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F-Project: Fisheries Data Collection in 2003

Deelrapport B5 in het F-project

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Samenvatting

In het kader van het F-project wordt van augustus 2002 tot en met februari 2006 gedetailleerde informatie verzameld van een groep boomkorschepen over hun aanlandingen en visserij-inspanning. Het doel van dit project is 1) het verbeteren van de bestandsschattingen van schol en tong; 2) het bevorderen van effectief gebruik van visserijgegevens in het proces van de bestandsschattingen; en 3) het verbeteren van de communicatie tussen visserijsector en onderzoek. Het project wordt in opdracht van de Nederlandse overheid en de vissector uitgevoerd door het Nederlands Instituut voor Visserij Onderzoek. Over de dataverzameling door de visserijsector voor het tweede deel van het project, wordt een serie van 5 rapporten gepubliceerd, waarvan dit het tweede deel is: over de gegevensverzameling in 2003.

De gebruikte methoden voor het bevorderen van effectief gebruik van visserijgegevens in het proces van de bestandsschattingen omvatten data verzameling door een steekproef van boomkorschepen; data bewerking, analyse en ontwikkeling tot data series die beschikbaar zijn voor implementatie in de bestandsschatting; en tot slot bijeenkomsten met deelnemende vissers waarbij zaken als de data verzameling, de data bewerking en de eerste resultaten worden behandeld.

In 2003 hebben 25 geselecteerde boomkorschepen gegevens per trek verzameld (zie tabel 2 op p10 en Figuur 1 op p11). De selectie van deze schepen vond plaats op basis van scheepscode, welke gerelateerd is aan de visgrond van een schip, en motorvermogen. Deze selectiecriteria zouden resulteren in een steekproef van schepen die representatief was voor de Nederlandse boomkorvloot. Bereidheid tot meewerken was een derde selectiecriterium waardoor sommige steekproefgroepen oververtegenwoordigd, en andere ondervertegenwoordigd waren. De steekproef die zo ontstond was in theorie representatief voor de boomkorvloot. De gegevens die in 2003 door de schepen in de steekproef zijn verzameld, zijn echter niet representatief. Niet alle schepen die in theorie meewerkten aan het project hebben in de praktijk hun gegevens opgestuurd, waardoor de schepen die hun vangstgegevens wel beschikbaar hebben gemaakt niet op een voor de vloot representatieve wijze over de Noordzee waren verdeeld. De reden waarom schippers hun gegevens niet hebben opgestuurd varieerde van gebrek aan tijd, tot technische problemen, tot ontevredenheid over de quotumadviezen voor 2004. Naast het feit dat niet iedereen zijn gegevens opstuurde, bleek ook dat sommige eurokotters die meewerken een groot deel van het jaar niet op schol en tong vissen, maar op garnaal. Dit leidt ertoe dat ontwikkelingen in het aanlandingssucces van deze kotters niet indicerend zijn voor de ontwikkelingen in de schol- en tongbestanden.

De verzamelde gegevens zijn bewerkt en geanalyseerd op het Nederlands Instituut voor Visserij Onderzoek. Met behulp van de gegevens zijn ruimtelijke en temporele patronen in visserij-inspanning en het “aanlandingssucces” (aantal kg aangeland per visuur) bestudeerd en is een begin gemaakt aan het onderzoeken van de effecten van beperkend quotum op het aanlandingssucces. De analyses van de gegevens zullen in eerste instantie betrekking hebben op de ruimtelijke verspreiding van de visserij-inspanning en het aanlandingssucces en op beperking van het aanlandingssucces door quota. Vervolgens zal verder worden gegaan met andere parameters als motorvermogen, diepte en weersomstandigheden.

In de eerste analyses over het effect van beperkende scholquota op het aanlandingssucces lijkt het erop dat het aanlandingssucces van schol wordt verlaagd als de quota voor schol beperkend zijn (Figuur 6 op p15). Dit gebeurt zowel op Noordzeeschaal, als op microschaal (binnen ICES kwadranten). Als reden hiervoor kan worden aangedragen dat vissers met een beperkend scholquotum 1) naar gebieden gaan met minder scholconcentraties (het zogenaamde “vissen met de handrem”; 2) hun tuig omstellen zodat dat meer geschikt is voor andere vissoorten dan schol, bijvoorbeeld tong of zwartvis; en/of 3) marktwaardige, maar minder waardevolle, schol (bijvoorbeeld de kleinste maten of kuitzieke schol) teruggooien

zodat het quotum gebruikt kan worden voor de waardevollere exemplaren van schol. In welke mate deze verschillende factoren invloed hebben op het aanlandingssucces wordt in 2004 verder onderzocht.

In september 2003 is een werkdocument geschreven met daarin een samenvatting van de gegevens die zijn verzameld in het kader van het F-project en het Microverspreidingsproject (1994-1999) en de eerste resultaten van de gegevensverzameling. Dit werkdocument is opgestuurd naar de WGNSSK (werkgroep voor demersale visserij in de Noordzee en het Skagerrak), welke onder andere de bestandsschattingen voor schol en tong uitvoert. In het werkdocument stond het verzoek aan de werkgroep te evalueren in hoeverre de gegevens geschikt (zouden kunnen) zijn als ijkserie voor bestandsschattingen van schol en tong, te evalueren hoe bruikbaar de aanpak van de datacollectie is en suggesties te geven voor verbetering. Vanuit de WGNSSK heeft men laten weten dat de gegevens in de huidige vorm nog niet geschikt zijn voor implementatie in bestandsschattingen voor schol en tong, omdat extra informatie nodig is over de leeftijdscategoriesamenstelling van de aanlandingen en omdat er gebruik gemaakt zou moeten worden van een indexgebied, zodat de data van jaar op jaar met elkaar vergeleken kan worden. Ondanks dat de gegevens niet geschikt waren voor de uiteindelijke bestandsschattingen, heeft men ze wel geanalyseerd in andere bestandsschattingsmodellen die geschikt zijn voor gegevens zonder leeftijdsverdeling. Uit deze analyse bleek dat de trend in het vangstsucces van schol en tong van de door de visserij verzamelde gegevens overeenkwam met de trends die werden gezien in andere gegevensreeksen, die wel in de bestandsschattingen zijn meegenomen. Omdat het de bedoeling is dat de gegevens uiteindelijk wel gebruikt worden in de bestandsschattingen, zal in 2004 aandacht worden gegeven aan het toevoegen van leeftijdsgegevens en het gebruik van een indexgebied.

Implementatie van de gegevens van de commerciële platvisvisserij in de bestandsschattingen zou waardevol zijn, aangezien deze visserij het hele jaar door in de hele Noordzee wordt uitgevoerd en dus een belangrijke informatiebron is over de verspreiding van schol en tong. Gestandaardiseerd aanlandingssucces van de platvisvisserij kan worden gebruikt als indicator voor de ontwikkelingen in visbestanden. De verzameling van de gegevens op zichzelf kan dienen als gereedschap voor discussie tussen vissers, visserij biologen en overheden. Vissers weten wat er op zee gebeurt, maar hebben soms moeite om dat wat ze zien en meemaken te communiceren naar biologen en overheden. Door middel van discussies over de gegevens kunnen onderling begrip, samenwerking en communicatie worden verbeterd.

Summary

From August 2002 until February 2006 data on landings and effort data from a group of beam trawlers are collected in the so-called F-project. The objective of this project is to 1) improve the quality of stock assessment of North Sea plaice and sole; 2) promote the effective use of fisheries data into the stock assessment process; and 3) improve the communication between the fishing sector and fisheries research. The project is funded by the Dutch government in collaboration with the fishing industry and is carried out by the Netherlands Institute for Fisheries Research. This report describes data collection by the fisheries sector in 2003 and its results for the second objective of the project: the promoting of effective use of fisheries data into the stock assessment process.

The methods for promoting effective use of fisheries data into the stock assessment process comprise data collection by a sample of beam trawlers; data compilation, analysis and development into suitable series for stock assessments; and finally discussions with fishers about the data and preliminary results.

Haul-by-haul data were collected by 25 selected beam trawlers in 2003. These vessels were selected on vessel id-code, which is correlated to the fishing ground of the vessel and engine power. With these selection criteria a group of vessels would be cooperating in the project, representative for the Dutch beam trawl fleet. Because willingness to participate in the project was another criterion, some of the sample groups (based on engine power and vessel-id) were over-represented and others were under-represented. In theory, a group of vessels cooperated that was representative for the Dutch beam trawl fleet.

Data compilation and analysis took place at the Netherlands Institute for Fisheries Research, where spatial and temporal patterns in effort and landings per unit effort (LPUE) are studied and where the effects of ITQ (Individual Transferable Quotas) on LPUE data are investigated. These are the main analyses and after that possible more parameters will be taken account for, if necessary.

In September 2004 a working document was written about the data collection in the F-project and the previous “Micro-distribution project” (1994-1999), including a description of the preliminary results. This document was sent to the WGNSSK (Working Group of demersal fisheries in the North Sea and Skagerrak), which is responsible for, amongst others, the assessment of North Sea Plaice and Sole. In the document the WGNSSK was requested to evaluate the (potential) utility of the data as a tuning series for plaice and sole in stock assessment, to evaluate the usefulness of the approach and to comment on avenues for improvement. The WGNSSK stated that the data were not yet suitable for implementation in stock assessment, due to lack of information on the age distribution of the landings and lack of an index area. In 2004 effort will be made to include this information. Although the data were not used in the final stock assessment model, they were analysed in other stock assessment models that do not need information on age distribution. From these analyses it appeared that the trend in the data was comparable with trends in other data sources that were used in the final assessment model.

Discussions with fishers were held twice in 2003, dealing with issues like the process of data collection, data analysis and preliminary results.

Although the sample of vessels was in theory representative for the Dutch beam trawl fleet, the collected data are not representative. Not all the fishermen in theory cooperating made their data available, and the fishermen that did send in their data had not distributed their fishery over the North Sea in a representative manner for the fleet. The reasons why fishermen did not send in their data vary from no time, to technical problems, to dissatisfaction about the quota advices for 2004. Next to this, several of the sampled euro

cutters targeted other species than plaice and sole, e.g. shrimp, so the development in LPUE of these euro cutters is not representative for the developments in plaice and sole stocks.

From the first results of the analyses on the effects of restricting plaice quota on LPUE it appears that LPUE decreases when quota are restricting. This occurs both at North Sea scale and micro scale (i.e. within ICES rectangles). Reasons for this lower LPUE can be that fishers 1) fish in areas with lower plaice concentrations; 2) use gear that is more suitable for a fishery with less plaice and more by-catch of other species, like sole; and/or 3) discard marketable but low quality plaice, in order to keep the more valuable specimens. How much these three factors influence LPUE will be further investigated in 2004.

Implementation of data from the commercial flatfish fishery in stock assessment could be very useful for the stock assessment because the fishery is carried out throughout the year and in the whole North Sea. It could be an important source of information on the distribution and abundance of flatfishes. Standardised catch per unit effort (CPUE) from the commercial fishery can be used as an indicator for developments in fish biomass. The data collection in itself can serve as a tool for discussion between fishers, fisheries biologists and authorities. Fishers know what is happening at sea, but have difficulties in communicating what they perceive to biologists and authorities. Through discussions on collected data understanding each other, cooperation and communication can be improved.

1. Introduction

Dissatisfaction exists within the fisheries sector, fisheries biologists, and the government, about how advice on fisheries management is developed and how this advice is communicated. The F-project was set up to improve this situation. The project consists of three parts: 1) improving of stock assessments; 2) increasing use of data from the fisheries sector; 3) improving communication between fishers and fisheries biologists, and fishers and policy makers about research and policy. This report deals with part 2, increasing use of data from the fisheries sector. In part 2 each year a report is written about the data collection over the past year.

Because the commercial flatfish fishery is carried out throughout the year and covers the entire North Sea, it is an important source of information on the distribution and abundance of flatfish. Catch and effort data from the flatfish fisheries can be used to calibrate stock assessments, for which at the moment only research survey data are used. Fishers question the way fisheries biologists carry out these research surveys: they argue that surveys are carried out in the wrong areas, at the wrong moment and with the wrong gear. They also have the impression that the stock development according to researchers does not correspond with their observations at sea.

CPUE from the commercial fishery can be used as an indicator for developments in fish biomass. Thorough analyses of commercial catch and effort data can improve the suitability of CPUE as such an indicator. However, the interpretation of commercial CPUE as an estimator for fish biomass in a large area like the North Sea is difficult. For example, fishers tend to concentrate on fishing grounds where fish abundance is high. If fish biomass decreases, but fish concentrate in specific areas, commercial CPUE may not decrease proportionally to stock biomass, resulting in overestimating of actual fish biomass. Another problem is that the data available are Landings Per Unit Effort (LPUE) data, because the fishers register the amounts of marketable fish and not the amounts of all fish caught. Fishers might increase the value of their catch within their Individual Transferable Quota (ITQ) by high grading, i.e. they discard marketable, but less valuable fish in order to keep the more valuable specimens. However, as long as there is no proof for high grading, the term CPUE will be used instead of LPUE.

The present report describes data collection from a research fleet in 2003, consisting of a sample of the commercial flatfish fleet. Correction of collected CPUE series will be dealt with in another report, product B2, in the F-project. The effects of limited ITQ's on CPUE are often discussed and this report describes the preliminary results of these analyses. This report is the second of a series of annual reports on fisheries data collection in the previous year of the F-project. The first report described the results of four months of data collection in 2002 (Quirijns, 2003). The methodology used in 2003 is the same as in 2002 and described in the first report, so it will not be described in detail in this report. In February 2006, the data collection over the period 2002-2005 will be summarized in the final report.

2. Methods

In the previous report on data collection in 2002 (Quirijns, 2003), the method used to select the sample group of beam trawl vessels was described in detail. This chapter gives an overview of changes in the method used in 2003, compared to 2002.

All analyses are carried out on the data collected by the research fleet, except for the analysis on the effects op ITQ's on CPUE. This analysis was carried out on EU-logbook data.

2.1 Sample group

In 2003 approximately the same group of beam trawl vessels as in 2002 was used to collect data for the F-project. At the beginning of the project it was planned to include 36 vessels in the sample, but in 2003 only 32 vessels cooperated in theory. In 2003 some vessels ended their participation in the project and some vessels joined. Chapter 3 gives an overview of how representative the group of vessels is for the entire beam trawl fleet.

2.2 Data collection

A new version of catch and effort registration software was developed at the Netherlands Institute for Fisheries Research: VRIS 2.0. Compared to the first version of VRIS, some extra variables were added (Table 1). In the 2nd version also fields were entered for registration of the market categories of plaice and sole landings.

Table 1. Parameters registered by the fishers.

Trip basis	Haul basis
Week number	Haul number
Vessel code	Date
Type of fisheries	Time of shot
Number of tickler chains	Haul duration
Mesh size	Position of shot and haul
Use of chain mat	Wind direction
Start & return date of trip	Wind speed
Start & return harbour of trip	Depth
Market categories (plaice and sole)	Catch by species
Remarks	

2.3 CPUE series

CPUE of plaice and sole is calculated for each haul of all the vessels. From these CPUE data basic maps are drawn and simple time series are calculated. According to fishers CPUE series are biased by limiting ITQ (Individual Transferable Quotas). The effect of ITQ on CPUE was investigated with data from the EU logbooks. Seasonal variation in CPUE was analysed by means of the data collected by the research fleet.

2.3.1 Effects of ITQ on CPUE

Effects of ITQ on bias in CPUE series were analysed by means of landing and effort data extracted from EU logbooks. These data were used because a lot of information is available from the logbooks, both from Dutch and British vessels. The data collected in the F-project is not sufficient yet to use for these analyses.

Dutch and British vessels with engine powers between 2000 and 2500 hp were selected for the analysis. Plaice quotas are more limiting for Dutch vessels than for British vessels, so the

differences in CPUE for the Dutch and British vessels could be due to difference in available quota.

The average CPUE of plaice within ICES rectangles is compared between Dutch and British vessels. For each year and month, the average CPUE of plaice and standard error in an ICES rectangle within both groups of vessels are calculated. The average CPUE in a month was calculated by taking the average CPUE of all ICES rectangles in that month.

2.3.2 Seasonal Variation in CPUE

Seasonal patterns were calculated from the data series from 1994-2003 (see also Quirijns & Rijnsdorp, *unpub.*). For each month in a year CPUE was expressed as a percentage of the yearly average. The monthly CPUEs were averaged over the years 1994-2002, in order to get the average pattern of CPUE throughout a year. Monthly CPUE in 2003, also expressed in percentages, were plotted in the same graph as the yearly pattern.

2.4 Communication with participants

In 2002 it was planned to have 2 plenary meetings in IJmuiden per year, to discuss the results with the skippers. However, it appeared that coming to IJmuiden cost too much time and energy for the skippers. After the plenary meeting in spring 2003 it was decided that personnel of the Netherlands Institute for Fisheries Research would visit the skippers in Vlissingen, Stellendam, Den Helder, Texel and Urk. During these visits the results from the data collection were discussed and the process of advising Total Allowable Catch (TAC) was explained.

2.5 Report for the WGNSSK

In September the Working Group of demersal fisheries in the North Sea and Skagerrak (WGNSSK) convened to discuss the situation of demersal fish stocks (WGNSSK), among which plaice and sole. From the Netherlands Institute for Fisheries Research a report was sent to this working group, containing the preliminary results of the data collected by fishers in collaboration with the institute since 1993. The data collected in the F-project in 2002 and 2003 were also included in this report. The report was presented to the group by a researcher from the Netherlands Institute for Fisheries Research. The working group was requested to evaluate its (potential) utility as a tuning series for plaice and sole, to evaluate the usefulness of the approach and to comment on avenues for improvement.

3. Results

This chapter deals with the results of data collection by the research fleet and the patterns and developments in effort and CPUE. A summary is given of the discussions with fishers and of the reaction of the WGNSSK on the report that was sent to this working group. Also the results of the preliminary analyses on ITQ effects on CPUE are described.

3.1 Data collection

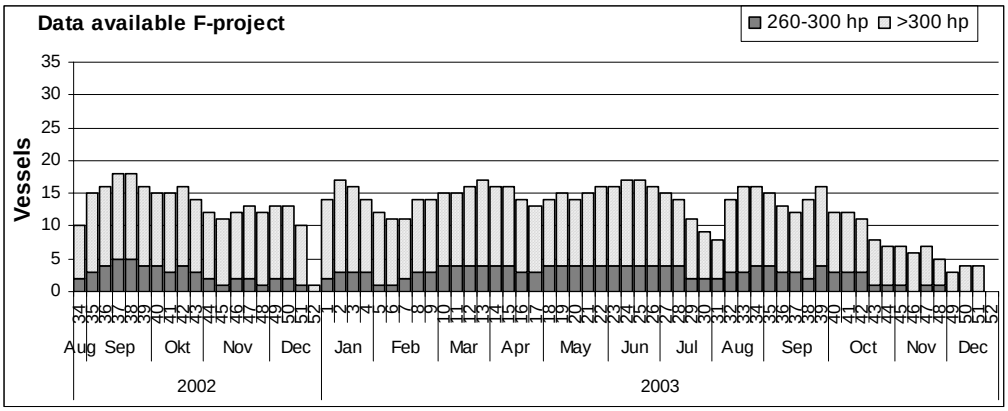
36 vessels were planned to be included in the research fleet (Table 2: planned vessels). Of the skippers of these 36 vessels, finally only 32 skippers cooperated in theory (Table 2: In sample). In practice even less skippers actually sent their data to the Netherlands Institute for Fisheries Research. Twenty-five fishers have made their data available at least once (Table 2: Available). On average 3 euro cutters and 10 large cutters per week sent in their data. For group 2 and 6 of the euro cutters, data lack from one vessel. These vessels were registered as cooperating vessels, but no data were received yet. In the large cutter group the main gap is observed in group 6, the northern fishing vessels, and 7, the flag vessels.

Table 2. Number of vessels in the project. 1) Planned: according to planning at the beginning of the project; 2) In sample: cooperating in theory in 2003; 3) Available: cooperating in practice in 2003.

Group & Vessel code	Fishing area: part of the North Sea with main activity	Euro cutters (260-300 hp)			Large cutters (>300 hp)		
		Planned	In Sample	**Available**	Planned	In Sample	**Available**
1. VLI, BR, ARM	South	1	0	**0**	2	4	**3**
2. KG, TH, YE	South	2	2	**1**	0	0	**0**
3. GO, SL, OD, BRU	South	3	2	**2**	5	4	**4**
4. IJM, SCH, KW	Middle	1	0	**0**	1	0	**0**
5. HD, TX, WR	Middle	1	2	**2**	5	7	**7**
6. UK, HA, EEM, LO, DZ, ZK, UQ	North	2	2	**1**	8	6	**2**
7. Flag vessels	North Sea	0	0	**0**	5	3	**3**
	Total	*10*	*8*	***6***	*26*	*24*	***19***

There was a decrease in data availability from week 27 to 31, corresponding with the month of July, due to fishers taking their summer holidays (Figure 1). In week 43, at the end of October, the TAC advice for 2004 was announced by the ICES biologists, which lead to dissatisfaction amongst the fishers, resulting in a decreased participation of vessels after week 43. In December, rough weather and fishers taking holidays also lead to a decrease in data availability. Possibly quotas were reached at the end of the season, so fishers stopped fishing. No data is available on the quota availability.

Figure 1. Data available per week from 2002 onwards: number of large cutters (>300 hp) and euro cutters (260-300 hp).



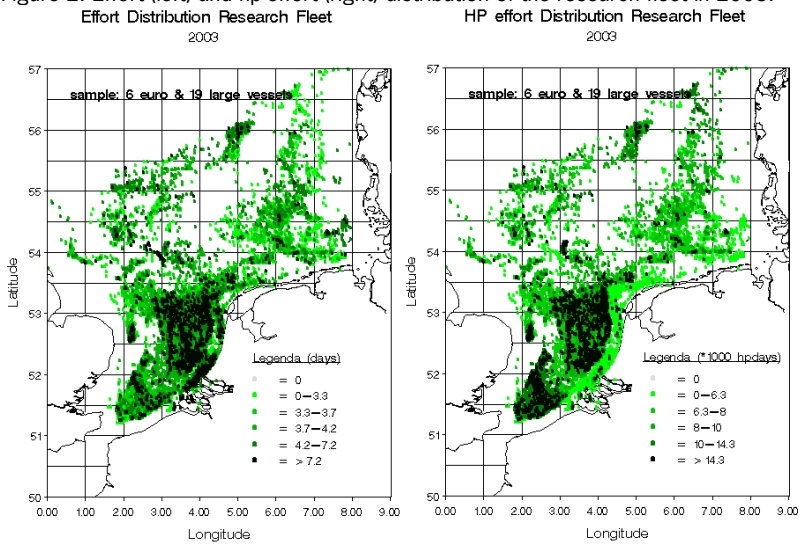
3.2 Patterns in Effort

Effort can be expressed in days fished or in hp*days fished. Days fished are used to express the absolute number of days fished at a certain position. Hp*days are used to incorporate the engine power of a vessel. This can be used to compare the effort of euro cutters with large cutters. Euro cutters have engines with 260-300 hp and large cutters have engines with more than 300 hp, often around 2000 hp. So for a sample of euro cutters, effort expressed in hours fished might be high compared to a sample of large cutters, but if effort of these samples are expressed in hp*days, probably effort of the large cutters will be higher.

The effort of the research fleet, expressed in days fished, throughout the year was mainly concentrated in the southern parts of the North Sea. Both euro cutters and large cutters fished in this area mainly up to 53°30" latitude. Effort expressed in hp*fishing day was also concentrated in the southern areas, but most fishing effort is observed in the most southern part of the North Sea and along the Dutch western coast, just outside the 12-miles zone. The area within the 12-miles zone does show a high fishing effort expressed in days fished, but effort expressed in hp*days is much lower. This is because only euro cutters, with relatively low engine powers, are allowed to fish in this area.

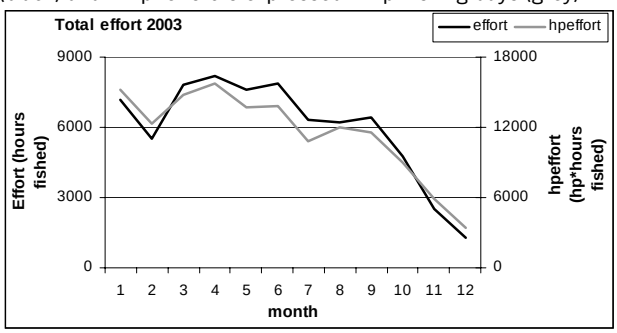
For 2003 the area coverage is quite high, although from the northern areas less data are available than from the southern areas (Figure 2). Looking at the effort of the research fleet in separate months (Appendix 1 and 2), the area coverage in the northern areas is consistently lower. The area coverage in the northern part of the North Sea (above 53°30" latitude) is relatively low, compared to the southern area, due to the lack of data from flag vessels and vessels from the northern part of the Netherlands.

Figure 2. Effort (left) and hp-effort (right) distribution of the research fleet in 2003.



The total effort of the sampled fleet per month in 2003, expressed in hours fished, was over 6000 hours fished per month until October (Figure 3). From then on the effort decreased down to approximately 1500 hours fished. The total effort expressed in hp*hours fished shows the same pattern.

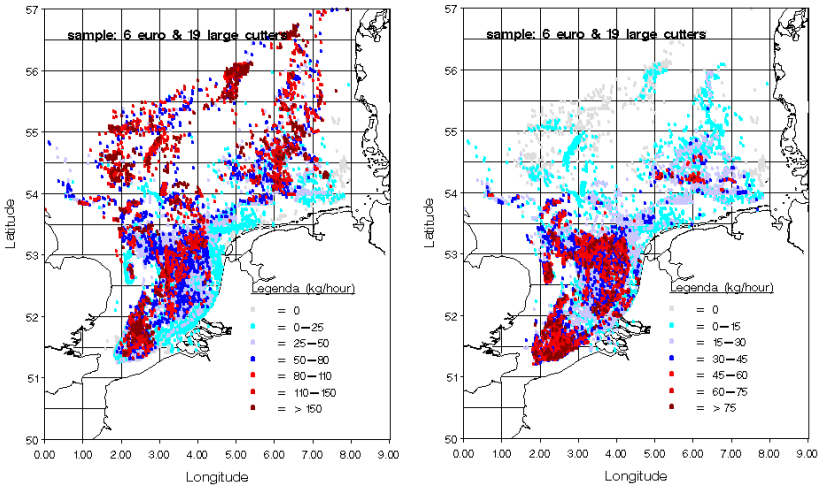
Figure 3. Development in total effort of the research fleet in 2003. Effort is expressed in fishing days (black) and in hp*effort is expressed in hp*fishing days (grey).



3.3 Patterns in CPUE

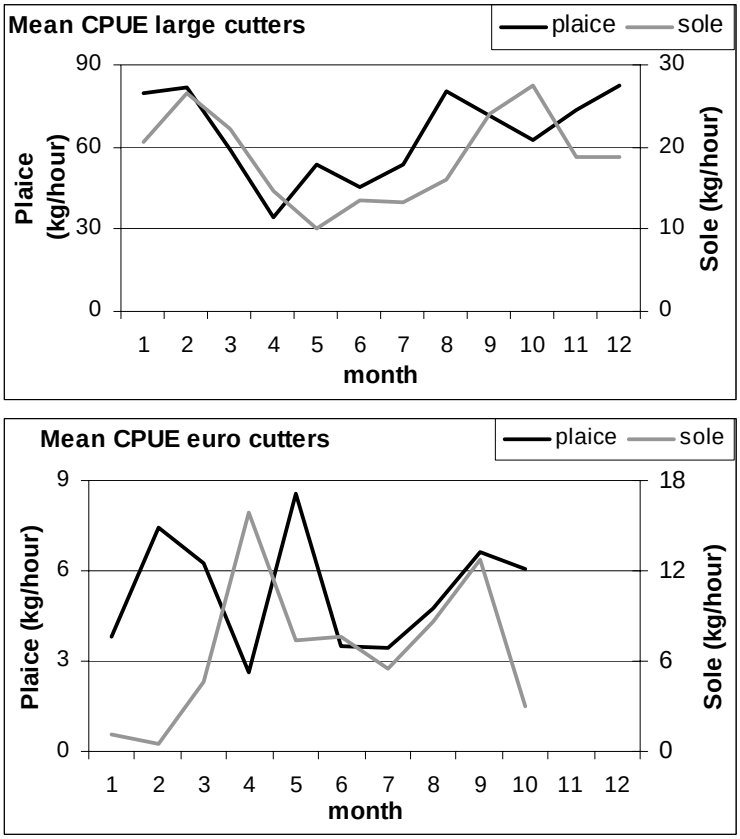
The CPUE expressed in kg/hours fished of plaice in 2003 (Figure 4) was highest in the most southern part of the fishing area, in the German Bight and in the most northern fishing areas. For sole the highest CPUE were found in the southern fishing areas. Comparing the patterns in CPUE of plaice and sole, it shows that vessels with plaice as their main target species fish in the northern fishing areas and have low by-catches of sole. On the other hand, vessels with sole as their main target species fish in the southern fishing areas, and are able to get quite high plaice by-catches, compared to the plaice catches of vessels targeting plaice. In Appendix 3 and 4 the patterns of CPUE for respectively plaice and sole are presented by month.

Figure 4. Distribution of CPUE for plaice (left) and sole (right) in 2003.



Average CPUE for plaice and sole were calculated in each ICES rectangle in each month. The total average per month was calculated by averaging CPUE from all ICES rectangles in a certain month (Figure 5). The CPUE series of the euro cutters from the research fleet probably are not representative for the plaice and sole targeting euro cutter fleet. This is because some of the euro cutters targeted shrimps in 2003, with plaice and sole as by-catch, so the average CPUE of the euro cutter fleet probably was higher than the CPUE of the sampled cutters.

Figure 5. Average CPUE per month of plaice (black) and sole (grey) in 2003 for large cutters (above) and euro cutters (below) in 2003. The CPUE of euro cutters probably is not representative for the plaice and sole fishing euro cutter fleet.

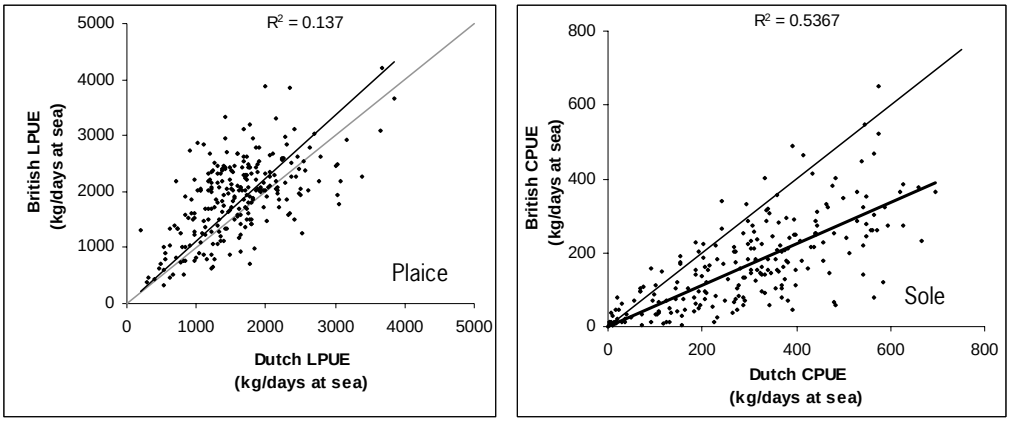


3.3.1 Effects of ITQ on CPUE series

The average CPUE of plaice in a month, within an ICES rectangle, is higher for British vessels than for Dutch vessels. This is shown in Figure 6 (left) where the black line is the trend line and, although there is a lot of variation in the data series, the slope of this line is higher than the slope of the grey 1:1 line. This means that the average plaice CPUE of British vessels is higher than the average CPUE of Dutch vessels. For sole the opposite can be seen in the right picture in Figure 6. Dutch vessels tend to catch more sole than British vessels within an ICES rectangle.

A skipper for whom the ITQ (Individual Transferable Quota) for a certain species is restricting can decrease the catch of this species by changing his fishing behaviour. He might: 1) allocate his effort differently, to avoid areas with high concentrations of the restricted species, e.g. plaice; 2) use different gear, suitable for other species than the restricted species; or 3) discard marketable but low quality plaice, in order to keep the more valuable specimen. Analysis on the influence of restricting TACs on fisher's behaviour will be carried out in 2004.

Figure 6. Plot of average British and Dutch CPUE of by ICES rectangle in kilograms/days at sea. Each dot represents the average CPUE in an ICES rectangle. The grey line through the dots represents a 1:1 proportion, the black line the regression line. Left graph shows results for plaice, right graph for sole.

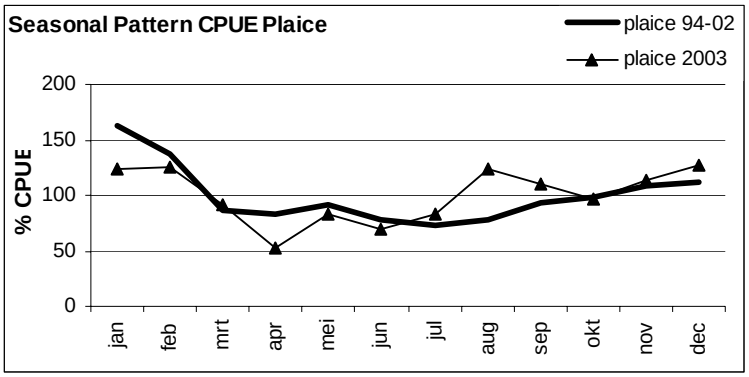


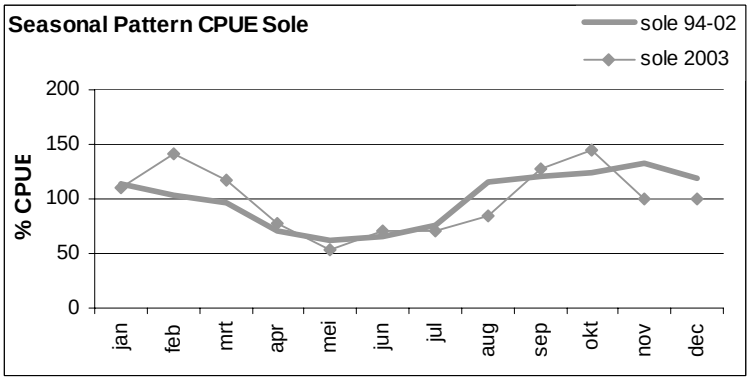
3.3.2 Seasonal variation

For both plaice and sole there is a predictable seasonal pattern in CPUE of large cutters: it decreases in spring, is low in summer and finally increases in autumn (Figure 7). The variation in CPUE in 2003 of both plaice and sole is not very different from the variation in average CPUE over the period 1994-2002. The average seasonal pattern shows that, between months, differences are observed in CPUE varying from 60 % - 140 % of the average annual CPUE, corresponding with a variation of more than a factor 2.

No further analysis was carried out to investigate factors causing seasonal variation. Perhaps it will be possible to investigate these factors during the F-project. However, priority is given to investigation of the effects of fishing behaviour on CPUE.

Figure 7. Seasonal pattern of plaice (upper graph) and sole (lower graph) CPUE in 2003, based on catch and effort of commercial vessels in micro distribution project and F-project. CPUE is expressed as a percentage, 100% is the annual average CPUE of each year. The development in CPUE is calculated for 2003 (thin line) and for an average seasonal pattern (bold line: 1994-2002). For example: in January plaice CPUE in 2003 was about 125 % from the annual average CPUE in 2003. The average CPUE from 1994-2002 was about 160 % from the annual average CPUE in each year.





3.4 Communication with participants

In 2003 a plenary meeting was held in IJmuiden in spring, where several issues concerning gaps in the available data, standardisation of the CPUE data, use of collected data in TAC advice system and the importance of knowledge on market categories in the landings were discussed. Because fishers from the southern part of the Netherlands were not able to attend this plenary meeting, a second meeting dealing with the same issues was held in Vlissingen and Stellendam. In autumn 2003, two people from the Netherlands Institute for Fisheries Research visited Vlissingen, Stellendam, Den Helder, Oudeschild and Urk for a second round of discussion.

In the early months of 2003 it already showed that coverage of the northern areas was relatively low, compared to the southern areas. The fishers mentioned two reasons for this. One of the reasons was that, in the beginning of 2003, a relatively high abundance of fish was available close to the coast, which resulted in the fishers not having to go farther. The other reason was the new effort regulation. Since 2003 fishers are limited in the amount of days they are allowed to spend at sea, which lead to a fishery closer to the coast. Fishers prefer spending their time on fishing, than on steaming and searching for high concentrations of fish. The fishers did agree that, if there were not enough northern fishers, the coverage of the northern areas might be jeopardised.

In order to use CPUE as an indicator for the plaice and sole stock sizes, a standardisation of the data is required. A standardisation is required because raw CPUE series are biased by several factors like effort distribution, quota limitation and depth. In order to use CPUE as an

indicator the bias in CPUE caused by such factors should be decreased to a minimum. During the meeting with fishermen correction for these factors was discussed.

Because effort is not evenly distributed over the North Sea, CPUE was averaged throughout larger areas. First CPUE was averaged within ICES rectangles, finally an overall mean CPUE was calculated by averaging CPUE of all ICES rectangles. However, the fishers argued that within a rectangle there are big differences in effort and CPUE. This can be caused by quota availability: fishers with higher quotas will go to areas with higher fish concentrations, because fishers with more limiting quotas will go to areas with more by-catch of other species. The effect of quota limitation on a larger scale was already discussed in a meeting in 2002, but during the 2003 spring meeting the micro-scale effect was discussed more thoroughly. To correct for this effect, smaller rectangles will be defined for averaging CPUE. A method should be developed to estimate the CPUE in rectangles that are not fished by the research fleet.

Depth might be a factor causing differences in CPUE on a micro-scale. During the meeting the effect of depth on CPUE was discussed. From a first inspection of local patterns in CPUE it seemed that CPUE and depth in one month were negatively correlated: lower CPUE was obtained in deeper water. But, the fishers argued that it is difficult to draw conclusions from one-month data, because fish concentrations might move through space and through depth ranges a lot in that period of time. It might be interesting to study the effect of depth on a smaller time scale, e.g. week. However, investigation of the fishing patterns, i.e. effort distribution, and its effects on CPUE series has a priority, because these effects are likely to be more important than the effects of depth. Effort distribution is partly influenced by depth, so before investigating the effects of depth, more understanding of patterns in effort distribution is required.

The process of getting towards a Total Allowable Catch (TAC) advice, and how the collected data can contribute in the process of calculating TACs, was discussed. It is important that fishers are aware of which committees are involved in the stock estimations and giving the TAC advice, because it would be helpful if they understand who is responsible for which part of the process and how and where their data can be used in the process.

Finally a presentation was given on the importance of information on the landing composition. Landings composition gives information about the developments in age composition of the population. It was stressed that the participating fishers should also register the market categories of their plaice and sole landings.

The autumn visits to the harbours were mainly dedicated to the report that was sent to the working group of demersal fish stocks in the North Sea and Skagerrak, which dealt with micro-distribution data (Quirijns & Rijnsdorp, *unpub.*). This report contained graphs of data availability, development in plaice and sole CPUE, seasonal variation and effort distribution, which are presented in Appendix 5. The graphs were discussed during the visits, leading to discussion of development of the plaice and sole stocks from 1994 to present. The CPUE of plaice showed some variation but no clear trend up or down. The CPUE of sole showed more variation and from 1994 to the present an overall downward trend was observed. CPUE was higher after a strong year class (1996) recruited to the fishery. The within-year variation in CPUE for both species is caused for a large part by seasonal variation.

3.5 Report for the WGNSSK

The working group on demersal fish stocks in the North Sea and Skagerrak (WGNSSK) studied the report on micro-distribution that was sent to them by the Netherlands Institute for Fisheries Research. The final stock assessment model requires information on age groups. These age groups are not defined in the micro-distribution data, so it was impossible to use these data in the final model. The data were used in other models that do not require information on age groups. These models are used to estimate the developments in fish stocks.

The micro distribution data showed a similar development as other input data used in the stock assessment.

In order to make the micro distribution data suitable for the final assessment model, information on age groups is required. For this information market categories from the landings of the research fleet can be used. The Netherlands Institute for Fisheries Research samples market categories throughout the year. From the samples ages are estimated by category. It will be investigated whether these age estimates can be combined with the market categories from the research fleet, which would enable to estimate the age distribution in the landings of the research fleet.

These data should be made available in 2004. Also an index area should be defined, which is a fixed area used to study developments and compare between years. Only ICES rectangles are included in which a minimum amount of data is available each year. With such an index area the data are independent of data availability outside this area.

4. Discussion

The objective of the data collection in the F-project is to develop a dataset from a group of beam trawl vessels representative for the entire beam trawl fleet. The collected data can be used to develop CPUE as an indicator for the stock size of plaice and sole in the North Sea and can also be used as a tool for discussion between fishers, fisheries biologists and fisheries managers.

4.1 Collected data

A dataset is being developed containing a lot of useful data, including detailed landings and effort, combined with environmental factors and remarks of the fishers concerning factors that influence catch rates. With these data it is possible to develop the CPUE as an indicator for stock sizes of plaice and sole. The group of vessels making their data available for this research is not representative for the entire beam trawl fleet, but might be representative for developments in the stock size. But although the southern North Sea is covered quite well by the sampled group, more data are needed in order to cover the northern fishing area. Mainly data from flag vessels and vessels from the north of the Netherlands are required in addition to the data already collected. This would reduce the variance in the ultimate estimate for CPUE. Whether it also causes bias in this parameter is still to be assessed.

There are several reasons why the data do not cover the entire fishing area of the North Sea. In the beginning of 2003 it was mainly due to the distribution of plaice and sole. Relative high abundances of both plaice and sole were found near the Dutch coast, so it was not necessary for the fishers to go further off the coast. The new effort regulations that were implemented since January 2003, a limitation in days at sea for each vessel, resulted in more fishing activities near the coast. Fishers preferred fishing in their limited amount of fishing days instead of steaming or searching for fish concentrations. Towards the end of the year low area coverage was mainly caused by decreased participation of vessels. In December for example only 4 large cutters and no euro cutters sent in their data. This decrease in cooperation was mainly caused by dissatisfaction among fishers about the TAC advices. In order to have a representative sample of the fleet again, it is required that all parties get to an agreement about the importance of this data collection.

The collected data should include the information that is required to correct the data for factors influencing the relationship between CPUE and fish stock developments. Environmental factors currently included are wind force and direction and depth. Temperature is another factor, which might have an impact on plaice and sole CPUE. One of the objectives of the data collection in the F-project is to collect sea bottom temperature as well. If possible temperature-measuring devices will be installed at several vessels to monitor temperature at the bottom of the sea. However, before installing these devices it is required that all vessels have the appropriate software onboard, which should first be realised. Another type of information that is very important is the remarks of the fishers concerning factors influencing their catch rates. Some fishermen fill this out regularly, while others never give any remark on such factors. Fishermen will be stimulated to fill out this kind of information too.

4.2 Effect of ITQ on CPUE

Differences in ITQ seem to result in difference in CPUE, although it is not known yet if this difference is caused by change of effort allocation, change of gear used of high grading. More analyses will be carried out in 2004 to investigate the effects of limited ITQs on CPUE data.

4.3 Use of data in stock assessment

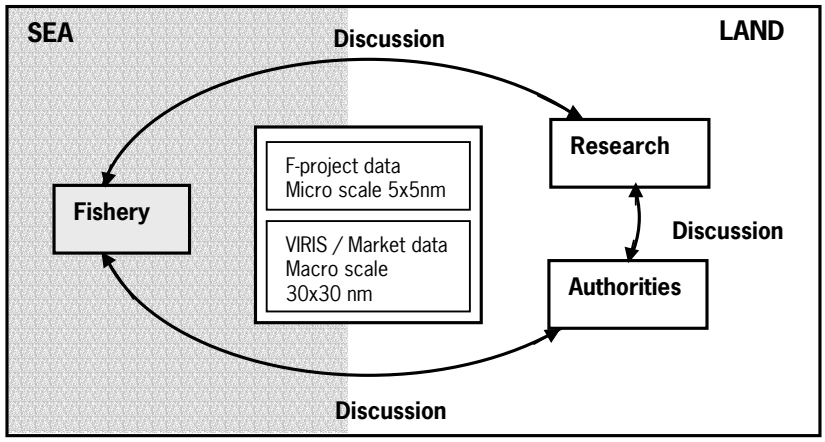
The working group that carries out stock assessments for plaice and sole (WGNSSK) studied the detailed catch and effort data collected by fishers and biologists and came to the conclusion that the data were not yet ready for implementation in the final stock assessment. In order to make the data suitable for implementation, first it is required that information on age composition of the landings is available, for example market categories of the landings. Authorities have been asked to check possibilities for making this information available. Secondly, an index area should be used while analysing the data, which will be realised in 2004.

Preparing CPUE series for stock assessments, through actions mentioned in the previous paragraph, has a priority in 2004. Furthermore, analyses should be done on the effects of parameters on CPUE series like engine power, depth, weather conditions and perhaps other parameters. These analyses will probably be carried out at the end of 2004 or in 2005.

4.4 Wider use of CPUE data

Although the data collected may not be representative for developments in plaice and sole stocks, the data collection is very useful. We are now able to make the process of data collection more efficient and increase our knowledge on the flatfish fishery in the North Sea. When the "data collection machine" (i.e. the process of data collection by fishers and processing data) is fully developed, ways are at hand to continue making fisheries data available. These data can be a tool for discussion between fishers, fisheries biologists and authorities (Figure 8). Fishers have a clear view of what is happening at sea, but for them it is difficult to communicate what they perceive to biologists and authorities. Discussion on collected data can be of help in understanding each other and improving cooperation and communication.

Figure 8. Data collection as a tool for discussion between fishers, fisheries biologists and authorities.



By means of the data collection macro and micro patterns in CPUE of plaice and sole are getting clearer for all parties. CPUE data of plaice and sole by ICES rectangle were already available from EU logbooks (VIRIS data set). These data, combined with landing data including size categories, give a lot of information about the macro patterns of CPUE in the North Sea. In order to understand the micro patterns of CPUE, the haul-by-haul data collected in the F-project, with latitude and longitude provided, can be used to analyse the effects of e.g. ITQ or depth on CPUE series.

Recommendations

In this report several recommendations were mentioned. This chapter lists the recommendations in order of priority.

1. Data collection should be made more efficient. The new software developed by one of the skippers should be implemented as soon as possible on all cooperating vessels in order to facilitate the fishers in registering their data. Fishermen from the research fleet should also be motivated to fill out remarks section, which is required for good interpretation of the data.

2. The collected data should be made suitable for implementation in stock assessment. For that, several actions are required:
    a. Data availability should be increased to get higher coverage of North Sea fishing area by increasing cooperation of vessels. Especially more data from vessels from the northern part of the Netherlands and from flag vessels are required. Also the sample of euro cutters should be expanded with plaice and sole fishing vessels.
    b. All parties involved in the data collection should be aware of the importance of collecting sufficient data.
    c. Information on age distribution of the landings of the research fleet should be made available and included in the dataset.
    d. An index area should be defined.

3. The data collected should be corrected for factors that have a major influence on the relationship between CPUE and fish availability. For a complete correction, several analyses should be carried out:
    a. Analyses on fishing behaviour: how do fishermen influence their catch composition by their behaviour (e.g. by switching area or gear, or high grading) and what are the motivations of fishermen when allocating their effort in time and space. This is the most important analysis that needs to be carried out;
    b. Development of a method to estimate the CPUE in rectangles that are not fished by the research fleet;
    c. Analyses on effects of depth;
    d. Analyses on effects of temperature;
    e. Analyses on factors influencing seasonal variation.

References

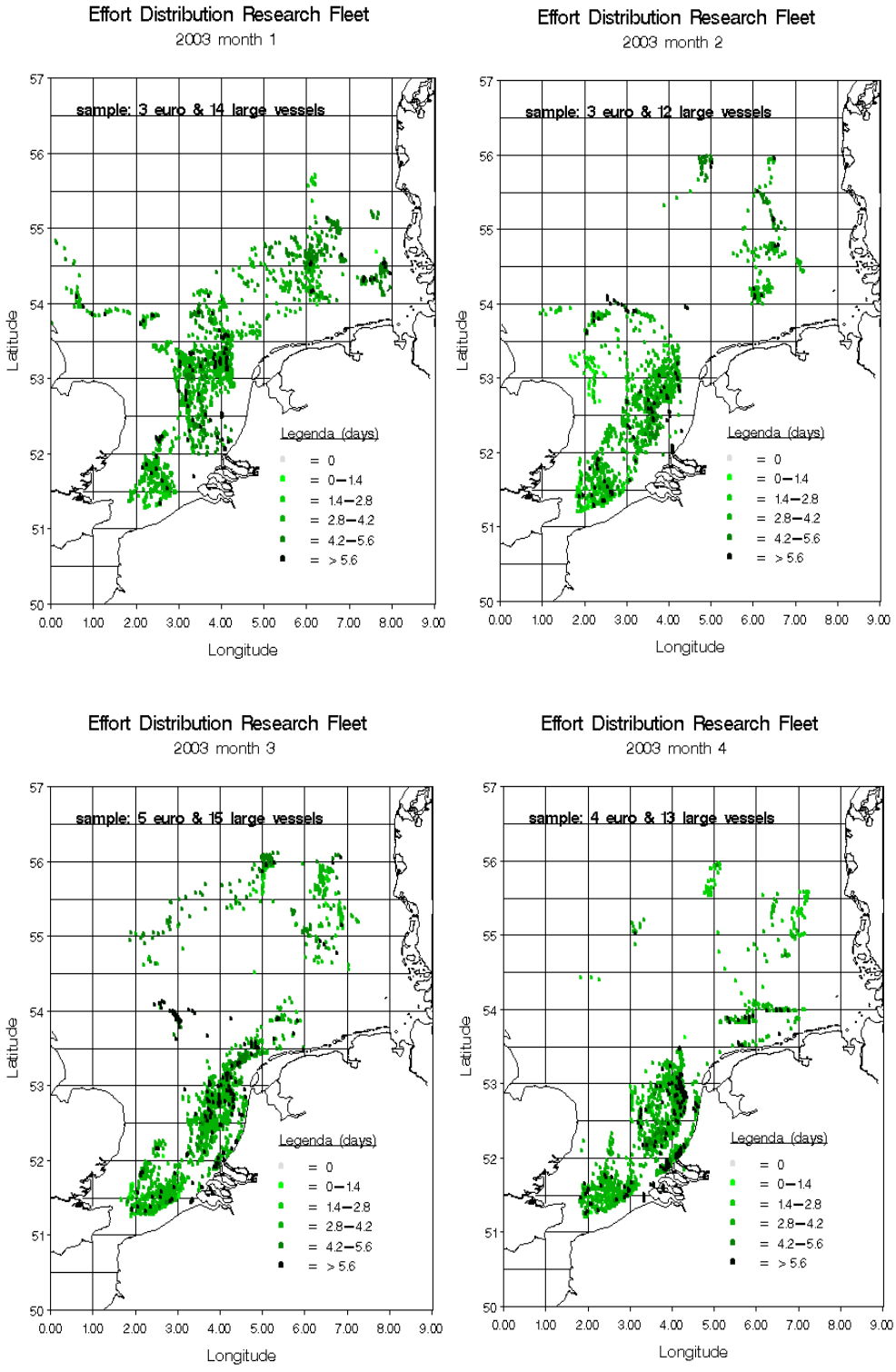
Quirijns, F.J., 2003. Data collection from September - December 2002. RIVO report nr. C035/03.
Quirijns, F.J. & Rijnsdorp, A.R., unpublished. Working Document for the WGNSSK (Boulogne, September 2003).

Appendices

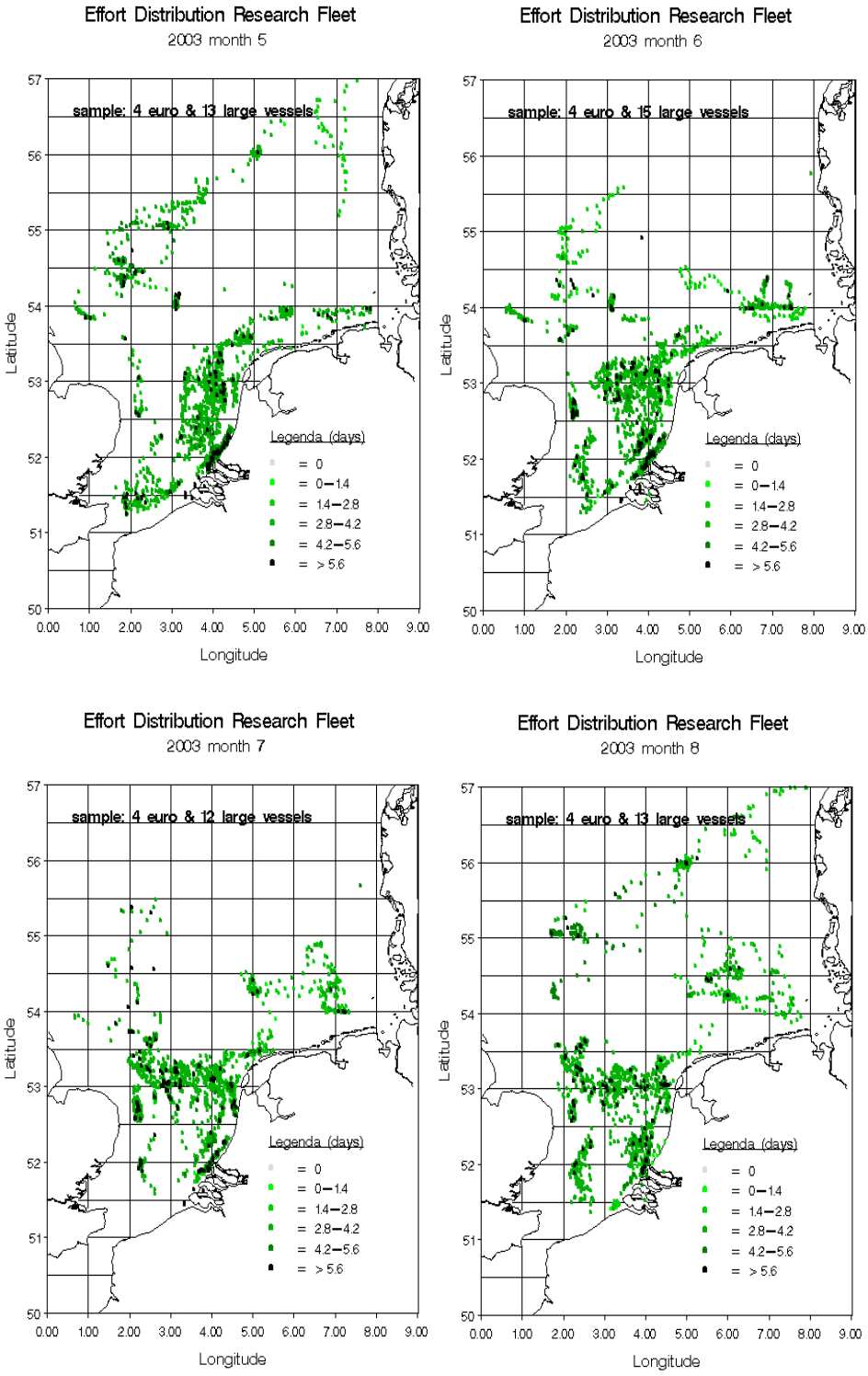
Appendix 1. Effort distribution of the research fleet
Appendix 2. HP-Effort distribution of research fleet
Appendix 3. Catch per Unit Effort of Plaice (per month, expressed in kg/hours fished)
Appendix 4. Catch per Unit Effort of Sole (per month, expressed in kg/hours fished)
Appendix 5. Figures from the report for the WGNSSK

Appendix 1. Effort distribution of the research fleet

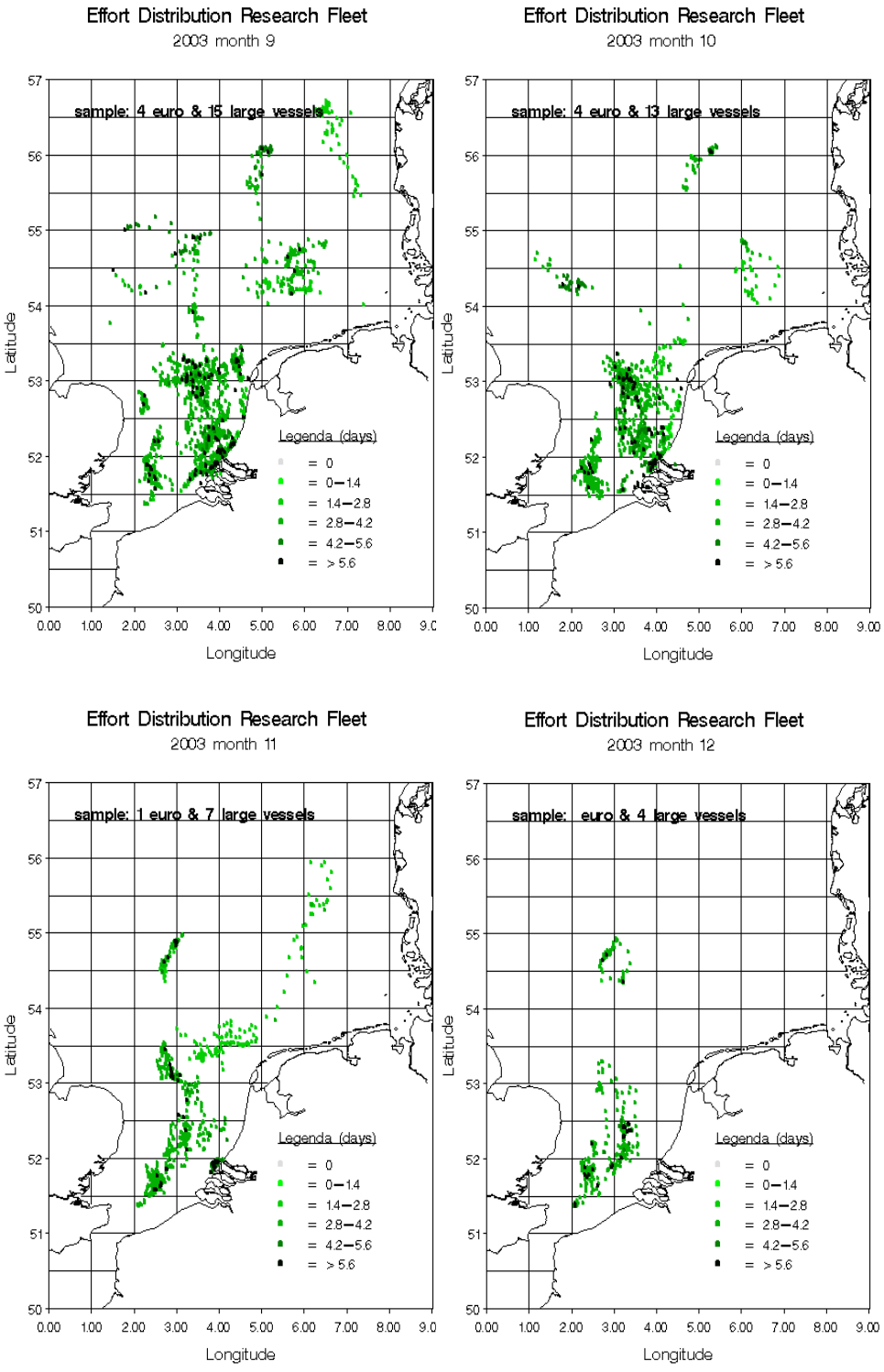
Distribution of effort of the research fleet by month, expressed in days fished.



Effort distribution from January-April.



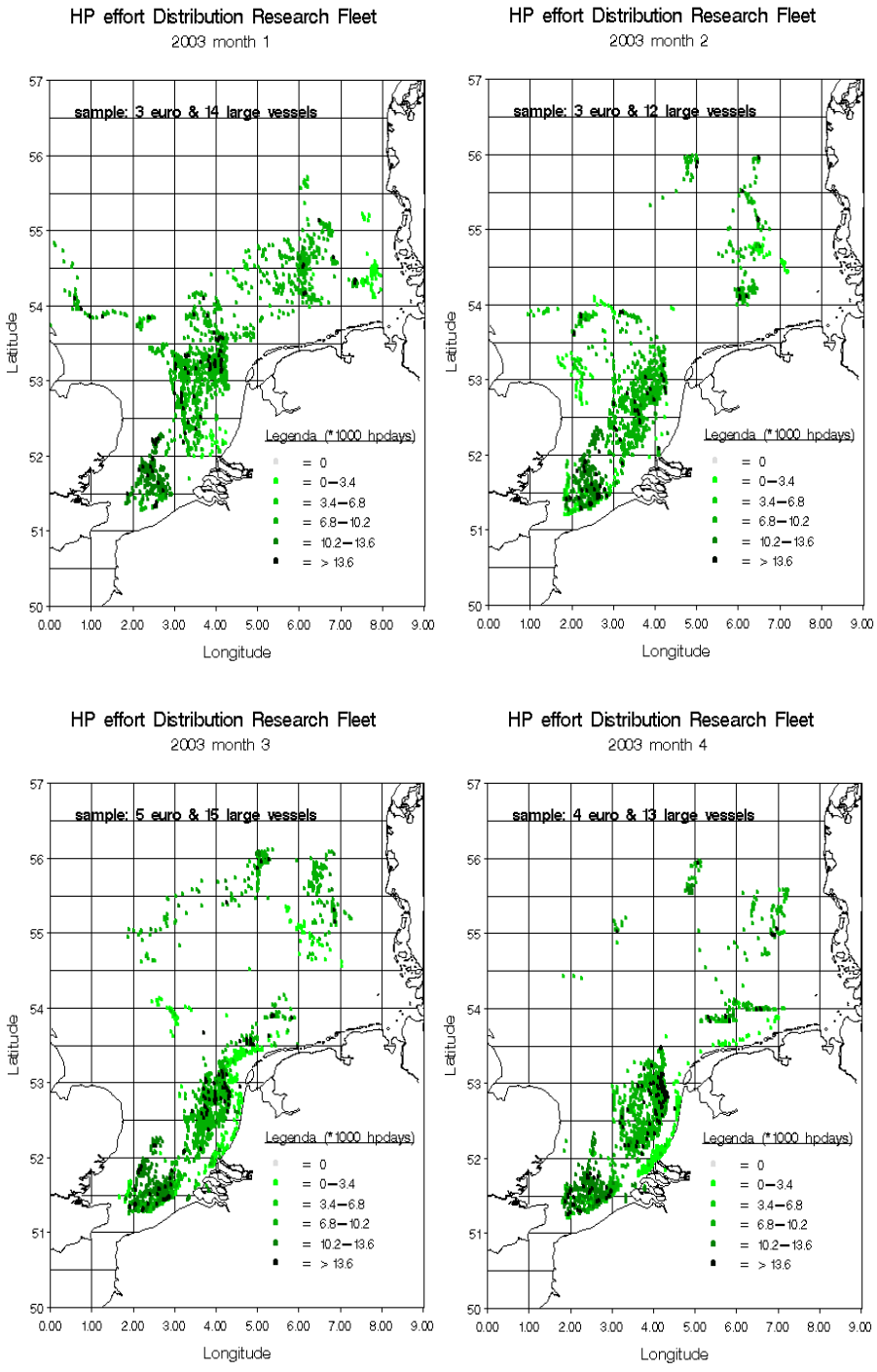
Effort distribution from May-August.



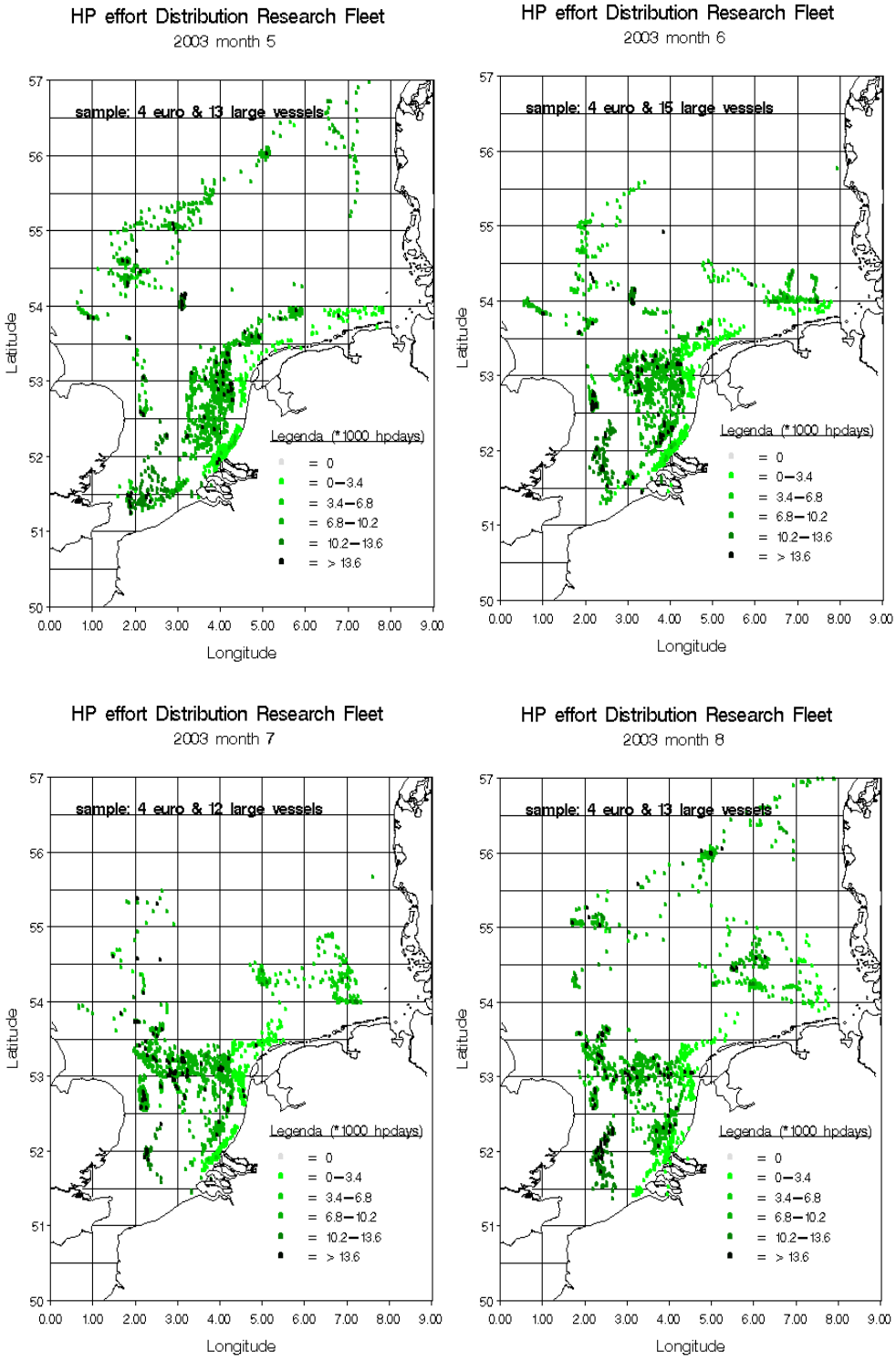
Effort distribution from September-December.

Appendix 2. HP-Effort distribution of research fleet

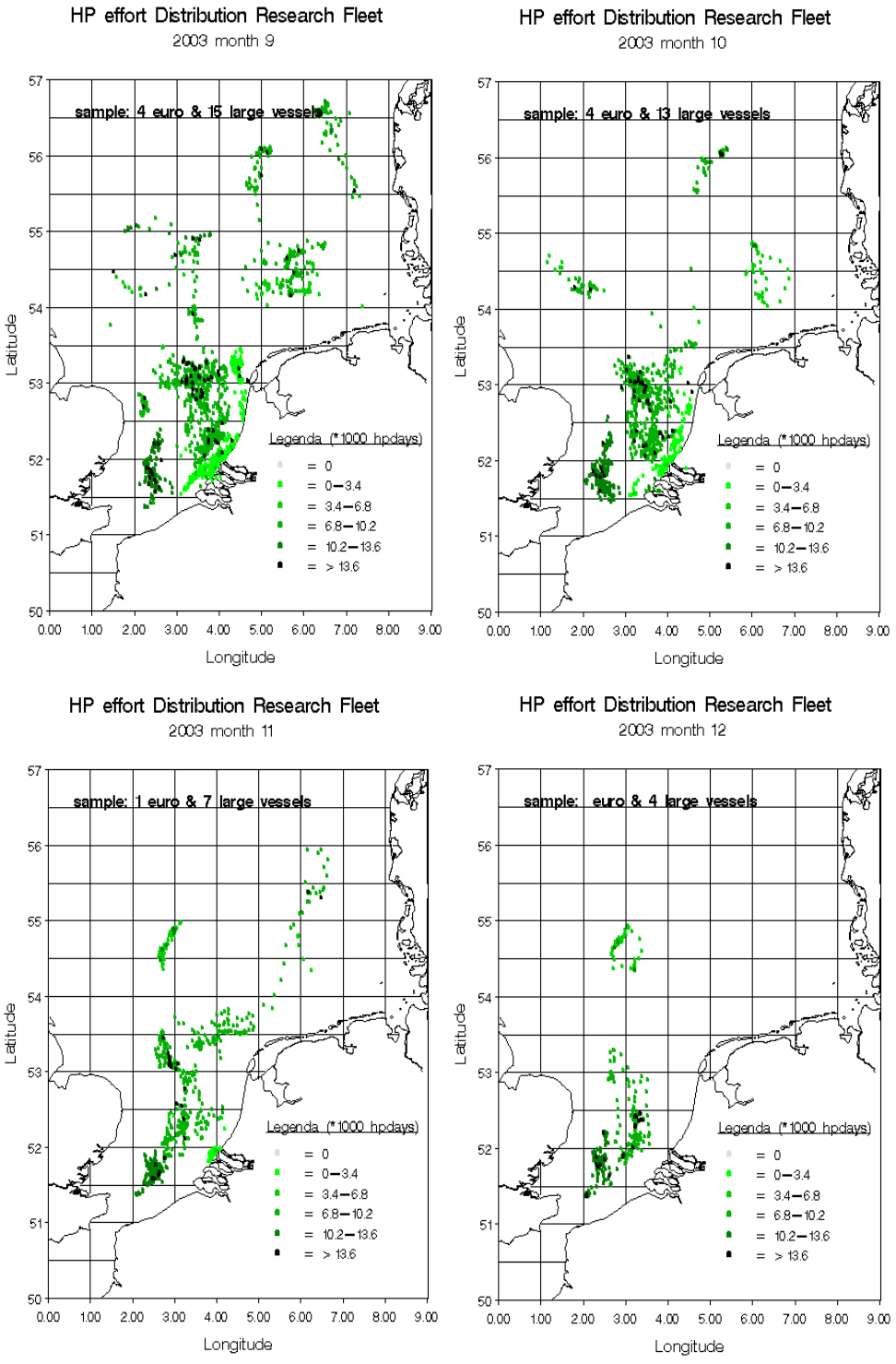
Distribution of HP effort of the research fleet by month, expressed in hp*days fished.



HP effort distribution from January-April.



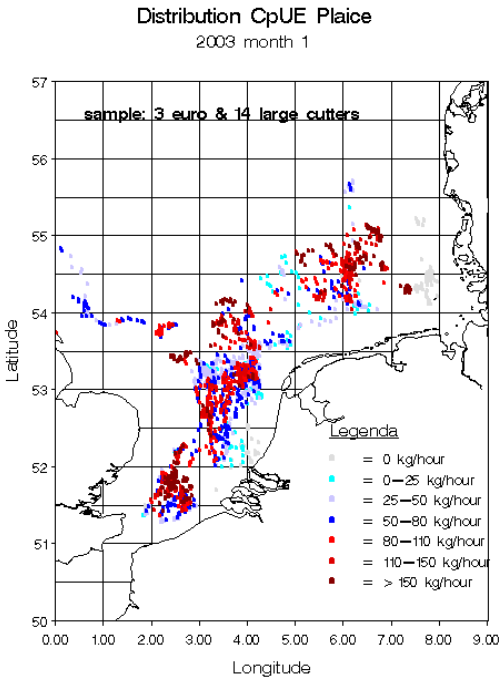
HP effort distribution from May-August.

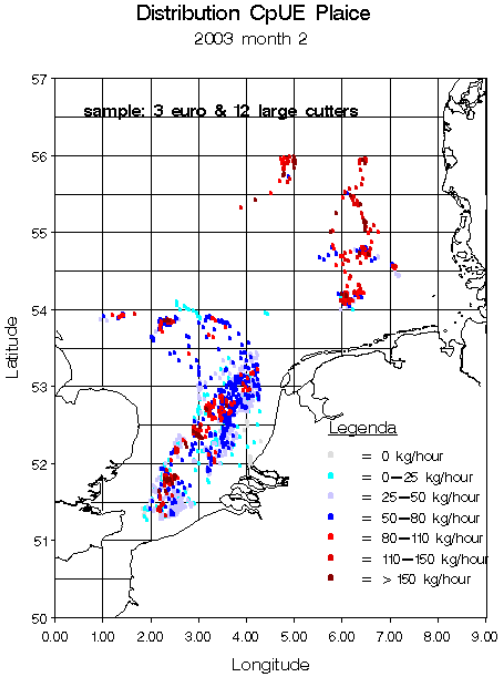


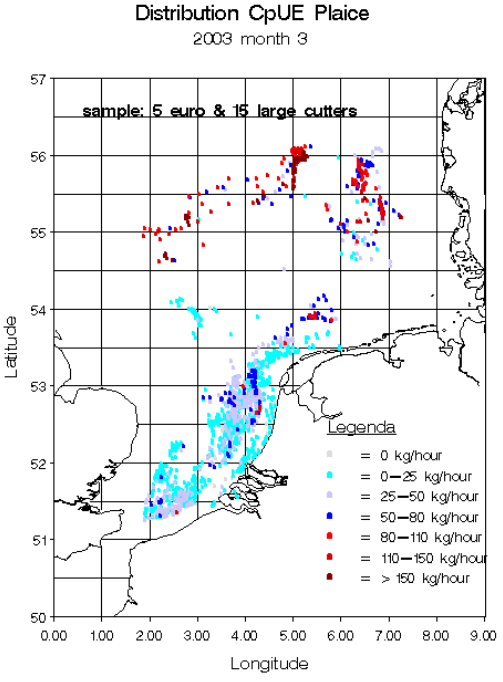
HP effort distribution from September-December.

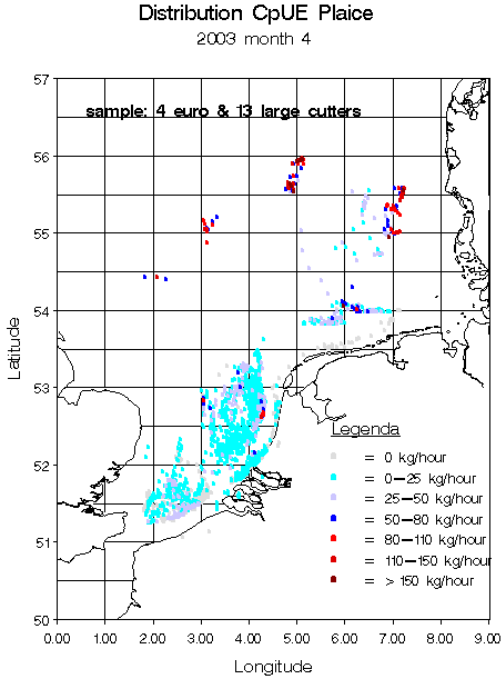
Appendix 3. Catch per Unit Effort of Plaice

Patterns of Catch per Unit Effort for plaice per month in 2003, expressed in kg/hours fished.

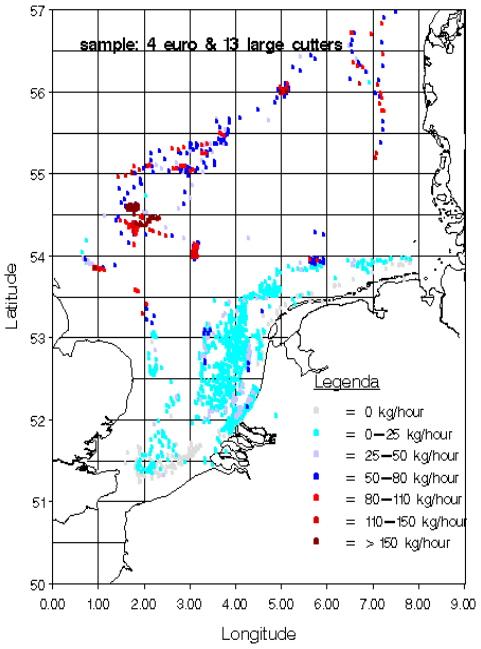




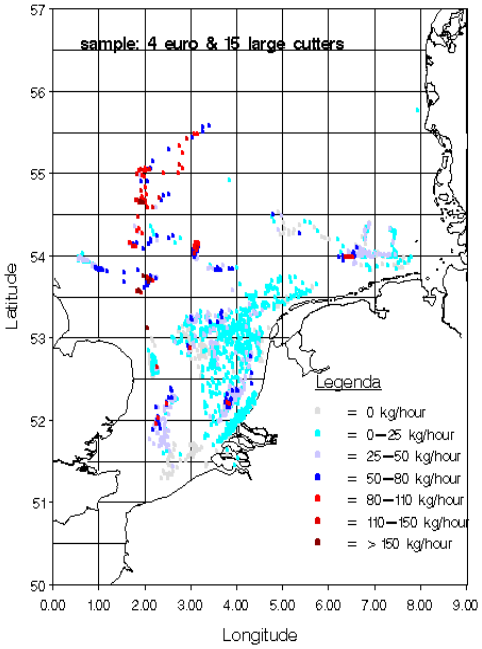




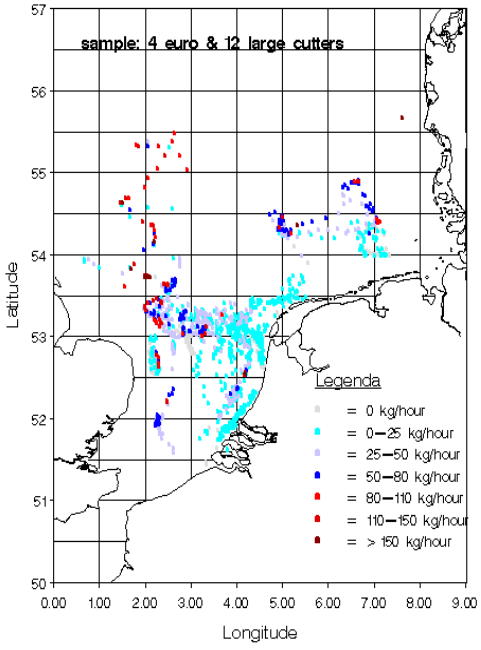
Distribution CpUE Plaice
2003 month 5



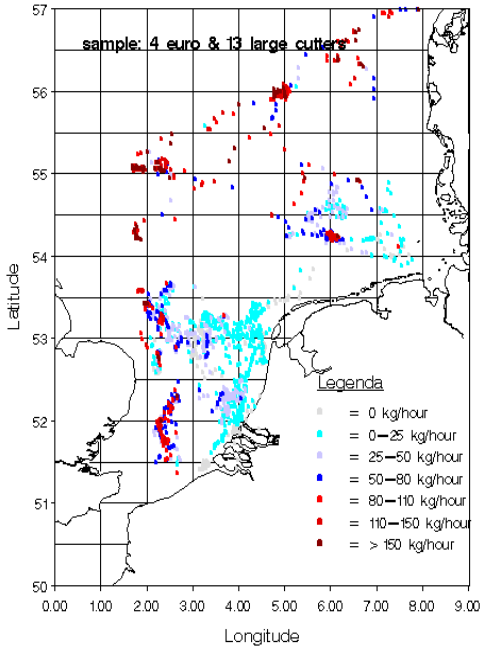
Distribution CpUE Plaice
2003 month 6



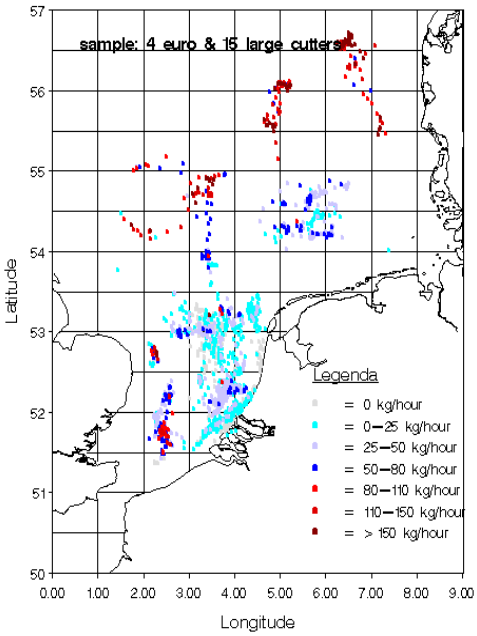
Distribution CpUE Plaice
2003 month 7



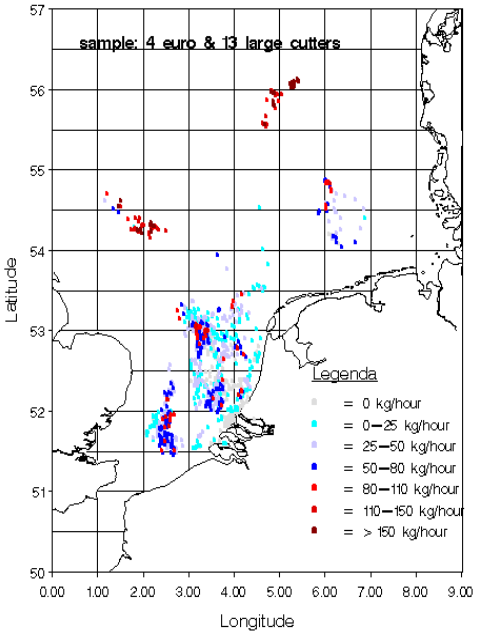
Distribution CpUE Plaice
2003 month 8



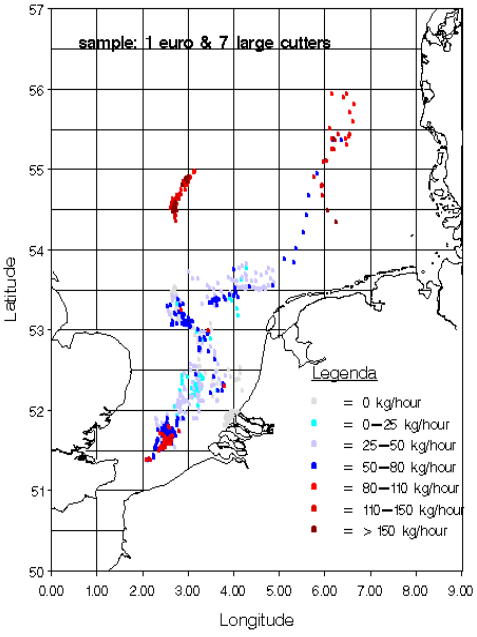
Distribution CpUE Plaice
2003 month 9



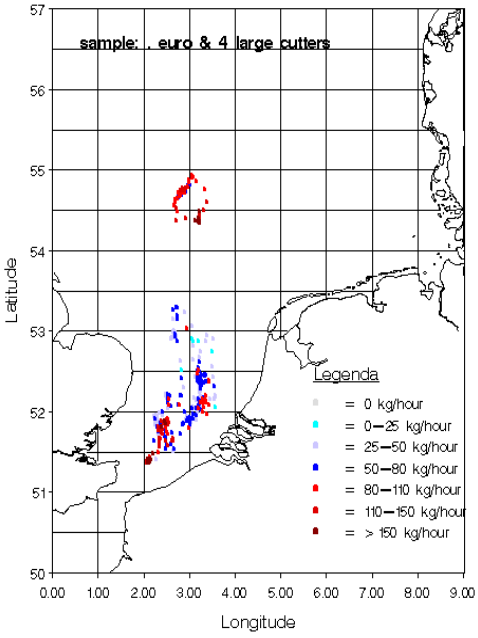
Distribution CpUE Plaice
2003 month 10



Distribution CpUE Plaice
2003 month 11

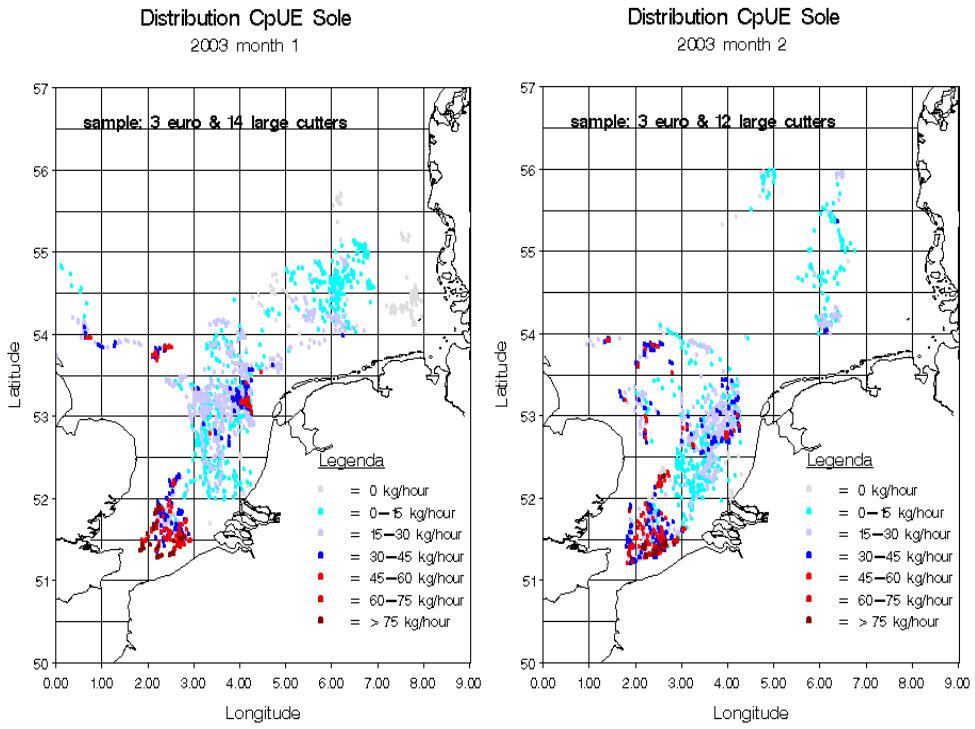


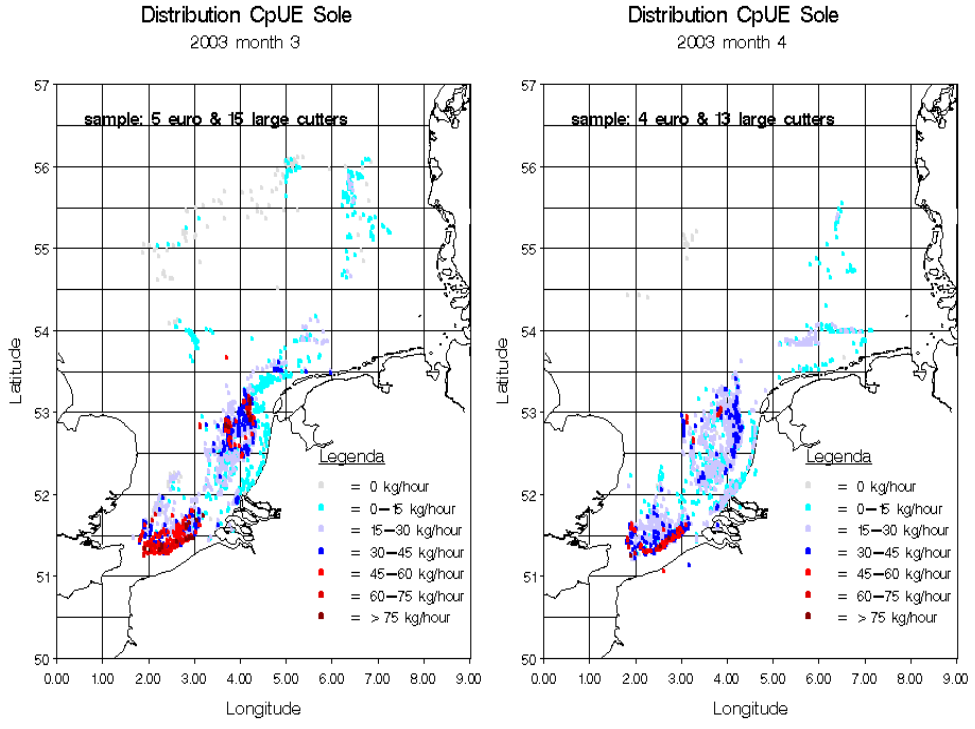
Distribution CpUE Plaice
2003 month 12

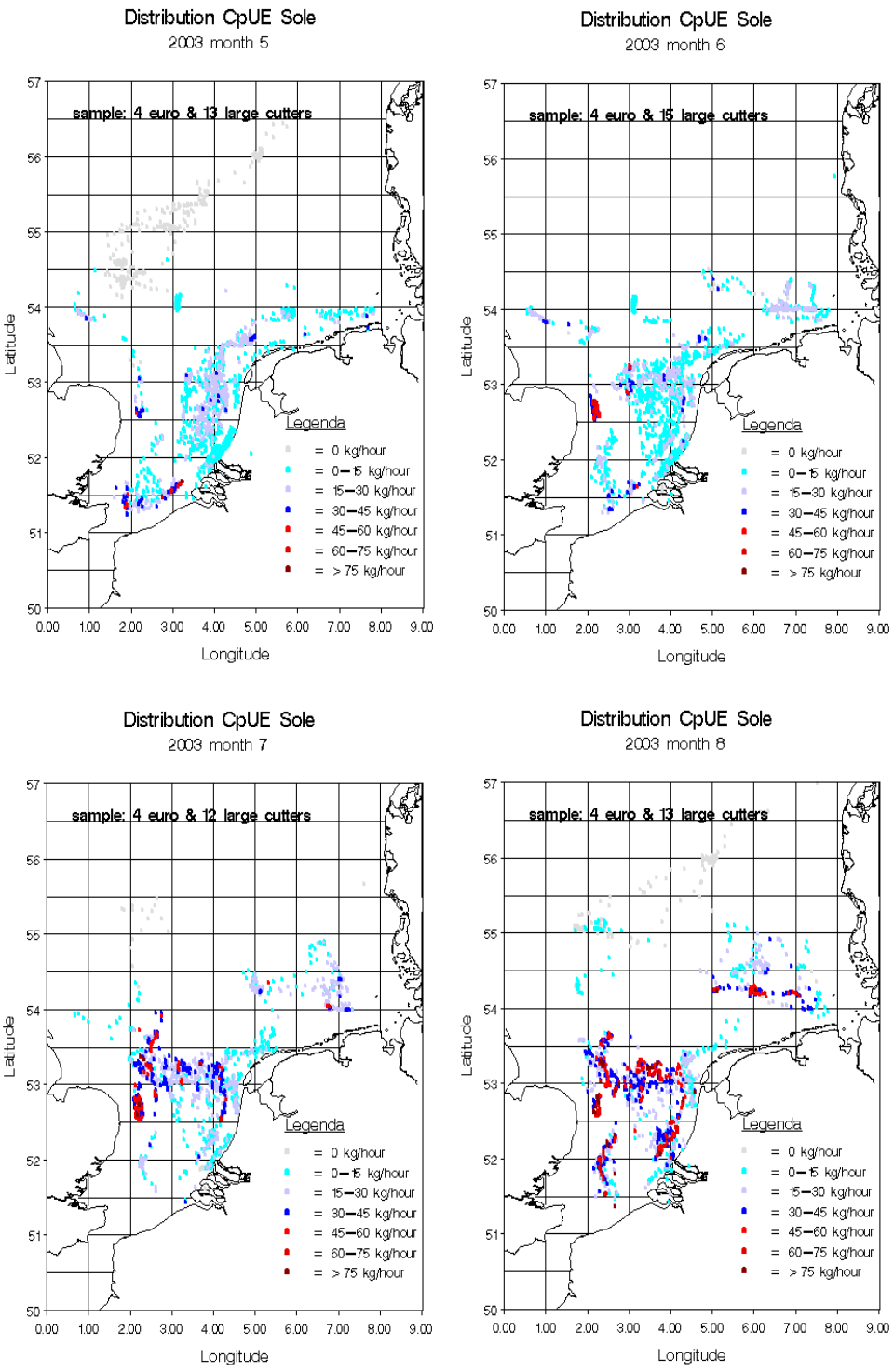


Appendix 4. Catch per Unit Effort of Sole

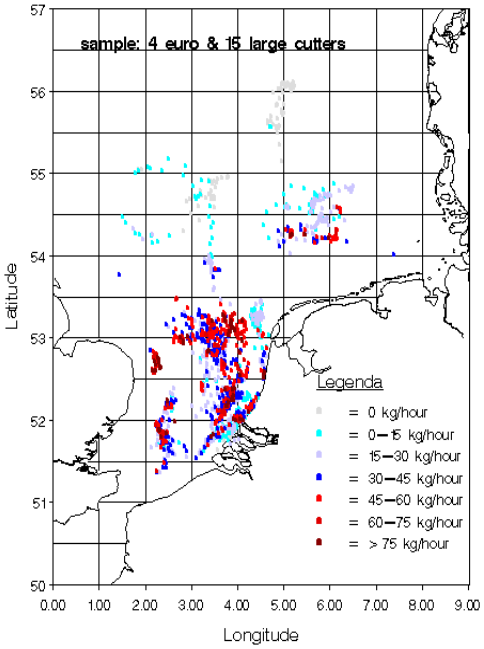
Patterns of Catch per Unit Effort for sole per month in 2003, expressed in kg/hours fished.



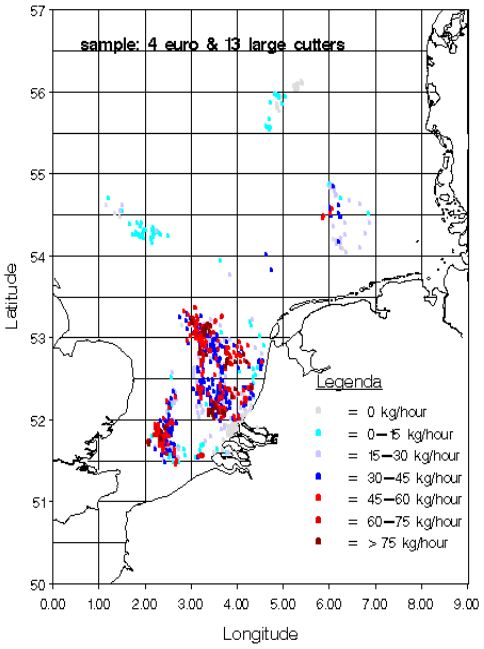



Distribution CpUE Sole
2003 month 5
sample: 4 euro & 13 large cutters
Distribution CpUE Sole
2003 month 6
sample: 4 euro & 15 large cutters
Distribution CpUE Sole
2003 month 7
sample: 4 euro & 12 large cutters
Distribution CpUE Sole
2003 month 8
sample: 4 euro & 13 large cutters
Legenda
= 0 kg/hour
= 0–15 kg/hour
= 15–30 kg/hour
= 30–45 kg/hour
= 45–60 kg/hour
= 60–75 kg/hour
= > 75 kg/hour
Latitude
Longitude

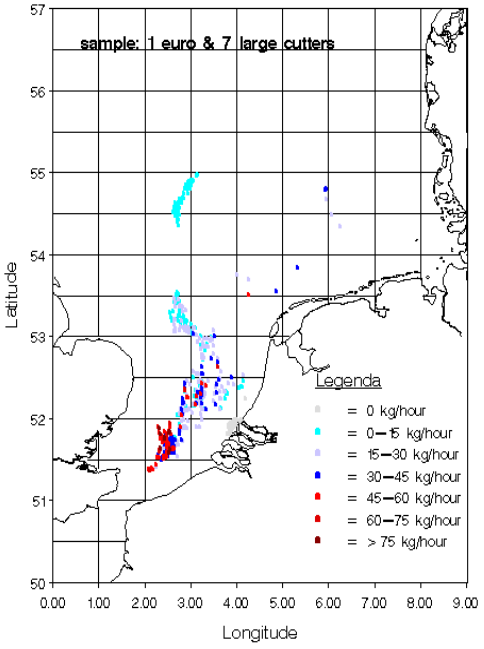
Distribution CpUE Sole
2003 month 9



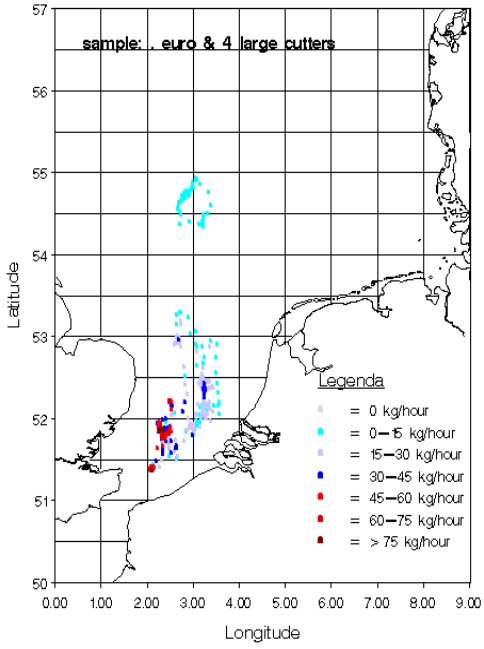
Distribution CpUE Sole
2003 month 10



Distribution CpUE Sole
2003 month 11



Distribution CpUE Sole
2003 month 12



Appendix 5. Figures from report sent to WGNSSK

Figure 5.1. Number of vessels (>221 kW) in sample: by month.

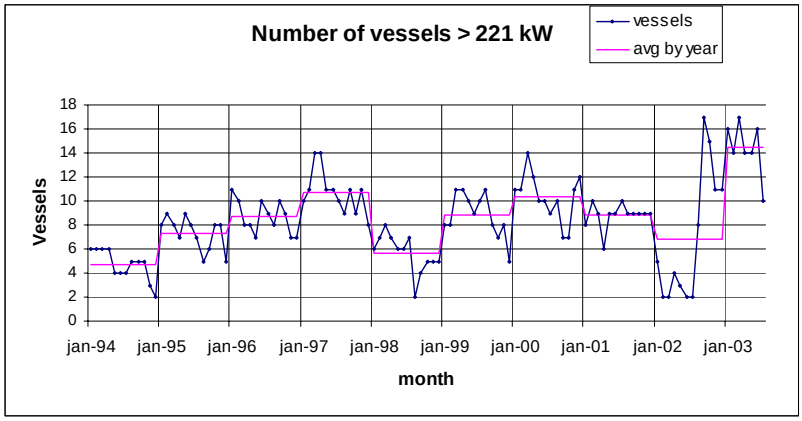


Figure 5.2. Effort distribution (hours fished) of micro distribution vessels (left) and the Dutch Fleet (right). Total effort in the period 1994-2002.

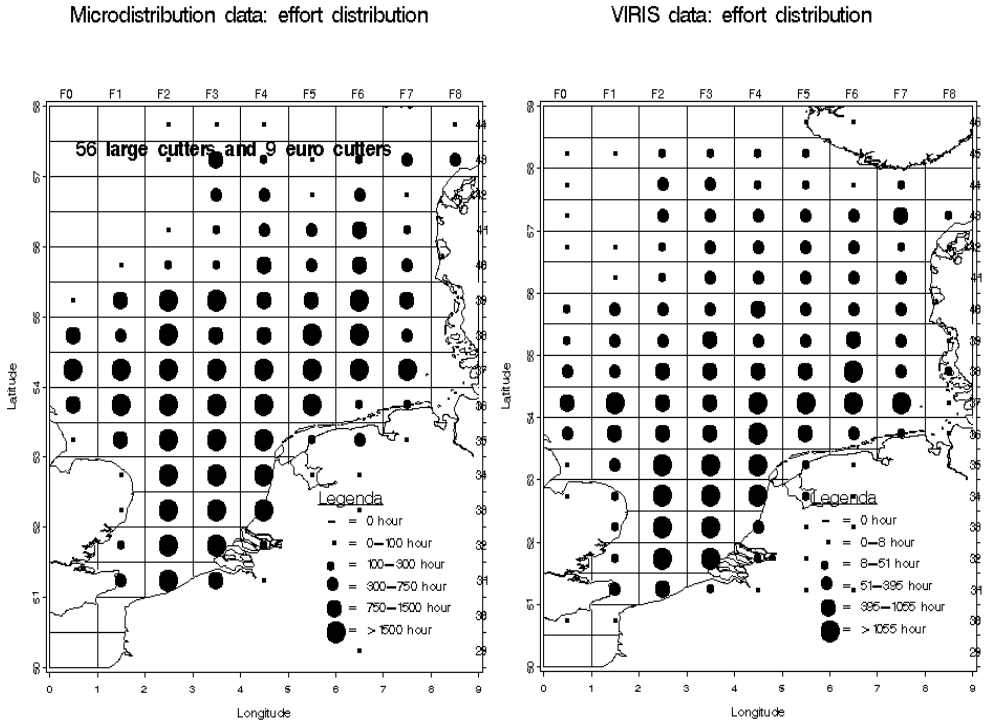


Figure 5.3. Average CPUE of vessels > 221 kW, for plaice (blue line) and sole (pink line), weighted by ICES rectangle, by month.

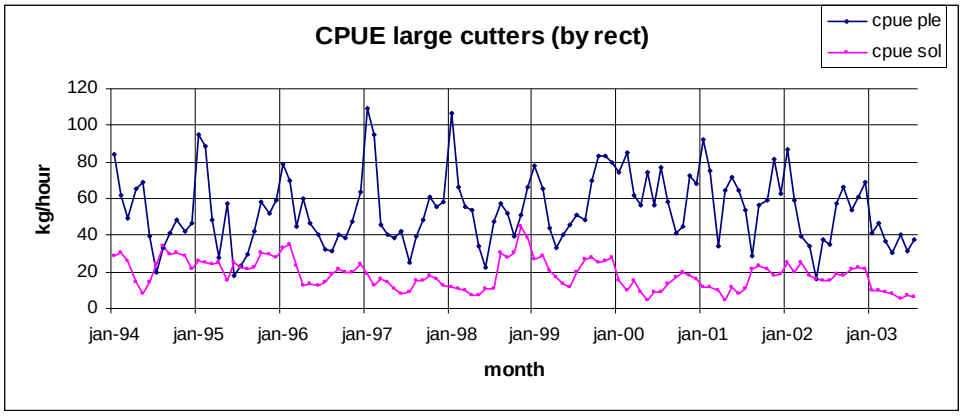


Figure 5.4. Average CPUE of vessels > 221 kW, for plaice (blue line) and sole (pink line), weighted by ICES rectangle, by year.

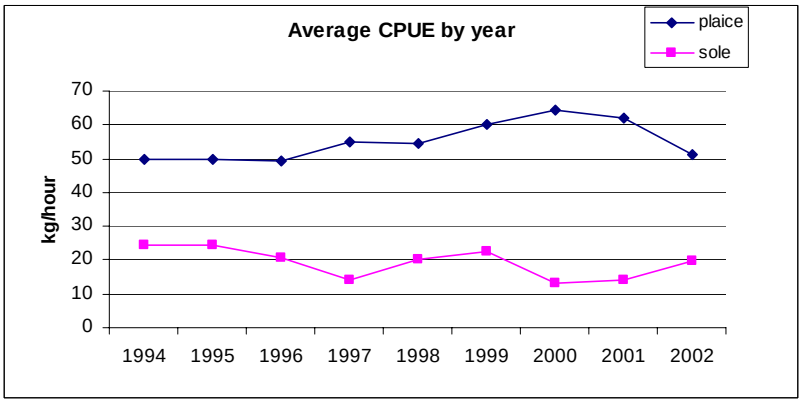


Figure 5.5 Average CPUE of vessels > 221 kW, for plaice (blue line) and sole (pink line), weighted by ICES rectangle, for the first 7 months of the year: January until July.