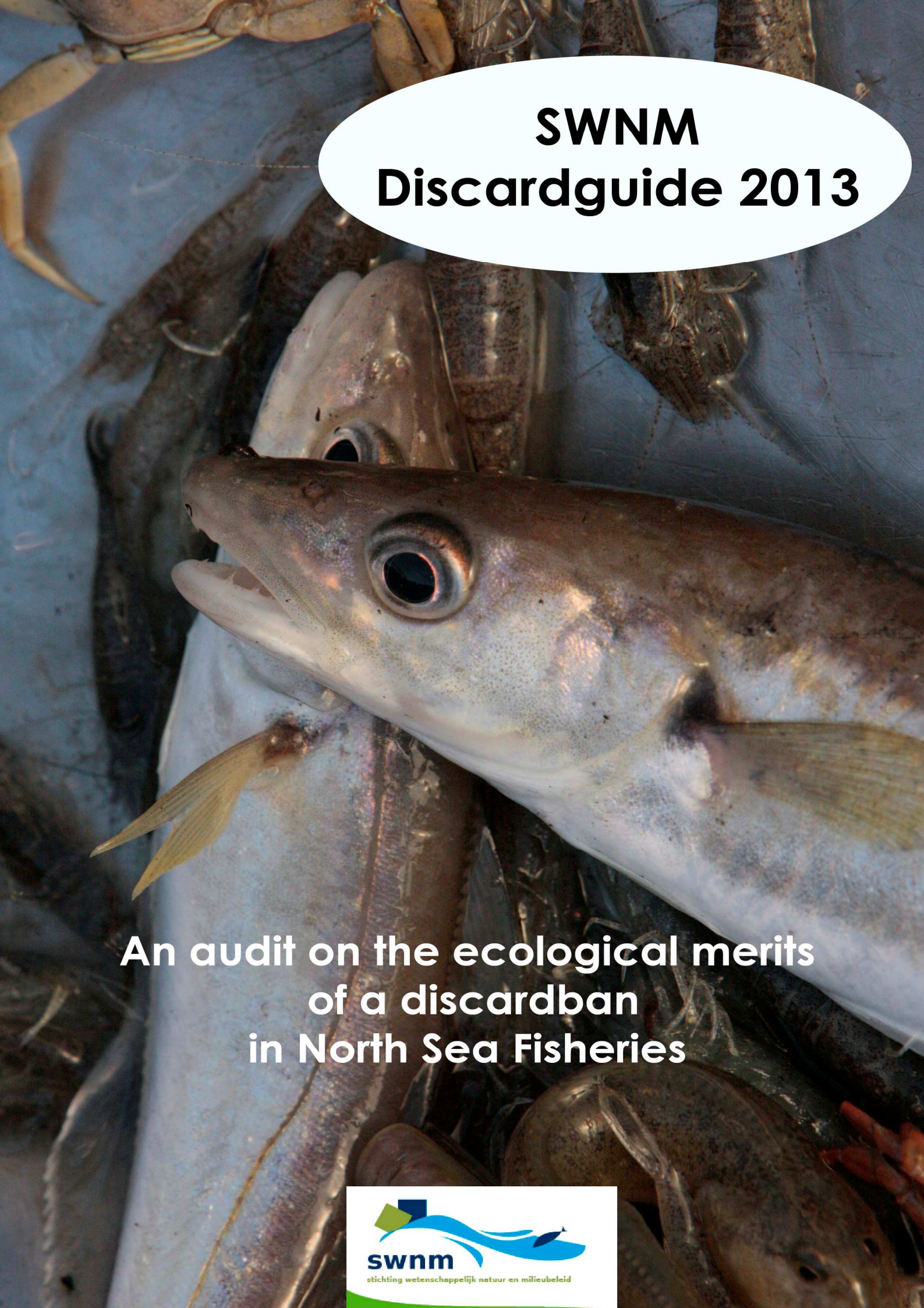

SWNM Discardguide 2013

An audit on the ecological merits of a discardban in North Sea Fisheries

swnm
stichting wetenschappelijk natuur en milieubeleid

CONTENT

The SWNM – Foundation for a Scientific Nature & Environmental Policy- is a grassroots Dutch NGO supported by fishermen who endorse environmental policies based on verifiable facts and knowledge of fisheries practices. It promotes a view of sustainable use of natural resources based on sound biology. The SWNM advisory board consists of academics with a life-time experience in fisheries biology and research.

The SWNM was founded in 2002 by the Dutch farmer Jan van de Geest. His cows were poisoned by sewage overflow, released from the sewer to surface waters by the Dutch Waterboard in episodes of high rainfall. Van de Geest filed a complaint to the Waterboard, but was ridiculed by government officials and many of his opponents. After all, he was 'only a farmer'. Van de Geest won his courtcase by issuing independent academic research on water quality, motivated by his dedication to factfinding and truth. After Van de Geest received compensation by the Waterboard, the problems of water pollution by sewage overflow came high on the national agenda.

Website: www.swnm.nl

Text, images and research:
www.rypkezeilmaker.nl nature/sciencewriter ©2013

1. Why this audit of the Discardban by the SWNM?

On 6 February 2013 the European Parliament (EP) voted for a ban on discards in fisheries in EU-member states: the obligation to dump all bycatch on shore where it is prohibited to be sold for human consumption[1]. According to the most common definition introduced by FAO, discards are all biomass that are cast over board- dead or alive. The discardban was labelled as the most significant change in the European Common Fisheries Policy (CFP) by the North Sea Regional Council. (NSRAC) [2] since it's adoption in 1983- after German socialist EPM Ulrike Rodust of the PECH-committee published her report on CFP-reform. [3] According to NSRAC the goal of fisheries policy should be to improve fish stocks, a discardban should not be a goal in itself.

The SWNM finds a distinction between political assumptions on the merits of a discardban, and the expected ecological result in practice of many different types of North Sea fisheries. A more neutral reading of the relevant scientific literature and advice from international fisheries experts, justifies a critical reflection on the proposed measures. It was the European Commission that failed for 30 years to implement practical and effective policies for reducing bycatch[4], while many fisheries and biologists developed own initiatives. If differences in types of fisheries practices are ignored, and survival rates of discarded fish species, the discardban can have a destructive ecological and economic outcome.

2. What is the aim of the Discardban?

One of the widely advertised motivations of a discardban and CFP-reform by politicians is that this would 'end overfishing', meaning economic overfishing [5]. The ban obliges fishermen to land all bycatch, for example target species under the Minimal Landing Size (MLS) allowed by European regulations. In plaice in North Sea fisheries the MLS is set at 27 cm, in sole 24 cm based on data of historical sizes in adults (4 yr) in the eighties. The weight in biomass of bycatch is then deducted from the quota of the target species. The loss of income and introduction of on board camera inspection (CCTV) caused by the measure would thus motivate fishermen to fish more sustainable, according to political proponents. Starting in 2014, pelagic fisheries are obliged to land all bycatch, followed by cod- hake- and plaice-fisheries in 2015. In 2016 the rest of the North Sea trawling fleet is to follow.

There is consensus both among fisheries biologists and fishermen, that high discard rates are a waste of economic and ecological resources[6]. The assumption made by politicians and managers[7] is that all discards in all fisheries die when cast overboard, and thus have a negative effect on populations. Thus banning discards would have a positive effect. However, in many cases fisheries scientists lack reliable data to judge effects of fisheries policies, and proper data on a relation between bycatch rates and health of fish stocks[8]. There is a high uncertainty bar of tens of percents in discard rates in the same types of fisheries, leading to under- or overrating it's ecological effects[9].

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[1] In Spain hake bycatch in nephrops fisheries under MLS is landed and sold for human consumption

[2] http://www.nsrac.org/wp-content/uploads/2012/03/NSRAC-1112-8-Discards-Policy-DRAFT-1.pdf
Position Paper: Discards Policy Paper Number: 1112-8

[3] February 2012 Rodust report; on the proposal for a regulation of the European Parliament and of the Council on the Common Fisheries Policy (COM(2011)0425 – C7-0198/2011 – 2011/0195(COD))

[4] Dr Dolf Boddeke Dutch fisheries biologist personal communication. Dr. Boddeke was part of the STCF for 13 years , the Scientific and Techncal Comitee for Fisheries of DG14 EU and member of the Advisory Committe for Fishery Management ACFM of ICES.

[5] The press release by the marketing office of the European Parliament cites Ulrike Rodust http://www.europa-nu.nl/id/vj6xjpc4u9xa/nieuws/ep_tegen_overbevissing_en

[6] Jose M. Bellido, M. Begoña Santos, M. Grazia Pennino, Xulio Valeiras, Graham J. Pierce (2011) Fishery discards and bycatch: solutions for an ecosystem approach to fisheries management? Hydrobiologia July 2011, Volume 670, Issue 1, pp 317-333

[7] https://zoek.officielebekendmakingen.nl/kst-31748-2.html The assumption is based on generalisation of all fisheries and a limited number of studies. In Dutch fisheries on sole and plaice less than 10 percent of discards survive after being cast overboard. The Dutch advisory body that audits financial effects of policy measures by government– Algemene Rekenkamer- cites a report by Imares in 2007 for this number. They cite one study by Van Beek in 1990: the high mortality in the study appears after four days in an experimental set up on deck of a fishing vessel in water of 16 degrees. Mortality is reduced significantly in different circumstances and could partly be a result of stress as the authors admit, exhaustion and malnutrition. In many other fisheries, like shrimp fisheries in the Dutch Wadden Sea problems with mortality of young plaice and sole bycatch have been solved by fisheries research institute RIVO 3 decades ago.

[8] The GAP-project of marine research institute Imares acknowledges objections of fishermen to the quality of their data and research and strives to improve this: http://gap2.eu/case-studies/case-study-12/ A logical deduction is that when even single species assessments lack appropriate data, the Ecosystem Approach advertised through Ospar and European Commission demands a pile of ecological knowledge that scientists are unable to deliver. The ecosystem approach- according tot fisheries biologist dr Ray Hilborn- 'means many different things to many people'

[9] http://sih.ifremer.fr/content/download/7991/54353/file/Discard_workshop_draft_1.pdf
'Discarding rates are often not very well estimated or they are totally unknown. In such cases discards may represent a major source of uncertainty about the real fishing mortality rates exerted on stock/stocks.'

3. Which discard rates in fisheries are most cited on global level and for the North Sea region?
One can find any suitable discard rate that supports the necessity of a chosen political agenda, without addressing the root cause of various discard rates in different fisheries. In 2005 the FAO[10] issued a new report on discards in fisheries, because it felt the numbers of their 1994 report were outdated. It restated the global rates of discarding to 8 percent of total catch, in contrast to the 20+% from the first report. High discard rates from the first report were '*frequently cited by various advocacy groups to decry the state of the world's fisheries and the use of terms such as "dirty fishing*" *merely undermines the considerable efforts and investments of many responsible fishers'*, according to FAO in 2005[11]. With advances made by the industry, the data from the 2005-report- dating from 1992 to 2001- again ask for a revision more in accordance with modern practices.

For beam trawl fisheries in the North Sea, the FAO mentions a discard-rate of 68,7 percent in weight [12]based on data from the 90's. Based on more recent data, marine institute Imares downrates these numbers for different type of Dutch trawlers and fisheries in it's advisory document on fisheries policy to Dutch Parliament[13]. Shrimp fisheries had 62 percent discards for 2009 and 2010, with 38 percent of discardweight consisting of undersized target species. Pelagic fisheries on mackerel had 16-37 percent discard rates, horse mackerel less then 1 percent. Sole fisheries with bottom trawlers using mesh sizes of 80 millimeter had discard rates varying around 10 percent from 1976 to 2008. Discarding rates among plaice-trawlers are significantly higher, with rates varying between 20 and 57 percent.

4. Are discard rates in North Sea fisheries among the highest of the world?
According to FAO in 2005 the *weight* of discarded bycatch of the North Sea trawling fleet in 1992-2001 was 300.000 tonnes, more than Japan. This weight in the '90s is cited by some advocating the European

[10] Kelleher, K. (2005) Discards in the world's marine fisheries. An update. FAO Fisheries Technical Paper. No. 470. Rome, FAO. 2005. 131p.
[11] DL Alverson in Kelleher (2005) forword: 'it is disturbing to note that so many scientists revert to 15-year old data in order to document possible current discard levels. **These old estimates are frequently cited by various advocacy groups to decry the state of the world's fisheries and the use of terms such as "dirty fishing" merely undermines the considerable efforts and investments of many responsible fishers.** A leading example is the Dutch brown shrimp trawling fleet in the Wadden Sea that solved problems of dead bycatch of young plaice and sole 30 years ago by introducing new equipment in sorting
[12] Kelleher, K (2005) Table 19 annex A.
[13] Mascha Rasenberg, Sebastian Uhlmann, Erik Buisman (2011) Aanlandingsplicht Werkdocument C151/11

discardban[14], claiming it is 13 percent of global discards 'on just 0,2 percent of the ocean surface'. However, a high discarded *weight* - in contrast to high discard*percentage*- not necessarily points to more unsustainable fisheries practice than other regions[15]: it points to a greater catch effort in the FAO-sample period, and the well known fact that the North Sea was more productive than other regions. Catch effort is related tot fleet size and environmental factors influencing productivity of the sea, both natural and anthropogenic.
The FAO-number on discarded weight by North Sea Beam trawlers can no longer be cited as a reflection of current practices, to advocate various agendas targeting 'overfishing'. The early nineties marked a North Sea with higher primary production in the coastal zone, and better recruitment for flatfish with nursery areas in the coastal zone. Higher primary and secondary production in the Dutch coastal zone was related to the higher load of dissolved phosphates from the Rhine, Schelde, and the Elbe in Germany[16] [17] The growth rate of both plaice and sole was related to higher productivity, correlating strongly with the load of dissolved phosphorous. [18][19]Both species are the major target species of the Dutch trawling fleet.

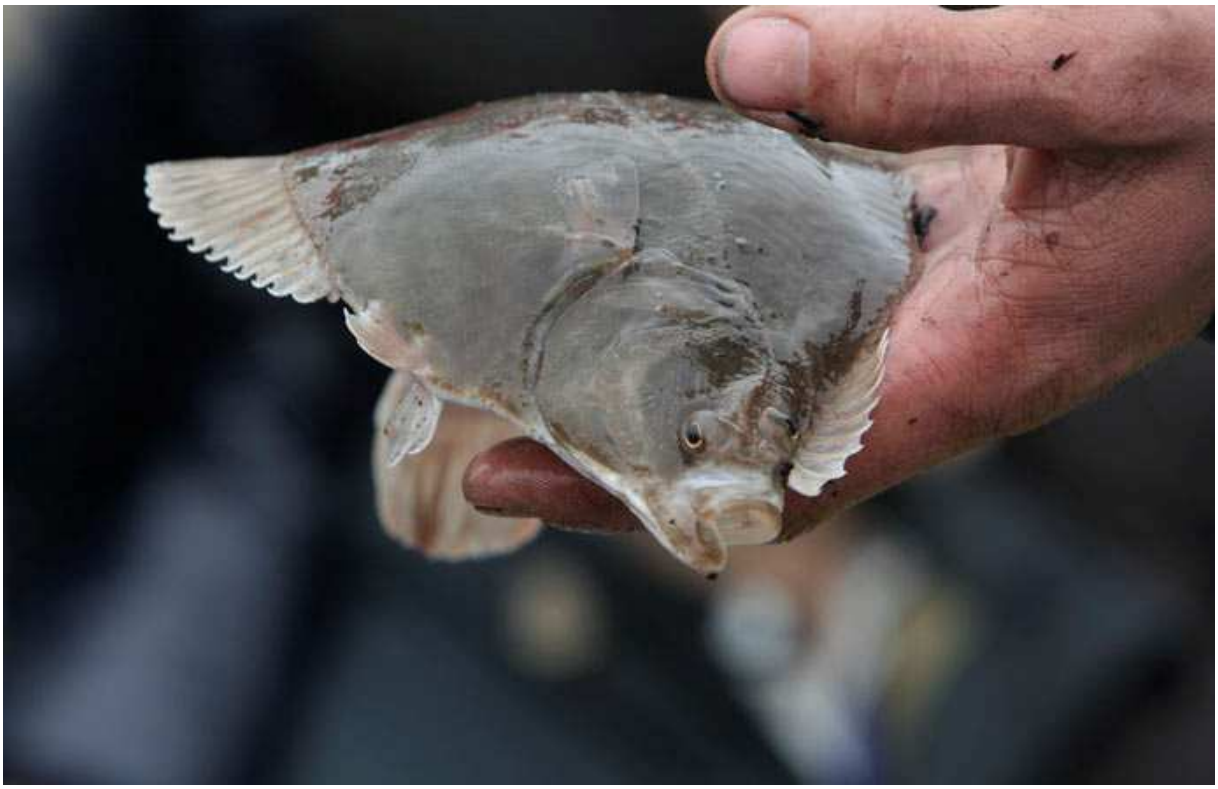
5. Did changing environmental factors in the North Sea significantly influence discarded weight?
In the period from 1985 to 1990 annual landings of North Sea sole had increased 2-fold from the late '50's to 165.000 ton. Meanwhile spawning stock biomass remained on the desired level of 300.000 tonnes. Following European environmental regulations in the '80s that reduced the load of dissolved phosphorous from the Rhine to levels of the '50s, primary production in the coastal zone halved from 1994 to 2004. Growth rate of 1st year sole in the Wadden Sea halved in the late '90s.
Dutch fisheries policy followed this drop in productivity in the late nineties. From 1994 to 2008 the Dutch government withdrew 121 vessels from the fleet, and the cumulative engine power the Dutch fleet dropped by 45 percent. Other studies cite a 40 percent decrease in the North Sea fishing fleet as a whole. So- 21 years after the start of the FAO-sampling period- the discarded weight of North Sea trawlers in 2013 must be a fraction of the 90's due to a marked drop in fishing effort, following a decline in productivity in the coastal zone.

6. Do estimates of discard rates by government advisory bodies reliably reflect fisheries practice?
In Holland a dispute arose between the fisheries sector and marine research institute Imares, which is the sole advisor on Dutch government policy related to fisheries. The dispute amounted to new research initiated by the fishing sector- the Productboard. They analysed catch of 20 beam trawl vessels to gather discard data on plaice, and compare them with Imares data from 2004 to 2008. Data from the Productboard were evaluated by Imares-scientists. The comparison showed that Imares overestimated discard rates of plaice in 2005 and 2006 with 44 percent and 55 percent respectively.[20] The years 2007 (13 percent) and 2008 (18 percent) yielded less marked differences, still Imares-data were significantly higher while using smaller samples (8 to 10 research trips per year), thus being less representative for fishermen's practice. [21]
A small sample by research institutes does not represent the distribution of fishing activities in space and time of the fleet. This can lead to high overestimates of discards.[22] Discard levels- catch of undersized

[14] Ben Diamond & Bryce D. Beukers-Stewart (2011): Fisheries Discards in the North Sea: Waste of Resources or a Necessary Evil?, Reviews in Fisheries Science, 19:3, 231-245 the '0,2 percent of the ocean'-number reflects the political advocacy intentions of the author. Fisheries of the world take place in waters of the continental shelf: 7,6 percent of ocean surface of which the North Sea occupies 2,6 percent
[15] See FAO 2005: Many countries in South East Asia have no discards because of greater utilisation of all catch
[16] Boddeke, R. en Hagel, P. 1994. Eutrophication, fisheries, and productivity of the North Sea continental zone. In Armantrout, NB, en Wolotira, R.J, Condition of the world´s aquatic habitats. Proceedings of the World Fisheries Congres, Theme 1, Oxford IBH Publishing Co.Pvt. Ltd. New Delhi. P 290/315
[17] Nanninga, HJ, (1997) Invloed van stikstof en fosfor op de visstand in de Noordzee, Vakgroep Mariene Biologie Rijksuniversiteit Groningen, guided by Wolff WJ,& Gieskes, WWC
[18] Rijnsdorp, AD, Van Beek, FA (1991) Changes in growth of plaice and sole in the North Sea. Neth.J. Sea Res.27, 433-439
[19] Rijnsdorp. A.D, Van Keeken. O.A, Bolle, L.J 2004, Changes in the productivity of the southeastern North Sea as reflected in the growth of plaice and sole, in ´ICES Theme Session The Life History, Dynamics and Exploitation of Living Marine Resources, Advances in Knowledge and Methodology
[20] Geciteerd in T.L. Catchpole, T.S. Gray (2010) Reducing discards of fish at sea: a review of European pilot projects / Journal of Environmental Management 91 (2010) 717–723 paragraaf 3.5: Dutch Self Sampling Project.
[21] Dr. Ir. G. M. Aarts & Ir. A.T.M. van Helmond (2008) Discard sampling of Plaice (Pleuronectes platessa) and Cod (Gadus morhua) in the North Sea by the Dutch demersal fleet from 2004 to 2008 Report number C094/09
[22] Christine Röckmann, Floor Quirijns, Harriet van Overzee, Sebastian Uhlmann (2011) Discards in fisheries – a summary of three decades of research at IMARES and LEIR eport number C068/11 IMARES: blz 14, table 4.8, At sampling discards of pelagic freezer trawlers, Imares found a discardrate of 17 percent in 2003. Improving sampling methodes lowered the rate to 6-8 procent in following years

target species- vary highly between season, time and location of fishing activities[23]. Research institutes are more and more forced to work on commercial basis, leaving less (financial) space for research trips. [24] This affects the quality of data presented by official bodies.

6. Do discard estimates of government advisory bodies vary with the scope of their reports?
Yes. The FAO-committee that delivered 'First guidelines for discards in fisheries' in December 2010[25] reverted to the 1994 FAO- bycatch estimate 'in excess of 20 million tonnes' in it's press release[26],. The report that marine science institute Imares –sole advisor of Dutch government- produced for the Productboard, presents different discard rates for the same fisheries for the same year, than for the Dutch government. In 2004 Imares found a discard rate for plaice fisheries of 34 percent, as presented in a report for the Productboard in 2009[27]. While in a 2011-report for the government it finds a discard rate of 57 percent in 2004 for the same fisheries, including biomass of sea urchins. [28] So, high discard rates that Imares reports can partly be attributed to quality of Imares research.[29].



When analysing data for the Productboard, Imares claims an upward trend in discards. In the report for government, there is no trend. Here discard rates remain constantly high from 2000 to 2008. If data for the Productboard are correct for 2005 and 2006, than government targets in 2009 to halve discards in 2013 have already been accomplished by selecting appropriate data. [30] If the data that Imares delivered to the Productboard are incorrect, than Imares made a false statement to the Productboard claiming their data showed similar trends. This conclusion underlines the necessity of gathering data in accordance with fishing practice in space and time, and necessity of second opinion in government reports.

[23]Dr. Ir. G. M. Aarts & Ir. A.T.M. van Helmond (2008) Discard sampling of Plaice (Pleuronectes platessa) and Cod (Gadus morhua) in the North Sea by the Dutch demersal fleet from 2004 to 2008 Report number C094/09
[24] Ir Hans Polet pers. comm..
[25] FAO. Report of the Technical Consultation to Develop International Guidelines on Bycatch Management and Reduction of Discards. Rome, 6–10 December 2010. FAO Fisheries and Aquaculture Report. No. 957. Rome, FAO. 2010. 32p.
[26] http://biodiversity-l.iisd.org/news/fao-releases-first-guidelines-on-fisheries-discard/
[27] Blz 17 table 2, paragraph 4.2 in: Dr. Ir. G. M. Aarts & Ir. A.T.M. van Helmond (2008) Discard sampling of Plaice (Pleuronectes platessa) and Cod (Gadus morhua) in the North Sea by the Dutch demersal fleet from 2004 to2008 Report number C094/09 for Productboard
[28] Christine Röckmann, Floor Quirijns, Harriet van Overzee, Sebastian Uhlmann (2011) Discards in fisheries – a summary of three decades of research at IMARES and LEI Report number C068/11 IMARES, table 4.4.
[29] The report of Rockmann from Imares neglects the research for the Productboard done by Imares in 2009
[30] Imares C077/09 Deskstudies underpinning the Dutch vision on the reform of the Common Fisheries Policy Martin Pastoors and Christine Röckmann (Editors)

7. What is the main cause of reported high discard rates?

Apart from a lack of reliable data that truly reflect fishing practices, there are a multitude of causes, as summarised by fisheries scientist in Plos Biology in 2012[31]. Discard rates vary among types of fisheries, mesh sizes[32] used, selectivity of the used method, location and both time of day and season. In beam trawl fisheries on plaice the season and distance to coast influence the chance of catching fish under MLS/discards, especially in July and August when young adult flatfish migrate from nursery areas in the coastal waters to deeper water: this is natural behaviour known since 1913 as Heincke's law after it's discoverer. Further from the coast in deeper water, catch under MLS is lower.

Also changes in environment on shorter and longer timescale, both natural and anthropogenic can be a driver in discard rates. Recently published work confirms that from 2000 to 2010 flatfish migrated to deeper water at smaller size and younger age.[33] The lower primary production in the coastal zone since the '90s due to lower amounts of dissolved phosphorous seems one of the causes for lower growth, and the authors claim a temperature-effect in warm summers. So if Imares-data for the government report in 2011[34] are correct, than the demonstrated doubling of discard rate from the '90s to the '00s, can partly be attributed to environmental changes.

8. Can European environmental policies lead to more fish caught under MLS/discards?

Primary production, benthos growth and plaice growth rate correlate strongly to eutrophication parameters like phosphorous [35][36][37] French studies in the delta of the Rhone and Loire confirm higher recruitment and growth rate of sole in more eutrophic waters. Also in experiments in a Scottish sea loch, the positive effect of eutrophication on growth of fish has been experimentally confirmed[38], as well as on benthos. Dutch scientists have proposed to launch new experiments in adding dissolved phosphorous, to enhance primary and secondary production in Dutch coastal nursery areas and stimulate recruitment and growth of flatfish[39]. Fertilisation is in common use in hatchery cultures of bivalves[40].

The purpose of the Ospar Commission and the EU Marine Directive is to '*eliminate eutrophication*'[41], as politicians hope to enhance marine biodiversity[42]. Thus European environmental regulations led to – and lead to- eliminating high flow of dissolved phosphorous into coastal waters prevailing through the 80's. Nitrogen loads remained high. Thus environmental regulations lower optimal feeding and growing conditions for species with nursery areas in the coastal zone.

A logic conclusion is thus, that European environmental regulations may have lowered recruitment and growth rate of commercially interesting fish and benthos species in the coastal zone of the Southern North Sea. With lower growth rate and smaller sized fish, fishermen logically have greater chances of

[31] Feekings J, Bartolino V, Madsen N, Catchpole T (2012) Fishery Discards: Factors Affecting Their Variability within a Demersal Trawl Fishery. PLoS ONE 7(4): e36409. doi:10.1371/journal.pone.0036409

[32] Niels Madsen, Jordan Feekings, Peter Lewy (2013) Discarding of plaice (Pleuronectes platessa) in the Danish North Sea trawl fishery Journal of Sea Research Volume 75, January 2013, Pages 129–134: at mesh sizes of 120 millimeter in Danish beam trawl fisheries on plaice discard-percentage was 30 times lower than with mesh sizes of 80-99 millimeter.

[33] .J. Poos, G. Aarts, S. Vandemaele, W. Willems, L.J. Bolle, A.T.M. van Helmond (2013), Estimating spatial and temporal variability of juvenile North Sea plaice from opportunistic data Journal of Sea Research Volume 75, January 2013, Pages 118–128:

[34] Christine Röckmann, Floor Quirijns, Harriet van Overzee, Sebastian Uhlmann (2011) Discards in fisheries – a summary of three decades of research at IMARES and LEIR eport number C068/11 IMARES, table 4.4.

[35] Engelhard, G. H., Pinnegar, J. K., Kell, L. T., and Rijnsdorp, A. D. 2011. Nine decades of North Sea sole and plaice distribution. – ICES Journal of Marine Science, 68: 1090–1104. de auteurs schrijven: 'the plaice growth rate is known to correlate strongly with various eutrophication parameters (e.g. phosphorus inputs), and there is evidence of increased benthic productivity in large areas of the North Sea during this period. Sole and plaice in the German Bight have been particularly heavily influenced by river run-off and nutrient inputs that increased in the 1960s and 1970s, but which have subsequently declined

[36] Rijnsdorp. A.D, Van Keeken. O.A, Bolle, L.J 2004, Changes in the productivity of the southeastern North Sea as reflected in the growth of plaice and sole, in ´ICES Theme Session The Life History, Dynamics and Exploitation of Living Marine Resources, Advances in Knowledge and Methodology

[37] Vadstein. O, Olsen. Y (2002), Sustainable Increase of Marine Harvesting, fundamental Mechanisms and New Concepts, Kluwer Academic Publishers, overzicht van Maricult Research Programme

[38] F.Gross, JEG. Raymont, SR. Nutman, DT Gauld (1946) Application of fertilizers to an open sea loch. Nature 158: 187

[39] Boddeke. R, Hagel, P (2007)Voorstel voor veldonderzoek naar het verband tussen fosfaattoevoeging aan het Nederlandse kustwater en visproductie, 15 pp: Adding orthophosphates, would 'restore' the Redfield Ratio, approached in '70s/'80s.

[40] Hatchery culture of bivalves, FAO Fisheries Technical Paper 471 via ftp://ftp.fao.org/docrep/fao/007/y5720e/y5720e00.pdf

[41] Evaluation of the OSPAR system of Ecological Quality Objectives for the North Sea (update 2010): Pp 94 "the Eutrophication Strategy requires the OSPAR Commission and Contracting Parties, individually or jointly, to take measures to reduce or to eliminate the anthropogenic causes of eutrophication and to assess, based on implementation reporting, the effectiveness of those measures on the state of the marine ecosystem"..

[42] Greenstreet, S. P. R. 2008. Biodiversity of North Sea fish: why do the politicians care but marine scientists appear oblivious to this issue? – ICES Journal of Marine Science, 65: 1515–1519.

catching fish below MLS (= discards). New meta-studies on the relation of growth rate and fishing pressure, demonstrate no relation between fishing intensity and change in growth rate. [43] So while European politicians blame fishermen for 'overfishing' as justification for a discardban, fishermen could blame EU-politicians and aligned advocacy groups for 'overregulation'[44], with poor scientific justification.

9. Do regulations in European Common Fisheries Policy (CFP) *cause* high discard rates?

The CFP always was a political compromise between member states, while successful fisheries policies closely follow biological advice and take regional differences in types of fisheries into account[45].Most fishermen hate discarding fish[46], and dumping dead fish at sea or on shore (with a discardban) is not in their interest. Occasionally–according to fisheries biologists involved in the STCF[47]- it was the European Commission that obstructed effective measures to reduce discarding. According to the Scottish Fishermen Federation (SFF) the political attention of EU-commissioner Maria Damanaki for discards was a welcome recognition to the fact that in many occasions high discard rates were caused by flawed regulations.[48]

[43] Hilborn, R., C. Minte-Vera (2008). Fisheries induced changes in growth rates in marine fisheries: are they significant?, Bulletin of Marine Science (Vol 83:1- pp95-105) : "Using a meta analysis of 73 commercially fished stocks we show that declines in mass-at-age are slightly more common than increases, *but there is no relationship between the intensity of fishing and the change in growth rate*".

[44] Jong De, F. (2006) Marine Eutrophication in perspective : On the relevance of Ecology for Environmental Policy, phd-thesis: algal blooms also occur naturally far at sea, there was no clear relation between eutrophied coastal waters and the algal bloom in the 1981 in the German Bight that triggered regulations. De Jong cites Odum on eutrophication: 'This is bad if clear water is desired; however, it is good if food production is desired'.

[45] Dr. Dolf Boddeke, pers. comm. Boddeke was part of the STCF for 13 years , the Scientific and Techncal Comitee for Fisheries of DG14 EU and member of the Advisory Committee for Fishery Management ACFM of ICES.

[46] Dr. Ray Hilborn personal communication.

[47] A great problem in mackerel fisheries with purse seines was 'slipping'. After closing the seine, fish is first concentrated. This leads to fish fatally damaging each other. When after hauling in the catch appears to be undersized, the catch is 'slipped', leading to great loads of dead discards. Attempts by fisheries biologists and fishermen to eliminate this problem in the '80s were ignored by the European Commission. According to fisheries biologist dr Dolf Boddeke – advisor to the European Commission- the problem could have easily been solved by taking a size sample before concentrating the catch.

[48] http://www.guardian.co.uk/environment/blog/2012/feb/24/fish-discards-ban-european-union
The Scottish Fishermen Federation: 'We welcome the fact that this appears to be a long overdue recognition from the EC, made in a statement by Commissioner Damanaki, **that the inherent cause of discarding is down to fundamentally flawed regulations, rather than from the legitimate activities of fishermen**."

The European quota-system would force fishermen in mixed fisheries to discard market quality fish to prevent fines when landing over quota-species[49]. European rules for 'Catch Composition' dictate a size ratio in catch- which led to discarding in order to oblige to rules. In practice this rule was mostly evaded. In many occasions, the MLS leads to higher discarding, as fishermen want to avoid landing fish under MLS. Danish scientists call for change in MLS for fisheries on plaice, to lower discard rates.[50] See also 8 on European environmental regulations enhancing chances of catching fish under MLS.

10. Are there countries where a discardban is successfully ending 'overfishing'?

There is no reliable evidence that a discardban improves fishing stocks. Advocacy groups point to a discardban in pelagic fisheries in Norway, citing a study of the Environment Department of the University of York[51]. The study claims a correlation between improved fish stocks in pelagic fisheries with low discard rates and a Norse discardban in 1987-88. However, Norse fisheries policies and practice – following biological advice instead of political compromise-are incomparable with CFP and the discardban was adopted voluntarily in a step by step phase by fishermen.

The study by Tom Catchpole for the European Commission- that evaluated 15 pilotprojects to lower discard rates[52]-mentions one pilot with a discardban on saithe and cod fisheries in Germany. It failed in the start up phase. There is no clear connection between a discardban and restoration of fishing stocks: discards are absent in many fisheries in South East Asia due to full utilization of all catch, not by more selective or sustainable fishing[53]. In Russia in the Soviet era a discardban was implemented, from which the fishmeal industry benefited. The fishmeal industry was now also the first sector to welcome the EP-vote on 6 february for a discardban.[54]

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[49] . http://www.telegraph.co.uk/news/uknews/1570439/Fishing-quotas-are-anecological-catastrophe.html

[50] Feekings J, Bartolino V, Madsen N, Catchpole T (2012) Fishery Discards: Factors Affecting Their Variability within a Demersal Trawl Fishery. PLoS ONE 7(4): e36409.

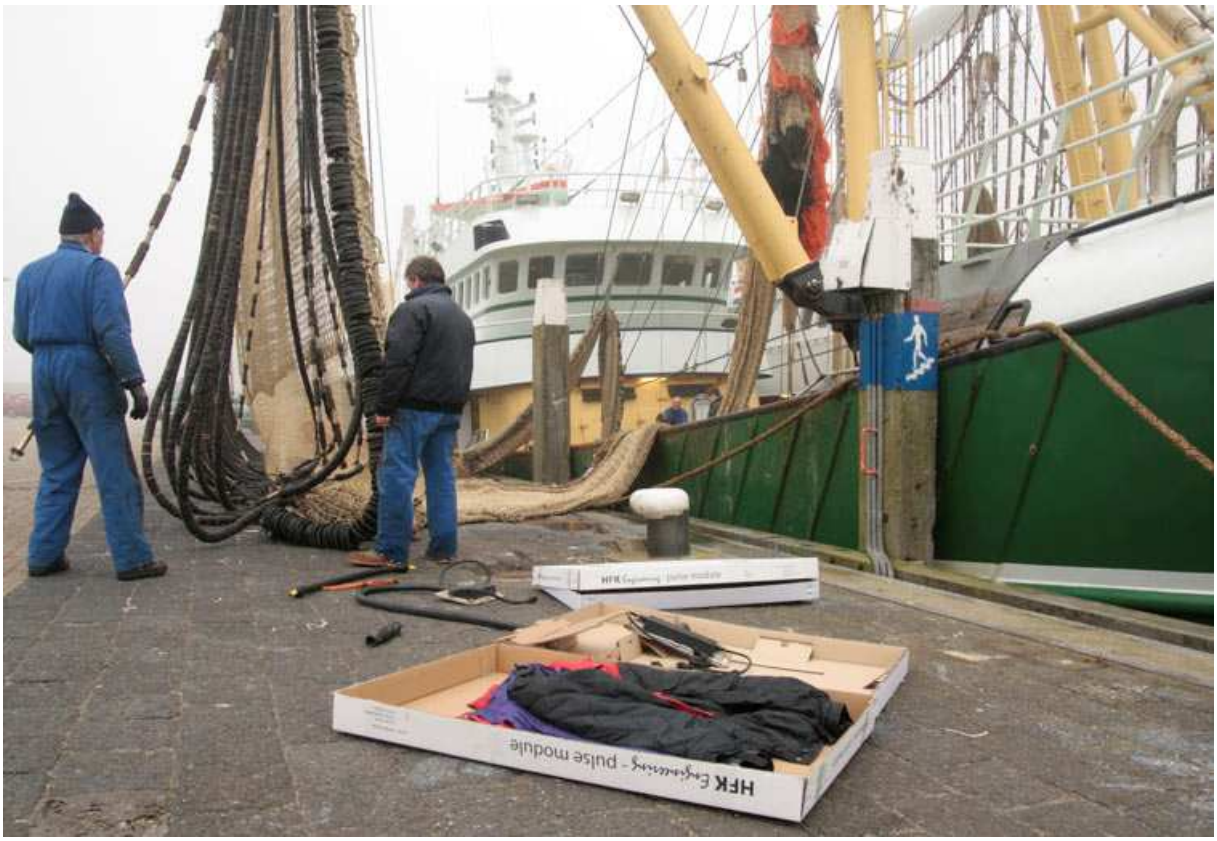
[51] Bespeking in Scruton R. (2012) Groene Filosofie, Verstandig nadenken over onze planeet: blz 101, de Noorse vissers handelen uit particulier initiatief op basis van vrijwilligheid, niet vanuit gecentraliseerde staatsdwang zoals NGO's voorstaan

[52] T.L. Catchpole, T.S. Gray (2010) Reducing discards of fish at sea: a review of European pilot projects / Journal of Environmental Management 91 (2010) 717–723. Most pilots were initiated because of a perceived 'crisis': upcoming regulations like restrictions in days at sea imposed on the fishing sector. 7 projects successfully lowered discard rates. The German project for a discardban was the only to fail in the start up phase.

[53] Kelleher et al (2005) FAO 5.5, pg 130 'Differences in discard rates between developed and developing fishing nations are not readily apparent except in the case of Southeast Asia where discards are generally negligible because of almost full utilization of the catch

[54] http://www.seafoodintelligence.com/EditModule.aspx?tabid=1&mid=382&def=News%20Article%20View&ItemId=32861 FISHMEAL & fish oil industry/IFFO welcomes EP vote

11. Does the name 'discards'- dump of dead or dying fish- accurately describe fishing practices?
Canadian fisheries consultant and economist Bruce Turris introduced the term 'releases', as being a 'kinder and more accurate term'[55]. The assumption –also made in press releases by Dutch government[56]- that all fish dies shortly after being hauled in the net and brought aboard is flawed and based on limited studies with one fishing method[57]. While some species are vulnerable, many species have high survival rate after catch and endure long time on deck. The Canadian trawling fleet in the Pacific successfully lowered discard rates, from 26 percent in 1996 to 8 percent in 2008 by taking these differences in survival rate between species into account. Only discarded fish species with a low survival rate were deducted from the quota, thus stimulating fishermen to use more selective gear.
For over a century fishery biologists use commercial (trawling) fishing gear to catch thousands of (flat)fish[58] for population research with the mark and recapture method. Fish is hauled on board, and marked with (plastic) tags, after which they are 'discarded'/released. Fishermen are asked to report the catch and location of recaptured fish with tags. Research institute Imares uses a beam trawl with tickler chains for catching plaice and sole to monitor migration patterns around offshore windfarms[59]. Fishery biologists would not do mark- and recapture experiments with (beam)trawlers, if all fish of all species would die[60] after release.



[55] Dr Bruce Turris, personal communication.
[56] Press release secretary of state Sharon Dijksma 27the februari, reacting to adoption of Discardban by EP and EC: government policy and Parliament were against a discardban. National policy opted for innovation and reduction of bycatch. Due to the EP-vote and adoption by the EC, national policy is now overhauled by Brussels. Dijksma adapts her (government) position in the press release to the new political situation
[57] Claims of government officials in Holland that 'all fish dies', are based on 1 study: Van Beek et al 1990: see nr 12
[58] http://fishbull.noaa.gov/1054/stewart.pdf Ian Stewart Fishery Bulletin: estimating migration patterns by tagging of sole after catch by trawler. In Holland fisheries biologist Joop de Veen tagged thousands of sole for research institute RIVO
[59] Imares research on migration of flatfish, caught by Beam trawl with tickler chains: http://www.noordzeewind.nl/wp-content/uploads/2012/11/pdf/OWE%202012%20Imares%20Winter%20Cod%20and%20Sole%20behaviour.pdf
[60] http://www.hafro.is/Bokasafn/Timarit/catag.pdf Icelandic guide to deck handling of fish species for research: 'The most important consideration during capture is the survival of the fish to be tagged or marked. Different species of fish vary a great deal in how vulnerable they are when handled**. Some, like plaice, can endure much handling without problems**. Others can hardly be touched without their life expectancy being greatly reduced.

12. What are main causes of high mortality among discards that can be avoided?

In Holland claims of mortality of discards in beam trawling of 90 percent or more, are widely used by government advisory bodies on fisheries.[61] The claim rests on one study in 1990[62], where in the period from 1972-1982 low survival rates on plaice were found- caught with beam trawl with tickler chains and otter trawl. It occurred, when after catch the plaice was kept for 4 days in an experimental set up of plastic tanks on board of a beam trawl in water of 16 degrees Celsius without food. Mortality in plaice was significantly lower in experimental set-ups with water of 10 degrees after 2 days with deck processing using conveyor belt. The authors admit that high mortality in their experiment can partly be overestimates caused by stress.

Most damage to flatfish leading to high mortality occurs due to bruises by heavy tickler chains[63]in their resting period when they hide deep in the sandy sediment of the North Sea. For plaice this partly can be solved by fishing in the activity period at night. In Holland the government stimulated the use of pulse-trawlers of which there are now 43 vessels operating[64]. The pulse trawl eliminates the use of tickler chains and chain mats. Dutch shrimp fisheries with beam trawl, problems with survival of young discarded plaice and sole have been solved for 30 years[65], with introduction of a slow rotating sorting machine where bycatch is sorted in sea water. A European discardban thus partly eliminates efforts by sector and researchers to reduce discards and increase survival of bycatch - without sound scientific justification.

[61] https://zoek.officielebekendmakingen.nl/kst-31748-2.html Report by 'Algemene Rekenkamer', the government advisory body that audits government policies on it's financial merits and output: it cites one report by government advisory body on marine policy Imares(Van Overzee & Quirijns, 2007), which cites one study from Van Beek 1990 where a mortality of 90 percent or higher was found. This one study on beam trawl fishery with tickler chains on plaice and sole is the foundation of the claim that all discarded fish dies in all fisheries

[62] E, Van Beek, PI Van Leeuwen, AD Rijnsdorp (1990) On the survival of plaice and sole discards in the otter trawl and beam trawl fisheries in the North Sea. Netherlands Journal of Sea Research 26 (1): 151-160 (1990) The study summarizes the results of experiments from 1972-1982, and adds experiments where survival is measured of sole and plaice escaping through the mesh. The'10 percent or less'-survival is from the summary. Overall discard survival was estimated to be between 0 and 50% in plaice and between 4 and 40% in sole.

[63] Van Beek et al (1990) report a survival rate of 60 percent of plaice and sole under MLS escaping through meshes

[64] The Pulse trawl is in an experimental phase in Holland for 13 years, motivated by ecological and economic reasons. It cuts fuel use by 50 percent and reduces bottom contact with gear, eliminating use of tickler chains or chain mats. EU-regulations still prohibit the use of pulse-trawlers, thus for every vessel a new permit is required. The Dutch government plans to phase out beam trawlers with tickler chains in 2016. Every beam trawl vessel that wants to change to pulse trawling is now on a waiting list.

[65] Dr Dolf Boddeke personal communication: as a young fisheries biologist dr Boddeke was responsible for the project in the '60s and '70s. Young plaice and sole was mortally wounded due to blows to it's organ of equilibrium in the sorting process.The Dutch fisheries institute RIVO (now Imares) developed a now widely used sorting machine plaice and sole are sorted in sea water from the catch. Bycatch of adult flatfish was solved with introduction of a wide meshed panel ('zeeflap').