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RIVO report

Number: C035/03

Fisheries Data Collection from September – December 2002

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Deputy Head of Department Biology and Ecology

Signature: _____

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Samenvatting

Vangst- en inspanningsgegevens van de commerciële vissersvloot kunnen worden gebruikt bij het verbeteren van bestandsbepalingen. Aan de ene kant kunnen ze worden toegepast bij het kalibreren van bestandsbepalingen en aan de andere kant kan grondige analyse van commerciële visserijgegevens gebruikt worden om de vangst per eenheid van visserij-inspanning (het vangstsucces) als indicator voor ontwikkelingen in visbiomassa te verbeteren. Het verzamelen van dergelijke visserijgegevens is onderdeel van het F-project dat wordt uitgevoerd op het Nederlandse Instituut voor Visserij Onderzoek (RIVO). Vanaf september 2002 zijn in het kader van dit F-project vangst- en inspanningsgegevens van een representatief deel van de Nederlandse boomkorvloot verzameld en bewerkt.
Vierenveertig schepen van de Nederlandse platvisvloot zijn geselecteerd op basis van motorvermogen en scheepscode. De scheepscode heeft een nauwe relatie met de visgrond waar het schip de visserijactiviteiten uitvoert. De schepen zijn zo geselecteerd dat de totale groep alle visgronden in de Noordzee zou dekken. In de steekproef zaten uiteindelijk 10 eurokotters (260-300 pk) en 34 grote kotters (>300 pk).
Alle schippers die meewerken aan het project hebben een elektronisch logboek gekregen. Hierin kunnen zij per trek hun vangsten, inspanning en omstandigheden tijdens het vissen vastleggen. De vastgelegde gegevens zijn op het RIVO verzameld en bewerkt. De verspreiding van de inspanning over de Noordzee gedurende de vier maanden, uitgedrukt in zeedagen en in pk-dagen, is in kaart gebracht (respectievelijk figuur 3 en 4), net als de verspreiding van het vangstsucces van schol en tong (in kg/uur) (respectievelijk figuur 1 en 2). Verder zijn tijdseries gemaakt van het gemiddelde vangstsucces per dag voor de individuele schepen en voor de hele groep van eurokotters en grote kotters. De deelnemende schippers kregen maandelijks de overzichten hiervan voor hun eigen schip en voor de hele groep.
Van de vierenveertig schippers hebben vierentwintig schippers minimaal één keer hun vangstgegevens naar het RIVO opgestuurd, met een gemiddelde van ongeveer 14 schippers per week. Uit de plots die van de gegevens zijn gemaakt blijkt dat het patroon van verspreiding van de inspanning en het vangstsucces gedurende de vier maanden redelijk constant blijft. De hoogste inspanningsconcentraties bevinden zich in de zuidelijke Noordzee, op de Doggerbank en in de Duitse bocht. In deze gebieden wordt ook het hoogste vangstsucces behaald voor schol. Het hoogste vangstsucces voor tong wordt dichter bij de Nederlandse kust behaald: in de Duitse bocht en in de zuidelijke Noordzee. In sommige gebieden is geen inspanning geregistreerd. De onderliggende reden hiervoor is dat die gebieden ongunstig zijn als visgebied. In december zijn de gebieden zonder inspanningsregistraties nog groter, doordat de meeste schepen aan de wal lagen voor hun kerstvakantie en doordat het aantal vissers dat mee wilde werken in die maand op zijn laagst was.
Het aantal vissers dat hun gegevens instuurde naar het RIVO nam af in de loop van de tijd. Deze afname werd voornamelijk veroorzaakt door een groep vissers die met het project wilden stoppen. De redenen waarom ze wilden stoppen waren gebrek aan tijd, bedrijfsproblemen of, de belangrijkste reden, ongunstige quota adviezen voor 2003. Veel vissers waren ontevreden met de quota adviezen en verloren hun vertrouwen in het onderzoek. Om een voldoende dekking te houden van de visserijgegevens in de Noordzee, is het noodzakelijk dat voldoende vissers meewerken. In dit kader worden intensieve gesprekken gevoerd met de vissers die oorspronkelijk hun medewerking aan het project hadden toegezegd. Daarnaast wordt hierover overleg met de vertegenwoordigers van de sector gevoerd. Waarschijnlijk zal een aantal vissers die zich hebben afgemeld hierdoor alsnog gaan meewerken, maar wellicht zullen ook nieuwe vissers gevraagd worden mee te werken aan het F-project.
De gegevens die tot nu toe zijn verzameld worden in 2003 gecorrigeerd voor factoren die het vangstsucces beïnvloeden zoals motorvermogen, weersomstandigheden, diepte enzovoorts.
Ondanks de verminderde medewerking van vissers, functioneert de technische opzet van het project goed. Een grote hoeveelheid gegevens is reeds verzameld en zal erg bruikbaar zijn bij het ontwikkelen van het vangstsucces als indicator voor veranderingen in de visbiomassa.

Summary

Commercial catch and effort data can be used to calibrate stock assessments and thorough analyses of the data can be used to improve catch per unit effort (CPUE) as an indicator of developments in fish biomass. Collection of these data is a part of the F-project that is carried out at the Netherlands Institute for Fisheries Research (RIVO). Detailed catch and effort data of a representative sample of the Dutch beam trawl fleet were collected from September to December 2002.

Forty-three vessels were selected from two fleet segments: 10 euro cutters (260-300 hp) and 33 large cutters (>300 hp). The selection was based on, amongst others, vessel id-code, which is correlated to the fishing ground of the vessel. All cooperating fishermen used an electronic logbook, developed at RIVO, to record their catch, effort and the circumstances under which they were fishing (e.g. wind force and direction, depth). All the data were compiled at RIVO where further data editing and data analyses were carried out. Effort distribution was plotted on a North Sea map, expressed in hours fished and in hours*hp fished. Time series of average CPUE (Catch Per Unit Effort) were calculated for plaice and sole, for each individual vessel and for the research fleet. In addition, monthly average CPUE by position was calculated and plotted at a North Sea map for the individual vessels and for the fleet segments. There is a clear pattern in the effort and CPUE, which seemed to remain constant over the four months of data collection.

The number of fishermen sending their data to RIVO declined over time because, amongst others, lack of time, unfavorable quota advice for 2003 or company problems. Of these reasons unfavorable quota advices were the main reason. Many fishermen lost faith in research and were dissatisfied with the quota advice. The continued cooperation of fishermen is necessary to retain sufficient area coverage. Hopefully several fishermen who ceased to cooperate with the project will change their mind and start co-operating again. Nevertheless, more fishermen need to be contacted to join in the project.

The data still need to be analysed and the CPUE adjusted for factors influencing CPUE, like engine power, depth, and wind etcetera. This will be done in 2003. Despite the decreased co-operation from fishermen, the technical set up of the system seems to be functioning well. A large amount of detailed data is collected and will be very useful to make CPUE as a better indicator for developments in fish biomass.

1. Introduction

Dissatisfaction exists within the fisheries sector, the research, and the government, about how management advice is developed and the communication of such advice. The F-project was set up to improve this situation. The project consists of three parts: 1) improvement of the stock assessments; 2) increased use of data from the fisheries sector; 3) improvement of communication about research and policy between fishermen and researchers and between fishermen and policy makers. This report deals with part 2, increased use of data from the fisheries sector.

Very often fishermen have the impression that the stock development according to researchers does not correspond with their observations at sea. They question the way fisheries biologists carry out their research surveys: they think that surveys are carried out in the wrong areas, at the wrong moment, with the wrong gear. Because the commercial flatfish fishery is carried out throughout the year and throughout the 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. Furthermore, catch per unit effort (CPUE) can be used as an indicator for developments in fish biomass. Thorough analyses of commercial catch and effort data can be used to improve the usefulness of CPUE as an indicator of changes in biomass. However, the interpretation of commercial CPUE as an estimator for fish biomass in a large area like the North Sea is difficult. For example, fishermen tend to concentrate on fishing grounds where fish abundance is high. If fish biomass decreases, but the fish concentrate in specific areas, commercial CPUE may not decrease proportionally to stock biomass and it will overestimate the actual fish biomass.

The present report describes the data collection from a research fleet consisting of a representative sample of the commercial flatfish fleet in 2002. The first results of four months of data collection are presented. It is the first out of a series of yearly reports about fisheries data collection in the previous year of the F-project. In February 2006, the data collection over the period 2002-2005 will be summarized in a single report.

2. Methods

In the Netherlands, the fleet targeting plaice and sole consists of about 400 beam trawl vessels. A sample of this fleet was drawn, based on fishing ground, available quota and engine power, in a way that the sample was representative for the entire fleet targeting plaice and sole. The distribution of vessels in the North Sea is linked with the harbour the vessels come from. So the vessels were divided in seven groups based on their vessel code, which corresponds with the harbour they originate from (table 1). For example, the vessels from group 1 carry out their fisheries in the southern North Sea, while the vessels from group 6 depart from the north of the Netherlands and carry out their fisheries in the northern North Sea. An extra group consisted of flag vessels. These vessels have higher quota for plaice than the Dutch beam trawlers and they can carry out their fisheries in areas with high fish abundance, while Dutch vessels might be restricted to areas with lower fish abundance due to their lower quota.

Table 1. Groups of vessels in the fleet.

Group	Vessel codes
1	VLI, BR, ARM
2	KG, TH, YE
3	GO, SL, OD, BRU
4	IJM, SCH, KW
5	HD, TX, WR
6	UK, HA, EEM, LO, DZ, ZK, UQ
7	Flag vessels

Each of the groups was divided in two segments: the euro cutters, with engine powers between 260 and 300 hp, and the large cutters, with engine powers above 300 hp. Based on the proportion of effort in 2001 in each of the seven groups within the two fleet segments, the number of vessels required for the sample was calculated for each group (table 2). For example: group 1 of the euro cutter segment accounted for 8% of total effort in the euro cutter segment in 2001. In accordance, 8% of the ten euro cutters that were planned to be included in the sample had to be in group 1, which corresponds with 1 vessel. For each group in both segments the same calculation was done. At the beginning of the program 43 vessels, including 10 euro cutters (260-300 hp) and 33 large vessels (>300 hp) were selected to participate in the research fleet.

Table 2. Proportion for effort of the seven groups in the euro cutter fleet and the large cutter fleet. Planned and realized number of vessels in each group.

Group	Euro cutters (260-300 hp)			Large cutters (>300 hp)		
	effort (%)	Nr of vessels in sample		effort (%)	Nr of vessels in sample	
		planned	realized		planned	realized
1	8	1	0	8	2	3
2	19	2	2	0	0	0
3	31	3	4	18	5	5
4	10	1	0	5	1	2
5	11	1	2	19	5	8
6	18	2	2	31	8	9
7	3	0	0	18	5	6
Total	100 %	10	10	100 %	25	33

The data collection started at the beginning of September 2002. All the co-operating fishermen recorded their catch (in kg) and effort (in fishing hours) by haul by means of an electronic logbook, called VRIS 1.1, developed at RIVO. The type of data registered by the fishermen is described in the table below.

Table 3.

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

In the “remarks” section the fishermen were asked to write down all the factors that might have influenced the catch per unit effort (CPUE), varying from e.g. damaged gear to change of tactics.
The fishermen sent their data regularly (mostly on a weekly basis) to RIVO where the data was added to the fisheries CPUE database. The editing and analyses of data was carried out with SAS. The daily average of CPUE by haul was calculated for plaice and sole, which resulted in time series for each individual vessel and for the segments in the research fleet. In addition, the monthly average CPUE by position was calculated and plotted on a North Sea map for the individual vessels and for the fleet segments. The effort distribution in the months September to December was also plotted on a North Sea map.
Regular communication took place with the fishermen and the fishermen were invited twice to come to RIVO for a plenary meeting and several times RIVO employees visited the fishermen to discuss the results of the data collection. During the discussions attempts were made to gain as much information as possible about factors that might influence CPUE. In this way the fishermen could help the researchers to understand differences in CPUE between different areas, seasons, vessels etcetera.

3. Results

Twenty-four fishermen have sent their data at least once to RIVO. The table below gives the available data by week. In table 5 the activity of the vessels by sample group is presented. The main gaps are found in the euro cutter group, where 4 out of 9 fishermen left the project, and the flag vessel group, where 3 out of 8 vessels left the project.

Table 4. Number of vessels by week for which data are available.

Week	Start date	Number of vessels for which data are available
35	26-8	10
36	2-9	14
37	9-9	16
38	16-9	16
39	23-9	16
40	30-9	14
41	7-10	16
42	14-10	15
43	21-10	14
44	28-10	12
45	4-11	11
46	11-11	11
47	18-11	11
48	25-11	11
49	2-12	10
50	9-12	11
51	16-12	9
52	23-12	2

Table 5. Vessels in sample: Number of vessels by group that made their data available and number of vessels that left the project.

	Euro cutters (260-300 hp)			Large cutters (>300 hp)		
Group	In sample	Data Available	Left	In sample	Data Available	Left
1	0	0	0	3	2	0
2	2	1	1	0	0	0
3	4	2	2	5	2	2
4	0	0	0	2	0	0
5	2	1	1	8	6	2
6	2	1	0	9	4	1
7	0	0	0	6	3	3
Total	10	5	4	33	17	8

Patterns in Effort

The effort, expressed in fishing hours, varies in the different areas in the North Sea (Figure 1). The areas where the euro cutters spent most of their time are located along the Dutch coast within the twelve miles zone. The large cutters are mainly active in the German Bight, around the Dogger Bank and in the Southern North Sea. The effort distribution in terms of hours fished * horsepower throughout the North Sea seems to have the same pattern (Figure 2), although the effort along the Dutch coast is not as important, compared to that of the large cutters.

Patterns in CPUE

The CPUE distribution of plaice and sole by month is presented in figures 3 and 4. The distribution pattern of CPUE was comparable in all four months from September to December. Figure 5 shows the trends in CPUE for plaice and sole. In general, the areas with high plaice CPUE were located in the northern part of the fished area, while sole CPUE was highest in the more southern areas. The highest CPUE of plaice was found at the Dogger Bank, in the German Bight, above 54º30 latitude and in the southern North Sea. For sole the fishing areas with highest CPUE were found in the coastal areas below 55º00 latitude.

Discussions with fishermen

Several interesting issues were discussed with the fishermen. During the first meeting, before the actual data collection began, a list of the main factors influencing CPUE was compiled. External factors included (e.g.) quota availability, fishermen's behaviour and area closure), environmental factors (e.g. temperature, wind force and direction and depth), and technical factors (e.g. mesh size and vessel size).
The effect of limited quota was more thoroughly discussed during the second meeting, after three months of data collection. During that meeting it was concluded that limited quota can result in a different effort distribution, i.e. what fishing ground is chosen by fishermen. However, limited quota cannot result in a different pattern of CPUE distribution, which shows how much fish is available in a certain area. This is an important conclusion, because this was one of the issues that fishermen and researchers did not agree upon for a long time. In an aggregated analysis where the individual fishing grounds are not analysed separately, limited quotas, if they meant that fishermen chose to go on grounds with lower CPUE, would result in a decreased average CPUE for the whole of the North Sea. However, if the fishing grounds are analysed separately, this effect may not occur.
For euro cutters, limited quotas also have another effect next to different effort allocation. Euro cutters can easily change target species. When they have low quotas for plaice and sole, they will target non-quoted species (such as gurnard, red mullet, turbot and brill).
Large cutters mainly have the choice of targeting plaice, or targeting sole with plaice as bycatch. It is possible to catch plaice and avoid sole, but it is impossible to catch only sole. This is mainly caused by the distribution of sole and plaice. Plaice fishing grounds are located in the northern part of the North Sea. Sole stays in the southern part of the North Sea, where plaice is also present, although in lower abundances than in the northern North Sea. Due to the distribution of sole and plaice the plaice targeting fishing fishermen come from the northern part of the Netherlands and the sole targeting fishermen live in the southern part of the Netherlands.

4. Discussion

Of the 43 fishermen, 24 have made their catch data available for RIVO, with an average of 12 fishermen per week. The number of fishermen sending their data to RIVO declined over time because, amongst others, lack of time, unfavorable quota advice for 2003 or company problems. The second reason, the unfavorable quota advice, was the main reason. Many fishermen were dissatisfied with the quota advice and lost faith in research.
The decline in the number of co-operating fishermen shows in the effort distribution maps (Figure 3 & 4). The area coverage of the North Sea decreased in the course of time. The main gaps are along the coast, where the euro cutters are active, and in the northern fishing grounds, where flag vessels are mainly active. For the reliability of the data, it is most important to get information on the distribution and abundance of plaice and sole in the entire North Sea. It is even more important than receiving data of exactly 43 vessels. For sufficient area coverage, it is required that more euro cutters and flag vessels join the sample and that the fishermen that did not send in data yet should do so. It is hoped that several fishermen who left the project will change their minds and start co-operating again. Nevertheless, more fishermen will be contacted to join in the project.
There is a clear pattern in the effort and CPUE, which seemed to remain constant over the four months of data collection. Apparently the fishermen know where to find a high abundance of plaice and sole. There are some areas where no effort was registered. From September until November, according to the fishermen, there was no effort in several areas because of low quality of the fishing ground there. In December there were large areas for which no effort was recorded. This is probably due to the fact that in this month several fishermen fishing in those specific areas had stopped sending their data to the RIVO. From the CPUE pattern it can be seen that plaice migrated offshore after September. In October higher abundance of plaice were found north of where they were concentrated in September.
The CPUE data have not yet been corrected for factors like engine power, wind and depth. In 2003 this correction will be carried out, which will result in CPUE as a better indicator for developments in fish biomass in the fished areas. Until now, the catch compositions of plaice and sole (i.e. the market categories) have not been registered. When the data on market categories are available, it will be possible to monitor the development of weekly catches by market category. And in consequence, changes in local abundance of old fish and young fish can be estimated. From February 2003 onwards, fishermen have been asked to record their catches per market category on a trip basis. To monitor fishing mortality, information on discards is required as well. In the data collected the landings and effort are known, but the actual catch is not.
Despite some organisational problems, i.e. co-operation with fishermen, the technical set up of the system seems to be functioning well. A large amount of detailed data is collected and will be very useful to make CPUE a better indicator of biomass.

Figures:

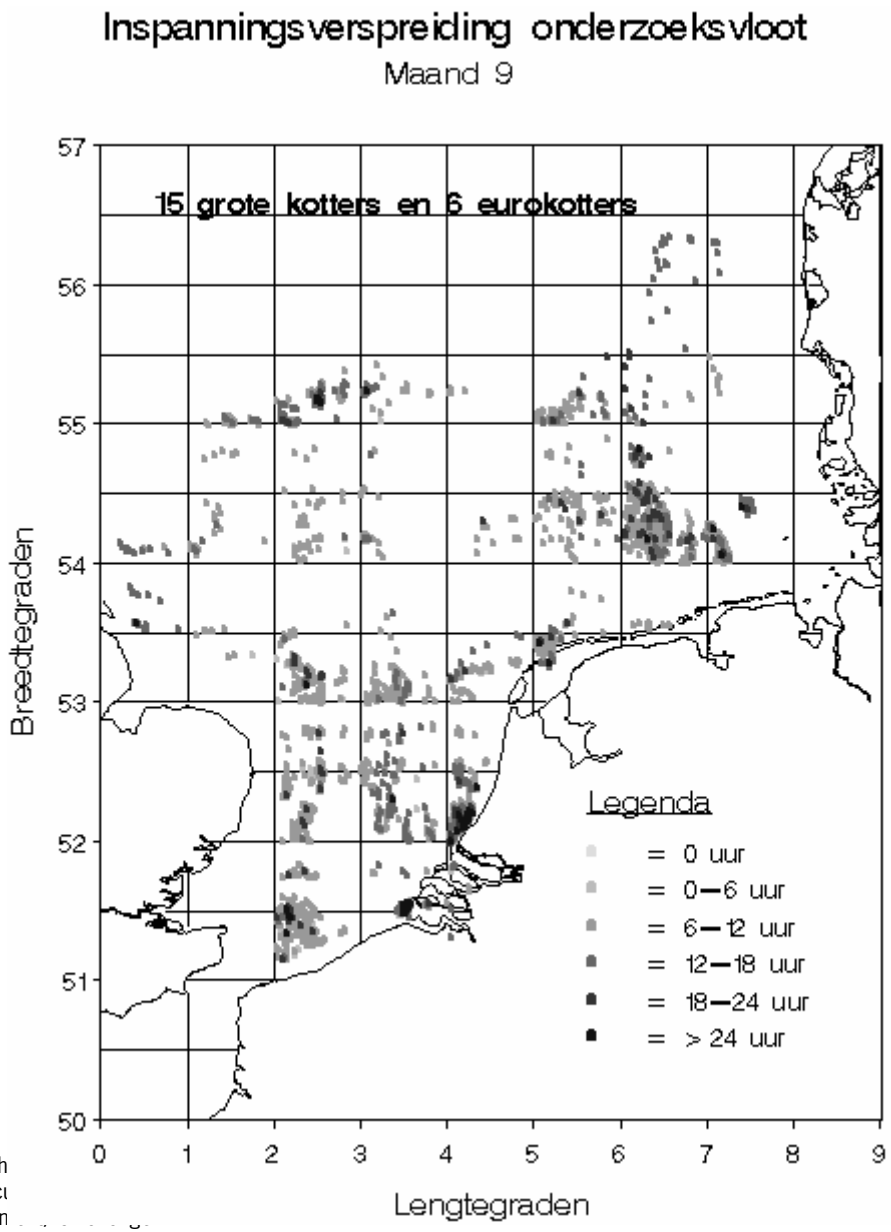
Figure 1. Distribution of effort (fishing hour) in the research fleet (both euro and large cutters) in September and October (3a), and in November and December (3b). Translation of Dutch words in the figure: maand = month, grote kotters = large cutters, eurokotters = euro cutters, uur = hours fishing.

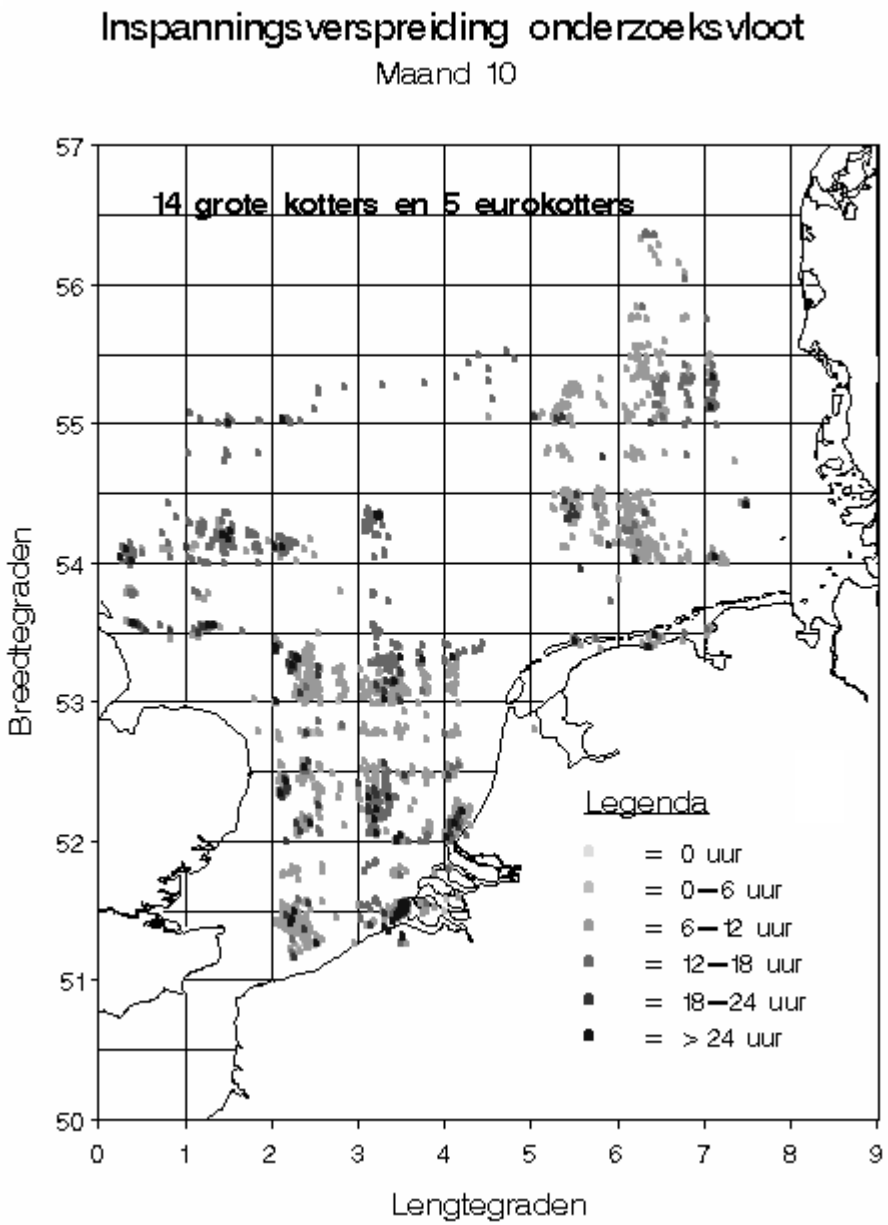
Figure 2. Distribution of hpeffort (fishing hour*hp) in the research fleet (both euro and large cutters) in September and October (4a), and in November and December (4b). Translation of Dutch words in the figure: maand = month, grote kotters = large cutters, eurokotters = euro cutters, pk uur = hp*hours fishing.

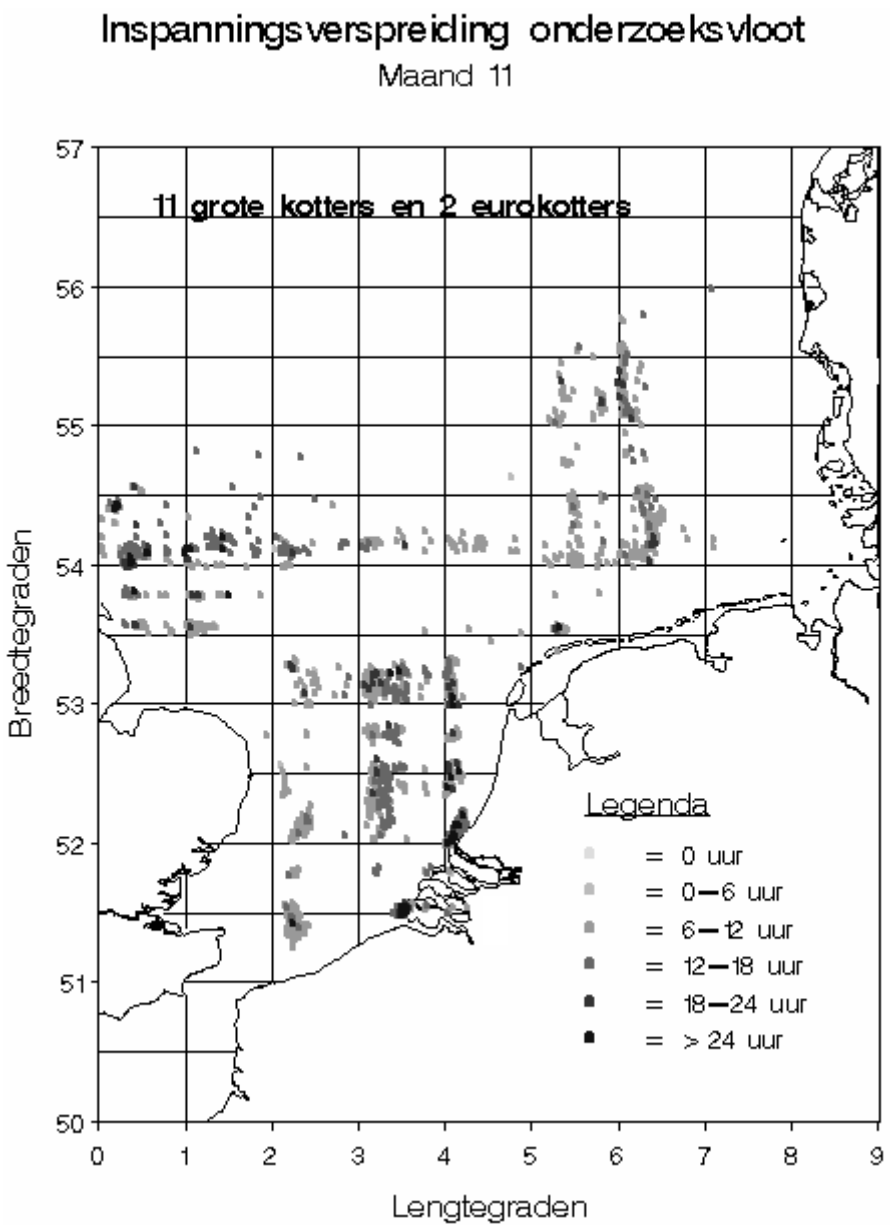
Figure 3. Distribution of CPUE (kg/fishing hour) in the research fleet (both euro and large cutters) of plaice in September and October (1a), and in November and December (1b). Translation of Dutch words in the figure: Schol = plaice, maand = month, grote kotters = large cutters, eurokotters = euro cutters, kg/uur = kg/hour.

Figure 4. Distribution of CPUE (kg/fishing hour) in the research fleet (both euro and large cutters) of sole in September and October (2a), and in November and December (2b). Translation of Dutch words in the figure: Tong = sole, maand = month, grote kotters = large cutters, eurokotters = euro cutters, kg/uur = kg/hour.

Figure 5. Trend in CPUE over time for plaice and sole.






Inspanningsverspreiding onderzoeksvloot
Maand 11
11 grote kotters en 2 eurokotters
Legenda
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= 0—6 uur
= 6—12 uur
= 12—18 uur
= 18—24 uur
= > 24 uur
Breedtegraden
Lengtegraden
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55
54
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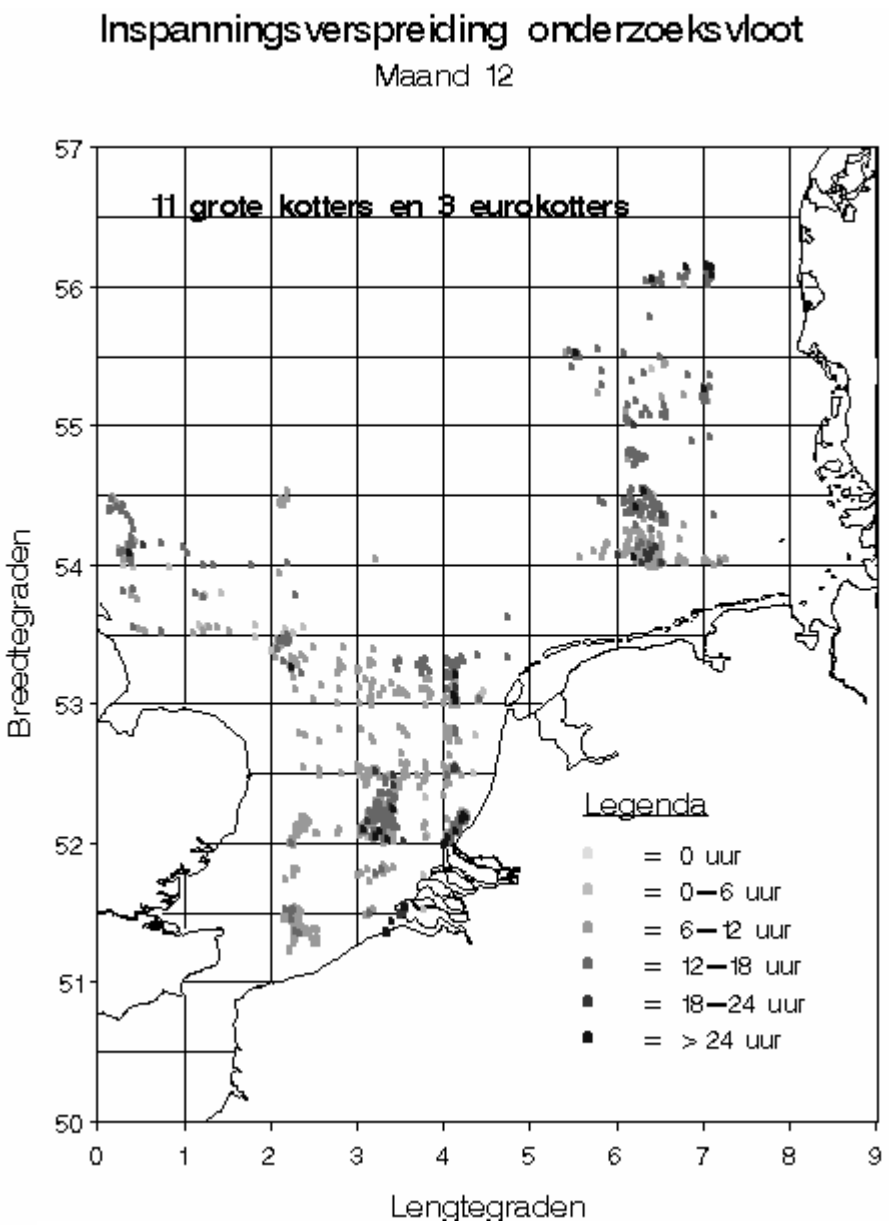
Inspanningsverspreiding onderzoeksvloot
Maand 12
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Legenda
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= 0—6 uur
= 6—12 uur
= 12—18 uur
= 18—24 uur
= > 24 uur
Breedtegraden
Lengtegraden
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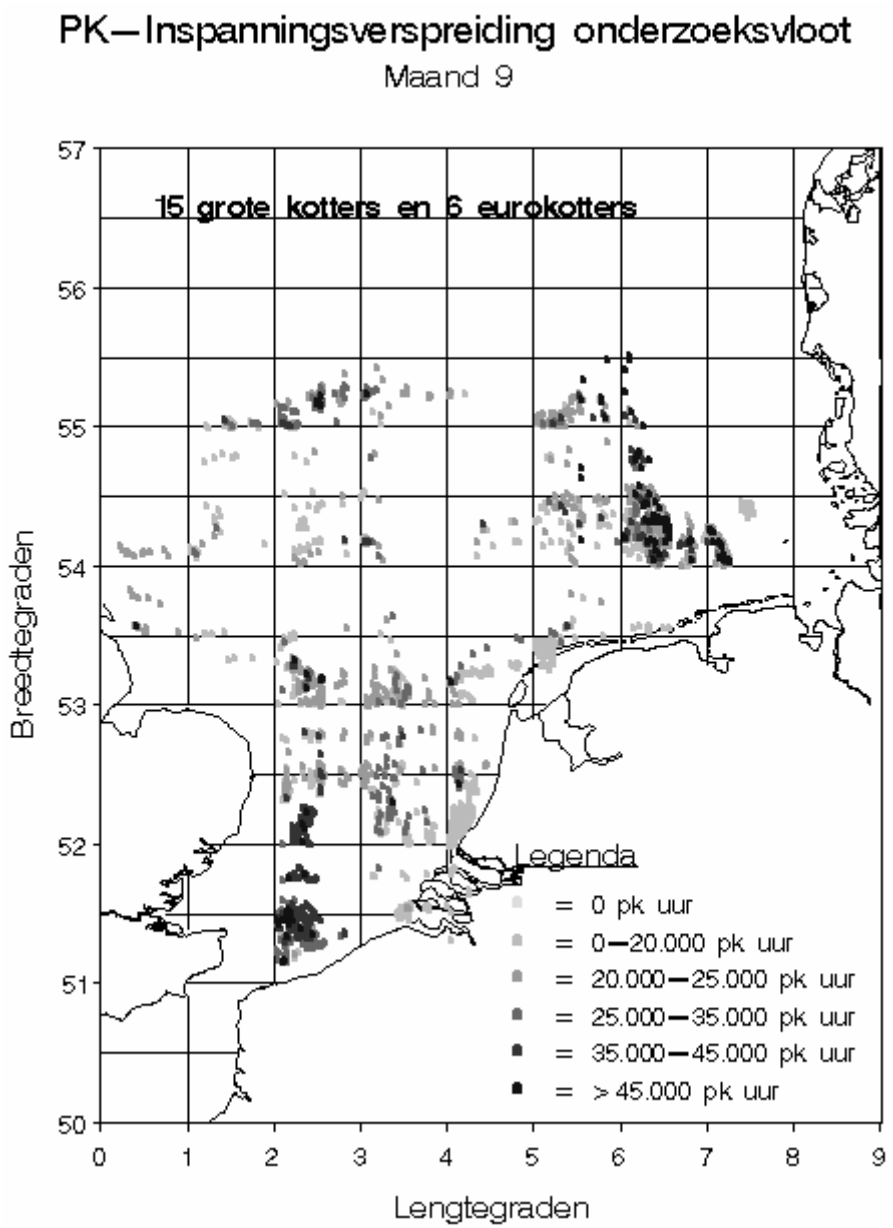
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Breedtegraden
Lengtegraden
Legenda
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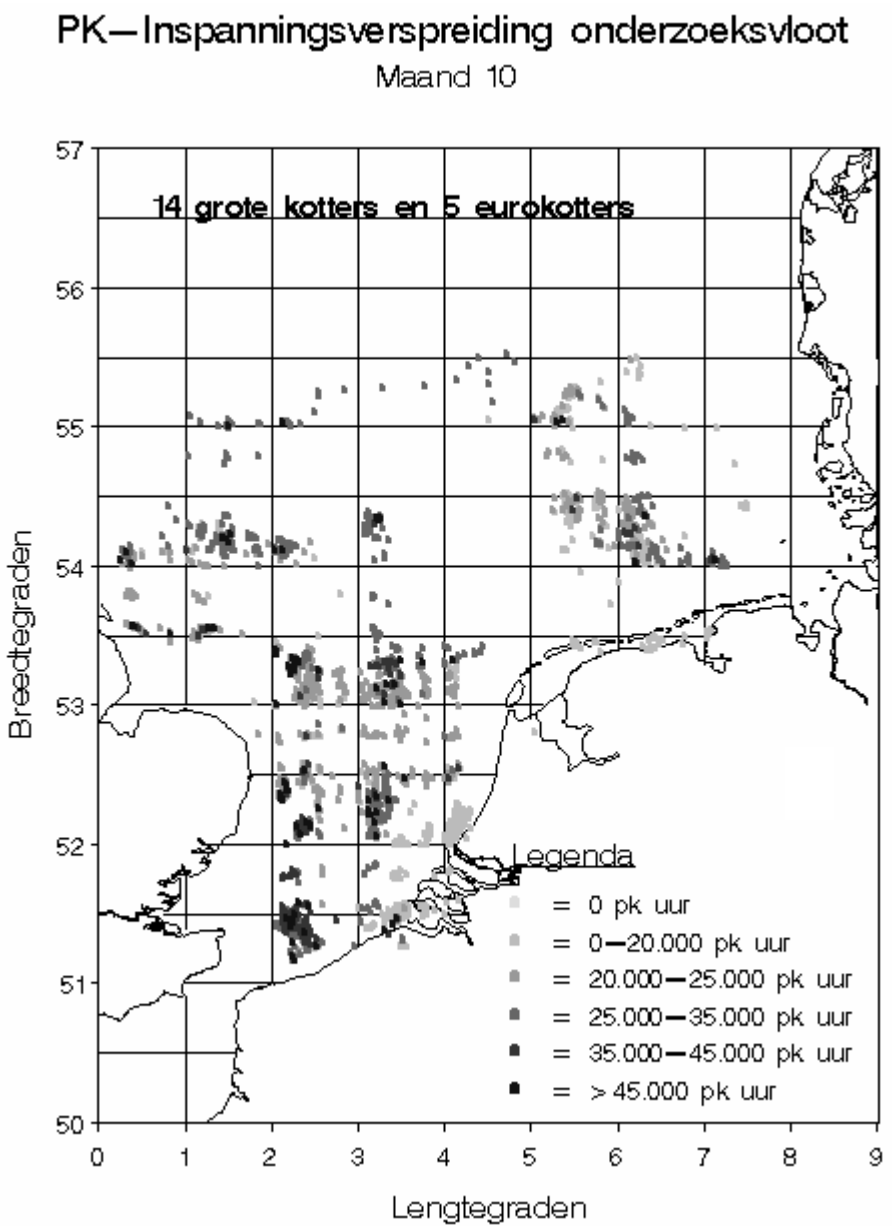
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14 grote kotters en 5 eurokotters
Breedtegraden
Lengtegraden
Legenda
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= 25.000—35.000 pk uur
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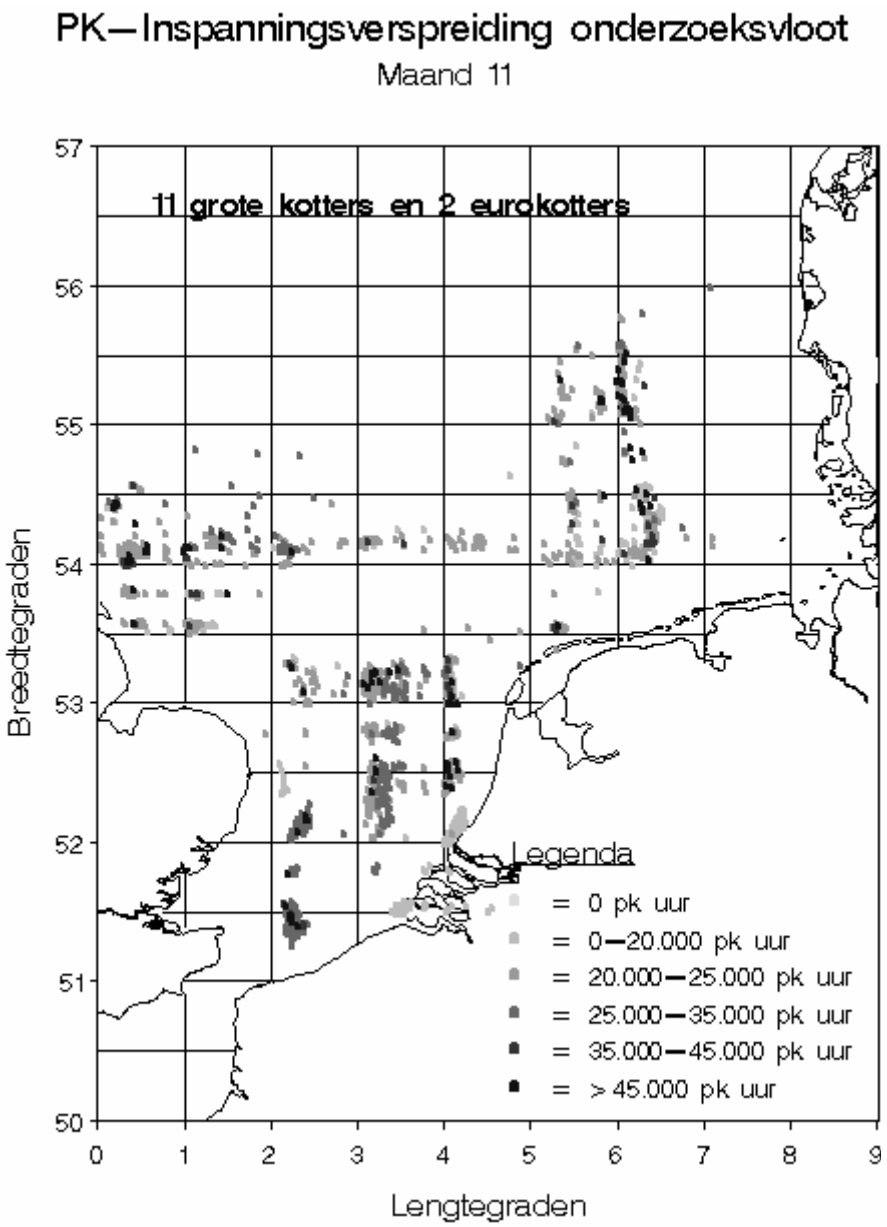
PK—Inspanningsverspreiding onderzoeksvloot
Maand 11
11 grote kotters en 2 eurokotters
Breedtegraden
Lengtegraden
Legenda
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= 0—20.000 pk uur
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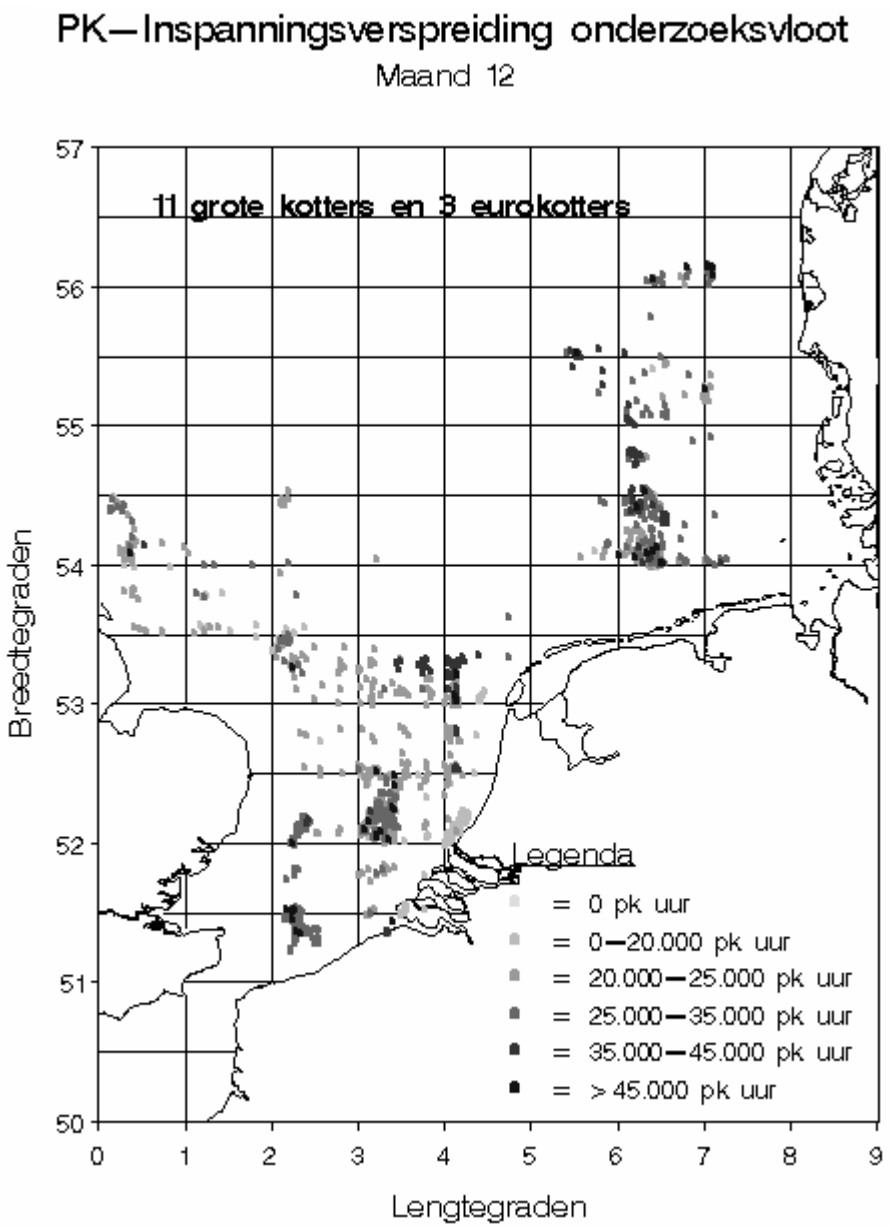
PK—Inspanningsverspreiding onderzoeksvloot
Maand 12
11 grote kotters en 3 eurokotters
Breedtegraden
Lengtegraden
Legenda
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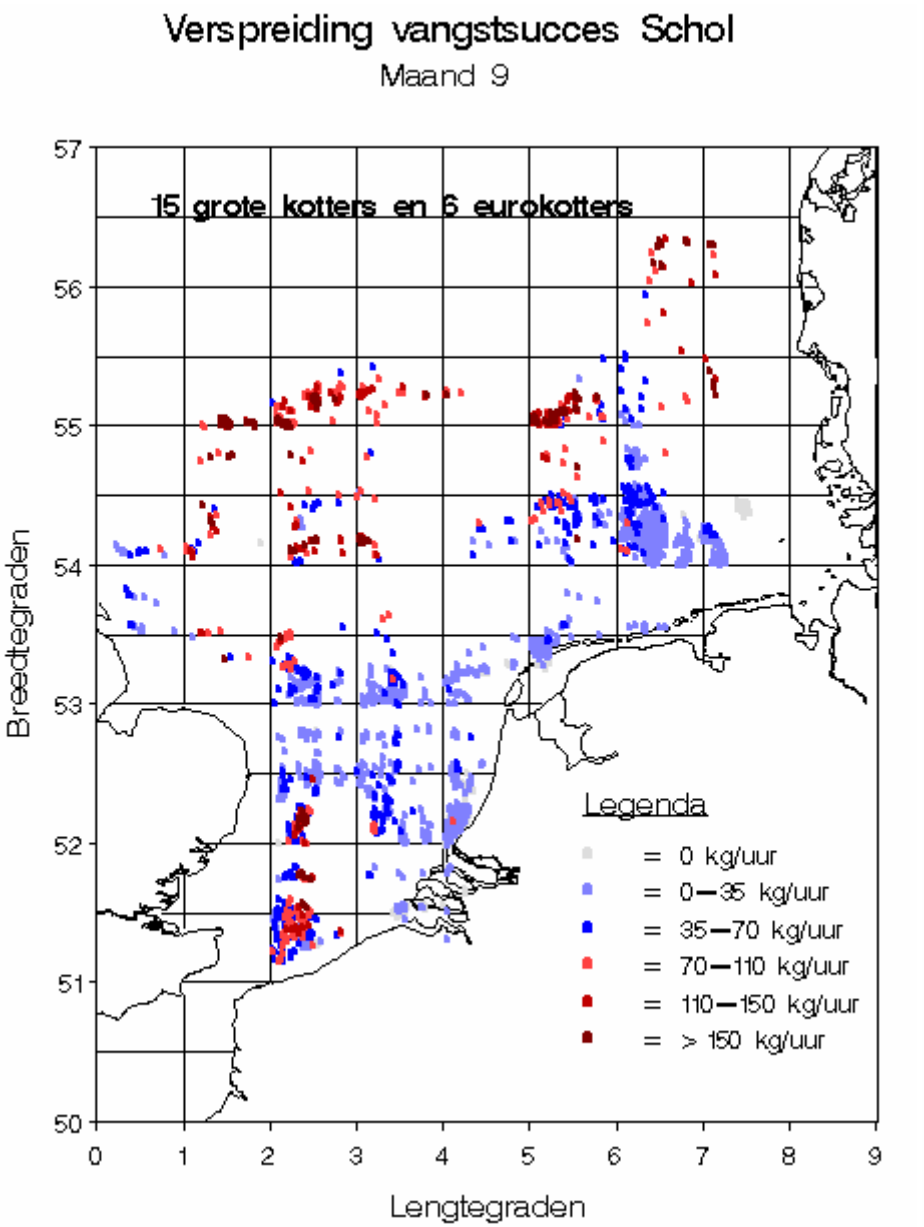
= 0—20.000 pk uur
= 20.000—25.000 pk uur
= 25.000—35.000 pk uur
= 35.000—45.000 pk uur
= > 45.000 pk uur


Verspreiding vangstsucces Schol
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Breedtegraden
Lengtegraden
Legenda
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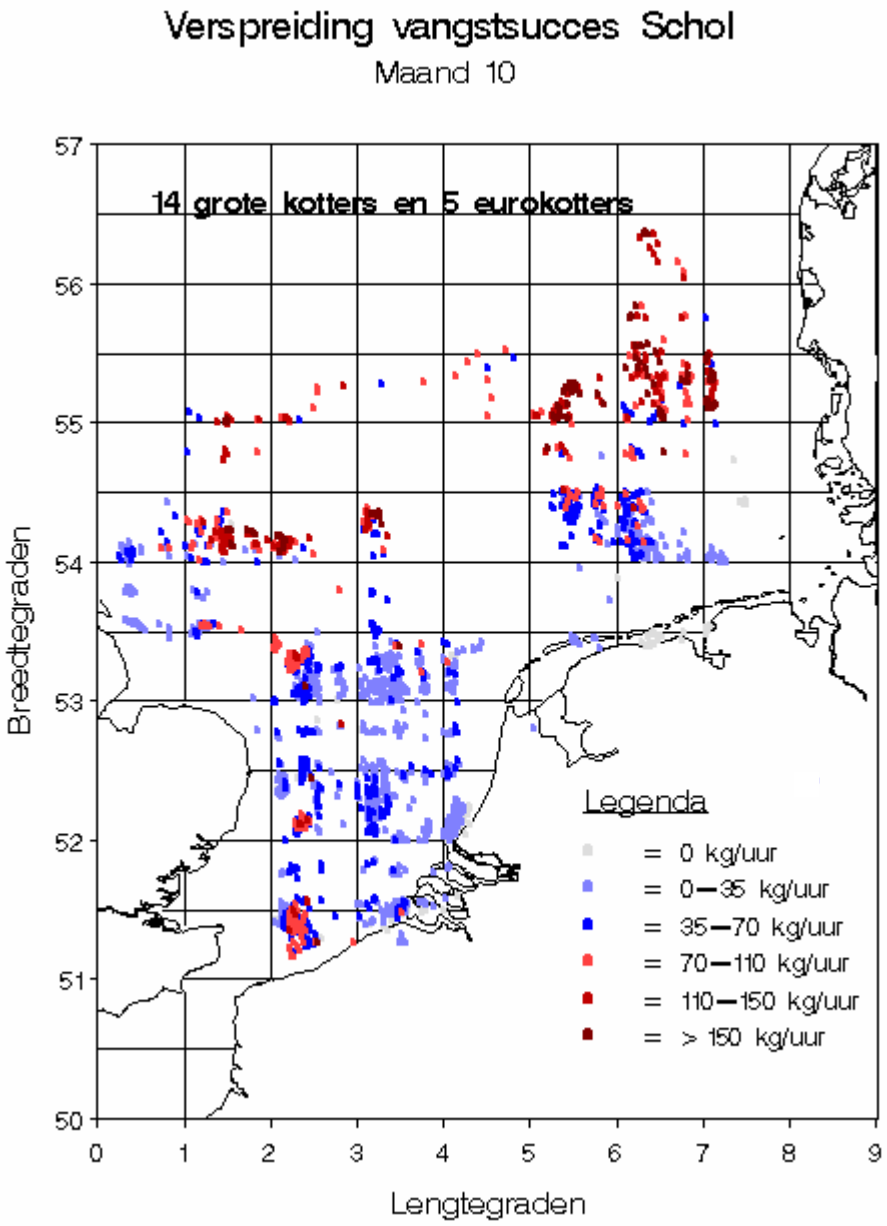
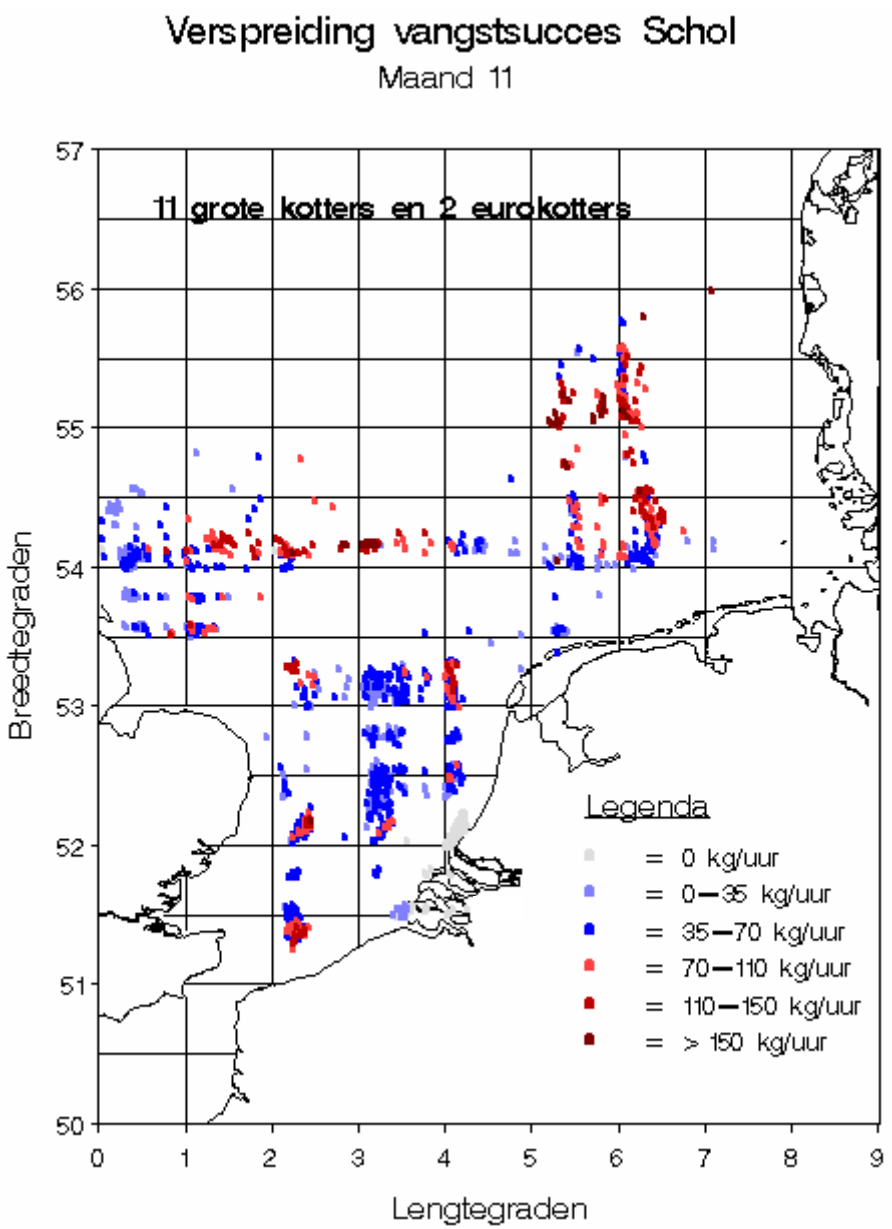
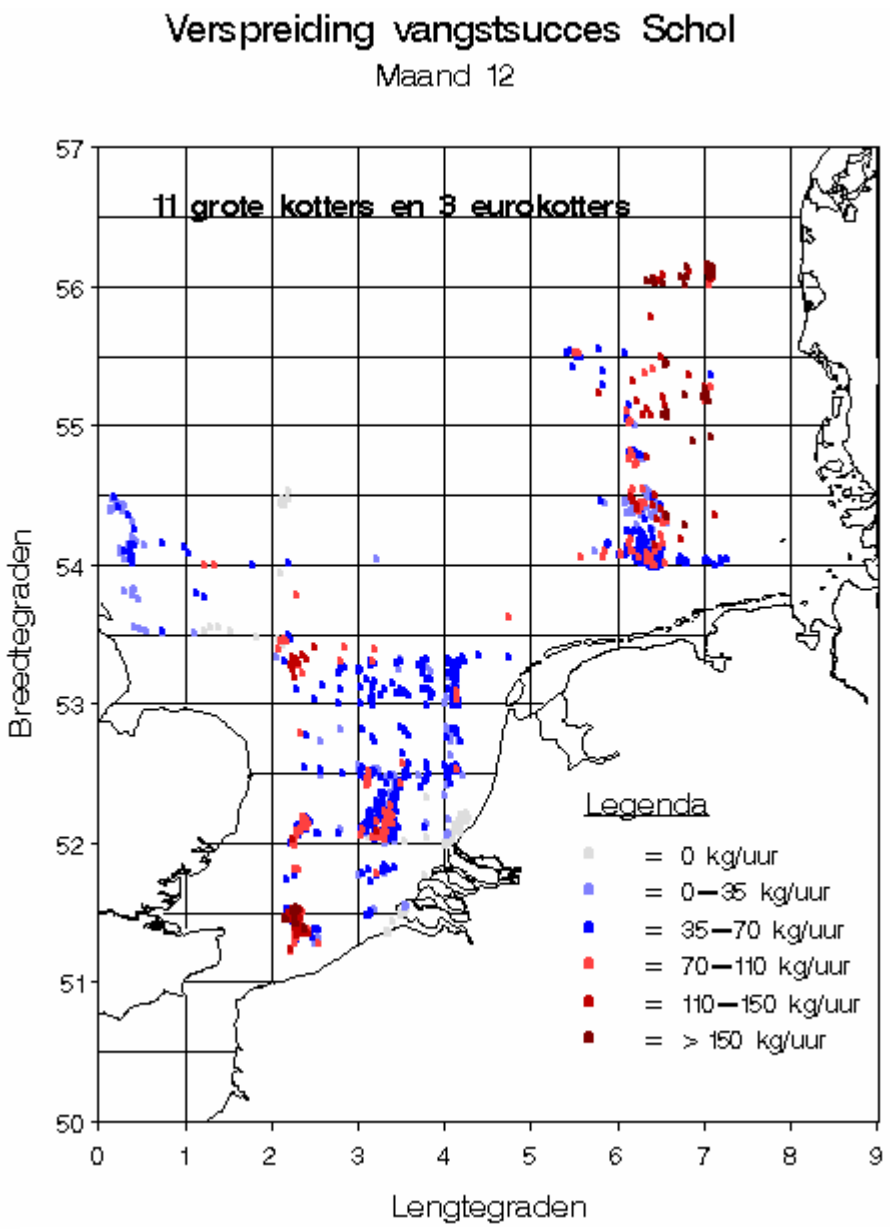
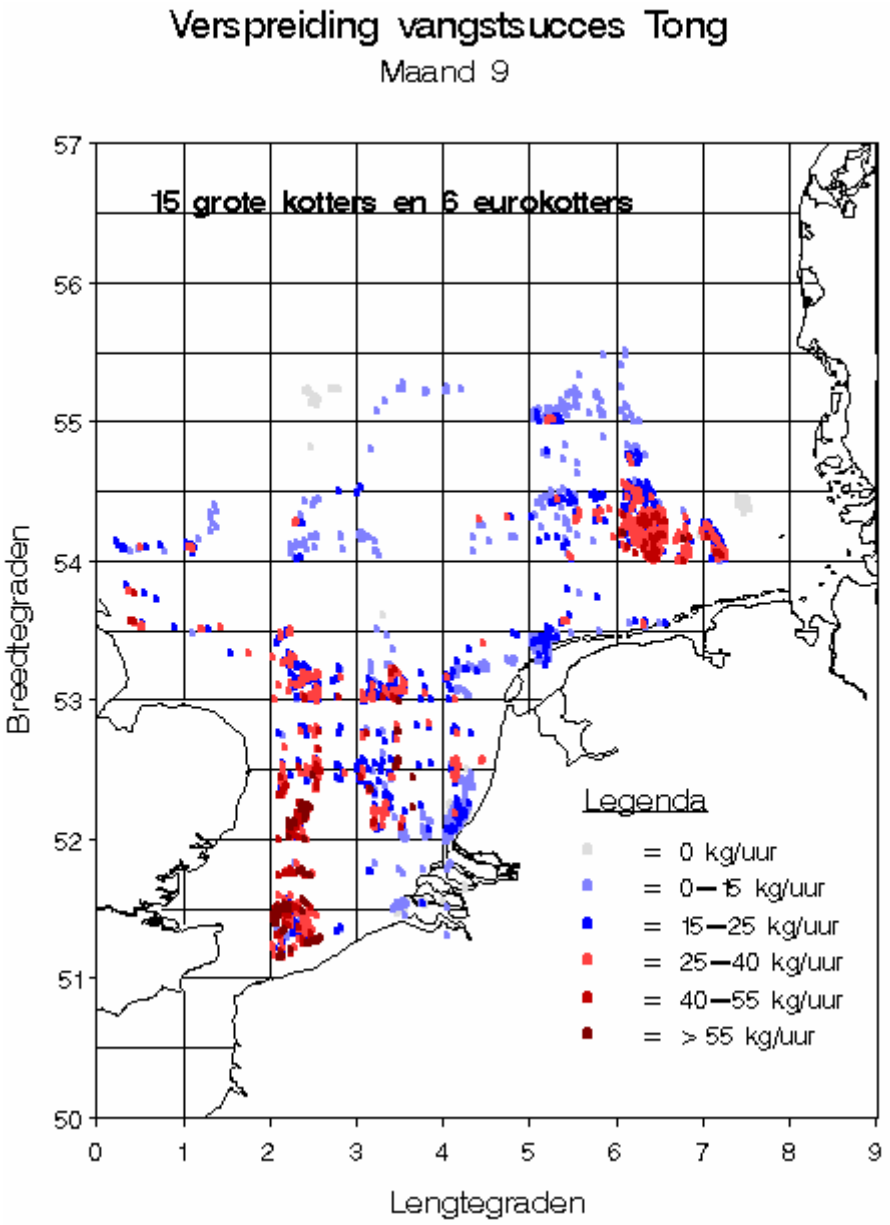
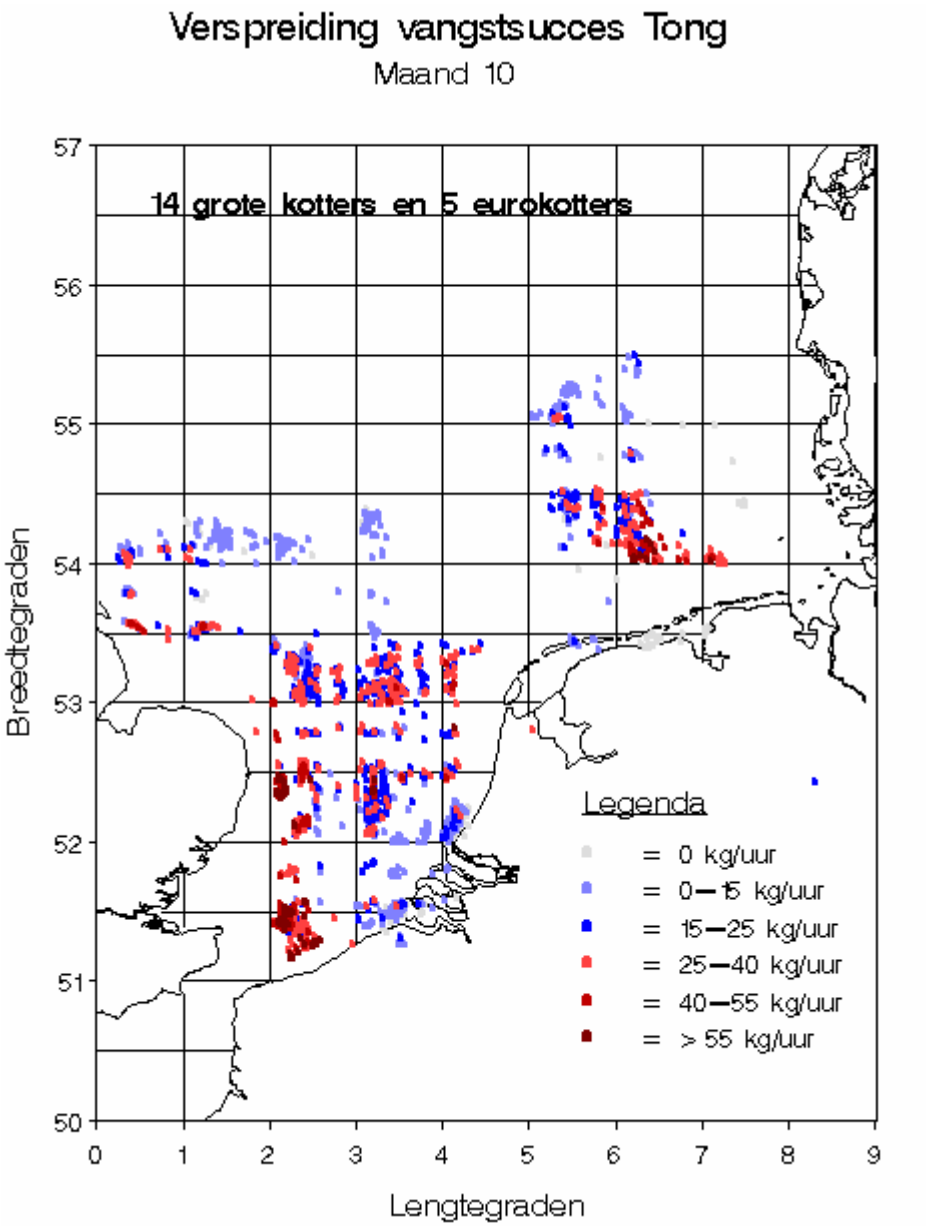
= 0—35 kg/uur
= 35—70 kg/uur
= 70—110 kg/uur
= 110—150 kg/uur
= > 150 kg/uur

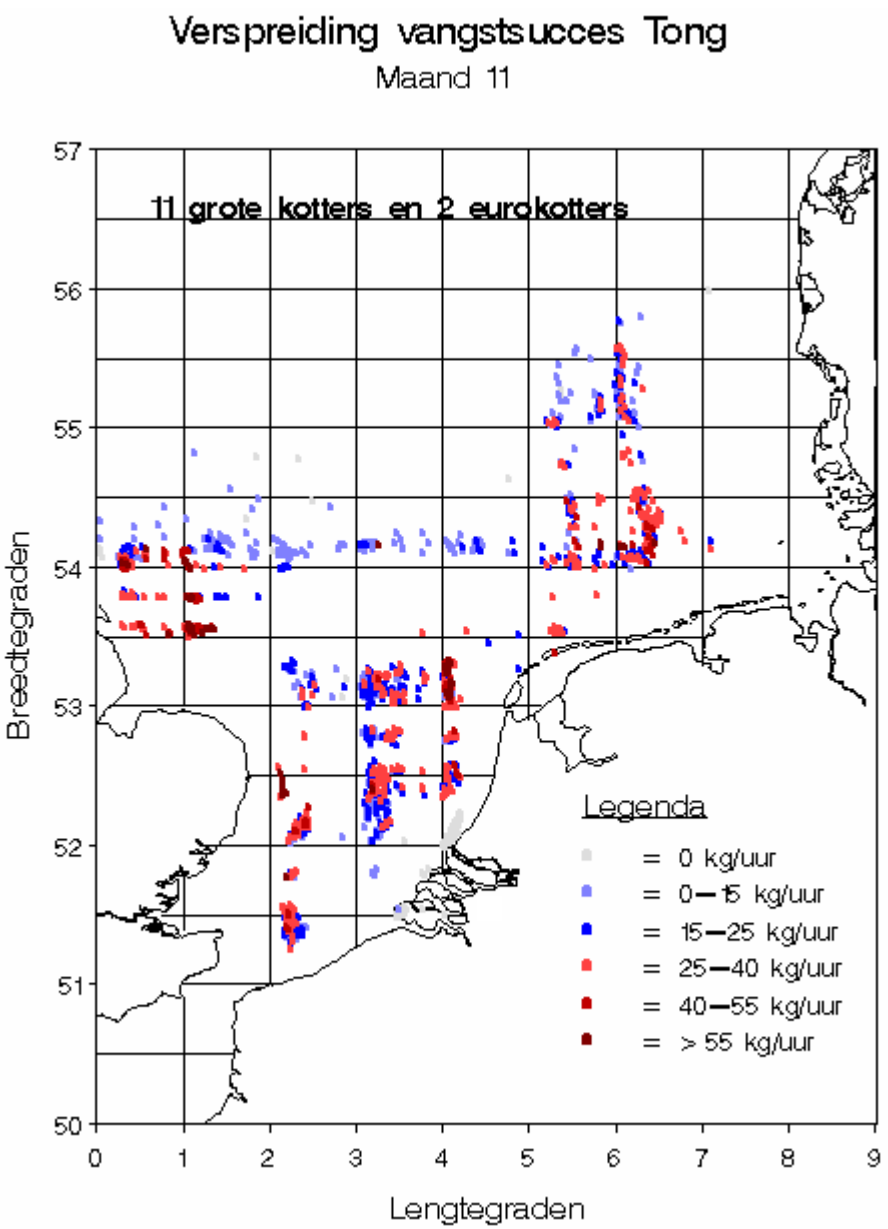

Verspreiding vangstsucces Schol
Maand 10
14 grote kotters en 5 eurokotters
Breedtegraden
Lengtegraden
Legenda
= 0 kg/uur
= 0—35 kg/uur
= 35—70 kg/uur
= 70—110 kg/uur
= 110—150 kg/uur
= > 150 kg/uur

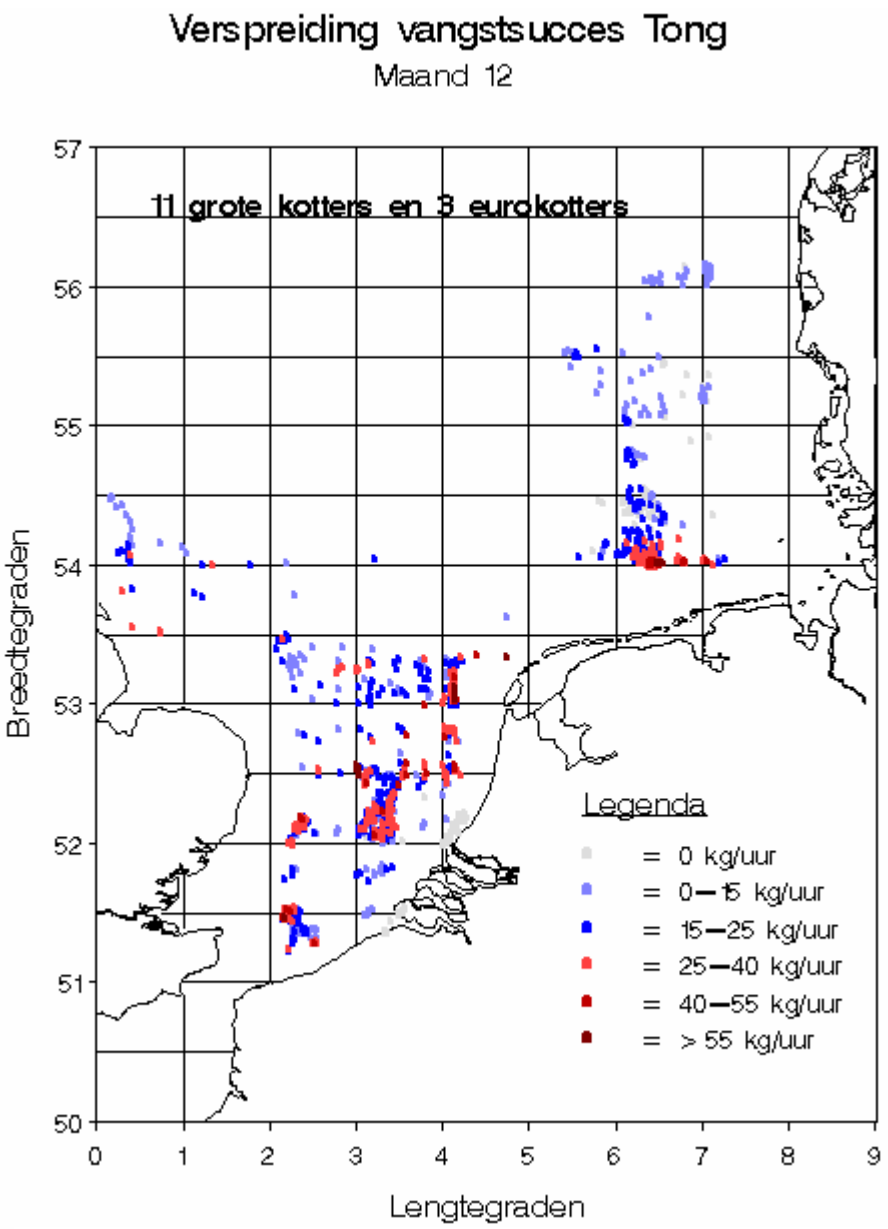

Verspreiding vangstsucces Schol
Maand 11
11 grote kotters en 2 eurokotters
Breedtegraden
Lengtegraden
Legenda
= 0 kg/uur
= 0—35 kg/uur
= 35—70 kg/uur
= 70—110 kg/uur
= 110—150 kg/uur
= > 150 kg/uur

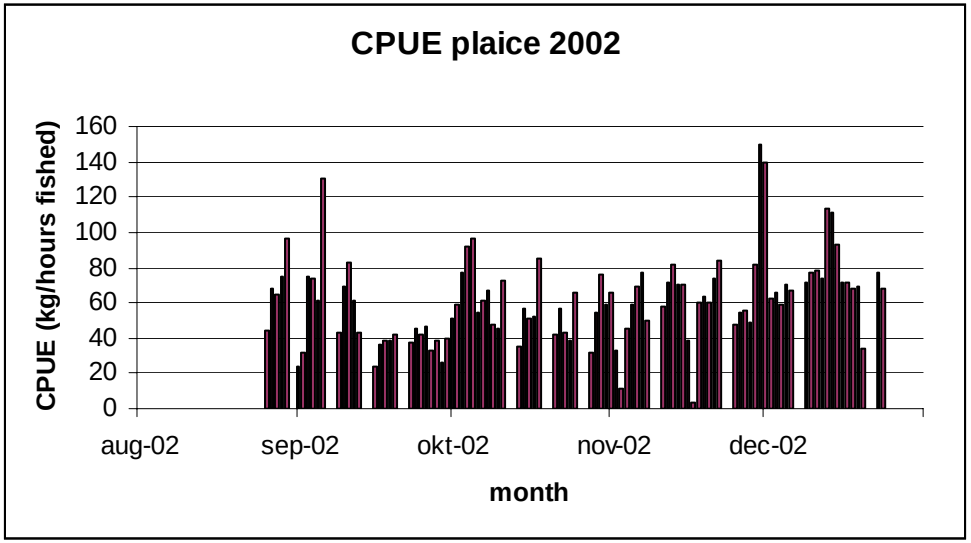

Verspreiding vangstsucces Schol
Maand 12
11 grote kotters en 3 eurokotters
Breedtegraden
Lengtegraden
Legenda
= 0 kg/uur
= 0—35 kg/uur
= 35—70 kg/uur
= 70—110 kg/uur
= 110—150 kg/uur
= > 150 kg/uur

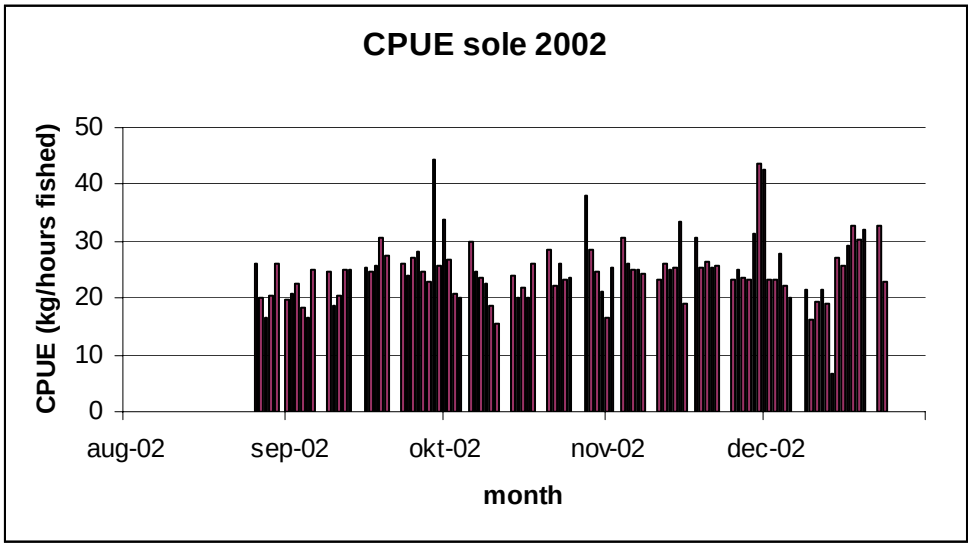

Verspreiding vangstsucces Tong
Maand 9
15 grote kotters en 6 eurokotters
Breedtegraden
Lengtegraden
Legenda
= 0 kg/uur
= 0—15 kg/uur
= 15—25 kg/uur
= 25—40 kg/uur
= 40—55 kg/uur
= > 55 kg/uur


Verspreiding vangstsucces Tong
Maand 10
14 grote kotters en 5 eurokotters
Breedtegraden
Lengtegraden
Legenda
= 0 kg/uur
= 0—15 kg/uur
= 15—25 kg/uur
= 25—40 kg/uur
= 40—55 kg/uur
= > 55 kg/uur


Verspreiding vangstsucces Tong
Maand 11
11 grote kotters en 2 eurokotters
Breedtegraden
Lengtegraden
Legenda
= 0 kg/uur
= 0—15 kg/uur
= 15—25 kg/uur
= 25—40 kg/uur
= 40—55 kg/uur
= > 55 kg/uur


Verspreiding vangstsucces Tong
Maand 12
11 grote kotters en 3 eurokotters
Breedtegraden
Lengtegraden
Legenda
= 0 kg/uur
= 0—15 kg/uur
= 15—25 kg/uur
= 25—40 kg/uur
= 40—55 kg/uur
= > 55 kg/uur


CPUE plaice 2002
CPUE (kg/hours fished)
160
140
120
100
80
60
40
20
0
aug-02
sep-02
okt-02
nov-02
dec-02
month


CPUE sole 2002
CPUE (kg/hours fished)
50
40
30
20
10
0
aug-02
sep-02
okt-02
nov-02
dec-02
month