Delineating catch quotas for Dutch demersal fisheries: a theoretical pilot study.

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Introduction

A reduction of unwanted catches is a key element of the Common Fisheries Policy reform proposal (EC, 2010). To achieve this, a landing obligation (or discard ban) will be introduced, prohibiting the at-sea disposal of quota-regulated species. Instead these catches shall be brought back to shore and counted against a quota, where applicable.

Upon request by the ministry more clarity is sought on how catch quotas could be calculated and what they would look like for the most relevant fish species of the Dutch demersal fishery. The current report provides an overview of total allowable catch allocations (TAC), national quota, landings and discards statistics for some of the most-relevant quota-regulated species caught by the Dutch demersal fleet. A number of scenarios of how the new catch quotas could be calculated are presented. The theoretical implications of these alternative scenarios for the Dutch fleet are described under the assumption of no change in relative stability.

DISCLAIMER: This report does not aim to predict how catch quotas will actually be calculated, how the additional bycatch quota would be allocated amongst participants in the fishery, nor how the *de minimis exemptions* will be applied. It is provided merely as background information with possibly scenario's. More importantly, the report does not deal with potential behavioural responses in the fisheries following a change from landing quota to catch quota. One may expect that a fundamental change from a 'requirement to discard' to a 'requirement to land' will have a substantial influence on how individual fishermen will operate in the new system. However, these effects are not included in this report.

Assignment

1. Provide an overview of the most important species that are caught by Dutch demersal fisheries.
2. Provide an overview of total allowable catches (TACs), Dutch quota shares, and estimates of total landings and discards for plaice, sole, cod, dab/flounder, whiting, turbot/brill and skates/rays.
3. How would catch quotas be calculated for the Dutch demersal fleet, if a) discards would be allocated via the relative stability system and b) if additional subtraction of 5% or 10% of discarding is allowed ('*de minimis exemptions*').

Note that (3) asks how catch quota *would* be calculated, while due to very limited information available to provide guidance on how this *should* be done, the current exercise merely present an answer to how they *could* be calculated.

Materials and Methods

TAC and quota information were derived from the annual TAC and quota regulations for the years 2010-2012 (EC 2010a, 2010b, 2011a, 2011b, 2012).

An overview of the most important fish species that were caught and discarded by Dutch demersal fisheries (beam trawls and otter trawls) in 2011 is presented, based on the discarded numbers per hour of fishing. The data underlying this table was collected in the context of the Data collection Framework of the European Commission (CVO 2012).

Previous attempts to extract data from an electronic data portal of the European Commission providing public access to relevant European fisheries catch and effort statistics (https://fishreg.jrc.ec.europa.eu/web/datadissemination/home) lead to questionable estimates. The statistics derived from this website were compared with statistics collated by ICES and differences were observed (ICES 2013). These differences in some cases were quite substantial (e.g. total landings of sole in 2010 were said to be 16 588 tonnes (Fishreg website) compared to 12 100 tonnes (ICES). Therefore, it was decided not to use the data from this portal, because it was not clear how some of the numbers were estimated. Likewise, discrepancies between Dutch data and the official STECF data exist. These differences are presented for information, though final analyses are carried out on the basis of STECF meeting of EWG 13-13 (specifically the annex 2 in https://stecf.jrc.ec.europa.eu/web/stecf/ewg1313) . This report present landings and discard data for various stocks for the last three years (2010-2012): common sole (*Solea solea*), European plaice (*Pleuronectes platessa*), dab (*Limanda limanda*), turbot (*Psetta maxima*), Atlantic cod (*Gadus morhua*), and whiting (*Merlangius merlangus*).

In the case of turbot, TAC and quota figures provided are combined quotas including brill (*Scophthalmus rhombus*) although the landings and discard data only apply to turbot. Similarly, dab and flounder have a combined TAC, but the landings and discard data only apply to dab. Landings and discards data for skates/rays were not available, so these stocks were not examined.

In summary, the following statistics were provided for the period 2010-2012 (and for all fleets included in the STECF database):

1. Total Allowable Catch (TAC) (fleet totals);
2. Dutch quotas;
3. Landings (international fleet totals and Dutch totals);
4. Discards (international fleet totals and Dutch totals)

This report presents a number of theoretical scenarios of how catch quota *could* be calculated. There is no implied preference to the sequence in which the scenarios are presented. They are merely presented to facilitate future discussions about different options that could be used to determine the future catch quota. The scenario's also allow for an assessment of potential limiting conditions for Dutch fisheries under the assumption of no change in behavioural patterns in the fleets. We used the following theoretical scenarios:

1. **TAC only**
   This scenario assumes no change in the quotas. i.e. the new catch-TACs are the same as the previous landings-TACs. Under this scenario the new quotas are likely to be limiting if the fleet is catching any fish above the stipulated landings-TAC for a given stock.
2. **NL catch**
   This scenario assumes that catch quotas will be set for each country according to their historical catches (landings + discards). This scenario would require a change in relative stability unless all nations had the same discarding ratio.
3. **TAC + EU %disc**
   This scenario assumes that catch quotas will be derived from the current landings-TAC adjusted up by the discards proportion of the European fleet (i.e. all fishing nations). For stocks that have discards included in the assessment, this scenario corresponds closest to how the landings-TACs are currently calculated. Under this scenario the new quotas are likely to be limiting if the Dutch fleet has a higher discarding ratio than the overall EU discarding ratio.
4. **EU landing + EU %disc**
   This scenario assumes that catch quotas would be established based on historic catch statistics (i.e. landings+discards) and subsequent application of the current relative stability allocation key to obtain catch-quota per country. This generally leads to lower quotas compared to the previous scenario based on TACs. Under this scenario the new quotas are likely to be limiting if the Dutch fleet caught a higher proportion of their quota than other nations (e.g. underutilization in other countries) or if the Dutch fleet has a higher discard ratio than the overall EU discarding ratio.

Calculating catch quotas for the Dutch fleet, starts by calculating a catch-TAC on an overall (all nations) fleet level. Since the distribution of quota among countries would not change, the relative stability principle is applied using the current quota percentages for the Netherlands to derive a theoretical catch quota for the Dutch fleet. These theoretical catch quotas are compared with the Dutch catch that year by calculating the 'surplus' catch i.e. the difference between the theoretical quota and the Dutch catch. Where this is positive (i.e. Dutch catch < theoretical quota), then the catch-quota would not be limiting to the fishery. Where this is negative (i.e. Dutch catch > theoretical quota), the Dutch catch exceeded the catch-quota, and had this been in place, then it would have limited the fishery.

Results

Table 1 lists estimated discard rates (numbers per unit of fishing effort, i.e. per hour of fishing) of various species from the Dutch demersal fleet in 2011. While values vary from year to year, this table is indicative of the general level of discarding of the various species in recent years. Dab and plaice dominate the discard numbers in all demersal gears.

Table 1. Average numbers per hour of discarded fish species in Dutch bottom beam-trawl (TBB) and otter-trawl (OTB) fisheries with mesh sizes ranging between 70-119 mm to target demersal fish (DEF) or mixed crustaceans and fish (MCD) in 2011. (from CVO report 12.010). TBB_DEF* refers to the smaller than 300 Hp beamtrawl segment.

Métier Mesh size	TBB_DEF 70-99	TBB_DEF* 70-99	TBB_DEF 100-119	OTB_MCD 70-99	OTB_DEF 70-99	OTB_DEF 100-119
Ammodytes sp.	15	16	2	0	<1	<1
Anglerfish	0	0	0	<1	0	0
Ballan wrasse	0	0	0	0	0	0
Bib	5	3	<1	<1	0	0
Blonde ray	3	0	0	1	<1	0
Bull-rout	14	11	2	1	20	17
Cod	1	2	3	3	1	3
Cuckoo ray	0	0	0	0	0	0
Dab	1350	408	128	424	405	470
Dragonet	53	8	2	6	4	2
Five-bearded rockling	<1	<1	0	0	0	0
Flounder	6	20	0	0	0	0
Four-bearded rockling	6	<1	0	5	2	0
Garfish	0	0	0	0	0	0
Greater pipefish	0	<1	0	0	0	0
Greater sand-eel	15	3	<1	0	<1	0
Greater weever	<1	<1	0	0	0	0
Grey gurnard	61	27	10	27	55	70
Haddock	0	0	0	<1	0	<1
Hake	0	0	0	<1	0	0
Herring	9	<1	0	<1	1	0
Hooknose	17	4	<1	<1	4	0
Horse mackerel	1	<1	0	0	0	0
John Dory	0	0	0	0	0	0
Lemon sole	40	5	13	9	3	16
Lesser sand-eel	0	0	0	0	0	0
Lesser spotted dogfish	3	<1	0	3	0	<1
Lesser weever	33	2	1	0	2	<1
Ling	0	0	0	<1	0	0
Long rough dab	1	6	1	11	9	1
Lumpsucker	0	0	<1	0	<1	<1
Mackerel	<1	0	0	0	0	0
Megrim	0	<1	0	<1	0	0
Mustelus sp.	<1	<1	<1	<1	0	0
Nilsson's pipefish	0	<1	0	0	0	0
Norwegian topknot	<1	0	0	<1	<1	0

Métier Mesh size	TBB_DEF 70-99	TBB_DEF* 70-99	TBB_DEF 100-119	OTB_MCD 70-99	OTB_DEF 70-99	OTB_DEF 100-119
Plaice	921	259	183	372	309	547
Pomatoschistus sp.	2	0	0	0	0	0
Raja sp.	0	0	0	0	0	0
Reticulated dragonet	2	<1	0	0	<1	0
Roker	3	<1	10	<1	<1	<1
Sand goby	2	<1	0	0	<1	0
Sand sole	0	0	0	0	0	0
Scaldfish	110	18	2	13	7	7
Sea bass	<1	0	0	0	0	<1
Sea-snail	<1	0	0	0	0	0
Solenette	115	23	6	4	13	2
Spotted dragonet	0	0	0	0	0	0
Spotted ray	4	2	5	7	<1	<1
Sprat	2	<1	0	<1	0	0
Spurdog	0	0	0	<1	0	0
Starry ray	0	0	0	<1	0	1
Striped red mullet	1	0	<1	<1	<1	0
Three-bearded rockling	2	0	0	0	0	0
Tope	0	0	0	0	0	0
Turbot	0	3	0	0	0	0
Tub gurnard	19	8	0	3	4	<1
Whiting	54	14	1	190	31	2
Witch	0	0	0	2	1	<1

Table 2 (below) shows the differences between the STECF estimates of landings and discards and the Dutch data reported to STECF. The Dutch landings data submitted to the STECF database is based on the logbook information. It is unclear why there are (small) differences between the Dutch landings data submitted and contained in the STECF database. The discard information from STECF is based on data submitted by The Netherlands in combination with international fill-ins for unsampled strata. The Dutch discard data is based on the raising of sampled strata to the overall fleet level. There are some substantial differences in estimated discards between the Dutch discard data and the STECF discard data which is due to the fill-in procedure used in STECF to compensate for unsampled strata. STECF estimates of dab discards – and to a lesser extend plaice discards - are to a large extend based on fill-ins. Nevertheless, the STECF data were the only source available that could address all the main demersal species caught in European fisheries and were therefor used for the analyses presented below.

Table 3 details the 2010-2012 catch estimates for the overall (EU) fleet and the Dutch (NL) fleet. The Netherlands holds the majority share of the quota for sole, dab (+flounder) and turbot (+brill), roughly a third of the plaice quota, and minor shares of the cod and whiting quotas. Note that the quota are expressed as the initial quota as embedded in the TAC and quota agreements and do not take into account quota swaps with other countries. Over the period 2010-2012, plaice is the only species that the Dutch fleet has consistently landed in excess of the initial quota before swaps. For

sole, cod and whiting landings in all years were less than the quota shares held by the Dutch fleet. In the absence of brill and flounder landings estimates, the uptake of the turbot/brill and dab/flounder quotas cannot really be estimated.

Discarding ratios by the Dutch fleet on average exceeded those of the combined EU fleet for plaice, turbot and whiting and sole to a lesser extent (table 3). However, discard ratios of turbot are very low. Discarding rates for dab are very similar, perhaps as a result of the raising process used by STECF to derive total estimates (i.e. using discarding rates from sampled fleets to derive estimates for fleets with only landings data). The discard ratio for cod in the Dutch fleet is smaller than the EU fleet.

Table 4.a presents the results of the four scenarios of catch quota calculation. The four scenarios (described above) are presented in the top row and can be summarized as:

1. **TAC only -** the new catch-TACs are simple the same as the previous landings-TACs.
2. **NL catch -** the catch quotas will be set for each country according to their historical catches
3. **TAC + EU %disc -** catch quotas will be derived from the current landings-TAC adjusted up by the discards proportion of the European fleet
4. **EU landing + EU %disc -** catch quotas would be established based on historic catch statistics (i.e. landings+discards) and subsequent application of the current relative stability allocation key.

The years 2010 to 2012 and the average 2010-2012 are presented in the blocks from top to bottom. Each scenario consists of four columns: 1) the new catch quota, 2) the surplus of the new catch quota compared to the yearly catch of the Dutch fleet, 3) the relative change in from landing quota to catch quota and 4) the relative catch surplus, i.e. column 2 expressed relative to the yearly catch of the Dutch fleet, Values in green generally indicate that the estimated yearly catch of the Dutch fleet would have been lower than the newly calculated catch quota and values expressed in red indicate that the yearly catch would have been higher than the newly calculated catch quota. The rows for turbot and dab should be interpreted with great caution because the catches of brill and flounder could not be included in the analysis

The patterns across years are generally quite similar although there are some differences in the absolute magnitude of the differences between the newly calculated catch quota and the estimated catches. Under scenarios 1, 3 and 4, **plaice** and **whiting** catch quotas would likely have been insufficient for the Dutch fishery (assuming no significant change in selectivity). The same appears to hold true for **dab**, although the poor quality of the STECF discard estimates for this stock and the lack of flounder data, make it very difficult to make any definite statements regarding this stock.
Cod and **sole** catch quotas would have been sufficient under all scenarios except in scenario 4 where the discard ratio was applied to the landings.

Table 2. Comparison of landings and discards estimates (tonnes) from the STECF database (EWG 13-13) and from Dutch data submitted to STECF.

LANDINGS	2010			2011			2012		
Species	**STECF**	**NL**	**% Diff (STECF/NL)**	**STECF**	**NL**	**% Diff (STECF/NL)**	**STECF**	**NL**	**% Diff (STECF/NL)**
Sole	9133	9165	100%	7960	7995	100%	8823	8885	99%
Plaice	27227	27231	100%	28761	29074	99%	31610	32524	97%
Dab	5015	5056	99%	4627	4986	93%	3986	4519	88%
Turbot	1180	1180	100%	1495	1497	100%	1696	1718	99%
Cod	2541	2596	98%	1910	2325	82%	1855	2611	71%
Whiting	585	585	100%	519	569	91%	451	507	89%

DISCARDS	2010			2011			2012		
Species	**STECF**	**NL**	**% Diff (STECF/NL)**	**STECF**	**NL**	**% Diff (STECF/NL)**	**STECF**	**NL**	**% Diff (STECF/NL)**
Sole	1308	1070	122%	997	1310	76%	2084	1788	117%
Plaice	21342	25670	83%	42060	26300	160%	32702	23920	137%
Dab	39591	26420	150%	80599	21990	367%	28828	20032	144%
Turbot	2	10	21%	49	40	122%	101	92	110%
Cod	314	400	79%	200	230	87%	227	170	134%
Whiting	2897	1710	169%	790	1710	46%	2020	1612	125%

Table 3. Overview of total allowable catch (TAC) quotas, landings and discards for six different (demersal) species, combined for all countries (EU) and individually for the Netherlands (NL), including quota shares (%), for year 2010, 2011, 2012 and average 2010-2012. All quantities are in tonnes. The relative discard ratio indicates how Dutch discards compares to the overall discarding levels.

2010	EU					NL						
Species (North Sea)	**TAC**	**Landings**	**Discards**	**Catch**	**%Disc. EU (Disc/ Catch)**	**quota**	**quota %**	**Landings**	**Discards**	**Catch**	**%Disc. NL (Disc/ Catch)**	**Rel. Discard ratio NL/EU**
Sole	**14050**	12209	1514	13723	**11%**	**10571**	75%	9133	1308	**10441**	13%	**1.14**
Plaice	**63825**	58962	30124	89086	**34%**	**22907**	36%	27227	21342	**48569**	44%	**1.30**
Cod in IV	**33552**	25971	5131	31102	**16%**	**3219**	10%	2541	314	**2855**	11%	**0.67**
Whiting	**12897**	10784	12399	23182	**53%**	**599**	5%	585	2897	**3482**	83%	**1.56**
Dab /	**18810**	7061	52024	59085	**88%**	**11654**	62%	5015	39591	**44606**	89%	1.01
Flounder		#N/A	#N/A	#N/A	#N/A		#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
Turbot /	**4737**	2325	5	2330	**0%**	**2633**	56%	1180	2	**1182**	0%	**0.86**
Brill		#N/A	#N/A	#N/A	#N/A		#N/A	#N/A	#N/A	#N/A	#N/A	#N/A

2011	EU					NL						
Species (North Sea)	**TAC**	**Landings**	**Discards**	**Catch**	**%Disc. EU (Disc/ Catch)**	**Quotum**	**Quotum %**	**Landings**	**Discards**	**Catch**	**%Disc. NL (Disc/ Catch)**	**Rel. Discard ratio NL/EU**
Sole	**14100**	10394	1224	11617	**11%**	**10571**	75%	7960	997	**8957**	11%	1.06
Plaice	**73400**	64707	67974	132681	**51%**	**26485**	36%	28761	42060	**70821**	59%	**1.16**
Cod	**26842**	22510	3343	25854	**13%**	**2575**	10%	1910	200	**2110**	9%	**0.73**
Whiting	**14832**	18678	10787	29466	**37%**	**714**	5%	519	790	**1309**	60%	**1.65**
Dab /	**18434**	6611	106262	112873	**94%**	**11421**	62%	4627	80599	**85226**	95%	1.00
Flounder		#N/A	#N/A	#N/A	**#N/A**		#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
Turbot /	**4642**	2690	58	2748	**2%**	**2579**	56%	1495	49	**1544**	3%	**1.49**
Brill		#N/A	#N/A	#N/A	#N/A		#N/A	#N/A	#N/A	#N/A	#N/A	#N/A

NOTE: for Dab and Turbot the TAC and quota apply to a combination of species (dab and flounder; turbot and brill). However, landing and discard information only applies to the individual species (dab and turbot) because landing and discard information for flounder and brill are not available in the STECF data set.

Table 3 – continued

2012	EU					NL						
Species (North Sea)	**TAC**	**Landings**	**Discards**	**Catch**	**%Disc. EU (Disc/ Catch)**	**Quotum**	**Quotum %**	**Landings**	**Discards**	**Catch**	**%Disc. NL (Disc/ Catch)**	**Rel. Discard ratio NL/EU**
Sole	**16200**	11142	2428	13570	**18%**	**12151**	75%	8823	2084	**10907**	19%	1.07
Plaice	**84410**	69868	47296	117164	**40%**	**30462**	36%	31610	32702	**64312**	51%	**1.26**
Cod	**26475**	22260	4072	26331	**15%**	**2540**	10%	1855	227	**2082**	11%	**0.71**
Whiting	**17056**	12083	8489	20571	**41%**	**843**	5%	451	2020	**2471**	82%	**1.98**
Dab /	**18434**	5964	43934	49898	**88%**	**11421**	62%	3986	28828	**32814**	88%	1.00
Flounder		#N/A	#N/A	#N/A	**#N/A**		#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
Turbot /	**4642**	2869	120	2989	**4%**	**2579**	56%	1696	101	**1797**	6%	**1.40**
Brill		#N/A	#N/A	#N/A	#N/A		#N/A	#N/A	#N/A	#N/A	#N/A	#N/A

Avg. 2010-2012	EU					NL						
Species (North Sea)	**TAC**	**Landings**	**Discards**	**Catch**	**%Disc. EU (Disc/ Catch)**	**Quotum**	**Quotum %**	**Landings**	**Discards**	**Catch**	**%Disc. NL (Disc/ Catch)**	**Rel. Discard ratio NL/EU**
Sole	**14783**	11248	1722	12970	**13%**	**11098**	75%	8639	1463	**10102**	14%	1.09
Plaice	**73878**	64513	48464	112977	**43%**	**26618**	36%	29199	32035	**61234**	52%	**1.22**
Cod	**28956**	23580	4182	27762	**15%**	**2778**	10%	2102	247	**2349**	11%	**0.70**
Whiting	**14928**	13848	10558	24406	**43%**	**719**	5%	518	1902	**2421**	79%	**1.82**
Dab /	**18559**	6545	67407	73952	**91%**	**11499**	62%	4543	49672	**54215**	92%	1.01
Flounder		#N/A	#N/A	#N/A	**#N/A**		#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
Turbot /	**4674**	2628	61	2689	**2%**	**2597**	56%	1457	51	**1508**	3%	**1.48**
Brill		#N/A	#N/A	#N/A	#N/A		#N/A	#N/A	#N/A	#N/A	#N/A	#N/A

NOTE: for Dab and Turbot the TAC and quota apply to a combination of species (dab and flounder; turbot and brill). However, landing and discard information only applies to the individual species (dab and turbot) because landing and discard information for flounder and brill are not available in the STECF data set.

Table 4.a Scenarios of alternative methods of setting catch quotas and the implications of these for the Dutch demersal fishery for four main species for the years 2010-2012.

2010	1. Catch quota: TAC only				2. Catch quota: NL catch				3. Catch quota: TAC + EU %disc				4. Catch quota: EU landing + EU %disc			
Species (North Sea)	Catch quota	Surplus (NL quota-NL catch)	Quota change	Rel. catch surplus (surplus/ NL catch)	Catch quota	Surplus (NL quota-NL catch)	Quota change	Rel. catch surplus (surplus/ NL catch)	Catch quota	Surplus (NL quota-NL catch)	Quota change	Rel. catch surplus (surplus/ NL catch)	Catch quota	Surplus (NL quota-NL catch)	Quota change	Rel. catch surplus (surplus/ NL catch)
Sole	**10571**	130	**1.0**	1%	**10441**	0	**1.0**	0%	**11882**	1441	**1.1**	14%	**10325**	**-116**	**1.0**	-1%
Plaice	**22907**	**-25662**	**1.0**	-53%	**48569**	0	**2.1**	0%	**34610**	**-13958**	**1.5**	-29%	**31973**	**-16595**	**1.4**	-34%
Cod	**3219**	364	**1.0**	13%	**2855**	0	**0.9**	0%	**3855**	1000	**1.2**	35%	**2984**	129	**0.9**	5%
Whiting	**599**	**-2883**	**1.0**	-83%	**3482**	0	**5.8**	0%	**1288**	**-2194**	**2.1**	-63%	**1077**	**-2405**	**1.8**	-69%

2011	1. Catch quota: TAC only				2. Catch quota: NL catch				3. Catch quota: TAC + EU %disc				4. Catch quota: EU landing + EU %disc			
Species (North Sea)	Catch quota	Surplus (NL quota-NL catch)	Quota change	Rel. catch surplus (surplus/ NL catch)	Catch quota	Surplus (NL quota-NL catch)	Quota change	Rel. catch surplus (surplus/ NL catch)	Catch quota	Surplus (NL quota-NL catch)	Quota change	Rel. catch surplus (surplus/ NL catch)	Catch quota	Surplus (NL quota-NL catch)	Quota change	Rel. catch surplus (surplus/ NL catch)
Sole	**10571**	1614	**1.0**	18%	**8957**	0	**0.8**	0%	**11815**	2859	**1.1**	32%	**8710**	**-247**	**0.8**	-3%
Plaice	**26485**	**-44336**	**1.0**	-63%	**70821**	0	**2.7**	0%	**54307**	**-16514**	**2.1**	-23%	**47876**	**-22946**	**1.8**	-32%
Cod	**2575**	465	**1.0**	22%	**2110**	0	**0.8**	0%	**2957**	847	**1.1**	40%	**2480**	370	**1.0**	18%
Whiting	**714**	**-595**	**1.0**	-45%	**1309**	0	**1.8**	0%	**1126**	**-183**	**1.6**	-14%	**1418**	109	**2.0**	8%

2012	1. Catch quota: TAC only				2. Catch quota: NL catch				3. Catch quota: TAC + EU %disc				4. Catch quota: EU landing + EU %disc			
Species (North Sea)	Catch quota	Surplus (NL quota-NL catch)	Quota change	Rel. catch surplus (surplus/ NL catch)	Catch quota	Surplus (NL quota-NL catch)	Quota change	Rel. catch surplus (surplus/ NL catch)	Catch quota	Surplus (NL quota-NL catch)	Quota change	Rel. catch surplus (surplus/ NL catch)	Catch quota	Surplus (NL quota-NL catch)	Quota change	Rel. catch surplus (surplus/ NL catch)
Sole	**12151**	1244	**1.0**	11%	**10907**	0	**0.9**	0%	**14799**	3891	**1.2**	36%	**10179**	**-729**	**0.8**	-7%
Plaice	**30462**	**-33850**	**1.0**	-53%	**64312**	0	**2.1**	0%	**51083**	**-13229**	**1.7**	-21%	**42282**	**-22030**	**1.4**	-34%
Cod	**2540**	458	**1.0**	22%	**2082**	0	**0.8**	0%	**3005**	923	**1.2**	44%	**2526**	444	**1.0**	21%
Whiting	**843**	**-1628**	**1.0**	-66%	**2471**	0	**2.9**	0%	**1435**	**-1036**	**1.7**	-42%	**1017**	**-1454**	**1.2**	-59%

Avg. 2010-2012	1. Catch quota: TAC only				2. Catch quota: NL catch				3. Catch quota: TAC + EU %disc				4. Catch quota: EU landing + EU %disc			
Species (North Sea)	Catch quota	Surplus (NL quota-NL catch)	Quota change	Rel. catch surplus (surplus/ NL catch)	Catch quota	Surplus (NL quota-NL catch)	Quota change	Rel. catch surplus (surplus/ NL catch)	Catch quota	Surplus (NL quota-NL catch)	Quota change	Rel. catch surplus (surplus/ NL catch)	Catch quota	Surplus (NL quota-NL catch)	Quota change	Rel. catch surplus (surplus/ NL catch)
Sole	**11098**	996	**1.0**	10%	**10102**	0	**0.9**	0%	**12796**	2695	**1.2**	27%	**9736**	**-365**	**0.9**	-4%
Plaice	**26618**	**-34616**	**1.0**	-57%	**61234**	0	**2.3**	0%	**46615**	**-14619**	**1.8**	-24%	**40705**	**-20529**	**1.5**	-34%
Cod	**2778**	429	**1.0**	18%	**2349**	0	**0.8**	0%	**3271**	922	**1.2**	39%	**2663**	314	**1.0**	13%
Whiting	**719**	**-1702**	**1.0**	-70%	**2421**	0	**3.4**	0%	**1267**	**-1154**	**1.8**	-48%	**1175**	**-1246**	**1.6**	-51%

Table 4.b Scenarios of alternative methods of setting catch quotas and the implications of these for the Dutch demersal fishery for dab, flounder, turbot and brill for the years 2010-2012. For Dab and Turbot the TAC and quota apply to a combination of species (dab and flounder; turbot and brill). However, landing and discard information only applies to the individual species (dab and turbot) because no landing and discard information for flounder and brill is available

2010	1. Catch quota: TAC only				2. Catch quota: NL catch				3. Catch quota: TAC + EU %disc				4. Catch quota: EU landing + EU %disc			
Species (North Sea)	**Catch quota**	**Surplus (NL quota-NL catch)**	**Quota change**	**Rel. catch surplus (surplus/NL catch)**	**Catch quota**	**Surplus (NL quota-NL catch)**	**Quota change**	**Rel. catch surplus (surplus/NL catch)**	**Catch quota**	**Surplus (NL quota-NL catch)**	**Quota change**	**Rel. catch surplus (surplus/NL catch)**	**Catch quota**	**Surplus (NL quota-NL catch)**	**Quota change**	**Rel. catch surplus (surplus/NL catch)**
Dab /	**11654**	**-32952**	**1.0**	-74%	**44606**	0	**3.8**	0%	**97515**	52909	**8.4**	119%	**36607**	**-7999**	**3.1**	-18%
Flounder		#N/A	#N/A	#N/A		#N/A	#N/A	#N/A		#N/A	#N/A	#N/A		#N/A	#N/A	#N/A
Turbot /	**2633**	1451	**1.0**	123%	**1182**	0	**0.4**	0%	**2639**	1456	**1.0**	123%	**1295**	113	**0.5**	10%
Brill		#N/A	#N/A	#N/A		#N/A	#N/A	#N/A		#N/A	#N/A	#N/A		#N/A	#N/A	#N/A

2011	1. Catch quota: TAC only				2. Catch quota: NL catch				3. Catch quota: TAC + EU %disc				4. Catch quota: EU landing + EU %disc			
Species (North Sea)	**Catch quota**	**Surplus (NL quota-NL catch)**	**Quota change**	**Rel. catch surplus (surplus/NL catch)**	**Catch quota**	**Surplus (NL quota-NL catch)**	**Quota change**	**Rel. catch surplus (surplus/NL catch)**	**Catch quota**	**Surplus (NL quota-NL catch)**	**Quota change**	**Rel. catch surplus (surplus/NL catch)**	**Catch quota**	**Surplus (NL quota-NL catch)**	**Quota change**	**Rel. catch surplus (surplus/NL catch)**
Dab /	**11499**	**-42716**	**1.0**	-79%	**54215**	0	**4.7**	0%	**129914**	75699	**11.3**	140%	**45818**	**-8397**	**4.0**	-15%
Flounder		#N/A	#N/A	#N/A		#N/A	#N/A	#N/A		#N/A	#N/A	#N/A		#N/A	#N/A	#N/A
Turbot /	**2597**	1089	**1.0**	72%	**1508**	0	**0.6**	0%	**2657**	1150	**1.0**	76%	**1494**	**-13**	**0.6**	-1%
Brill		#N/A	#N/A	#N/A		#N/A	#N/A	#N/A		#N/A	#N/A	#N/A		#N/A	#N/A	#N/A

2012	1. Catch quota: TAC only				2. Catch quota: NL catch				3. Catch quota: TAC + EU %disc				4. Catch quota: EU landing + EU %disc			
Species (North Sea)	**Catch quota**	**Surplus (NL quota-NL catch)**	**Quota change**	**Rel. catch surplus (surplus/NL catch)**	**Catch quota**	**Surplus (NL quota-NL catch)**	**Quota change**	**Rel. catch surplus (surplus/NL catch)**	**Catch quota**	**Surplus (NL quota-NL catch)**	**Quota change**	**Rel. catch surplus (surplus/NL catch)**	**Catch quota**	**Surplus (NL quota-NL catch)**	**Quota change**	**Rel. catch surplus (surplus/NL catch)**
Dab /	**11421**	**-21393**	**1.0**	-65%	**32814**	0	**2.9**	0%	**95547**	62733	**8.4**	191%	**30915**	**-1899**	**2.7**	-6%
Flounder		#N/A	#N/A	#N/A		#N/A	#N/A	#N/A		#N/A	#N/A	#N/A		#N/A	#N/A	#N/A
Turbot /	**2579**	782	**1.0**	44%	**1797**	0	**0.7**	0%	**2686**	890	**1.0**	50%	**1661**	**-136**	**0.6**	-8%
Brill		#N/A	#N/A	#N/A		#N/A	#N/A	#N/A		#N/A	#N/A	#N/A		#N/A	#N/A	#N/A

Avg 2010-2012	1. Catch quota: TAC only				2. Catch quota: NL catch				3. Catch quota: TAC + EU %disc				4. Catch quota: EU landing + EU %disc			
Species (North Sea)	**Catch quota**	**Surplus (NL quota-NL catch)**	**Quota change**	**Rel. catch surplus (surplus/NL catch)**	**Catch quota**	**Surplus (NL quota-NL catch)**	**Quota change**	**Rel. catch surplus (surplus/NL catch)**	**Catch quota**	**Surplus (NL quota-NL catch)**	**Quota change**	**Rel. catch surplus (surplus/NL catch)**	**Catch quota**	**Surplus (NL quota-NL catch)**	**Quota change**	**Rel. catch surplus (surplus/NL catch)**
Dab /	**11499**	**-42716**	**1.0**	-79%	**54215**	0	**4.7**	0%	**129914**	75699	**11.3**	140%	**45818**	**-8397**	**4.0**	-15%
Flounder		#N/A	#N/A	#N/A		#N/A	#N/A	#N/A		#N/A	#N/A	#N/A		#N/A	#N/A	#N/A
Turbot /	**2597**	1089	**1.0**	72%	**1508**	0	**0.6**	0%	**2657**	1150	**1.0**	76%	**1494**	**-13**	**0.6**	-1%
Brill		#N/A	#N/A	#N/A		#N/A	#N/A	#N/A		#N/A	#N/A	#N/A		#N/A	#N/A	#N/A

Discussion

The new Common Fisheries Policy (CFP)sets out an obligation to land all catches of quota-regulated species and count them against an existing landing or catch quota. The new CFP also specifies that there may be additional quota agreed to accommodate for the current discards that should be counted against the quota in the future. The CFP does not specify how these catch quota should be calculated. There are many different ways of how catch quota could be determined and allocated. This report does not aim to predict how catch quotas *will* be calculated or *should* be calculated. Nor does it specify how the additional bycatch quota *should* be allocated amongst participants in the fishery, nor how the *de minimis exemptions* will be applied. It is provided merely as background information with potential scenarios how it *could* be done.

More importantly, the report does not deal with potential behavioural responses in the fisheries following a change from landing quota to catch quota. One may expect that a fundamental change from a 'requirement to discard' to a 'requirement to land' will have a substantial influence on how individual fishermen will operate in the new system. However, these effects are not included in this report.

Data

There are three data sources that provide the underpinning of this report:

1. Annual TAC and quota regulations
2. STECF dataset on landings and discards (STECF EWG 13-13)
3. Dutch dataset on landings and discards submitted to STECF EWG 13-13.

The focus in this report is on the key demersal species in the North Sea that are of interest to the Dutch fisheries. The TAC and quota information is derived directly from the TAC and quota regulations (i.e. quota before swaps). for Dab and Turbot the TAC and quota apply to a combination of species (dab and flounder; turbot and brill). However, landing and discard information only applies to the individual species (dab and turbot) because landing and discard information for flounder and brill are not available in the STECF data set. Therefore the scenarios for dab and turbot cannot be used to assess the potential catchquota for those species. They are only presented as a very rough indication of possible order of magnitudes for catch quot for these species.

The landing information that underpins this report is generally consistent between different data sources. However, there are substantial discrepancies between the discard information contained in the Dutch submission to STECF and the final estimates contained in the STECF database. This is due to the fill-in procedure used in STECF where strata that do not have discard information provided by the country, are filled in based on average discard ratios of similar strata for other countries. The fill-in procedure attempts to generate as far as possible a consistent dataset. Although it does run the risk of raising discard data based on very small sample size, the STECF data is currently the only source that generates an EU wide perspective on landings and discards. It can be anticipated that the STECF will play a major role in the future decision-making on catch quota.

Catch quota calculation scenarios

Four different scenarios for catch quota calculation have been analysed in this report:

1. **TAC only -** the new catch-TACs are simple the same as the previous landings-TACs.
2. **NL catch -** the catch quotas will be set for each country according to their historical catches
3. **TAC + EU %disc -** catch quotas will be derived from the current landings-TAC adjusted up by the discards proportion of the European fleet
4. **EU landing + EU %disc -** catch quotas would be established based on historic catch statistics (i.e. landings+discards) and subsequent application of the current relative stability allocation key.

Scenario 1 (current TAC) indicates that for plaice and whiting, the Dutch fleets exceed the current quota. This is due to the high discard ratios for these species. Because of the recent underutilisation of the Dutch quota for sole and cod, the direct transfer of TACs to catch quota would not be limiting for the Dutch fleet.

Scenario 2 (current catch) essentially allows fishing to continue as it is at present because national catches (landings and discards) are simply treated as the new catch quota. In cases where discard survival is not negligible, this scenario could actually lead to an increase in overall fishing mortality because of the high amount of fish removed from the system.

Scenario 3 (TAC + EU discard %) is often referred to as a likely scenario to be applied, whereby some suggest that only a certain proportion (e.g. 75%) of the current discard ratio would be added to the current landings TAC. If relative stability is to be adhered to, then this scenario is expected to create limiting conditions for Dutch bycatches of plaice and whiting . This is because nations that have a relatively low discarding ratio are likely to receive a greater increase in TAC than their current discard levels. And nations that discard at a higher ratio than the overall average would not get enough additional quota to cover their current levels of discarding.

Scenario 4 (EU landing + EU discard %) investigates a slightly different type of change on top of a possible catch-quota system. In this scenario, catch quota are brought in line with current landings and thereby remove paper quota or precautionary TACs[1]. For certain stocks (e.g. North Sea horse mackerel), not all nations fully utilise their available quota and the differences per country can be substantial. The consequences therefore vary largely per country. If the catch quotas are set as the current total landings plus a discard proportion, then all the countries fully landing their share would see a notable reduction in their allowable catch because one (or a few) other nations have not recently landed their full share. In the case of sole, the Netherlands has not fully utilised its quota in recent years and applying this method would seem to have little negative effect because this functions as a type of buffer. For plaice, the situation would be the reverse, because landings have been generally higher than the national quota, facilitated through quota swaps with countries which have underutilised their plaice quota. The plaice TAC has been underutilised by all countries combined and this would thus lead to a reduction in overall TAC and in Dutch quota. In addition, the system of banking and borrowing that is in place for some stocks currently provides the industry

[1] Note that in the past 'precautionary TACs' were set for some species to prevent expansion of the fishery to those species. The precautionary TACs were not based on analytical assessments but rather as an upper cap of historical landings. They were by definition higher than the actual landings.

some flexibility in utilisation of their quota. The current scenario would have an unintended 'side effect' because underutilisation would be penalised.

It is uncertain how the catch quota will be determined for stocks that are currently managed under joint TACs (e.g. turbot/brill and dab/flounder). It could prove particularly difficult to determine if the jointly managed stocks have different discard rates and different economic value.

Implications of catch-quota for the Dutch fishery for different species

Under the scenarios examined, the introduction of a catch quota system would potentially be most limiting for the fishery on plaice and whiting. It could also prove to be potentially limiting for the fisheries on sole. It could be potentially beneficial for the fisheries catching cod.

Sole
Even though the Dutch discard ratio is only slightly higher than the rest of fleet, new sole quotas could be restrictive for the Dutch fleet given their large quota share. The likely impacts on the Dutch fleet are less obvious looking at the period 2010-2012 since the Dutch fleet landed less than its quota share in these years. There are indications of sole discard rates exceeding 15% in certain years. However, the current assessment of sole ignores discarding due to a lack of a historic time series. Hence, the current advice from ICES does not consider discards when deciding on the level of catch that should correspond to the appropriate F level as laid out in the agreed management plan for the stock. The introduction of catch quota for sole should thus go hand in hand with including discards in the assessment.

Plaice
New plaice quotas are likely to be restrictive for the Dutch fleet due to a large quota share, high discard ratios, and a higher discard ratio than the overall ratio. Plaice is discarded in large quantities by the Dutch fleet. The Dutch discard ratio exceeds the overall average implying that the likely increase in national quota to accommodate the landing of previously discarded fish would not be sufficient. Discarding of plaice is largely due to the overlap in distribution of marketable sized sole and undersized plaice. By changing to substantially larger mesh sizes and fishing further north of the Dutch coastline, it would be possible to decrease the quantity of discarded plaice but only at the expense of the catch of marketable sole.

Cod
Though the Dutch fleets only have a small proportion of the overall TAC, they land less than their available quota and discard at a lower ratio than other nations. Hence, future catch quotas are unlikely to be restrictive for the Dutch fleets. In none of the last three years has the Dutch discard ratio of cod exceeded the stock average. This suggests that should the additional bycatch quota be divided equally among participating fishing nations, then the Netherlands would receive a relatively large quota compensation to cover level of discarding currently experienced.

Whiting
The Dutch fleet only holds a small proportion of the whiting TAC and the Dutch discard ratio for this stock is significantly higher than those of the other fleets. This could lead to new catch quota that is lower than the current TAC for the Dutch fleet. The low landings (lower than the quota share) suggest that this stock could be less problematic than plaice for example.

Dab

The discard rates for dab are very high. Unfortunately it is not possible to compare estimated discarding rates between countries because the data raising procedures in STECF blurs any differences between countries. Atlhough there is a combined TAC for dab and flounder, the high level of discarding of dab suggests that it could still be an economically problematic species for the fishery following the implementation of a discard ban. The sheer quantities caught would take up substantial storage space on-board could otherwise be used for marketable fish and would potentially require more frequent return trips to offload landings. Landings of this stock are insignificant in relation to discards. Should a catch quota be implemented for this stock, it could be considered to use historical *catches* rather than *landings* when dividing this up between nations and fleets.

Turbot

Proportionally, the Dutch fleets have a much higher discarding ratio than other nations, but the amount of discards is very low. It is difficult to evaluate how restrictive the catch TAC for this stock could be to the Dutch fishery without considering the extent of brill discarding.

Skates and rays

There was insufficient information in the STECF data to answer questions regarding these species. This is probably due to an misspecification of the category RAJ (all ray species combined) whereas several member states submitted data by individual ray species. Quick examination of the Dutch data for 2011 suggest that discarding of these species is relatively low compared to the quota and that the Dutch fleet is generally landing less than the quota.

De minimis exemptions
STECF 13-16 has shown that the *de minimis* rules in article 15 can be interpreted in many different ways (STECF 2013). *De minimis* could for example apply at an individual member state level or across several states involved in a fishery or region. Similarly, it could apply at the individual species level or for all species combined. At an operational level it could apply at an individual vessel, fleet, member state or regional (multi- state) level.

Because of these uncertainties, it is not possible at present to determine whether or not the *de minimis* exemptions will apply to the Dutch fisheries. However, in our interpretation of the text this would not have an effect on the calculations of the catch quota. The *de minimis* exemptions provide for the possibility to discard a limited amount of fish, which will not be subtracted from the catch quota, but which needs to be carefully documented.

Quality Assurance

IMARES utilises an ISO 9001:2008 certified quality management system (certificate number: 124296-2012-AQ-NLD-RvA). This certificate is valid until 15 December 2015. The organisation has been certified since 27 February 2001. The certification was issued by DNV Certification B.V. Furthermore, the chemical laboratory of the Fish Division has NEN-EN-ISO/IEC 17025:2005 accreditation for test laboratories with number L097. This accreditation is valid until 1th of April 2017 and was first issued on 27 March 1997. Accreditation was granted by the Council for Accreditation.

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Justification

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The scientific quality of this report has been peer reviewed by the a colleague scientist and the head of the department of IMARES.

Approved: Dr. J.A.M. Craeymeersch
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Date: 20th of May

Approved: Dr. ir. N.A. Steins
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Date: 20th of May