

**EUROPEAN COMMISSION  
DGXIV (FISHERIES)**

**REGIONAL SOCIO-ECONOMIC STUDIES ON  
EMPLOYMENT AND THE LEVEL OF DEPENDENCY ON  
FISHING**

**DENMARK (Lot 3)**

**FINAL REPORT  
NOVEMBER 1999**

*BY*

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## ACRONYMS

<b>Amt</b>	County (NUTS 3, Amter)
<b>CFP</b>	Common Fisheries Policy
<b>DC</b>	Direct Coefficients
<b>DoF</b>	Directorate of Fisheries
<b>DKK</b>	Danish Krone
<b>EAGGF</b>	Agricultural Guidance and Guarantee Fund
<b>ERDF</b>	Regional Funds
<b>ESF</b>	Social Funds
<b>FAO</b>	Food and Agriculture Organisation (UN)
<b>FIFG</b>	Financial Instrument for Fisheries Guidance
<b>Fte</b>	Full-Time Equivalent
<b>GDP</b>	Gross Domestic Product
<b>GNP</b>	Gross National Product
<b>GRIT</b>	Generation of Regional Input-Output Tables
<b>GT/GRT</b>	Gross Tonnage / Gross Registered Tonnage
<b>GVA</b>	Gross Value-Added
<b>ICES</b>	International Council for the Exploration of the Seas
<b>IDC</b>	Indirect and Direct Coefficients
<b>IFM</b>	Institute for Fisheries Management
<b>Kw</b>	Kilowatts
<b>LQ</b>	Location quotient
<b>MFAF</b>	Ministry of Food, Agriculture and Fisheries
<b>MAGP</b>	Multi-annual Guidance Programme
<b>NUTS</b>	Nomenclature des unités territoriales statistiques
<b>OP</b>	Operational Programme
<b>SDU</b>	University of Southern Denmark
<b>SJFI</b>	Danish Institute of Agriculture and Fisheries Economics
<b>TAC</b>	Total Allowable Catch
<b>VCR</b>	Vessel Construction and Repair

## 1 INTRODUCTION

This report is presented by MacAlister Elliott & Partners in association with the Centre for Agricultural Strategy, University of Reading (UK). The objectives of this study (Lot 3) for the European Commission DGXIV (Fisheries) are as follows:

- Quantify and describe the socio-economic importance of the fishing industry in Denmark
- Determine the level of dependency of these areas on fishing in terms of value-added, employment and quotas
- Compare the development of the industry since 1991
- Examine the extent to which the EU socio-economic measure have been implemented and have affected the industry

The study results will be used by the Commission to prepare future structural assistance programmes and assist in targeting supporting measures at the areas most dependent on the fishing industry.



**Figure 1** Map of Denmark showing NUTS 3 counties, main fishery harbours and case study areas

## 2 EXECUTIVE SUMMARY

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### 2.1 METHODOLOGY

Data sources used in the study included:

- Directorate of Fisheries (DoF)
- Danmarks Statistik
- SJFI (Danish Institute of Agriculture and Fisheries Economics)
- Dansk Havbrugerforening f.m.b.a. (Danish Association of Mariculture)
- Danish Environmental Agency
- University of Southern Denmark (SDU)

Data was reviewed at the NUTS 3 level to provide a brief analysis of the fishing industry including SWOT analyses. Where possible, data and statistics were collected for the study reference year of 1997 although some data was only available for 1996.

Economic indicators of dependency characterising the fishing industry were calculated in the form of three dependency ratios (gross value-added, employment and dependency on landings of species subject to quotas) at NUTS 3 levels.

Data was collected for the case study areas of Bornholm County and Esbjerg municipality using on-site primary data collection, analysis of regional economic data sets and review of previous reports and studies. Employment multipliers were calculated for the case study areas using the Generation of Regional Input-Output Tables (GRIT) technique.

The development of the industry was also evaluated and discussed by comparing data sets with those presented in the previous 'Regional, Socio-economic Study in the Fisheries Sector' (Denmark)<sup>1</sup> and using time-series data where available.

The actual and perceived impact of the EU Structural Funds, particularly FIGG and the Pesca Initiative, were determined through programme expenditures, a telephone survey of program administrators and key people from the industry.

### 2.2 BRIEF ANALYSIS OF FISHING AND RELATED ACTIVITIES

Denmark has a population of 5.27 million (1996), land area of 43,100 km<sup>2</sup>, coastline of 7,314 km and population density of 122 people per km<sup>2</sup>. Seasonally adjusted unemployment in April 1999 was 5.8% of the total labour force, with the main employment sectors being public and private services, manufacturing and local government.

#### 2.2.1 General

In 1997 the fleet consisted of 4,582 vessels, of which some 3,300 are less than 10 GRT. Around 39% of the fleet is made up of vessels less than 6 metres in length, 71% by vessels less than 10 metres and 94% by vessels less than 20 metres.

Vessels less than 100 GRT fish almost exclusively for fish for human consumption, whilst the larger vessels fish for herring for human consumption and species destined for fishmeal reduction. The Danish fishery mainly targets single species rather than multi-species fisheries, with stern trawling being the principal method of fishing in terms of volumes landed.

While the most important regions in terms of numbers of fishing vessels are Storstrøms, Fyn, Ringkøbing and Nordjylland, the majority of fishing capacity, measured in gross vessel tonnage, is

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<sup>1</sup> Commission of the European Communities (CEC). Directorate General for Fisheries (DGXIV), 'Regional, Socio-economic Study in the Fisheries Sector, Denmark' 1992

located in the Ribe region. Danish fishing vessels are on average about 30 years old which makes the Danish fleet one of the oldest in the EU.

Danish nominal catch in 1997 for human consumption was approximately 330,000 tonnes valued at DKK 2,160 million. The catch for reduction to fishmeal and oil was about 1.4 million tonnes valued at DKK 1,115 million, with this product largely destined for the West coast ports of Esbjerg, Thyboeroen, Hanstholm, Hirtshals, and Skagen.

Traditional fishing grounds are located in the North Sea (ICES area IVa,b,c), Skagerrak/Kattegat (area IIIa) and the Baltic Sea (area IIIId), with main fishing ports located along the North and West coast of Jutland. Bornholm Island, in the Baltic Sea, is the centre for landings from the Baltic Sea.

Cod, flatfish, Norway lobster, mackerel and herring account for more than 60% of the value of landings to Danish ports, with cod, herring and mackerel being the principal quota species in terms of the volume of landings.

Denmark is a net exporter of fish products, with exports in 1997 of DKK 15,464 million and imports of DKK 8,408 million. Much of the imports are subject to re-export following processing by the country's large, and high-technology, processing sector. A substantial part of the fish caught for human consumption and landed in Denmark is exported as gutted, whole, fresh fish or as fresh or frozen fillets. However, the Danish processing industry makes a variety of further processed products, including frozen retail packed commodities of nearly all fish species landed and canned products of mainly herring and mackerel.

Inland capture fisheries are negligible, but freshwater aquaculture produced 32,000 tonnes of rainbow trout in 1997, valued at DKK 482 million, and 1,200 tonnes of eel in 1996, valued at DKK 86 million. The mariculture industry consists of 28 sea cage farms and land-based saltwater aquaculture plants that produced 7,352 tonnes of rainbow trout in 1998, valued at DKK 150 million.

### **2.2.2 Employment**

The fish production and processing industries and related services employed about 18,144 fte persons in 1997, consisting of 6,850 commercial fishermen (1,000 of whom are aquaculture/mariculture workers) and 6,400 processing workers. An additional 3,700 people are employed in wholesale and retail operations.

No data is available on employment specific to the fisheries sector in related service sectors, but it is estimated that if people employed in service functions (such as rope and net production, shipyards and marine engine repairs) are included, about 3% of total employment in the private sector in Denmark is dependent on fisheries.

In Denmark as a whole, 58% of those employed in the catching sector are self-employed, but in some regions the figure is much higher (e.g. 86% of those employed in Kobenhavn/Roskilde are self-employed). Ringkøbing/Viborg and Nordjylland are the most important regions in terms of numbers of people employed in both the catching and processing sectors.

Danish statistics on employment cannot be separated by gender or educational background for the fisheries sector, neither do they give a good picture of the breakdown of full and part time employment, except for the processing industry. It is known however, that the industry is characterised by significant annual fluctuations in employment.

### **2.2.3 Ownership**

Denmark has a privately owned production sector that is supported by a large public sector supplying public goods, services and infrastructure. Processing, wholesale, export and service facilities are all privately owned, but thoroughly regulated to counteract externalities such as health hazards to consumers and employees, environmental degradation, tax evasion, etc.

## 2.3 QUANTIFYING, DESCRIBING AND EXAMINING THE LEVEL OF DEPENDENCY

### 2.3.1 Ratios

A series of ratios were used to examine dependence on the fishing sector.

Ratio 1 (share of value added) shows that almost 3% of the total GVA in Bornholm comes from the capture fishing and aquaculture sectors. Other areas very dependent are the counties on the West coast of Jutland (Ringkjøbing and Ribe) and the county of Nordjylland.

Ratio 2 examines the level of dependency on employment in capture fishing and processing as a proportion of total employment in areas at the NUTS 3 and 5 levels. The most dependent municipalities are Holmsland, Thyborøn-Harboøre and Læsø with estimated fishery enterprise employment of 19.0%, 18.5% and 16.3% respectively of total employment in the same area. Esbjerg has the largest estimated fishery enterprise employment, but also has a large total employment and therefore ranks as only the 26<sup>th</sup> most dependent region.

Ratio 3 determined the proportion of landings value in an area that is subject to EU quota. Main landing sites in Denmark are all extremely dependent on EU quotas with the ratio for 14 main landing sites being between 84% and 97%. The harbours of Bornholm have the highest dependencies of all Danish landings sites.

### 2.3.2 Case Studies

Case studies examining the level and variety of dependency on fishing were carried out for the NUTS 3 island of Bornholm and NUTS 5 Esbjerg municipality. Both areas display high levels of public sector employment of 30-40%.

Bornholm is a remote island in the Baltic Sea, traditionally highly dependent on fishing. Decreases in landings with the decline in the Baltic cod stock and the changing landing patterns of foreign vessels, have had a severe impact upon the fishing community. The local fleet reduced in number by about one-third from 1987 to 1996, and employment has fallen by about 30% in the processing sector, which is dominated by the production of frozen cod blocks. The situation in Bornholm has been made worse with the increase in competitive services around the Baltic Sea following liberalisation of the former Eastern Bloc states, which has reduced Bornholm's traditional importance as the major centre of Baltic Sea landings.

Esbjerg is located in Ribe County, on the South Western coast of Jutland, and has a high level of landings destined for the fish meal industry. The value of landings into Esbjerg has fallen by 25% since 1991 as a result of declining cod stocks, and the failure of the large seine fleet, that used to target plaice, to modernise its fishing techniques; the seine fleet has now switched its efforts to catching species for fish meal. The processing industry that relied on cod and flat fish landings for processing has also been badly affected, and processing activities are now strongly focused on fish reduction activities.

The following table highlights the importance of fishing in Bornholm and Esbjerg.

#### Indicators of Dependency

Ratio	Bornholm (%)	Esbjerg (%)	Denmark (%)
1 fishing GVA/total GVA	2.95%	* 1.49%	0.334%
2a fishing/total employment	1.72%	1.43%	0.29%
2b processing/total employment	4.35%	1.50%	0.32%
3 proportion of quota species landed ♣	95%	76%	83%

- NB
1. Bornholm displays the highest value of Ratio 1 of all NUTS areas in Denmark
  2. Within Bornholm, the community of Neksø exhibits a employment dependency of 9.3%
- \* calculated for Ribe County
- ♣ quota species for human consumption, by value

### 2.3.3 Multipliers

Two sets of employment multipliers (forward and backward) were calculated for the fishing and processing industries in the NUTS 3 regions of Bornholm and Ribe. In 1992 Danmarks Statistik published national backward employment multipliers for capture fishing of 1.6 and 3.4 for fish processing. The results are summarised in the following table and discussed in Section 5.3.4.

#### Multiplier results for case study areas

	Bornholm	Ribe
<b>Backward Multipliers</b>		
0500 Fishing	1.26	1.43
1509 Mfr. of food, beverages and tobacco	2.90	3.16
<b>Forward Multipliers</b>		
0500 Fishing	1.44	1.45
1509 Mfr. of food, beverages and tobacco	1.57	1.61

## 2.4 EXAMINATION OF THE DEVELOPMENT OF THE INDUSTRY

### 2.4.1 Comparison with previous study

The previous 1991 study chose to define fisheries dependent areas, using the notional areas Zone 1: Western Jutland, Zone 2: Northern Jutland and Zone 3: Bornholm. These zones are based on NUTS 5 areas which do not aggregate to NUTS 3 Counties, the level at which this study presented most data.

### 2.4.2 Development of the economy and industry

Cod is still the most important species being landed in Denmark in terms of value, followed by sand-eel, plaice, and herring. However, the value of cod landings decreased by 37% from 1990-1996.

A comparison of capture employment data at the national level shows that there has been a 16% decrease in capture fishing employment from 6,956 fishermen in 1990<sup>2</sup> to 5,866 fishermen in 1996. Landings have decreased in value from 1990-1996 by 13%. The number of vessels over five GRT/GT has decreased by 27% over the same period and the overall GRT of the fleet has fallen by 22%.

Total fish sector<sup>3</sup> employment in Zone 1 fell by 23% between 1991 and 1996; in Zone 2 the reduction was 17% over the same period and in Zone 3, 24%. These dramatic changes were particularly felt in fish processing employment; total numbers employed have fallen from 9,352 in 1990<sup>4</sup> to 7,661 in 1996, equating to a 20% decrease. Employment in wholesale and retail activities has also declined, but increased in the fish meal industry, which is relatively much smaller.

There has been an increase in mariculture but freshwater trout aquaculture employs fewer people in 1996 (about 620) than in 1990, even though there are 5-10% more plants operating. Eel farming employs more people since 1990 but the industry had consolidated and there are now fewer plants.

## 2.5 EXAMINATION OF SOCIO-ECONOMIC MEASURES

### 2.5.1 Support measures

For the period 1994-1999, the EU made available EURO 139 million for FIFG measures and EURO 17 million for the PESCA initiative, for support to the fisheries sector in Denmark. FIFG funds have been complemented by EURO 76 million from Danish public funding, and EURO 222 million from the private sector, forming Denmark's OP for fisheries (1994-1999).

<sup>2</sup> Table VII (pg. 13) 1991 regional study

<sup>3</sup> 'fish sector' includes capture, culture, processing, fish meal, wholesale, auction and retail sub-sectors

<sup>4</sup> Table XIII (pg. 18) 1991 regional study

The regional development fund (ERDF), the social fund (ESF) and the agricultural guidance and guarantee fund (EAGGF) were not used in Denmark for fisheries or fisheries-related purposes to any significant extent, although selected areas of Denmark did receive Objective 2 and Objective 5b status between 1994 and 1999.

Two national programmes, that have also helped develop and support the fishing industry, are the 'FOETEK Programme' (a food technology programme), and the 'herring endowment project'. The latter was part of the Danish government's 'Bornholm package', implemented to alleviate the consequences of the crisis caused by the decline of the Baltic cod stock in the early 1990s, and the impact of the liberalisation of the old Eastern Bloc countries.

### **2.5.2 Actual impact**

There has been a strong emphasis on the FIFG decommissioning scheme which is estimated to have resulted in a 16% decrease in fishing employment between 1991 and 1996. Redundant young fishermen on the West coast of Jutland have been absorbed into the manufacturing industry and fishermen tend not to have difficulties in finding alternative work on land.

If decreased employment in the fishing sector (particularly in the processing sector) is considered a problem, then subsidies can be viewed as having had a negative effect. However, because of the strong condition of the Danish economy, there is a general labour shortage in other sectors providing employment opportunities for those previously employed in the fishing sector. The support measures have contributed to an improvement in the competitive strength of the fishing sector as a whole being undertaken in labour-saving production factors.

The allocation of PESCA funds is much smaller than that allocated under FIFG measures. Projects eligible for subsidies were carried out in 38 municipalities and the island of 'Christiansoe', east of Bornholm.

### **2.5.3 Perceived impact**

Interviews conducted with key industry players, found that the 'decommissioning' and 'processing/marketing' measures are considered to have reduced employment in the fish sector as a whole, but that the reduction would have been greater if there had been no subsidies at all. When one considers the cost structure of the industry in the face of the declining availability of domestic supplies of fish (from quota reductions), imports restricted by import prices, and high transportation costs, the economic viability of the industry in the long-run was doubtful.

There is some concern about restrictions of the decommissioning scheme caused by the high debt rates characterising Danish vessel owners and that because of the restrictive policy with respect to new investments, the average age of the Danish fishing fleet has actually increased. However industry leaders surveyed indicated that the impact of the decommissioning programme was 'very significant'.

Aid offered to fishermen to encourage early retirement is perceived to have had 'no impact' as fishermen base their retirement decisions almost entirely on state operated schemes. Generally, the capture sector is more concerned about generational change - attracting new entrants at the same time as making provision for those retiring - rather than retirement schemes on their own.

When asked about the possible result of introducing payments to fishermen who lose jobs on vessels, industry leaders felt that such a scheme would have 'limited' or 'no impact' because of the current provision of general labour market schemes in Denmark (retraining, education), widespread membership of unemployment schemes and strong labour market on land.

Respondents to the survey considered the impact of FIFG funding on processing, marketing and aquaculture was 'moderate' to 'very significant' and that the Pesca Initiative was 'very significant'.

### **2.5.4 Obstacles to development, employment and diversification**

Primary obstacles to development of the all sub-sectors of the industry were perceived to be the complexity and cost of compliance with regulations, whilst opportunities in the catching sector were

thought to be limited due to limits on increasing catches and in the culture sector due to limits on water resource utilisation. Secondary obstacles to development in the capture and culture sectors include lack of finance and its high cost, whilst there was felt to be a shortage of labour in the capture sector. No sectors felt that there was any lack of labour skills, however about 20% of the companies in the processing survey said that in the future they were afraid of not getting enough labour. The need for new technology was felt to be important in terms of fleet renewal in the capture sector, product development in processing and new species in aquaculture.

Employment expansion in the capture fishery sub-sector is not seen as a possibility by industry leaders. Employment opportunities on land are perceived to be quite good at the moment. The Danish economy is strong. Though fishermen are officially classified as unskilled, their attributes are recognised by industry, particularly in relation to reliability and willingness to undertake shift work. Opportunities have been identified in the manufacturing and general service sectors. Limited opportunity is perceived in the agriculture, food processing or tourism industries. Employment is not perceived to have expansion potential in the aquaculture sector generally.

### **2.5.5 Populations at risk**

Analysis of the dependency on fish sector employment, absolute and proportionate decline in fish sector employment between 1991 and 1996, decrease in vessel power and decrease in the value of landings over the period in combination with the extent of dependency on quota species landings and ageing fleets, has been carried out to determine which municipalities are most at risk. Results indicate that four of Bornholm's municipalities are ranked as extremely dependent on the fishing sector, which accords with the information presented throughout the report and in the case study. The towns of Frederikshavn, Skagen, Hirtshals and Læsø in North Jutland and Lemvig in Ringkøbing County are also found to be particularly dependent on the fishery sector.

### **2.5.6 Suggestions for improvements**

Several suggestions are presented as ways of ensuring the viability of the industry, and of improving the socio-economic measures being supported by the EU:

- Measures should be designed to guarantee long-term, sustainable production and a competitive industry; if incomes to those employed in the fishing sector do not increase over time, the industry will lose its labour to other sectors.
- Viewed in the short-term, some support measures appear to be in contradiction with resource policy, because incentives are created which increase fishing effort.
- The problem of economic and social cohesion in Denmark, when considered in light of the regional consequences of different productivity (and income) developments, require income subsidies to activities in certain regions.
- The analysis of populations at risk highlights the fact that Bornholm, North Jutland and Ringkøbing are counties with the municipalities most dependent on the fishing industry. There is a strong argument that future Structural Funds and support measures to the industry should continue to be geographically targeted with special reference to the weakest areas.
- The use of support measures should be flexible so as to allow for frequent adjustment, based on regular socio-economic analyses financed from the 'socio-economic measures'.
- Grants to assist aquaculture production should continue to be aimed at promoting reduced environmental impact of production, so sustaining jobs and the supply of product. Grants to the eel sector are considered to be an inefficient use of funds. Grants for commercialisation of new aquaculture species are recommended.
- The effect of the decommissioning scheme has been that the fishing fleet has been reduced, but not necessarily in a way that has ensured that the least cost-efficient vessels have been removed.