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**COMMUNICATION FROM THE COMMISSION TO THE COUNCIL AND THE
EUROPEAN PARLIAMENT**

A policy to reduce unwanted by-catches and eliminate discards in European fisheries

IMPACT ASSESSMENT

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Executive summary

This document constitutes an impact assessment of various possible options to reduce discards in the EU. It provides the basis for the Communication from the Commission to the Council and the European Parliament on a policy to reduce unwanted by-catches and eliminate discards in European fisheries (the Discard Communication).

The objective of a new policy on discards is to ensure fisheries which are economically, environmentally and socially sustainable and with minimal impact on the marine ecosystem, by significantly reducing the waste of natural resources in fisheries through the incidental by-catch and the subsequent discard of marine animals which are not deemed to benefit society.

Unwanted by-catches and discarding has a negative effect both on the economy of future fisheries and the health of marine ecosystems. When unwanted by-catch is discarded, it dies (in most cases) and thus is lost to the ecosystem and to future fisheries. When species of commercial value are discarded, there will be lower catch options in the future. When species without commercial value are discarded the fisheries are impacting biodiversity and the functioning of the marine ecosystem.

The following policy options can be considered:

- The first option consists of not taking any specific measures to reduce by-catches and discards but to continue with fisheries management as it is.
- The second option would be to take supplementary direct measures and adapt current CFP instruments to reduce unwanted by-catches and discards where necessary; in particular, real-time area closures, obligation to switch fishing grounds, and promotion of selective gears.
- The third option would be to implement a discard ban. Two sub-options are considered. The first is a discard ban as a stand-alone measure. The second is a discard ban combined with supplementary measures intended to reduce the negative effects of the discard ban (i.e. the direct costs on fishermen and the costs of enforcement) and/or to amplify the positive effects thereof. This may include requirements to change fishing ground when high amounts of unwanted by-catch are encountered, real time closures and encouragement of the use of selective fishing gear.

The following matrix summarises the likely general impacts as a result of these options. The impacts will however vary by fishery.

Effects / Options	Adapt current CFP plus supplementary measures	Discard ban as a stand alone measure	Discard ban plus supplementary measures
Reduction of by-catch and discards	Small to negligible. Even negative	High	Higher and quicker than those from a pure discard ban

Economic impacts	<p>Loss of future yield as resources are wasted and thus lower income to fishermen.</p> <p>No significant effects on marketing and distribution</p>	<p>Significant cost increases for fishermen in the short term.</p> <p>Medium and long term positive effects through larger stocks with larger fish and healthy ecosystem.</p> <p>Positive effects likely on reduction of overcapacity</p> <p>Positive effects on other fisheries likely</p> <p>Positive effects on marketing and distribution in particular for low value species</p>	<p>Short term cost increases less significant due to by-catch reducing measures.</p> <p>Medium and long term positive effects through larger stocks with larger fish and healthy ecosystem</p> <p>Positive effects likely on reduction of overcapacity</p> <p>Positive effects on other fisheries likely</p> <p>Positive effects on marketing and distribution in particular for low value species</p>
Social impacts	<p>Some job losses in the medium or longer term likely due to lost income</p>	<p>Short term job losses in industrial fisheries.</p> <p>Longer term job increases likely as stocks will be larger</p> <p>Handling landings of previously discarded fish may create some new jobs</p>	<p>Short term job losses in industrial fisheries less significant due to reduced cost increases</p> <p>Longer term job increases likely as stocks will be larger</p> <p>Handling landings of previously discarded fish may create some new jobs</p>
Environmental impacts	<p>Small to negligible reduction of negative impacts</p>	<p>Significant reduction of negative impacts</p>	<p>Significant to very significant reduction of negative impacts</p>
Enforcement costs	<p>High</p>	<p>High</p>	<p>High. Smaller than those from a pure discard ban</p>
Administrative burden	<p>Not significant</p>	<p>Not significant</p>	<p>Not significant</p>
Quality and availability of data	<p>No impact</p>	<p>Positive impact</p>	<p>Positive impact</p>

The present impact assessment compares the possible options and comes to the conclusion that, while the specific situation of each fishery will need to be looked at carefully, the most suitable one is generally that which consists of combining a discard ban with different measures intended to reduce the economic and social costs

of the discard ban and/or to amplify the positive effects thereof on discards. These measures will need to be selected on a fishery by fishery basis. The Discard Communication is hence based on that preferred option.

The Discard Communication will be the starting point for a debate which will then form the basis for specific regulations on a fishery by fishery basis. Monitoring of outcomes of these regulations will be based on observer and landing data collected through the Data Collection Regulation. These data will enable an analysis of the development of unwanted by-catches as regulations are introduced.

Impact assessment report

1. PROCEDURAL ISSUES AND CONSULTATION OF INTERESTED PARTIES

This document constitutes an impact assessment of different possible options to reduce discards in the EU. It provides the basis for the Communication from the Commission to the Council and the European Parliament on a policy to reduce unwanted by-catches and eliminate discards in European fisheries (the Discard Communication). The Discard Communication is item 2007/FISH/002 in the Commission Work Programme.

The Communication is the first step in an initiative to strengthen the efforts to reduce the amount of unwanted incidental by-catches and their subsequent discarding in European fisheries. The objective of the Communication is to launch a debate and extended consultation with Member States and stakeholders during the first half of 2007 on the policy options and implementation modalities to reduce unwanted by-catches and eliminate discards. Based on those consultations, a plan for implementation for specific fisheries will then be developed and implementing regulations will be proposed starting from 2008.

During the preparation of the Communication consultations have been made with Member States and the stakeholder bodies which advise the Commission on issues relating to the Common Fisheries Policy – the Regional Advisory Councils (RAC) through a coordination meeting with participation of all RAC's and the Advisory Committee for Fisheries and Aquaculture (ACFA).

As the Communication is a discussion document intended to launch a debate, consultations with Member States and stakeholders have necessarily been limited in scope, based on information from the Services that the Commission will launch an initiative and an outline of the options considered. Far more detailed consultations will take place once the Discard Communication is adopted. The results of these consultations will be reflected in future proposals to be developed starting from 2008.

Member States have expressed general support to address the issue, but have also mentioned the expected complications when attempts are made to reduce discards in mixed fisheries. Reference has been made to the former initiative to develop pilot experiments to reduce by-catches. Stakeholder consultative bodies have expressed general support for an initiative to reduce discards and have raised issues relating to the applicability of experiences from elsewhere, the definition of discards and the utility of various possible instruments. It was highlighted that if closures are used as an instrument, mechanisms ensuring impartiality must be ensured and the issue of possible counting of landed by-catches against quotas must be resolved. Industry representatives have pointed to more selective fishing gears as a major route for improvement while environmental NGO's have supported that the Commission takes a firm initiative to reduce unwanted by-catches. It was also suggested that the industry could assist in initiating and policing closures.

All these interventions and concerns have been taken onboard in the present Impact Assessment report and the Discard Communication.

External expertise was used to assemble information on the present state of discarding in European Fisheries, as summarised in the section on the extent of discarding in European fisheries below. This was organised through a Study Group of the Scientific, Technical and Economic Committee for Fisheries (STECF)¹.

The present impact assessment compares the possible options and comes to the conclusion that, at this stage, the most suitable one is that which consists in combining a discard ban with different measures, to be implemented on a fishery by fishery basis, intended to reduce the economic and social costs of the discard ban and/or to amplify the positive effects thereof on discards. The Discard Communication is hence based on that preferred option.

2. PROBLEM DEFINITION

2.1. The issue that requires action - what are discards and why are they a problem?

Discards are animals which are dumped back in the sea after being caught in a fishing operation.

As most animals die as a result of the experience, discarding has a negative impact both on the marine ecosystem, as animals are killed, but also on the economy of the fishing industry, as animals which would otherwise have continued to grow and reproduce and thus contribute to fishing yields in the future, are destroyed.

The FAO definition of discards² includes both commercially exploited species and any other animal which is caught incidentally such as non-target finfish, crustaceans, molluscs, sea mammals and seabirds. This is a broader definition of discards than the one used by the Commission in its 2002 communication. Commitments made in relation to the World Summit on Sustainable Development and the Convention on Biological Diversity justify an inclusion of species which are not of commercial interest in initiatives to reduce discards. The FAO definition should therefore be the basis for the future discard policy of the European Commission.

2.2. The underlying drivers - the causes of by-catches and discards

Discarding takes place when a fishery encounters high incidental by-catches of animals which are not wanted.

The main reason that large amounts of unwanted by-catches are taken is that the overall fishing pressure is too high. A high fishing pressure results in low stocks of the commercial species. A high fishing pressure also means that few fish survive and grow. The result is fish stocks with very few larger fish. When the fishery depends entirely on newly recruited fish the catch will consist nearly entirely of fish close to

¹ Discarding by EU fleet. Report of the STECF Subgroup on Research Needs, Brussels 9-12 October 2006 - http://ec.europa.eu/fisheries/legislation/reports_en.htm.

² FAO Fisheries Report No 547 (FAO 1996).

the minimum landing size. The result for the commercial species is that a high proportion of the fish caught will be juveniles. The result for non-target species is that the fishing pressure on non-target species is high.

Once on board, a proportion of both the target species and of non-target organisms are discarded; i.e. returned to the sea. There are several reasons for discarding and in practical fisheries operations these reasons are interlinked. Individuals of marine animals are discarded due to market considerations and regulatory requirements.

Market-driven discarding ('high-grading') may take place both when by-catches of species with a low market value are taken and when individual fish of the target species are discarded to make room for more valuable individuals onboard. In many fisheries, economically-driven discarding is at least as important as or more important than discarding induced by regulations. Examples are the discarding of plaice in flatfish fisheries targeting sole or discarding ('slipping') in the pelagic fisheries.

A management system which relies on landing quotas as the main regulator of fishing activity will lead to discards when various species are caught together in mixed fisheries. When the quota for one species is exhausted or a vessel does not have a quota for a species which is caught in its fishery, the options are either to stop the fishery altogether or to continue fishing other species and then discard those for which the vessel has no quota. Regulations specifying a maximum percentage composition of a species kept on board will similarly result in discards. A management system which entirely relies on effort control, without associated landing quotas, would not induce this type of discards, although discarding for economic reasons would continue even under an effort management regime.

Minimum landing size regulations lead to discards when the selectivity of the gear is such that some fish below the minimum landing size are caught. The selectivity of fishing gear should therefore be such that few fish below the minimum landing size are caught. In mixed fisheries it is impossible to devise one gear design which will correspond to the minimum landing size of all the species caught. If, as is for instance the case in flatfish fisheries, catching sole and plaice simultaneously, the smaller species (sole) has the larger value, it will be economically inefficient to require a mesh size which corresponds to the minimum landing size for the larger species (plaice) and considerable amounts of undersized fish of the less valuable but larger species will thus be discarded as a result.

2.3. Who is affected by discards and how?

2.3.1. Discarding has negative economic and environmental effects

For most species, animals which are discarded will have a poor rate of survival in the sea and discarding is therefore as far as most species are concerned, equivalent to killing animals. Examples of exceptions where some survival is expected are most clam and mussel fisheries and some fisheries for crustaceans.

Unwanted by-catches and the discarding resulting from them is a problem in relation to the long term economic sustainability of fisheries and to the conservation of marine ecosystems.

Regarding economic sustainability, discarding leads to the killing of fish which do not contribute to the economy of fishing. As further developed below³, discards of juvenile fish or over-quota fish implies the loss of future yields (and hence income) incurred by the discard mortality. Discards of mature fish constitutes a waste of resources on the short term and reduces the spawning biomass which would otherwise have been available to support future productivity.

As far as conservation is concerned, discarding of non-target species affects the functioning of the marine ecosystem. The by-catch and discarding of certain sensitive species affects the biodiversity of the sea. Certain marine organisms including some shark and ray species and some seabirds and marine mammals are reduced to such low population sizes that a by-catch is incompatible with measures to be taken for the urgent recovery of these populations as would be required under CITES. Discarding thus undermines attempts to progress in other policies or international agreements such as the Convention on Biological Diversity.

Current discard practices have also altered certain components of the marine ecosystem as some populations of animals have benefited from the increased availability of dead fish close to the surface or at the bottom of the sea. For example, the populations of certain species of sea birds have increased due to the availability of discards and it must be expected that a reduction of discards will result in reduced populations of these species of sea birds as well.

The fishing industry is thus affected negatively in two main ways: firstly because fish which are killed without contributing to the income of the sector will not contribute to the income in the future either. If the fish were left to live and grow in the sea they would be available as an economic resource in the future; secondly, the fishing industry will be affected because in the longer term it is dependent on a healthy marine ecosystem.

2.3.2. *The extent of the discards problem*

2.3.2.1. The extent of discards worldwide

Data on discards are scattered and difficult to compare across fisheries.

The most recent estimation of discards at a worldwide level was conducted by FAO in 2005⁴. According to this study, the worldwide discard rate in weight is estimated at 8% (proportion of the catch discarded relative to total catch weight). Based on this discard rate, yearly average discards in the 1992-2001 period are estimated to be 7.3 million tonnes, for an average yearly marine nominal catch for that same period of 83.8 million tonnes. FAO considers that trawl fisheries for shrimp and demersal finfish account for 52% of total estimated discards and just 22% of landings. Most purse-seine, long line, jig, trap and pot fisheries have low discard rates according to this study. Small-scale fisheries have lower discard rates than industrial fisheries. Small-scale fisheries account for 11% of global landings and 3.7% of the discards.

³ See the section on Economics of discards.

⁴ *Discards in the world's marine fisheries. An update.* Kieran Kelleher. FAO Fisheries Technical Paper 470, 2005. Data used are for the period 1992 to 2003.

2.3.2.2. The extent of discards in European fisheries

Data on the extent and economics of discards in the EU have been collected by national fisheries research laboratories and through studies financed by the European Commission. From 2002 data on discards have been collected regularly through the Data Collection Regulation⁵.

The studies prior to the Data Collection Regulation in 2000 have covered different fisheries and periods of time. They constituted a first attempt to quantify and qualify the discard issue in the EU⁶. Data from these studies have been aggregated and tabulated by the International Council for the Exploration of the Sea (ICES)⁷, in a study commissioned by the Commission⁸ and summarised in the FAO (2005) report on discards worldwide. The summary provided in the study by FAO (2005) contains discards estimates per FAO statistical area based on a large variety of local data. The estimates relate to the period 1992-2001. EU waters are mainly included in FAO's Northeast Atlantic (Area 27) and Mediterranean and Black Sea (Area 37) areas. The summary estimates from this study are as follows:

The Northeast Atlantic area accounts for 1332000 tonnes of discards. This represents 19.6% of total worldwide discards for 11% of worldwide landings. The average discards for the area is 13% on weight basis.

The Mediterranean and Black Seas account for 18000 tonnes of discards according to this study. This corresponds to 0.26% of total discards, which compares with 0.45% of total recorded landings. The average discard rate on a weight basis for the area is 4.9%.

FAO attributes the high level of discards in Area 27 to high discards in many EU fisheries. Nevertheless, FAO also recognises significant discard reductions in EU's *Nephrops* fisheries, due to the compulsory use of square mesh panels, and flatfish fisheries where the minimum landing size has been decreased for some species. Nevertheless, the study shows the existence of very significant variations between zones in the area:

⁵ Council Regulation (EC) No 1543/2000 (OJ L176, 15.7.2000, p. 1).

⁶ Among these, the following ones are particularly relevant:

- At sea sampling from the DK fishing fleets in the North Sea and Skagerrak (project No 94/023),
- On board sampling of fish landed and discarded by commercial fishing vessels (95/094),
- By-catch of marine mammals and discards in pelagic fisheries (94/018),
- Amount of by-catches in various German fisheries (94/019),
- Research into *crangon* fisheries unerring effect (94/044),
- Biological sampling of fish discards in the Bay of Biscay (94/054),
- Studies of the Discards of Commercial fisheries from the South Coast of Portugal (95/081),
- Composition and fate of discards from *Nephrops* trawling in Scottish and Italian waters (96/092),
- Discards of the western Mediterranean trawling fleets (94/027),
- Discarding from herring and mackerel in ICES sub-areas IVa and VIa (96/082), and Monkfish fishery in Northern EU waters (96/086),
- Evaluation du volume et cartographie des captures accessoires de la pêche de crevettes pénéides en Guyane française. (92/3504).

⁷ Report of the Study Group on Discard and By-catch Information, ICES CM 2002/ACFM:09, ICES 2002.

⁸ Tingely, D, K.Erzini and I Goulding 2000. Evaluation of the state of knowledge concerning discarding practices in European fisheries. Megapesca 2000.

Northern waters show a low discards rate (3.9%), resulting from the combination of the discards ban in Norway (and Iceland), low diversity in catch composition and high manufacturing capacity for fishmeal in Iceland, Norway and Denmark.

The Baltic Sea shows a very low level of discards (1.4%). This results from the combination of a small number of commercial species in the area, fisheries which can target one species at a time and a well developed processing industry. Individual discards rates per species are reported to be: 7% (Cod trawl), 5% (salmon and cod gillnet fisheries) and negligible for herring and sprat fishmeal fisheries.

Total annual **North Sea** discards are estimated between 500 000 and 880 000 tonnes. Leaving aside pelagic species and species targeted for fishmeal production, which according to the available data have low rates of discards, the remaining fisheries are said to present high levels of discards, although reduction of catches and effort together with the effects of regulatory measures and the increased use of more selective gears, may have resulted in reductions of discards (particularly of undersized fish). Beam trawl flatfish fisheries (70% discards rate by weight) and the Nephrops and Crangon trawl fisheries (83%) represent particularly high levels of discards.

EU Atlantic fisheries: These fisheries represent high aggregated discard levels. The reasons for that are overfishing of demersal stocks, together with the dominance of demersal trawl gear. Minimum landings size and quota regulations, weak market conditions for smaller-sized fish, a diminishing proportion of larger-size fish in the sea and the wide geographical range of many important stocks are also contributing factors. The Algarve Nephrops and deepwater shrimp fishery (70% discard rate), the Algarve demersal finfish trawl fishery for hake, sea bream and other species (62%), the Irish razor shell dredge (60%) and the French Bay of Biscay hake trawl (56%) represent particularly high levels of discards.

Waters west of Ireland and Scotland: Discards rates are said to vary between 31 and 90% depending on the fleets, target species and depth range. Increasing pressure on stocks, together with weak market demand and quota restrictions, in particular when the catch composition differs from the available quota mix, are said to be the main factors for these discards. Regarding the latter, FAO points to the weaknesses in quota trading systems. As regards specific fisheries, FAO reports of very high discards of whiting in Nephrops fisheries (60% by weight of the catch), 30% of hake discards in hake catches, mainly because of trawl damage and to large quantities of pelagic species (horse mackerel, mackerel and blue whiting) by demersal trawlers.

Celtic Sea and Atlantic fisheries: FAO reports a 33% rate of discard by the French trawler fleet and average total discards by the French fleet fishing in ICES areas VII and VIII of 18.7%.

Iberian fisheries: Spanish multispecies beam trawls are reported to discard 45% of the catch, while the Spanish gillnet fisheries, hake long line and small pelagics purse-seine fisheries have discard rates of between 13 and 15%. Particularly high discard rates are reported from the Tagus estuary beam trawl targeting sole and Crangon (90%) and the Algarve Nephrops and deepwater shrimp fishery (43-70%)

Mediterranean and Black sea: As indicated above, the average discard level in the whole of Area 37 is low (4.9%). FAO points to a number of explaining factors, such as the importance of artisanal fisheries, the existence of relatively few trawl grounds, the existence of markets for small sizes of many species and the absence of a quota system which would lead to low discards if high grading is negligible. However, the poor data coverage concerning discards available for these two seas could put the accuracy of the results in to question.

Since 2002, discards data have been collected more systematically as such data are an integral part of the data collected by all coastal member states under the Data Collection Regulation. The data collected until 2005 were analysed by an STECF subgroup in 2006⁹.

The report points to a range of problems in the data available making comparisons and absolute estimates difficult and concludes that "The discard ratios presented show a predictable picture: by-catch species are frequently discarded; target species vary between fleets, they can be targeted by one gear but be considered by-catch in others; beam and single trawl are one of the gears with high discard rates and in a wide range of the studied species, while other gears such as hooks, gill nets and trammel nets have low discards as they are more selective. Beam trawl is a non-selective gear, but also a much targeted fishery, and consequently beam trawl fisheries catch several species but only retain a few species." Regarding the causes of discarding the report concludes that "The length frequency analysis shows that the majority of the species are either discarded due to MLS [minimum landing size] restrictions (such as highly valuable species like cod, hake and plaice), or to market forces, namely due to low commercial value in general (whiting) or for small sizes (megrim and horse mackerel). There are also examples of discarding as a result of the interaction between market requirements and multispecies quota restrictions (herring, mackerel and saithe). There is no clear change in discarding behaviour between areas, except for the North Sea where discarding of all species studied is related to MLS restrictions, and in the Mediterranean where there is a fishery targeting hake well below MLS. Finally it is important to point out the clear mismatch between MLS and gear selectivity for most of the métiers studied."

STECF pointed out that the results presented were provisional and only applicable for the species, years and gears analysed. STECF also considered that the results probably contained errors due to a range of data problems encountered.

2.3.3. *The economics of discarding*¹⁰

From the perspective of fishermen, the decision to discard depends on a comparison between different costs. For a given management system, once the fish is on board, discarding takes place because the landed value of the fish does not cover the costs of on-board handling, processing, storing and then landing. To put it in more formal

⁹ Discarding by EU fleet. Report of the STECF Subgroup on Research Needs, Brussels 9-12 October 2006 - http://ec.europa.eu/fisheries/legislation/reports_en.htm.

¹⁰ This section is based on two works, *By-catch management and the economics of discarding*. S. Coase. FAO fisheries technical paper, n°370. 1997 and *Economic aspects of discarding*, prepared by the Agricultural Economics Research Institute (LEI) of The Hague, 2001 (hereinafter, "EU2001") Contract reference 97/SE/018.

terms, discarding takes place because the costs of landings minus the opportunity cost of the discarded fish (measured by the foregone price that could have been received by it in the market) are higher than the costs of discarding¹¹.

The costs of landing the fish include activities such as preliminary fish processing (e.g. the labour involved in gutting and gulling), storing (e.g. ice costs) and handling (e.g. crate costs) as well as actual costs involved in landing the fish. The costs of discarding are expected to be relatively low for low quantities of discards as discarding is relatively easy, but would increase with the quantities of discards, as a greater proportion of the crew time would be involved in the discarding process.

However the above view does not take into account that discarding can result in significant negative externalities that are not borne by the fishermen active in any given fishery, but by other fishermen, consumers or society at large. In other words, if these costs were incurred by fishermen active in any given fishery; it is likely that they would alter their own harvesting strategies. Negative externalities arise for several reasons:

- First, discarding results in foregone future income, above all for the relevant fishery itself, as large discards of juveniles which have no or low present value will result in losses of future marketable fish and reduce the spawning stock of the species;
- Second, where fisheries interact, discarding in a given fishery can reduce the potential revenue in another;
- Third, discarding can have negative consequences on the ecosystem. This could furthermore affect the future yields of marketable species. This would be the case for instance of discards of low or no commercial value but which have an important role in the food chain; and
- Finally, the costs associated with trying to collect information on the level of discarding for the purpose of providing scientific advice for management decisions, and the costs of enforcement, may be considerable.

The loss of future income caused by discarding was evaluated in a study in 2001¹². The study examined three EU case studies (the Dutch flat fish beam trawl fishery, the UK North Sea Whitefish Trawlers and the French Nephrops Fishery). The study estimates discard levels and foregone yield in economic terms. For the Dutch beam trawl fishery, the estimate of discards was 0.8 kg fish discards for each kg of landed fish for 1998. According to this study, the value of discards of marketable species in the Dutch beam trawl fisheries, in terms of the foregone revenues from future catches is estimated at about €160 million, 70% of the annual landings value of the fishery. For the UK North Sea Whitefish Trawlers, the study estimates that €75 million worth of cod; haddock and whiting were discarded in 1999 which was equivalent to

¹¹ If the capacity of the hold is fully used, the foregone profits resulting from the higher value fish that could have occupied the place used by the fish that would otherwise have been discarded has to be added to the discarding costs.

¹² Economic aspects of discarding, Agricultural Economics Research Institute (LEI), The Hague. Contract reference 97/SE/018.

42% of the landed value. For the French Nephrops Fishery, the average discard ratio is in the range of 20 to 45%, according to the species and to the season. It is particularly high for the target species, Nephrops, where 30% of the catches were estimated to be discarded. The value of discards amounted in 1997 to €43 million, nearly 100% of the value of the Nephrops sold in auctions.

From an economic point of view, reductions of discards can be achieved by giving incentives that will help to internalize externalities. Two main types of incentives can be used:

- incentives intended to reduce the costs of landing fish which would otherwise have been discarded,
- incentives intended to increase the costs of discarding and the costs of taking large unwanted by-catch.

Among the former, the economic literature on discards refers to the following:

- Giving subsidies for landing fish otherwise to be discarded;
- Taking actions intended to reduce the costs associated with landing;
- Introducing tolerance levels for by-catch in relation to quotas;
- Taking actions intended to increase the value of low/no commercial value species.

Among the latter, the literature discusses the following:

- Introducing a discard ban;
- Expropriating illegal fish;
- Increasing enforcement;
- Introducing a by-catch fee

The above measures will help to increase landings of previously discarded fish. However, as regards the basic problem, that unwanted by-catches are taken, these incentives may work in contradiction. Incentives to reduce the cost of landing discards may ensure that unwanted by-catches are landed rather than discarded but will not in themselves provide incentives to reduce by-catches. On the contrary, they may encourage fishing practices where some by-catches are maintained as a supplementary source of income. The incentives to increase the cost of discarding or the cost of taking unwanted by-catch will on the other hand also be incentives to reduce the amount of unwanted by-catches taken in the first place. Such incentives will encourage the industry to develop and use selective fishing gear and to avoid fishing in areas and at times where the abundance of un-wanted animals is high. Fishermen will compare the marginal cost of discarding with that of improved selectivity or more selective fishing practices. If the marginal cost of discarding is higher than that of selective fishing, the fisher will employ selective gear and targeted fishing practices to avoid unwanted fish.

The main regulatory issue is then to achieve the optimal combination and intensity of the above types of measures.

2.4. How would discarding evolve if no action is taken?

If no specific action to reduce discarding is taken it is expected that discarding will continue on the present levels. More selective gears have been developed and implemented in some fisheries and although this has contributed to local reduction of discarding, the overall contribution of such efforts has remained marginal. As discussed below in Section 5, the economic motivations to discard would remain and would lead to continuation of those discard practices.

2.5. The right for the EU to act and the measures taken so far

The need to reduce discards in European fisheries was referred to by the Commission in its Communication on the Reform of the Common Fisheries Policy ("Roadmap") of May 2002¹³. The reduction of discards was further identified by the Commission as an important objective for the future of the Common Fisheries Policy in its Communication on this subject adopted in 2002¹⁴. Subsequently, the Council adopted conclusions on 3 April 2003 inviting the Commission to explore different ways to resolve this problem and, in particular, to promote the implementation of pilot projects to reduce discards in cooperation with the fishing industry. As a result, even if the implementation of the policy will require actions being taken also at Member State level and/or lower, there is clearly room for action at the Community level.

Since the Council conclusions in 2003, a number of initiatives have been taken or are ongoing in order to reduce discards:

- Efforts to reduce the fishing pressure on stocks outside safe biological limits are ongoing through the implementation of recovery plans and long term management plans. The Communication on MSY¹⁵ highlighted that for many stocks, it is possible to get the same amount of catch with much less fishing effort and the intention is that long term management plans in the future should be based on this approach. In fisheries which present high discard levels of associated species, the reduction of effort is expected to reduce discards of these species;
- Effort management has been introduced as a supplementary measure to landing quotas, thereby reducing the fishing going on after the quota on recovery stocks have been taken;
- Two regulatory measures have recently been adopted to encourage the use of more selective gears that reduce by-catches in Nephrons fisheries;
- Exploration of alternatives to technical measures which generate discards (including the reduction of species for which MLS are imposed). Compulsory use of by-catch reducing devices (BRD) in given fisheries;

¹³ COM(2002) 181.

¹⁴ COM(2002) 656.

¹⁵ COM(2006) 360.

- Some pilot projects to improve the selectivity of fishing gear are ongoing;
- By-catch limits have been set in many fisheries for commercial species.

However, the European Commission considers that these measures and initiatives have only contributed marginally to an overall reduction of unwanted by-catches and discards. The analysis by FAO in 2005 confirms that the EU is lagging behind other regions and countries. The main value added of the new policy initiative will to accelerate the reduction of unwanted by-catches and discards.

3. OBJECTIVES

The objective of the Common Fisheries Policy¹⁶ is to 'ensure exploitation of living aquatic resources that provides sustainable economic, environmental and social conditions. For this purpose, the Community shall apply the precautionary approach in taking measures designed to protect and conserve living aquatic resources, to provide for their sustainable exploitation and to minimise the impact of fishing activities on marine eco-systems.'

In extension of this, the objective of a new policy on discards is to contribute to fisheries which are economically, environmentally and socially sustainable and with minimal impact on the marine ecosystem by significantly reducing the waste of natural resources in fisheries through the incidental by-catch and the subsequent discard of marine animals which do not contribute to societal benefits.

4. POLICY OPTIONS

At this stage of the debate on how to reduce discards in the EU, the Commission considers that the following options should be considered:

- The first option consists of not taking any specific measures to reduce by-catches and discards but to continue with the present management, unchanged.
- The second option would be to take supplementary direct measures and adapt current CFP instruments to reduce unwanted by-catches and discards where necessary; in particular, real-time area closures, obligation to switch fishing grounds, and promotion of selective gears.
- The third option would be to implement a discard ban. Two sub-options will be considered below. The first is a discard ban as a stand-alone measure. The second is a discard ban combined with supplementary measures intended to reduce the negative effects of the discard ban (i.e. the direct costs on fishermen and the costs of enforcement) and/or to amplify the positive effects thereof.

¹⁶ Council Regulation (EC) No 2371/2002.

4.1. Description of the options

4.1.1. *To continue with the present management.*

This option consists of not taking any specific measures to reduce discards but to continue with the present management, including quotas and effort regulations

4.1.2. *To take supplementary direct measures and adapt current CFP instruments to reduce unwanted by-catches and discards*

This option implies to supplement the existing management system with several possible direct measures. The most important ones to be considered are regulations of fishing gears, permanent or temporary area closures, and an obligation to move fishing grounds.

Regulations of fishing gear consist of measures which intend to make the fishing gear more selective such as mesh size regulations and regulations requiring sorting panels and similar devices.

Spatial management measures refer basically to *closed areas or boxes*. A number of boxes have been introduced with that aim, including the plaice box and the Norway pout box in the North Sea.

Real-time closures, where areas are closed temporarily for fishing when large proportions of undersized fish are observed in the fisheries, may be an alternative. This obligation exists in Norway and other countries and seems to work smoothly. However, in order to be effective, a very flexible system, which would allow for the closure of a zone in a matter of hours or maximum days, would be crucial. The current decision making process at the European Institutions level does not in principle allow for such smooth and prompt reactions, so that it would be necessary to set up a system whereby real-time closures are implemented by Member States but under a set of rules which ensure impartiality. Criteria for real time closure of fisheries need to be defined on the basis of by-catch monitoring. Reopening may then be contingent on evidence that fisheries within the by-catch limits can be conducted, based on limited exploratory fishing.

The Commission originally proposed such a system for the cod recovery plan, whereby Member States would be able to close areas of high abundance of juvenile cod for a maximum period of six weeks, subject to notification to (and tacit approval of) the Commission. This idea was rejected by the Council however, partly because it was seen as a complication of the regulation, but also because of the mistrust of some Member States of any delegation of management responsibility to national authorities.

Another possible measure is an obligation for an individual fishing vessel *to move fishing grounds* when the proportion of unwanted by-catch in a given haul exceeds certain thresholds.

4.1.3. *To implement a discard ban in the EU as a stand-alone measure*

The above option focuses mainly on how to fish. That is why it focuses on selectivity and other measures intended to reduce by-catch, as a precondition to a reduction of

discards. However, a more direct approach would be to provide strong motivation to avoid unwanted by-catches by making it illegal to discard. Such an approach has been pursued in some countries outside the EU where a *discard ban* has been introduced. As a result, EU fishing vessels are already submitted to a discard ban, for instance when fishing in Norwegian waters.

A discard ban would require, as a minimum, the following elements:

- Moving from a *prohibition to have on board or to land* to a *prohibition to catch* undersized and /or fish for which there is no quota. In practice the prohibition to catch will be a prohibition to proceed in fishing when unwanted by-catches exceed maximum acceptable catch limits which are to be defined on a fishery-by-fishery basis. A discard ban would *require the elimination of minimum landing sizes* (MLS) and its replacement by Minimum Catch Sizes (MCS). Acceptable by-catch limits need to be defined on a fishery by fishery basis. The basis for these limits will be existing data on discards. As a starting point, the acceptable limits could be a reduction relative to the discards of that species/size over recent years in the fishery. Special considerations will apply in fisheries exploiting species with highly variable year classes. The by-catch level should be low to maximize the positive effects of this measure. Another issue to assess is to what extent tolerance levels should be reduced over time.
- An obligation to land all fish on board whether the fish are within the quotas available to the vessel and above minimum legal sizes or not; and

Deduction of undersized fish from the quota of the vessel is a strong motivation to avoid catching such fish in the first place. Such deduction should therefore be considered as an element in a discard ban.

A discard ban would require new monitoring and enforcement instruments. Observers on board will be an important tool but are costly, especially when applied to small or medium size vessels. Other, less costly, instruments based on logbooks and data analysis such as reference fleets and comparisons of catch reports across vessels and areas will play an important role as well. This involves a careful monitoring of the landings of individual vessels combined with a systematic analysis of detailed catch and landings figures which are compared with data from observers on board when it is not possible to have such observers on board all fishing vessels.

The balance between these instruments will vary between fleets, based on considerations of economy and efficiency. In large scale fisheries an extensive coverage by observers will be an option while in smaller scale fisheries the emphasis will be on reference fleets and comparisons of data across vessels and areas.

4.1.4. *To implement a discard ban combined with supplementary measures*

This option means to accompany a discard ban with a series of additional measures aimed at enhancing the positive effects on discards resulting from a pure discard ban and at attenuating the private and enforcement costs resulting from the discard ban.

These additional measures can be of three main types:

4.1.4.1. Measures intended to reduce by-catch

Most of the possible measures under this category have already been referred to in the second option above. In fact, these measures intend to reduce the amount of by-catch taken in a given fishery and, hence, the quantity of fish that would have been otherwise discarded:

Promoting the use of more selective gears. Evidence from Norway and New Zealand show that a discard ban in itself serves as a strong motivation for the industry to improve the selectivity of fishing gears. This could be further strengthened by technical measures requiring fishing gear to be selective, by promoting research into more selective gears and by giving more incentives to favour selectivity, for instance by rewarding the use of more selective gears with additional days at sea.

The *temporary closure of some areas* when the proportion of undersized fish or other unwanted by-catches taken in the area exceeds certain thresholds and *an obligation to move fishing grounds* when the proportion of undersized fish in a given haul exceeds certain thresholds have been discussed above. These measures would, when combined with a discard ban, work together with the motivation of the industry to avoid having to land unwanted by-catch.

Another type of possible measures falling within this category are those intended to *increase the flexibility and transferability of quotas*, in particular in multi-species fisheries. By looking at what is currently being done in Norway, Iceland and other countries where transferability is possible, several possibilities could be considered:

- quota substitution between species based on agreed *exchange rates* between species on the basis of market values or in accordance with values determined by the fisheries administration,
- Multi-species quotas. Expressed for instance in x-equivalent of a given fish (cod equivalent) in accordance with agreed rates, and
- multi-year quotas.

Some measures within this category presuppose that tenure systems have been put in place which enable the transfer of quotas. A debate on rights based management issues has been launched by the Commission by means of a Communication¹⁷. The debate could help to ascertain the extent to which individual rights to fish could promote discards by high grading, in particular in the context of shrinking overall quotas. The same debate could help to shed light on whether transferability of rights helps in correcting the potential discard-enhancing effect.

Another possible measure would be introducing a by-catch fee, as carried out/exists successfully in some developing countries, (e.g. Namibia). Further incentives, such as the possibility to redeem part of the fee in view of the use of selective gears, could also be examined.

¹⁷ COM(2007) 73.

Finally, it would be possible to allow for discarding at sea of species where scientific evidence show that their survival rate after discard is high, for instance some crustaceans and molluscs.

Enforcing a discard ban with such supplementary measures will basically require the same instruments for a discard ban as for a stand-alone measure. In order to control and enforce requirements to change fishing ground or real time closures, electronic log book schemes may be implemented with almost real time reporting of the catch composition. This also requires that there is capacity for nearly real time analysis of such log books and landings data to identify candidates for area closures, and that systems are put in place which enable and oblige Member States to implement such closures in a fair way once tolerance levels for unwanted by-catch are exceeded.

4.1.4.2. Measures intended to reduce landing costs

The two main measures that could be contemplated are:

- To set tolerance levels for landing of juvenile fish up to a given percentage of the catch per target and by-catch species. For instance, in Iceland only 50% of undersized fish counts against quota provided it does not exceed 10% of total catch. In addition, that fish is to be landed separately.
- Fish which are above these tolerance levels should normally be confiscated. Otherwise, the anti-discard policy could actually end up promoting discards. Confiscation means that the fisherman should not receive any part of the value of that catch. However, as an incentive to land by-catch, Norwegian fishermen receive since 1999, 20% of the proceeds of the sale of illegal fish to cover the landing costs. That level was the result of a negotiation between all stakeholders. It should be possible to modify the level of the compensation in view of the evolution of discards.¹⁸ The remuneration will certainly reduce the monitoring and enforcement costs but should be carefully set in order for it not to promote increased catches of low or no value species.

These measures will act as further incentives for fishermen to land what they would otherwise discard, in spite of the discard ban (assuming that enforcement would never be perfect).

4.1.4.3. Measures intended to increase the market price of previously discarded fish

Measures in this category would focus on the marketing and distribution chain and are intended to find commercial outcomes for low value species, in particular within the human consumption chain. An interesting example is the "by-catch bank" operated in Iceland to assist in commercialising these species, by means of actions intended to modify the tastes of consumers.

¹⁸ In New Zealand, by-catches can be provided to a processor without payment to fisherman. (EU2001, 25). The processor will pay the State a price decided by the State. The processor will be able to pay to the fisherman an additional amount of money.

5. ANALYSIS OF IMPACTS

5.1. The environmental impact of measures to reduce unwanted by-catch

Regarding *environmental impacts* reducing unwanted by-catches will lead to a situation where fisheries have a reduced negative impact on marine biodiversity and on the marine ecosystem.

This reduction of negative environmental impact would be greatest when choosing those policy options which are expected to be most efficient in reducing unwanted by-catches.

Certain populations of organisms which have benefited from the additional supplies of dead animals resulting from discarding will lose part of their food base and will be reduced in numbers. This includes certain sea bird populations and scavenging benthic organisms. This effect is expected to be greater for those policy options which are most effective in reducing discards at sea.

5.2. Environmental, economic and social impacts resulting from continuing the present management without specific measures to reduce unwanted by-catch

Continuing the current management measures without specific measures to reduce unwanted by-catch and discarding is not expected to lead to a reduction in discarding. The negative environmental impacts of fishing are therefore maintained and the industry will continue to suffer long term economic loss due to the loss of future yields which discarding inflicts.

New approaches, notably the MSY approach which intends to reduce the fishing mortality to lower levels for most stocks, may reduce effort overall. Reduced effort is expected to result in less unwanted by-catch of juveniles because the stocks will grow to consist of more large fish. As a result of the effort reduction, the level of by-catch and, hence, that of discarding of undersized fish and of non-target marine organisms, would decrease accordingly.

A reduced effort would not however remove the motivations for high-grading and economically motivated discarding would therefore still take place.

Continuing the present management will not reduce discarding significantly and to the extent the MSY policy for a reduction of overall fishing pressure succeeds some positive effect will be seen but some important drivers for discarding remain in place.

The Commission considers that the positive effect of this option will be considerable but not sufficient and it will therefore not be considered any further in this document.

5.3. Taking supplementary direct measures and adapting current CFP instruments to reduce unwanted by-catches and discards

5.3.1. Effects on by-catches and discards

Regulations of fishing gear, such as mesh size regulations and regulations requiring sorting panels and similar devices, aim directly at changes in selectivity and should

thus in principle reduce by-catches and hence discards. The introduction of sorting panels in some fisheries for shrimp and Nephrops have resulted in considerable reductions in unwanted by-catches of finfish.

A change in selectivity may, however, also lead to lower catches of commercial fish close to but larger than the minimum landing size. This is equivalent to short term economic losses for the individual vessel. When introducing such measures without simultaneous measures to motivate the industry to avoid by-catches, one must therefore be aware that any regulation which reduces the economic profitability of fisheries will be counteracted by legal (and in some cases illegal) adaptations of the gear which will reduce the effects of the regulation. The history of technical regulations has demonstrated that there may be a large difference between the outcomes of studies made under ideal conditions, on the one hand, and those resulting from implementing the same technology through regulations, on the other. Such differences are due to adaptations by the industry. These adaptations and the regulatory responses constitute a recurring process of increasingly detailed micromanagement which is one of the main reasons that technical regulations have developed into a complex body of legislation which is difficult to implement and to understand for the citizens. Increased complexity of regulation runs counter to the objective of simplification of legislation which is an important aim in its own right for the European Commission.

Spatial management measures such as *closed areas* may reduce by-catches and hence discards by reducing fisheries in areas with high abundance of juvenile or non-target fish. A number of boxes have been introduced with that aim, including the plaice box and the Shetland box in the North Sea. Evaluations of the effect these boxes have however, has not demonstrated that their intended benefits were achieved. It is not known whether this is due to a flaw in the original concept, to the large number of derogations which have been accepted for these boxes or to non-compliance. There is a real doubt in many cases as to the effectiveness of this kind of measure in reducing by-catches and hence discards. The utility of a closed area should always be judged on the basis of the specifics of each case rather than on the basis of generalised assumptions. In those cases within Community waters where proposals have been made, such as closed areas to protect cod, it has proven difficult to identify areas with high abundance of juvenile fish which are sufficiently stable in space and time to form the basis for closed areas aiming at reducing catches of juveniles.

As indicated above, in the absence from areas with a consistent presence of juvenile fish, *real-time closures*, where areas are closed temporarily for fishing when large proportions of undersized fish are observed in the fisheries, may be an alternative. The implementation issues relating to this instrument have been discussed above.

5.3.2. *Economic and social impacts*

The basic point to make as regards economic and social impacts is that as the current management will not significantly change, the basic incentives to discard will not change significantly either. Without a change in the incentives, the level of discards is not expected to be reduced significantly. This implies that no significant changes are to be expected either with regard to the current situation.

In addition, most of the above measures will entail additional short-term cost increases for fishermen. For instance, an obligation to move fishing grounds may imply additional fuel consumption and lost time. The adoption of more selective gear or the prohibition of the use of certain gears may also entail significant additional investments in compliant gear and may also reduce catch at least in the short term.

As regards marketing and distribution, for some species, small reductions of discards might somewhat increase catches of larger fish in the short to medium term and result in small positive price changes depending on the magnitude of the quantity increase and on consumer's preference for bigger sizes. For others, or in some markets having a preference for smaller sizes, these effects could be neutral or negative. In the end, as the changes are not expected to be of any significance, these positive effects would normally be negligible.

For social impacts, effects directly attributable to the supplementary measures are not expected to be very significant either. However, some job losses could occur, in view of the cost increases.

5.3.3. Enforcement costs

In addition, some of these measures, such as closed areas or real-time closures would require a very high level of additional, costly monitoring and control activities, paid for by the Member States.

5.3.4. Balance of impacts

On balance, the net effects are not expected to be clearly positive in most cases if this option is chosen.

Discard-reducing effects of some of the additional measures could be partially or totally compensated by discard-inducing effects from the basic policy instruments. If so, it is very unlikely that cost increases for fishermen -and the associated job losses- together with the increase in enforcement costs, would be compensated by a significant reduction of discards.

5.4. Implementing a discard ban as a stand-alone measure

5.4.1. Effects on discards and by-catches

The main strength of a discard ban is that it creates strong incentives for the industry to address the core problem –that unwanted by-catches are taken – through active development of more targeted and selective fishing gear and fishing practices.

Therefore, if properly implemented and enforced, a discard ban should progressively and significantly reduce discards. Regarding by-catch, a discard ban would be a powerful incentive to reduce by-catch in the first place, by increasing selectivity. This has been the case in all jurisdictions where a discard ban exists. Prohibiting to catch undersized/no quota fish is a powerful incentive towards using more selective gears, for instance separator grates, the Nørdmore grate, in shrimps fisheries, increased mesh sizes and square mesh panels.

5.4.2. *Economic impacts*

In what follows, the most likely impacts of a discard ban will be outlined. The purpose is not so much to conduct a proper quantitative impact assessment but to point out areas where significant impacts are to be expected when compared with the current management situation. It has to be stressed that the actual effects will critically depend on the characteristics and present state of each specific fishery.

It has to be noted also that generally speaking, negative impacts on fishers and any market distortions are expected to be at their maximum level shortly after introducing the discard ban and that they will get gradually attenuated over time in parallel with the reduction of discards.

5.4.2.1. Direct effects on fishers

The adoption of a discard ban may have significant economic impacts on fishers, both on a short and long term, when compared with the current management system. On the short term, it will most likely increase the costs for fishers active in those fisheries, especially multispecies fisheries, which formerly generated high levels of by-catch, which so far was discarded (i.e.: because the cost of landing was higher than the cost of discarding).

Under a discard ban, discarding will not be a legal option and it is very likely that the costs of landing will be increased:

- Labour costs involved in fish processing on board will increase. Fish that was so far discarded without further processing will have to be processed. In cases where automatic processing machines are used to process fish, it is likely that the increase in labour costs will be substantial, to the extent that machines are unable to process small sizes.
- Storage, handling, landing levies and auction costs to the market would also increase in proportion to the additional volume represented by previously discarded fish.
- The effect on transport costs to the market are somewhat ambiguous as high grading is associated with extra effort (and hence with additional consumption of fuel). Also, to the extent that conservation pattern of by-catch differs from that of the target species, the prohibition to discard could require more frequent journeys to port or modifications in fishing zones.
- Furthermore, the obligation to keep previously discarded fish on board would reduce the space available in the bay for the target species. This will imply an additional cost to the extent that the size of the bay is optimised for the expected level of catches of the target species.
- Finally, if there are high price differences between grades of fish or between species, fishermen will have to bear an additional cost in the form of foregone income. This cost could be more substantial if increasing landings of small fish of the target species (even if above the minimum size) could have negative effects on prices of all sizes - see for instance the case of 25 cm plaice in Dutch flat fisheries

above. Increasing landings of previously discarded low value species could also affect the price of a target species, depending on cross-substitutability across species.

In the short term, it is likely that the net costs increase would negatively affect profitability and would lead to capacity adjustment. However, as stated above, the net overall short term effects would very much depend on the situation of each individual fishery.

For those characterised by excess capacity, depressed stocks and poor profitability, a cost increase could be beneficial in the long term as capacity will be adjusted more rapidly and effort would decrease. For fisheries which are close to the maximum sustainable yield, the cost increases would reduce short term profitability.

These cost increases will be more intense in the short to medium term and should reduce over time in parallel with the reduction of discards, and the attainment of a new equilibrium, which will be characterised by far less discards.

Furthermore, it is to be expected that the industry will try to reduce these costs by various means. One avenue will be to introduce more fuel-efficient vessels and gears. Another one is increasing selectivity to reduce by-catch, and hence discards (see above).

Positive economic effects will occur in the medium to long term as a result of larger stocks, larger stock spawning biomass, stocks composed of bigger fish as well as from better balanced ecosystems. Larger stocks consisting of bigger fish will have direct positive economic impacts because the catches per unit of effort exerted will be higher and more valuable. Larger stock spawning biomass and healthy marine ecosystems will have positive economic impacts as this is the basis for the continued productivity of the fish stocks on which the industry depends.

5.4.2.2. Effects on other fisheries

A discard ban would clearly benefit other fisheries which target fish that is discarded at a juvenile stage by other fleets. The size of stocks would increase as would the profitability of these fisheries.

5.4.2.3. Economic impacts on the marketing/distribution chain

The question to answer is what will happen once the previously discarded fish is landed.

A requirement to bring all catches back to the harbour requires also that systems are set up to deal with landings which would otherwise have been discarded. Such landings may be used to produce protein and oil or be sold to the normal human consumption market. In order not to encourage targeted fisheries the income from this should not go back to the individual vessels. A small fraction of the income may be paid to the vessel to cover handling expenses. Systems for handling the remaining funds need to be set up and decisions need to be made about the purposes for which these funds can be used. It may for instance be possible to use the proceeds to co-finance the by-catch regulation system, observer schemes or to support pilot

experiments aimed at developing practices and techniques which result in reduced by-catches.

In order to outline the economic impacts on the marketing/distribution chain, it is important to distinguish between fish below minimum catching size or catches exceeding the quota on the one hand and low/no commercial value on the other hand. Regarding small or above quota fish, a further distinction has to be introduced between undersized fish and marketable fish for which there is no quota available for the vessel.

Marketable fish

Marketable fish has a market value. As a result of a discard ban, some quantities of marketable fish over the quota available will be sold in the market. Hence there would be an increase in supply of a magnitude that could be substantial in the first years of application of the discard ban and which would normally reduce over time.

The effects on prices of this additional supply will depend on the own-price flexibility of the species and on the existence of substitutes (either other fish species or other types of food) as well as on the general supply and demand conditions in the market.

Existing studies concerning different species show that own-price flexibilities are not negligible¹⁹, which indicates a demand relatively sensitive to changes in quantities. Price sensitivity seems also to be higher in the short rather than long, term. On that basis, a sudden increase of the landings of a given species might result in a relatively substantial short term price decrease.

The availability of ready substitutes also has a bearing on the assessment of the likely impact of increasing landings. On occasions, cross-substitution could have a greater effect on prices than that of own landings. For instance, it appears that whitefish species can be substitutes to each other. In this respect, increased landings of one of them could reduce the prices of all of them.

However, the impact would need to be estimated on a fishery by fishery basis.

It has to be added however that data from Iceland indicate that the additional supply of fish resulting from the discard ban was very small and that it did not appear to have had any significant economic effects. However, no study has been undertaken to verify this point.

Undersized fish

A discard ban will imply that quantities of undersized fish will be landed. It remains to be determined whether such fish would be put on the normal market or would be disposed of through other chains. If these fish are put on the normal market, the main economic impact of these landings would depend on the relation between price and size; that is, on substitution between sizes, and on national/local size preference.

¹⁹ An increase of 10% in the quantities landed leads to a price reduction in between 3-7%, depending on species.

There are not many studies on this but; but in most cases, larger sizes command a somewhat higher market price. There are also cases of national/local preference for smaller sizes, in which case, small fish will command a relatively higher price.

Furthermore, there are also cases where fishermen are hostile to the landing of small fish. In the case of plaice in the Dutch flatfish beam trawl fishery, the fishermen showed their opposition to the then planned reduction of MLS for plaice to 22cm. They indicated they did not intend to land plaice under 25cm because of fears that such small fish would reduce prices for all sizes.

Low value or non-commercial species

The question to answer is what would happen with fish for which currently there is no significant market.

Experience in Europe shows that small markets for some of these species could develop. That was the case for species like dab and flounder. However, these markets are small and tend to collapse as soon as the maximum marketable volume is reached.

It is to be expected that new markets could emerge. Most of them would rise or grow outside the human food chain (e.g., cosmetics or pharmaceuticals). However, some others could arise within the human food chain. For example, there is a market for dried fish heads from Iceland which are apparently exported to Nigeria. In addition, the growing perception of fish and fish related products (such as Omega 3 organic acids) as something positive for health could result in significant additional markets in the medium to long term.

However, apart from a few examples –such as those referred to above-, international experiences in the developed world are not very promising. Despite technological progress, there are few examples of products being made commercially. The development of these markets could also require additional costs in improving on board handling systems and transshipment at sea.

Currently, the most promising (existing) market is that for fish meal and fish oil production. The EU fish meal and fish oil processing industries are unable to meet demand²⁰. Imports mainly from South America cover 44% of fish meal and 27% of fish oil demand. Projections to 2010 predict a larger increase in demand from 206000 to 318000 tonnes for fish meal and from 194000 to 327000 tonnes for fish oils. Imports would need to cover 68% of fish meal and 47% of fish oil demands. This demand comes from aquaculture (33%), the pig industry (32%) and the poultry industry (29%).

The EU supply comes from industrial fisheries, mainly for sand eels and sprats (67% of EU supply, both under TAC and quotas) and trimmings (33%). Hence landings of these species will increase the supply of EU raw material at least in the short term.

²⁰ The Fish Meal and Fish Oil industry its role in the Common Fisheries Policy. Working paper, European Parliament, Fisheries Series No Fish 113 EN, 2004.

5.4.3. *Social impacts*

Given the wide variety of fisheries in the EU, it is particularly difficult to outline the social impact to be expected of a discard ban.

It is generally expected that the impact on employment on small scale, artisanal fisheries should be lower than in industrial fisheries, as they present lower levels of discards. Hence the negative impact on coastal communities dependent on these fisheries would not be very significant.

Furthermore, the obligation to land could create new job opportunities, in particular for coastal communities. For instance, some redundant vessels could be used to take to port previously discarded fish from larger vessels. There are a few examples of this type of activity in some African countries.

The impact on industrial fisheries would very much depend on the characteristics of the fisheries, but employment losses in the short term cannot be excluded. The level of job losses and the extent to which they could be compensated by new job opportunities in new by-catch processing capacity is unclear, but not negligible.

Ultimately, cooperation with the industry, in particular as regards the modalities of implementation and the complementary measures to be taken, will be essential to ensure the success of the discard ban and to minimize its negative impacts. Any discard reduction measure will probably result in additional short term costs to fishers, so any further action needs to be discussed and legitimized by the industry.

5.4.4. *Enforcement costs*

Enforcement and monitoring costs would result in an additional burden for fisheries administrations due to costs of having observers on board and to monitor and analyse catches.

Whether and how these costs could in part be supported by the industry is an open question to be answered on a fishery by fishery basis. The debate originated by the Discard Communication is expected to address this issue.

5.4.5. *Balance of impacts*

On balance, a discard ban would significantly reduce discards and unwanted by-catch.

However it will also entail significant additional short term costs to fishermen, in particular in multispecies fisheries. These costs will get reduced as by-catches get reduced and as the industry adapts to the new situation. Structural adjustment should ideally permit a smaller but healthier fishery sector. Positive effects on catches and fish size will be more intense than with the previous option, which could help further improve the economic situation of the sector in the medium term, depending on market preferences for these larger sizes.

Positive effects on fisheries targeting fish previously discarded in other fisheries will also help to compensate the above costs from a societal perspective.

Effects on processing and marketing could be significant and normally speaking positive, in particular for low value species. These positive effects could further compensate the above additional costs.

Monitoring and enforcement costs would most likely be higher than in the present management system.

However, if properly enforced, the obligation to land will substantially improve the quality and quantity of data to be used in the management of the fisheries for stock assessment and quota determination. This could be a very important positive effect.

5.5. Implementing a discard ban with supplementary measures

5.5.1. Effects on by-catches and discards

A discard ban will in itself provide strong incentives for the industry to develop and implement targeted and selective fishing gear and fishing practices in order to reduce unwanted by-catch. However, the industry may be assisted in this effort by some supplementary measures which provide guidance on how to avoid by-catches. Such measures may include requirements to move fishing ground when maximum acceptable by-catch limits are exceeded, real time temporal closures of areas where high abundances of juveniles or non-target species have been encountered, and support to more selective gear.

The effects of the discard ban on by-catches and discards are, with such supplementary measures, expected to be better than the effects from the pure discard ban. This is because of the effects of the directed measures intended to help the industry as a whole to reduce by-catch. These will supplement with information and means of action which may be difficult for the industry to otherwise implement. Lower by-catch levels will result in lower potential discard levels as well.

The effects of other measures in this category, in particular as regards quota flexibility, could also be positive and substantial.

5.5.2. Economic and social impacts

The economic and social impacts resulting from this option will in principle be very similar to those resulting from a pure discard ban. There will be short term costs but these will be counterbalanced by the longer term gains from larger stocks with larger fish and a healthy marine ecosystem.

Measures which help the industry in reducing by-catches will, under a discard ban, result in direct short term reductions of costs to handle unwanted by-catch and foregone income from using storage capacity for less valuable fish or fish without market value. The supplementary measures will imply some direct short term costs to the individual vessel, as requirements to move fishing ground or real time closures will add short term costs in terms of fuel costs and time. However, if the industry was to set up such systems itself as a collective effort to reduce the economic burden from a discard ban, the costs would accrue as well. Overall, the economic impact is supposed to be more positive than for a pure discard ban. If so, the social costs, in

particular in terms of employment loss in industrial fisheries, characterised by high by-catches and hence discards, would as well be somewhat lower.

Finally, measures intended to increase the price of previously discarded fish could result in additional revenue in the medium term.

5.5.3. *Enforcement costs*

Unless enforcement is effective, the handling costs and the foregone income following the introduction of a pure discard ban, would act as an incentive to discard, in spite of the discard ban. In this respect, the supplementary measures discussed above in this chapter will help the industry in reducing by-catches and will hence reduce the enforcement costs associated with a pure discard ban. However, there would be some added enforcement costs for the Member States from the supplementary measures. The balance between these two contrary effects should normally be positive but cannot be generalised a priori for all fisheries.

5.5.4. *Balance of impacts*

On balance, this option would be more effective than the pure discard ban in terms of reduction of by-catches and hence of discards at similar or lower economic, social and enforcement costs.

6. COMPARING THE OPTIONS

As way of introduction to the issue of comparing the options, the table below, reproduced from FAO (2005)²¹, shows the weighted average discard rates for fisheries using different discard-related management measures. In this table the discard rates in fisheries where a specific management measure has been taken have been averaged.

Measure	Discard rate (%)
Turtle excluded device	62.3
MLS	50.9
By-catch reduction device	43.9
Obligatory discard landing	32.2
Obligatory release of certain species	19.8
By-catch quotas	19.8
Observers	18.4
Area closures	10.5
Time closures	9.9
By-catch plan	7.6
Multiple measures	3.8
Discard ban	3.6

This is based on a global assessment and may not apply directly to conditions in each and every European fishery. The fisheries where the different measures have been made are also very different and the absolute numbers are therefore not directly

²¹ Op cit, p. 52.

comparable. However, the table can be considered as a useful general indication of the relative effectiveness of different measures in reducing discards.

It has to be added that, as far as additional administrative burdens are concerned, none of the options analysed are expected to result in any significant additional administrative burden for private firms.

6.1. Comparing the option to take supplementary direct measures on the basis of current CFP instruments with the options which include a discard ban

The possible measures discussed within the option to take supplementary measures without a discard ban would have positive effects on reducing discards.

However, one fundamental problem with this option is that the basic principle will still be the prohibition to have on board undersized or no quota fish. This principle combined with shrinking quotas and stocks composed mainly of small fish, will counteract the positive effects on discards resulting from these additional measures.

In addition, as indicated above, many of the possible measures, such as the obligation to move to another fishing ground and the real time closures, will entail some additional costs for fishermen without introducing incentives to comply with regulations.

This option amounts to fighting the symptoms of a sickness leaving the causes for it intact.

A discard ban will on the other hand, if properly enforced, address the root of the problem by creating strong motivations for the industry to avoid unwanted by-catch in the first place. A discard ban basically turns the challenge to reduce unwanted by-catch to those which are in the best position to identify the most practical methods to avoid unwanted by-catches, the industry itself.

This points to the conclusion by FAO (2005)²² that *"a no-discard policy is consistent with best practice and is likely to minimize discards"*.

For these reasons, the Commission considers at this stage that options including a discard ban are preferable to options which do not include this element.

6.2. Comparing introducing a pure discard ban and a discard ban combined with supplementary measures

The remaining issue is then to compare the pure discard ban option with that in which the discard ban is supplemented by additional measures, as discussed above.

The general approach in the countries and in FAO (2005) is that a discard ban should always be seen as just one component in a policy which is based on creating incentives and guidance to reduce unwanted by-catches rather than as a stand-alone measure.

²² Op cit, p. 60.

As discussed above, it is expected that the option where a discard ban is used together with supplementary measures would be associated with the same or better benefits without having larger economic or social costs.

As regards enforcement costs, the discard ban combined with supplementary measures is expected generally to be associated with lower enforcement costs than those resulting from a pure discard ban because the industry gets guidance on how to avoid unwanted by-catch, but this balance may play out differently in some fisheries.

6.3. Matrix of impacts

The following matrix summarises the above likely general impacts. Of course they will vary per fishery:

Effects / Options	Adapt current CFP plus supplementary measures	Discard ban as a stand alone measure	Discard ban plus supplementary measures
Reduction of by-catch and discards	Small to negligible. Even negative	High	Higher and quicker than those from a pure discard ban
Economic impacts	Loss of future yield as resources are wasted and thus lower income to fishermen. No significant effects on marketing and distribution	Significant cost increases for fishermen in the short term. Medium and long term positive effects through larger stocks with larger fish and healthy ecosystem. Positive effects likely on reduction of overcapacity Positive effects on other fisheries likely Positive effects on marketing and distribution in particular for low value species	Short term costs increases less significant due to by-catch reducing measures. Medium and long term positive effects through larger stocks with larger fish and healthy ecosystem Positive effects likely on reduction of overcapacity Positive effects on other fisheries likely Positive effects on marketing and distribution in particular for low value species
Social impacts	Some job losses in the medium or longer term likely due to lost income	Short term job losses in industrial fisheries. Longer term job increases likely as stocks will be larger Handling landings of	Short term job losses in industrial fisheries less significant due to reduced cost increases Longer term job increases likely as stocks will be larger Handling landings of

		previously discarded fish may create some new jobs	previously discarded fish may create some new jobs
Environmental impacts	Small to negligible reduction of negative impacts	Significant reduction of negative impacts	Significant to very significant reduction of negative impacts
Enforcement costs	High	High	High. Smaller than those from a pure discard ban
Administrative burden	Not significant	Not significant	Not significant
Quality and availability of data	No impact	Positive impact	Positive impact

6.4. The preferred option

From the above analysis of impacts, it can be concluded that a discard ban puts a cost on taking unwanted by-catches and will thus motivate development of technologies and practices which catch fewer unwanted fish. The combination of a discard ban with some supplementary measures will combine strong motivations to avoid by-catches with some guidance on how to avoid by-catches.

Hence, while the specific situation of each fishery will need to be looked at carefully, the European Commission considers that the best way forward will generally be to combine a discard ban with different measures intended to reduce its economic and social costs and/or to amplify the positive effects thereof on discards. These measures will need to be selected on a fishery by fishery basis. The Discard Communication is hence based on that preferred option.

It has to be stressed that not all of the above supplementary measures will be equally applicable to all fisheries. There is not a unique discard problem, but several discards problems related to different types of discarding by various types of fisheries. Different problems require different solutions; thus, selecting supplementary measures will depend on the reasons for discarding and on the features of each fishery. Discard bans are much easier to apply and enforce in clean fisheries –which result in much less by-catch of other commercial species- than in mixed/multi species fisheries, which are very common in EU waters.

The debate launched by the Discard Communication should, among other things, focus on this question.

7. MONITORING

The Communication will initiate a consultation process on the basis of which the directions and instruments of a new discard policy will be decided and subsequently

transformed into specific regulations on a fishery – by – fishery basis. The outcomes of the Communication on the ground will thus only materialise through the specific regulations.

Once regulations are in place, unwanted by-catches will be recorded as a routine part in collecting scientific data through the Data Collection Regulation²³ and the development of the fish stocks will be assessed annually as part of the scientific advice supporting the CFP. Monitoring will then be based on simple indicators of the progressive reduction of by catch and the improvements in the state of the stock.

8. IMPLEMENTING A DISCARD BAN COMBINED WITH SUPPLEMENTARY MEASURES IN THE EU

There are two main ways to adopt a discard ban in the EU:

- To do it in one go, with common rules for all fisheries or
- To do it progressively, fishery by fishery, with a view to cover all fisheries within a given time frame.

The first would require an enormous regulatory effort and also a huge adaptation effort by the industry. It will not take into account the specificities of fisheries, in view of its "one size fits all" nature. On the other hand, it will probably take less time to implement and will not a priori seem to create distortions between fisheries.

The second way would take longer to put in place but will reflect better the particularities of each fishery. It will also allow for margin to rectify if the proposed system is not working properly. On the other hand it will require a significant effort to define a set of criteria and/or incentives to define the order in which fisheries will be selected (e.g.: large discards, low rate of survival, alternative fishing methods, high value species, ecosystem impact of discards).

The drivers for unwanted by-catches and the nature of discarding differ largely between fisheries and the proper balance of different instruments and their specific regulatory measures should be set up with sensitivity to the specifics of each fishery. The apparent equal treatment from a one-fits-all approach may in fact cover considerably divergent effects in different fisheries.

The Commission would therefore at this stage prefer an approach where general principles for an approach to reduce unwanted by-catches and discards are established on the basis of the discussion following the Discard Communication but that specific implementation regulations are then developed on a fishery-by-fishery basis and accompanied by specific impact assessments for these fisheries.

²³ Council Regulation (EC) No 1543/2000 (OJ L176 15.7.2000, p. 1). A revised Data Collection Regulation is expected to be in force from 2009 and is intended to be based on fisheries rather than stocks so that the sampling of catches and landings will be structured as required to monitor regulations on a fishery basis.