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Pilot study: Catches of North Sea cod by recreational fishermen in the Netherlands

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Nederlandse samenvatting

Sinds de jaren '70 van de vorige eeuw is de omvang van het kabeljauwbestand in de Noordzee aan het afnemen. In 1999 is een kabeljauwherstelplan opgesteld, met als doel het paaibestand (de hoeveelheid kabeljauw die in staat is zich voort te planten) te laten toenemen boven de zogenaamde voorzorggrens (minimum omvang van het paaibestand dat nodig wordt geacht om de voortplanting niet in gevaar te brengen). Voor beroepsvissers zijn verschillende maatregelen ingesteld om dit voor elkaar te krijgen. Naast de beroepsvisserij wordt echter ook door de recreatieve visserij op kabeljauw gevist. Onder de recreatieve visserij valt ondermeer de zeehengelsport, maar ook standwant visserij anders dan met vaartuigen. Hoeveel door deze vissers wordt gevangen is onbekend. Om de vangsten van kabeljauw door recreatieve vissers te schatten heeft de Europese Unie via een verordening (Commissie Verordening 1581/2004 als aanvulling op Commissie Verordening 1639/2001) de Lidstaten opgedragen een schatting te maken van de hoeveelheid kabeljauw die door recreatieve vissers in Europese wateren wordt gevangen.

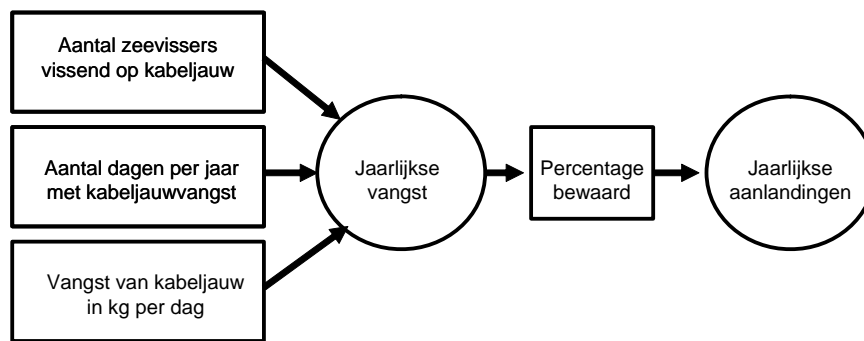
In Nederland werd deze studie verricht door Wageningen IMARES (voorheen RIVO, Nederlands Instituut voor Visserijonderzoek). De studie is opgezet als pilot-studie, wat betekent dat dit onderzoek met name bedoeld is om te kijken of een bemonstering wel mogelijk is en tegen welke kosten dit uitgevoerd kan worden.

Voor de zeehengelsport kon voldoende gegevens worden verkregen om een schatting te maken van de vangsten. Voor de overige recreatieve visserijen, zoals de standwant visserij, kon onvoldoende informatie worden ingewonnen binnen dit project over de hoeveelheid vissers, hun inspanning en vangsten om een goede schatting te maken voor hun vangsten van kabeljauw. Als gevolg worden in deze studie de volgende twee hoofdvragen beantwoord:

- Wat is de jaarlijkse vangst in gewicht van kabeljauw uit de Noordzee gevangen door de recreatieve zeehengelsportvisserij in Nederland?
- Is het mogelijk een routinematige bemonstering op te zetten om vangsten van kabeljauw in de recreatieve visserij (sportvisserij en ook andere vormen van recreatieve visserij) te monitoren?

Voor dit onderzoek werd informatie over de vangsten van kabeljauw in de zeehengelsportvisserij ingewonnen door middel van een enquête, een vangstlijst en veldobservaties. Via deze bronnen werd informatie verzameld over de vangsten van kabeljauw en het aantal dagen in een jaar op kabeljauw gevist wordt, maar niet over het aantal vissers. Voor de inschatting van het aantal vissers werden gegevens uit de NIPO enquêtes voor 2003 en 2004 gebruikt.

Om de vangsten van kabeljauw in de zeehengelsportvisserij te bepalen, werden berekeningen gedaan die weergegeven staan in onderstaand schema.



Het aantal hengelaars werd bepaald aan de hand van de NIPO enquêtes en werd geschat op 425.000 en 450.000 personen. Aangenomen werd dat tussen 20% en 25% van deze hengelaars jaarlijks op kabeljauw visten, wat resulteerde tot schattingen van 85.000-106.250 hengelaars in 2003 en 90.000-112.500 hengelaars in 2004 op kabeljauw. In de IMARES enquête werd aangegeven dat van de visdagen op zee meer dan 50% op kabeljauw werd gevestigd. Doordat de enquête voornamelijk is ingevuld door hengelaars die gericht op kabeljauw vissen, werd dit percentage niet als representatief gezien voor het algemene beeld. Het percentage hengelaars op kabeljauw werd daarom naar beneden bijgesteld.

De hengelaars die de enquête hadden ingevuld werden ingedeeld in vijf groepen. De indeling werd gemaakt naar het aantal keer dat in een jaar op zee met de hengel gevestigd werd: 1-5, 6-10, 11-20, 21-50 en meer dan 50 dagen op zee gevestigd in een jaar. De gegevens uit de enquête werden opgesplitst over drie verschillende visserijmethoden: vanaf de kant, vanuit een kleine boot en vanaf een opstapschip. Het aantal hengelaars op kabeljauw werd vermenigvuldigd met het aantal dagen dat een hengelaar kabeljauw vangt, en het gewicht van de kabeljauw per visdag. Veldobservaties gemaakt door IMARES lieten overeenkomsten zien met de resultaten uit de enquête voor vangsten van hengelaars vanaf de kant, maar niet vanaf het opstapschip. Vangsten voor mensen die 1-5 keer vissen van het opstapschip waren in de veldobservaties veel lager dan die uit de IMARES enquête. De gegevens uit de enquête zijn voor deze groep hierdoor in de berekening naar beneden bijgesteld.

De uiteindelijke schatting van de jaarlijkse kabeljauwvangst in de hengelsport in Nederland lag tussen de 456 en 1.765 ton. Vervolgens is het percentage bewaarde kabeljauw gebruikt om de aanlandingen van kabeljauw te berekenen. In de enquête is het percentage bewaarde kabeljauw ingevuld in aantal, terwijl voor de berekening het bewaarpercentage in gewicht nodig was. Omdat kleinere kabeljauw meestal teruggezet wordt en omdat die minder wegen dan grote kabeljauw, is het bewaarpercentage een onderschatting. Omdat echter geen andere gegevens beschikbaar zijn, is het bewaarpercentage in aantal gebruikt. De schatting van de jaarlijkse aanlandingen van kabeljauw lag tussen de 264 ton en 1.037 ton.

Door de afwezigheid van een vergunningensysteem voor de recreatieve visserij in Nederland is het bijna onmogelijk om een regulier bemonsteringsprogramma op te zetten om jaarlijkse visinspanning en vangsten voor bepaalde soorten te schatten. De belangrijkste problemen zijn het schatten van het aantal recreatieve vissers actief op zee, het schatten van de visserijinspanning die zij gebruiken en duidelijk krijgen welke verschillende visserijen gebruikt worden vanaf verschillende locaties.

Het wordt niet aangeraden om door te gaan met de methode die in deze Nederlandse pilot studie gebruikt is om de kabeljauwvangsten in de recreatieve visserij te schatten. De geschatte vangsten zijn te onzeker en zijn alleen beschikbaar voor een bepaalde groep binnen de recreatieve visserij. Ze zijn voornamelijk gebaseerd op vrijwillige co-operatie van, voornamelijk meer gemotiveerde, recreatieve hengelaars en hun organisaties. Hierdoor is er waarschijnlijk een structurele afwijking (bias) in de schatting. Gegevens uit een enquête kunnen resultaten opleveren die geen structurele afwijking hebben (unbiased), wanneer deze gegevens verkregen zijn van een universele groep personen. Een vergunningensysteem maakt het mogelijk om een universele steekproef uit de populatie vissers te nemen, maar het blijft moeilijk om een waarde te hechten aan de verkregen informatie door de interviews. Zelfs met een vergunningensysteem zal het bemonsteren van de vangsten moeilijk zijn met hoge kosten. Daarnaast moeten meer veldobservaties worden verzameld, vooral van de grote groep hengelaars die maar een beperkt aantal keer gaan vissen in een jaar en van andere vormen van de recreatieve visserij. Hiervoor is een klein team van mensen nodig die een volledige baan zullen hebben aan deze bemonstering. Het verzamelen van vangstgegevens van andere soorten daartegen kan dan worden uitgevoerd met weinig extra inspanning. Het wordt aanbevolen dat wanneer een regulier bemonsteringsprogramma wordt opgezet binnen de EU, internationale richtlijnen, procedures en afspraken worden gemaakt die door alle Lidstaten kunnen worden toegepast.

Summary

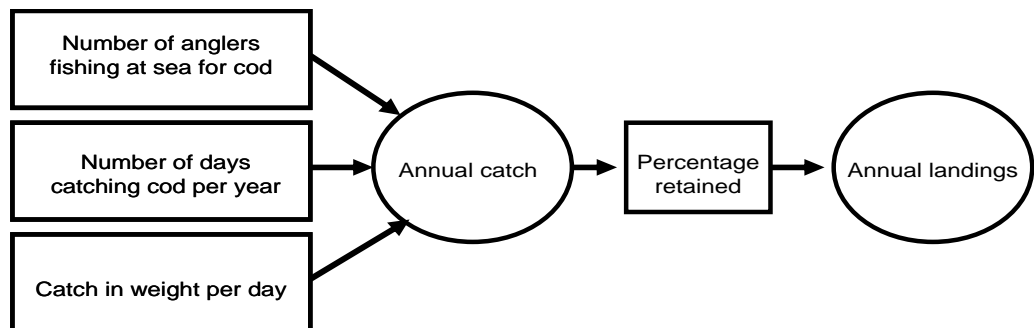
Since the 1970's the spawning stock biomass of North Sea cod has been decreasing. A cod recovery plan was implemented in 1999 with the aim to increase the spawning stock biomass of cod above the precautionary limit. For commercial fishermen several constrictions were implemented. Next to commercial fishing, cod is also caught in a recreational fishery. Angling is one type of recreational fishery, as is fishing with nets without using a vessel. How high the catches are in these fisheries is unknown. To investigate the catches of cod by recreational fishermen, the European Union installed regulation 1581/2004 as supplement to regulation 1639/2001, which obliges Member States to conduct a pilot study to estimate recreational catches of cod in European waters.

In the Netherlands this study was conducted by Wageningen IMARES as a pilot study. For the recreational angling for cod sufficient data could be collected to estimate the catches of cod. For the other types of recreational fisheries, such as fishing with nets, insufficient data could be collected to make an estimate of the catches of cod. As a result two main questions are answered:

- What are the annual catches of North Sea cod in weight by recreational angling in the Netherlands?
- Is it possible to establish a regular monitoring program to estimate catches of cod by recreational fishermen (recreational anglers and other recreational fishermen)

Information on catches of cod was gathered through a questionnaire, a catch sheet, and through field observations. These sources gave information on the number of fishing days and catches by anglers, but not on the total number of people angling for cod at sea, which was obtained from a study by NIPO in 2003 and 2004.

The total catch and total landings of cod were calculated using the overview below.



The annual number of anglers at sea was obtained from NIPO and was estimated to be between 425.000 and 450.000, of which between 20% and 25% were assumed to fish for cod, which resulted in estimates of 85.000-106.250 anglers in 2003 and 90.000-112.500 anglers in 2004 targeting cod. From the IMARES questionnaire the percentage of anglers targeting cod was over 50%, but this high percentage is due to the fact that mainly anglers targeting cod sent in their data. Because of this the percentage of anglers fishing for cod from the questionnaire was thought not to be representative for the entire population of anglers. The percentage was therefore corrected downwards.

The anglers were divided into five groups, depending on the number of days fishing per year (1-5, 6-10, 11-20, 21-50 and over 50 days fishing at sea per year). Three different main fishing

methods were assumed; shore, small boat and charter vessel. The distributions of number of anglers using different methods were multiplied by the number of days per year that an angler caught cod and by the weight of cod caught per day. The weight of cod caught from a charter vessel for anglers fishing between 1-5 days a year was corrected, since the numbers from the questionnaire were much higher than those from the observations made by IMARES observers.

This calculation resulted in the annual catch of cod in the Netherlands of between 456 and 1.765 tonnes. To this catch the retain rate was applied, which was based on numbers instead of weight. Because smaller fish are usually returned that weigh less, the retain rate is an underestimate. However since no other data were available, the retain rate based on numbers was applied, what resulted in a landings weight of cod of between 264 and 1.037 tonnes.

In the absence of a license system in the Netherlands for recreational fisheries, it is almost impossible to set up a regular monitoring programme to estimate annual fishing effort and recreational catches for specific species. The major problems encountered are to estimate the number of recreational fishermen active in marine waters, the effort they employ and the various gears they are using operated from different access points.

It is not recommended to continue the approach applied in the Dutch pilot for future estimation of cod catches in the recreational fishery. The estimated catches are too uncertain and cover only part of the recreational fishery. They are primarily based on voluntary co-operation of, mainly more motivated, recreational anglers and their organisations. This is thought to have led to bias in the obtained estimates. Information from a questionnaire can deliver unbiased estimates, when the information is obtained from an unbiased group of participants. A licence system will allow to take an "unbiased sample" of the fishing population, but it still remains difficult to value the information obtained by interviews. Even with a licence system, monitoring the fishery will remain difficult and expensive. Also more field observations have to be collected, especially from a large group of sport anglers who carry out their hobby occasionally and other types of recreational fishing. This would require a small team of people having almost a full time job on this programme. The collection of catch data for additional species, however, could also be carried with limited additional costs. It is recommended that, if a regular monitoring programme is introduced in the EU, international guidelines, procedures and standards are developed which can be applied in all Member States.

1. Introduction

Since the 1970's the spawning stock biomass of North Sea cod has been decreasing and has been considered to be outside of safe biological limits since the early 1980's. To enhance the recovery of the stock, the European Union and Norway agreed to implement a cod recovery plan in 1999. The objective of this recovery plan was to increase the spawning stock biomass of cod above precautionary limits by a reduction of fishing mortality. To accomplish this, catch and effort limitations and gear alterations were installed for commercial fishermen.

National catch statistics (landings and discards) reflect in most cases only catches from commercial fishing operations. In 2005 and 2006, Dutch nominal landings were 1.659 and 1.567 tonnes for 2005 (ICES 2006) and 2006 (VRIS database) respectively. However, cod is also caught by recreational fishermen. With recreational fishing, no sale of fish is involved. Recreational fishing can be recreational angling, fishing from small boats equipped with nets, hand-held lines or nets, gill nets, stationary nets on the seabed. So far, these recreational fisheries are not restricted by the recovery plan. In 2004, the European Union introduced Regulation 1581/2004 as supplement to Regulation 1639/2001, which obliges Member States to estimate catches of cod by recreational fishermen in European waters (areas III, IV, V, VI and VII, Figure 1.1).



Figure 1.1. Map of areas under study for catches of cod by recreational fishermen.

This present study is conducted as a pilot-study and has investigated if monitoring of catches by recreational fishermen is possible. For recreational anglers, information on catches and number of anglers was or became available to make an estimate of the catches of cod for this type of fishery. For the other types of recreational fishing, such as nets set at the sea bottom, no information was available or could not be gathered within this project, because it involves much more field work than the budget of the project could account for. As a result two main questions will be answered for the Dutch study:

- What are the annual catches of North Sea cod in weight by recreational anglers in the Netherlands?
- Is it possible to install a monitoring program to monitor catches of cod by all types of recreational fishermen with sufficient precision?

Chapter 2 describes the methods used to investigate the amount of cod caught by recreational anglers. Chapter 3 describes the results of this study and results on the monitoring of actual catches. The results are discussed in chapter 4.

2. North Sea cod catches by recreational anglers: Methods

In some countries, recreational anglers are obliged to have a fishing license when fishing at sea. In these circumstances, information on catches can be obtained by approaching recreational anglers directly and randomly, by e.g. a telephone survey. In the Netherlands recreational anglers fishing at sea are not obliged to have a fishing license. As a result, they are not registered, and cannot be approached directly. In our case, only registered charter vessel owners, which carry anglers to sea, could be contacted by telephone. Some owners were contacted, but were reluctant to give information. In order to obtain information on catches by recreational anglers fishing in the Netherlands, anglers had to be approached either through anglers organizations, or by direct field observations. For this IMARES study, information on catches of cod was gathered through a questionnaire and a catch sheet, and through field observations. These sources give information on the number of fishing days and catches for individual anglers, but not on the total number of people angling for cod. Information on the number of people angling was obtained from a study by NIPO in 2003 (4.673 households questioned) and 2004 (11.540 households questioned) (NIPO 2003, 2004), conducted for the Dutch anglers organization "Sportvisserij Nederland".

2.1 Questionnaire

A questionnaire was made available on the internet website of Wageningen IMARES, which contained questions on annual angling trips and daily catches of cod by anglers in the Netherlands (Table 2.1). In addition, also contact information of the anglers, such as name, address, city, phone number and email address was asked. In the questionnaire a division was made between three different types of angling for cod: from the shore, from a small boat and from a charter vessel.

- The first group (shore) consists of all angling activities that take place from the shore along the Dutch coast.
- The second group (small boat) consists of all angling activities operating from all small boats. These boats are owned by either the fishermen themselves, or by a guide exploiting his boat. Maximal capacity on such a boat is limited (maximum of around 8 anglers).
- The third group (charter vessel) consists of anglers, which operate from commercially exploited charter vessels. Capacity on these vessels is up to 30-40 anglers.

Table 2.1. Questionnaire.

<i>Question number</i>	<i>Questions</i>
1	How many days do you fish at sea annually for all species from the Netherlands?
2	How many of these days do you fish at sea only for North Sea cod?
3	How many of these days fishing for North Sea cod do you not catch any cod?
4	Which period of the year do you fish for North Sea cod from the Netherlands?
5	From which place do you mainly fish?
6	How many cod do you catch on average during a day fishing in number?
7	How much cod do you catch on average during a day fishing in weight?
8	What is the average length of the cod you catch in cm?
9	What percentage of the cod do you return to the sea?
10	Do you keep records on your cod catches and would you be willing to provide this information for the purpose of our study?

In order to estimate the catch in weight of cod, questions 1, 2, 3, 7 and 9 were necessary, while questions 4, 5, 6 and 8 were asked as additional information. The answers on question 10 could be used to find out if it is possible to install a monitoring program. For this question, anglers could mark two options:

- 0 Yes, I keep records of my catches in a logbook and am willing to give this information for this study.
- 0 No, I do not keep records of my catches in a logbook, but am willing to keep record of my catches in a logbook for the coming year.

To have anglers fill in the questionnaire, the Dutch anglers organization “Sportvisserij Nederland” (Former NVVS) was contacted for cooperation. “Sportvisserij Nederland” is the Dutch national angling organization, representing 9 regional anglers Federations and 3 specialist organizations, having a shared membership of around 400.000 anglers. Three articles (Picture 2.1) were published in the spring of 2005 in the magazines of “NVVS” to inform anglers about the study and to ask them to fill in the questionnaire. These magazines were “Het Visblad” which monthly publishes articles on fresh and salt water angling, “Zeehengelsport” which also on a monthly basis publishing articles on only sea angling, and “NVVS contact” which is a quarterly club magazine.



Picture 2.1

- | | | | |
|-----------|--------------------------------------|-------------|-------------|
| Top left | Article in magazine “Het Visblad” | number 5, | May 2005 |
| Top right | Article in magazine “Zeehengelsport” | number 4, | April 2005 |
| Bottom | Article in magazine “NVVS contact” | number 138, | spring 2005 |

Next to these three magazines also the four Angler Federations along the Dutch coast were asked for cooperation. These Federations were:

- 1. "Hengelsportfederatie Groningen Drenthe" (north coast, eastern part)
- 2. "Federatie Friesland van Hengelsportverenigingen" (north coast, western part)
- 3. "Federatie van Hengelsportverenigingen NoordWest Nederland" (west coast, northern part)
- 4. "Federatie van Hengelsportverenigingen Zuidwest Nederland" (west coast, southern part)

The last one invited Wageningen IMARES to give a presentation on the study. After this presentation this Federation, as well as the other three, indicated to inform their members on this study and to persuade them to fill in the questionnaire. One angling club ("Deltavissers") published an article in their magazine (Picture 2.2).



Picture 2.2. Article in magazine from "Deltavissers".

In July 2006, the first results of the questionnaire were sent to participating anglers (Van Keeken et al. 2006). In July 2006 also an appeal was made on the internet website of www.Zeevisland.com (Picture 2.3) to anglers to fill in the questionnaire. On this website information on fish trips can be found and anglers fill in catch information.



Picture 2.3. The internet website of www.Zeevisland.com.

2.2 Field observations

Two observers from Wageningen IMARES made two trips on a charter vessel to observe catches of cod. They also went to IJmuiden pier and the southern province of Zeeland to monitor catches of cod along the coast on several occasions.

2.3 Calculating cod catch

The annual catch of cod can be calculated by multiplying the number of people angling for cod by the number of days in a year that these anglers catch cod and the catch in weight per day. When this estimate of the cod catch is multiplied by the percentage of cod retained (part of the catch that is kept), this results in an estimate of the annual landings of cod (Figure 2.1).

For the estimation of cod catches in the Netherlands, the distinction in fishing method and in experience of the angler was made as described in chapter 2.1. Catches in the three different methods, coast, small boats and charter vessels will differ, since more small cod can be expected along the coast, while larger cod can be expected near obstacles such as ship wrecks more offshore. Small boats are also faster and usually have more experienced anglers than the charter vessels, and as a result catches can differ. Anglers were also differently grouped, depending on the number of days angling at sea. This was done because it was expected that anglers that fish more have also more experience than anglers that fish less, and therefore have higher catches. Anglers were grouped into 1-5, 6-10, 11-20, 21-50, and 51 or more days fishing at sea.

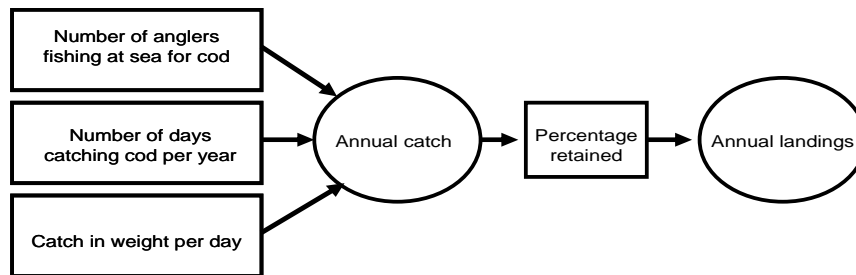


Figure 2.1. Schematic overview of basic calculations to estimate annual catch of cod.

2.4 Monitoring program: catch sheets

Anglers who had mentioned to have either logbook information, or wanted to register logbook information, received an Excel program in 2005. This excel program could form the basis for a monitoring program to obtain information on daily catches of anglers (Table 2.2). The anglers were asked to return this information twice per year.

Table 2.2. Example of the excel spreadsheet that was sent to anglers.

Day	Name	Club	Date	City	Method
1	Jan de Boer	Het Visje	1-1-2005	IJmuiden	Small boat
2	Jan de Boer	Het Visje	1-1-2005	IJmuiden	Small boat
3	Jan de Boer	Het Visje	2-1-2005	IJmuiden	Charter vessel
4	Jan de Boer	Het Visje	2-1-2005	IJmuiden	Shore

Day	Latitude	Longitude	EW	Number	Length (cm)	Weight (kg)	Returned
1	55.15	2.2	E	1	45	0.6	Yes
2	55.15	2.3	E	1	50	.	Yes
3	.	.	.	0	.	.	No
4	.	.	.	2	50	.	No

3. North Sea cod catches : Results

3.1 Number of anglers fishing at sea for cod

In total 238 anglers filled in the questionnaire during spring 2005 - autumn 2006. The data from 13 submissions were excluded from the analysis, because these data were either insufficient or contained errors. Eventually the data from 225 anglers were used. The 225 anglers were grouped into five different groups, depending on the number of days fished at sea per year (Table 3.1).

Table 3.1. Number of anglers, distribution and average number of days fishing for the five different groups.

<i>Times fishing per year</i>	<i>Number of anglers</i>	<i>Percentage</i>	<i>Average number of days fishing</i>
1-5	12	5%	4.1
6-10	39	17%	8.6
11-20	77	34%	15.9
21-50	81	36%	31.2
>=51	16	7%	73.1
Total	225		

In a national population of anglers it is to be expected that most anglers fish only few times a year and that the number of anglers decreases with increasing days. This corresponds also with the outcome of the NIPO questionnaire (Figure 3.1). The IMARES questionnaire showed that most anglers fished between 11-50 days per year, while only 5% fished 1-5 times a year. In the NIPO questionnaire in 2004 this was close to 80%. In the IMARES questionnaire, anglers that fished 1-5 days at sea had an average of over 4 fishing days at sea (Figure 3.2), while in the total population of anglers this average can be expected to be closer to 1, since more anglers will fish 1 time than 5 times. Also for the group fishing 6-10 times and 11-20 times a year, the average from the IMARES questionnaire seems biased towards higher values than could be expected from a normal population of anglers.

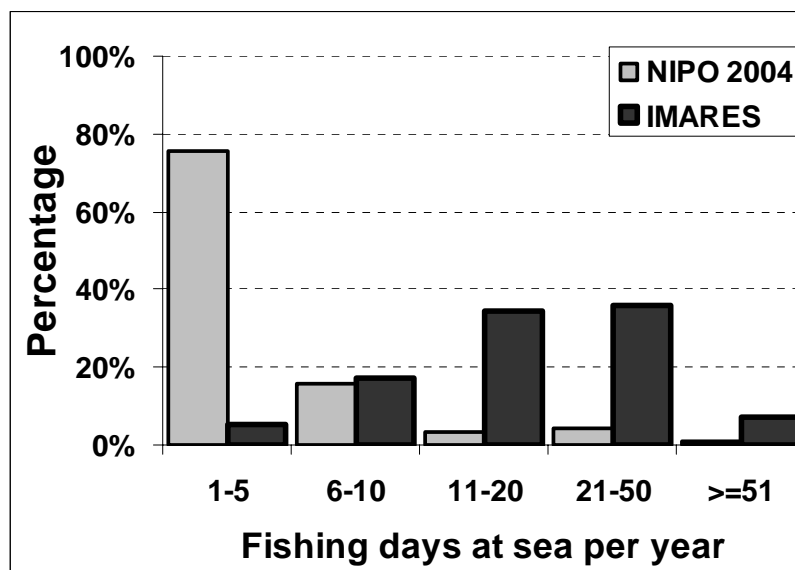


Figure 3.1. Distribution in percentage of the number of fishermen responding to the IMARES questionnaire and fishermen estimated by NIPO in 2004 fishing at sea

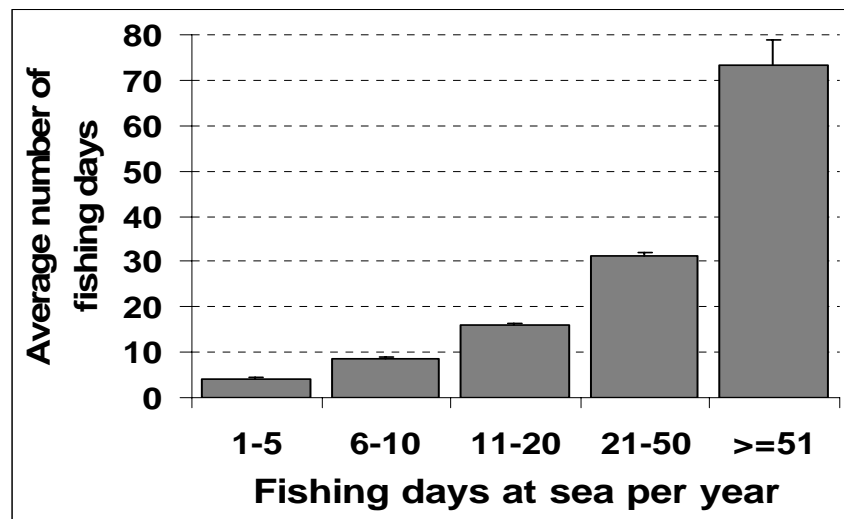


Figure 3.2. Average number of fishing days per group from IMARES questionnaire.

NIPO estimated a total of 425.000 and 450.000 anglers fishing at sea for all species in 2003 and 2004 respectively. From the IMARES questionnaire anglers indicated that over 50% of their fishing days they targeted cod. Since the questionnaire attracted anglers mainly targeting cod, this percentage can be considered an overestimate of the actual percentage of anglers fishing for cod. Messages of anglers posted on www.Zeevisland.com in 2006 showed a percentage of around 30% of anglers fishing for cod with boats, but a lower percentage for anglers fishing from the shore. It was finally assumed that of the anglers fishing at sea, between 20% and 25% are targeting cod. Multiplying these percentages with the number of anglers estimated by NIPO in 2003 and 2004 resulted in a minimum of 85.000 and a maximum of 112.500 anglers fishing for cod annually in the Netherlands (Table 3.2).

Table 3.2. Number of anglers fishing at sea from NIPO 2003 and 2004, and estimated number of anglers fishing for cod, assuming that between 20% and 25% of all anglers at sea target cod.

	<i>Number of anglers</i>	<i>20%</i>	<i>25%</i>
NIPO 2003	425.000	85.000	106.250
NIPO 2004	450.000	90.000	112.500

The total number of anglers fishing for cod in the Netherlands was distributed over five different groups, which depended on the number of days fishing at sea. Since the data from the IMARES questionnaire on the number of anglers fishing at sea was biased towards anglers fishing between 11-50 times (Table 3.1), values from the NIPO questionnaires in 2003 and 2004 were used (Table 3.3). With the four different values for the number of anglers for cod, this resulted into four distributions of number of fishermen fishing for cod.

Table 3.3. Distribution of fishermen fishing for cod over the five groups.

<i>Days fishing at sea</i>	<i>2003</i>	<i>2004</i>
1-5	80%	76%
6-10	11%	16%
11-20	6%	3%
21-50	2%	4%
51	1%	1%

The number of anglers fishing for cod was divided into three different angling methods: shore, small boat and charter vessel. The percentage per vessel type was estimated in three different ways, based on NIPO 2003, NIPO 2004 and on the outcome of the IMARES questionnaire. (Table 3.4). The first two were derived from NIPO 2003 and 2004, for which anglers were assumed to fish with only one angling method. These two distributions were taken as minimum values, since in practice anglers can use more than one method. The data from the IMARES questionnaire were taken as maximum values, since these are from anglers that fish many times and as a result will use more methods than anglers that fish few times. Multiplying these three distributions over the four distributions of anglers fishing for cod resulted in 12 combinations of anglers fishing for cod with different methods (Annex I).

Table 3.4. Distribution of fishermen fishing from shore, small boat and charter vessel, using NIPO 2003 and 2004 data, assuming no overlap in angling method, and using IMARES questionnaire data, allowing overlap in angling method.

	<i>Shore</i>	<i>Small boat</i>	<i>Charter vessel</i>
NIPO 2003	46%	19%	35%
NIPO 2004	51%	15%	34%
IMARES	73%	57%	40%

3.2 Number of days catching cod per year

In the IMARES questionnaire the total number of days fishing for cod and the number of these days that no cod was caught were asked. This information was used to calculate the average number of days with cod catches per group (Table 3.5). Most angling was carried out from shore, while least days were spent fishing from a charter vessel. From the three methods, most fishing days without catching cod were from the shore. For the group of anglers fishing 1-10 days, most days with cod catches were on a small boat, while for the groups of anglers above 11 days this was the case for fishing from the shore (Table 3.6). This was especially the case for the group of anglers that fished 51 days and more (Figure 3.3). This group mainly fished from the shore (data from 16 anglers).

Table 3.5. Average number of fishing days for the five groups.

<i>Days fishing at sea</i>	<i>Shore</i>	<i>Small boat</i>	<i>Charter vessel</i>
1-5	1.6	1.3	1.0
6-10	4.6	3.0	0.6
11-20	8.9	3.5	1.4
21-50	12.8	7.3	2.1
>=51	37.5	11.4	3.9

Table 3.6. Average number of fishing days with cod catches for the five groups.

<i>Days fishing at sea</i>	<i>Shore</i>	<i>Small boat</i>	<i>Charter vessel</i>
1-5	0.9	1.0	0.9
6-10	2.0	2.5	0.6
11-20	5.0	2.7	0.9
21-50	6.2	5.3	1.4
>=51	22.9	6.7	3.4

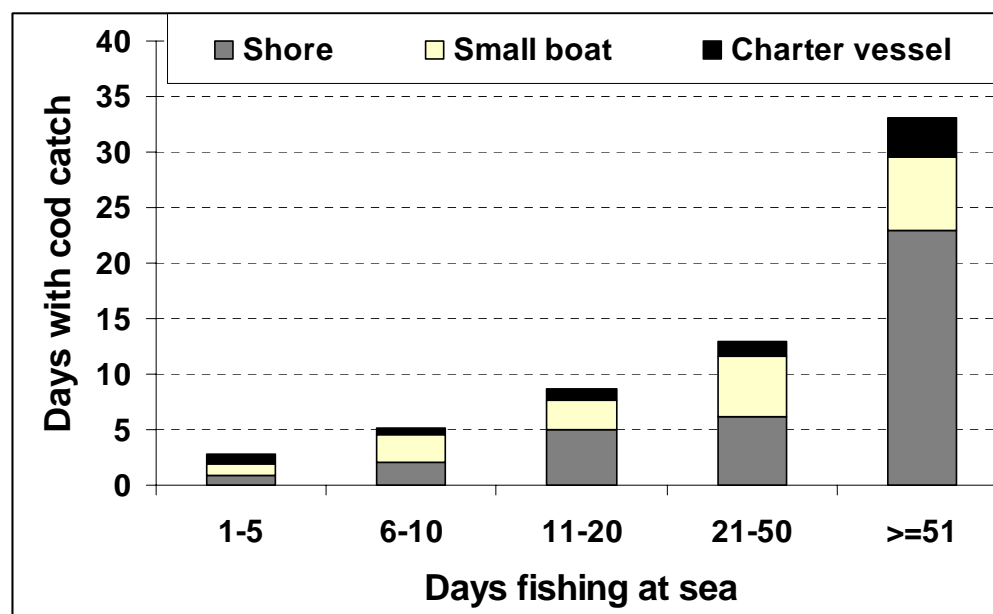


Figure 3.3. Average number of fishing days with cod catches for the five groups.

3.3 Catch in weight per day

The average weight of the catch in kg reported in the IMARES questionnaire was on average lowest for anglers fishing from the shore and highest for anglers fishing from small boats (Table 3.7). From the shore the catches increase with more days fishing (probably experience), while for small boats and charter vessels this is not the case. Only anglers fishing from small boats more than 50 times a year had catches that were more than 10 kg higher than the other four groups. Catches in this group were also very variable, with four anglers having catches between 1-5 kg and six between 15-75 kg. Because of the low percentage of anglers fishing more than 51 days in a year, these high catch weights do not have a major effect on the estimation of the total catches of cod in the Netherlands.

Table 3.7. Average weight in kg of cod catch per day for the five groups.

<i>Days fishing at sea</i>	<i>Shore</i>	<i>Small boat</i>	<i>Charter vessel</i>
1-5	0.5	13.8	8.3
6-10	1.9	12.9	7.9
11-20	2.1	11.3	8.3
21-50	3.1	14.4	8.4
>=51	4.1	25.4	9.6

In 2005 and 2006 several observer trips were made by observers from IMARES (Table 3.8). On several occasions they went to the pier in IJmuiden and to the Dutch most southwestern province of Zeeland to observe catches. The observations of anglers from the shore did not show a very different pattern in their catches compared to the IMARES questionnaire. On the other hand, observations during two trips on a charter vessel showed lower catches compared to the catches reported in the IMARES questionnaire. Charter vessels are often used for day events, for example by business companies or groups of friends. These anglers are usually less skilled and catches can be expected to be lower than the catches reported in the IMARES questionnaire. The catches for anglers on charter vessels fishing 1-5 times per year were therefore corrected to on average 2 kg of cod per fishing day (Table 3.9, Figure 3.4). In 2005 an angling club sent in catch information on six of their fishing days they organized (Table 3.10). These data were from anglers fishing for all kinds of species, and could eventually not be used in the estimation of cod catches.

Table 3.8. IMARES observations from shore and charter vessel of anglers fishing for cod.

<i>Observation</i>	<i>Angling method</i>	<i>Number of anglers</i>	<i>Number of cod caught</i>
1	Shore	8	0
2	Shore	15	8
3	Shore	10	2
4	Shore	3	0
5	Shore	0	-
6	Shore	12	20
7	Shore	18	35
8	Shore	22	60
9	Shore	30	80
10	Shore	20	40
11	Shore	30	50
12	Charter vessel	50	11
13	Charter vessel	55	6

Table 3.9. Average weight in kg of cod catch per day for the five groups, with the catches of charter vessels adjusted for the group fishing 1-5 days.

<i>Days fishing at sea</i>	<i>Shore</i>	<i>Small boat</i>	<i>Charter vessel</i>
1-5	0.5	13.8	2.0
6-10	1.9	12.9	7.9
11-20	2.1	11.3	8.3
21-50	3.1	14.4	8.4
>=51	4.1	25.4	9.6

Table 3.10. Number of anglers, number of cod and total number of fish caught during fishing trips from a fishing club.

<i>Observation</i>	<i>Number of anglers</i>	<i>Number of cod</i>	<i>Total fish caught</i>
1	35	27	248
2	33	7	64
3	40	7	170
4	31	0	8
5	112	0	Unknown
6	28	10	Unknown

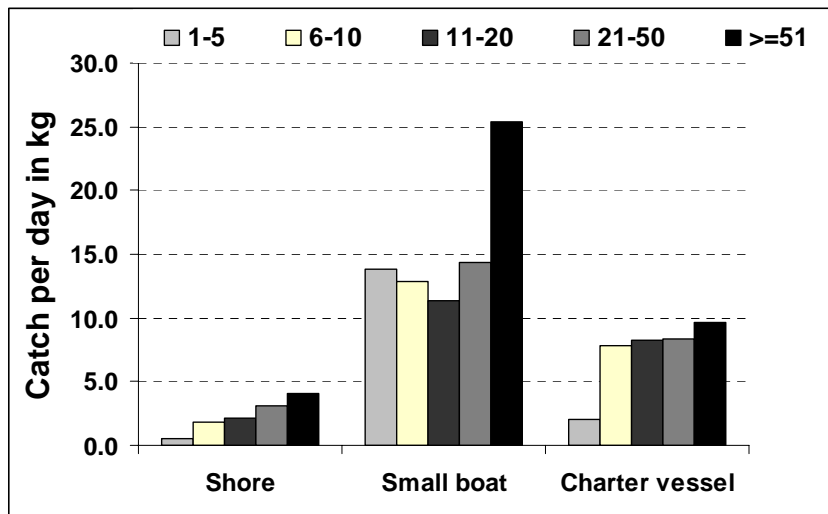


Figure 3.4. Average weight in kg of cod catch per day for the five groups.

3.4 Annual catch and landings of cod

Multiplying the 12 distributions of anglers fishing for cod with different methods (chapter 3.1) times the number of days of catching cod (chapter 3.2) and the average weight per day (chapter 3.3) resulted in 12 estimates of the annual cod catch in the Netherlands in ton. These estimates varied between 456 and 1.630 tonnes in 2003 and 492 and 1.765 tonnes in 2004 (Table 3.11, Annex II).

Table 3.11. Weight of cod in tonnes caught annually for 12 different scenarios.

	<i>Distribution mthd</i> 1	<i>Distribution mthd</i> 2	<i>Distribution mthd</i> 3
Dist 2003, 20%	514	456	1,232
Dist 2003, 25%	680	604	1,630
Dist 2004, 20%	555	492	1,334
Dist 2004, 25%	734	651	1,765

In the questionnaire the return rate of cod was also asked (Table 3.12, Figure 3.5). However it was not specified if it had to be filled in as number or as weight. Where for this study the return rate was needed in weight, anglers filled it in as number. In number it is fairly easy to estimate a return rate, while in weight it is much more difficult, since each fish has to be weighted, or an estimate of the weight of each fish has to be made. The return percentage of cod in number will be higher than the return rate in weight, since the return will mostly consist of smaller cod. For this analysis however the percentage of cod kept (retain rate=1-return rate) reported in the questionnaire is applied to the catch data to obtain the landings data. Percentage of cod kept was lowest from the shore, and highest from the charter vessel (Figure 3.5).

Table 3.12. Percentage of cod kept after catching for the five groups in number.

<i>Days fishing at sea</i>	<i>Shore</i>	<i>Small boat</i>	<i>Charter vessel</i>
1-5	60%	60%	63%
6-10	54%	64%	72%
11-20	37%	66%	80%
21-50	32%	60%	72%
>=51	46%	49%	75%

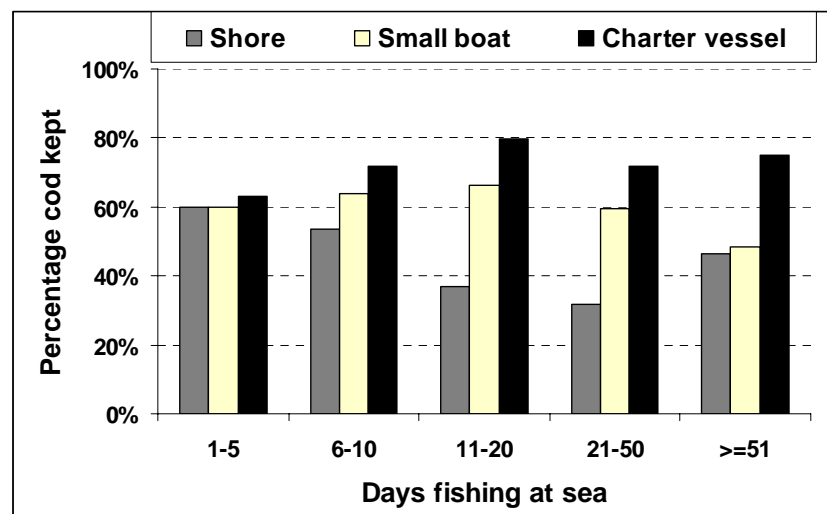


Figure 3.5. Percentage of cod kept after catching for the five groups in number.

Eventually the estimate of tonnes of cod landed annually by anglers in the Netherlands varied between 264 and 960 tonnes in 2003 and 284 and 1.037 tonnes in 2004 (Table 3.13, Annex III).

Table 3.13. Weight of cod in tonnes landed annually for 12 different scenarios.

	Distribution mthd 1	Distribution mthd 2	Distribution mthd 3
Dist 2003, 20%	301	264	725
Dist 2003, 25%	398	350	960
Dist 2004, 20%	324	284	783
Dist 2004, 25%	429	376	1,037

3.5. Annual monitoring program: catch sheet

To set up an annual sampling program for anglers, it was investigated if it was possible to have anglers sent in their daily catch data. In the questionnaire it was asked if anglers keep records on their cod catches and if they were willing to provide this information for this study? Out of the 225 anglers that filled in the questionnaire, only 17 indicated that they held track of their catches and were willing to give them to IMARES, while 187 anglers indicated that they did not record their catches but were willing to do this.

Before the summer of 2006 the anglers that filled in the questionnaire (total of 116, of which 12 indicated they held track of their catches) were asked to send in their catch data using the Excel catch sheet provided by IMARES. Eventually only 11 anglers sent their catch data to IMARES, of which five anglers fished almost exclusively from shore, five almost exclusively from small boats, and one angler fished one day from a charter boat. Most data were sent in 2005; only three anglers who sent data in 2005 did this again in 2006, while one person sent in data for 2006, but not for 2005.

4. Discussion

4.1 Annual catch and landings of cod

Next to recreational angling, cod can also be caught by other recreational fishermen using other gear than rod and line e.g., fishing with hand-held lines or nets (gill nets) set from shore, for which no estimates of cod catch are given in this study. Recreational anglers can be approached through angling organisations or the internet, which is however not possible for recreational fishermen using nets, since they are not well organized as recreational anglers. As a result it was not possible to obtain sufficient information on these recreational fishermen setting nets, e.g. number of fishermen setting nets, their fishing effort or catches to give an estimate for their catches of cod.

In the absence of a licensing system it is difficult to obtain an exact estimate of the number of anglers fishing for cod. Information from the NIPO questionnaire resulted in an estimate of 425.000 to 450.00 anglers at sea. To estimate the number of anglers fishing for cod is even more difficult. It is debatable what can be considered as fishing for cod. Can a day fishing for cod and catching only other species be considered as a day fishing for cod? On the other hand, when fishing for other species and catching cod, should this be considered a day fishing for cod or not? As a result, these estimates are always an approximation, with uncertainty.

The percentage of days that anglers target cod based on the IMARES questionnaire was above 50%, much higher than expected. The high percentage is caused by the fact that the questionnaire attracted anglers that target mainly cod. When looking at catch reports that are available through the internet, the percentage of anglers that target cod appear much less than in the questionnaire. Especially during the summer, when a lot of people go fishing for one or few days when the weather is nice, reports of cod catches are relatively low. During the summer species such as flatfish species, mackerel and increasingly seabass are reported. An estimate of 20%-25% seems more reasonable than the 50%. However this 20%-25% is a best guess, and the real percentage could well be below or above this estimate.

During the trips made by observers from IMARES, the catches were lower than those reported in the questionnaire, especially for the charter vessels. Data from the questionnaire came from more experienced and motivated anglers, which in general will have higher catches. Also catches will vary by e.g. season, area, and even time of the day. Therefore it is not realistic to consider the few observations made by IMARES personnel as representative for the whole population of anglers.

The percentage retained was used to calculate the landings of cod from the catch data. The problem here was that this percentage was only available from numbers of fish caught and not from weight. In number it is fairly easy to estimate a return rate, while in weight it is much more difficult, since each fish has to be weighted, or an estimate of the weight of each fish has to be made. Because usually smaller cod will be returned, which weigh less than larger cod, the retain rate used is an underestimate of the actual retain rate in weight. However it is not possible to correct the return rate in number to return rate in weight, and therefore the return rate in number was applied. This has no consequences for the estimation of cod catches by anglers but landings from these catches are underestimated.

Not much is known of the survival rate of cod returned to sea after catching. During or after catching the cod, the fish can be mortally wounded by e.g. hauling from larger depth, or damaged during unhooking. Cod can however survive the catching process when hauled from shallow areas or hauled slowly from larger depth, and treated with caution during the unhooking process. However to what extent cod survive the process is unknown.

Estimates of catches of cod by recreational anglers was also made by Smit et al. (2004), who estimated cod catches to be between 186 and 408 ton. These estimates of catches in this report are lower compared to the estimates of catches in this report. This was due because the catches from Smit et al. were from earlier years, and were based on some interviews with anglers and their own expert judgment. No catch data series was taken into account. As was done in this report they also made a division in angling from shore, charter boats and small boats. They divided this last group however into small charter boats and four different groups of private owned boats, depending on number of days these vessels are out to catch cod.

4.2 Annual monitoring program for North Sea cod caught by recreational fishermen

In the absence of a license system in the Netherlands for recreational sea fisheries, it is almost impossible to set up a regular monitoring programme to estimate annual fishing effort and recreational catches for specific species. The major problems encountered are to estimate the number of recreational fishermen active in marine waters, the effort they employ and the various gears they are using operated from different access points. Problems of secondary nature are the directivity towards specific species and catch per unit effort. These last problems can be overcome by an adequate monitoring programme.

The approach, applied in this pilot study is delivering uncertain estimates which identify the order of magnitude of the catches. They are primarily based on voluntary co-operation of recreational fishermen and their organisations to fill in the questionnaire. For this study co-operation was obtained from recreational anglers but mostly from the more motivated anglers. This is thought to have led to a bias in the obtained estimates from the questionnaire. Information from a questionnaire can deliver unbiased estimates, when the information is obtained from an unbiased group of participants. A licence system will allow to take an "unbiased sample" of the sea fishing population, but it still remains difficult to value the information obtained by interviews. Even with a licence system, monitoring the fishery will remain difficult and expensive. An estimate of catches should preferably be based on information that can be validated rather than based on stories.

It is not recommended to continue the approach applied in the Dutch pilot for future estimation of cod catches in the recreational fishery. The estimated catches are too uncertain and cover only part of the recreational fishery. In order to expand the estimates to all recreational species, a considerable network with contacts has to be built up and maintained. It can be anticipated that, when a regular monitoring programme will be introduced, the co-operation will discontinue or decrease when restrictive measures are implemented to protect one of the species or just because of losing lack of interest. Also more field observations have to be collected, especially from a large group of sport anglers who carry out their hobby occasionally and for other types of recreational fisheries. This would require a small team of people having almost a full time job on this programme. The collection of catch data for additional species, however, could than also be carried with limited additional costs.

The expertise to monitor recreational fisheries for the purpose of obtaining reliable catch estimates is limited in most Member States. It is recommended that, if a regular monitoring programme is introduced in the EU, international guidelines, procedures and standards are developed which can be applied in all Member States. This is preferred rather than every Member State trying to solve the same problems themselves. These standards will have to take account of the large variety in recreational fisheries in EU water, each associated with specific sampling problems. It is also anticipated that such a sampling programme would require considerable resources.

Lessons can be learned from other countries where such programmes exist, such as the USA. A presentation of the US monitoring programme is given by PGCCDBS in 2005. The associated costs of carrying out the programme in 2003 was \$13.5 million. The costs of a European programme would probably be in the same order of magnitude.

Reliable catch estimates on the recreational fisheries are important for a proper management of fish stocks of course but it is also a basic component in socio-economic surveys, which seems to become an increasingly important factor in European management of commercial and recreational fisheries.

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Annex I: Number of anglers

Table I.1. Number of anglers per group of number of times angling per year.
Distribution of anglers from NIPO 2003, distribution of angling methods from NIPO 2003.
Percentage of cod anglers: 20% (left), 25% (right).

<i>Times angling</i>	<i>Shore</i>	<i>Small boat</i>	<i>Charter Vessel</i>	<i>Times angling</i>	<i>Shore</i>	<i>Small boat</i>	<i>Charter Vessel</i>
1-5	31,280	12,920	23,800	1-5	41,400	17,100	31,500
6-10	4,301	1,777	3,273	6-10	5,693	2,351	4,331
11-20	2,346	969	1,785	11-20	3,105	1,283	2,363
21-50	782	323	595	21-50	1,035	428	788
>=51	391	162	298	>=51	518	214	394

Table I.2. Number of anglers per group of number of times angling per year.
Distribution of anglers from NIPO 2004, distribution of angling methods from NIPO 2003.
Percentage of cod anglers: 20% (left), 25% (right).

<i>Times angling</i>	<i>Shore</i>	<i>Small boat</i>	<i>Charter Vessel</i>	<i>Times angling</i>	<i>Shore</i>	<i>Small boat</i>	<i>Charter Vessel</i>
1-5	29,716	12,274	22,610	1-5	39,330	16,245	29,925
6-10	6,256	2,584	4,760	6-10	8,280	3,420	6,300
11-20	1,173	485	893	11-20	1,553	641	1,181
21-50	1,564	646	1,190	21-50	2,070	855	1,575
>=51	391	162	298	>=51	518	214	394

Table I.3. Number of anglers per group of number of times angling per year.
Distribution of anglers from NIPO 2003, distribution of angling methods from NIPO 2004.
Percentage of cod anglers: 20% (left), 25% (right).

<i>Times angling</i>	<i>Shore</i>	<i>Small boat</i>	<i>Charter Vessel</i>	<i>Times angling</i>	<i>Shore</i>	<i>Small boat</i>	<i>Charter Vessel</i>
1-5	34,680	10,200	23,120	1-5	45,900	13,500	30,600
6-10	4,769	1,403	3,179	6-10	6,311	1,856	4,208
11-20	2,601	765	1,734	11-20	3,443	1,013	2,295
21-50	867	255	578	21-50	1,148	338	765
>=51	434	128	289	>=51	574	169	383

Table I.4. Number of anglers per group of number of times angling per year.
Distribution of anglers from NIPO 2004, distribution of angling methods from NIPO 2004.
Percentage of cod anglers: 20% (left), 25% (right).

<i>Times angling</i>	<i>Shore</i>	<i>Small boat</i>	<i>Charter Vessel</i>	<i>Times angling</i>	<i>Shore</i>	<i>Small boat</i>	<i>Charter Vessel</i>
1-5	32,946	9,690	21,964	1-5	43,605	12,825	29,070
6-10	6,936	2,040	4,624	6-10	9,180	2,700	6,120
11-20	1,301	383	867	11-20	1,721	506	1,148
21-50	1,734	510	1,156	21-50	2,295	675	1,530
>=51	434	128	289	>=51	574	169	383

Table I.5. Number of anglers per group of number of times angling per year.
 Distribution of anglers from NIPO 2003, distribution of angling methods from IMARES.
 Percentage of cod anglers: 20% (left), 25% (right).

<i>Times angling</i>	<i>Shore</i>	<i>Small boat</i>	<i>Charter Vessel</i>	<i>Times angling</i>	<i>Shore</i>	<i>Small boat</i>	<i>Charter Vessel</i>
1-5	49,867	38,987	27,502	1-5	66,000	51,600	36,400
6-10	6,857	5,361	3,782	6-10	9,075	7,095	5,005
11-20	3,740	2,924	2,063	11-20	4,950	3,870	2,730
21-50	1,247	975	688	21-50	1,650	1,290	910
>=51	623	487	344	>=51	825	645	455

Table I.6. Number of anglers per group of number of times angling per year.
 Distribution of anglers from NIPO 2004, distribution of angling methods from IMARES.
 Percentage of cod anglers: 20% (left), 25% (right).

<i>Times angling</i>	<i>Shore</i>	<i>Small boat</i>	<i>Charter Vessel</i>	<i>Times angling</i>	<i>Shore</i>	<i>Small boat</i>	<i>Charter Vessel</i>
1-5	47,373	37,037	26,127	1-5	62,700	49,020	34,580
6-10	9,973	7,797	5,500	6-10	13,200	10,320	7,280
11-20	1,870	1,462	1,031	11-20	2,475	1,935	1,365
21-50	2,493	1,949	1,375	21-50	3,300	2,580	1,820
>=51	623	487	344	>=51	825	645	455

Annex II: Catch of cod

Table II.1. Catch of cod in kg per group of number of times angling per year.
Distribution of anglers from NIPO 2003, distribution of angling methods from NIPO 2003.
Percentage of cod anglers: 20% (left), 25% (right).

<i>Times angling</i>	<i>Shore</i>	<i>Small boat</i>	<i>Charter Vessel</i>	<i>Times angling</i>	<i>Shore</i>	<i>Small boat</i>	<i>Charter Vessel</i>
1-5	14,337	178,727	43,633	1-5	18,975	236,550	57,750
6-10	16,268	57,152	14,491	6-10	21,531	75,642	19,180
11-20	25,205	29,130	13,968	11-20	33,359	38,555	18,487
21-50	15,340	24,757	6,827	21-50	20,303	32,767	9,036
>=51	36,622	27,433	9,818	>=51	48,470	36,308	12,994
Total	107,771	317,199	88,738	Total	142,638	419,822	117,447

Table II.2. Catch of cod in kg per group of number of times angling per year.
Distribution of anglers from NIPO 2004, distribution of angling methods from NIPO 2003.
Percentage of cod anglers: 20% (left), 25% (right).

<i>Times angling</i>	<i>Shore</i>	<i>Small boat</i>	<i>Charter Vessel</i>	<i>Times angling</i>	<i>Shore</i>	<i>Small boat</i>	<i>Charter Vessel</i>
1-5	13,620	169,790	41,452	1-5	18,026	224,722	54,863
6-10	23,662	83,130	21,078	6-10	31,317	110,025	27,898
11-20	12,602	14,565	6,984	11-20	16,680	19,277	9,244
21-50	30,680	49,515	13,655	21-50	40,606	65,535	18,073
>=51	36,622	27,433	9,818	>=51	48,470	36,308	12,994
Total	117,186	344,433	92,986	Total	155,099	455,867	123,070

Table II.3. Catch of cod in kg per group of number of times angling per year.
Distribution of anglers from NIPO 2003, distribution of angling methods from NIPO 2004.
Percentage of cod anglers: 20% (left), 25% (right).

<i>Times angling</i>	<i>Shore</i>	<i>Small boat</i>	<i>Charter Vessel</i>	<i>Times angling</i>	<i>Shore</i>	<i>Small boat</i>	<i>Charter Vessel</i>
1-5	15,895	141,100	42,387	1-5	21,038	186,750	56,100
6-10	18,036	45,120	14,077	6-10	23,871	59,718	18,632
11-20	27,945	22,998	13,569	11-20	36,985	30,438	17,959
21-50	17,007	19,545	6,632	21-50	22,510	25,869	8,778
>=51	40,602	21,657	9,537	>=51	53,738	28,664	12,623
Total	119,485	250,420	86,202	Total	158,142	331,439	114,091

Table II.4. Catch of cod in kg per group of number of times angling per year.
Distribution of anglers from NIPO 2004, distribution of angling methods from NIPO 2004.
Percentage of cod anglers: 20% (left), 25% (right).

<i>Times angling</i>	<i>Shore</i>	<i>Small boat</i>	<i>Charter Vessel</i>	<i>Times angling</i>	<i>Shore</i>	<i>Small boat</i>	<i>Charter Vessel</i>
1-5	15,100	134,045	40,267	1-5	19,986	177,412	53,295
6-10	26,234	65,629	20,476	6-10	34,721	86,862	27,101
11-20	13,972	11,499	6,785	11-20	18,493	15,219	8,979
21-50	34,015	39,091	13,265	21-50	45,020	51,738	17,556
>=51	40,602	21,657	9,537	>=51	53,738	28,664	12,623
Total	129,924	271,921	90,330	Total	171,958	359,895	119,554

Table II.5. Catch of cod in kg per group of number of times angling per year.
Distribution of anglers from NIPO 2003, distribution of angling methods from IMARES.
Percentage of cod anglers: 20% (left), 25% (right).

<i>Times angling</i>	<i>Shore</i>	<i>Small boat</i>	<i>Charter Vessel</i>	<i>Times angling</i>	<i>Shore</i>	<i>Small boat</i>	<i>Charter Vessel</i>
1-5	22,856	539,315	50,421	1-5	30,250	713,800	66,733
6-10	25,934	172,458	16,746	6-10	34,324	228,254	22,163
11-20	40,182	87,902	16,141	11-20	53,182	116,341	21,363
21-50	24,455	74,707	7,889	21-50	32,367	98,877	10,442
>=51	58,382	82,780	11,345	>=51	77,271	109,561	15,015
Total	171,809	957,162	102,541	Total	227,394	1,266,832	135,716

Table II.6. Catch of cod in kg per group of number of times angling per year.
Distribution of anglers from NIPO 2004, distribution of angling methods from IMARES.
Percentage of cod anglers: 20% (left), 25% (right).

<i>Times angling</i>	<i>Shore</i>	<i>Small boat</i>	<i>Charter Vessel</i>	<i>Times angling</i>	<i>Shore</i>	<i>Small boat</i>	<i>Charter Vessel</i>
1-5	21,713	512,350	47,900	1-5	28,738	678,110	63,397
6-10	37,722	250,848	24,357	6-10	49,926	332,005	32,237
11-20	20,091	43,951	8,070	11-20	26,591	58,170	10,681
21-50	48,910	149,414	15,779	21-50	64,734	197,753	20,884
>=51	58,382	82,780	11,345	>=51	77,271	109,561	15,015
Total	186,818	1,039,342	107,451	Total	247,259	1,375,600	142,214

Annex III: Landings of cod

Table III.1. Landings of cod in kg per group of number of times angling per year. Distribution of anglers from NIPO 2003, distribution of angling methods from NIPO 2003. Percentage of cod anglers: 20% (left), 25% (right).

<i>Times angling</i>	<i>Shore</i>	<i>Small boat</i>	<i>Charter Vessel</i>	<i>Times angling</i>	<i>Shore</i>	<i>Small boat</i>	<i>Charter Vessel</i>
1-5	8,602	107,236	27,489	1-5	11,385	141,930	36,383
6-10	8,717	36,514	10,434	6-10	11,537	48,327	13,809
11-20	9,317	19,360	11,153	11-20	12,331	25,623	14,761
21-50	4,897	14,759	4,903	21-50	6,481	19,534	6,490
>=51	16,938	13,325	7,363	>=51	22,417	17,635	9,745
Total	48,470	191,193	61,342	Total	64,152	253,050	81,188

Table III.2. Landings of cod in kg per group of number of times angling per year. Distribution of anglers from NIPO 2004, distribution of angling methods from NIPO 2003. Percentage of cod anglers: 20% (left), 25% (right).

<i>Times angling</i>	<i>Shore</i>	<i>Small boat</i>	<i>Charter Vessel</i>	<i>Times angling</i>	<i>Shore</i>	<i>Small boat</i>	<i>Charter Vessel</i>
1-5	8,172	101,874	26,115	1-5	10,816	134,833	34,563
6-10	12,679	53,111	15,176	6-10	16,781	70,294	20,086
11-20	4,659	9,680	5,576	11-20	6,166	12,811	7,381
21-50	9,794	29,519	9,807	21-50	12,963	39,069	12,979
>=51	16,938	13,325	7,363	>=51	22,417	17,635	9,745
Total	52,241	207,508	64,037	Total	69,142	274,643	84,755

Table III.3. Landings of cod in kg per group of number of times angling per year. Distribution of anglers from NIPO 2003, distribution of angling methods from NIPO 2004. Percentage of cod anglers: 20% (left), 25% (right).

<i>Times angling</i>	<i>Shore</i>	<i>Small boat</i>	<i>Charter Vessel</i>	<i>Times angling</i>	<i>Shore</i>	<i>Small boat</i>	<i>Charter Vessel</i>
1-5	9,537	84,660	26,704	1-5	12,623	112,050	35,343
6-10	9,664	28,827	10,136	6-10	12,791	38,153	13,415
11-20	10,330	15,284	10,834	11-20	13,672	20,229	14,340
21-50	5,429	11,652	4,763	21-50	7,186	15,422	6,304
>=51	18,779	10,519	7,153	>=51	24,854	13,923	9,467
Total	53,739	150,942	59,590	Total	71,125	199,776	78,869

Table III.4. Landings of cod in kg per group of number of times angling per year. Distribution of anglers from NIPO 2004, distribution of angling methods from NIPO 2004. Percentage of cod anglers: 20% (left), 25% (right).

<i>Times angling</i>	<i>Shore</i>	<i>Small boat</i>	<i>Charter Vessel</i>	<i>Times angling</i>	<i>Shore</i>	<i>Small boat</i>	<i>Charter Vessel</i>
1-5	9,060	80,427	25,368	1-5	11,991	106,447	33,576
6-10	14,057	41,930	14,743	6-10	18,605	55,495	19,512
11-20	5,165	7,642	5,417	11-20	6,836	10,114	7,170
21-50	10,859	23,304	9,526	21-50	14,372	30,844	12,609
>=51	18,779	10,519	7,153	>=51	24,854	13,923	9,467
Total	57,919	163,822	62,208	Total	76,658	216,823	82,334

Table III.5. Landings of cod in kg per group of number of times angling per year.
Distribution of anglers from NIPO 2003, distribution of angling methods from IMARES.
Percentage of cod anglers: 20% (left), 25% (right).

<i>Times angling</i>	<i>Shore</i>	<i>Small boat</i>	<i>Charter Vessel</i>	<i>Times angling</i>	<i>Shore</i>	<i>Small boat</i>	<i>Charter Vessel</i>
1-5	13,713	323,589	31,765	1-5	18,150	428,280	42,042
6-10	13,896	110,182	12,057	6-10	18,392	145,829	15,957
11-20	14,853	58,418	12,888	11-20	19,659	77,318	17,058
21-50	7,807	44,537	5,666	21-50	10,333	58,946	7,499
>=51	27,002	40,207	8,509	>=51	35,738	53,215	11,261
Total	77,272	576,933	70,884	Total	102,271	763,588	93,817

Table III.6. Landings of cod in kg per group of number of times angling per year.
Distribution of anglers from NIPO 2004, distribution of angling methods from IMARES.
Percentage of cod anglers: 20% (left), 25% (right).

<i>Times angling</i>	<i>Shore</i>	<i>Small boat</i>	<i>Charter Vessel</i>	<i>Times angling</i>	<i>Shore</i>	<i>Small boat</i>	<i>Charter Vessel</i>
1-5	13,028	307,410	30,177	1-5	17,243	406,866	39,940
6-10	20,213	160,264	17,537	6-10	26,752	212,114	23,211
11-20	7,427	29,209	6,444	11-20	9,829	38,659	8,529
21-50	15,614	89,073	11,332	21-50	20,665	117,891	14,998
>=51	27,002	40,207	8,509	>=51	35,738	53,215	11,261
Total	83,283	626,164	73,999	Total	110,227	828,746	97,939