE	UNPROFITABLE	UNPROFITABLE
Value of landings	65.7	54,6	51.2	41.2	50.5
Crew share	23.0	19.1	17.9	14.5	17.7
Gross cash flow	15.3	10.9	9.4	3.4	8.9
Net profit	1.0	-3.4	-4.9	-10.9	-5.4
Gross value added	38.4	30.0	27.3	17.8	26.6
300 Fleet					
Operating profit margin	**6.9%**	**8.5%**	**5.2%**	**-30.3%**	**6.5%**
Performance	PROFITABLE	PROFITABLE	PROFITABLE	UNPROFITABLE	PROFITABLE
Value of landings	198.4	206.9	179.1	99.8	194.4
Crew share	86.4	90.0	78.0	43.4	84.6
Gross cash flow	40.4	44.3	36.0	-3.5	39.3
Net profit	13.7	17.5	9.3	-30.2	12.6
Gross value added	126.8	134.3	114.0	39.9	123.9
Galician Purse Seiners					
Operating profit margin	**-10.7%**	**-12.0%**	**-16.3%**	**-16.3%**	**-16.3%**
Performance	UNPROFITABLE	UNPROFITABLE	UNPROFITABLE	UNPROFITABLE	UNPROFITABLE
Value of landings	31.9	30.8	28.3	28.3	28.3
Crew share	17.9	17.3	15.9	15.9	15.9
Gross cash flow	4.9	4.6	3.7	3.7	3.7
Net profit	-3.4	-3.7	-4.6	-4.6	-4.6
Gross value added	22.9	21.9	19.6	19.6	19.6

FIGURES

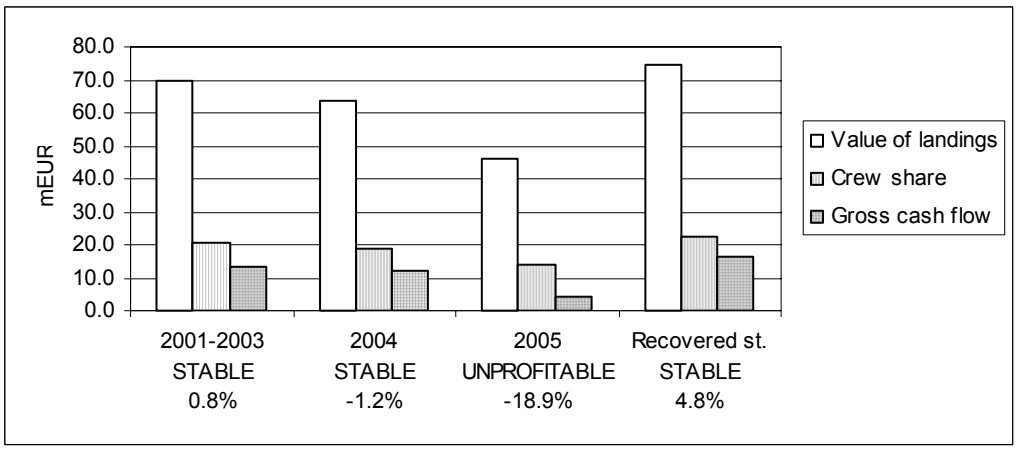
1. Belgium

Beam Trawlers ≥ 24 m

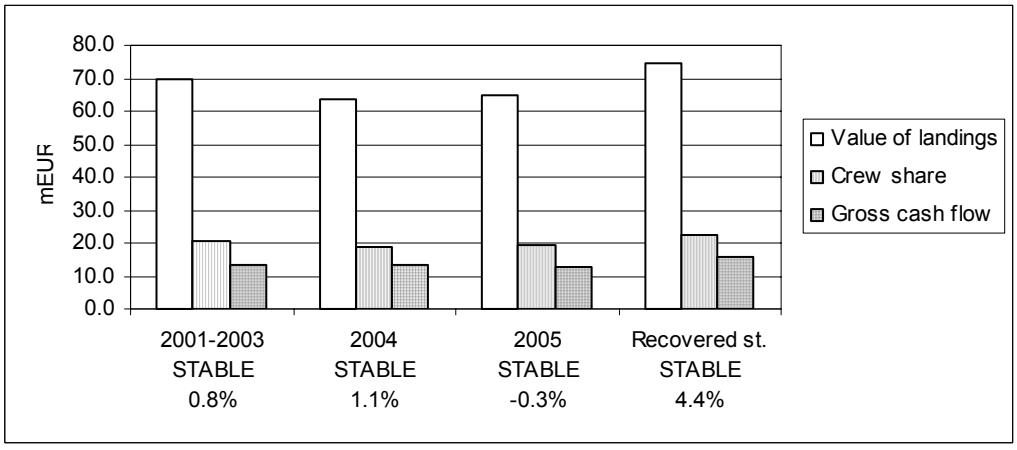
Single species assessment



Mixed fisheries assessment



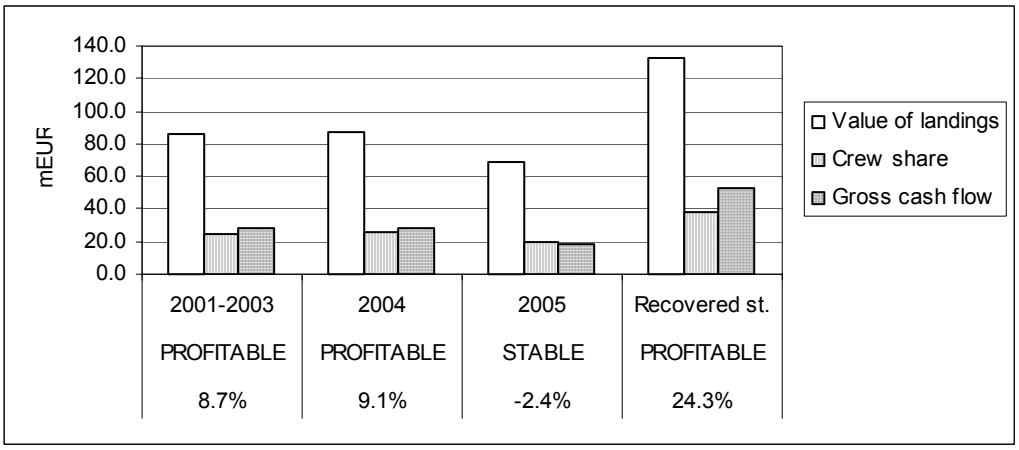
Management plan assessment



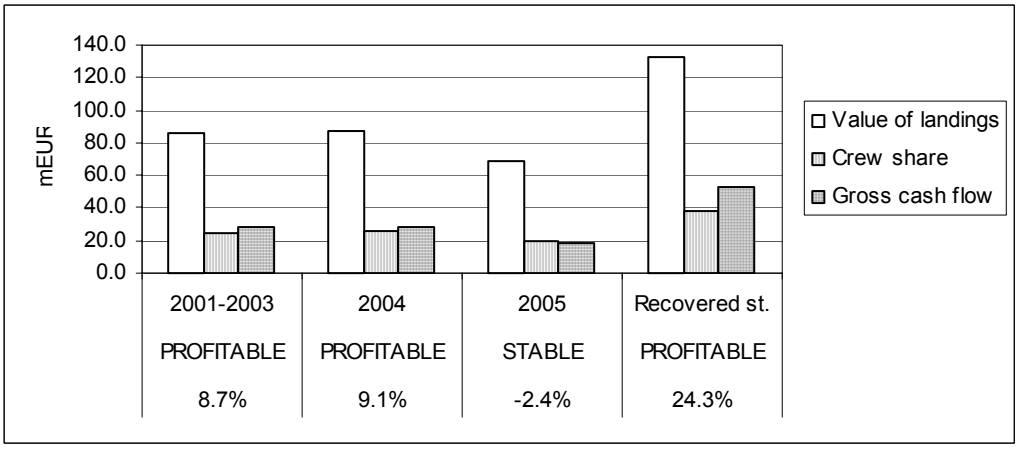
2. Denmark

Trawlers and Purse Seiners ≥ 40 m

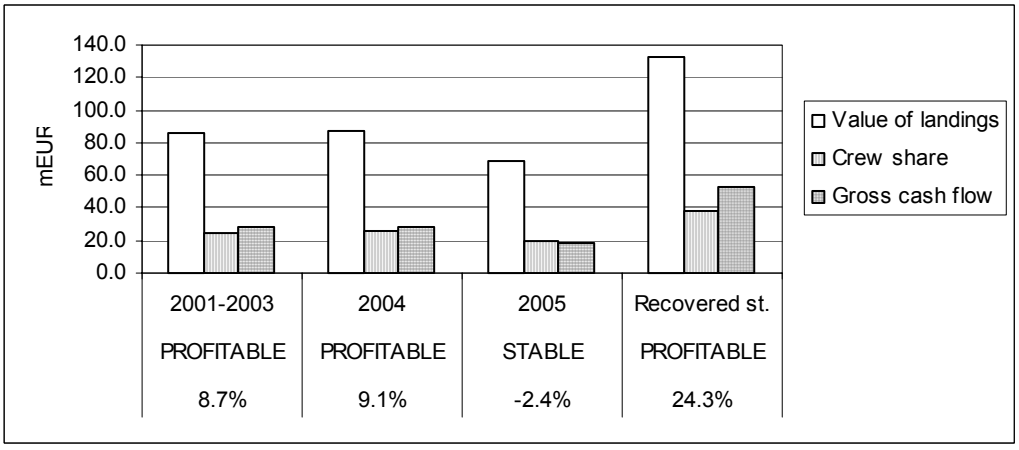
Single species assessment



Mixed fisheries assessment

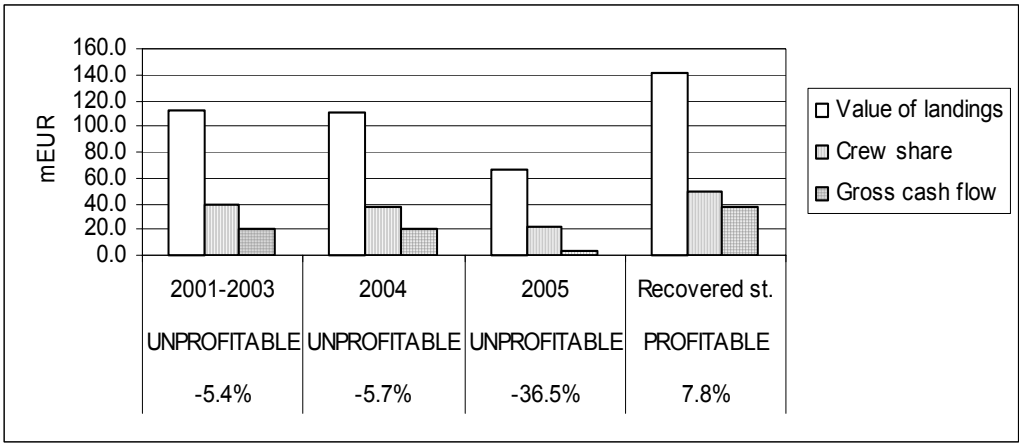


Management plan assessment

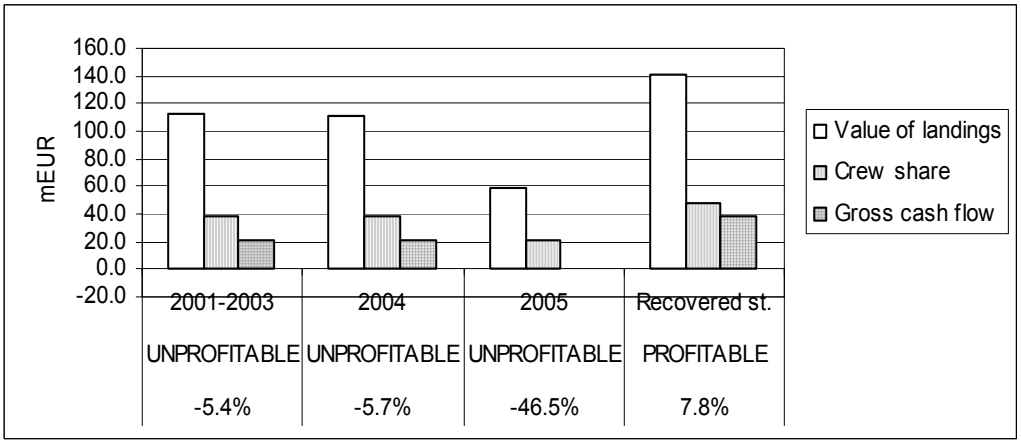


Trawlers 24 – 40 m

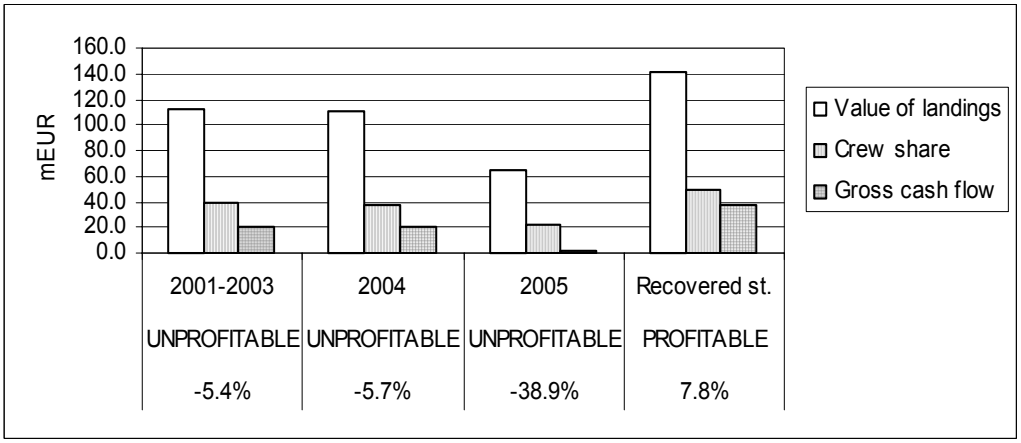
Single species assessment



Mixed fisheries assessment

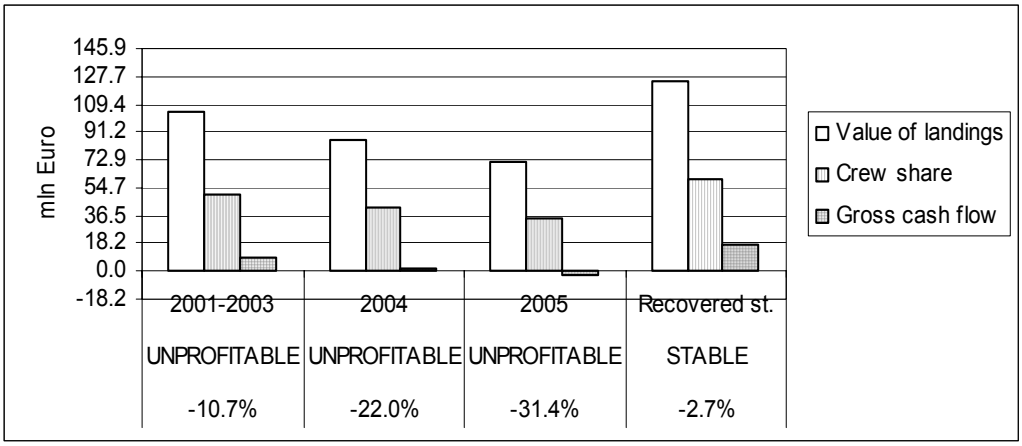


Management plan assessment

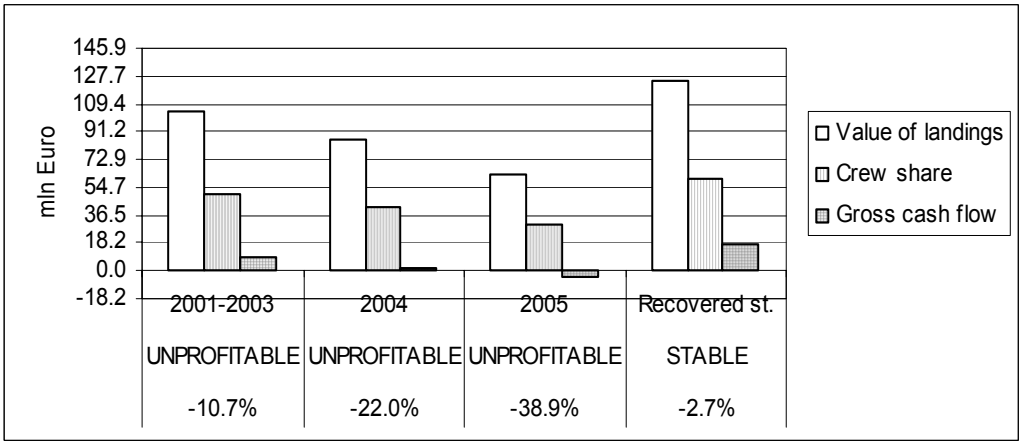


Trawlers < 24 m

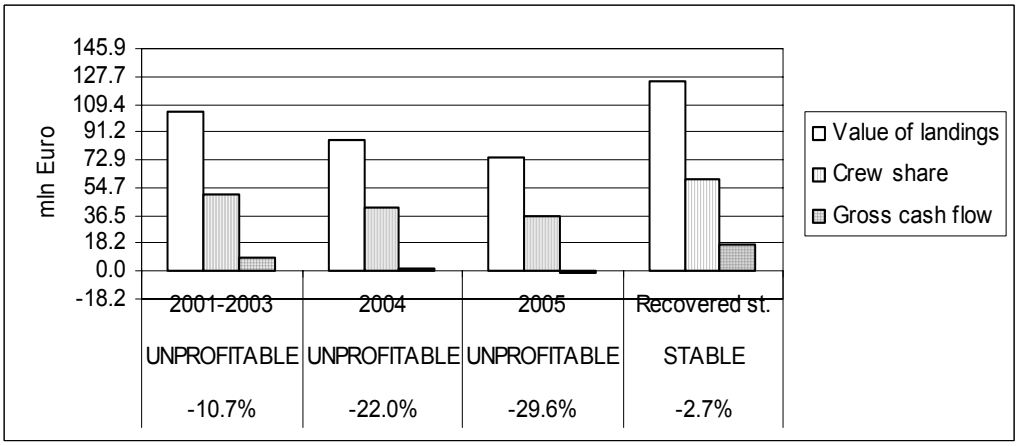
Single species assessment



Mixed fisheries assessment

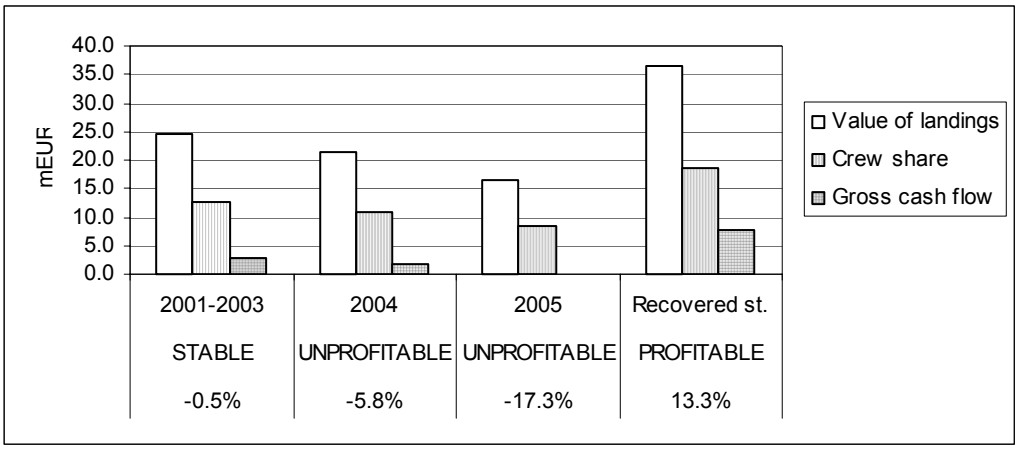


Management plan assessment

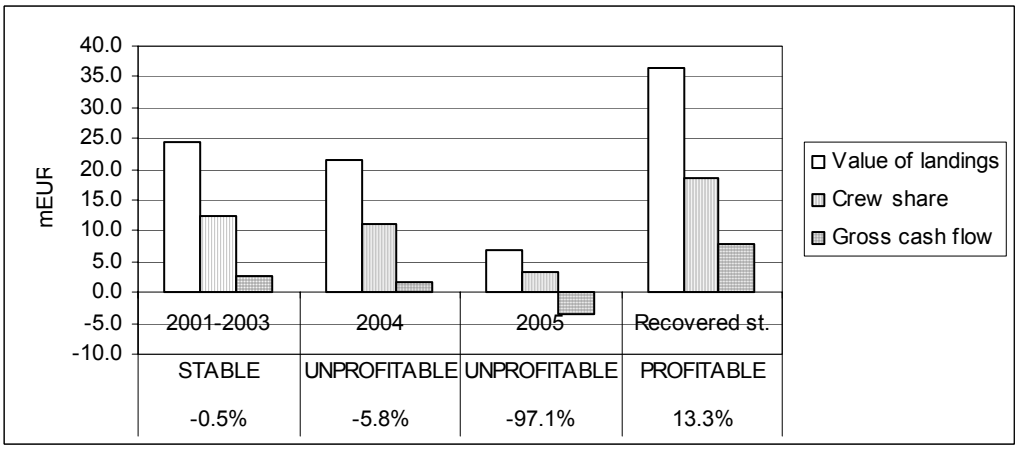


Danish Seiners

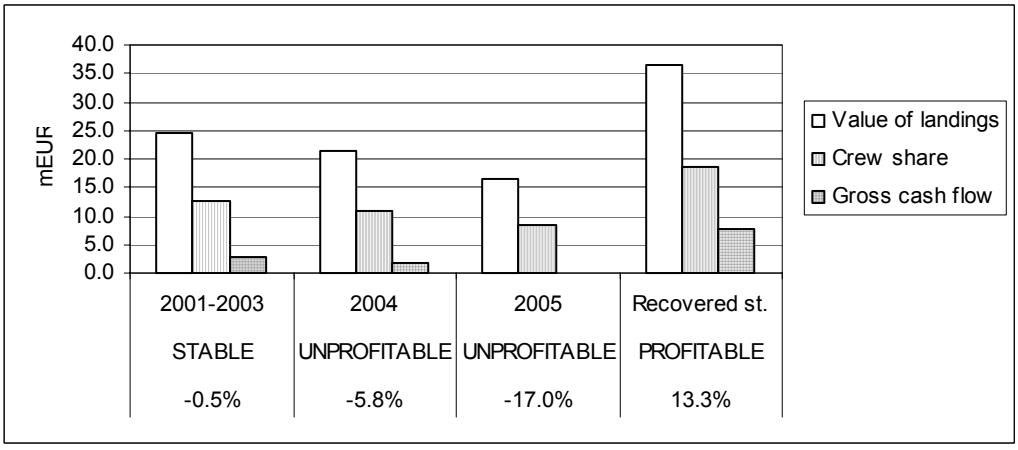
Single species assessment



Mixed fisheries assessment

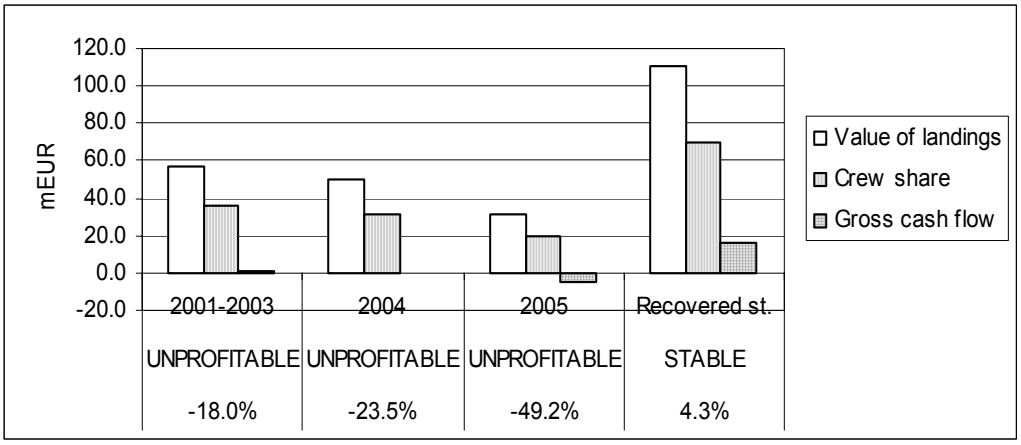


Management plan assessment

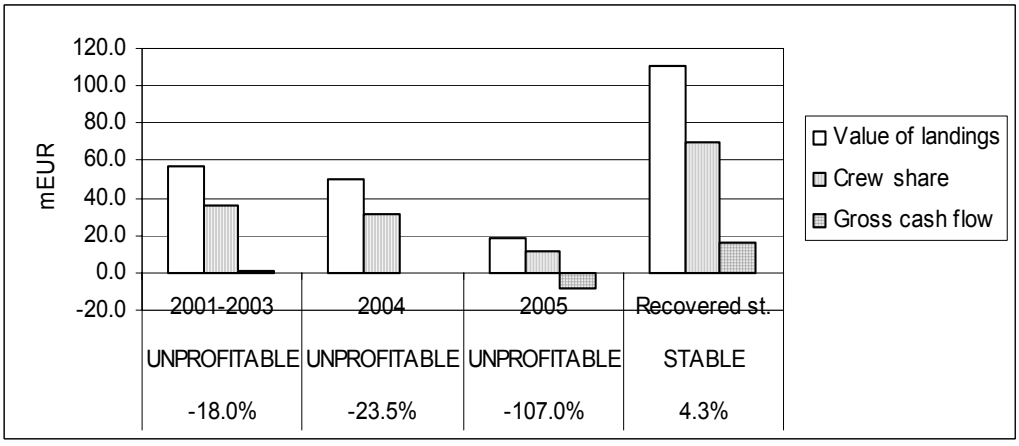


Gill Netters

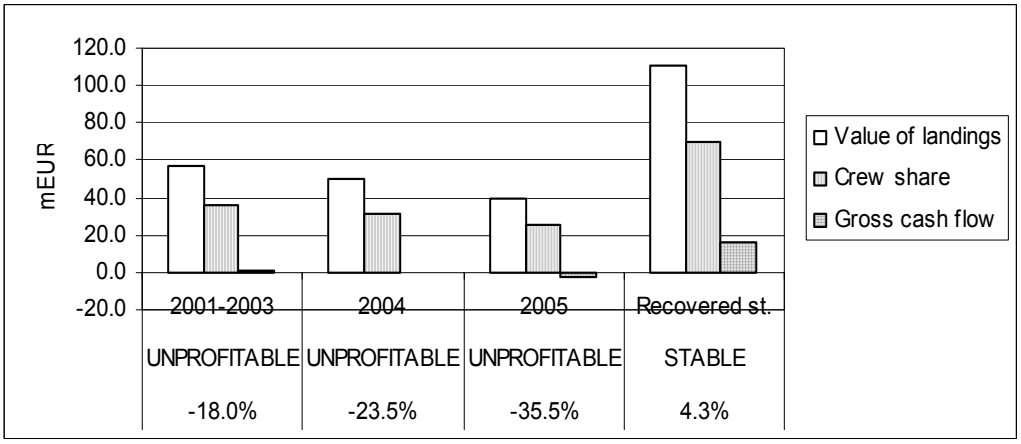
Single species assessment



Mixed fisheries assessment



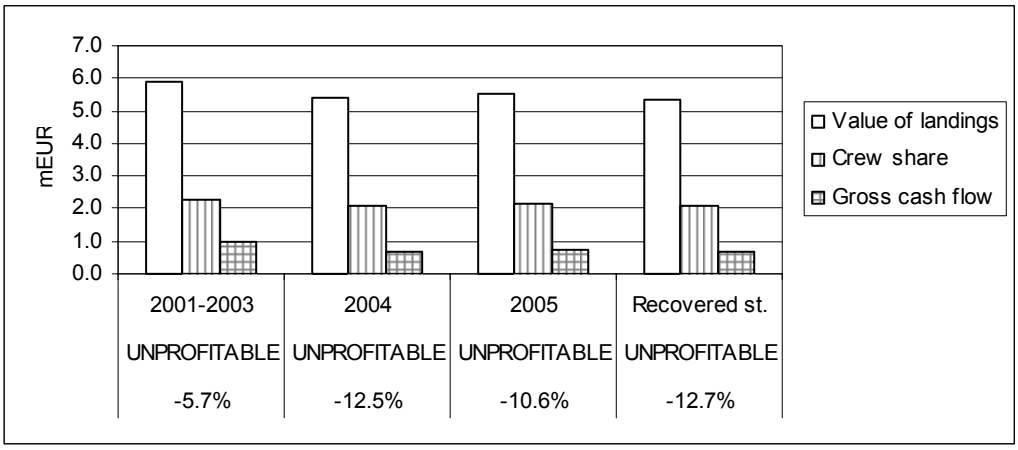
Management plan assessment



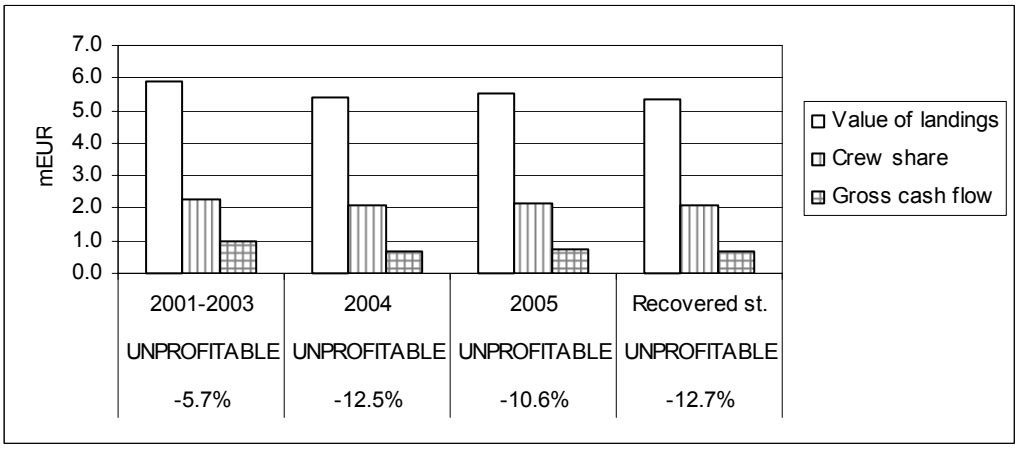
3. Finland

Trawlers < 24 m

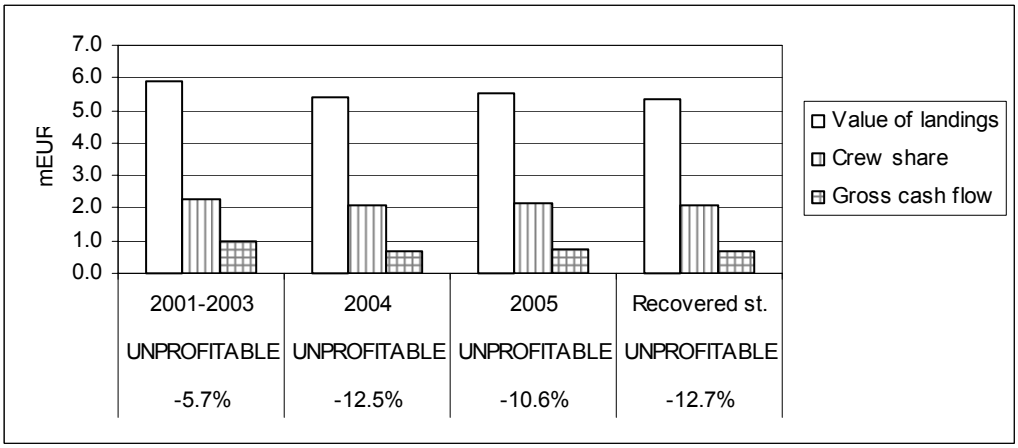
Single species assessment



Mixed fisheries assessment

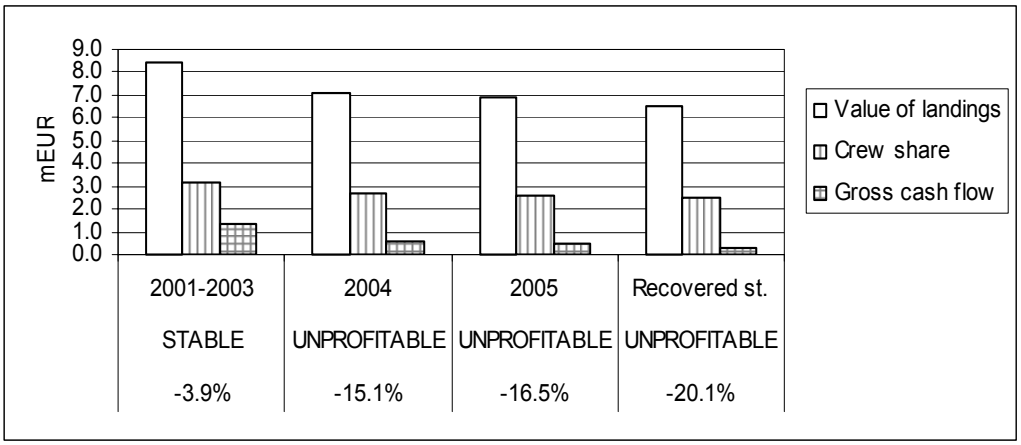


Management plan assessment



Trawlers ≥ 24 m

Single species assessment



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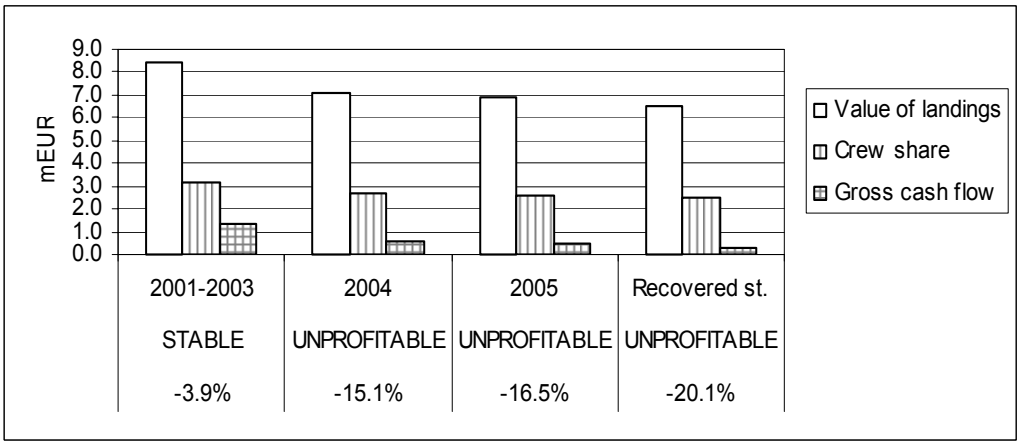
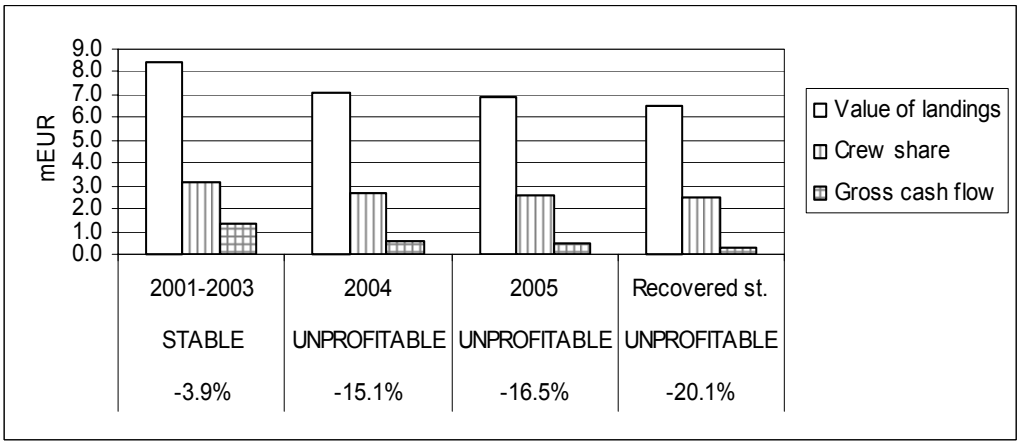


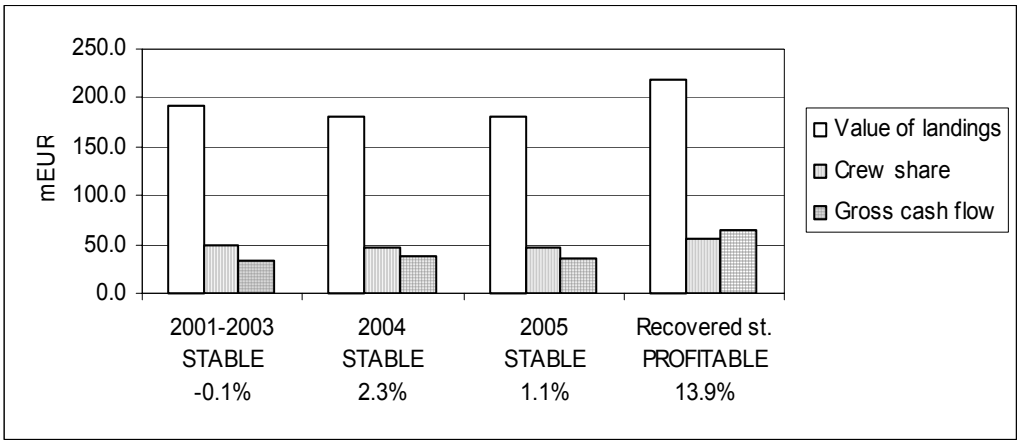
Management plan assessment



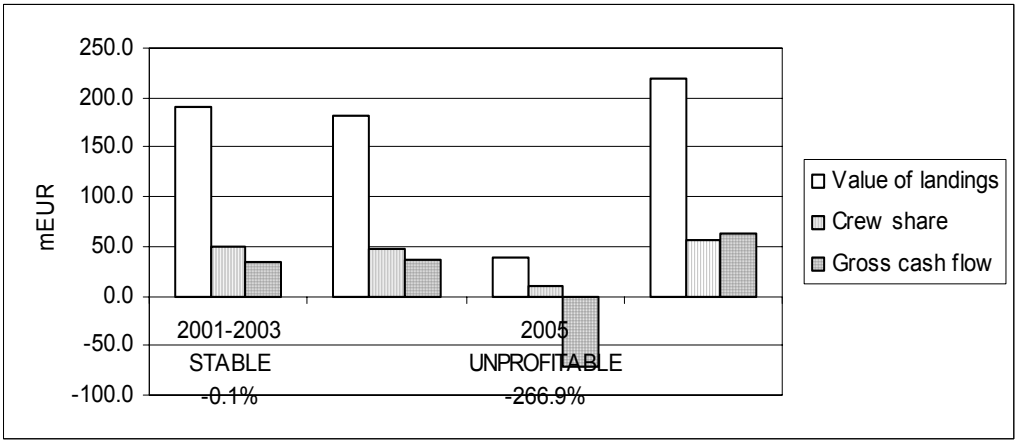
4. Netherlands

Beam Trawlers ≥ 24 m

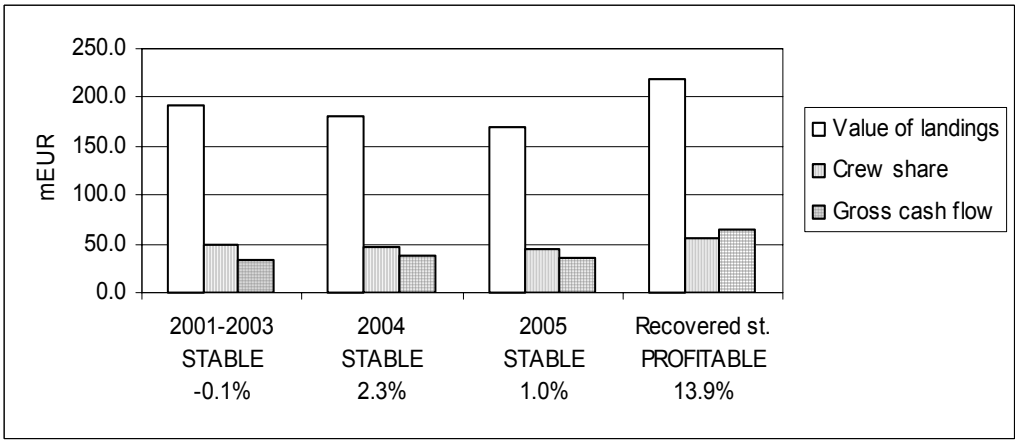
Single species assessment



Mixed fisheries assessment

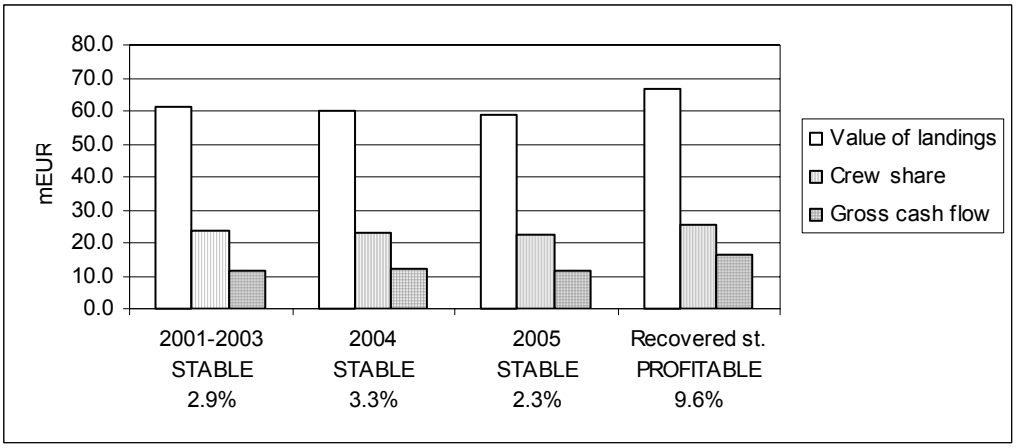


Management plan assessment



Beam Trawlers < 24 m

Single species assessment



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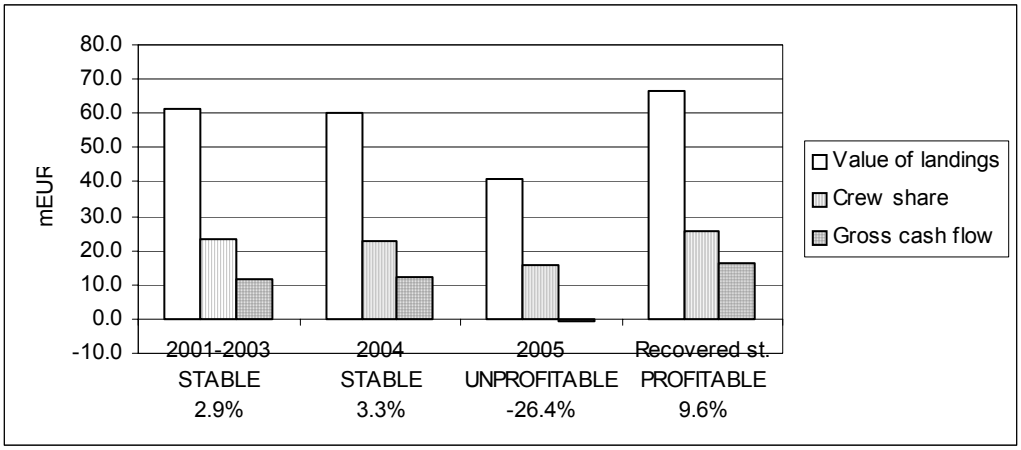
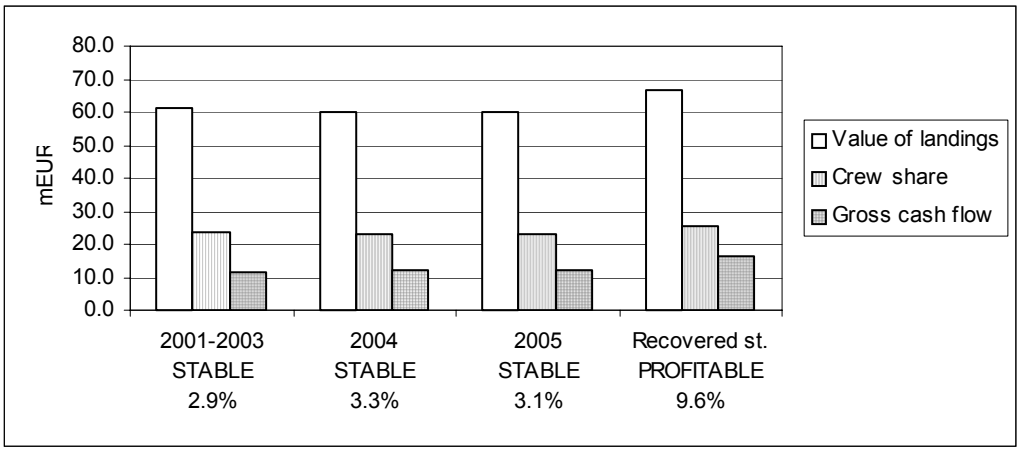


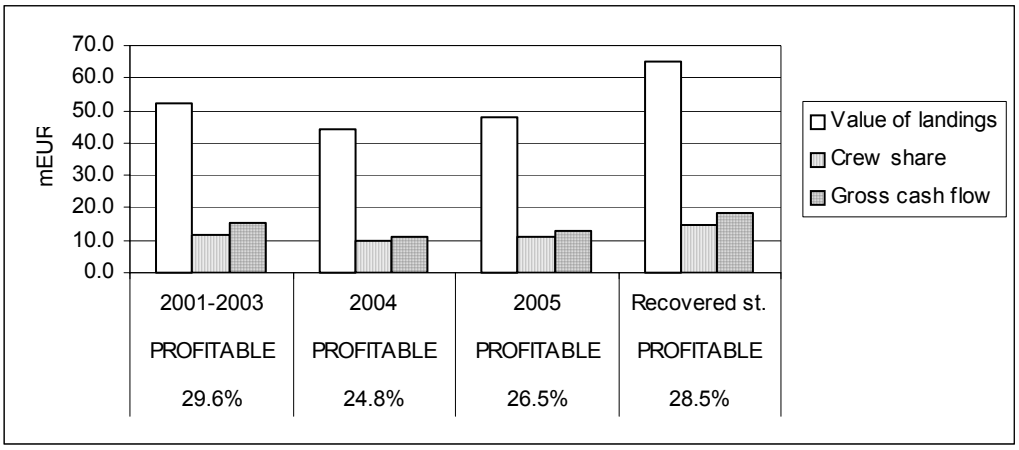
Management plan assessment



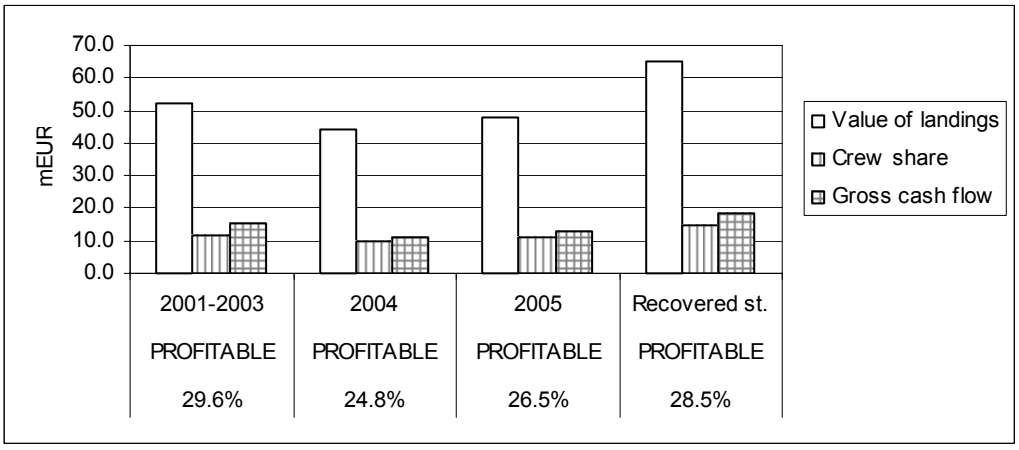
5. Sweden

Pelagic Trawlers and Purse Seiners ≥ 24

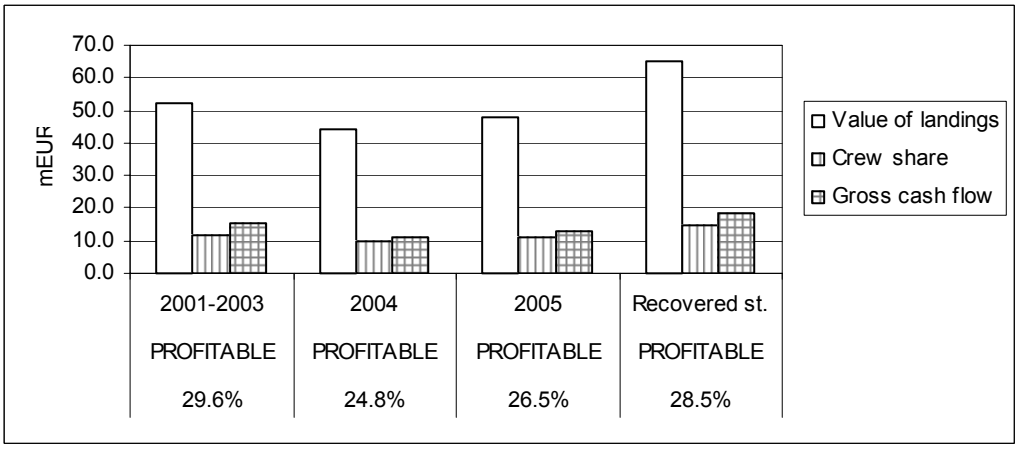
Single species assessment



Mixed fisheries assessment

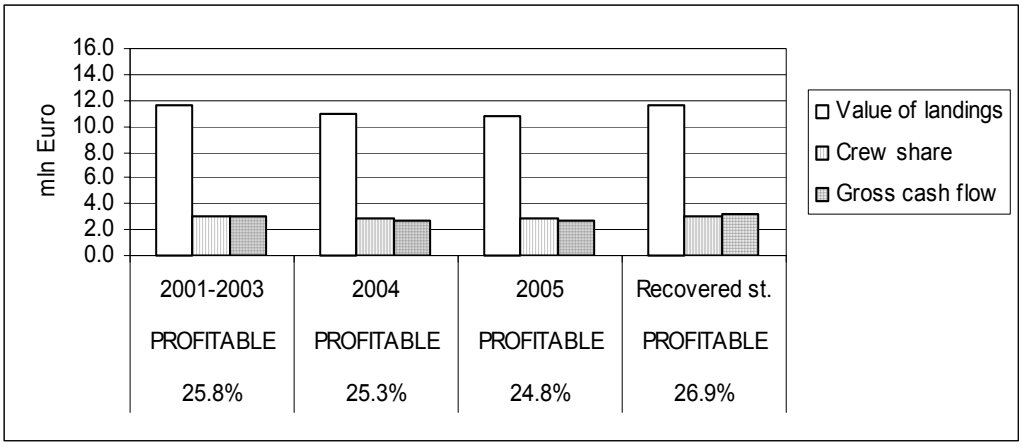


Management plan assessment



Shrimp Trawlers

Single species assessment



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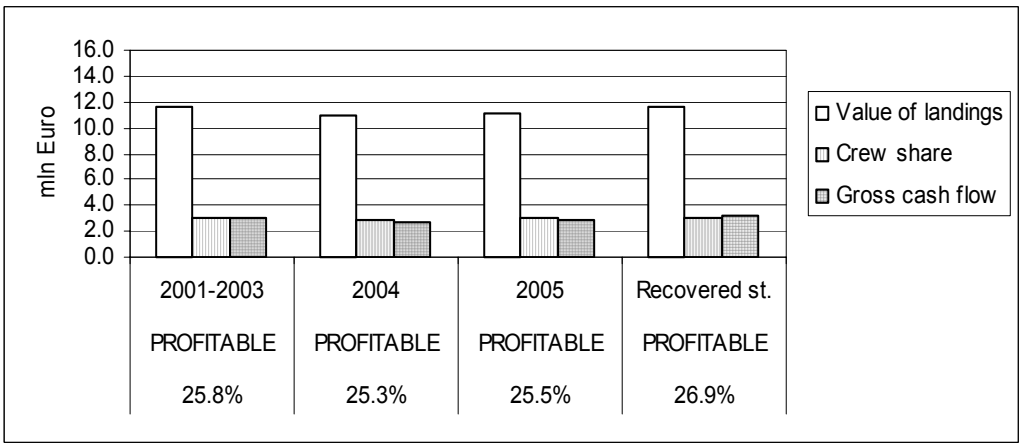
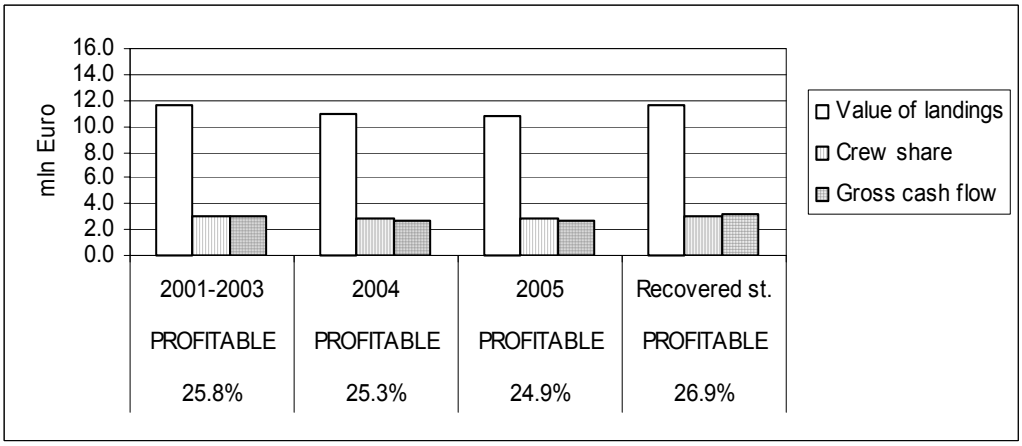
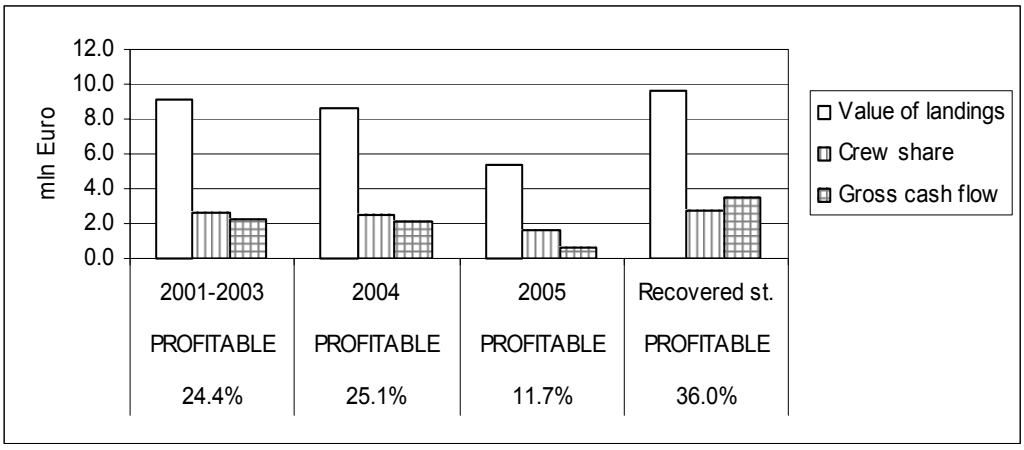


Management plan assessment

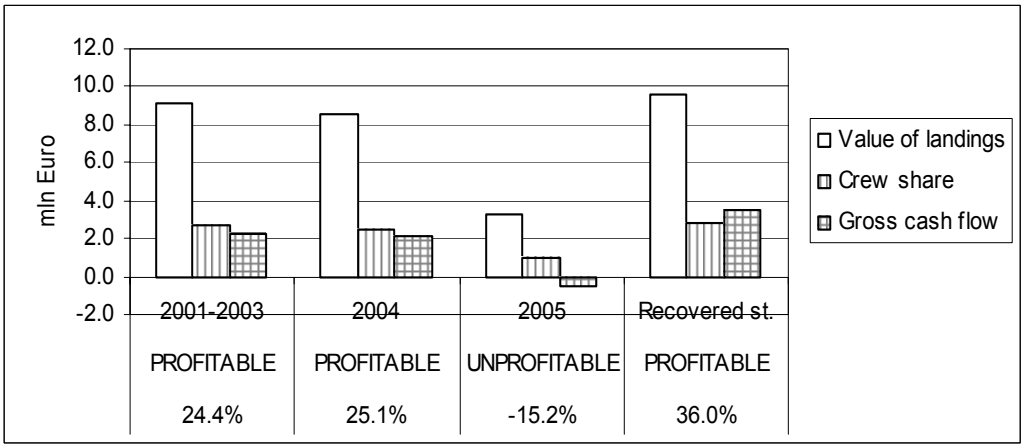


Trawlers ≥ 24 m

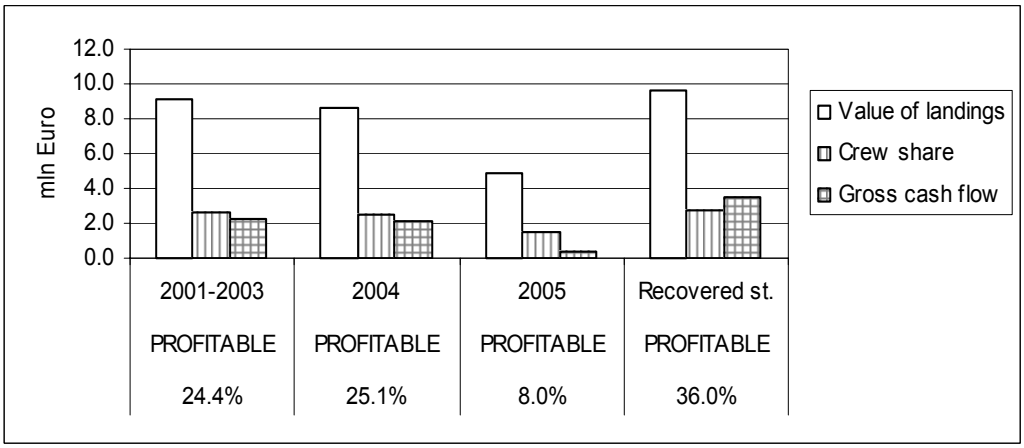
Single species assessment



Mixed fisheries assessment

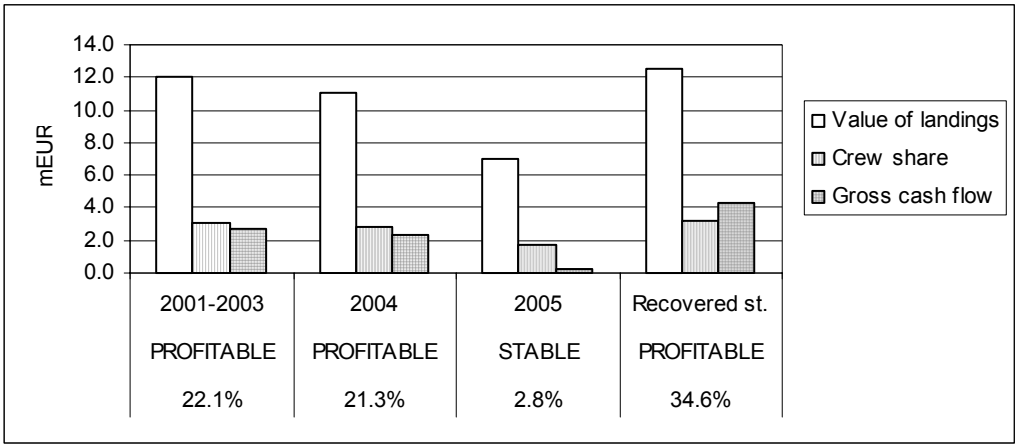


Management plan assessment

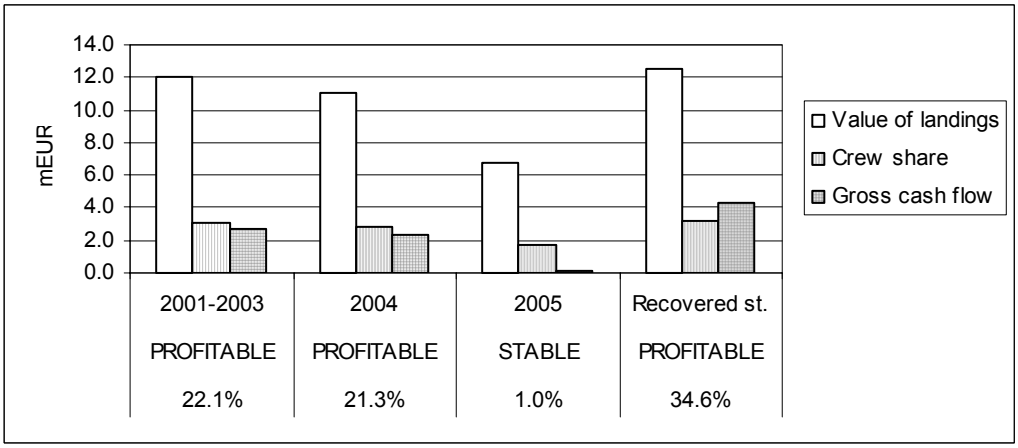


Trawlers < 24 m

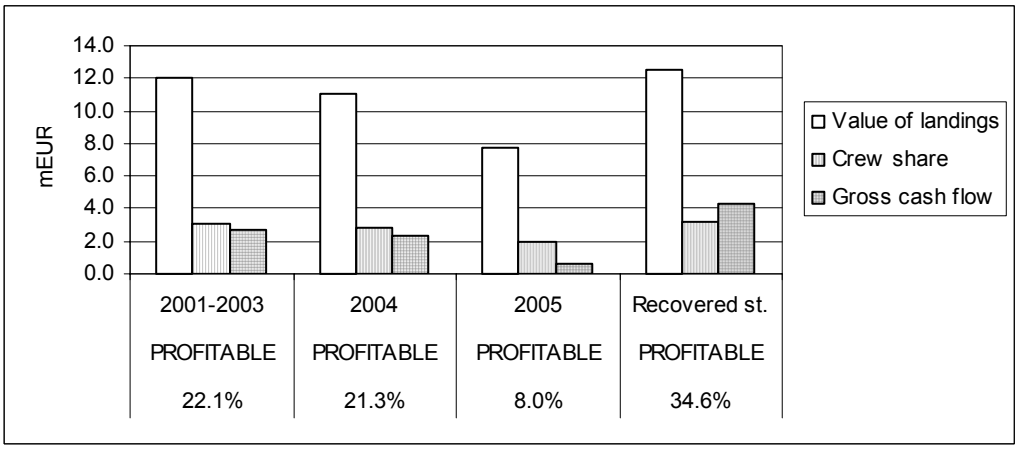
Single species assessment



Mixed fisheries assessment

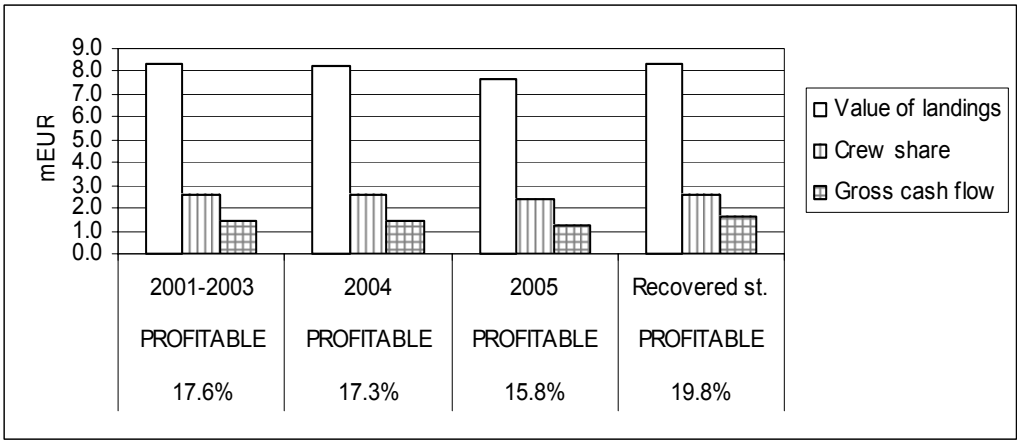


Management plan assessment

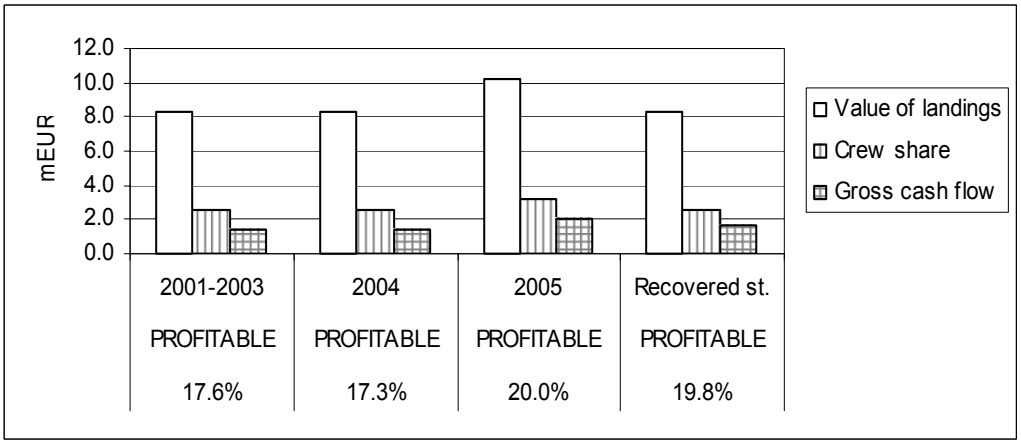


Nephrops Trawlers

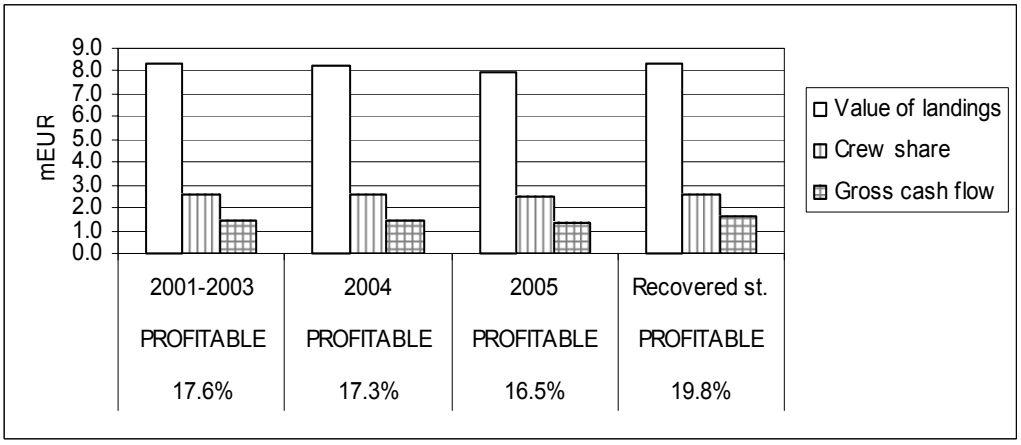
Single species assessment



Mixed fisheries assessment

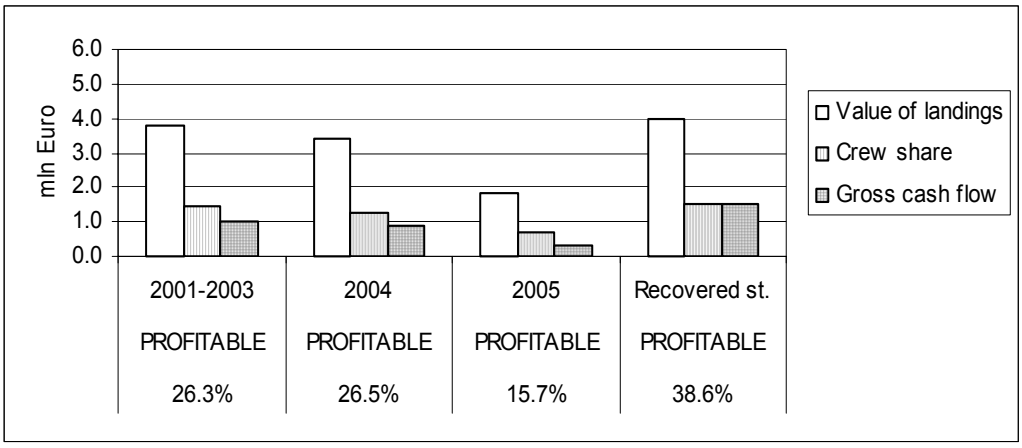


Management plan assessment

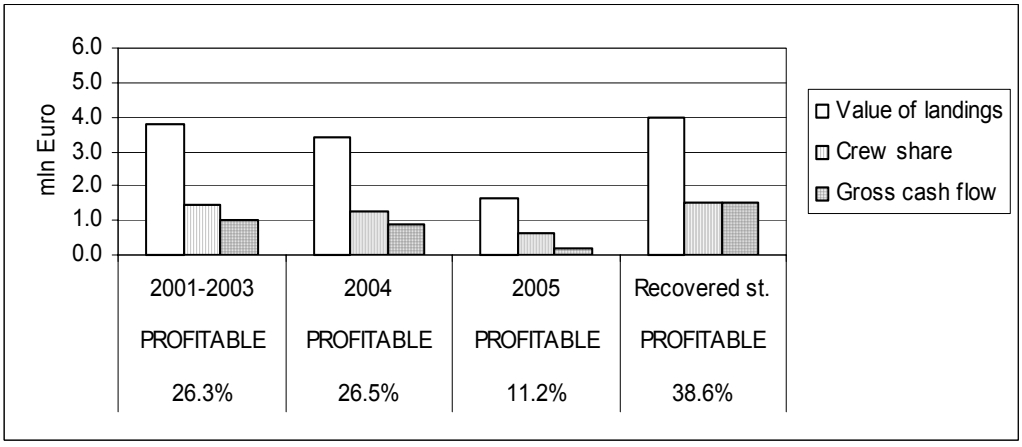


Gill Netters ≥ 12 m

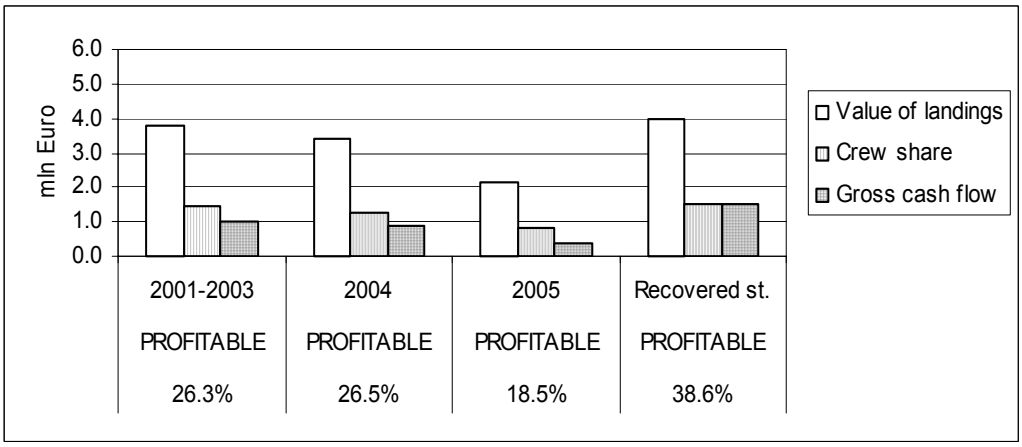
Single species assessment



Mixed fisheries assessment

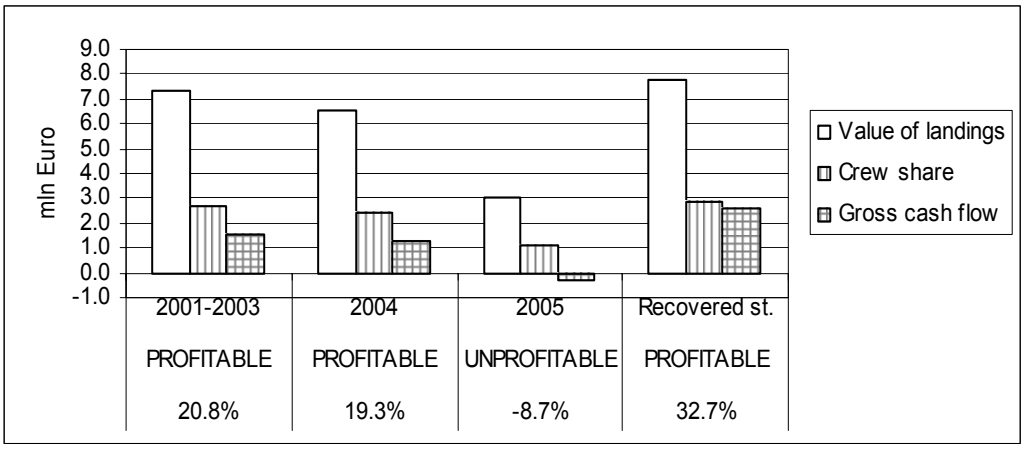


Management plan assessment

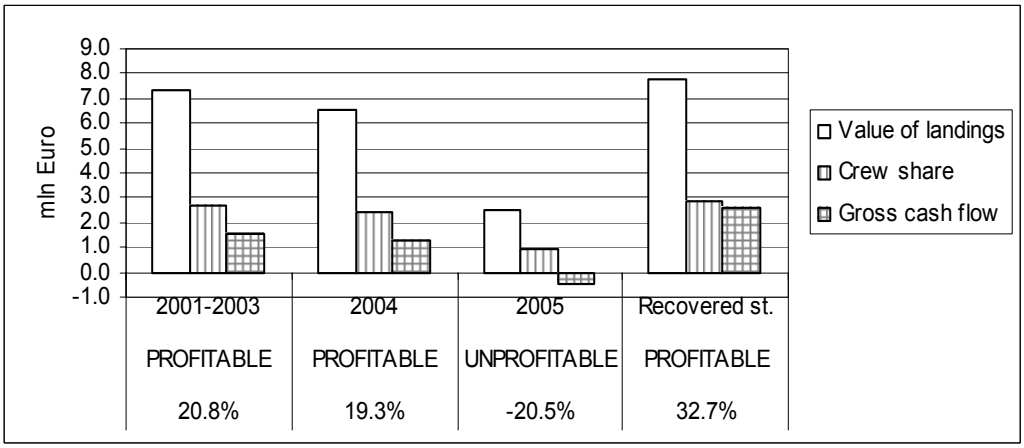


Gill Netters < 12 m

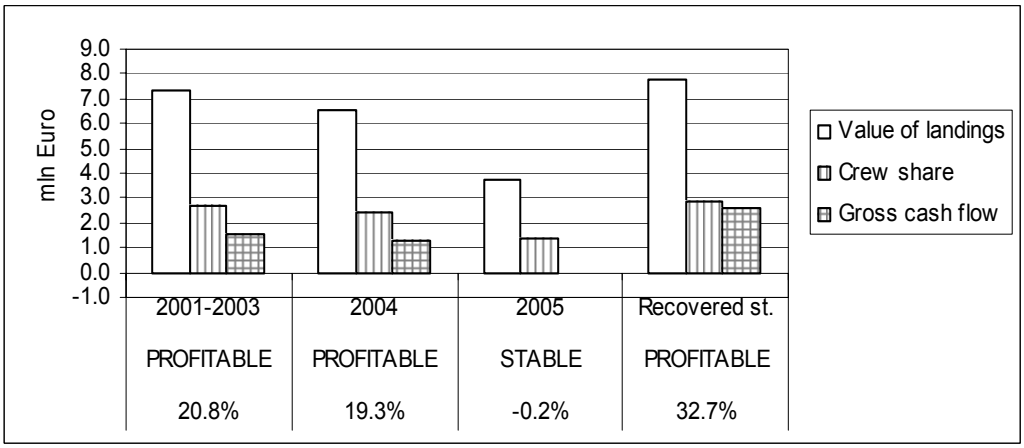
Single species assessment



Mixed fisheries assessment



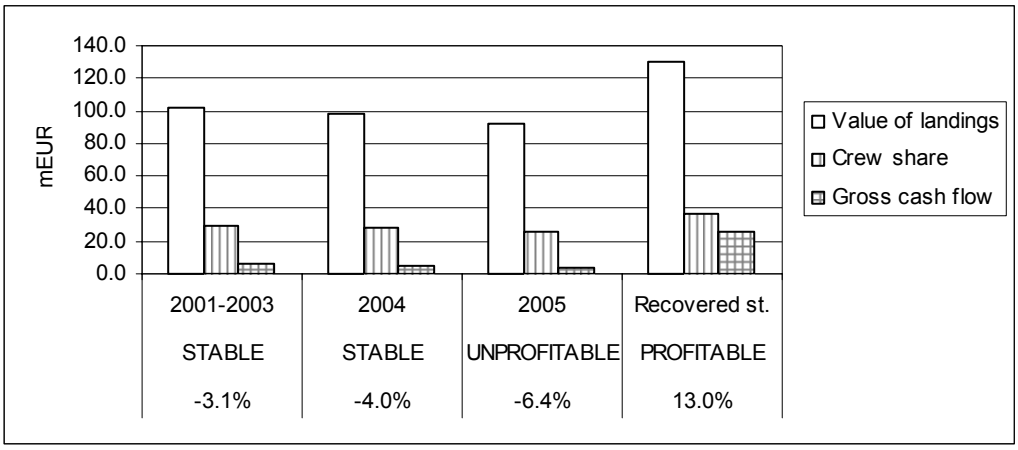
Management plan assessment



6. United Kingdom

Scottish Demersal Trawlers ≥ 24m

Single species assessment



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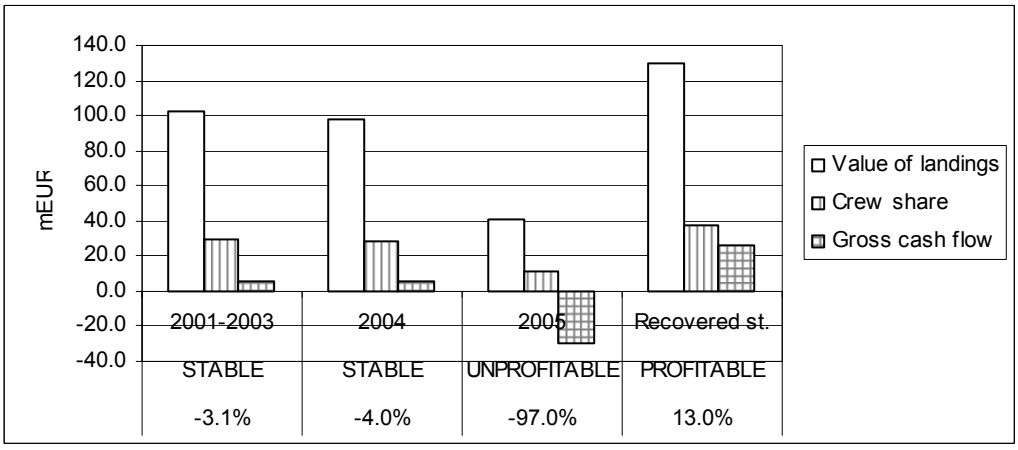
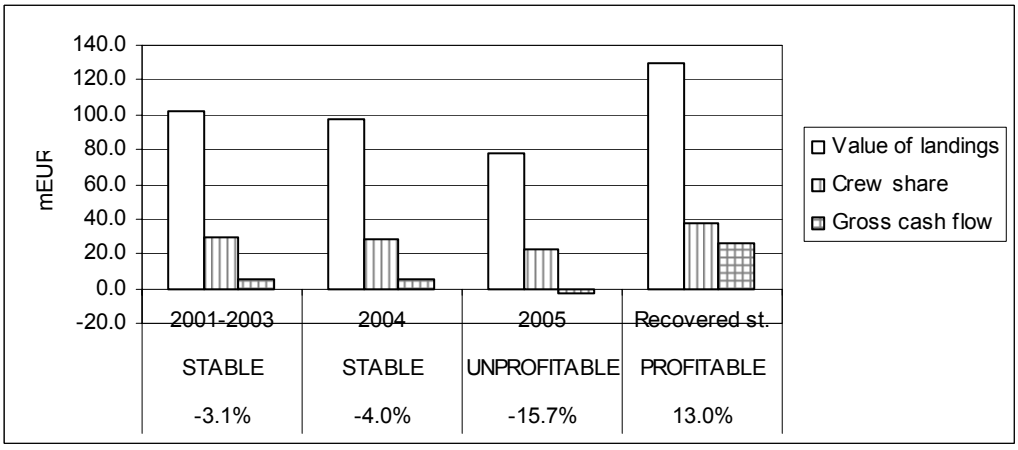
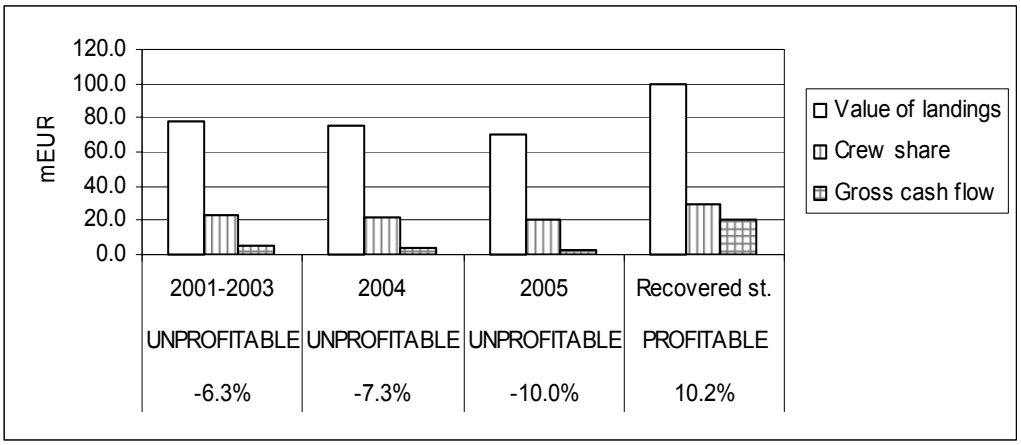


Management plan assessment



Scottish Demersal Trawlers < 24m

Single species assessment



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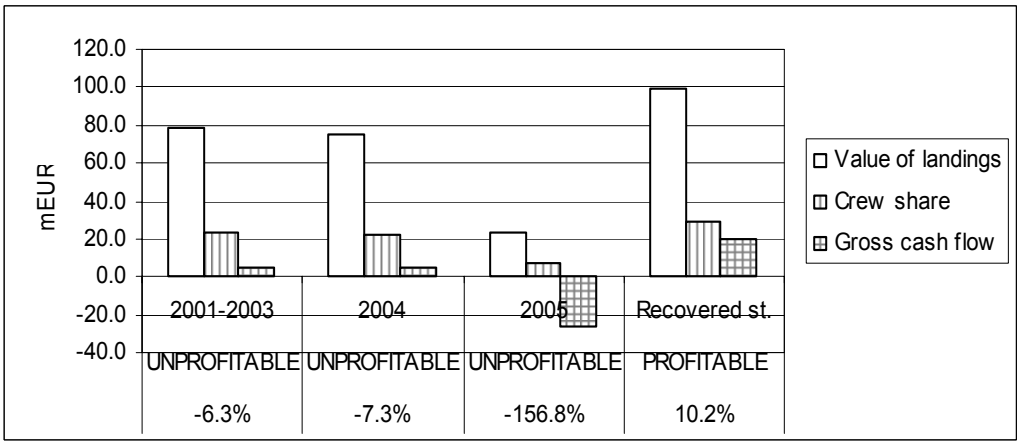
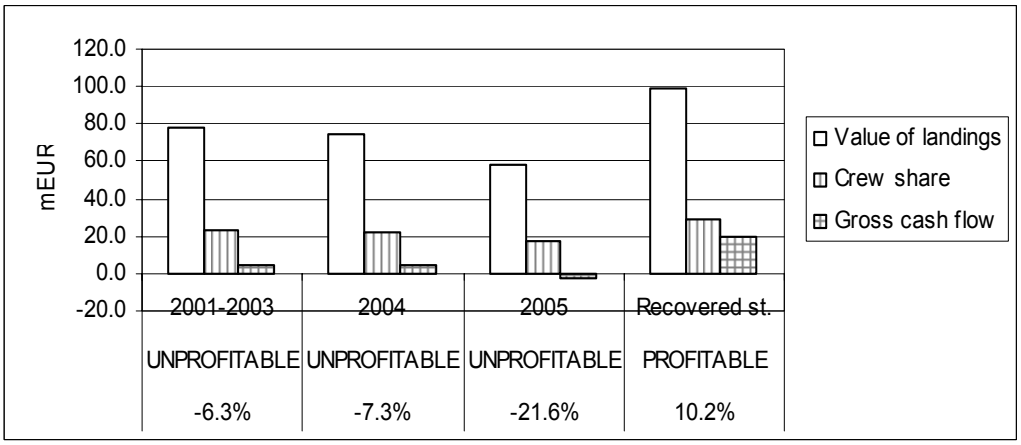
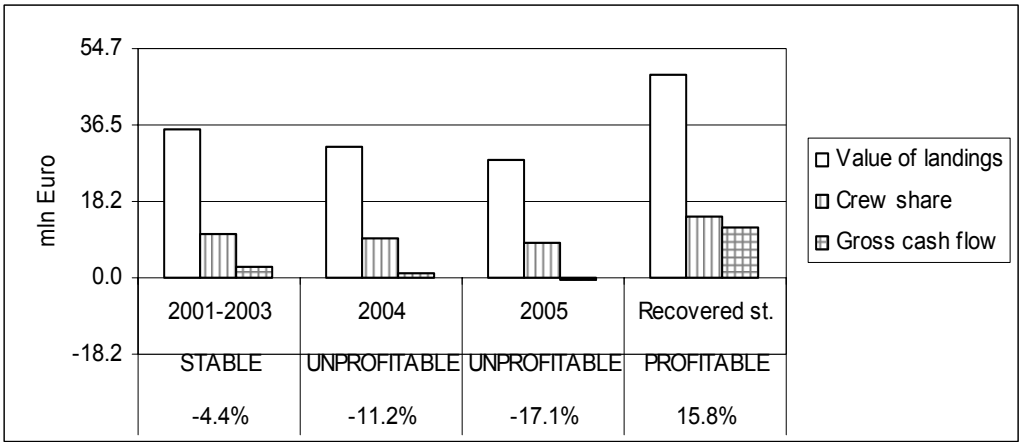


Management plan assessment



Scottish Demersal Seiners

Single species assessment



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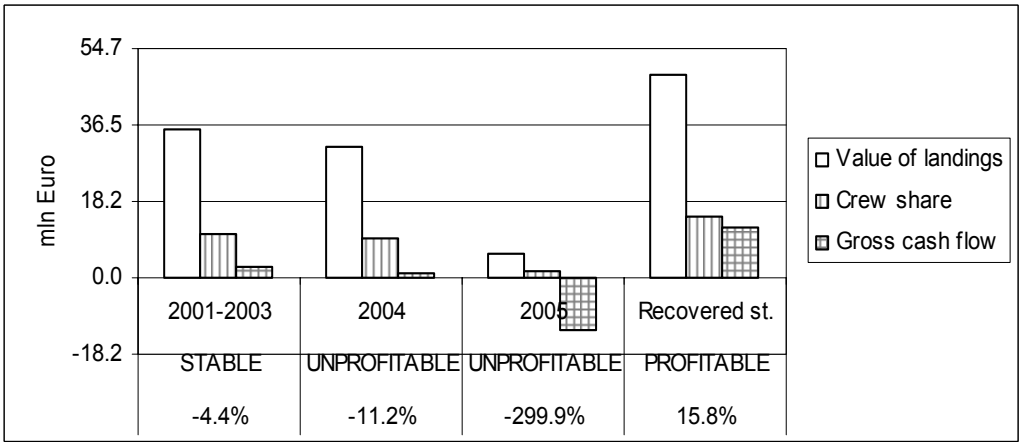

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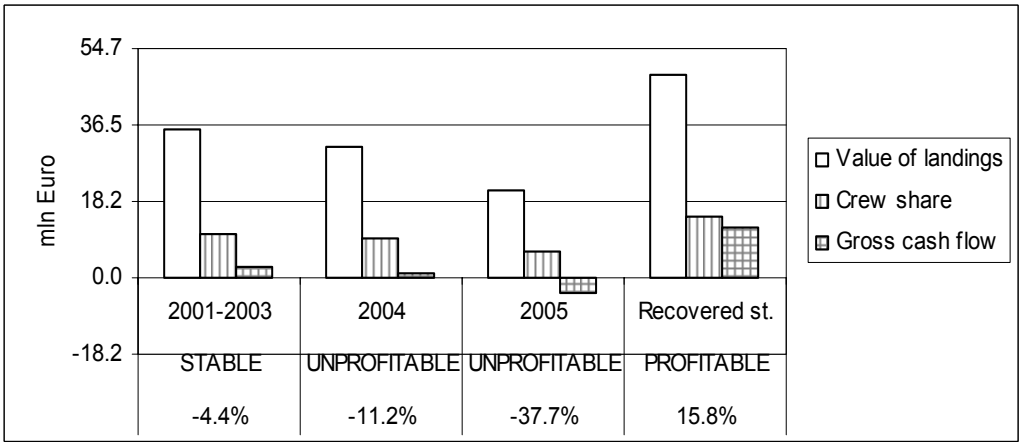
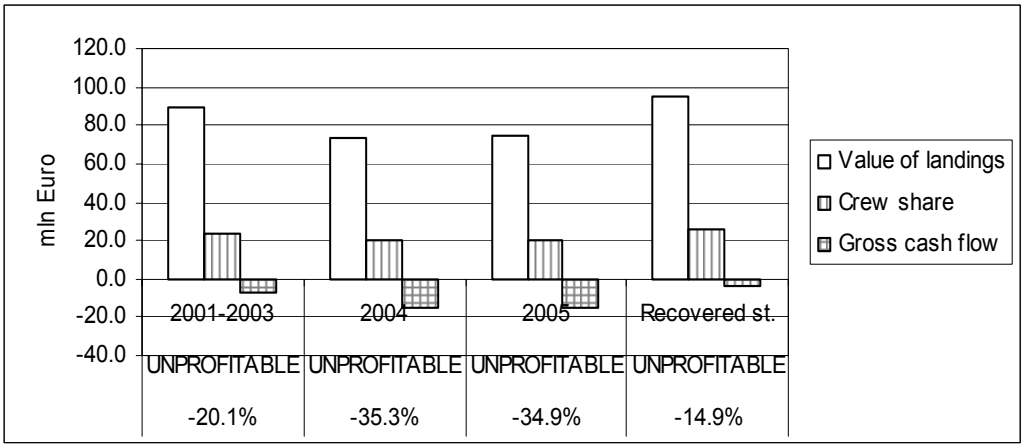


United Kingdom, Beam Trawlers

Single species assessment



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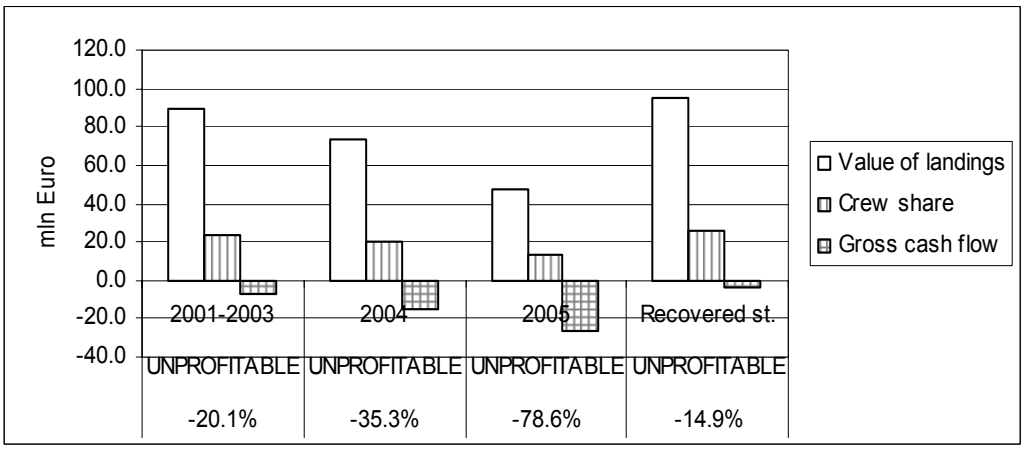

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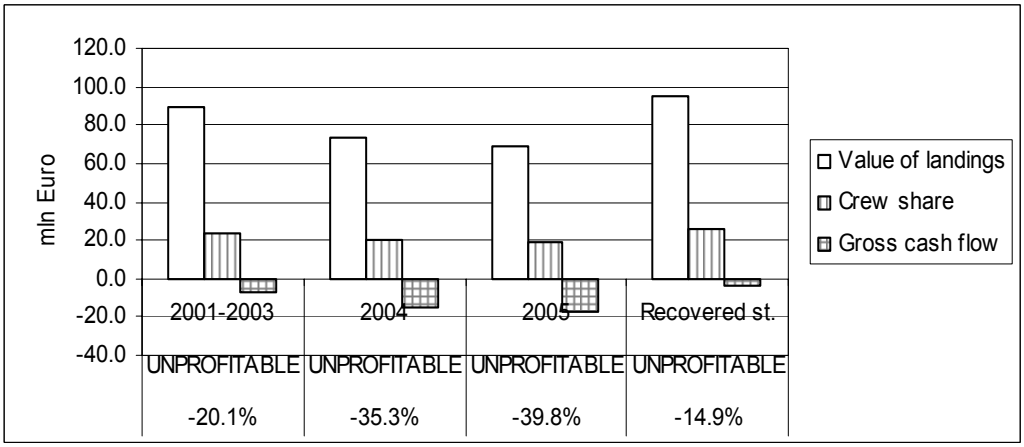
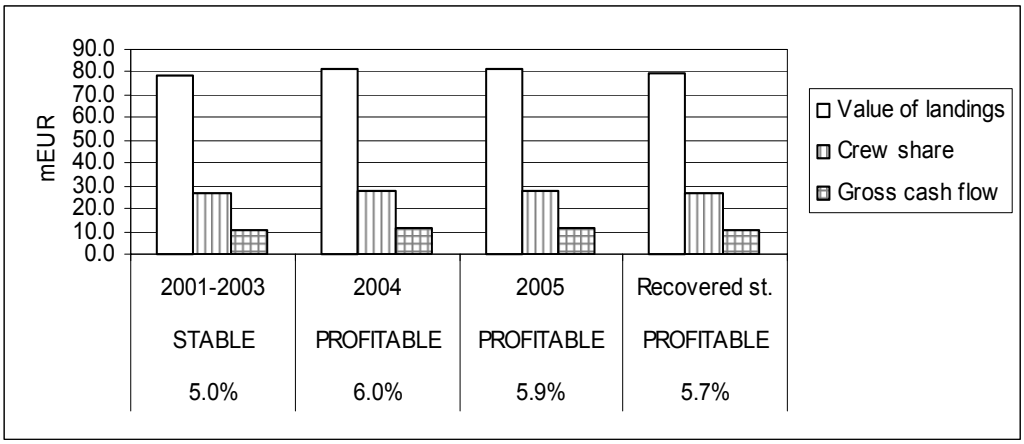


Scottish Nephrops Trawlers

Single species assessment



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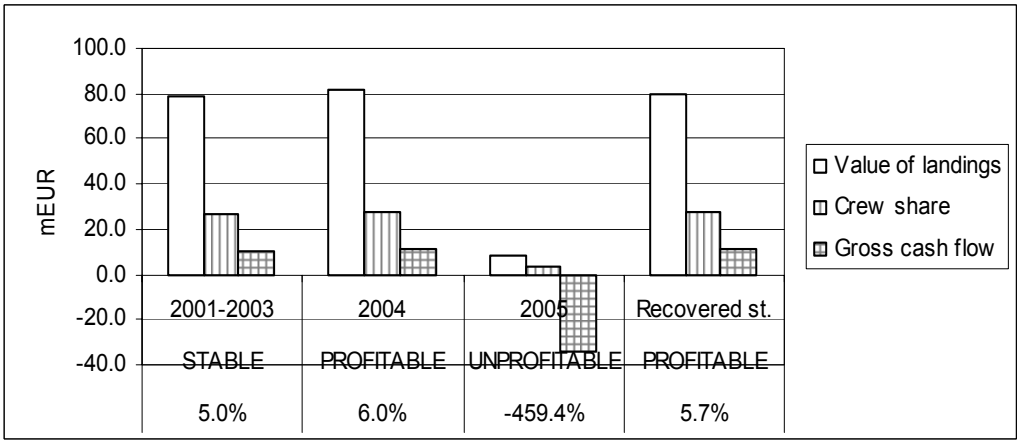
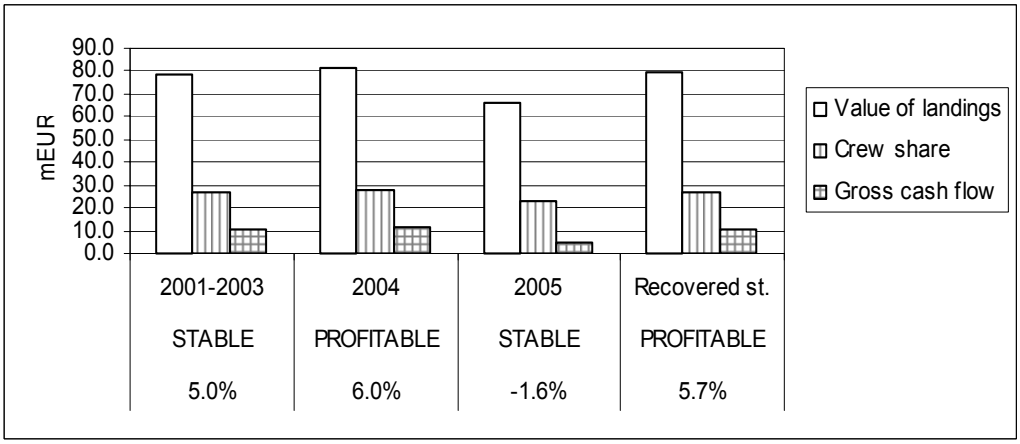
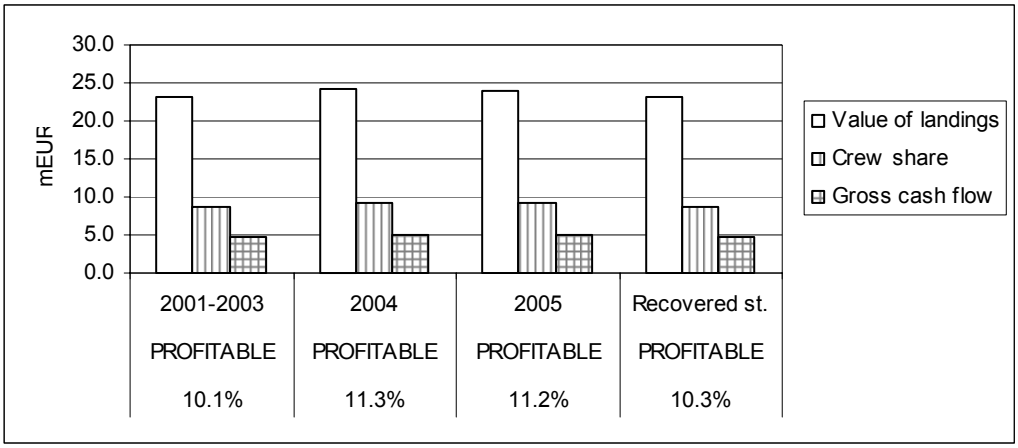


Management plan assessment



Northern Ireland Nephrops Trawlers

Single species assessment



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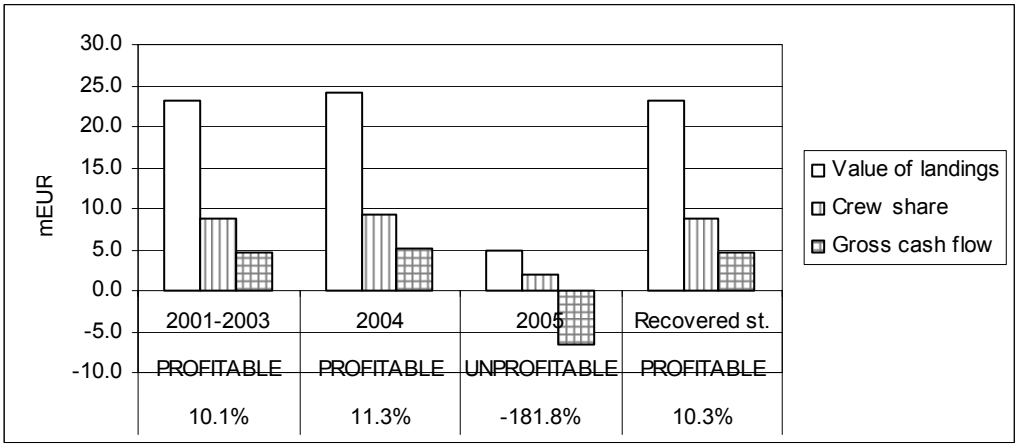

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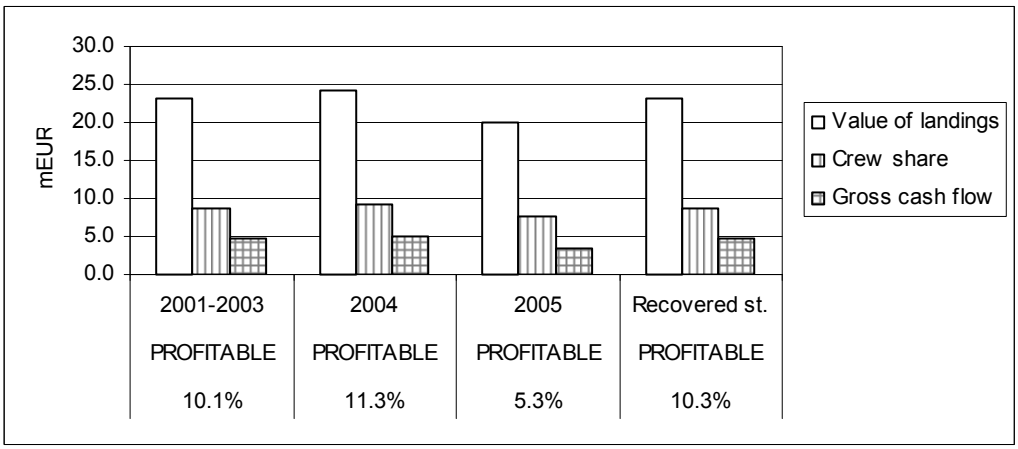
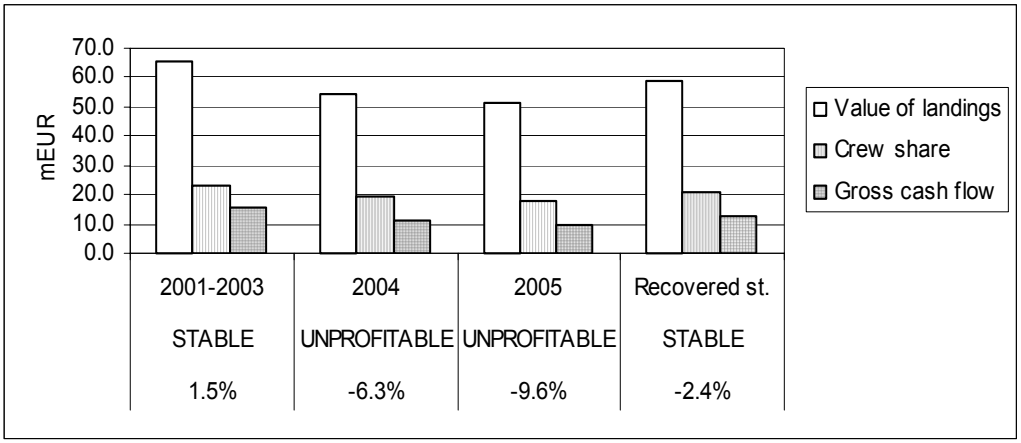


7. Spain

N and NW trawlers

Single species assessment



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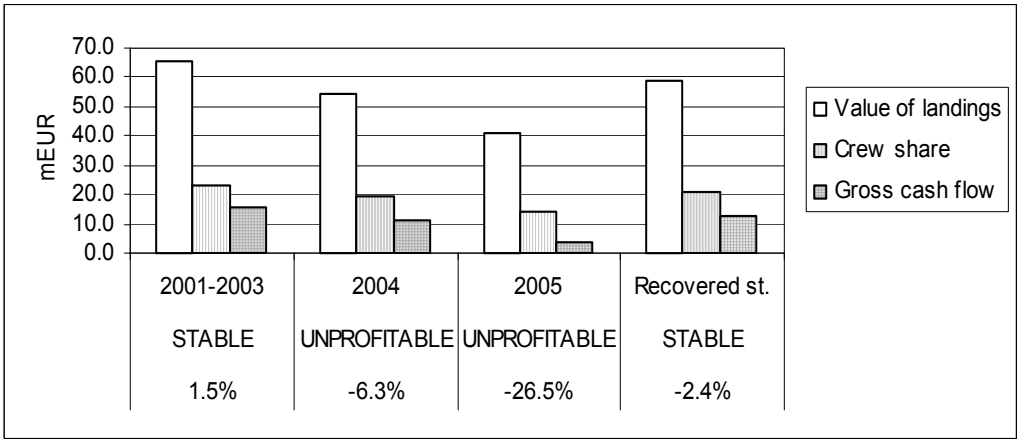

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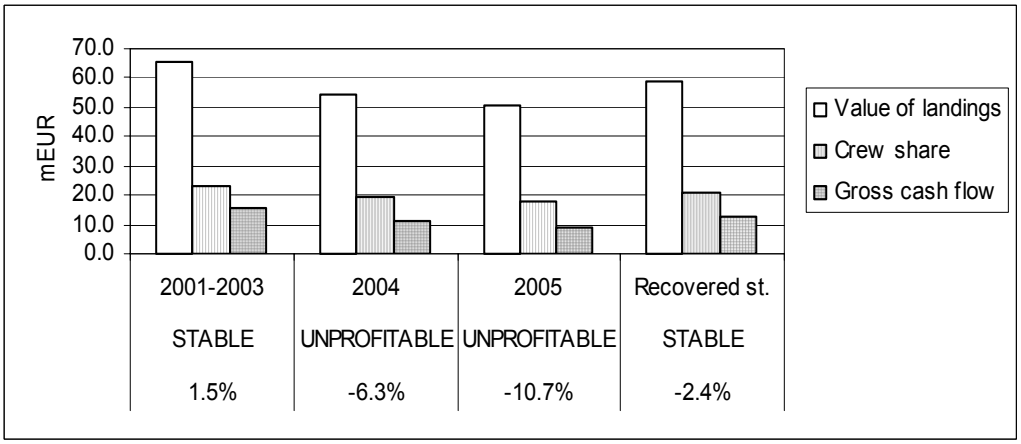
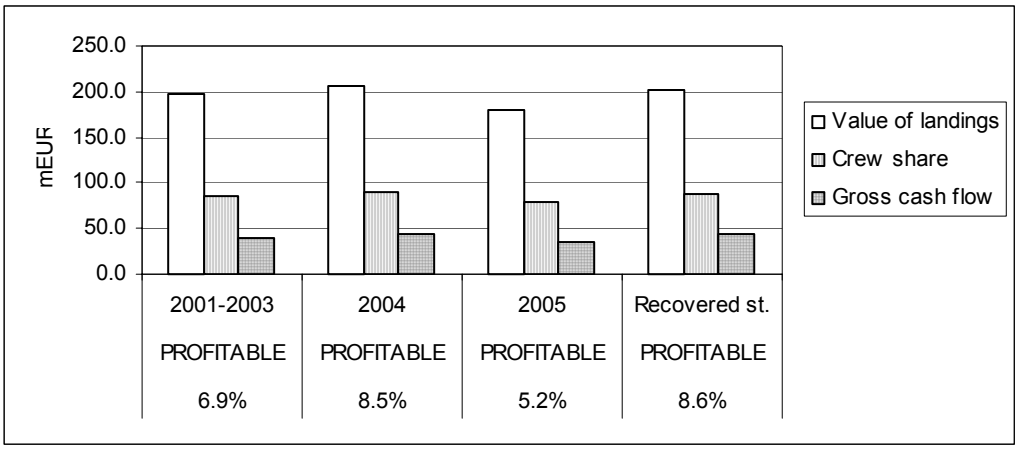


300 Fleet

Single species assessment



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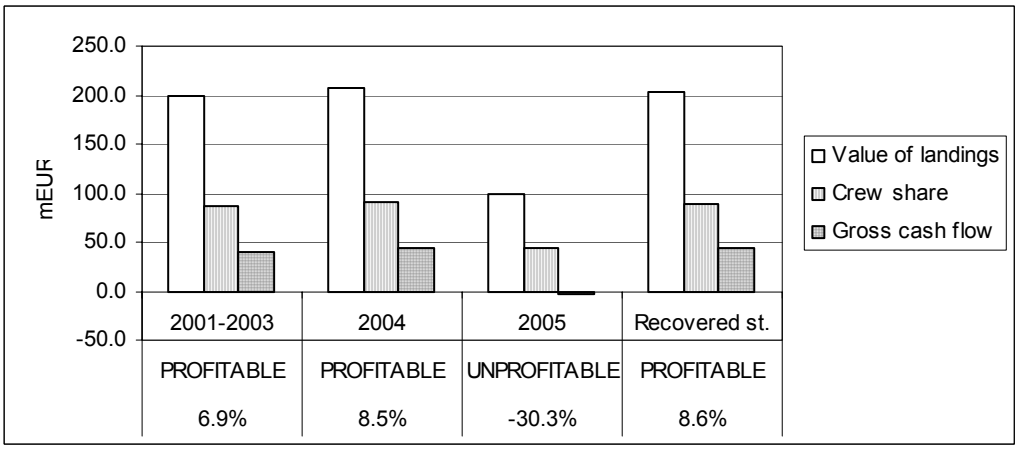

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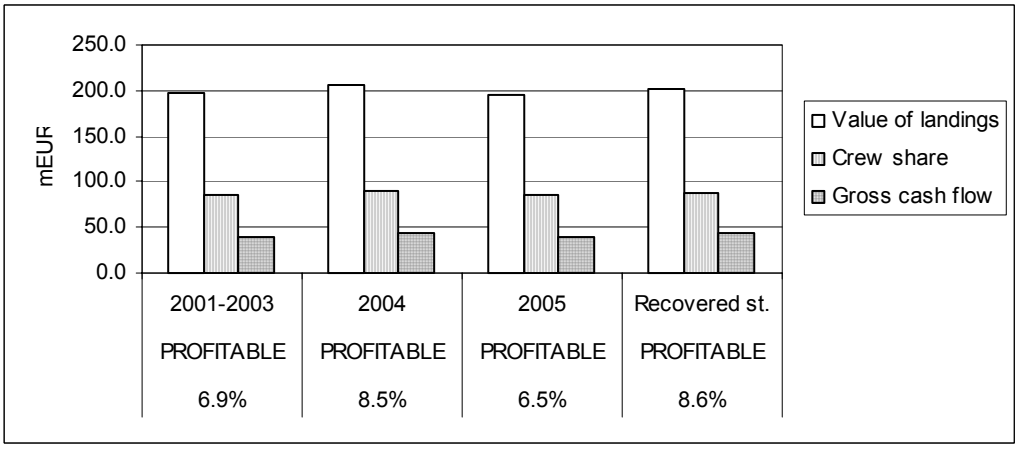
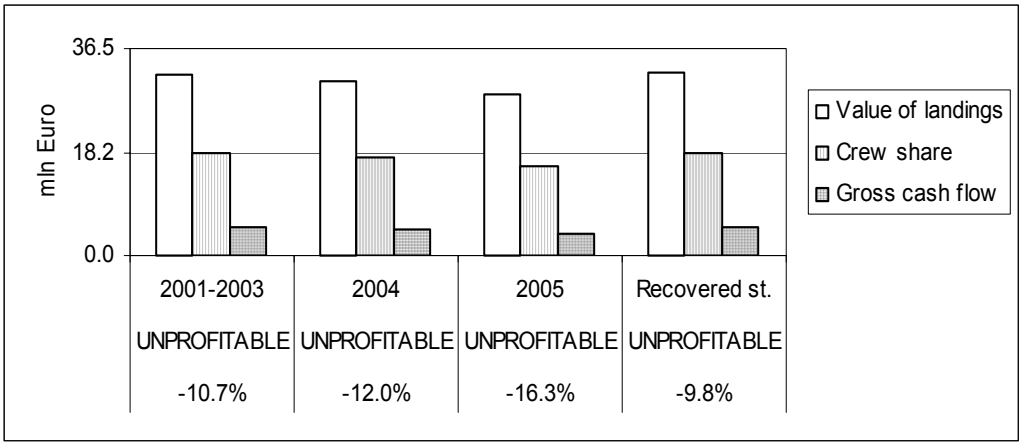


Galician Purse Seiners

Single species assessment



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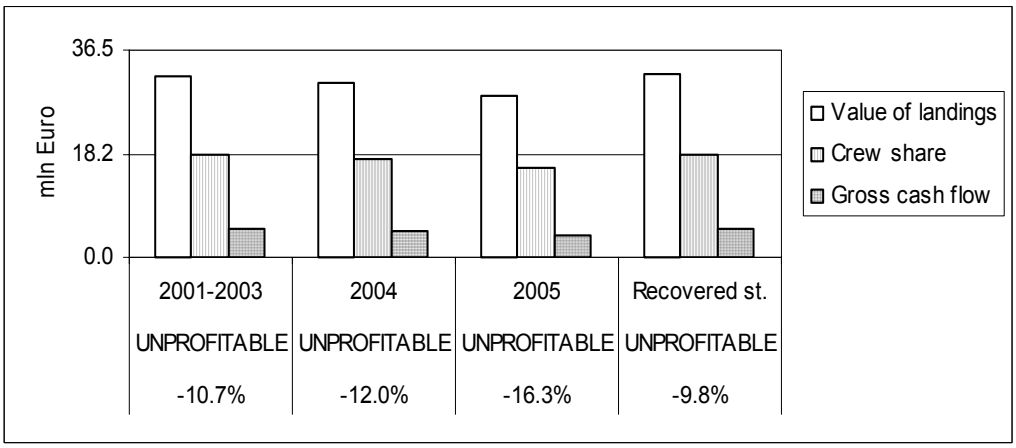
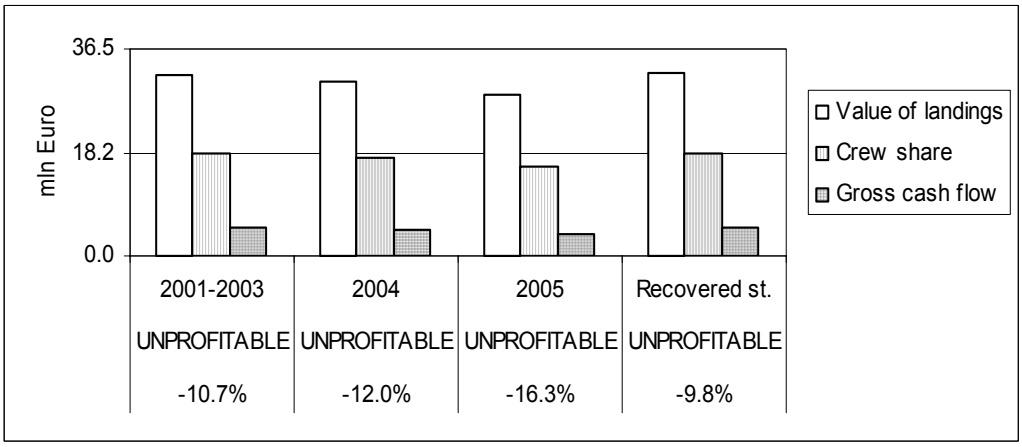


Management plan assessment



Reference to previous reports

SEC (2004) 61 “The Potential Economic Impact on Selected Fishing Fleet Segments of TACs Proposed by ACFM for 2004 (EIAA-model calculations)”. Report of the Scientific, Technical and Economic Committee for Fisheries, Commission Staff Working Paper, Brussels, 20.01.2004.

EAFE-AC Report (2002) The Potential Economic Impact on Selected Fishing Fleet Segments of TAC's Proposed by ACFM for 2002 (EIAA-model calculations), European Association of Fisheries Economists’ Advisory Committee. http://www.eafe-fish.org/notices/eafe-ac-eiaafinal.doc

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ANNEX 2

The EIAA Model

Methodology, Definitions and Model outline

1. Methodology

Background

The background to this report is the need for economic assessment to supplement the ACFM advice demanded by STECF and other interested agents.

Objective

To produce short-term economic forecasts that take into consideration the quota advice given by ACFM for the fleet segments specified in the economic report.

Data requirements

- Technical details of fleet segments
- Landings by species
- Prices by species
- Cost information for fleet segments
- ACFM advice for landings by management stocks

Costs and earnings data are drawn from the Annual Economic Report on Economic Performance of Selected European Fleets, while ACFM advisory data are extracted from pertinent ACFM reports by the SGRST (subgroup on Reviews on Stocks).

Scenario calculations

The EIAA report presents scenarios. They are intended as information to aid in making political choices. Therefore the scenarios should not be interpreted individually but rather in comparison with one another for each country. Such comparison indicates what change can be expected if one or another choice is made.

On many major species the ACFM provides options according to the level of fishing mortality. Different options for various stocks can be combined in the catch composition of the fleet segments leading to a potentially very large number of scenarios, many of them not leading to converging results.

It cannot be foreseen which TAC will be decided upon by the Council of Ministers and to which extent quotas will be swapped between Member States. For some stocks ACFM does not provide any advice. In other cases the advice is not identical to the TAC management areas.

Only for a relatively few stocks are precautionary Spawning Stock Biomasses and TACs estimated.

Data problems

When combining biological assessment and advice with economic assessment and advice, a number of data problems arise. Based on the problems detected in the work with the economic assessment the problems could be divided into 6 areas:

1. Where quota species are constituting a large part of the landings composition of the fleet segments but the final data are not available

2. Where item one applies, but where data exists and where the management decisions have been made already

3. Where the quota species constitute only a small share of the total landings of the fleet segment

4. Where no biological assessment is made but where precautionary quotas are fixed

5. Where the biological stock assessment areas are inconsistent with the quota management areas

6. Where no assessment and no quota management is in function

The model can be applied with necessary adjustments to all areas.

Assumptions

In many cases assumptions have had to be made regarding information lacking which is essential for use in the model, e.g. the composition of costs and catches of specific fleet segments, price flexibility rates of certain species, etc.

Constant fishing patterns but changing catch compositions

The calculations require an assumption regarding the relative shares of the various national fleet segments in the national landings of a specific species. It is assumed that this fishing pattern will not change from the reference year to the year for which the evaluation is made.

It is assumed that the fleet segments catch a constant share of the species. This means that the catch composition of a segment will change when the TACs change.

The time that becomes available due to reduced effort on one stock remains unused. It is not utilised on another species. For short term forecasting, when the quota changes remain within reasonable limits, this assumption can be justified. However, over a longer time period and with more substantial changes in the overall composition of fishing opportunities (quota and non-quota species) the fleets may adjust their fishing pattern to the new conditions.

Effort and catch of non-target species

The model does not include fishing effort as such but rather changes in costs entailed by changes in fishing activity. When a TAC is changed the activity (effort) and fishing costs on the specific species will have to be adjusted accordingly. These adjustments have been introduced calculating the share of that species in the total value of the landings of the fleet segment. The total fishing activity (effort) of that fleet segment will be affected by changes in the share of this particular species in the weighing of the new activity of all species with the respective shares in value of landings (see the example in Annex table 5.1 on page 73). Consequently, the effort of a fleet segment shifts away from the species which are to be protected by reduced TACs. However, the activity of a fleet segment is further influenced by price changes on the species e.g. if the price goes up the activity exerted on this particular species will go up. With quota restrictions this activity could be interpreted as an activity and hence costs that are connected with discarding. Finally, the activity is influenced by changes in fish stock abundance.

Landings of non-quota species are not affected by the change in activity on the quota species.

The activity (effort) influences the variable costs in the short and the long run while fixed costs are unchanged. Variable costs are assumed to be non-linear with effort because it is assumed that the stock abundance influences the catch per unit effort in a non-linear way. This implies that e.g. a smaller quota requires less fishing effort to be caught and therefore lower variable costs. At the same time a lower stock abundance leads to a lower catch per unit effort, which offsets some of the lower effort needed to catch the lower quota. To include these assumptions the model operates with a catch-stock abundance flexibility rate, a catch-gear (technology) flexibility rate and a catch-price flexibility rate. The procedure is summarised in the following items:

Live weight equivalents

As the ACFM advice is provided in live weight, all catches and landings are assumed to be live weight equivalents. In practice some fish is landed headed or gutted so that also the respective price information regards dead weight price per kg.

Quota uptake

Nominal quota, as set at the beginning of the year, is used. However, in practice quotas are swapped between countries, some quotas remain unutilised and/or some are exceeded. The total effect of these changes is summarised in an uptake correction factor. This factor allows the projected landings of the coming year to be different from the proposed quota.

Prices

Price level is adjusted to changes in the volume of landings. Future price is calculated based on a price flexibility rate at -0.2 as a default value. Consequently, value of lower quota is somewhat (20%) offset by higher prices. General price trends could not yet be included, only the total European catches are taken into account. A greater refinement of price elasticity by species should be pursued in a later stage. In the model price changes are calculated for each species (e.g. one herring and cod species etc.). Landings from third countries are not included.

2. Definitions

Gross Earnings of the vessel and catches (Value of landings)

Gross earnings of a vessel are determined by annual volume of catches per species and the prices of those species.

Variable costs

Variable costs vary directly with activity (effort) i.e. fuel, provisions, repairs. When effort, exerted on a certain stock, is reduced due to lower TAC, the total variable costs of that fleet segment are reduced relative to weight of the reduced species in the fleet segment's composition of landings (cf. above concerning effort).

Fixed costs

Fixed costs (including interest payments and depreciation) are kept constant and are assumed not to vary with effort. This is justified because in the short-run no changes in the invested capital can be expected. In the long run with higher TACs, the associated higher stock abundances and excess fleet capacity is assumed to make it possible for the current fleet to catch the higher volumes.

Gross value added

Gross value added = depreciation costs + interest + crew share + net profit, or,
Gross value added = Gross revenues - all expenses (excl. labour remuneration, instalments and interest payments on loans).

Crew share

Crew share is a percentage of the wages to the crew of the gross revenue. In some cases crew share is calculated from the difference between gross revenue and variable costs.

Gross cash flow

Gross cash flow = gross value added – crew share (= income to the vessel)

Net result

Net result = gross revenues – variable costs – fixed costs – crew share

3. Presentation and interpretation of results

EIAA contains a short, a medium and a long-term assessment of expected changes in economic performance. Four main indicators are used for this purpose:

- *Gross revenue:* Is total landing value and is easy to relate to because it compares to total landing volume and are often used as an indicator of gross income.

- *Crew remuneration:* Earnings of the crew members, including a skipper-owner. An important indicator for the economic attractiveness of the profession. If the figure is divided by an opportunity salary, employment measured in full-time fishermen is easily calculated.

- *Gross cash flow:* Can be considered the main indicator for the feasibility of the survival of fishing companies in the short run (2-3 years). Negative cash flow cannot be born for long, as the cash expenses exceed cash income. Low cash flow will lead to problems of repayment of loans. The policy of the banks becomes of crucial importance in such situation.

- *Net profit (result):* Represents the "above normal" economic remuneration of invested capital. As this is the 'bottom line' of the calculations, it is very sensitive to changes in earnings or costs. It must be stressed that the net result calculated in EIAA is an economic and not a fiscal indicator. This means that it shows the long-term feasibility of survival of the sector. A low economic net result may be still quite satisfactory in fiscal terms in the medium term (4-5 years). Net result is presented in the diagrams relative to the gross revenue, and in this way the result represents a substitute for net profit relative to investments.

This information is presented in diagrams, with the scenarios placed along the horizontal axis. The value of landings, crew share and gross cash flow are shown as histograms. Below each scenario there is a verbal indication of the economic performance of the fleet segment and the precise value of the ratio of net profit to gross value of landings. The classification is derived from this ratio as follows:

- *Profitable:* Net profit/gross value of landings > 5%.

- *Stable:* -5% < net profit/gross value of landings < 5%

- *Unprofitable:* Net profit/gross value of landings < -5%. In this situation fishing cannot continue in the long run.

4. Specification of the biological data required for the EIAA model

All data specified below must be defined with precise correspondence to the definition of TACs in terms of species and areas for all North East Atlantic stocks.

The following data is required:

- Estimation of long term TAC under precautionary or status quo conditions (yield per recruit at Fpa * number of recruits).

- Time series of SSB, annually up-dated to reflect latest VPA or another indicator reflecting stock abundance under long term sustainable conditions.

- Indication of the multi-species effect, e.g. probability distribution that all stocks will recover at the same time, if management is properly implemented.

If information about fishing mortalities and SSB does not exist, which is the case for a number of management areas, only the TAC fixed for the management area is used in the calculation.

5. EIAA model equations

The EIAA model computes future landings value and costs by use of recorded baseline information, which is a three years average, and future TACs as proposed by the EU Commission, ICES et. al.

5.1. Landings of quota species in future periods:

The landing of quota species in future periods per fleet segment is calculated by taking the quota share of the country of the total EU-TAC and distribute that by use of the fleet segments share of the national share in the baseline period. The degree to which the quota is exhausted is taken into account by use of an up-take-ratio:

1.1 $$L_{t,i,j,m} = \left(\sum_a Q_{t,i,a} \cdot ns_{i,a,m} \right) \cdot nu_{i,m} \cdot \left(\frac{L_{0,i,j,m}}{L_{0,i,m}} \right)$$

where $nu_{i,m}$ can be changed and is defined as:

1.2 $$nu_{i,m} = \frac{\sum_j L_{0,i,j,m}}{\sum_a Q_{0,i,a,m}}$$

$L_{0,\,i,\,m,\,j}$	Member State *m* landings at base years of species *i* by fleet segment *j* (exogenous variable)
$L_{t,\,i,\,j,\,m}$	Member State *m* landings at year *t* of species *i* by fleet segment *j* (endogenous variable)
$Q_{t,\,i,\,a}$	Quota at year *t* of species *i* in area *a* (exogenous variable)
$ns_{i,\,a,\,m}$	Relative stability i.e. Member State *m* share of species *i* in area *a* (parameter)
$nu_{i,\,m}$	Member State *m* quota uptake ratio of species *i* (parameter, calculated by the model). Can be changed for future years
$Q_{0,\,i,\,a,\,m}$	Member State *m* quota in base years of species *i* (exogenous variable)

The following is described on Member State level. Therefore *m* is omitted.

5.2. Prices in future periods

After the calculations of future landings prices are calculated. First the baseline prices are calculated from the landings value and the landings volume. Then, assuming that the price of each species in the future is a function of the total EU-TACs, future prices are calculated. The function includes a price flexibility rate which is fixed at –0.2 as a default rate:

2.1 $$P_{0,i,j} = \frac{TR_{0,i,j}}{L_{0,i,j}}$$

2.2 $$P_{t,i,j} = P_{0,i,j} \cdot \frac{\sum_a Q_{t,i,a}^{\alpha_i}}{\sum_a Q_{0,i,a}^{\alpha_i}}$$

$\alpha_i \leq 0$

$P_{0,i,j}$	Fish prices in base years of species *i* by fleet segment *j* (endogenous variable)
$L_{0,i,j}$	Landings of quota species *i* in base years by fleet segment *j* (exogenous variable)
$TR_{0,i,j}$	total revenue of quota species in base years of species *i* by fleet segment *j* (exogenous variable)
$P_{t,i,j}$	Fish prices year *t* of species *i* by fleet segment *j* (endogenous variable)
α_i	Price flexibility of quota species *i*. Can be changed

5.3. Gross revenue in future periods

Gross revenue (total revenue) in future periods is calculated by the computed landings and prices for the future period. The value of non-quota species are calculated from baseline information and added to the computed future value of quota species. Finally the computed gross revenue for the future period is adjusted with a coefficient to account for income outside fisheries etc.:

3.1 $$TR_{t,j} = (\sum_i P_{t,i,j} \cdot L_{t,i,j} + K_{t,j}) \cdot \frac{GR_{0,j}}{\sum_i P_{0,i,j} \cdot L_{0,i,j} + K_{0,j}}$$

where $K_{t,j}$ is defined as:

3.2 $$K_{t,j} = TR_{0,j} - \sum_i P_{0,i,j} \cdot L_{0,i,j}$$

and $GR_{0,j}$ is defined as:

3.3 $$GR_{0,j} = TR_{0,j} + O_{0,j}$$

$TR_{t,j}$	Total revenue at year *t* by segment *j*
$K_{t,j}$	Landings value at year *t* of other species than quota species of segment *j*
$GR_{0,j}$	Gross revenue including non-fisheries specific income of segment *j*
$O_{0,j}$	Income from non-fisheries specific activities of fleet segment *j*

5.4. Variable costs in future periods

A fleet activity variable *A* is calculated and used in the model to adjust variable costs. Changes are considered only within fleet segments, not between segments. The calculation of the fleet activity variable consists of three steps. The rationale behind this procedure is the (well known) Cobb-Douglas type production function where an explicit functional form a fleet segment and a single species is:

4.1 $$A = a * \frac{p(TL)L^{\chi}}{SSB^{\beta}}$$

where

A: fleet activity
a: coefficient
p: price as a function of aggregate landings TL on EU level
L: landings per segment
SSB: spawning stock biomass
chi and beta are parameters (flexibilities)

Expanding this expression in terms of time, species and fleet segment one gets the expression that is applied in the model:

4.2 $$A_{t,j} = \sum_i \left(\frac{L_{0,i,j} \cdot P_{t,i,j}}{\sum_i L_{0,i,j} \cdot P_{0,i,j}} \cdot \left(\frac{L_{t,i,j}}{L_{0,i,j}} \right)^{(\chi_{i,j})} \cdot \left(\frac{SSB_{t,i}}{SSB_{0,i}} \right)^{(-\beta_i)} \right)$$

$\chi \geq 0$; and $\beta \geq 0$

4.3 $$RC_{t,j} = RC_{0,j} \cdot A_{t,j}$$ function of quota species only, or

4.4 $$RC_{t,j} = RC_{0,j} \cdot AA_{t,j}$$ function of all species

where

4.5 $$AA_{t,j} = A_{t,j} \cdot \frac{\sum_i P_{t,i,j} \cdot L_{t,i,j}}{TR_{t,j}} + \frac{TR_{t,j} - \sum_i P_{t,i,j} \cdot L_{t,i,j}}{TR_{t,j}}$$

$A_{t,j}$ 'Activity coefficient' as a function of quota species at year *t* of fleet segment *j;* $A_{0,j} = 1$ (endogenous variable) calculated for the baseline

$L_{t,i,j}$ Landings in volume in baseline period 0, and TAC in period *t* of species *i* by fleet segment *j*

$P_{t,i,j}$ Prices in period *t* of species *i* by fleet segment *j*

$SSB_{t,i}$ Spawning stock biomass at year *t* of species *i* (exogenous variable)

$AA_{t,j}$ 'Activity coefficient' as a function of quota and non quota species at year *t* of fleet segment *j;* (endogenous variable)

$\chi_{i,j}$ 'Technology flexibility rate' of quota species *i* by fleet segment *j*

β_i 'Stock – effort' flexibility rate of quota species *i*

$RC_{t,j}$ Running costs at year *t* of fleet segment *j,* includes fuel and other fishing days dependent costs (endogenous variable)

$RC_{0,j}$ Running costs at base years of fleet segment *j,* includes fuel and other fishing days dependent costs (exogenous variable)

The *'P-element'* account for incentives to reallocate effort as a function of changes in relative prices. Note that future prices depend on the price flexibility rates, see equation 2.1 and 2.2.

The *'L-element'* accounts for technological accessibility. If χ is zero the fish is easily accessible, and when χ increases if accessibility becomes harder. The default value in the model is $\chi = 1$. The inclusion of the element makes it possible to distinguish between different accessibilities in particular for demersal and pelagic species and different fishing technologies.

The *SSB-element* accounts for accessibility caused by stock abundance. $\beta = 0$ implies there is no stock abundance effect on activity. With full effect $\beta = 1$. Default values are between 0.6 and 0.8 for demersal species and between 0.1 and 0.2 for pelagic species

When the A-variable is calculated for each fleet segment the recorded variable costs $RC_{0,j}$ for the baseline period is multiplied with *A* to obtain variable cost for the future period. A numerical example in annex table 1 shows the calculation of A_t in the lower right hand cell.

The model contain to options for calculating *A*. One option takes into account only the effect of changes in the quota species. The second options denoted *AA* is adjusted for the share of the value of the quota species relative to the total landings value.

By use of that procedure it is assumed that each species in the landings composition could be caught separately which makes it possible to add the cost share oh each species. However in many fisheries joint production prevails entailing that species are caught in fixed proportions. These fixed proportions are however changed in future periods by change of the quota compositions.

Further to the variable costs the crew share is calculated in the model for the baseline period by taking the costs of the crew relative to the gross revenue.

4.6 $$CC_{t,j} = cc_{0,j}\, TR_{t,j}$$

where $cc_{0,j}$ is defined as:

4.7 $$cc_{0,j} = \cdot \frac{CS_{0,j}}{GR_{0,j}}$$

$CC_{t,j}$ Crew share at year *t* of fleet segment *j* (endogenous variable)

$CC_{0,j}$ Crew share coefficient in base years of fleet segment *j* (endogenous variable)
$CS_{0,j}$ Crew share in base years of fleet segment *j* (exogenous variable)

5.5. Fixed costs

Fixed costs are assumed constant i.e. transferred from the baseline period to the future period. The model distinguish between fixed costs related to the operation of the vessel and fixed capital costs

5.1 $$FC_{t,j} = FC_{0,j}$$

5.2 $$DC_{t,j} = DC_{0,j}$$

FC_j Fixed costs, fleet segment *j,* other than *DC* and *RC*
DC_j Depreciation and interest costs, fleet segment *j*

5.6. Indicators of economic performance:

A number of economic indicators are calculated as shown by the subsequent expressions.

Cash Flow:

6.1 $$GF_{t,j} = TR_{t,j} - (RC_{t,j} + CC_{t,j} + FC_{t,j})$$

Net profit:

6.2 $$NP_{t,j} = TR_{t,j} - (RC_{t,j} + CC_{t,j} + FC_{t,j} + DC_{t,j})$$

Operating profit margin:

6.3 $$OPM_{t,j} = \frac{TR_{t,j} - (RC_{t,j} + CC_{t,j} + FC_{t,j} + DC_{t,j})}{TR_{t,j}}$$

Gross value added:

6.4 $$GV_{t,j} = NP_{t,j} + CC_{t,j} + DC_{t,j}$$

$GF_{t,j}$ Gross cash flow at year *t* of fleet segment *j*

$NP_{t,j}$ Net profit at year t of fleet segment j
$OPM_{t,j}$ Operating profit margin at year t of fleet segment j

5.7. Break even and 'over capacity'

The EIAA model contains information that makes it possible to calculate the gross revenue that is required to cover fixed costs exactly with the given variable costs. That is denoted the Break-even revenue. With salary to the owner/skipper of the vessel included in the variable cost the Break-even revenue is the revenue that equals net profit at zero.

Break-even Revenue = (Depreciation + Interest) * Revenue / (Revenue - (Fuel C. + Running Costs + Vessels Costs + Crew Share)) or BeR = Fixed costs * Revenue / Gross Cash Flow if vessels costs are included in fixed costs.

If Break-even revenue and the actual revenue is compared an indication of the change of the fixed costs in order to comply with break-even is obtained. Assuming that fixed costs are a proxy for capacity an indication of over and under capacity is provided. The result does not indicate whether a required change in fixed cost actually is possible, only that it is necessary.

Further it is possible with the information in the model to estimated remuneration of the fish stocks i.e. include resource rent. Required resource rent is include in the fixed costs of a fleet segment, and the obtained result indicates the level of capacity if the 'capital' fish resources is remunerated in the same way as the capital invested in fishing vessels.

7.1 $$BR_{t,j} = \frac{(DC_{t,j} + [FC_{t,j}]) \cdot TR_{t,j}}{GF_{t,j}}$$

Note: Inclusion of $FC_{t,j}$ is subject to consideration; therefore in bracket

Definition: Over-capacity = 1- Revenue / Break-even Revenue

7.2 $$OC_{t,j} = 1 - \frac{TR_{t,j}}{BR_{t,j}}$$

The value share of the fish stocks subject to quotas of each fleet segment and Member State is calculated:

7.3 $$SSBLC_{t,i,j,m} = rl \cdot P_{t,i,j,m} \cdot \left(\sum_a SSB_{t,i,a} \cdot ns_{i,a,m} \right) \cdot nu_{i,m} \left(\frac{L_{t,i,j,m}}{L_{0,i,m}} \right)$$

Break-even with quota fish stock value included (subsequently Member State i.e. m is omitted):

7.4 $$BRLS_{t,j} = \frac{(DC_{t,j} + \sum_i SSBLC_{t,i,j} + [FC_{t,j}]) \cdot TR_{t,j}}{GF_{t,j}}$$

7.5 $$OCLS_{t,j} = 1 - \frac{TR_{t,j}}{BRLS_{t,j}}$$

Calculation of other species excl. quota species are calculated:

7.6 $$SSBNC_{t,i,j} = rn \cdot SSBLC_{t,i,j} \frac{TR_{0,j} - \sum_i P_{0,i,j} \cdot L_{0,i,j}}{\sum_i P_{0,i,j} \cdot L_{0,i,j}}$$

7.7 $$BRTS_{t,j} = \frac{(DC_{t,j} + \sum_i SSBLC_{t,i,j} + \sum_i SSBNC_{t,i,j} + [FC_{t,j}]) \cdot TR_{t,j}}{GF_{t,j}}$$

Note: Inclusion of $FC_{t,j}$ is subject to consideration; therefore in bracket

7.8 $$OCTS_{t,j} = 1 - \frac{TR_{t,j}}{BRTS_{t,j}}$$

$BR_{t,j}$	Break-even at year *t* of fleet segment *j*. It is optional to include *FC*
$OC_{t,j}$	Over capacity at year *t* of fleet segment *j*
$SSBLC_{t,i,j}$	Spawning stock biomass costs of quota species at year *t* of species *i* by fleet segment *j*
rl	Remuneration percentage of the quota fish stocks
$BRLS_{t,j}$	Break-even at year t of fleet segment *j* including remuneration of quota species
$OCLS_{t,j}$	Over capacity at year *t* of fleet segment *j* taking stock remuneration (resource rent) of quota species into account
rn	Remuneration percentage of the non quota fish stocks
$SSBNC_{t,i,j}$	Stock biomass costs of non quota species at year *t* of species *i* by fleet segment *j*
$BRTS_{t,j}$	Break-even at year t of fleet segment j including remuneration of quota species
$OCTS_{t,j}$	Over capacity at year *t* of fleet segment *j* taking stock remuneration (resource rent) of quota and non quota species into account.

Fixed costs are divided between fixed operational costs on one-hand and depreciation and interest payments on the other. These are maintained constant throughout time.

Annex table 5.1. Numerical example of the calculation of fleet activity A

	Landings and quotas											**Stock abundance SSB**				**Total**
	Base year			Year t								Base	Year t			Year t
Species	Landings/ quotas	Price	Revenue	Quota	Price flexibility	Price	Revenue	'Price effect'	Chi (χ)	'Volume effect'	Total effect	SSB	SSB	Beta (β)	'SSB effect'	Total effect
1	50	12.0	600	50	-0.2	12	600	0.308	1	1	0.308	200	200	1	1.000	0.308
2	40	10.0	400	30	-0.2	10.5	420	0.215	1	0.75	0.162	150	100	1	1.500	0.242
3	30	5.0	150	45	-0.2	4.5	135	0.069	1	1.5	0.104	100	200	1	0.500	0.052
4	10	70.0	700	15	-0.2	63	630	0.323	1	1.5	0.485	50	75	1	0.667	0.323
5	5	20.0	100	7.5	-0.2	18	90	0.046	1	1.5	0.069	50	75	1	0.667	0.046
Total	135		**1950**	147.5			1875	0.962			1.12692					0.971

The activity variable A for period t is in this example 0.971.

6. The workbook

The model is constructed in an Excel workbook. A workbook contains all the formulas of the model. The model is constructed by use of cell-references named arrays and if-sentences. No macros or virtual basic is used.

All the data information of EU quota-management areas and fish stocks is included in every workbook. The quota-management areas and the stock information are updated every year and the reason for the inclusion of that information in all workbooks is to avoid mistakes with respect to these two variables.

A workbook is *country specific* i.e. costs and earnings information is included in separate workbooks for each country. The country workbook comprises currently up to four fleet segments. More fleet segments can be handled by using several workbooks for one country.

When a workbook is used for one particular country, a country code specified in every workbook must be invoked to extract the quota and the fish stock information from the data sheets for that particular country.

A workbook is organised in 17 sheets:

1. Guidelines that explain what is included in the workbook
2. AER Input that included cost and earning information copied from the AER. Catch compositions in volume and value on national level and on fleet segment level are included here as well.
3. Selected economic indicators and result figures in € on fleet segments
4. Detailed result tables on fleet segments
5. Selected economic indicators and result figures in national currency on fleet segments where that apply
6. Figures showing 'overcapacity' base on the 'break-even principle'
7. Allocation of shares of spawning stock biomass on fleet segment in terms of value
8. Catch-effort and stock-catch flexibility rates. Parameters that can be changed
9. Calculated up-take-ratios. Can be changed
10. Price flexibility rates and calculated prices
11. Fleet segment shares of national quota. Can be changed
12. Spawning stock biomass information on quota management areas
13. Long term TAC on quota management areas
14. EU TAC for the base years and the coming year on quota management areas
15. Relative stability matrix i.e. Member State share of TAC per area
16. Calculation of fleet activity changes
17. Auxiliary information such as exchange rates, deflator indices and interest rates

I relation to these sheets the latest version includes to more sheets (19 in total): one with capacity data from the AER and one with capacity adjustment calculations (adjustment of number of vessels and fixed costs) in the long run assuming use of maximum number of fishing days per year