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Landings, effort and CPUE of the Dutch beam trawl fleet 1990-2004

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Summary

In this report we have investigated the landings, effort and CPUE data of the Dutch beam trawl fleet and foreign fleet components that land their catches in the Netherlands. The landings, effort and CPUE data were derived from the Dutch official logbook database (VIRIS). The CPUE data could, on the one hand, be used to calibrate the stock assessments of plaice and sole but can also be used as independent sources of information on the development of the fishery. The maps of landings, effort and CPUE that are presented in this report, can be used to discuss trends in the fishery both over time and space, in line with recommendations of the ICES Study Group on Fishery Information

The Dutch beam trawl fishery is a mixed fishery for flatfish in the North Sea, where sole and plaice are the main targets and turbot, brill and cod may be important by-catch species. Trips are on average 5 days. The peak in the number of vessels was in the middle of the 1980 when over 600 vessels participated in the fishery. Since then the number of vessels has declined to around 400 vessels in 2001. Around 60% of the recent fleet consists of so-called Eurocutters (260<HP<=300) which are allowed to fish in the 12-mile Zone and the plaice box. The second fleet segment consisted of large beam trawlers (>1500 HP) which accounted for just below 35% of the total number of vessels.

An important development in the Dutch demersal fishery has been the process of re-flagging vessels to other countries. Re-flagging is understood here as the registration of a (Dutch) vessel to a different country, while keeping largely the same ownership and crew. Often the re-flagged vessels will still generally behave as Dutch vessels but due to different quota regulations, their fishing pattern may change. In 2001 there were around 96 Dutch vessels registered in foreign countries.

The overall trend in the landings of plaice show a substantial decrease since the early 1990s, in line with the decrease in TAC's. The overall trend in fishing effort of the Dutch beam trawl fleet shows an increase in effort up to 1995 and a decrease thereafter. The decrease in fishing effort between 1995 and 2002 is around 30%. The decrease in effort of UK vessels landings into the Netherlands is slightly higher, but it is unclear in how far this is attributable to the flag-vessels within the UK fleet. The overall trend in the CPUE of plaice show a substantial decrease in the Dutch fleet since the early 1990s (in line with the decrease in TAC's) but an increase in the UK fleet.

CPUE could, in theory, be used as a proxy for abundance of fish but TAC management could affect the targetting of the fleet which could bias the CPUE estimates. The effects of quota management on the catch rates of the fleets are currently being investigated in other products within the F-project. The interpretation of the foreign fleets' CPUE is further hampered by lack of data on the engine power of the vessels so that the vessels cannot be partitioned in different vessel categories.

An analysis of flag-vessel plaice CPUE has been presented based on flag-vessels landing into the harbours of Harlingen and Urk from 1991 onwards. The data have been made available by one of the producers organization. The trends in plaice CPUE per market category have highlighted how the strong 1996 yearclass could be followed in the landings within the different market categories. The strong yearclass has not been able to substantially lift the CPUE on the largest sized plaice, which may indicate that the yearclass was already fished out by the time it reached 40 cm. The spatial patterns in the flag-vessel data have not been analyzed (yet). This is important because it can demonstrate whether the observed trends in CPUE can be identified on very specific spatial locations or rather on a widely distributed area.

Although it has been suggested that notably the rectangle allocations in the official logbook database may not correspond accurately to the actual fishing positions, preliminary comparisons between the VIRIS database and detailed skippers logbooks in the micro-

distribution project (Rijnsdorp et al. 1998) and the F-project (RIVO, unpublished data) indicates that there was considerable overlap in spatial allocations from the two data-sources.

The issue of foreign landings into the Netherlands is highly relevant to assess the developments in plaice. The Dutch quota for plaice is around 40% of the total international TAC. Re-flagging of Dutch vessels to other countries (England, Scotland, Belgium, Germany) has enlarged the fishing opportunities for plaice for the Dutch firms involved. It has not been possible to obtain information on all flag-vessels from the beginning of the re-flagging (early 1990s) because the Dutch logbook database only started to record foreign vessels from 1995 onwards. International coordination is required (and currently ongoing) to re-establish a time series of flag vessel landings and effort from the UK register, which is considered the most important regarding plaice.

Nederlandse samenvatting

In dit rapport worden de aanvoer, de inzet en het vangstsucces (CPUE) van de Nederlandse boomkor vloot en buitenlandse vlootsegmenten geanalyseerd. De gebruikte gegevens zijn afkomstig uit de Nederlandse vangst registratie database (VIRIS). De gegevens over vangstsucces zijn in principe bruikbaar als calibratie voor toestandsbeoordelingen van schol en tong. Zij kunnen echter ook worden gebruikt als onafhankelijke bronnen van informatie over de ontwikkelingen in de visserij. De kaarten met aanvoer, inzet en vangstsucces die in dit rapport worden gepresenteerd, kunnen worden gebruikt om de ontwikkelingen in ruimte en tijd te bediscussiëren, zoals geadviseerd door de ICES studie groep over Visserij Informatie.

De Nederlandse boomkor vloot voert een gemengde visserij op platvis uit in de Noordzee. Schol en tong zijn de belangrijkste doelsoorten maar tarbot, griet, schar en kabeljauw kunnen belangrijke bijvangsten zijn. De visreizen duren gemiddeld vijf dagen. Het aantal schepen in de Nederlandse vloot had haar maximum rond 1980 met meer dan 600 schepen die deelnamen aan de visserij. Sindsdien is het aantal schepen teruggelopen tot ongeveer 400 in 2001. Rond 60 procent van de vloot bestaat uit zogenaamde Eurokotters met een motorvermogen onder de 300 pK (221 kW). Deze schepen hebben toestemming om te mogen vissen binnen de 12-mijls zone en in de scholbox. Het tweede belangrijke vlootsegment bestaat uit de schepen met motorvermogens boven de 1500 pK. In dit segment bevinden zich ongeveer 35 procent van de Nederlandse vloot.

Een belangrijke ontwikkeling in de Nederlandse demersale visserij is het proces van omvlaggen naar andere landen geweest. Omvlaggen is het overzetten van een Nederlands schip naar een buitenlandse registratie terwijl het eigendom en vaak ook de bemanning voornamelijk Nederlands blijven. De omgevlagde schepen gedragen zich vaak als de andere Nederlandse schepen maar omdat zijn onder een andere quotum regelgeving vallen, verandert hun visserij patroon wel vaak. In 2001 waren er iets minder dan 100 Nederlandse schepen die geregistreerd stonden in het buitenland.

De tendens in de aanvoer van schol laat een duidelijke afname zien sinds het begin van de jaren negentig, overeenkomstig de afname in TAC voor deze soort. De visserij inspanning van de Nederlandse vloot is toegenomen tot 1995 en laat daarna een afname zien. De afname in visserij inspanning tussen 1995 en 2002 is ongeveer 30%. De afname van inzet van schepen uit het Verenigd Koninkrijk (VK) is nog iets hoger maar het is niet duidelijk welk deel hiervan wordt veroorzaakt door de vlagschepen binnen de VK vloot. Het vangstsucces van schol laat een duidelijke teruggang zien in het eerste deel van de jaren negentig en een relatief constant vangstsucces daarna. De VK vloot laat echter een toename zien in het vangstsucces van schol na 1995.

Het vangstsucces zou in theorie kunnen worden gebruikt als maat voor de abundantie van vis. Een mogelijk probleem is echter dat het TAC beheer de gerichtheid van de visserij kan beïnvloeden en dat zou weer kunnen leiden tot een systematische afwijking in het vangstsucces. Het effect van quota beheer op het vangstsucces wordt momenteel onderzocht binnen een ander onderdeel van het F-project. De interpretatie van het vangstsucces van buitenlandse vloten wordt bemoeilijkt doordat er geen gegevens zijn over de motorvermogens van de schepen zodat ze niet kunnen worden ingedeeld in verschillende scheepscategorieën.

Een analyse van het schol vangstsucces van vlagschepen die aanvoeren in de havens van Harlingen en Urk is gepresenteerd in dit rapport. De data zijn beschikbaar gemaakt door de P.O. Oost. De ontwikkeling in vangstsucces per marktcategorie van deze schepen laat zien hoe de sterke 1996 jaarklas gevolgd kan worden door de verschillende categorieën. De sterke 1996 jaarklas heeft het vangstsucces in de grootste marktcategorie (schol I) echter niet substantieel laten toenemen, wat er op wijst dat deze jaarklas al grotendeels opgevist was voordat zij 40 cm lengte bereikte. De ruimtelijke patronen in deze dataset zijn nog niet geanalyseerd maar dit zal in de nabije toekomst worden gedaan. Het is belangrijk dat die

ruimtelijke component wordt toegevoegd aan de analyse om te laten zien of de waargenomen tendensen in vangstsucces behoren bij hele specifieke ruimtelijke gebieden of juist bij hele uitgebreide gebieden (en dus meer representatief).

Hoewel soms wordt gesteld dat met name de toewijzing aan kwadranten problematisch is in de officiële logboeken, hebben voorlopige vergelijkingen tussen VIRIS en gedetailleerde logboeken van schippers (microverspreiding, F-project) laten zien dat er een behoorlijke overlap tussen die verschillende bronnen. Om die reden kunnen VIRIS gegevens worden gebruikt als redelijke benadering van het gedrag van de vloot.

Voor schol is de buitenlandse aanvoer in Nederland hoogst relevant. Het Nederlandse quotum van schol is ongeveer 40% van de internationale TAC. Het omvlaggen van Nederlandse kotters naar andere landen (Engeland, Schotland, België, Duitsland) heeft de visserijmogelijkheden van Nederlandse bedrijven vergroot. Er is echter nog geen gegevensreeks van alle vlagschepen vanaf het begin van het omvlaggen (begin jaren negentig). In VIRIS worden buitenlandse schepen pas sinds 1995 geregistreerd. Internationale samenwerking is er nu op gericht om een tijdsreeks van aanvoer en inzet van vlagschepen te genereren gebaseerd op de logboek database van het Verenigd Koninkrijk.

1. Introduction

The F-project is a 4-year research project with the objective to improve the mutual understanding between fishermen, scientists and fisheries managers, by stimulating communication and collaboration between fishermen and fisheries scientists. One of the three working packages of the F-project is concerned with the improvement of stock assessment of plaice and sole. The annual stock assessments of plaice and sole by ICES have raised serious criticism on the transparency of the methodology, the quality of the input data and the quality of the stock assessment models used. The objectives of the F-project are to prepare for a comprehensive fisheries evaluation of North Sea flatfish by analyzing and seeking improvements of the following points:

- Representativity of the input data
- Uncertainty and bias in the stock assessment
- Uncertainty and bias in the short-term prognosis
- Biological reference points
- Produce a manual on quality assurance
- Explore alternative methods

These issues will be investigated in several smaller studies of which a total of 13 separate reports and 4 other products will be produced, which, taken together, represent an extensive analysis of the problem.

In this report we investigate the landings data of the Dutch beam trawl fleet, the effort allocation and the catch rates (CPUE). The data can on the one hand be used to calibrate the stock assessments of plaice and sole but can also be used as independent sources of information on the development of the fishery. The maps of landings, effort and CPUE that are presented in this report, can be used to discuss trends in the fishery, in line with recommendations of the ICES Study Group on Fishery Information (ICES 2004)

The overall research questions that forms the basis of this report is: present and analyze landings, effort and CPUE per fleet segment in both temporal and spatial dimensions.

The Dutch beam trawl fishery is a mixed fishery for flatfish in the North Sea, where sole and plaice are the main targets and turbot, brill and cod may be important by-catch species. Trips are on average 5 days. The peak in the number of vessels was in the middle of the 1980 when over 600 vessels participated in the fishery. Since then the number of vessels has declined to around 400 vessels in 2001. Around 60% of the recent fleet consists of so-called Eurocutters (260<HP<=300) which are allowed to fish in the 12-mile Zone and the plaice box. The second fleet segment consisted of large beam trawlers (>1500 HP) which accounted for just below 35% of the total number of vessels (Van Wijk et al. 2002).

An important development in the Dutch demersal fishery has been the process of re-flagging vessels to other countries. Re-flagging is understood here as the registration of a (Dutch) vessel to a different country, while keeping largely the same ownership and crew. Often the re-flagged vessels will still generally behave as Dutch vessels but due to different quota regulations, their fishing pattern may change (Pastoors et al. 1997; Marchal et al. 2001). In 2001 there were around 96 Dutch vessels registered in foreign countries (around 20% of the Dutch fleet).

2. Material and methods

This section will provide an historical overview of the landings of the Dutch beam trawl fleet from 1990-2004 and also of the foreign landings into the Netherlands from 1996 onwards. The results will only be based on the officially reported landings in the Dutch logbook system.

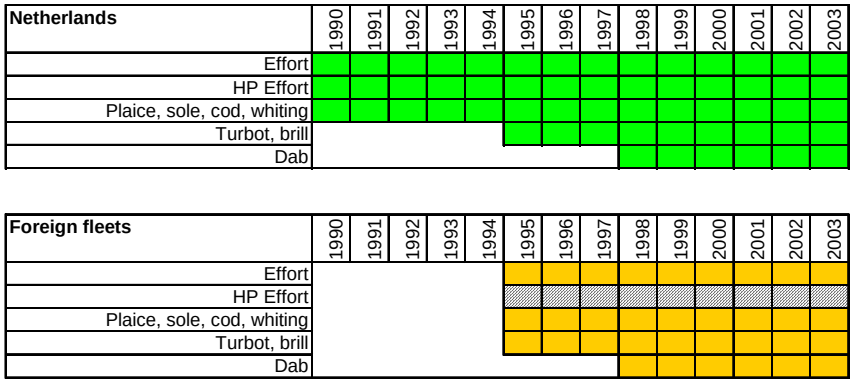
The analyses were based on four sources of information (Figure 2.1):

- Official logbook data. (VIRIS)
- Official landings as reported to ICES
- Fishery Economics data on effort and capacity (LEI)
- Market and effort of UK flag vessels landing into the ports of Harlingen and Urk.

The official logbook data are kept at the General Inspection Service (AID) of the Netherlands Ministry of Agriculture, Environment and Fishery (LNV). The data are stored in an Oracle database. The Netherlands Institute for Fisheries Research (RIVO) and Agricultural Economics Research Institute (LEI) have access to (part of) that database. RIVO and LEI derive a summary of the official VIRIS database, which is stored as SAS datasets. The summary consists of:

- landings information by vessel, trip and rectangle
- effort information (total trip length) by vessel and trip
- fleet information (length, engine power, gear)

The summary was used for all subsequent analysis presented in this report and stored as a SAS dataset. Since 1995 landings and effort by foreign vessels in the Netherlands are also incorporated in the database. The engine power of the foreign vessels is not always known and therefore partly missing. The number of species that were incorporated in the database increased over the years, e.g. turbot and brill were incorporated from 1995 onwards and dab from 1998 onwards.



Summary of effort and landings data available in VIRIS

The analyses have been restricted to two fleet segments: the Eurocutters with engine powers between 260 and 300 Hp, and the large cutters with engine powers above 300 Hp. CPUE was calculated by summing all landings and all effort (fishing days) for a given stratum and then dividing the two to arrive at an estimated kg/day.

The spatial maps of landings and effort distributions were generated based on an extraction of the VIRIS dataset.

An important part of the previously Dutch vessels have been re-flagged to other countries (notably England, Scotland, Belgium and Germany). To date, no comprehensive dataset exists of catch and effort of these flag-vessels. However, data have been made available by the

producers organization for UK flag vessels on the landings of these vessels in the harbours of Harlingen and Urk (Geert Meun, pers. comm.). The data consists of time series of the number of landings by vessel and year, the Horse power of the engine by vessel and the landings of plaice by quarter and market category. The time series starts in 1991, but the category compositions of Harlingen are only available from 1993 onwards.
Figure 3.4.1 presents the number of vessels that have been included in the analysis over the years of the time series. For 1991 and 1992 only a small number of vessels were available in the data series, but for the later years there were on average 25 vessels in the sample.

The data collected for the flag vessels were compared with the data contained in the Dutch VIRIS database (for the years 1995-2001). Comparisons were carried out both on effort and landings estimated from these two data sources. Since the data on flag vessels did not incorporate spatial information, the spatial patterns could in theory be derived from the VIRIS database if it could be established that the overall patterns between VIRIS and PO-data was the same.

CPUE was calculated both on the overall landings and effort and on the landings by market category and effort.

An overview of the data available for analysis is presented in the text table below. The text table includes binary options of when subdivision by country, HP-class, ICES rectangle, Quarter, Trip and Market category are available.

Source	Variable	Fleet	Startyear	Lastyear	Country	HP class	Rectangle	Quarter	Trip	Category
VIRIS	Plaice, sole, cod, whiting landings	NL	1990	2003	Y	Y	Y	Y	Y	N
VIRIS	Turbot, brill landings	NL	1995	2003	Y	Y	Y	Y	Y	N
VIRIS	Dab landings	NL	1998	2003	Y	Y	Y	Y	Y	N
VIRIS	(HP) Effort	NL	1995	2003	Y	Y	Y	Y	Y	N
VIRIS	Plaice, sole, cod, whiting landings	Foreign fleets	1995	2003	Y	Y	Y	Y	Y	N
VIRIS	Turbot, brill landings	Foreign fleets	1995	2003	Y	Y	Y	Y	Y	N
VIRIS	Dab landings	Foreign fleets	1998	2003	Y	Y	Y	Y	Y	N
VIRIS	Effort	Foreign fleets	1995	2003	Y	Y	Y	Y	Y	N
Visserij in cijfers	HP Effort	NL	1980	2002	Y	Y	N	N	N	N
Visserij in cijfers	HP Capacity	NL	1980	2002	Y	Y	N	N	N	N
Afslag Harlingen, Urk	Plaice landings	UK flag vessels	1991	2002	Y	Y	N	Y	N	Y
Afslag Harlingen, Urk	HP Effort	UK flag vessels	1991	2002	Y	Y	N	Y	N	N
ICES	Plaice, sole international landings	EU	1957	2002	Y	N	N	N	N	N
ICES	Cod, whiting international landings	EU	1963	2002	Y	N	N	N	N	N

3. Results

3.1 Landings

The landings by species, gear and Hp-class are shown in table 3.1.1 for the years 1990-2004. Landings by ICES division are shown in table 3.1.2.

The results presented so far, only referred to the Dutch cutter fleet. As mentioned above, an important part of the previously Dutch vessels have been re-flagged to other countries (notably England, Scotland, Belgium and Germany). To date, no comprehensive dataset exists of catch and effort of these flag-vessels[1]. As a proxy, the Dutch logbook database has been analysed on the foreign landings in the Netherlands. These landings are predominantly from flag-vessels although "real" foreign vessels may also land in the Netherlands because of marketing and price conditions. A substantial proportion of the Belgian, German and UK landings of plaice (around 65%) and sole (around 85%) is landed in the Netherlands (tables 3.1.3 and 3.1.4). Although the actual contribution of flag-vessels to those landings could not be quantified, it is likely to be high.

The spatial distribution of landings from Dutch and foreign vessels (landing into the Netherlands) were expressed in tonnes by ICES rectangle and are presented below.

3.1.1 Plaice

[figures 3.1.1.1-3.1.1.5] The two Dutch fleet segments show a more and more southern distribution of plaice landings over the course of the time series. Notably the high landings from the German Bight have disappeared in recent years. This is in agreement with the overall decrease in fishing effort in the German Bight. The landings pattern of the UK fleet landing into the Netherlands clearly shows a more northern distribution compared to the Dutch large cutter fleet. The UK fleet still generates high landings from the German Bight area, which suggests that the low landings in the Dutch fleet may be more due to quota limitations than to unavailability of plaice in that area. The German fleet landing into the Netherlands has shown rather divergent patterns in their plaice landings. In some years the hot spots are clearly inside the German Bight whereas in other years the landings are mostly taken off Den Helder. The Belgian landings are predominantly taken in the North Eastern part of the North Sea and appear to sustain the same pattern although the overall level has decreased.

3.1.2 Sole

[figures 3.1.2.1-3.1.2.5] Landings of North Sea sole by the Dutch fleet segments are relatively similar in spatial distribution, although the effect of strong year classes can be clearly detected. Sole is mostly taken in the southern part of the North Sea. Landings by the UK, German and Belgian fleets are relatively small and have been plotted on the same scale. German landings of sole are generally taken north of the Dutch Wadden islands and appear to be more concentrated that the Belgian and UK landings.

3.1.3 Cod

[figures 3.1.3.1-3..3.2] Cod landings are shown for the Dutch fleet segments only. The decline in the cod landings in recent years is clearly shown in the graphs. Cod landings from the German Bight have virtually disappeared, so that the major area of cod landings is now the most southern part of the North Sea.

[1] A flag-vessel is here defined as a vessel owned by a Dutch company and with a predominantly Dutch crew and skipper, but registered in a foreign country.

3.1.4 Dab

[figures 3.1.4.1-3.1.4.2] Dab landings are shown for the Dutch fleet segments only and from 1998 onwards because prior to that year dab were not included in the logbook database. Dab landings in 1999 were the highest in the (short) time series. Landings in 2002 were only around 60% of the landings in 1999. The spatial patterns in the landings of the large beam trawlers shows a marked absence of landings from the Dogger area in the most recent years, compared to the late 1990s.

3.1.5 Turbot

[figures 3.1.4.3-3.1.4.4] Turbot landings are shown for the Dutch fleet segments only and from 1995 onwards because prior to that year turbot were not included in the logbook database. Turbot landings have fluctuated around 2000 tonnes annually. The spatial patterns in the landings of the large beam trawlers shows that turbot are predominantly landed from the German Bight area, but that in some years substantial landings are also generated from the southern North Sea. Overall, the patterns in landings appears to be relatively stable over time.

3.2 Effort

Time trends in the composition of the Dutch cutter fleet are presented in figure 3.2.1. The Dutch fleet consisted of a maximum of around 600 vessels in the mid 1980s and has decreased to 400 vessels in 2001. The size composition of the fleet has changed over the time series from a fleet dominated by vessels with engine powers between 222 and 1100 kW to a situation where the fleet consist of two major categories: vessels under 222 kW (Eurocutters) and vessels over 1100 kW (large cutters).

Time trends in fishing effort of the Dutch cutter fleet are shown in figure 3.2.2 (since 1980, source LEI) and table 3.2.1 (since 1991, source VIRIS). The LEI series extends over a longer time frame and is therefore useful to investigate the long term trends, whereas the VIRIS data have a shorter time-scale but allows for relatively high spatial resolution. Because effort is expressed as HP-days at sea, the effort of the fleet is dominated by the large cutters (>1100kW), which exert over 90% of the fishing effort in the most recent years. Table 3.2.1 also shows that the effort in otter trawling (which included twin trawling) has increased since 1997, especially for the Euro cutter segment. The time trends of fishing effort and number of vessels of the Dutch cutter fleet are summarized in figure 3.2.3 and show that the decrease in number of vessels which started in the late 1980s has only resulted in a decrease in fishing effort after 1995. The decrease in fishing effort between 1995 and 2002 is estimated at around 30%.

The allocation of fishing effort by ICES division, gear and year is shown in table 3.2.2 and figure 3.2.4. For beam trawls, the decrease in overall fishing effort since 1995 is mainly driven by a decrease in fishing effort in division IVb. The fishing effort in division IVc has been relatively stable since 1995 and the effort in division IVa is so low that it can be ignored.

Table 3.2.3 summarizes the effort allocation by country and year as reported in the Dutch logbook database. Effort is expressed as days at sea because engine power is often not available for foreign vessels. The results indicate that foreign vessels take up between 25 and 30% of all the days at sea from vessels landing in the Netherlands. It should be noted that days at sea may not be an appropriate proxy for the true effort allocation as the larger vessels are expected to exert substantially more effort than the smaller Eurocutters. Foreign landings by UK registered vessels are usually from large cutters, the German vessels from Eurocutters and the Belgian vessels from a mix between Eurocutters and large vessels.

The spatial allocation of fishing effort from Dutch and foreign vessels are presented in figures 3.2.4 and 3.2.5. The Dutch fleet was split into Eurocutters and Large cutters. Effort was expressed as the total number of days at sea by ICES rectangle. Both Dutch fleet segments

show a slightly more southern distribution of fishing effort over the course of the time series. The Eurocutters show a very consistent hot spot off the coast of Zeeland (Figure 3.2.4.a). The large cutters show in general a series of hot spot in the southern North Sea and into the German Bight (figure 3.2.4.b). The fishing effort in the German Bight appears to have decreased in recent years. The effort allocation of the UK fleet landing into the Netherlands clearly shows a more northern distribution compared to the Dutch large cutter fleet (Figure 3.2.5.a). The German fleet landing into the Netherlands is fishing mostly off Den Helder and the Dutch Wadden islands (figure 3.2.5.b) and the Belgian fleet has a wide distributional area from the most southern part to the North Eastern part of the North Sea (figure 3.2.5.c). These consist of different fleet segments, which are responsible for different spatial patterns: large cutters make long trips to the northern areas whereas the Eurocutters stay in the Southern North Sea.

3.3 CPUE

Time trends in CPUE of the Dutch cutter fleet are shown in table 3.3.1 and shows a substantial decline in CPUE of large beam trawlers for plaice (from 1800 kg/day in 1991 to 1100 kg/day in 2002). There is no apparent decline in CPUE for sole.

The average CPUE of the Dutch cutter fleet by species, ICES division, gear and year is shown in table 3.3.2. Table 5.2.3 summarizes the CPUE (kg/day) by country and year as reported in the Dutch logbook database. The UK vessels show an increase in plaice CPUE since 1995. It should be noted that in this case days at sea may not be an appropriate proxy for the true effort allocation as the larger vessels are expected to exert substantially more effort than the smaller Eurocutters. The mixture of engine powers in the foreign fleets were not available, so that this effect could not be assessed.

3.3.1 Plaice

The CPUE by rectangle for plaice is shown in figures 3.3.1 (Dutch beam trawl vessels) and 3.3.2 (foreign vessels landing into the Netherlands). For the Dutch fleet, the decrease in plaice CPUE is mostly apparent in area IVb, which may be driven by the more southern distribution of the fleet in this area.

The spatial allocation of plaice CPUE from Dutch and foreign vessels (landing into the Netherlands) is shown in figures 3.3.1. The Dutch fleet was split into Eurocutters and Large cutters. Effort was expressed as the total number of days at sea by ICES rectangle. The large Dutch beamers show the highest CPUE in the central North Sea. In the first years of the time series, the north-western part of the North Sea appears to represent the area with the highest catch rates for plaice, whereas in later years this area is not covered anymore by the fleet. The UK fleet, on the other hand, appears to realise a high plaice CPUE in the southern part of the North Sea, especially in the most recent years. It should be noted that the effort of the UK fleet is very low in this area (figure 3.3.2.a) which may cause some indeterminacy in the calculated CPUEs.

3.3.2 Sole

[figures 3.3.3] CPUE of North Sea sole by the Dutch fleet segments is highest is the most southern part of the North Sea. Euro-cutters also find substantial concentrations of sole in the coastal area and the plaice box.

3.3.3 Cod

[figure 3.3.4] CPUE of cod clearly shows the decrease in landings of cod by beam trawl vessels. Only a few concentrations of cod remained in the early 2000's.

3.3.4 Dab

[figure 3.3.5] CPUE of dab is only available from 1998 onwards and shows that the highest catch rates are obtained at the Dogger Bank area. Euro cutters are also able to find concentrations of dab in the southern part of the North Sea. It should be noted that market conditions are expected to have a substantial effect on the CPUE of dab because it is only worthwhile to land dab if the price is high enough.

3.3.5 Turbot

[figure 3.3.6] Catch rates for Turbot are relatively evenly distributed over the North Sea although with a predominance in the Eastern part of the German Bight.

3.4 Flag vessels

The time trends in the plaice category compositions in the Dutch auctions and the categories realised by the sampled flag vessels in the harbours of Harlingen and Urk are shown in figure 3.4.1. Market category 1 denotes the largest plaice (>41 cm), category 4 the smallest plaice (27-30 cm). The overall pattern is very similar but the average distribution over the market categories is different in the flag vessel time series, where relatively more larger plaice are landed (figures 3.4.2-3.4.3).

A comparison between trends in CPUE in the PO data (kg/day) with the information on the same vessels in the VIRIS database is shown in figure 3.4.4. Note that the 1991 point in this graph is only based on 6 vessels whereas from 1993 onwards the sample consists of around 25 vessels. There appears to a high degree of consistency between the two data sources for the years of overlap. The interpretation of the overall trend in CPUE is heavily dependent on how the information from 1991 is weighted. If this is considered as a relevant (but small) sample, then there appears to be a substantial drop in CPUE between 1991 and 1992. Otherwise, the 1991 data point would be ignored because of low sample size. More effort is needed to make sure that the information content of the 1991 data point is sufficient.

Figure 3.4.5. shows the trends in CPUE (kg/day) per market category for the flag-vessels (PO data) from 1992-2003 (1991 omitted, 2003 only the first two quarters). This shows that the relative increase in CPUE in the recent years is largely driven by an increase in CPUE for the two middle market categories. There appears to be an overall decrease in CPUE for the largest sized plaice (category 1). It is also clear from the graph how the strong 1996 yearclass enters the fishery in 1999 (category 4) and subsequently 2000 (category 3), 2001 (category 2) and 2002 (category 1). This yearclass has not been able to substantially lift the CPUE on the largest sized plaice.

4. Discussion

The landings data described above was derived from the Dutch official logbook database (VIRIS). Although it has been stated that notably the rectangle allocations in the official logbook database may not correspond accurately to the actual fishing positions, preliminary comparisons between the VIRIS database and detailed skippers logbooks in the micro-distribution project (Rijnsdorp et al. 1998) and the F-project (RIVO, unpublished data) suggested that there was considerable overlap in spatial allocations from the two data-sources (Jan Jaap Poos, pers. comm.).

The issue of foreign landings into the Netherlands is highly relevant to assess the developments in plaice. The Dutch quota for plaice is around 40% of the total international TAC. Re-flagging of Dutch vessels to other countries (England, Scotland, Belgium, Germany) has enlarged the fishing opportunities for plaice for the Dutch firms involved. It has not been possible to obtain information on all flag-vessels from the beginning of the re-flagging (early 1990s) because the Dutch logbook database only started to record foreign vessels from 1995 onwards. International coordination is required (and currently ongoing) to re-establish a time series of flag vessel landings and effort from the UK register, which is considered the most important regarding plaice.

The overall trend in the landings of plaice show a substantial decrease since the early 1990s, in line with the decrease in TAC's which have been agreed. Landings cannot be interpreted as availability. CPUE could be used as a proxy for availability (see section 5) but even here, TAC management could affect the targetting of the fleet which could again influence or bias the CPUE estimates. The effects of quota management on the catch rates of the fleets are currently being investigated in other products in the F-project.

4.1 Effort

The effort data described above was derived from the Dutch official logbook database (VIRIS). Although it has been stated that notably the rectangle allocations in the official logbook database may not correspond accurately to the actual fishing positions, preliminary comparisons between the VIRIS database and detailed skippers logbooks in the micro-distribution project (Rijnsdorp et al. 1998) and the F-project (RIVO, unpublished data) suggested that there was considerable overlap in spatial allocations from the two data-sources (Jan Jaap Poos, pers. comm.).

The overall trend in fishing effort of the Dutch beam trawl fleet shows an increase in effort up to 1995 and a decrease thereafter. The decrease in fishing effort between 1995 and 2002 is around 30%. The decrease in effort of UK vessels landings into is slightly higher than that, but it is unclear whether this is all attributable to flag-vessels.

The issue of foreign landings into the Netherlands is highly relevant to assess the developments in plaice. The Dutch quota for plaice is around 40% of the total international TAC. Re-flagging of Dutch vessels to other countries (England, Scotland, Belgium, Germany) has enlarged the fishing opportunities for plaice for the Dutch firms involved. It has not been possible to obtain information on all flag-vessels from the beginning of the re-flagging (early 1990s) because the Dutch logbook database only started to record foreign vessels from 1995 onwards. International coordination is required (and currently ongoing) to re-establish a time series of flag vessel landings and effort from the UK register, which is considered the most important regarding plaice but has a substantial effect on the effort allocation of the segment of large beam trawlers.

4.2 CPUE

The CPUE data described above was derived from the Dutch official logbook database (VIRIS). Although it has been stated that notably the rectangle allocations in the official logbook database may not correspond accurately to the actual fishing positions, preliminary comparisons between the VIRIS database and detailed skippers logbooks in the micro-distribution project (Rijnsdorp et al. 1998) and the F-project (RIVO, unpublished data) suggested that there was considerable overlap in spatial allocations from the two data-sources (Jan Jaap Poos, pers. comm.).

The issue of foreign landings into the Netherlands is highly relevant to assess the developments in plaice. The Dutch quota for plaice is around 40% of the total international TAC. Re-flagging of Dutch vessels to other countries (England, Scotland, Belgium, Germany) has enlarged the fishing opportunities for plaice for the Dutch firms involved. It has not been possible to obtain information on all flag-vessels from the beginning of the re-flagging (early 1990s) because the Dutch logbook database only started to record foreign vessels from 1995 onwards. International coordination is required (and currently ongoing) to re-establish a time series of flag vessel landings and effort from the UK register, which is considered the most important regarding plaice.

The overall trend in the CPUE of plaice show a substantial decrease in the Dutch fleet since the early 1990s (in line with the decrease in TAC's) but an increase in the UK fleet. CPUE could, in theory, be used as a proxy for availability but TAC management could affect the targetting of the fleet which could again influence or bias the CPUE estimates. The effects of quota management on the catch rates of the fleets are currently being investigated in other products in the F-project. The interpretation of the foreign fleets CPUE is further hampered by lack of data on the engine power of the vessels so that the vessels cannot be partitioned in different vessel categories.

An analysis of flag-vessel data has been presented in this report. The flag-vessels were those that landed into the harbours of Harlingen and Urk from 1991 onwards. The data have been made available by the producers organization (Geert Meun, pers. comm.). The data have been analysed and compared to the VIRIS data and found to contain the same overall trends. The spatial patterns in the flag-vessel data have not been analysed (yet). This is important because it can demonstrate whether the observed trends in CPUE can be identified on very specific spatial locations or rather on a widely distributed area.

The trends in CPUE per market category have highlighted how the strong 1996 yearclass could be followed in the landings within the different market categories. The strong yearclass has not been able to substantially lift the CPUE on the largest sized plaice, which may indicate that the yearclass was already fished out by the time it reached 40 cm.

In theory, the data on flag-vessels could be used to generate calibration series for stock assessment purposed. Given that the market sampling in the Netherlands is stratified by market category, it would be possible to generate an age composition of the landings of the flag vessels based on the market compositions. When this would be coupled to the effort, it would generate an age-stratified calibration series. This has not been carried out (yet) because there is a need to first analyse the spatial distribution of the fleet and to evaluate whether this can be considered representative of the stock distribution.

5. Acknowledgements

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7. Terminology

Term	Description
Catch	Total removals of fish from the stock (in numbers or in weight)
Catch rate	CPUE
CPUE	Catch (or landings) in biomass per unit of effort (in days, HP days, etc.)
Effort	Number of days or HP days at sea
Flag vessel	Vessel registered in a different country than the company and/or the crew that operates the vessel
ICES	International Council for the Exploration of the Sea
HP	Horse Power
HP days	Horse Power days (days at sea multiplied by the HP of the vessel)
KW	KiloWatt
KW days	KiloWatt days (days at sea multiplied by the KW of the vessel)
Landings	Landed part of the catch (in numbers or in weight)
Logbook	EU required forms of declaration of fishing activities (landings, area etc)
VIRIS	NL logbook database system.