Stichting Wageningen Research
Centre for Fisheries Research (CVO)

Recreational fisheries in the Netherlands:
Summary of the reported catches of the species under the obligations of the Data Collection Framework (European Sea bass, Atlantic Cod, European Eel, Pollack, Salmon and Elasmobranchs) from 2010 to 2023.

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Summary

The legal framework for the collection of recreational fisheries data by EU Member States was given by the EU Data Collection Framework (Council Regulation EU 2017/1004 and Commission Delegated Decision EU 2021/1167). The Netherlands is obliged to report on retained catches of Atlantic cod (*Gadus Morhua*), European sea bass (*Dicentrarchus labrax*), pollack (*Pollachius pollachius*), sharks and rays in marine water and on European eel (*Anguilla anguilla*) and Atlantic Salmon (*Salmo salar*) by recreational fishers in marine and fresh water. On behalf of the Dutch Ministry of Agriculture, Nature and Food Quality, Wageningen Marine Research (WMR) started the Recreational Fisheries Programme in 2009 under the Statutory Tasks Programme (Dutch: WOT visserij). The Recreational Fisheries Programme aims to estimate the catches from the angling activity in Dutch marine and fresh waters and is based on three surveys: (1) screening survey, (2) logbook survey and (3) gillnet survey. Results of the gillnet survey are presented in a separate report.

In order to estimate the number of recreational anglers fishing in fresh or marine waters, an online screening survey was conducted in December 2009, 2011, 2013, 2015, 2017, 2019 and 2021. The screening survey serves the purpose of obtaining an estimate of the total angling population in the Netherlands and to select participants for the logbook survey. In addition, an extra screening was conducted in March 2021 to collect information for year 2020 in order to analyse the impacts of COVID19 on the recreational fishing activity. Results show that since 2009, the number of recreational anglers in the Netherlands has been declining from 1.6 million in 2009 to 0.9 million in 2019, after which numbers have started to increase again to 1.4 million in 2021.

To estimate the yearly catches, logbook surveys were conducted in 2010-11, 2012-13, 2014-15, 2016-17, 2018-19, 2020-21 and 2022-23. In each logbook survey, a total of 1,500-2,500 anglers participated in the survey by documenting their catches. This report provides an overview of the reported catch of Atlantic cod, European sea bass and European eel, which were raised (extrapolated) to the total amount catches in the Netherlands. Recent estimates of retained European eel recreational catches have decreased from 95 (95%CI 43-163) tonnes in 2010 to 10 (95%CI 2-21) tonnes in 2022. Estimates of Atlantic cod retained recreational catches have decreased from 698 (95%CI 425-2,041) tonnes in 2010 to 249 (95%CI 130-418) tonnes in 2022. The total amount of retained catches of European sea bass has increased from 156 tonnes (95%CI 72-272) to 550 tonnes (95%CI 305-878) in 2022. In recent years, the percentage of sea bass that is returned has also increased, resulting in much higher total (retained + returned) catches. The estimates should be treated with caution as there are high confidence intervals around the estimates. Only few pollack, salmon, rays and sharks catches were reported. These have not been raised to the total number, but only the absolute number of reported fish are reported here.

1 Introduction

Recreational fishing is defined as the fishing of aquatic animals (mainly fish) that do not constitute the individual's primary resource to meet basic nutritional needs and are not generally sold or otherwise traded on export, domestic or black markets" (FAO, 2012). In the Netherlands, recreational fishing consists mainly of angling, which is a very popular activity worldwide. Although most recreational anglers make few fishing trips per year, collectively they catch substantial quantities of fish (van der Hammen et al. 2016). For some fish species, recreational fisheries have a significant impact on stocks and therefore there is an increasing need to provide estimates of the recreational catch (Coleman et al., 2004, Hyder et al. 2018). The dynamic nature of participation in recreational fisheries in terms of activity levels makes it challenging to accurately assess the number of people that are engaged in recreational fisheries. In order to keep the potential biases as low as possible, a survey design was used which encourages accurate and complete data reporting (van der Hammen et al. 2016).

The legal framework for collection of recreational fisheries data by EU Member States was given by the EU Data Collection Framework ("DCF", Council Regulation EU 2017/1004 and Commission Delegated Decision EU 2021/1167). The Netherlands is obliged to report on recreational catches (retained and released) of Atlantic cod (*Gadus Morhua*), European sea bass (*Dicentrarchus labrax*), pollack (*Pollachius pollachius*), sharks and rays in marine water and on European eel (*Anguilla anguilla*) and Atlantic Salmon (*Salmo salar*) in inland waters. On behalf of the Dutch Ministry of Agriculture, Nature and Food Quality, the Recreational Fisheries Programme started in 2009 under the Statutory Tasks Programme (Dutch: 'Wettelijke Onderzoekstaken'). The Recreational Fisheries Programme is managed and designed by Wageningen Marine Research (WMR). The aim of the Recreational Fisheries Programme is to collect data on recreational fisheries catches as obliged under the DCF. The programme consists of several surveys that are run every two years:

- **Screening survey:** Online panel survey conducted by the company Verian (earlier called Kantar and TNS NIPO) that surveys a high number (~ 50,000 households) of Dutch citizens on their participation in recreational fisheries. The participants reflect the demographics of the entire Dutch population. Data collected are used to estimate the total population of anglers in the Netherlands and their demographic profile. It is also used to select participants for the logbook survey.
- **Logbook survey:** Participants (2,000-2,500) are asked to keep a monthly logbook of their recreational catches in which they report trip information, number and length of species caught and whether fish was retained or released, among other things. Participants are mostly recruited via the screening survey, but an increasing number of participants is also reached through social media and recreational fishing websites. Collected data are used to estimate the yearly catch per angler.
- **Gillnet survey:** Specifically designed to collect information on recreational gillnet fisheries. Results of the gillnet survey will be published in a separate report.

In this report, we focus on the total number of Dutch anglers from the screening surveys from 2009 to 2021 and the catch estimates from the logbook surveys from the first survey (2010-2011) until the most recent survey (2022-2023). Estimates in all years have been updated for consistency and to be able to compare estimates over years (see point 2.3). Changes may occur compared to estimates from previous reports because: 1. Some respondents have been removed because they were flagged as unreliable by Verian, 2. All estimates have now respondents from only 6 year old or older, 3. Lengths from the logbooks have now been used instead of onsite data, 4. Weighting of respondents was applied to all screening surveys, 5. More general data cleaning was applied to all survey years.

2 Materials and methods

2.1 Surveys

An overview of the time periods that the screening and logbook surveys were running is presented in Table 2-1. The screening survey always takes place at the end of a calendar year in December. In March 2021, an additional screening survey was done to specifically collect data on participation in recreational fisheries in 2020 under the covid-19 situation. The first logbook survey started in March 2010 and ran until February 2011. In 2012 and 2014 the logbook survey started in April instead of March and ran until March instead of February.

Table 2-1 Overview of the time period by year and month that the screening survey and logbook survey were carried out. Orange: screening survey, blue: logbook. In March 2021 an additional screening survey was carried out. The next screening survey in December 2023 is followed by the logbook survey 2024-2025.

	J	F	M	A	M	J	J	A	S	O	N	D
2009												
2010												
2011												
2012												
2013												
2014												
2015												
2016												
2017												
2018												
2019												
2020												
2021												
2022												
2023												

2.1.1 Screening Survey

The screening survey is an online panel survey which is conducted biennially by the commercial marketing company Verian (earlier called Kantar and TNS NIPO). The demographics of the panel such as age, gender, education level and place of residence are controlled by Verian to ensure that it resembles the demographics of the Dutch population as much as possible.

The questions about recreational fishing are offered in December in an omnibus questionnaire containing questions of a range of different topics. Participants do not know the topics of the before filling in the questionnaire and are not allowed to skip topics. This is assumed to lower possible non-response that is directed to fisheries questions. Until 2019, the questions for the whole family were answered by a single member of the family. Starting in 2021, each family member of 16 years or older fills in the questions individually. Parents would fill in the questions for children aged 6-15.

In the screening survey, respondents were asked if they had fished recreationally the year before, what gear(s) they had used, if they were intending to participate in freshwater and/or marine recreational

fisheries in the next year and if they would be interested in participating in a 12-month logbook survey. In addition, they were asked to indicate how many fishing trips they had made the year before to determine their level of fishing 'avidity' (number of trips per year). The questions of the December 2021 screening survey are listed in annex 1.

2.1.2 Logbook survey

Participants for the logbook survey are recruited from the screening survey in the year before. In the earlier survey years, participants were selected with a probability of inclusion based on an analysis of demographics including age, gender and region of residence such that it matched ratios found in the screening survey as much as possible. This was done on an individual basis, i.e. some members of the same household could be included in the survey, whereas others were not. In the more recent years, due to the lower participation rate and the decreased size of the Verian database, this was not always possible, especially for marine recreational fishers. Since 2019 all fishers who wanted to, were included in the logbook survey. The Verian database has a turnover rate of ~ 10% per year. This means that several participants have joined multiple surveys.

Anglers were grouped by their - in the screening survey stated- fishing avidity. To recruit additional participants, from the 2012-13 survey onwards, anglers from external sources (the Dutch angler organisation, social media, recreational fisheries websites, previous participants) were also asked to join the survey. This resulted in a group of externally recruited anglers joining the logbook survey. This group is usually much smaller compared to the group of anglers recruited through the Verian database (table 2). In order to make more or less equal groups, marine water participants were grouped in three avidity groups (1-5, 5-10 and > 10 yearly fishing trips) and freshwater participants were grouped in four groups (1-5, 5-10, 11-25 and > 25 yearly fishing trips).

Participants of the logbook survey were sent: a letter regarding the survey, a logbook with instructions on how to fill in the logbook and a fish identification chart. Participants were asked to maintain the logbook in which they record per fishing trip information on catch and effort. The information in the logbooks included among other questions: fishing location, water body type, start and end date and time of the fishing trip, gear used, catch (number of fish, species, size), whether a fish was retained or released and whether the recorded length of fish was measured or *estimated* (see annex 2 for the logbook questionnaire). Participants were contacted online once a month by Verian and requested to transfer the data recorded in their logbooks to online questionnaires. The participants were also expected to indicate if they had *not* fished during that month. The logbook surveys usually start in March.

2.2 Analysis

A simplified scheme of the raising procedure is visualised in Annex 3. In short, the screening survey is used to estimate the proportion of fresh and marine recreational anglers in the Dutch population. Each participant in the screening survey is also provided with a weight by Verian, which is used to correct for deviations in the obtained proportions from the representativeness of the entire Dutch population. The total number of inhabitants in the Netherlands was obtained from Statistics Netherlands (CBS[1]), which are then used to raise the corrected proportions found in the screening survey to the total number of fresh and marine anglers. Subsequently, the logbooks are used to estimate the yearly catches for each fish species. To ensure representativeness of the logbook participants to the recreational fishing community, it is corrected for deviations in the proportion of participants per avidity class. The average catches per year per respondent in number and weight are estimated per avidity class. Subsequently, these are multiplied

[1] https://www.cbs.nl/nl-nl/onze-diensten/open-data/statline-als-open-data

with the total number of anglers within the avidity class (as estimated from the screening), leading to the total number or weight per species and avidity group. Summing these estimates for each avidity group results in the total catch estimate per species. Confidence intervals were estimated by bootstrapping: in each of 10,000 iterations a participant was removed randomly from the dataset to estimate the variance. Respondents have reported their trips in the Netherlands and optionally also their trips in foreign countries. In this report only the catches in the Netherlands are included in the analyses.

2.2.1 Converting numbers to biomass and data cleaning

Biomass of retained fish is estimated by converting the length that were assigned to the individual fish by the angler to fish weight by a length weight relationship (Annex 5). Rays, sharks, pollack and salmon/sea trout were only reported in small amounts and only numbers of recorded fish are presented in this report.

Data was checked and cleaned for all survey years. annex 4). Cleaning consisted of:

- Verian flagged some respondents as unreliable, after detection that a single person filled in multiple questionnaires. They were removed from all analyses which changed the estimates from previous years.
- In 2012-13 and 2014-15 survey, the length of returned fish was not requested, however, there are some reported returned fish lengths from few trips. These trips were excluded.
- Some duplicate trips were observed which were excluded in the estimation.
- Unrealistic lengths are set to NA. For cod and seabass, lengths smaller than 10cm and larger than 90cm were set to NA. For eel, lengths smaller than 10cm and larger than 100cm are set to NA.
- Set length to NA of measured fish when a respondent had caught at least 5 fishes in a year and more than 80% of the measured fishes have the same length.

For this report, we updated catch estimations from previous years. The most significant changes are:

- In the past the Verian database was representative for the Dutch population. However, because it has become more difficult for Verian to keep a representative response, the representativeness of the participants in the screening survey for the Dutch population has decreased. Therefore, Verian calculates a weighting factor for each participant, which are now used to correct for possible deviations from census demographic. Weighting factors have also been applied to all previous screening surveys.
- In previous analyses of the screening survey, some years had the full age range starting at age 0, whereas other years started at age 6. In those years where data from respondents aged 0-5 was present, data from respondents aged <6 were removed to better compare the yearly estimates.
- For cod, seabass and eel measured and estimated reported lengths are used to estimate a mean weight from given length-weight relationship, and the reported mean weight is used to impute catches without reported length. This procedure is done for returned and retained groups separately per survey year. In years without returned lengths (2012-13 and 2014-15) lengths from neighbouring years (2010 and 2016) are used to impute the lengths.
- For years with less than 10 reported lengths per group per year, the length with missing values were imputed using mean length of adjacent years as well.
- Data cleaning has been standardized and was applied to previous survey data (see above and annex 4).

2.2.2 Drop-out and non-response

The population of anglers changes over time, with anglers leaving or entering recreational fishery, the so called 'drop-ins' and 'drop-outs'. This also happened with participants of the logbook survey. Some fishers in the logbook survey did not fish at all. These are called drop-outs and were excluded from the analysis (see Table 3-2). Dropping-out mainly occurred in the lowest avidity groups (1-5 yearly fishing trips). Weighting for avidity ensures that the drop out removal does not cause bias because of changes in the distribution of avidities.

Non-response occurs when participants do not fill in all logbooks. Most participants did return their logbook every month (12 times), but a proportion filled them in between 1-11 times. It was decided that fishers who returned their logbook only 1-7 times are excluded from the analyses. Those that returned their logbooks 8-11 months are included in the analyses and the missing months are imputed with the mean catches of the available data of that person. The limit at 8 times is an arbitrary decision. By selecting fishers that returned their logbook 8 times, the number of data that is unused and the amount of data that is imputed is both quite small.

2.2.3 Species recognition

The participants of the survey were provided with a species identification chart and a free smart phone app developed by the Dutch Angling Association ('Sportvisserij Nederland') to assist with identification of the catch. Fishers could also fill in "species unknown" and it was advertised that fishers could email a picture of the fish if they were unsure about the species. However, only two times a picture was shared with us for species recognition. For the species analysed in this report, most errors in species recognition can be expected in cod and pollack, which can be difficult to distinguish from some other species in the *Gadiformes* order and salmon and sea trout. The latter are therefore grouped.

3 Results

3.1 Number of recreational anglers: online screening survey

Since the start of the screening survey in 2009, the participation rate of marine anglers among the Dutch population did not change much, from 3.8% in 2009 to 3.5% in 2021 (Table 3-1), although in 2019 and in 2020 the participation was somewhat lower (2.0% and 2.8%). In the same period, the participation rate of freshwater anglers decreased from 9.3% in 2009 to 7.7% in 2021. The lowest value was recorded in 2019 were 4.5% of the panel members indicated having made at least one trip in fresh water. The increase from 2019 to 2020 is probably due to the first COVID-19 lockdown, where recreational fishing was probably boosted by the lack of other activities.

Extrapolation to the Dutch population level resulted in a decrease of 1,438 thousand in 2009 to 1,280 thousand freshwater anglers in 2022. Marine fishing activity decreased from 588 thousand to 574 thousand anglers.

Table 3-1 *Number of anglers resulting from the screening survey in December 2009, 2011, 2013, 2015, 2017, 2019, 2021 and the extra survey in March 2021 ('2020 survey'). The screening survey in March 2021 is referred to as 2020, because the question refers mostly to 2020. The table shows the number and percentage of anglers (>=6) in the Netherlands; per waterbody type; and the total number of anglers. The total number of anglers is estimated as anglers who fish in either waters or both, because many anglers fish in both water types, the total number of anglers is lower than the sum of marine and freshwater anglers.*

		Anglers in the Netherlands	
Year		**Percentage**	**Number (x1000)**
2009	Marine	3.8%	588
	Fresh	9.3%	1,438
	Total	**10.4%**	**1,604**
2011	Marine	3.3%	521
	Fresh	8.0%	1,245
	Total	**8.7%**	**1,359**
2013	Marine	3.2%	500
	Fresh	7.3%	1,143
	Total	**7.9%**	**1,251**
2015	Marine	3.4%	535
	Fresh	6.8%	1,089
	Total	**7.6%**	**1,209**
2017	Marine	3.5%	560
	Fresh	6.5%	1,055
	Total	**7.3%**	**1,179**
2019	Marine	1.9%	317
	Fresh	4.6%	755
	Total	**5.3%**	**874**
2020*	Marine	2.8%	457
	Fresh	7.0%	1,143
	Total	**7.4%**	**1,209**
2021	Marine	3.5%	574
	Fresh	7.7%	1,280
	Total	**8.2%**	**1,363**

* Additional survey due to changes in fishing behaviour due to the COVID19 pandemic, carried out in March 2021 (but questions relate mostly to 2020, March 2020-February 2021)

3.2 Logbooks

3.2.1 Initial Participation, Response rate and dropout rate

Between 871 (2020-21) and 1,772 (2012-13) marine anglers and between 1,570 (2010-11) and 2,499 (2016-17) freshwater anglers started the logbook survey. Most participants were recruited from the Verian database and a smaller number were recruited through active recruitment by advertisements on recreational fisheries websites and or social media (Table 3-2), though the number of respondents recruited externally is increasing.

Response rate has been high for every survey year: most participants documented their catches for 8-12 months (Table 3-2). Respondents who responded less than 8 months were removed from further analyses. Drop-outs are fishers who did not report having fished a single time during the survey year, even though they had planned to do so and even though they had returned their logbooks every month. The drop-out rate for marine fishers is very high throughout the survey years (Table 3-2): 66-83 % of the respondents were classified as dropouts. For fresh water, the drop-out rate is much lower (19-37 %), although still substantial (Table 3-2). All dropouts are excluded from the analysis. After removal of non-respondents and drop-outs, 103-434 marine anglers were included and 1069-1566 fresh water anglers (Table 3-2).

Table 3-2 *Summary of numbers of 1. anglers starting the logbook survey, between brackets those recruited externally (through recreational fishery websites, the angler organisation and social media), 2. Number of anglers who filled in the logbooks at least eight times, 3. Number of anglers reporting at least one trip (removing drop-outs) and 4. Number of anglers included in final analysis.*

	Participants							
	Marine				Fresh			
Year	**Starting**	**>= 8 logbooks**	**>= One trip**	**Included**	**Starting**	**>= 8 times**	**>= One trip**	**Included**
2010-11	1,428 (0)	1,290 (0)	491 (0)	434 (0)	1,570 (0)	1,398 (0)	1,277 (0)	1,069 (0)
2012-13	1,772 (103)	1,486 (73)	467 (58)	410 (49)	2,157 (103)	1,802 (74)	1,638 (88)	1,396 (66)
2014-15	1,396 (75)	1,223 (54)	392 (52)	327 (35)	2,256 (126)	1,987 (89)	1,648 (112)	1,456 (87)
2016-17	1,569 (40)	1,458 (30)	336 (18)	278 (13)	2,499 (62)	2,325 (49)	1,685 (44)	1,566 (37)
2018-19	1,517 (23)	1,114 (12)	251 (15)	183 (8)	2,281 (36)	1,618 (17)	1,433 (25)	1,078 (13)
2020-21	871 (68)	718 (33)	167 (35)	103 (20)	2,209 (113)	1,827 (63)	1,621 (97)	1,409 (61)
2022-23	1,179 (177)	935 (111)	282 (99)	210 (68)	2,245 (272)	1,806 (178)	1,636 (220)	1,380 (158)

3.2.2 Number of reported Fishing trips

The number of marine fishing trips reported in the logbook survey decreased from 1,630 reported trips in 2010-11 to 639 trips in 2020-21 but increased again to 1,389 trips in 2022-23 (Table 3-3). In fresh water the number of reported trips varied from 7,548 in 2018-19 to 16,151 in 2014-15 (Table 3-3).

Table 3-3 *Number of reported fishing trips in fresh and marine water, between brackets those from externally recruited anglers.*

Year	Number of trips	
	Marine	Fresh
2010-11	1,630 (0)	10,126 (0)
2012-13	2,019 (521)	15,143 (1,518)
2014-15	1,978 (359)	16,151 (2,329)
2016-17	1,274 (202)	9,346 (873)
2018-19	707 (70)	7,548 (608)
2020-21	639 (306)	8,943 (1,999)
2022-23	1,389 (798)	8,535 (2,873)

3.3 Catch estimates

3.3.1 Atlantic cod (Gadus morhua)

Numbers and biomass of total recreationally caught (retained and released) cod have strongly decreased after 2016-17 to its lowest estimate of 172,000 cod in 2020-21 (Table 3-4). A reason for the decrease could be that the cod stock in the North Sea and English Channel is very low, in contrast with more northern regions where the cod stock is increasing (ICES 2022a). However, in the most recent logbook survey, the estimate of retained and released cod has increased again to a total of 721,000 cod. The percentage of retained cod has decreased from 76% to 44% since the first survey. The length of retained cod varies considerable between and within years (Figure 3-1). Since mid-2013 a bag limit for cod (combined with seabass) was implemented of 25 cod or 20 kg. The minimal landing size is 35 cm.

Table 3-4 *Trend in the catch estimates of Atlantic cod by marine anglers and 95% Confidence intervals between brackets.*

	Year	Retained	Released	Sum	% Retained
Number (x1000)	*2010-11*	332 (232, 444)	105 (61, 159)	437	76
	2012-13	587 (317, 917)	331 (201, 493)	918	64
	2014-15	591 (326, 911)	452 (228, 737)	1,133	52
	2016-17	112 (65, 167)	159 (67, 292)	271	41
	2018-19	115 (32, 221)	369 (27, 1001)	484	24
	2020-21	110 (23, 235)	62 (16, 126)	172	64
	2022-23	318 (155, 536)	403 (119, 874)	721	44
Biomass (tonnes)	*2010-11*	698 (425, 1,041)	46 (18, 94)	744	94
	2012-13	499 (327, 801)	99 (67, 164)	598	83
	2014-15	756 (360, 1686)	135 (73, 239)	891	85
	2016-17	154 (81, 260)	34 (17, 57)	188	82
	2018-19	155 (51, 338)	108 (12, 394)	263	59
	2020-21	165 (34, 394)	61 (4, 247)	226	73
	2022-23	249 (130, 418)	113 (40, 209)	362	69

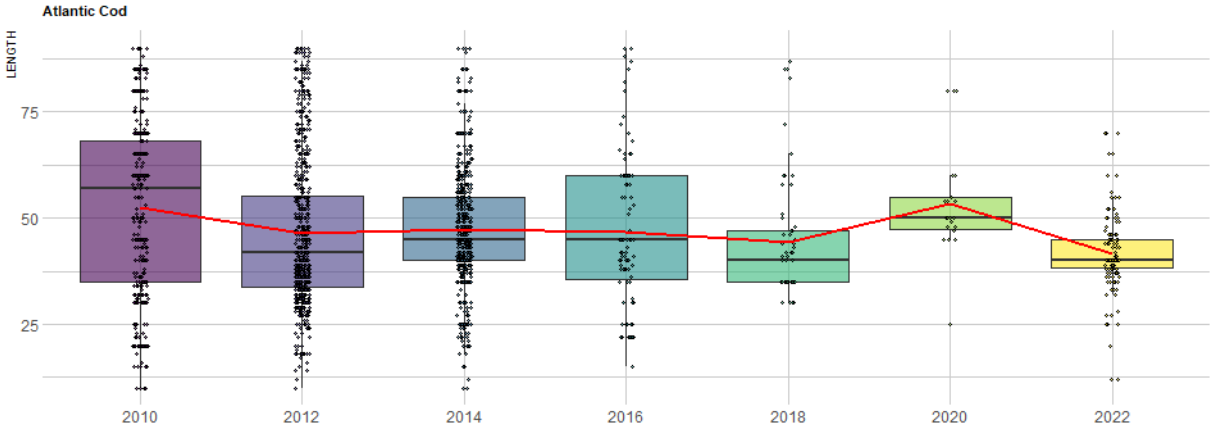

Figure 3-1 *Boxplot (box representing median, 25th percentile, 75th percentile) with individual lengths of retained Atlantic cod (points). Red line is the mean. Source: logbooks 2010-2023.*

3.3.2 European sea bass (Dicentrarchus labrax)

Numbers and biomass of retained sea bass have fluctuated over the years with high numbers in 2012-13, 2020-21 and 2022-23 (Table 3-5). However, because the number of released sea bass increased substantially from 2010-11 to 2022-23, the percentage of retained sea bass decreased from 59% in 2010-11 to 16% in 2022-23 (Table 3-5). A reason for the decrease could be the recent management measures (Table 3-6). The mean length of retained sea bass is 41.2 cm (Figure 3-2).

Table 3-5 *Recreational catch estimates of European sea bass and the 95% confidence intervals (between brackets).*

	Year	Retained	Released	Sum	% Retained
Number (x1000)	*2010-11*	141 (61, 250)	99 (63, 143)	240	59
	2012-13	288 (154, 460)	274 (166, 399)	562	51
	2014-15	141 (86, 209)	352 (218, 515)	493	29
	2016-17	237 (55, 500)	479 (300, 698)	716	33
	2018-19	153 (69, 250)	1120 (390, 2457)	1273	12
	2020-21	408 (155, 740)	1625 (968, 2403)	2033	20
	2022-23	314 (203, 444)	1655 (1125, 2273)	1969	16
Biomass (tonnes)	*2010-11*	156 (72, 272)	41 (23, 65)	197	79
	2012-13	249 (131, 433)	110 (69, 165)	359	69
	2014-15	156 (80, 263)	135 (87, 208)	291	54
	2016-17	216 (49, 509)	187 (112, 288)	403	54
	2018-19	142 (76, 264)	662 (199, 1,781)	804	18
	2020-21	442 (181, 898)	779 (457, 1,304)	1,221	36
	2022-23	550 (305, 878)	950 (646, 1,442)	1,500	37

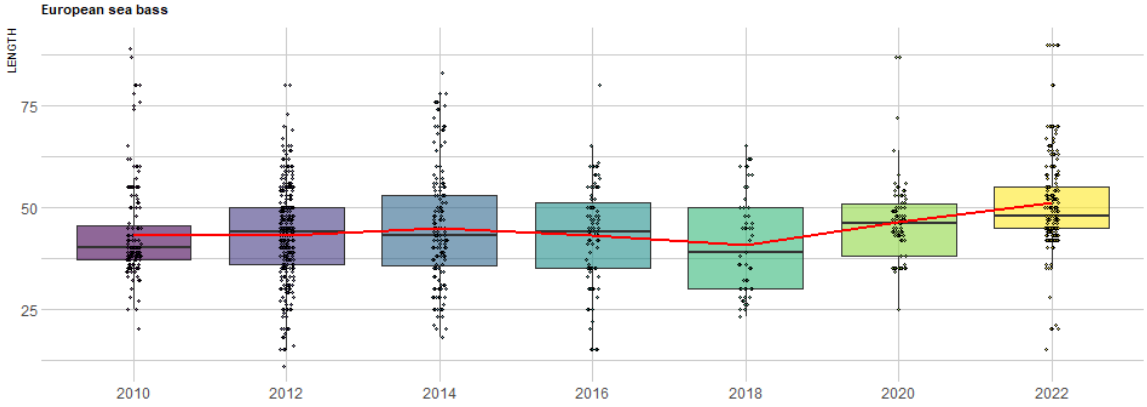

Figure 3-2 *Boxplot (box representing median, 25th percentile, 75th percentile) with individual lengths of retained European sea bass (points). Red line is the mean. Source: logbooks 2010-2023.*

Table 3-6 *Management measures for recreational fisheries on sea bass. On 1 June 2013, the Dutch authorities set a bag limit for the first time (maximum 20 kg or 25 individuals of cod, sea bass or cod and sea bass). On 29 March 2015 the EU set an EU-wide bag limit (3 sea bass per day). MLS is the minimum landing size and applies throughout. 'c'(orange): Season is closed (only catch and release). 'o' (green): Season is open (bag limit applies).*

Year	MLS (cm)	Bag limit	Month											
			J	F	M	A	M	J	J	A	S	O	N	D
2013 Jan-May	36	none	o	o	o	o	o							
2013 Jun-Dec	36	20 kg or 25 sea bass and/or cod						o	o	o	o	o	o	o
2014	36	20 kg or 25 sea bass and/or cod	o	o	o	o	o	o	o	o	o	o	o	o
2015 Jan-Mar	36	20 kg or 25 sea bass and/or cod	o	o	o									
2015 Apr-Aug	36	3				o	o	o	o	o				
2015 Sep-Dec	42	3									o	o	o	o
2016	42	1	c	c	c	c	c	c	o	o	o	o	o	o
2017	42	1	c	c	c	c	c	c	o	o	o	o	o	o
2018	42	1	c	c	c	c	c	c	c	c	c	o	o	o
2019	42	1	c	c	c	o	o	o	o	o	o	o	c	c
2020	42	2	c	c	o	o	o	o	o	o	o	o	o	c
2021	42	2	c	c	o	o	o	o	o	o	o	o	o	c
2022	42	2	c	c	o	o	o	o	o	o	o	o	o	c
2023	42	2	c	c	c	o	o	o	o	o	o	o	o	o

3.3.3 Pollack (Pollachius pollachius)

Pollack is rarely reported in the logbooks (Table 3-7). Most pollack was reported in 2014-15, 2016-17 and 2022-23, but the majority in each survey year was reported by one or a few anglers in each year. The number of records in the logbooks was too small to raise the data to the Dutch population.

Table 3-7 *Total (absolute) number of pollack reported per survey.*

Year	Retained	Released	Total
2010-11	3	1	4
2012-13	5	0	5
2014-15	26	0	26
2016-17	7	27	34
2018-19	3	8	11
2020-21	2	1	3
2022-23	11	12	23

3.3.4 Sharks and rays

Sharks and rays are rarely reported in the logbooks. If reported, it is often very few individuals or family members reporting the majority of sharks and/or rays. For example, of the 265 sharks and rays that were reported in 2014-15, 218 of these were reported by a single family with 5 members. This occurred to a lesser extend in 2012-13 (45 and 66 from two family members). The number of sharks and rays reported thus strongly depend on the occurrence of a single person of family reporting many and the data should therefore be viewed with caution. Clearly, some sharks and rays are caught in recreational fisheries, but the data are not of sufficient quantity and quality to make an estimate of the total number. Species that were reported were: Thornback ray, sting ray, dogfish and houndsharks. Since 2018 no sharks or rays were reported.

Table 3-8 *Total number of sharks and rays reported in logbooks per survey.*

	Sharks			Rays		
Year	Retained	Released	Total	Retained	Released	Total
2010-11	6	11	17	0	0	0
2012-13	0	59	59	0	7	7
2014-15	31	191	222	8	35	43
2016-17	4	3	7	0	0	0
2018-19	0	0	0	0	0	0
2020-21	0	0	0	0	0	0
2022-23	0	0	0	0	0	0

3.3.5 European Eel (Anguilla anguilla)

Numbers and weight of retained and released eel in fresh and in marine water have decreased from 2010-11 to 2020. The biomass of retained eel in fresh and marine water decreased as well (Table 3-9). However, the low number of recorded eel and anglers recording eel in both fresh and marine water also results in inaccurate estimates. The cause of the decrease is unknown. It could be that compliance to the obligation to release eel, which came into place in 2009 (Netherlands Eel Management Plan, LNV 2009 & 2018), has increased over the years.

Because it is obligatory to release all caught eel, all retained eel can be considered as illegal fishing and the question is if this should be reported as recreational landings.

Table 3-9 *Overview of retained and released eel in fresh and marine water by recreational anglers between 2010-2023. 95% Confidence intervals between brackets.*

		Number (x1000)				Biomass (tonnes)	
	Year	**Retained**	**Released**	**Sum**	**% Retained**	**Retained**	**Released**
Fresh	2010-11	302 (169, 461)	814 (528, 1196)	1116	27	62 (30, 103)	133 (81, 220)
	2012-13	356 (229, 509)	1,774 (1155, 2544)	2130	17	46 (31, 68)	274 (185, 406)
	2014-15	264 (115, 459)	1,506 (902, 2186)	1770	15	21 (10, 36)	228 (142, 347)
	2016-17	53 (20, 97)	162 (114, 217)	215	25	6 (2, 13)	23 (17, 38)
	2018-19	76 (9, 180)	276 (150, 441)	352	22	10 (1, 23)	31 (22, 53)
	2020-21	31 (9, 64)	152 (100, 213)	183	17	5 (1, 11)	41 (23, 64)
	2022-23	8 (1, 18)	130 (80, 189)	138	6	1 (0, 3)	23 (15, 37)
Marine	2010-11	140 (65, 242)	83 (49, 122)	223	63	33 (13, 60)	14 (7, 22)
	2012-13	109 (45, 187)	78 (31, 142)	187	58	31 (7, 97)	15 (7, 32)
	2014-15	143 (75, 224)	169 (77, 282)	312	46	25 (10, 43)	36 (17, 64)
	2016-17	76 (18, 154)	85 (42, 144)	161	47	23 (5,59)	24 (7, 53)
	2018-19	15 (0, 44)	117 (13, 291)	132	11	3 (0, 13)	17 (6, 40)
	2020-21	28 (0, 87)	148 (56, 261)	176	16	13 (0, 40)	43 (16, 89)
	2022-23	83 (20, 162)	105 (46, 175)	188	44	9 (2, 18)	14 (5, 25)

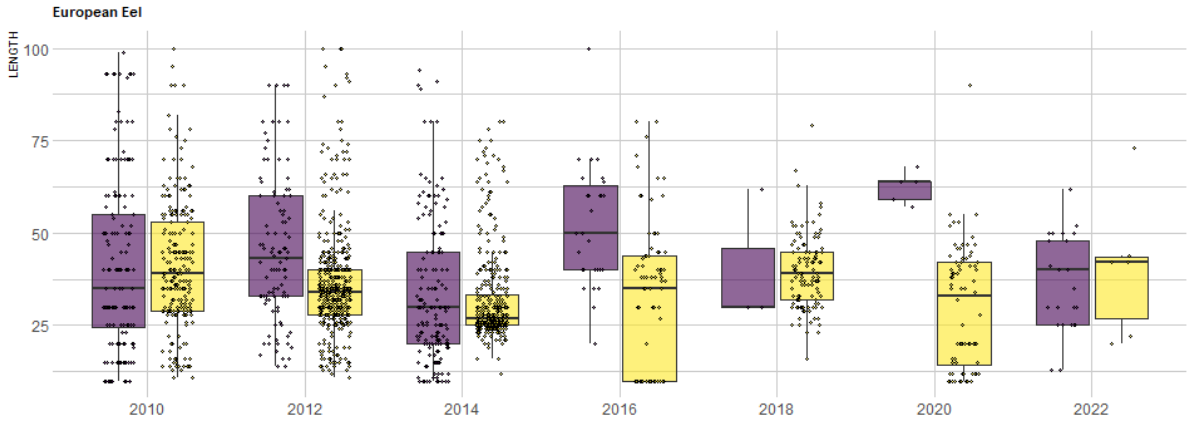

Figure 3-3 *Boxplot (box representing median, 25th percentile, 75th percentile) with individual lengths of retained European eel (points). Purple: marine water; yellow: fresh water. Source: logbooks 2010-2023.*

3.4 Salmon/Sea trout

Salmon and sea trout are difficult to distinguish and are therefore grouped. Salmon and sea trout are migratory species and can be reported in both fresh and marine waters. However, in the Netherlands, salmon (*Salmo salar*) and sea trout (*Salmo trutta*) in fresh water are mainly reported in (paid) trout ponds (which may also be confused with Rainbow trout). As the reason for reporting recreative angling catches is to inform on its possible effects on the *wild* population, we do not report on fresh water salmon or sea trout. Few anglers reported very large amounts of (small) salmons, which are recorded to be unreliable and therefore excluded from this report. After this data cleaning, only few salmon or sea trout catches are

reported (Table 3-10). Although there is no hard rule on how many fish are needed to estimate the total catches at the population level, it was decided that the number of records in the logbooks was too small to raise the data to the population level.

Table 3-10 *Total (absolute) number of salmon and sea trout reported in the logbook survey in marine waters, after data cleaning.*

Year	Retained	Released	Total
2010-11	2	8	10
2012-13	23	12	35
2014-15	30	11	41
2016-17	8	26	34
2018-19	102	78	180
2020-21	2	3	5
2022-23	1	1	2

4 Discussion

4.1 Screening survey: number of recreational anglers

In the Netherlands, the participation rate in recreational angling slowly declined from 10.4% (1.6 million anglers) in 2009 to 8.2% (1.4 million anglers) in 2021. The decline can be seen mostly between 2009 and 2019. In 2020 the participation started to increase again, possibly influenced by lock-downs due to the COVID19 pandemic, when recreational was one of the few leisure activities that were allowed.

4.2 Commercial catches

The percentage of recreational cod catches of the total cod landings (recreational + commercial), varied over the years and has large confidence intervals (Table 4-1). Both the recreational and the commercial catches have decreased over the years. A reason for the general decrease in recreational catches could be that the cod stock in the North Sea and English Channel is very low and still decreasing (ICES 2022a). The percentage of recreational sea bass catches remains high and has large confidence intervals (Table 4-1). The estimated share of recreational landings has increased and is the highest in the latest year (58-80% of the total landings).

Table 4-1 *Commercial catches (discards not included) vs. recreational catches (angling, catch & release mortality not included) (tonnes) in the Netherlands. 95% Confidence intervals between brackets.*

Species	*Comm. landings*	*Year*	*Comm. Landings (tonnes)*	*Recr. Landings (tonnes)*	*% Recr. Landings from total landings*	*Reference (commercial)*
Cod	Dutch landings from area IV	*2010*	2,657	698 (425, 1041)	21 (14-28)	ICES (2022a)
		2012	1,955	499 (327, 801)	20 (14-29)	ICES (2022a)
		2014	1,242	756 (360, 1686)	38 (22-58)	ICES (2022a)
		2016	1,365	154 (81, 260)	10 (6-16)	ICES (2022a)
		2018	515	155 (51, 338)	23 (9-40)	ICES (2022a)
		2020	590	165 (34, 394)	22 (5-40)	ICES (2022a)
		2022	594	249 (130, 418)	30 (18-41)	ICES (2023a)
Sea bass	Dutch landings in IVbc, VIIa, and VIId–h	*2010*	399	156 (72, 272)	28 (15-41)	ICES (2022b)
		2012	376	249 (131, 433)	40 (26-54)	ICES (2022b)
		2014	253	156 (80, 263)	38 (24-51)	ICES (2022b)
		2016	156	216 (49, 509)	58 (24-77)	ICES (2022b)
		2018	172	142 (76, 264)	45 (31-61)	ICES (2022b)
		2020	223	442 (181, 898)	66 (45-80)	ICES (2023b)
		2022	225*	550 (305, 878)	71 (58-80)	ICES (2023b)

* Preliminary

4.3 Sources of error: accuracy and precision

4.3.1 Precision

The 95% confidence intervals (CI's) show the range of values in which the real value lies with 95% certainty. The CI's should always be taken into consideration when interpreting the estimates. Especially in marine water, a large group of (low avid) fishers are fishing in an opportunistic way. They were planning to fish (stated in the screening survey), but in the end did not fish at all in marine water during the logbook period. These fishers did return their logbooks, so they are not non-responders, but just didn't fish. These so called drop out were also removed from the analysis, resulting in a large group of fishers being excluded

from the analyses, resulting in low precision (high CI's). In order to increase the precision: (1) separate (stratified) surveys could be executed designed for specific species, and/or (2) the sample size of the number of participating anglers should be increased.

4.3.2 Bias

Bias is a systematic departure from the true values caused by non-representative data collections and other persistent factors and can generally not be quantified because the true values are seldom known. Bias in our estimates can be caused by several factors. First, the representativeness of the Verian database can not be validated. Deviation from demographic profiles (gender, age, location, income, family size, ethnic groups) is corrected by weighting, which is expected to remove most bias in the screening survey. However, it is difficult to judge whether weighting corrects for all biases. For example, the participants as such are a group that is interested and has time to participate in market surveys. If there is a relation between fishing behaviour and interests in participating in this kind of surveys, this might cause some bias. A second issue might be that joining the logbook survey is time much more time consuming for avid fishers, possibly causing relatively higher non-response in this group. A third issue is that although weighting for avidity is applied, within groups there might still be some under or overrepresentation in each avidity group, especially the highest avidity group as this group has the widest range. For example, the highest avidity group in marine water is > 10 trips per year. However, there are also fishermen that fish weekly or daily, catching relatively many fish on a yearly basis. Under- or overrepresentation of the very high avid fishers in the high avidity group will result in bias. To recruit as many fishermen as possible, also in this high avidity group, active recruitment through advertisements on fishers platforms (website angler organisation, recreational fishers Facebook groups, fishers journal etc.) was executed. In the latest survey year, the group externally recruited avid marine fishers increased compared to previous survey years. It remains to be investigated how the variable number of externally recruited -high avid- fishers influence the results.

4.3.3 Species identification

Several freshwater and marine fish species are difficult to identify. Misidentification of species could result in biased (under and/or over) estimates of catches. Participants in the logbook survey receive a species identification chart and there is also a species identification app. In addition, fishers are asked to send a picture of their catches if they are in doubt of identification. However, WMR has received a picture of an unidentified fish only once. However, some species might be difficult to distinguish and some error may occur.

4.3.4 Foreign anglers

The catch estimates derived from the presented survey only represent the catches realised by recreational angling by inhabitants of the Netherlands. The catch estimates do not include the catches by visiting foreign anglers (tourists).

4.3.5 Catch & Release mortality

A proportion of the released fish will not survive the ordeal of being caught due to injuries sustained in the hooking and handling process and/or due to barotrauma. Lewin et al. (2019), investigate post-release mortality of European Sea bass with different bait types, air exposure time and deep/shallow hooking. This resulted in an estimation of 5% (95%CI: 2.8%-9.1%) catch and release mortality. Because we do not report the catch and release mortality, the estimate of the retained fish will be an underestimation of the total mortality due to recreational fisheries in this report will be an underestimation.

5 Conclusion

The recreational program gives a good indication of the number of recreational fishers (freshwater and marine) in the Netherlands. Despite the high CI's and challenges regarding bias, these remain constant throughout all surveys and do not show an increasing trend. Therefore, the estimated recreational catches (by number and biomass) presented here can be used as an indication of trends in the Dutch recreational catches of European sea bass, Atlantic cod and European eel. The estimates are also used as input data for the ICES assessment working groups for these species.

Thank you to all participating anglers who willingly reported their catches. Verian (Lisanne van Thiel and Marsha Hilhorst) is thanked for the logistics of the screening and logbook surveys. The Dutch angling organisation (Sportvisserij Nederland, Remko Verspui, David Vertegaal and Onno Terlouw) is thanked for fruitful discussions and review of a previous version of this report.

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7 Quality assurance

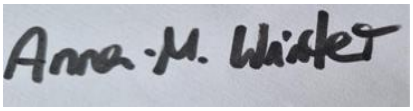
CVO is certified to ISO 9001:2015 (certificate number: 268632-2018-AQ-NLD-RvA). This certificate is valid until December 15th, 2024. The certification was issued by DNV Business Assurance B.V

Justification

CVO Report: 24.013
Project number: 4311216011

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

Approved by: Dr. A.M. Winter
Researcher

Signature: 

Date: 5 April 2024

Approved by: Ing. S.W. Verver
Head Centre for Fisheries Research

Signature: 

Date: 5 April 2024

8 Annex 1 Screening Questionnaire (December 2021)

CAWI
Questionnaire

Heeft u dit jaar, in 2021, gevist in Nederlands zee- en/of kustwater?
1 ja
2 nee

Hoe vaak heeft u in 2021 gevist in Nederlands zee- en/of kustwater?

Aantal keer:

Met welk vistuig heeft u in 2021 gevist in Nederlands zeewater en/of kustwater?

Meer antwoorden mogelijk

1 hengel
2 peur
3 fuik
4 staand want
5 hoekwant
6 net
7 anders, namelijk... *Open

Heeft u dit jaar, in 2021, gevist in Nederlands binnenwater?

1 ja
2 nee

Hoe vaak heeft u in 2021 ongeveer gevist in Nederlands binnenwater??
Aantal keer:

Met welk(e) vistuig(en) heeft u in 2021 gevist in Nederlands binnenwater??

Meer antwoorden mogelijk

1 hengel
2 peur
3 fuik
4 staand want
5 hoekwant
6 net
7 anders, namelijk... *Open

Wat voor type(s) visserij heeft u in 2021 gedaan?

Meerdere antwoorden mogelijk

1 Vliegvissen
2 Karpervissen
3 Roofvissen
4 Witvissen
5 Meervalvissen
6 Zeebaarsvissen
7 Zeevissen

8 Anders/Onbekend

Heeft u in 2021 wel eens gebruik gemaakt van een alternatief voor een loodgewicht?

Onder een alternatief voor een loodgewicht verstaan wij elk type visgewicht waarin geen lood verwerkt zit, zoals bijvoorbeeld een ander metaal, glas of steen.

2 ja
1 nee
999 weet niet

Hoe vaak (bij hoeveel vistrips) in 2021 heeft u een alternatief voor een loodgewicht gebruikt?

Indien u dit niet meer precies weet, kunt u dan een schatting maken?

Wat vindt u van de alternatieven voor vislood?

Meerdere antwoorden mogelijk

1 Heel belangrijk om te gebruiken voor het milieu en de gezondheid
2 Deze zijn net zo goed als loodgewichten
3 Deze zijn minder goed dan vislood
4 Voor mij niet belangrijk omdat ik te weinig vis
5 Ik vind ze te duur
6 Ze zijn niet beschikbaar in mijn viswinkel
7 Voor mijn type visserij zijn er geen bruikbare loodalternatieven
8 Anders
9 Weet ik niet/ik ken ze niet

Bent u van plan om volgend jaar, in 2022, te gaan vissen?
1 ja
2 nee

Waar bent u van plan om volgend jaar, in 2022, te gaan vissen?

Meerdere antwoorden mogelijk
1 binnenwateren
2 zeewater en/of kustwater

Bent u van plan om volgend jaar, in 2022, (weer) met een loodalternatief te gaan vissen?
1 ja
2 nee

Van maart 2022 tot en met februari 2023 wordt er voor de zevende keer een grootschalig project met betrekking tot recreatieve visserij uitgevoerd door Wageningen Marine Research (www.wur.nl/marine-research). Voor vragen over het onderzoek kunt u contact opnemen met Tessa van der Hammen.

Het doel van dit project is:
- een goed overzicht te krijgen van de aantallen gevangen en meegenomen vis door recreatieve vissers;
- informatie te verzamelen over (veranderingen) in de visstand in Nederland.

Voor een onderzoek binnen dit project kunnen we uw hulp goed gebruiken. Het onderzoek bestaat uit het registreren van uw vistrips gedurende een jaar (1 maart 2022 tot en met 28 februari 2023). U houdt bij of en hoe vaak u gevist heeft, hoeveel u heeft gevangen en waar u gevist heeft.

U kunt de gegevens van uw vistrips maandelijks via een online vragenlijst aan ons doorgeven.

Het maakt niet uit of u één keer, elke dag of helemaal niet gevist heeft in een maand. Wij zijn ook op zoek naar mensen die maar af en toe vissen.

Deelname aan dit onderzoek, levert u, naast de gebruikelijke vergoeding in NIPOints, 8 euro op in de vorm van een cadeaubon.

Bent u bereid om mee te werken aan dit onderzoek?

Normal

1 ja
2 nee

9 Annex 2 Logbook Questionnaire

CAWI
Questionnaire

Author(s)
van Thiel, Lisanne (Verian)

Heeft u in de maand [D3_MAAND] gevist?

Dit kan in Nederland zijn, maar ook in het buitenland. Het gaat in het onderzoek vooral om de vistrips in Nederland. Uw vistrips in het buitenland hoeft u niet in de vragenlijst in te voeren, maar we zijn wel blij met deze informatie.

1 Ja
2 Nee

Nu volgt een aantal vragen over vistrip nummer [nummer] die u heeft gemaakt in de maand [D3_MAAND]. Op het volgende scherm kunt u de begindatum, begintijd, einddatum en eindtijd van deze vistrip invullen. Gebruikt u voor het invullen van de tijd in uren en minuten in totaal 4 cijfers (24-uursklok). Wilt u hieronder de begindatum, begintijd, einddatum en eindtijd van deze vistrip invullen? Gebruikt u voor het invullen van de tijd in uren en minuten in totaal 4 cijfers (24-uursklok).

Begindatum [D2_DAGENPERMAAND] [D3_MAAND] Begintijd: 00:00
Einddatum [D2_DAGENPERMAAND] [D3_MAAND] Eindtijd: 00:00

In welk land heeft u gevist?

DropDown List LANDEN. Default staat deze vraag op 'Nederland'.

Onder vissen in Nederlands zee- en/of kustwater verstaan wij het vissen in: alle Nederlandse zee- en kustwateren, zoals Noordzee, Waddenzee, Ooster- en Westerschelde, Eems en Dollard, zowel vanaf strand, dijk en pier als vanaf een schip of een boot.

Onder vissen in binnenwater verstaan wij het vissen in alle Nederlandse binnenwateren, zoals rivieren, meren en plassen, polderwateren, de Biesbosch, Grevelingen, Veerse Meer, IJsselmeer, Volkerak-Zoommeer en Haringvliet maar ook het vissen in karperputten, forelvijvers, sierwateren, vennen en dergelijke, zowel vanaf de kant als vanaf een boot.

Waar heeft u gevist?
1 Zee- en kustwater
2 Binnenwater

Op welke locatie heeft u gevist?
Kunt u de locatie aangeven op onderstaande kaart door het rode symbooltje op de juiste locatie te plaatsen?

Navigeren op de kaart:
Klik en sleep de kaart om rond te kijken of gebruik de pijlen. Sleep de zoomschuifregelaar links op de kaart (+ en -) omhoog of omlaag om steeds meer in of uit te zoomen.

Als het niet lukt om de juiste locatie via Google Maps in te voeren, kunt u deze vraag overslaan door op '>' te drukken.

Wat voor type visserij heeft u deze vistrip gedaan?

Meerdere antwoorden mogelijk
1 Vliegvissen
2 Karpervissen
3 Roofvissen
4 Witvissen
5 Meervalvissen
6 Zeebaarsvissen
7 Zeevissen
8 Anders/Onbekend

Een 'betaalwater' is een specifiek water waar entree wordt geheven om er te kunnen vissen.

Betaald vissen met bijvoorbeeld een charterboot wordt hier dus niet onder verstaan. Het 'betaalwater' (b.v. forelvijver) kan particulier eigendom zijn en tegen commercieel tarief kan er worden gevist. De visstand wordt via regelmatige uitzettingen onderhouden en kent meestal een specifieke visstand. Vaak gaat het om (regenboog)forel, meerval, steur en in sommige wateren ook karper. Het 'betaalwater' kan ook eigendom zijn van een hengelsportvereniging en een visser kan een dagkaart als schriftelijke toestemming kopen voor een niet-commercieel tarief. De visstand wordt in deze wateren ook vaak via uitzettingen onderhouden.

Heeft u gevist in betaald water of onbetaald water?
1 In betaald water
2 In onbetaald water

Kunt u hieronder aangeven in welk type binnenwater u gevist heeft?
1 Forelvijver of Visvijver
2 Stadswater
3 Meer of plas
4 Sloot
5 Kanaal
6 Grote rivier
7 Kleine rivier
8 Haven
9 Anders

Heeft u vanaf de kant of vanaf een boot gevist?
1 Vanaf de kant
2 Vanaf de boot

U heeft gevist vanaf de kant. Kunt u aangeven vanaf waar u gevist heeft?
1 Vanaf het strand
2 Vanaf een dijk
3 Vanaf een pier
4 Vanaf een andere plek

U heeft gevist vanaf een boot. Wat was het maximaal aantal passagiers van deze boot?

Capaciteit (aantal passagiers):

Kunt u hieronder aangeven wat voor boot dit was?
1 Eigen boot
2 Boot van anderen
3 Charterboot of huurboot

Welk vistuig heeft u gebruikt tijdens deze vistrip?
1 Hengel
2 Peur
3 Hoekwant
4 Staand want
5 Fuik
6 Net
7 Anders, namelijk *Open

Met hoeveel [vistuig plural1] heeft u gevist tijdens deze vistrip?
1: hengels
2: peuren
3: hoekwanten
4: staand wanten
5: fuiken
6: netten
7: [answer]+en

Wat voor type visgewicht heeft u tijdens deze vistrip gebruikt?

Onder een visgewicht verstaan wij alles wat gebruikt wordt om aas en/of lijn te verzwaren, zoals loodgewichten, voerkorven, knijpgewichten/-loodjes, method feeders, jigkoppen, drop-shot gewichten en ander kunstaas. Het visgewicht kan van lood zijn/met lood verzwaard zijn, maar ook een loodvervanger zoals ijzer, tungsten, steen, glas of een ander metaal. Dan spreek je van een loodvervanger.
1 Lood
2 Een loodvervanger, namelijk ... *Open
3 Geen

Bent u tijdens deze vistrip lood verloren?
1 Ja
2 Nee

Hoeveel lood bent u verloren tijdens deze vistrip (in gram)?

Als u het niet precies weet, wilt u dan proberen een schatting te geven?

Heeft u vis gevangen tijdens deze vistrip?
Het gaat hierbij alleen om uw eigen vangst.
1 Ja
2 Nee

Op de volgende schermen kunt u de verschillende vangsten (soorten, teruggezet of meegenomen en lengtes van de vissen) invoeren. U kunt eerst de vissoort(en) aangeven, die u gevangen heeft in deze vistrip. Als u de vis niet kent, kunt u het hier opzoeken: [http://www.sportvisserijnederland.nl/vis-water/vissoorten/']. Vervolgens kunt u per vissoort aangeven wat de lengte per vis was van de vissen die u van deze soort gevangen heeft en hoeveel vis(sen) u van deze vissoort heeft meegenomen of teruggezet.

Voor de meegenomen vissen is het verplicht de lengtes in te vullen. Voor de teruggezette vissen kunt u de lengtes noteren, indien u deze bijgehouden heeft. Dit is niet verplicht, behalve voor de aal/paling, kabeljauw en zeebaars.
Wilt u de lengte in hele centimeters invullen? U kunt dus geen komma gebruiken.

Welke soorten vis heeft u gevangen tijdens deze vistrip?

1 Aal of Paling
2 Bot
3 Diklipharder
4 Fint
5 Geep
6 Griet
7 Grote Pieterman
8 Haring
9 Horsmakreel
10 Kabeljauw
11 Koolvis
12 Makreel
13 Pollak
14 Puitaal
15 Rode Poon
16 Schar
17 Schelvis
18 Schol
19 Spiering
20 Steenbolk
21 Tarbot
22 Tong
23 Wijting
24 Zalm
25 Zeebaars
26 Zeedonderpad
27 Zeeforel
28 Afrikaanse meerval
29 Alver
30 Baars
31 Barbeel
32 Bittervoorn
33 Blankvoorn
34 Brasem
35 Bruine Amerikaanse dwergmeerval

36 Europese meerval
37 Giebel
38 Goudvis
39 Graskarper
40 Karper
41 Kolblei
42 Kopvoorn
43 Kroeskarper
44 Pos
45 Regenboogforel
46 Rivierdonderpad
47 Riviergrondel
48 Roofblei
49 Ruisvoorn of Rietvoorn
50 Serpeling
51 Snoek
52 Snoekbaars
53 Spiegelkarper
54 Spiering
55 Winde
56 Zalm
57 Zeelt
58 Zonnebaars
59 Zwartbekgrondel
60 Andere vissoort, namelijk *Open
61 Andere vissoort, namelijk *Open
62 Andere vissoort, namelijk *Open
63 Andere vissoort, namelijk *Open
64 Onbekend/weet niet

U kunt nu voor de soort [vissoort] de volgende zaken invoeren:

- hoeveel vis(sen) u heeft meegenomen;
- wat de lengte van deze meegenomen vissen was;
- hoeveel vis(sen) u heeft teruggezet;
- wat de lengte van deze teruggezette vissen was (optioneel).

Wilt u de lengte in hele centimeters invullen? U kunt dus geen komma gebruiken.

Zijn alle soorten en lengtes van deze vistrip ingevoerd?
1 Ja
2 Nee, soort vergeten
3 Nee, aantallen of lengtes niet volledig

Kunt u hier aangeven of u de lengtes van de meegenomen vissen heeft gemeten of geschat?
1 Ik heb de lengtes gemeten
2 Ik heb de lengtes geschat

Kunt u hier aangeven of u de lengtes van de teruggezette vissen heeft gemeten of geschat?
1 Ik heb de lengtes gemeten

2 Ik heb de lengtes geschat

Wilt u nog een vistrip invullen?

1 Ja
2 Nee

Heeft u nog opmerkingen over deze vragenlijst of dit onderzoek?

1 nee
2 ja, namelijk *Open

10 Annex 3 Raising scheme

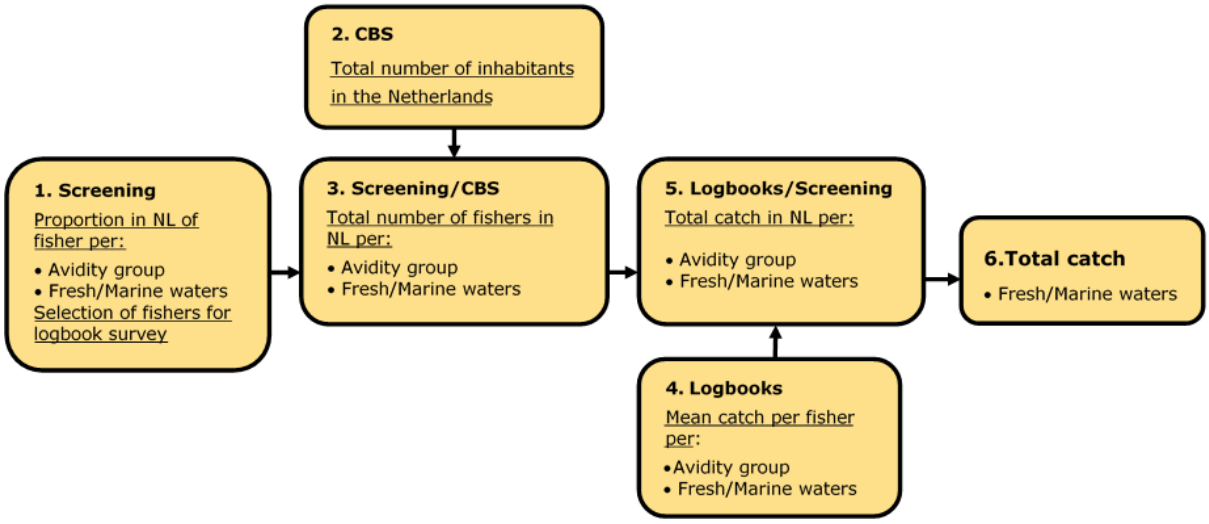


Figure A3 *Flow chart to illustrate the different components of the recreational fishery survey to estimate total catch (in number or weight)*

11 Annex 4 Data cleaning for logbook survey

In the database Verian sometimes detects unreliable respondents. When these are found, we exclude them from the analyses and remove them from our database. Note that this detection/deletion process might not be instant and could cause some inconsistencies of estimates among years.

Family	**Measure**	**Reason**
3079023401-05	Removed	Detected as unreliable by Verian
3089389201-05	Removed	Detected as unreliable by Verian
3089756101-05	Removed	Detected as unreliable by Verian
3090397602-3	Removed	Detected as unreliable by Verian
3090334001-4	Removed	Detected as unreliable by Verian
3090400101-6	Removed	Detected as unreliable by Verian
308599030-5	Removed for cod	Detected by WMR as unreliable length distribution
Trips		
43256, 33886, 50178	Removed for cod	Reported released length in 2012 when released lengths were not asked for (expected that it is retained).
50178, 32663, 32665	Removed for eel	Reported released length in 2012 when released lengths were not asked for (expected that it is retained).

In addition, following hard and soft rules are applied to check the reported catch number and length:

1. Exclude duplicate trips. Duplicate fresh water trips are identified as same fisher, same trip start and end time in the same month. Duplicate marine water trips are identified as same fisher and same trip start time in the same month.
2. Set unrealistic lengths to NA. For cod and seabass, lengths smaller than 10cm and larger than 90cm are set to NA. For eel, lengths smaller than 10cm and larger than 100cm are set to NA;
3. Set length to NA of measured fish when a fisher has caught at least 5 fishes in a year and more than 80% of the fishes have the same length;

The latest data cleaning processing are listed in the table below.

Species	selection	measure	reason
cod	42 trips	Removed from analysis	Duplicate trips
	length <10cm and >90cm	Set length to NA	Unrealistic length
	61 length measurements	Set length to NA	80% of the fishes have the same length
seabass	42 trips	Removed from analysis	Duplicate trips
	length <10cm and >90cm	Set length to NA	Unrealistic length
	24 length measurements	Set length to NA	80% of the fishes have the same length
eel	42 marine trips and 1739 fresh water trips	Removed from analysis	Duplicate trips
	length <10cm and >100cm	Set length to NA	Unrealistic length
	14 length measurements	Set length to NA	80% of the fishes have the same length

12 Annex 5 Length Weight relationships

The length weight formula to convert lengths to weight is:

$W=a*L^b$,

with W= weight in kg, L = length in cm.

The parameters used for Sea bass, Cod and eel are:

European sea bass: a = 0.0074, b = 3.096
Atlantic cod: a=0.0068, b=3.101
European eel: a = 0.00107, b = 3.133