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## **Abstract**

The objective of this paper is to examine the costs of managing the Baltic salmon fishery. To achieve we first review the theoretical framework about the costs of managing fisheries. Second, we describe the management system governing the Baltic salmon fishery. Finally, we estimate the costs of managing the Baltic salmon fishery based on the available data.

**Key words:** Fisheries management costs, Baltic salmon fishery

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## **1. Introduction**

Differences in the institutional arrangements of fishery management systems have increasingly attracted attention during the last decade. Previously overlooked, the costs of managing fisheries have proven substantial after a number of studies. Pioneering work in this field was done by Arnason *et al.* (2000), who compared the fisheries management costs of Iceland, Norway and Newfoundland in the 1990s. The OECD Committee for Fisheries was another main contributor in the area. In a study called *Transition to Responsible Fisheries* (OECD 2000) it estimated that USD 2.2 billion was spent annually on fisheries management, accounting for approximately 36 percent of total governmental financial transfers to the fishery sector. Further development was the publication of *The Costs of Managing Fisheries* (OECD 2003a), which provided a framework for categorising and understanding fisheries services, and several case studies.

This study of the costs of managing the Baltic salmon (*Salmo salar*) fishery presents an attempt to estimate these costs in a transboundary context. The collection of data for this exercise is problematic as it is often difficult to delimit the expenditures of a given authority or institution dedicated to managing a particular species. Further issues arise from the multilayer management structure, including international, EU, national and a number of regional and local bodies involved in the process. The typical studies conducted around the world focus on national or regionally bound fisheries, and less often on a single species fisheries through a national perspective.

The objective of this paper is to examine the costs of managing the Baltic salmon fishery. To achieve this objective the study has several tasks. First, to a review of the theoretical framework about the costs of managing fisheries. Second, to describe the management system, governing the Baltic salmon fishery. Finally, an attempt to estimate the costs of managing the Baltic salmon fishery, based on the available data is made. We will discuss the implications of the provided fisheries services and the expenditures made for them on the conservation of the stock and the prospects for the commercial fishery.

## **2. Background: fishery services and costs**

The classical theory of fishery economics has outlined the maximization of the present value of net benefits flowing from fish resources as a primary objective of fisheries management. This approach has however omitted for decades the costs of fishery management, which

according to a number of recent works appear to be far from negligible. Among the first concerned with the costs of fishery policy enforcement are Sutinen and Andersen (1985) and Anderson and Lee (1986). Especially, Sutinen and Andersen (1985, 388-389) point at the growing expenditures on fisheries law enforcement in the US<sup>1</sup> and quote a cost estimate of about USD 200 million annually at the beginning of the 1980s for research, administration and enforcement. Another attempt to bring attention to this issue, which has remained largely unnoticed, is the paper of Kuperan *et al.* (1998) on measuring the costs of small scale fisheries management in the Philippines under different management regimes.

As Whitmarsh and Charles (2001) report about the state of fisheries economics, the economics of compliance and enforcement, the costs of fishery management, and the institutional framework of regulation have become predominant themes during the last years. Among the acclaimed contributions in this field are the works of Arnason (1999) and Arnason *et al.* (2000), who compared the management costs of three fisheries in the 1990s. A substantial thrust to the research and assessment of management costs also provide the reports of the OECD Committee for Fisheries on the government financial transfers to the sector (OECD 2000) and especially on the costs of managing fisheries (OECD 2003a).

### ***The need for fisheries management***

In order to develop a framework for understanding and assessing of fisheries management costs, it is necessary to briefly present the current role of fisheries management.

It is generally recognised that the open access to fish resources leads to their overexploitation. To prevent such a development, analogous to the already classical tragedy of commons (Hardin 1968), governments have traditionally intervened with the intention to regulate the fishing industry in a way beneficial to fishermen, consumers, other stakeholders or society as a whole. As OECD (2003a) points out, the governments have recognised the need to ensure sustainable exploitation of renewable fisheries resources. This translates into the general objective to guarantee the optimum use of marine resources and of capital and human resources applied to the catching of fish. From an economic perspective the primary goal of fisheries management is to generate resource rent from the exploitation of fish resources, which is subject to sustainability considerations. Resource rent is the excess, in the long term,

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<sup>1</sup> The authors state that after the adoption of the Fishery Conservation and Management Act of 1976 the annual federal expenditures on fisheries law enforcement have more than doubled.

of revenues over the necessary costs of commercial operations in the fishery. The costs of operation include all normal cash expenditure plus depreciation, the opportunity cost of labour and capital, and a risk premium. Under open access, equivalent to no management, no resource rent would be realised in a fishery. This objective is therefore predominantly concerned with improving the economic efficiency and the economic viability of fishery. Other objectives pursued by governments in managing fisheries often have less to do with maximising economic return from a fishery but are directed more towards ensuring that equity and conservation concerns are addressed. Regarding social concerns governments often pursue objectives related to fair distribution of fishing rights, income and employment to specific groups or regions within a society. Considerations for conservation of the resource or its alternative uses (e.g. recreational fishing) may also be taken into account in setting fisheries management policies.<sup>2</sup> Fisheries management will, therefore, almost always involve a compromise resulting from the pursuit of different objectives and stakeholders interests, stemming from diverse social, political, legal, economic and biological factors (King 1995, 269).

### ***Defining fisheries services***

Fishery management costs are described by Arnason (1999, 5) as “... all expenditures on activities that are necessary to develop and operate the existing fisheries management system”. This definition excludes public expenditures, such as direct payments, cost-reducing transfers and market support. This is done on the basis that they are generally used to provide infrastructure support, reduce fisheries capacity or effort or to support post-harvest activities, and they have no particular connection to the actual management of fisheries. These expenditures can be viewed as adjustment costs during a certain period of time, rather than as a part of the on-going costs of fisheries management. Expenditures such as the running of lighthouses and harbours, the provision of weather forecast services or the implementation of safety measures at sea, which do not arise solely to support fishing activities but benefit also other maritime industries are excluded, as well.

As indicated by Arnason (1999), Schrank *et al.* (2003) and OECD (2003a) fisheries management activities are subdivided according to the types of services provided. The three broad components of fisheries services are:

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<sup>2</sup> See for example Sutinen and Johnston (2003).

- Research services (biological and economic research to inform fisheries management decision makers).
- Management services (design, implementation and administration of management policies and rules).
- Enforcement services (monitoring and enforcement of management rules).

Research serves as a basis for management decisions and the design and implementation of new management systems (Arnason 1999, Wallis and Flaaten 2003). Research activities or services include data collection, surveys, data analysis and stock assessment. Research activities are usually determined by the information needs of the decision makers that are implementing the management rules. For example, when setting the total allowable catch (TAC), information is usually required on the impacts of different catch strategies on the size of fish stocks. The number of stakeholders and their preferences about allocation of the resource among the interested parties and over time is also essential for distributing fishing licenses or quotas (Abdullah *et al.* 1998). The economic dimension of research normally covers issues like whether a change in the management system will increase the returns of fishers and society at large.

The creation and implementation of management rules usually comprises three functions (Wallis and Flaaten 2003, OECD 2003a):

- Adjusting management setting within an existing management system. An example of these types of adjustment is the annual process of setting TACs that commonly occurs within the EU and many other countries.
- Recommending amendments or additions to the existing management system. An example of this more fundamental form of change might be the decision to introduce new effort controls (e.g. limits on number of vessels) or output controls (e.g. vessel or fisher quotas).
- Administering the existing management system. This can include monitoring fishing licenses, permits, vessel numbers and catch returns.

Enforcement services involve surveillance of compliance with fisheries laws and regulations and prosecution of fishers who do not abide by these rules (Arnason 1999, OECD 2003a). Surveillance takes place at sea and on land. It often involves cooperation with the Coast

Guard or Navy and surveillance at sea consists of boarding of fishing vessels and checking licences, gear and size and composition of catch. Onshore monitoring may involve checking landings and accuracy of catch reports. Information collected onshore can be used for cross-checking of catch against licenses and quotas. Minor offences are usually punished by fines or the catch or gear being confiscated, while major offences are taken to the courts of law.

Resource maintenance, as defined by Abdullah *et al.* (1998), involves the costs of maintaining and enhancing the resource through long-term interventions. In the case of Baltic salmon examples of this are the restocking efforts and compensation schemes to counter negative consequences of development (e.g. damming of rivers by hydroelectric power plants).

### ***The benefits of managing fisheries***

Wallis and Flaaten (2003) point out that the levels of expenditure dedicated to managing fisheries suggest that the resource and its users are important to most governments. Fisheries services have the potential to create benefits for society and for groups within society, such as commercial fishers, consumers, recreational fishers, the broader community, minority or interest groups, and government agencies. These beneficiaries are often described as stakeholders in the fishery:

Commercial fishers can potentially benefit from fisheries services in three ways (OECD 2003a)<sup>3</sup>:

- Increasing output from the fishery by managing the stock in a way that maximises yields over the long run. This management objective may not coincide with maximising economic yield for commercial fishers, but for most exploited fish stocks it represents an improvement over the open access regime where rent is dissipated in the fishery.
- Reducing costs per unit of effort by reducing competition in the fishery. Reducing competition between the fishers, either by allocating individual output limits (e.g. individual quotas) or by limiting inputs (e.g. limits on the number and size of vessels), creates the opportunity for increased profits for involved fishers.
- Increasing the return per unit of output from the fishery. An example of this could be a change in the management system that allows fish to grow to a larger size before they

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<sup>3</sup> The original work on the beneficiaries of fisheries management is a paper by Haynes *et al.* (1986).

are harvested. If the market places a premium on larger fish, and the value of the earlier catch forgone is less than the premium, then fishers will have gained an additional benefit from the management system change.

Consumers will benefit from fisheries management if it results in higher catches and more stable supply. These benefits will be realised through the market as a decrease in the domestic price leading to an increase in consumers' surplus.

While the benefits received by commercial fishers and consumers are related to the functioning of the markets, there may be also potential non-market benefits (Wallis and Flaaten 2003):

- Recreational fishers benefit from fisheries services if they result in higher catches, less pressure on fish stocks and reduced crowding on fishing grounds. Sutinen and Johnston (2003) have called for full integration of the recreational sector into the management of fisheries as a way to reduce conflicts and improve the sustainability and value of marine recreational fisheries.
- Society benefits as a whole, if fisheries services maintain passive use values (e.g. existence and bequest values) of fish and other marine resources.
- Cultural minorities and indigenous people benefit where fisheries services provide for the interests and customs of these groups.

Government agencies may also be a beneficiary from the managing of fisheries (Wallis and Flaaten 2003). Bureaucracies often see the size of their budget as being directly and positively related to the value of their activities to society as a whole. Individuals within the bureaucracy also have the opportunity to gain from larger budgets. This means that expenditures may be larger than under more competitive or transparent conditions. If work of negligible value is undertaken, the benefits arising from the use of public funds would be received solely by the government agency concerned.

### *Cost drivers of fisheries services*

The cost effective provision of fisheries services raises the question whether there is an optimal level of the costs related to fisheries management. In which cases can costs be considered too high or too low? What criteria can be used to evaluate management costs and



is there any reliable benchmark? From an economic point of view it seems clear that the optimal level of management costs is the one that maximises the rent obtained from the fishing activity when taking into consideration all costs. However, there have been few attempts to model the costs of fisheries management, apart from earlier attention on enforcement (Sutinen and Andersen 1985, Anderson and Lee 1986) and the work of Arnason (1999).

According to OECD (2003a), due to the number of factors that are likely to influence the costs of managing fisheries, and the diverse characteristics of fisheries, it would be difficult to determine what would constitute an optimal level of expenditure on fisheries research, management and enforcement with any precision, even theoretically. Albeit, Arnason (1999) points out that fisheries management costs will generally lead to higher fishing effort and lower optimal biomass levels than suggested by conventional models.<sup>4</sup> His analysis (2003) suggests that the exclusion of an explicit fisheries management cost function would most likely lead to biased policy recommendations. The comparisons performed by Arnason *et al.* (2000) and OECD (2003a) indicate that it is worthwhile to examine the quality and value of provided fisheries services, as the empirical evidence shows that management costs vary between 3 and 20 percent (OECD 2003a) of the value of landings in OECD countries without any remarkable variance in the level of benefits produced by these services. Therefore, it is important to have an insight of the factors influencing the fisheries management costs.

The potential driving forces behind the costs of fisheries services can be divided into several large categories (Ulmas 2003, OECD 2003a): geographical, resource, industrial and institutional characteristics.

As pointed out by OECD (2003a) a positive relationship between the **geographical characteristics** of a country and the cost of providing fisheries services might be expected. Such geographical characteristics include the size of the Exclusive Economic Zone (EEZ), the length of the coastline and the proximity of other countries. It might be expected that the

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<sup>4</sup> Anderson and Lee (1986) reach a similar conclusion. Sutinen and Andersen (1985) also support that the presence of management costs will lead to lower optimal biomass levels compared to costless fishery management, but according to them there may be cases under which the optimal effort under costly enforcement is less than the costless perfect enforcement optimum. OECD (2003a) supports the inclusion of management costs in the total fishing costs in order to keep lower optimal effort.

longer the coastline and the size of the EEZ, the greater the cost of monitoring and enforcement. This, however, may depend on the number of landing sites for the fishing fleet. With a limited number of landing sites enforcement should not be a very difficult task. Analogously, if there were a large number of countries undertaking fishing activities in the vicinity of a nation's EEZ, there may be increased costs associated with establishing and enforcing agreements with these countries to ensure that sovereignty over resources is maintained.

**Resource characteristics** encompass the main features of the fish resource that is managed. The *quantity of fish resources* is likely to influence the costs of managing those resources (OECD 2003a). It may be expected that countries endowed with significant resources will face high expenditures for management in absolute terms, compared to countries with limited resources. However, there may be some economies of scale with regards to research, management and enforcement, so that the relative costs may favour countries with larger resource endowments.

Whether the fishery is a *single-species or multi-species fishery* can be important as well. It may be expected that the problems associated with multi-species fisheries and fisheries with high by-catch and discard potential could lead to higher management costs due to the more complex nature of the resource and its management. According to Ulmas (2003), managing multi-species fisheries remains a very complicated and largely unresolved task under most fisheries management regimes.

The *state of the resource stocks*, i.e. whether they are overfished, fully fished or developing is likely to influence management costs. It is believed that developing and overfished fisheries would require high fisheries services costs. The first one, due to the need for a major research effort to establish the extent of the stock and its dynamics. In the second case, the driving factor would be the attempt to adjust fishing effort in order to increase rent generation.<sup>5</sup> Uncertainty about resources will also have impact on the range of fisheries services costs. A higher degree of uncertainty may lead to increased costs of enforcement and management services, because of the need for closer monitoring of fishing effort and catch. and more frequent adjustment of management measures (e.g. TACs and effort controls).

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<sup>5</sup> This should not be considered, however, as a cost strictly related to fishery management.

**Industrial characteristics**, such as the *size of the fisheries sector*, either in absolute or relative terms, also have an important influence on the amount of money that governments are willing to direct towards its management. One would also think that expectations about the prospects of the industry are likely to particularly influence research costs (Ulmas 2003).

In addition to the relative size of the sector, it may be expected that the *size and composition of the fleet* influences the costs of management and enforcement. In the case of converging costs per vessel, a large fleet of small boats will involve greater costs for licensing, administration, surveillance and enforcement than a smaller fleet of large vessels. Another important factor may be the capacity of the fleet, e.g. measured in terms of tonnage. The extent to which a country's fleet is dedicated to coastal or offshore operations will also be a significant cost driver.

The variables of the **institutional arrangement** can substantially influence the bottom line of the expenditures dedicated to managing fisheries. One of the most important issues is the relative impact of the different types of *management instruments* on fisheries services costs. Broadly defined, the available options are output controls, input controls and technical measures (FAO 1997). Each of the groups of management instruments has both advantages and disadvantages. For instance, input or effort control is considered to be costly to design, adapt, manage and enforce due to the ability of fishers to adapt their fishing effort and techniques to circumvent regulations. Nevertheless, alleviating such costs is one of the claimed advantages of individual transferable quotas. There is currently limited empirical evidence on the impact of management instruments on fisheries services costs.

In addition, the *fisheries management system* with its underlying governance structure, i.e. how users are co-ordinated, how information is collected and analysed, how decisions are made and in what way monitoring and enforcement take place, influences the magnitude of fisheries services provided and the cost of management (Arnason 2003, Ulmas 2003).

The *extent of actual or potential conflict between users and uses* of the marine resource has an impact on the costs of fisheries services by affecting the amount of time and resources required to resolve conflicts between stakeholders and enforce any agreements that may result. This is particularly true about resolving conflicts between commercial and recreational

fishers, fishers and environmental groups and other interested groups. Such processes involving consultations with stakeholders are taking place within the EU after the reform of the CFP in 2002, and the recent examples demonstrate that a substantial amount of time is required to launch these consultative bodies.

Finally, Shrank *et al.* (2003) point out that the *way in which fisheries services are delivered* to users also affects the magnitude of the costs of the services. In many countries the government is the only supplier of many fisheries services. A rationale for this may be the public good nature of the services themselves<sup>6</sup> or limited competition in their provision. However, there may be scope for reducing the costs of managing fisheries through the private provision of certain types of services, such as research and enforcement activities.

### ***Governance and fisheries management costs***

One of the major variables that influence the magnitude of fisheries services costs is the management system (Arnason 1999), or as OECD (2003a) defines it, the set of processes and organisations that develops and implements rules affecting the use of resources. Such arrangements in the context of fisheries management that are equitable, efficient in the allocation of resources and provide the means of resolving conflicts over access to resources, are usually termed as good governance (Ostrom 1990; Costanza 1998; Friedheim 1999).

In recent years governance of marine resources has become an increasingly important issue in the policy debate on fisheries management. Particularly, the extent of user participation in the process of design, implementation and enforcement of fisheries management regimes influences services costs. Hanna (1999) and OECD (2003a) have argued that a higher degree of user participation will lead to higher compliance rates, more effective management outcomes, longer lasting returns on management inputs and potentially, lower overall costs of management. User participation is regarded as an essential element of good governance, and there is a general trend towards devolving the management process from the government to the users. This can range from co-management (OECD 1997, 2003a; Costanza 1998) to local self-management as proposed by Bruckmeier and Neuman (2005) for the case of the Baltic Sea.

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<sup>6</sup> Arnason (2003) points out aptly that the fisheries services are closer to the definition of club goods, as defined by Varian (1992).

In economic terms the extent to which the governance structures function in a cost-effective way depends very much on who decides what services need to be delivered and who pays for the services. According to Arnason (2003) there are several typical arrangements of providers and payees of fisheries services (Table 1).

Table 1. Provision of Fisheries Management Services

	<i>Arrangements</i>	<i>Provider</i>	<i>Payee</i>
1	Current Arrangement	Government	Government
2	Cost Recovery	Government	Fishing Industry
3	Contracting out	Private Sector	Government
4	Self-Management	Fishing Industry	Fishing Industry

Source: Arnason (2003, 36)

Under the prevailing current arrangement of providing those services there is a risk of introducing two major government deficiencies: incentive problems and asymmetric distribution of costs and benefits. Under the cost recovering arrangement the government provides the fisheries services but the industry, as the recipient of these services, has to pay the cost. In this case the industry has no incentive to ask for management services whose costs exceed the overall benefits, and the providing agencies have little incentive to produce such services. Although there is an increased level of accountability, there may be still an incentive problem, if the government agencies receive payments for their activities automatically and do not have to compete with other agencies for financing or with other service suppliers.

The third arrangement, contracting out services, can increase the incentives for cost-efficiency. Actually there are more variations to this management regime. In OECD (2003a) an arrangement under which the industry pays for the provided services is outlined. Another approach is co-operative decision making with outsourcing of fisheries services paid by the industry. Finally, under self-management the industry takes care of the management services itself. This eliminates the government incentive problem and greatly alleviates the asymmetry problem. However, due to the public (or club) good characteristics of fisheries management services to the members of the industry, these services still have to be provided in a centralised way.

As Arnason (2003) points out there does not seem to be any apparent solutions to the problem of efficient provision of fisheries management services. In reality the choice is between several imperfect alternatives. The comparison of different alternatives clearly shows that the arrangement where government both provides and pays for fisheries services is an inferior one. The most promising one in respect to cost-efficiency seems to be the self management regime.

### **3. Institutional framework**

Prior to evaluating the management costs of the Baltic salmon fishery, it is necessary to describe the main features of the management arrangement in which these costs accrue. Even after the adoption of the new Common Fishery Policy in 2002 the question raised by Symes (1995) “Who are the managers?” remains up-to-date.

#### ***IBSFC***

As pointed out by Romakkaniemi *et al.* (2003) the concerns over the salmon stocks and calls for international fishing regulations date back to the late 19<sup>th</sup> century. The current system is a product of a gradual development that started in the 1950s and 1960s and eventually resulted in the establishment of the International Baltic Sea Fishery Commission (IBSFC) under the Convention on Fishing and Conservation of the Living Resources in the Baltic Sea and the Belts, signed in Gdansk, 1973, by the governments of the states bordering the Baltic. The pattern of membership of the Commission changed in 1984 with the accession of the European Economic Community to the Convention and the simultaneous withdrawal of the Community’s members at that time (Ranke 2003). The political changes in the early 1990s brought new members (Estonia, Latvia and Lithuania) and caused the disappearance of one of the founding parties (the German Democratic Republic). The subsequent enlargements of the EU in 1995 and 2004 reduced further the number of contracting parties to just two at present: the European Community and the Russian Federation (IBSFC 2004). Following the last wave of EU enlargement, the Baltic Sea has become virtually an “European pond” with more than 90 percent of its waters under the jurisdiction of member countries, and a fairly small presence of the Russian fleet (Symes 2005).

The prerogatives of the IBSFC cover the provision of management services, concerning the marine resources in the Baltic Sea, excluding the internal waters. In practical terms it recommends regulatory measures to the contracting parties. An agreement on total allowable catches (TAC) and allocation scheme for salmon was reached for the first time in 1991. In 1995, the IBSFC adopted long-term management goals, which led to the Salmon Action Plan (SAP) agreed upon in 1997. The most important goal concerning wild stocks is to attain at least 50 percent of the estimated natural production capacity in each wild salmon river by 2010 (IBSFC and HELCOM, 1999).

It remains unclear whether the Salmon Action Plan will be implemented until 2010 with the planned withdrawal of the EU from the IBSFC until January 1, 2006 (Commission of the European Communities 2005), which would effectively put an end to the IBSFC. Under these circumstances the EU will continue its relationships with the Russian Federation on a bilateral basis, remaining committed to managing the salmon fisheries through TACs.

### ***European Union***

As the European Union's Common Fishery Policy (CFP) nowadays covers most of the waters of the Baltic Sea and the management and exploitation of living aquatic resources in these waters, it requires a more detailed overview. Although the exclusive competence of the European Community in the conservation, management and exploitation of living aquatic resources has been established by the Treaty of Rome (Article 37), it was not until 1983 that the first full-fledged CFP was launched<sup>7</sup>. In 1992 a CFP review followed and the present state is the outcome of the 2002 reform inscribed in the Council Regulation (EC) No 2371/2002 of 20 December 2002 on the conservation and sustainable exploitation of fisheries resources. The 2002 reform is still under development and several new institutions should be launched in the near time. It is necessary to note that the institutional change that is taking place is a response to the shift in the objectives of fishery management at a global level. The world's commercial fisheries are moving from target resource-oriented management, such as TACs and other various controls of the size and operations of fishing activity (FAO 2003) towards a larger concept of ecosystem based approach to fishery management (Botsford *et al.* 1997; Commission of the European Communities 2002b; FAO 2003; Symes 2005).

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<sup>7</sup> As a consequence, the following year the European Community became a contracting party to the Gdansk Convention and replaced Denmark and the Federal Republic of Germany at the IBSFC.

The management of fisheries requires sound assessment of the status of available stocks. In terms of **research** the EU relies on collection of data from the member states' scientific institutes. Working groups of scientists within the International Council for the Exploration of the Seas (ICES)<sup>8</sup> coordinate and report on research, which is then discussed by the ICES Advisory Committee on Fishery Management (ACFM) and used to produce scientific advice for the European Commission (Fig. 1). ICES is also the primary source of scientific advice to IBSCF in setting the annual TACs. The Commission consults also the Scientific, Technical and Economic Committee on Fisheries (STECF) in forming a proposal on fishery measures. A source of advice are also research projects under the framework programmes for research and technological development. In addition a framework providing direct financial support for the collection and management of the data needed to conduct the CFP has been established since 2001 (Council Regulation (EC) No 1543/2000 of 29 June 2000 and Commission Regulations (EC) No 1639/2001 and No 1581/2004).

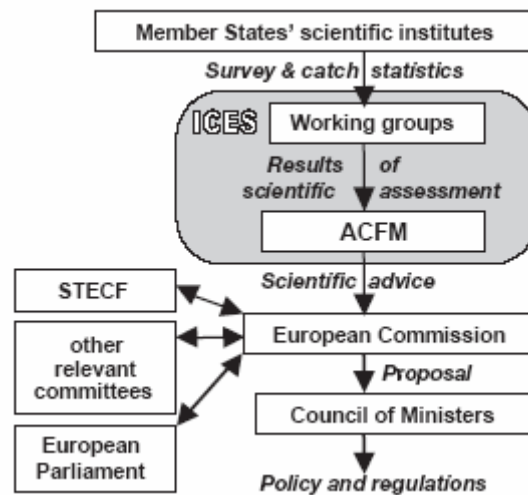


Fig. 1. Route for the implementation of scientific research into fisheries policy within the European Community.

Source: Daw and Gray (2005, 190)

The **management** process follows the usual route of decision-making within the EU. It involves the following institutions:

- The European Commission and more specifically the Directorate-General for Fisheries and Maritime Affairs, which prepares proposals for new policy and regulations and

<sup>8</sup> ICES is an intergovernmental organisation that coordinates and promotes marine research in the North Atlantic. All Baltic countries but Lithuania are its members.



ensures that Community law is implemented in the member states. As of April 2005 there are five Directorates with over 250 employees.

- The European Parliament's Committee on Fisheries discusses the proposals of the Commission.
- The Council of the European Union adopts or rejects council regulations or decisions concerning the CFP based on the proposals of the Commission.
- The Economic and Social Committee and the Committee of the Regions can be also consulted in some cases.
- The Court of Auditors is responsible for the control of the Community's budget and whether the expenditures have produced the expected outcomes.
- The Court of Justice and the Court of First Instance take an active part in forming the Community fishery policy, resolving disputes between the institutions of the EU, member states and other concerned parties.

Besides the above institutions various committees consisting of representatives of the member states and the industry as well as scientific experts have been set up to assist in the implementation of the CFP by providing advice on proposed legislation. Among the more important related to the management of fisheries are:

- The Committee for Fisheries and Aquaculture, which provides opinion on subjects dealing with the general implementation of the CFP such as conservation measures, control and enforcement, some structural measures and data collection programmes.
- The Advisory Committee on Fisheries and Aquaculture (ACFA), representing all major groups of stakeholders.
- The Baltic Sea Regional Advisory Council (RAC), which will be set up under the 2002 CFP reform. It will include representatives of the fishing sector (2/3 of the votes) and other concerned interest groups. The RAC can formulate recommendations and advice for the Commission and competent national authorities on all aspects relating to fisheries management in its region or field of competence.<sup>9</sup>

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<sup>9</sup> The legal basis for the establishing of RACs is Council Decision of 19 July 2004 establishing Regional Advisory Councils under the Common Fisheries Policy (2004/585/EC). For more details and information on the establishment of the first RAC for the North Sea see *Fishing in Europe* 25, 2005, 4-8.

**Enforcement** of EU rules and regulations have suffered from many shortcomings in terms of uniformity, equity and effectiveness. There is currently a Community Inspectorate with a staff of 25, which will be reinforced by the creation of Community Fisheries Control Agency with headquarters in Vigo, Spain, and an annual budget of 5 million euros and 49 staff (Council of the EU, 2005). The main responsibility for the implementation of the CFP rules will remain, however, with the member states.

The member states of the European Union have rather diverse fishery management arrangements that vary both in institutional setup, ownership of waters and distribution of fishing rights for salmon.

### *Denmark*

The management regime in Denmark is set by the Ministry of Food, Agriculture and Fisheries in consultation with fishermen's organisations and the fishing industry in the Regulatory Committee (or Regulation Advisory Board). The Regulatory Committee meets monthly to evaluate the current catch/quota situation for possible changes. Economic incentives are the preferred instrument in controlling the fleet capacity. The main policy instrument applied to the salmon fishery in the Baltic sea and the Belts is a license, stipulating both the access to the fishery and the technical capacities of the vessel, i.e. tonnage and engine power.

Most of the research and data collection are concentrated within the Danish Institute for Fisheries Research, Department of Marine Fisheries. Monitoring and enforcement activities are the responsibility of the Danish Directorate for Fisheries. Both organisations are operating under the Ministry of Food, Agriculture and Fisheries.

### *Estonia*

Research service is mainly provided by the Estonian Marine Institute, Tallinn, working under the auspices of the University of Tartu. It offers scientific advice in the fields of marine ecosystems, marine biology and fisheries, and develops international co-operation with bodies such as ICES.

Management services are provided by two different ministries: Ministry of Environment and Ministry of Agriculture. The Fish Resources Department at the Ministry of Environment is

trusted with shaping the national fishery policy through the development and amending of the Fishing Act and related regulations. It manages and co-ordinates research, assessment, exploitation, reproduction and protection of fish resources. The 15 County Environmental Departments are also responsible for issuing fishing permits, collecting fishing statistics, as well as implementation of the governmental fishery policy on local level. The main functions of the Fishery Economics Department at the Ministry of Agriculture deal with the development of the fishing industry, port facilities, processing plants, as well as market organisation.

Fisheries enforcement services are provided by the Environmental Inspectorate, in the domain of the Ministry of Environment, and by the County Environmental Departments. Surveillance of compliance with fisheries law in the Baltic Sea is done by inspectors of Environmental Inspectorate. It involves boarding of fishing vessels and checking fishing permits, fishing gear and the size of fish. The Environmental Inspectorate also checks landings of the Baltic Sea trawlers at ports. Surveillance of compliance with fisheries law in coastal fisheries and inland waters is provided by inspectors at the County Environmental Departments.

### ***Finland***

The Finnish Game and Fisheries Research Institute (FGFRI) is the most important scientific institution in Finland providing research services to the fishery management system. Its Fisheries Research Unit, together with the Socioeconomic and Aquaculture Research Unit and the countrywide network of research stations, are the main divisions within the institute involved in research on the Baltic salmon fishery. The FGFRI is also responsible for salmon stocking programmes, which focus mostly on the northernmost part of the Gulf of Bothnia.

The actual management is secured by an intricate network of institutions with a varying scope of responsibilities. One of the factors influencing the institutional arrangement is the property rights system, which in Finland and Sweden includes private ownership of waters. Today, the Finnish water areas can be divided into three groups on the basis of ownership: some areas are owned by individuals, i.e. parcelled water areas, most common in the southern and western parts of the country; areas under joint ownership by groups of private real estate holders, represented by fishing corporations; and finally outside the village boundaries – public water areas owned by the state.

The government's fisheries administration is arranged by the Ministry of Agriculture and Forestry, which implements the CFP and issues national regulations. The Department of Fisheries and Game with its Units of Fisheries Industry and of Recreational Fishery is responsible for the national fisheries policies. The district administrative authorities for the fisheries sector are the Employment and Economic Development Centres (T&E Centres).<sup>10</sup> They deal with the structural aid granted to fisheries, lease out fishing rights, take decisions on temporary bans of fishing activities, provide advise on issues concerning water rights, regional planning and the management of watercourses, as well as recreational fisheries. Seven out of fifteen centres operate in coastal regions.

According to the Fishing Act (286/1982) the waters are divided into fishing regions regardless of their ownership, municipal division or division under government administration. A fishing region forms a uniform area for the management of fishing, comprising one or more municipalities, where it is appropriate to apply uniform measures in organising fishing conditions. The members of the fishing region include the fishing corporations, the owners of the water areas, organisations of professional fishermen operating in the region and organisations representing recreational fishermen. The representative bodies of the fishing region are the meeting of the fishing region, administrative board and a manager. Whenever an area is outside the scope of the fishing region administration or governmental authorities, it is the fishing corporation that organises the fishing and management of the fish stock in its area.

Environmental Permit Authorities<sup>11</sup> resolve outstanding issues, concerning different aspects of the fisheries management (e.g. gear, closing of areas, etc.) and may impose obligations for restocking salmon when damage has been done. Enforcement is performed by officials of the Ministry of Agriculture and Forestry and the T&E Centres. Water bailiffs appointed by the T&E Centres, as well as the fishing regions, fishing corporations, owners of fishing waters or holders of fishing rights exercise monitoring and control. As in most other countries, surveillance and enforcement of fishery regulations requires the participation of police or

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<sup>10</sup> The T&E Centres are jointly operated by the Ministry of Trade and Industry, the Ministry of Agriculture and Forestry, and the Ministry of Labour. Fifteen centres countrywide provide a comprehensive range of advisory and development services, including fisheries, for businesses, entrepreneurs, and private individuals.

<sup>11</sup> There are three of them, responsible for Western, Eastern and Northern Finland.

coast guard, and the resolution of disputes or charges for violating fishing rules entails the Appeals Board for Rural Industry and general courts.

### ***Germany***

Most of the research activities concerning the Baltic Sea are performed by the Institute for Baltic Sea Fisheries in Rostock. The institute produces data and decision making tools to facilitate a sustainable fisheries management and contributes to the international research in this area. Regular stock assessment of commercially important species are performed to aid governmental authorities in the distribution of TACs.<sup>12</sup> Besides, the Regional Agriculture and Fisheries Research Centre of Mecklenburg-Vorpommern, whose Fisheries Department is in the premises of the Institute, is providing information to local users.

The provision of management services is generally transferred from the Federal Ministry of Consumer Protection, Food and Agriculture to the *Länder* level, namely to the respective fisheries units of the Ministry of Food, Agriculture, Forests and Fisheries of Mecklenburg-Vorpommern, with a seat in Rostock and the Ministry of Environment, Nature Protection and Agriculture of Schleswig-Holstein in Kiel. Fishermen and environmentalists also participate in the decision-making process through a number of organisations.

Regarding enforcement the Federal Office of Agriculture and Food (BLE), headquartered in Hamburg, is generally responsible for compliance with EU fisheries legislation as well as for monitoring and control of fisheries regulations outside the limit of 12 nautical miles. The tasks of monitoring and control of fishing activities inside the limit of 12 nautical miles and in the ports belong primarily to the fisheries authorities in the coastal *Länder*. BLE and partly also customs authorities have been entrusted fisheries inspection competence in the coastal sea area (Commission of the European Communities 2001).

### ***Latvia***

The Latvian Fish Resources Agency (LATFRA) is a governmental institution under the Ministry of Agriculture, responsible for fisheries research and aquaculture. It performs

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<sup>12</sup> Baltic salmon does not constitute an especially important species for the German commercial fishing. The German quota is slightly above 2 percent both of EU and total TAC. The institute has completed, however, a pilot study under the EU Fishery Data Collection Program about the catches of German sport anglers in 2002, concluding that they do not have any major influence on the salmon stock (Schultz 2004)

research on the state of the stocks and on related environmental conditions, prepares the annual recommendations on the national management of commercial and recreational fishery and provides scientific advice for Latvia's participation in the CFP. The agency participates in the work of the EU fisheries committees, ICES and other international fisheries and research organisations.

Management activities are concentrated within the National Board of Fisheries, subordinated to the Ministry of Agriculture. It is responsible for the development and implementation of the national fishery policy. It ensures both the provision of administrative services to the fishing industry (distribution of quotas, issuing licences, maintaining of fishing vessel register, etc.) and represents the country in international fisheries organisations.

The enforcement of fishing regulations is the responsibility of the Marine Environmental Board, supervised by the Ministry of Environment. It carries out control of fishing in Latvian waters and ports. The monitoring and surveillance activities are performed by the Marine Control Sections in Riga, Ventspils and Liepāja.

### ***Lithuania***

Fishery research in Lithuania is mainly provided by the Fishery Research Laboratory in Klaipėda, subordinated to the Fisheries Department of the Ministry of Agriculture. Other scientific organisations offering advice on fishery measures are the Institute of Ecology of Vilnius University and Klaipėda University.

The implementation of the fishery policy is the responsibility of the Fisheries Department under the Ministry of Agriculture. It prepares the legal framework for the management of fish resources under the CFP. The department supervises also the processing industry and trade in fish and fishery products.

Since 2001 the Regional Environmental Protection Departments under the Ministry of Environment are authorised to carry out the functions of the protection and control of fish resources (Ministry of Environment 2001). The Water Resources Department, a unit within the same ministry, mentions among its priorities the preparation and implementation of programmes concerning the exploitation and restoration of fish resources.

## *Poland*

The main research unit in Poland is the Sea Fisheries Institute in Gdynia. It provides scientific advice on biological and economic aspects of fishery management, as well as output on processing technology.

The fisheries administration is an integral part of the Ministry of Agriculture and Rural Development. The structural policy in the fishery sector is the responsibility of the Department of Fisheries. It is also in charge of data collection and processing, collection of fisheries statistics and reporting about the sector. It is worth noting that fishermen organisations play a key role in the division of national quotas. The most important are the Polish Fisheries Chamber, the Fishing Shipowners Association and the Sea Fishermen Union. A second administrative tier consists of the Regional Sea Fishery Inspectorates in Gdynia, Słupsk and Szczecin, responsible for the supervision and enforcement of sea fisheries regulations. They conduct control of permits and licences, vessels, gear, conditions of fish storage and processing plants as well.

## *Sweden*

The institutional set-up for providing services to the fishing sector is dominated by the National Board of Fisheries (NBF), established in 1948, under the supervision of the Ministry of Agriculture, Food and Consumer Affairs. The Board, with its head office in Göteborg, is organized in five departments:

- Department of Marine Resources
- Department of Coastal and Freshwater Resources
- Department of Markets and Structures
- Department of Fisheries Control
- Department of Administration

A large part of the fisheries research is carried out by the NBF at its three institutes of marine, coastal and freshwater research and a network of research stations and offices. Research is also undertaken at the universities and other public institutions.

The framework of the national fishery policy is drawn by the Ministry of Agriculture, while NFB is the executive branch of the administration, responsible for the implementation of the fisheries policy and for giving technical advice to the government. At regional level, the 21 county administrative boards include fisheries experts.<sup>13</sup> In public waters the responsibility for management lies with the government and the regional or local authorities. Normally, waters extending up to 300 meters from the shoreline are privately owned meaning that conservation and management rests with the owners. Along the southern coast of Sweden, fishing is allowed for the public and professional fishermen in privately owned waters with a limited number of gears. Fisheries monitoring and surveillance at sea and in harbours is conducted by the Coast Guard in co-operation with the NBF.

### ***Russian Federation***

The body governing fishing activities in the Russian EEZ is the Federal Fishery Agency (FFA) under the Ministry of Agriculture. It is responsible for the research, conservation and rational use of living aquatic resources. The research services, concerning the Baltic Sea are provided by the Atlantic Research Institute of Marine Fisheries and Oceanography (AtlantNIRO) in Kaliningrad, and more precisely by the Laboratory of the Baltic Sea under the Department of the Baltic Sea and Lagoons. General scientific support is provided also by the Russian Research and Design Institute for Economics, Information and Automated Control Systems of Fisheries (VNIERKh), Moscow. The fishery policy and regulations, as well as the distribution of the annual TACs are managed by the FFA. The monitoring and enforcement in the Baltic Sea is entrusted to two bodies: the Western Baltic Basin Department for Protection and Reproduction of Fish Resources and Fisheries Regulation (Zapbaltrybvod), Kaliningrad, and its analogue (Sevzaprybvod), headquartered in St Petersburg and responsible for the Russian part of the Gulf of Finland. Both the research and enforcement units are under the authority of the FFA, thus building up a centralised administration of fisheries policy. In addition, the marine resources are federal property under the Law on fishery and conservation of aquatic biological resources, 2004.

The above review demonstrates a variety of management systems, which have developed in different institutional traditions and still function in their own ways, despite the existence of the EU Common Fishery Policy and the negotiated TACs within the IBSFC. However.

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<sup>13</sup> Twelve of the counties are bordering the Baltic Sea.



common for all of them is the governmental provision of fisheries services and the lack of channels for recovery of the expenditures associated with these services.<sup>14</sup> One of the consequences of this wide range of approaches and institutional setups is divergence in the share of management costs compared to the value of landings between the Baltic countries.

Another practical implication for this study is the difficult access to data, which is dispersed among different authorities both in the coastal countries and within the EU. As a general rule, where fisheries services are provided in a centralised way, there is a lower degree of transparency and the published data is scarce or highly aggregated. In the case of decentralised management systems, the main difficulty consists in identifying all involved bodies and gathering information from them. Besides, none of the existing data collecting systems accounts for the costs of managing a particular species, such as the Baltic salmon, at all stages of the management process. Therefore, we have to rely on sources, which are not strictly comparable and apply different methodological approaches to estimating the costs of management. Nevertheless, there is enough available information to draw a general picture of the development of the salmon fishery during the last decade and the impact of management costs on it.

#### **4. Assessment of the costs**

Baltic salmon has been severely decimated during the twentieth century due to damming by hydroelectric power stations in the homing rivers, habitat destruction, pollution and overfishing. Until the 1940s there used to be a natural occurrence of salmon in about 80 to 120 rivers around the Baltic Sea. Wild salmon stocks remain today in less than 30 rivers, most of them mouthing into the Gulf of Bothnia (IBSFC and HELCOM 1999). Even after the adoption of the IBSFC Salmon Action Plan (1997-2010) the downward trend in the Baltic salmon fishery has not been reversed. The total catch of Baltic salmon has decreased by half after the implementation of the SAP, while the TACs have not changed substantially since 1997. The year 2003 has marked the lowest catch recorded since 1972 (ICES 2004). At the same time the salmon catch has remained a stable, yet negligible part of the total sea fishing activities. It constitutes 0.2 percent of the total catch of fishery products from Baltic waters.

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<sup>14</sup> When payment for a fishing licence or permit is required, it is not connected to the fishery management.

The main players in the commercial fishing of salmon are five out of the nine coastal countries. These are Finland, Sweden, Denmark, Latvia and Poland which in 1997 accounted together for 97 percent of the catch, respectively 95 percent in 2003. The largest share in 2003 has gone to Denmark, ousting Finland and Sweden, while Poland and Latvia have also exchanged places due to a transfer of quotas from Latvia to Poland. All catches of salmon within the German quota are caught as by-catches in the trawl, trap net or gillnet fishery (ICES 2004), because of the low profitability and relatively small national quota. Similar is the situation in the Estonian and Lithuanian coastal fisheries, where salmon is also caught only as a by-catch. The development of the commercial Baltic salmon fishery is presented on Fig.2.

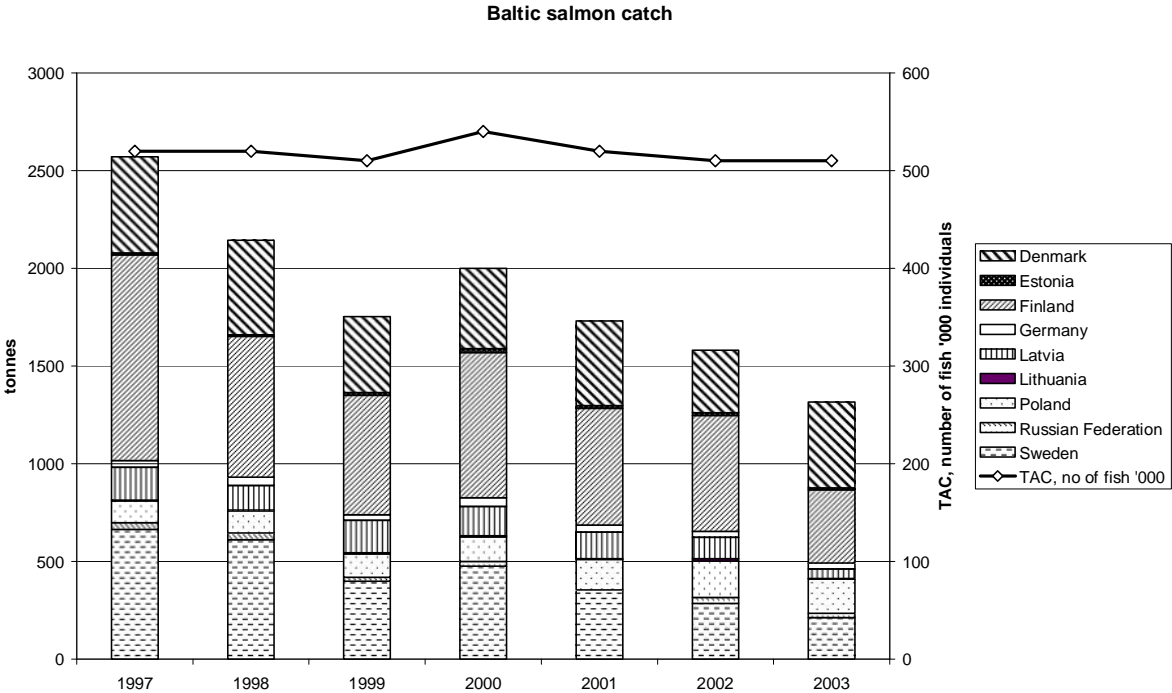


Fig. 2. Baltic salmon catch, 1997-2003

Source: Eurostat, ICES (2004)

The above picture is reinforced by the decline in the number of vessels and fishermen engaged in salmon fishing. In 2004, 115 vessels fished less than 20 days and only 15 vessels fished more than 40 days.<sup>15</sup> According to ICES (2004) it seems likely that only vessels,

<sup>15</sup> One Danish, seven Finnish and seven Swedish vessels. This continued a decline from the previous years, e.g. 120 vessels fished less than 20 days and 32 vessels – more than 40 days in 2003.

fishing more than 40 days per year, may receive more than 50 percent of their annual income from the salmon fishery.

The value of commercial catch at producer prices in 2003 equalled slightly more than 3.8 million euro. The area most heavily affected by the drastic decrease in catches was the Gulf of Finland where only 25 percent of a significantly reduced TAC, in comparison to previous years, were caught in 2003. There offshore fishing has nearly ceased, being responsible for less than 10 percent of the catch, following a long term downward trend that started in the mid 1980s.

The reasons behind this decline can be sought in several directions according to ICES (2004):

- Sharp decrease of offshore fisheries in the Baltic countries and Russia due to low profitability;
- Decreasing of offshore fisheries due to fishing regulation and seal predation (Gulf of Bothnia) and low numbers of salmon (Gulf of Finland);
- Coastal fisheries in the Gulf of Bothnia and Gulf of Finland suffer from high impact of salmon predation by seals in fishing gear.

In this light of a general decline of fisheries in the Baltic during the last decade, it is worth inspecting the magnitude of expenditures for management services. Despite the recent attempts by OECD (2000, 2003a, 2003b, 2004) and several independent studies (Arnason *et al.* 2000, Ulmas 2003) estimates of fishery management costs are not widely available. Whenever such estimates have been published or extracted from public records they are usually at a high level of aggregation and include different categories of services within an expenditure item (Table 2.).

Table 2. Costs of management services to marine capture fisheries at current prices in euros

	1999	2000	2001	2002
<i>Estonia</i>				
Research costs	545 390	562 103	658 861	715 921
Management costs	251 721	237 685	312 330	378 916
Enforcement costs	1 019 058	988 771	1 089 972	1 218 085
Total	1 816 169	1 788 559	2 061 163	2 312 922
<i>Denmark</i>				
General services	901 066*	2 267 341*		861 322*
<i>Finland</i>				
Research	2 859 195	2 859 000	2 859 000	2 900 000
Rearing and distribution of salmon smolt	234 622*	256 000*	432 800*	74 000
Management costs	2 354 631	2 355 000	2 355 000	2 400 000
Enforcement costs	1 009 128	1 009 000	1 009 000	1 000 000
Total	6 457 575	6 479 000	6 655 800	6 374 000
<i>Sweden</i>				
General services**	20 924 551*	19 404 377	17 413 191	17 985 992

\* including EU contribution

\*\* including aquaculture and marketing and processing.

Source: OECD (2003b, 2004), Ulmas (2003)

The public expenditures on fishery management have not diminished over the last few years, while both the quantity and value of landings have decreased, this being coupled with smaller fleets and shrinking numbers of full-time employed fishermen. It is difficult to compare the above numbers (Table 2.) as they encompass different categories of costs, ranging from the conventional division between research, management and enforcement (e.g. Estonia and Finland) to general services for Denmark and the highly aggregated estimate for Sweden, including not only marine fisheries, but also aquaculture, as well as marketing and processing. The provision of fisheries services has been most cost-effective in Denmark, while on the other side of the range is Finland. There is no obvious reason to expect that the costs of managing the salmon stocks have followed a different development. For instance the cost of Finnish research on Baltic salmon only equalled 652 000 euro in 2004. The Finnish government has attributed in the state budget about 2 million euro yearly for stocking programmes during 2000-2004. According to Salminen *et al.* (2004) between 60 and 70

percent of this sum was spent on salmon. Moreover, salmon is one of the few species under a special management regime established at international level, including instruments as TACs, technical regulations and envisioning negotiation procedures and specialised scientific advice. This means that the management costs in relation to production in tonnes, value of production, per vessel and per fisher have increased during the last years.

More significant is that these contrary trends – a comparatively steady level of management costs and dwindling fishery – may lead to further fall in the biomass and increased fishing efforts. Especially disturbing is the situation in Finland, where for various years the management costs have been in the range of 50 to percent of the value of catch in monetary terms, which is the highest ratio among OECD countries (OECD 2003c; Wallis and Flaaten 2003). This may be an indicator either for undisclosed passive use values of certain fisheries or of substantial government failure and distortion of public interests and funds.

Even more illustrative is the situation of the salmon fishery in the Gulf of Finland, which has been identified as a separate management unit by the IBSFC. According to ICES (2004) due to the much lower catch than the agreed TAC, no TAC constraints have been used for the predictions for 2004 and 2005. In a sense this obliterates the meaning of setting a quantitative restriction for the Gulf of Finland, as it has no impact on the fishermen's behaviour nor on the modelling of the stock.

At the same time (2002-2003) the record low catches have been accompanied by an upwards trend in release of reared smolt reaching a level of about 700 000 individuals per year. Some of the explanations about the lack of positive effect are sought in the low survival of released smolts, estimated at 2.9 percent for 2004 and 2005 (ICES 2004). Assuming that about half of the catch in the Gulf of Finland is coming from reared and released fish, this roughly results in a ratio of 100 reared smolts to one caught salmon, thus putting the expenditures for this individual salmon well above 70 euros.<sup>16</sup> The value of stockings, measured per kilogramme, has surpassed the producer prices and stayed as high as 190 percent over the price level since 2001 (Fig. 3).

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<sup>16</sup> One of the possible explanations about the extremely low survival rates of released smolt is predation (seals, cormorants) (ICES 2004), which considering the falling catch may be interpreted as feeding of these predators.

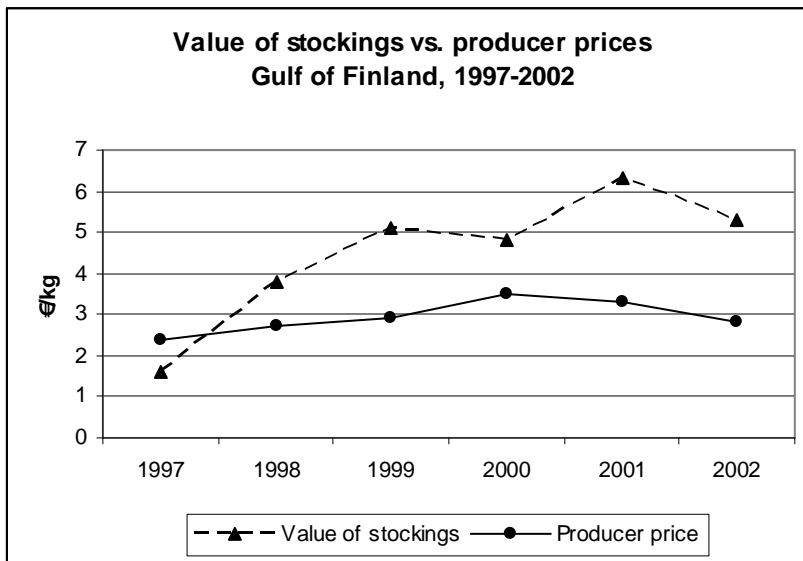


Fig. 3. Value of Finnish released reared salmon and producer prices for the Gulf of Finland, 1997-2002

Source: Salminen *et al.* 2004

To sum up, the commercial catch of salmon in the Gulf of Finland has already lost its economic value, and it hardly provides subsistence to fishermen in the region. The management efforts have proved futile, although they still engage considerable public expenditures.

The situation in the Main Basin and the Gulf of Bothnia is somewhat better, although the signs of decline are present there as well. The assessment of the long-term stocking programmes is at best precarious. As Romakkaniemi *et al.* (2003) point out, appropriate management appears to have created the necessary conditions for the recent recovery in the wild salmon stocks of the northern Baltic Sea, but good timing of favourable natural factors acting on larger scales has facilitated the positive development. If this improvement is to be attributed to management measures, it has been achieved by yearly releases of over 5 million smolts in the Baltic Sea (excl. the Gulf of Finland), mainly by Sweden, Finland, Latvia and Poland. These annual releases have remained remarkably stable over the period 1997-2004, equalling on average slightly above 6 million produced smolts per year, while at the same time the total catch has fallen by half. Estimates about stocking of Finnish rivers range from 0.38 to 0.77 euro per reared individual (Erkinaro *et al.* 2003), while expert opinions point as high as 0.85 euro per smolt. This means that only the costs of stocking of Baltic salmon have

been close to or even over the commercial value of landings at the predominant market prices during the recent years. Depending on the estimate they range from 2.2 to 5.5 million euro compared to less than 4 million worth of landings.

Although noted by the ICES (2004, 115), the impact of market prices has not been taken into account in modelling the development of Baltic salmon fisheries and consequently excluded from the scientific advice on management measures. However, even under the current management system, featuring subsidies for the fishing industry through high releases of reared salmon, profitability of offshore fishing is falling. This process is mainly driven by the competitive pressure of Norwegian farmed salmon exercising a substitution effect on the demand for Baltic salmon. This is clearly illustrated by the disproportion between the domestic catch and the import of farmed salmon in Finland, which in 2003 had a 29 percent of the whole Baltic catch. While the Finnish sea fishery caught 343 t of salmon, worth 909 000 euros, the country imported 11 305 t of fresh salmon from Norway, valued at 28.9 million euro during the same year (FGFRI 2004).

This is confirmed by Virtanen *et al.* (2005), who see the salmon fishery clearly as a small-scale one in the case of Finland. This holds valid even more for the other Baltic countries, where it forms a smaller share of the total catch, or has already lost its value as an offshore fishery. Therefore, they imply that wild salmon is evolving into a niche market together with sea trout as a perfect substitute. In conclusion, on the Finnish fish market farmed and wild species of salmonids comprise integrated markets, the price level of which is determined on the global salmon market (Virtanen *et al.* 2005).

Coupled with the recent trends, this suggests that in the mid term the Baltic salmon fishery may be limited mainly to coastal and river fishery, which requires a different managerial behaviour. Actually, the current system is providing false incentives and prolonging the exploitation of the stock in the open sea, without being able to secure reliable incomes for the decreasing number of fishermen involved in salmon fishery. If fishery management costs were recovered from the industry, significant part of fisherman can be expected to withdraw from the salmon fishery in the short to mid-term due to low profitability.

There are few beneficiaries from the current management regime. Consumers do not seem to benefit from the management actions as supply is mainly determined by the Norwegian fish farming. The price of farmed Atlantic salmon establishes the prices not only for Baltic salmon but also for all species of Pacific salmon in the long term (Asche *et al.* 1999). Commercial fishers are also on the losing side, which is confirmed by the falling number of vessels fishing for salmon for more than 40 days, which is considered as the lower limit securing more than half of the fishermen's annual income. Recreational fishers are also suffering from reduced stocks, which indirectly affects local tourism. The only obvious group of beneficiaries are the government agencies involved in providing management services through public funds. There are not sufficient studies to establish the values put on the management of Baltic salmon stocks hold by society as a whole.

## **5. Conclusion**

The current case study demonstrates a surprisingly weak relationship between the levels of salmon stock and harvest (catch) and the management costs. This may be attributed to inertia of the complex institutional setup, which is responsible for the management of the fishery. The multilateral management system, which has evolved around the salmon fishery seems to be insensitive to the recent changes in the fishery. Figuratively, the Baltic salmon fishery can be compared to a single medium-sized enterprise in terms of employment and commercial value at present. On this background the scope of management activities dedicated towards the commercial sector of the fishery appears oversized. The management costs, including large-scale stocking programmes, clearly exceed the value of catch in monetary terms during the past few years and engage substantial human resources. Moreover, these efforts may actually contribute to the deterioration of the salmon stocks through the significant government financial transfers, providing false incentives to the fishermen.

The forthcoming end of the IBSFC gives a chance for rethinking of the overly complicated management regime of the Baltic salmon fishery. From an economic point of view it seems reasonable to cease the heavy subsidisation in the form of stocking programmes. There is a cautious support in this direction from fishery scientists, as well (Romakkaniemi *et al.* 2003; ICES 2004). This may release the existing pressure from offshore fisheries and provide better conditions for recovery of the stocks in biological terms. This gradual disappearance of



offshore fisheries seems inevitable and it may not be indefinitely prolonged through the current management measures. An alternative may be the development of a niche market for wild salmon and/or greater emphasis on recreational fishing in case the society values this use of the fishery high enough. The continuation of the current practices will bring only deadweight loss to society accompanied by a limited transfer of benefits to a decreasing number of fishermen and a steady stream of benefits to governmental agencies, funded by taxpayers.

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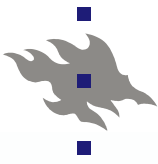
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