

Bycatch of protected, endangered, and threatened species (PETS)

Advice summary

ICES summarizes new bycatch information on marine mammals, seabirds, and marine turtles in 2019 and 2020, based on reported bycatch data received through an ICES data call.

The available monitoring data for 2017–2020 are used to highlight species, métiers, and ecoregions where bycatch may be of particular concern. The average bycatch rate of marine mammals was 0.03 specimens per monitored day-at-sea. A high bycatch rate (0.6) of the common dolphin *Delphinus delphis* was observed in bottom pair trawl fisheries in the Bay of Biscay and Iberian Coast. The average bycatch rate of seabirds was 0.1 with higher values being associated with nets and/or line fisheries and the highest bycatch rate (1.2) recorded for the northern fulmar *Fulmarus glacialis* in set longlines in the Greater North Sea. Bycatch rates of sea turtles were higher in line fisheries in all ecoregions and highest (0.1) for the loggerhead sea turtle *Caretta caretta* in drifting longline fisheries in the Azores ecoregion.

ICES reiterates that monitoring sampling design does not yet allow for robust and unbiased estimations of numbers of sensitive species caught incidentally in fishing activities.

Request

Work Package I, section 1.1.3. of the Specific Grant Agreement between the EU and ICES requests ICES to the extent possible to:

- 1) *Provide, on the basis of data provided by Member States and any other relevant data sources, annual estimates of the numbers of specimens of sensitive species (as defined in Article 6(8) of Regulation (EU) 2019/1241) excluding fish species) caught incidentally in fishing activities, disaggregated by sea area and type of fishing gear. These estimates shall be accompanied with evaluations or estimates of their accuracy where possible. They shall be provided by October/November each year and shall cover incidental catches made until 31 December of the previous year. For marine mammals, when appropriate, ICES shall accompany these estimates with calculated values of potential biological removal (PBR), or appropriate proxies for those values.*
- 2) *Provide warnings of any serious threats from fishing activities alone or in conjunction with any other relevant activity to local ecosystems or species as soon as ICES is aware of such threats.*

This advice section covers only aspects of impacts on marine mammals, seabirds, and marine turtles. Information relating to habitats will be advised separately. ICES advice in recent years (ICES, 2017, 2018, 2019, 2020a, 2020b) has analysed bycatch in further areas and for other species than those described here.

Elaboration on the advice

ICES summarizes annual bycatch observations (for 2019 and 2020) and multiannual bycatch rates (2017–2020) of marine mammals, seabirds, and marine turtles, based on reported and observed bycatch and monitoring data received through ICES data calls (ICES, 2021a). In addition, bycatch rates with precision estimates are provided for harbour seal (*Phoca vitulina*) in the Greater North Sea ecoregion and part of the Baltic Sea ecoregion. ICES reiterates that the monitoring data for many areas and métiers remains insufficient to provide reliable bycatch estimates for most protected, endangered, and threatened species.

Annual bycatch observations

Marine mammals

For marine mammals, a total of 609 bycatch incidents (fishing operations with bycatch) were reported in 2019 and 2020, involving 868 specimens (440 seals and 428 cetaceans) from ten species (four seal species and six cetaceans) across nine ecoregions (Table 1). The net métiers accounted for 80% of marine mammal bycatch incidents across ecoregions, including 79% of bycaught cetaceans and 74% of bycaught seals. The average monitoring coverage in net métiers with marine mammals bycatch was equal to 3%. Traps and pelagic trawls accounted for 9% and 6% of marine mammal bycatch incidents, respectively. The average monitoring coverage was equal to 25% for traps and 1% for pelagic trawls.

Seabirds

For seabirds, a total of 749 bycatch incidents were reported in 2019 and 2020, involving 2596 specimens from at least 33 species across nine ecoregions (Table A1). The net métiers accounted for 77% of bycatch incidents involving seabirds across ecoregions, with an average monitoring coverage of 10%. Longlines accounted for 10% of seabird bycatch incidents with an average monitoring coverage of 1%.

Turtles

For marine turtles, a total of 87 bycatch incidents were reported in 2019 and 2020, involving 115 specimens from three species and two families (the loggerhead turtle [*Caretta caretta*], the green sea turtle [*Chelonia mydas*], and the leatherback sea turtle [*Dermochelys coriacea*]) across five métiers and six ecoregions (Table A2). The loggerhead turtle accounted for 90% of the total bycatch incidents. Longlines and pelagic trawls accounted for the majority of reported incidents for all bycaught turtle species: 41% and 35% respectively. The respective monitoring coverage was 2% and 3%.

Multiannual bycatch rates

Marine mammals

The average bycatch rate of marine mammals across métiers and ecoregion was 0.03 specimens per monitored day-at-sea in 2017–2020. Higher than average bycatch rates were observed in two species of seals (grey seal *Halichoerus grypus* and the harbour seal *Phoca vitulina*) and three cetaceans (common dolphin [*Delphinus delphis*], harbour porpoise [*Phocoena phocoena*], and the long-finned pilot whale [*Globicephala melas*]; Figure 1)). Higher bycatch rates of grey seal were observed in fisheries using set gillnets and midwater otter trawls in the Celtic Seas (both catching 0.06 grey seals per monitored day-at-sea), in trammel net fisheries in the Greater North Sea (0.08) and in pots and traps fisheries in the Baltic Sea (0.07). High bycatch rates of common dolphin were recorded in bottom pair trawl and pelagic pair trawl fisheries (0.6 and 0.1 dolphins per monitored day-at-sea, respectively) in the Bay of Biscay and the Iberian Coast. Pelagic pair trawl fisheries in the Bay of Biscay and the Iberian Coast also had a higher than average bycatch rate of long-finned pilot whales (0.06). Higher bycatch rates of harbour porpoise and harbour seal (0.04 specimens per monitored day-at-sea) were observed in set gillnet fisheries in Icelandic waters.

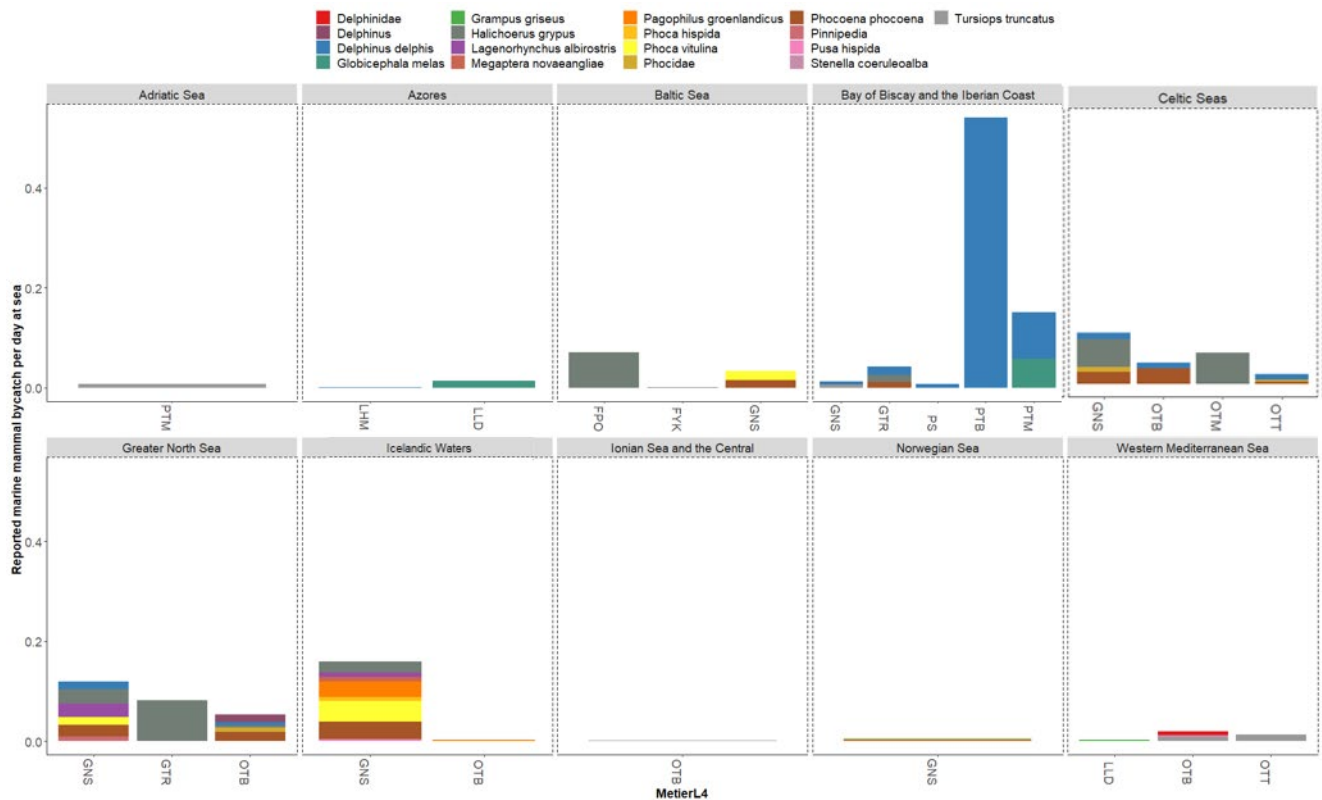


Figure 1 Bycatch rates (specimens per monitored day-at-sea) of marine mammal species as reported through ICES data calls by ecoregion and métier (level 4) with at least one recorded bycatch event, and for which there was a minimum of 50 monitored days-at-sea in 2017-2020. A description of métiers can be found at <https://vocab.ices.dk/?ref=1498>

Seabirds

The average bycatch rate of seabirds across métiers and ecoregions was 0.1 specimen per monitored day-at-sea in 2017-2020. Higher than average bycatch rates were observed in 5 species (the northern fulmar *Fulmarus glacialis*, the velvet scoter *Malanitta fusca*, the common guillemot *Uria aalge*, the northern gannet *Morus bassanus* and the European herring gull *Larus argentatus*) and were associated with nets and/or line fisheries (Figure 2).

There was a high bycatch rate of northern fulmar (1.2 specimens per monitored day-at-sea) in set longlines in the Greater North Sea. Set longlines had a higher bycatch rate of the European herring gull in the Icelandic Waters (0.3), while trolling lines were associated with a higher bycatch rate of northern gannet in the Bay of Biscay and the Iberian Coast (0.2).

Higher bycatch rates of common guillemot were observed in trammel net fisheries in the Bay of Biscay and the Iberian Coast (0.4) and in set gillnets in the Greater North Sea (0.2). Set gillnet fisheries in the Baltic Sea had a high bycatch rate of velvet scoter (0.6).

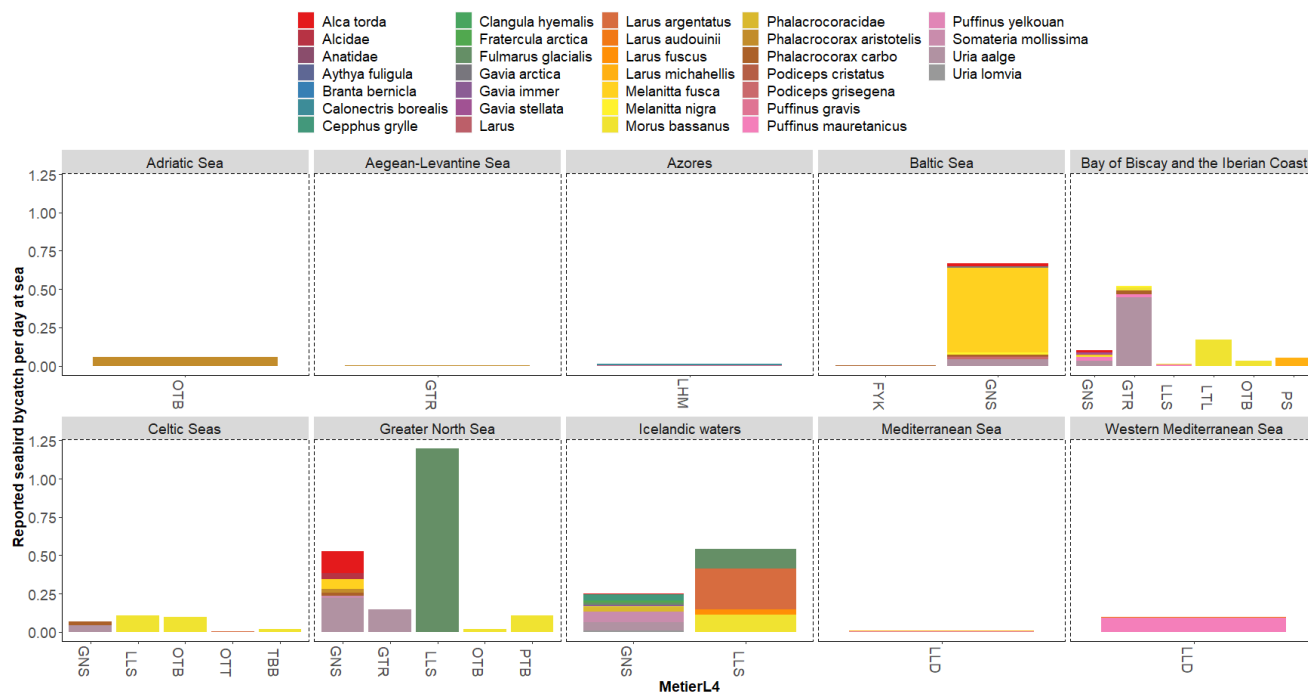


Figure 2 Bycatch rates (specimens per monitored day-at-sea) of seabird species as reported through ICES data calls by ecoregion and métier (level 4) with at least one recorded bycatch event and for which there was a minimum of 50 monitored days at sea in 2017–2020.

Turtles

The average bycatch rate of sea turtles across métiers and ecoregions was 0.01 specimen per monitored day-at-sea in 2017–2020. Bycatch rates of the loggerhead sea turtle were higher in line fisheries in all ecoregions and highest in drifting longline fisheries in the Azores (0.1 turtles per monitored day-at-sea) and in the Adriatic Sea (0.02; Figure 3). Drifting longline fisheries in the Azores also had a bycatch rate of 0.02 leatherback sea turtles per monitored day-at-sea. The bycatch rate of loggerhead sea turtles in trawl fisheries was higher in bottom otter trawls in the Adriatic Sea (0.02).

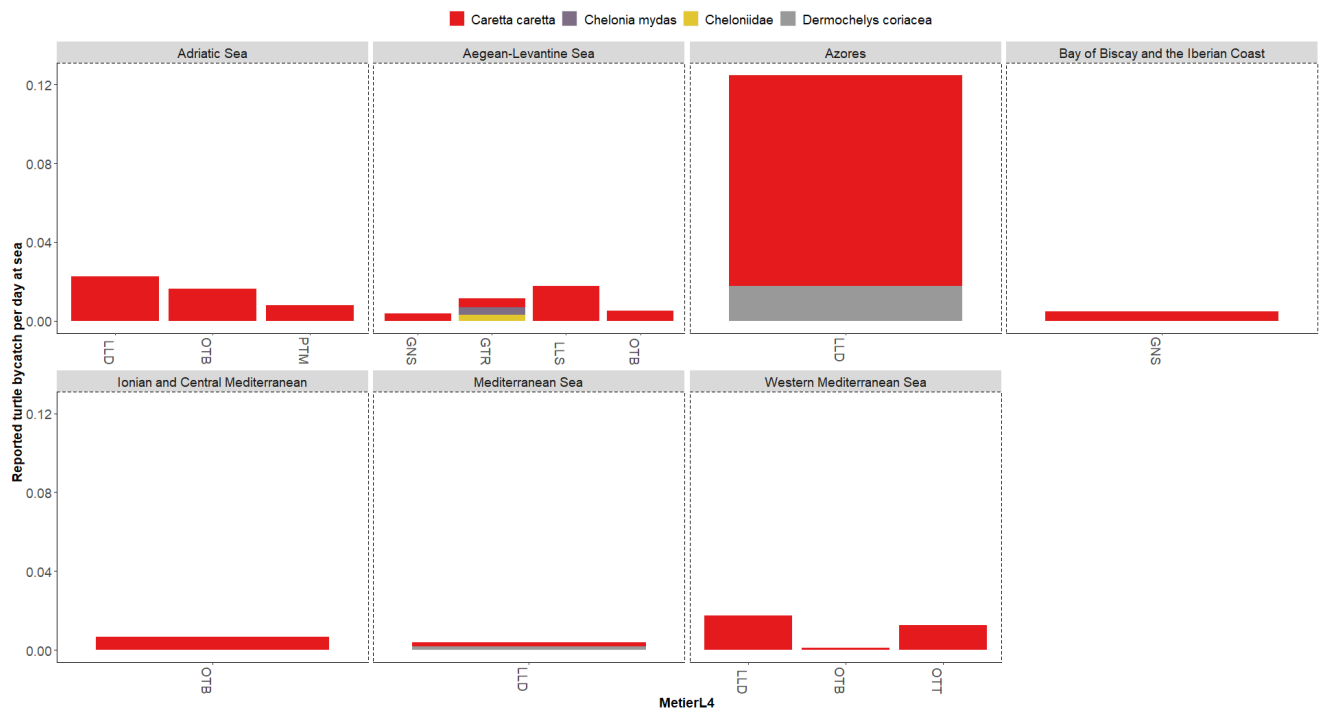


Figure 3 Bycatch rates (specimens per monitored day-at-sea) of marine turtle species as reported through ICES data calls by ecoregion and métier (level 4) with at least one recorded bycatch event and for which there was a minimum of 50 monitored days at sea in 2017–2020.

Bycatch rate with precision estimates

Harbour seal is a species and area of concern for which enough data were available. A bycatch rate with precision estimates was therefore calculated for the species for the Greater North Sea and the Western Baltic Sea (subdivisions 3.b.22, 3.c.23, and 3.d.24) for 2017–2020. The highest upper bycatch rate of the species was 0.073 individuals per day-at-sea. Bycatch was associated with gillnets and trammel nets (Table 1).

Table 1 Estimates of lower and upper 95% bycatch rate (individuals per day-at-sea) for harbour seals in the Greater North Sea ecoregion and the western Baltic Sea. Estimated rates were derived from data on observed effort and bycatch as well as fishing effort data submitted to WGBYC from 2017 to 2020. The observed days-at-sea are pooled from 2017 to 2020; the presented fishing effort is from 2020.

Ecoregion	Level 4 métier	Fishing effort days-at-sea (2020)	Monitored days-at-sea	Total number of specimens taken as bycatch	Bycatch rate lower 95% CI	Bycatch rate upper 95% CI
Baltic Sea	GNS	1699*	282	12	0.022	0.073
Greater North Sea	GNS	36371	2722	57	0.016	0.027
	GTR	2189	437	1	0.000	0.013

* Fishing effort from Germany is not included, as most originates from small vessels resulting in estimation bias.

It should be noted that a high bycatch rate does not necessarily mean that the amount of bycatch is high. But equally, a high annual bycatch number does not mean that there is a direct risk of a detrimental decrease in abundance of a given PETS population/species as risk depends on the population size.

Suggestions

Considering that EU Member States are obliged to monitor bycatch of protected, endangered, and threatened species (PETS), ICES suggests that the Regional Coordination Groups ensure that fisheries monitoring programmes are designed and implemented to minimize bias in the estimation of bycatch rates.

Further investigations into the use of electronic monitoring (EM) as a potentially efficient and reliable method for recording bycatch events should be encouraged; these should include calibration with existing methods (e.g. onboard observer data) and adequate assessment of EM footage.

With the currently available data ICES cannot estimate robust confidence intervals around the estimates of bycatch rates. To improve estimation, ICES recommends collection and provision of data at fishing operation level and that all monitoring effort should be reported for all métiers, regardless of whether there was recorded bycatch or not.

The use of mitigation measures affects bycatch rates of PETS. Complete information on the presence/absence and type of métier-specific mitigation measures is required to enable unbiased estimation of bycatch rates and robust evaluations of the effectiveness of mitigation measures.

Basis of the advice

Annual bycatch observations

Data submissions were received via a formal ICES data call issued to all ICES countries (except USA and Canada) and eight non-ICES EU Member States (six from the Mediterranean Sea region and two from the Black Sea region [ICES, 2021a]). The 2021 data call requested data from 2019 and 2020 on fishing effort, monitoring effort, and reported bycatch of marine mammals, seabirds, and marine turtles from dedicated PETS bycatch (e.g. observer or remote electronic bycatch monitoring programmes, bycatch pilot projects) and non-dedicated multipurpose monitoring programmes (e.g. the Data Collection Framework, DCF). The monitoring data consisted of information collected through a number of different methods including at-sea observers, electronic monitoring, port observers, and vessel-crew observers (which included logbook data reported as monitored/observed data by two countries). In general, the quality and scope of the information provided through the data call is improving but remains variable. The data received are summarized by ecoregion, species, statistical area, and gear in the Annex (tables A1–A3).

Multiannual bycatch rates

Bycatch rates of marine mammals, seabirds, and marine turtles were calculated based on aggregated data from 2017 to 2020 by species and métiers for different ICES ecoregions (ICES, 2021b). Data used for the calculation of bycatch rates was selected based on the following criteria: (1) monitoring coverage within a métier (level 4) was above an arbitrarily set limit of 50 days-at-sea; and (2) data based on vessel self-reporting (as opposed to at-sea monitoring by observers or EM) were excluded.

Bycatch estimates and accuracy

Bycatch rates of harbour seals were estimated with precision level for some net métiers (gillnets and trammel nets) in the Greater North Sea ecoregion and gillnets in the western Baltic Sea (subdivisions 3.b. 22, 3.c.23, and 3.d.24; ICES, 2021b). The arbitrary limit used for inclusion of data in the analysis was a minimum monitoring coverage of ten days-at-sea. A binomial probability density function (Clopper and Pearson, 1934) was used to calculate the lower and upper range of bycatch rates from an expected 95% confidence interval.

Additional information

Data submissions to ICES are continually improving: out of 26 countries contacted 22 responded to the data call in 2021. However, the recent data acquisition again highlights that insufficiencies remain in terms of appropriate metrics of fishing effort data and in PETS bycatch data collection (sampling designs and protocols) to support robust assessments of the interactions with fisheries across a wide range of sensitive species.

Bycatch data from multipurpose programmes (such as the DCF) is improving but may still lead to underestimation of bycatch rates, particularly in métiers where the collection of robust commercial catch and PETS bycatch data by a single observer is potentially incompatible. As sampling designs in multipurpose programmes do not always explicitly consider métiers with relatively higher risk of PETS bycatch, the reliability of broadscale bycatch estimates that rely heavily on data from those programmes may also be negatively affected.

ICES tabulated risk indices from FishPi*, together with recent fishing effort and monitoring effort from the WGBYC database to highlight those métiers and areas that are considered to have a higher likelihood of bycatch but which are currently relatively under-monitored with respect to PETS bycatch (WGBYC; ICES, 2021). The approach helps identify métiers and areas where additional bycatch monitoring would be targeted most effectively, but it cannot be used to identify specific bycatch issues that might constitute a major threat to a single species.

To minimize bias and ensure the accuracy of bycatch rates, a set of validated criteria for selecting the most accurate and representative data is needed and should be routinely applied prior to extrapolating observed bycatch rates to total annual fishing effort to produce mortality estimates.

Available data (from ten countries) on strandings from 2019 and 2020 indicated interactions between 11 marine mammal species and fishing gears (nine cetacean species and two seal species) and estimated that in some extreme situations about 76 % of the analysed cetaceans died due to interaction with fisheries. Strandings data can provide additional information on the general distribution of bycatch of marine mammals in fishing gears, which can augment at-sea monitoring data.

ICES notes that some level of cryptic (undetected, unaccounted) bycatch mortality may also occur in some fisheries. Sensitivity analysis could be carried out to assess how such cryptic mortality might affect bycatch mortality estimates.

For continued provision of incidental bycatch data from the Mediterranean Sea and the Black Sea to ICES, compatibility of data formats should be ensured.

Sources and references

Clopper, C. J. and Pearson, E. S. 1934. The Use of Confidence or Fiducial Limits Illustrated in the Case of the Binomial. *Biometrika*, 26(4), 404–413. <https://doi.org/10.2307/2331986>.

EU. 2019. Regulation (EU) 2019/1241 of the European Parliament and of the Council of 20 June 2019 on the conservation of fisheries resources and the protection of marine ecosystems through technical measures, amending Council Regulations (EC) No 1967/2006, (EC) No 1224/2009 and Regulations (EU) No 1380/2013, (EU) 2016/1139, (EU) 2018/973, (EU) 2019/472 and (EU) 2019/1022 of the European Parliament and of the Council, and repealing Council Regulations (EC) No 894/97, (EC) No 850/98, (EC) No 2549/2000, (EC) No 254/2002, (EC) No 812/2004 and (EC) No 2187/2005. Official Journal of the European Union, L 198: 105–201. <http://data.europa.eu/eli/reg/2019/1241/oj>.

ICES. 2017. Bycatch of small cetaceans and other marine animals – review of national reports under Council Regulation (EC) No. 812/2004 and other information. *In* Report of the ICES Advisory Committee, 2017. ICES Advice 2017, byc.eu. 4 pp. <https://doi.org/10.17895/ices.pub.3052>.

ICES. 2018. Bycatch of small cetaceans and other marine animals – review of national reports under Council Regulation (EC) No. 812/2004 and other information. *In* Report of the ICES Advisory Committee, 2018. ICES Advice 2018, byc.eu. 8 pp. <https://doi.org/10.17895/ices.pub.4514>.

ICES. 2019. Bycatch of protected and potentially vulnerable marine vertebrates – review of national reports under Council Regulation (EC) No. 812/2004 and other information. *In* Report of the ICES Advisory Committee, 2019. ICES Advice 2019, byc.eu. 14 pp. <https://doi.org/10.17895/ices.advice.5564>.

* https://www.masts.ac.uk/media/36783/fishpi2_summary-report-final-clean-21-08-19.pdf.

ICES. 2020a. EU request on emergency measures to prevent bycatch of common dolphin (*Delphinus delphis*) and Baltic Proper harbour porpoise (*Phocoena phocoena*) in the Northeast Atlantic. *In* Report of the ICES Advisory Committee, 2020. ICES Advice 2020, sr.2020.04. 21 pp. <https://doi.org/10.17895/ices.advice.6023>.

ICES. 2021a. Data call for ICES advisory work related to bycatch of protected species (WGBYC-2021). <https://www.ices.dk/sites/pub/Publication%20Reports/Data%20calls/Datacall.2021.WGBYC.pdf>

ICES. 2021b. Working Group on Bycatch of Protected Species (WGBYC). ICES Scientific Reports. 3:107. 169 pp. <https://doi.org/10.17895/ices.pub.9256>

Recommended citation: ICES. 2021. Bycatch of protected, endangered, and threatened species. *In* Report of the ICES Advisory Committee, 2021. ICES Advice 2021, byc.eu. <https://doi.org/10.17895/ices.advice.9335>.

Annex

Table A1 Total number of marine mammals and observed bycatch rates $[(\text{number of specimens}) \times (\text{monitored days-at-sea})^{-1}]$ in 2019 and 2020, obtained through the ICES data call. Bycatch numbers and rates are grouped by gear type and fishing area. The number of incidents is defined as monitored days-at-sea with bycatch. Fishing effort monitored corresponds to $[(\text{monitored days-at-sea}) \times (\text{fishing effort})^{-1}] \times 100$.

Ecoregion	Species	GSA*/ICES statistical area	Year	Level 3 métier	Monitored days-at-sea	Fishing effort days-at-sea	Fishing effort monitored (%)	Total number of incidents	Total number of specimens
Azores	<i>Delphinus delphis</i>	27.10.a.2	2020	Rods and lines	442	25349	1.74%	1	1
Baltic Sea	<i>Halichoerus grypus</i>	27.3.d.28.1	2019	Traps	9314	11323	82.26%	1	1
	<i>Halichoerus grypus</i>	27.3.d.28.2	2019	Traps	501	644	77.73%	1	1
	<i>Halichoerus grypus</i>	27.3.d.29	2019	Longlines	38	164	23.17%	1	3
	<i>Halichoerus grypus</i>	27.3.d.29	2019	Nets	16798	27416	61.27%	3	4
	<i>Halichoerus grypus</i>	27.3.d.29	2019	Traps	5050	7773	64.97%	7	11
	<i>Halichoerus grypus</i>	27.3.d.30	2019	Bottom trawls	30	67	44.78%	1	1
	<i>Halichoerus grypus</i>	27.3.d.30	2019	Nets	43	24448	0.18%	2	2
	<i>Halichoerus grypus</i>	27.3.d.30	2019	Traps	99	11450	0.86%	4	5
	<i>Halichoerus grypus</i>	27.3.d.31	2019	Traps	60	15462	0.39%	14	20
	<i>Halichoerus grypus</i>	27.3.d.32	2019	Nets	12823	19204	66.77%	1	12
	<i>Halichoerus grypus</i>	27.3.d.32	2019	Traps	1800	7153	25.16%	1	2
	<i>Halichoerus grypus</i>	27.3.d.28.1	2020	Traps	11235	13239	84.86%	1	1
	<i>Halichoerus grypus</i>	27.3.d.29	2020	Nets	18048	27780	64.97%	5	6

Ecoregion	Species	GSA*/ICES statistical area	Year	Level 3 métier	Monitored days-at-sea	Fishing effort days-at-sea	Fishing effort monitored (%)	Total number of incidents	Total number of specimens
	<i>Halichoerus grypus</i>	27.3.d.29	2020	Traps	5991	8442	70.97%	6	7
	<i>Halichoerus grypus</i>	27.3.d.30	2020	Nets	38	22701	0.17%	3	4
	<i>Halichoerus grypus</i>	27.3.d.30	2020	Traps	88	12188	0.72%	5	9
	<i>Halichoerus grypus</i>	27.3.d.31	2020	Nets	7	13833	0.05%	1	1
	<i>Halichoerus grypus</i>	27.3.d.31	2020	Traps	42	15653	0.27%	6	13
	<i>Halichoerus grypus</i>	27.3.d.32	2020	Traps	1829	7292	25.08%	5	8
	<i>Phoca vitulina</i>	27.3.b.23	2019	Nets	224	6088	3.68%	2	2
	<i>Phoca vitulina</i>	27.3.c.22	2019	Nets	182	15191	1.20%	9	10
	<i>Phoca vitulina</i>	27.3.b.23	2020	Nets	76	4714	1.61%	1	1
	<i>Phoca vitulina</i>	27.3.c.22	2020	Nets	123	14509	0.85%	2	2
	<i>Phocoena phocoena</i>	27.3.b.23	2019	Nets	224	6088	3.68%	6	6
	<i>Phocoena phocoena</i>	27.3.c.22	2019	Nets	182	15191	1.20%	9	10
	<i>Phocoena phocoena</i>	27.3.b.23	2020	Nets	76	4714	1.61%	2	2
	<i>Phocoena phocoena</i>	27.3.c.22	2020	Nets	123	14509	0.85%	3	3
	<i>Pusa hispida</i>	27.3.d.31	2020	Nets	7	13833	0.05%	4	4
Bay of Biscay and the Iberian Coast	<i>Delphinus delphis</i>	27.8.a	2019	Nets	164	220741	0.07%	4	4
	<i>Delphinus delphis</i>	27.8.a	2019	Pelagic trawls	167	22886	0.73%	8	13
	<i>Delphinus delphis</i>	27.8.b	2019	Bottom trawls	164	123485	0.13%	4	8

Ecoregion	Species	GSA*/ICES statistical area	Year	Level 3 métier	Monitored days-at-sea	Fishing effort days-at-sea	Fishing effort monitored (%)	Total number of incidents	Total number of specimens
	<i>Delphinus delphis</i>	27.8.b	2019	Pelagic trawls	50	8573	0.59%	4	16
	<i>Delphinus delphis</i>	27.9.a	2019	Surrounding nets	45	15715	0.29%	1	2
	<i>Delphinus delphis</i>	27.8.a	2020	Bottom trawls	72	512675	0.01%	4	21
	<i>Delphinus delphis</i>	27.8.a	2020	Nets	228	206685	0.11%	3	3
	<i>Delphinus delphis</i>	27.8.a	2020	Pelagic trawls	32	20388	0.16%	2	4
	<i>Delphinus delphis</i>	27.8.b	2020	Longlines	5	20958	0.02%	1	1
	<i>Delphinus delphis</i>	27.8.b	2020	Nets	81	124019	0.07%	1	2
	<i>Delphinus delphis</i>	27.8.c	2020	Bottom trawls	62	14730	0.42%	1	1
	<i>Delphinus delphis</i>	27.8.c	2020	Nets	49	27969	0.18%	1	1
	<i>Delphinus delphis</i>	27.8.d.2	2020	Bottom trawls	9	5295	0.17%	1	4
	<i>Delphinus delphis</i>	27.9.a	2020	Nets	434	170840	0.25%	4	6
	<i>Delphinus delphis</i>	27.9.a	2020	Surrounding nets	194	25571	0.76%	4	4
	<i>Phocoena phocoena</i>	27.8.a	2019	Nets	164	220741	0.07%	1	1
	<i>Tursiops truncatus</i>	27.9.a	2019	Nets	302	167598	0.18%	1	1
Celtic Seas	<i>Delphinus delphis</i>	27.7.f	2019	Nets	59	2326	2.55%	2	2
	<i>Delphinus delphis</i>	27.7.g	2019	Bottom trawls	172	65121	0.27%	1	1
	<i>Delphinidae</i>	27.7.g	2019	Bottom trawls	172	65121	0.27%	1	1

Ecoregion	Species	GSA*/ICES statistical area	Year	Level 3 métier	Monitored days-at-sea	Fishing effort days-at-sea	Fishing effort monitored (%)	Total number of incidents	Total number of specimens
	<i>Delphinidae</i>	27.7.h	2019	Nets	37	13539	0.28%	1	1
	<i>Globicephala melas</i>	27.7.j.2	2020	Pelagic trawls	38	1613	2.39%	2	3
	<i>Halichoerus grypus</i>	27.6.a	2019	Pelagic trawls	109	3149	3.46%	3	3
	<i>Halichoerus grypus</i>	27.7.b	2019	Pelagic trawls	26	581	4.47%	4	4
	<i>Halichoerus grypus</i>	27.7.f	2019	Nets	59	2326	2.55%	5	7
	<i>Halichoerus grypus</i>	27.7.j.2	2019	Nets	134	8231	1.63%	62	73
	<i>Halichoerus grypus</i>	27.6.a	2020	Pelagic trawls	117	2408	4.86%	5	6
	<i>Halichoerus grypus</i>	27.7.b	2020	Pelagic trawls	19	812	2.34%	2	2
	<i>Halichoerus grypus</i>	27.7.f	2020	Nets	4	2144	0.19%	1	1
	<i>Halichoerus grypus</i>	27.7.g	2020	Nets	7	2340	0.30%	2	5
	<i>Halichoerus grypus</i>	27.7.j.2	2020	Nets	123	10423	1.18%	67	84
	<i>Phoca vitulina</i>	27.7.f	2020	Nets	4	2144	0.19%	1	1
	<i>Phocoena phocoena</i>	27.7.g	2019	Bottom trawls	172	65121	0.27%	1	1
	<i>Phocoena phocoena</i>	27.7.g	2019	Nets	52	3131	1.66%	1	1
Greater North Sea	<i>Delphinus delphis</i>	27.7.e	2019	Nets	170	81971	0.21%	3	4
	<i>Delphinus delphis</i>	27.7.e	2020	Bottom trawls	65	249313	0.03%	1	1
	<i>Delphinus delphis</i>	27.7.e	2020	Nets	44	64844	0.07%	1	1
	<i>Delphinus</i>	27.3.a.20	2020	Bottom trawls	73	27250	0.27%	2	2

Ecoregion	Species	GSA*/ICES statistical area	Year	Level 3 métier	Monitored days-at-sea	Fishing effort days-at-sea	Fishing effort monitored (%)	Total number of incidents	Total number of specimens
	<i>Halichoerus grypus</i>	27.3.a.20	2019	Nets	311	9318	3.34%	1	1
	<i>Halichoerus grypus</i>	27.4.c	2019	Bottom trawls	58	37545	0.16%	1	1
	<i>Halichoerus grypus</i>	27.7.e	2019	Nets	170	81971	0.21%	6	7
	<i>Halichoerus grypus</i>	27.4.b	2020	Pelagic trawls	22	2332	0.94%	6	12
	<i>Lagenorhynchus albirostris</i>	27.3.a.20	2020	Nets	119	8210	1.45%	1	2
	<i>Phoca vitulina</i>	27.3.a.20	2019	Nets	311	9318	3.34%	12	13
	<i>Phoca vitulina</i>	27.3.a.21	2019	Nets	51	3989	1.28%	3	4
	<i>Phoca vitulina</i>	27.4.c	2019	Traps	4	7936	0.05%	1	3
	<i>Phoca vitulina</i>	27.3.a.20	2020	Nets	119	8210	1.45%	3	4
	<i>Phoca vitulina</i>	27.3.a.21	2020	Nets	19	4567	0.42%	1	1
	<i>Phoca vitulina</i>	27.4.a	2020	Nets	148	5425	2.73%	2	2
	<i>Phoca vitulina</i>	27.4.b	2020	Nets	54	7848	0.69%	9	12
	<i>Phocoena phocoena</i>	27.3.a.20	2019	Nets	311	9318	3.34%	26	27
	<i>Phocoena phocoena</i>	27.3.a.21	2019	Nets	51	3989	1.28%	26	33
	<i>Phocoena phocoena</i>	27.4.a	2019	Nets	351	6547	5.36%	13	16
	<i>Phocoena phocoena</i>	27.7.d	2019	Seines	8	15123	0.05%	1	1
	<i>Phocoena phocoena</i>	27.3.a.20	2020	Nets	119	8210	1.45%	8	8
	<i>Phocoena phocoena</i>	27.3.a.21	2020	Bottom trawls	61	13620	0.45%	1	1
	<i>Phocoena phocoena</i>	27.4.a	2020	Nets	148	5425	2.73%	6	6

Ecoregion	Species	GSA*/ICES statistical area	Year	Level 3 métier	Monitored days-at-sea	Fishing effort days-at-sea	Fishing effort monitored (%)	Total number of incidents	Total number of specimens
	<i>Phocoena phocoena</i>	27.4.b	2020	Nets	54	7848	0.69%	35	91
	<i>Pinnipedia</i>	27.3.a.20	2019	Nets	311	9318	3.34%	1	1
	<i>Pinnipedia</i>	27.4.b	2020	Nets	54	7848	0.69%	1	1
Icelandic Waters	<i>Halichoerus grypus</i>	27.5.a	2019	Nets	112	8242	1.36%	2	5
	<i>Halichoerus grypus</i>	27.5.a	2020	Nets	105	8240	1.27%	3	5
	<i>Megaptera novaeangliae</i>	27.5.a	2020	Nets	105	8240	1.27%	2	2
	<i>Pagophilus groenlandicus</i>	27.5.a	2019	Nets	112	8242	1.36%	5	10
	<i>Pagophilus groenlandicus</i>	27.5.a	2020	Nets	105	8240	1.27%	1	1
	<i>Phoca vitulina</i>	27.5.a	2019	Nets	112	8242	1.36%	3	3
	<i>Phoca vitulina</i>	27.5.a	2020	Nets	105	8240	1.27%	8	10
	<i>Phocoena phocoena</i>	27.5.a	2019	Nets	112	8242	1.36%	12	21
	<i>Phocoena phocoena</i>	27.5.a	2020	Nets	105	8240	1.27%	11	23
Norwegian Sea	<i>Halichoerus grypus</i>	27.2.a.2	2019	Nets	1416	44564	3.18%	1	1
	<i>Halichoerus grypus</i>	27.2.a.2	2020	Nets	1348	43997	3.06%	1	1
	<i>Phoca vitulina</i>	27.2.a.2	2019	Nets	1416	44564	3.18%	14	19
	<i>Phoca vitulina</i>	27.2.a.2	2020	Nets	1348	43997	3.06%	6	7
	<i>Phocoena phocoena</i>	27.2.a.2	2019	Nets	1416	44564	3.18%	28	32
	<i>Phocoena phocoena</i>	27.2.a.2	2020	Nets	1348	43997	3.06%	26	31
Adriatic Sea	<i>Tursiops truncatus</i>	17	2020	Pelagic trawls	261	9347	2.79%	1	1

Ecoregion	Species	GSA*/ICES statistical area	Year	Level 3 métier	Monitored days-at-sea	Fishing effort days-at-sea	Fishing effort monitored (%)	Total number of incidents	Total number of specimens
Western Mediterranean Sea	<i>Tursiops truncatus</i>	7	2020	Bottom trawls	113	256277	0.04%	1	1

* GSA = FAO geographical subarea.

Table A2 Bycatch rates ($[\text{number of specimens}] \times [\text{monitored days-at-sea}]^{-1}$) for selected seabird species for which the reported data met specific criteria, by areas and gears in 2019 and 2020. The number of incidents is defined as monitored days-at-sea with bycatch. The monitored fishing effort corresponds to $([\text{monitored days-at-sea}] \times [\text{fishing effort}]^{-1}) \times 100$.

Ecoregion	Species	GSA*/ICES statistical area	Year	Level 3 métier	Monitored days-at-sea	Fishing effort days-at-sea	Fishing effort monitored (%)	Total number of incidents	Total number of specimens
Azores	<i>Calonectris borealis</i>	27.10.a.2	2020	Rods and lines	442	25349	1.74%	1	3
	<i>Puffinus gravis</i>	27.10.a.2	2020	Rods and lines	442	25349	1.74%	1	2
	<i>Alca torda</i>	27.3.b.23	2019	Nets	224	6088	3.68%	1	1
Baltic Sea	<i>Alca torda</i>	27.3.b.23	2020	Nets	76	4714	1.61%	2	2
	<i>Anas platyrhynchos</i>	27.3.d.32	2019	Nets	12823	19204	66.77%	7	58
	<i>Anas platyrhynchos</i>	27.3.d.32	2019	Traps	1800	7153	25.16%	4	38
	<i>Anas crecca</i>	27.3.d.30	2020	Nets	38	22701	0.17%	2	2
	<i>Anatidae</i>	27.3.d.28.1	2019	Nets	12875	16009	80.42%	1	3
	<i>Anatidae</i>	27.3.d.32	2019	Nets	12823	19204	66.77%	3	7
	<i>Anatidae</i>	27.3.d.28.2	2019	Nets	1452	2713	53.50%	1	3
	<i>Anatidae</i>	27.3.d.29	2020	Nets	18048	27780	64.97%	2	6
	<i>Anatidae</i>	27.3.d.32	2020	Nets	15239	20036	76.06%	14	56
	<i>Anatidae</i>	27.3.d.32	2020	Traps	1829	7292	25.08%	4	13
	<i>Aythya fuligula</i>	27.3.d.28.1	2020	Nets	12760	16456	77.54%	1	1
	<i>Aythya</i>	27.3.d.29	2019	Nets	16798	27416	61.27%	2	4
	<i>Aythya</i>	27.3.d.32	2019	Nets	12823	19204	66.77%	1	1
	<i>Aythya</i>	27.3.d.29	2020	Nets	18048	27780	64.97%	3	5
	<i>Branta bernicla</i>	27.3.d.32	2020	Nets	15239	20036	76.06%	1	1
	<i>Bucephala clangula</i>	27.3.d.30	2019	Nets	43	24448	0.18%	1	1
	<i>Bucephala clangula</i>	27.3.d.30	2020	Nets	38	22701	0.17%	1	3

Ecoregion	Species	GSA*/ICES statistical area	Year	Level 3 métier	Monitored days-at-sea	Fishing effort days-at-sea	Fishing effort monitored (%)	Total number of incidents	Total number of specimens
	<i>Bucephala clangula</i>	27.3.d.31	2020	Nets	7	13833	0.05%	2	2
	<i>Bucephala clangula</i>	27.3.d.32	2020	Nets	15239	20036	76.06%	1	1
	<i>Clangula hyemalis</i>	27.3.d.29	2019	Nets	16798	27416	61.27%	1	1
	<i>Clangula hyemalis</i>	27.3.d.32	2019	Nets	12823	19204	66.77%	1	1
	<i>Clangula hyemalis</i>	27.3.d.30	2020	Nets	38	22701	0.17%	2	4
	<i>Clangula hyemalis</i>	27.3.d.32	2020	Nets	15239	20036	76.06%	2	2
	<i>Gavia arctica</i>	27.3.b.23	2019	Nets	224	6088	3.68%	2	2
	<i>Gavia arctica</i>	27.3.d.31	2019	Traps	60	15462	0.39%	1	1
	<i>Larus argentatus</i>	27.3.d.31	2019	Traps	60	15462	0.39%	1	1
	<i>Laridae</i>	27.3.d.31	2020	Nets	7	13833	0.05%	1	1
	<i>Melanitta fusca</i>	27.3.b.23	2019	Nets	224	6088	3.68%	3	3
	<i>Melanitta fusca</i>	27.3.d.26	2019	Nets	23	22356	0.10%	1	168
	<i>Melanitta fusca</i>	27.3.b.23	2020	Nets	76	4714	1.61%	1	1
	<i>Melanitta fusca</i>	27.3.d.29	2020	Nets	18048	27780	64.97%	4	4
	<i>Melanitta nigra</i>	27.3.b.23	2019	Nets	224	6088	3.68%	1	3
	<i>Melanitta nigra</i>	27.3.d.30	2020	Nets	38	22701	0.17%	2	2
	<i>Mergus merganser</i>	27.3.d.29	2019	Nets	16798	27416	61.27%	1	1
	<i>Mergus merganser</i>	27.3.d.30	2019	Nets	43	24448	0.18%	2	9
	<i>Mergus merganser</i>	27.3.d.32	2019	Nets	12823	19204	66.77%	1	5
	<i>Mergus merganser</i>	27.3.d.29	2020	Nets	18048	27780	64.97%	4	4

Ecoregion	Species	GSA*/ICES statistical area	Year	Level 3 métier	Monitored days-at-sea	Fishing effort days-at-sea	Fishing effort monitored (%)	Total number of incidents	Total number of specimens
	<i>Mergus merganser</i>	27.3.d.30	2020	Nets	38	22701	0.17%	6	13
	<i>Mergus merganser</i>	27.3.d.32	2020	Nets	15239	20036	76.06%	3	4
	<i>Mergus merganser</i>	27.3.d.32	2020	Traps	1829	7292	25.08%	2	5
	<i>Mergus serrator</i>	27.3.d.29	2019	Nets	16798	27416	61.27%	2	3
	<i>Mergus serrator</i>	27.3.d.30	2019	Nets	43	24448	0.18%	1	1
	<i>Mergus serrator</i>	27.3.d.31	2019	Traps	60	15462	0.39%	1	1
	<i>Mergus serrator</i>	27.3.d.32	2019	Traps	1800	7153	25.16%	1	1
	<i>Mergus serrator</i>	27.3.d.29	2020	Nets	18048	27780	64.97%	2	2
	<i>Mergus</i>	27.3.d.30	2019	Nets	43	24448	0.18%	2	12
	<i>Mergus</i>	27.3.d.30	2019	Traps	99	11450	0.86%	1	1
	<i>Mergus</i>	27.3.d.31	2019	Nets	8	15886	0.05%	3	25
	<i>Mergus</i>	27.3.d.31	2019	Traps	60	15462	0.39%	7	61
	<i>Mergus</i>	27.3.d.32	2019	Nets	12823	19204	66.77%	2	2
	<i>Mergus</i>	27.3.d.32	2019	Traps	1800	7153	25.16%	1	1
	<i>Mergus</i>	27.3.d.29	2020	Nets	18048	27780	64.97%	3	3
	<i>Mergus</i>	27.3.d.30	2020	Nets	38	22701	0.17%	4	10
	<i>Mergus</i>	27.3.d.31	2020	Traps	42	15653	0.27%	3	23
	<i>Phalacrocorax carbo</i>	27.3.b.23	2019	Nets	224	6088	3.68%	10	10
	<i>Phalacrocorax carbo</i>	27.3.c.22	2019	Nets	182	15191	1.20%	1	2
	<i>Phalacrocorax carbo</i>	27.3.d.28.1	2019	Traps	9314	11323	82.26%	4	10
	<i>Phalacrocorax carbo</i>	27.3.d.29	2019	Nets	16798	27416	61.27%	3	6

Ecoregion	Species	GSA*/ICES statistical area	Year	Level 3 métier	Monitored days-at-sea	Fishing effort days-at-sea	Fishing effort monitored (%)	Total number of incidents	Total number of specimens
	<i>Phalacrocorax carbo</i>	27.3.d.29	2019	Traps	5050	7773	64.97%	3	3
	<i>Phalacrocorax carbo</i>	27.3.d.30	2019	Nets	43	24448	0.18%	12	26
	<i>Phalacrocorax carbo</i>	27.3.d.30	2019	Traps	99	11450	0.86%	6	9
	<i>Phalacrocorax carbo</i>	27.3.d.31	2019	Nets	8	15886	0.05%	2	20
	<i>Phalacrocorax carbo</i>	27.3.d.31	2019	Traps	60	15462	0.39%	4	38
	<i>Phalacrocorax carbo</i>	27.3.d.32	2019	Nets	12823	19204	66.77%	19	40
	<i>Phalacrocorax carbo</i>	27.3.d.32	2019	Traps	1800	7153	25.16%	8	15
	<i>Phalacrocorax carbo</i>	27.3.b.23	2020	Nets	76	4714	1.61%	5	6
	<i>Phalacrocorax carbo</i>	27.3.d.28.1	2020	Traps	11235	13239	84.86%	2	7
	<i>Phalacrocorax carbo</i>	27.3.d.29	2020	Nets	18048	27780	64.97%	2	2
	<i>Phalacrocorax carbo</i>	27.3.d.29	2020	Traps	5991	8442	70.97%	1	1
	<i>Phalacrocorax carbo</i>	27.3.d.30	2020	Bottom trawls	40	70	57.14%	1	10
	<i>Phalacrocorax carbo</i>	27.3.d.30	2020	Nets	38	22701	0.17%	13	15
	<i>Phalacrocorax carbo</i>	27.3.d.30	2020	Traps	88	12188	0.72%	1	1
	<i>Phalacrocorax carbo</i>	27.3.d.31	2020	Traps	42	15653	0.27%	3	88
	<i>Phalacrocorax carbo</i>	27.3.d.32	2020	Nets	15239	20036	76.06%	12	26
	<i>Phalacrocorax carbo</i>	27.3.d.32	2020	Traps	1829	7292	25.08%	7	7

Ecoregion	Species	GSA*/ICES statistical area	Year	Level 3 métier	Monitored days-at-sea	Fishing effort days-at-sea	Fishing effort monitored (%)	Total number of incidents	Total number of specimens
	<i>Podiceps cristatus</i>	27.3.b.23	2019	Nets	224	6088	3.68%	1	1
	<i>Podiceps cristatus</i>	27.3.d.29	2019	Nets	16798	27416	61.27%	1	1
	<i>Podiceps cristatus</i>	27.3.d.30	2020	Nets	38	22701	0.17%	2	2
	<i>Podiceps cristatus</i>	27.3.d.31	2020	Nets	7	13833	0.05%	2	2
	<i>Podiceps cristatus</i>	27.3.d.32	2020	Nets	15239	20036	76.06%	1	1
	<i>Podiceps cristatus</i>	27.3.d.32	2020	Traps	1829	7292	25.08%	1	1
	<i>Podiceps grisegena</i>	27.3.b.23	2020	Nets	76	4714	1.61%	1	1
	<i>Somateria mollissima</i>	27.3.b.23	2019	Nets	224	6088	3.68%	30	45
	<i>Somateria mollissima</i>	27.3.c.22	2019	Nets	182	15191	1.20%	1	3
	<i>Somateria mollissima</i>	27.3.d.29	2019	Nets	16798	27416	61.27%	4	24
	<i>Somateria mollissima</i>	27.3.d.32	2019	Nets	12823	19204	66.77%	4	4
	<i>Somateria mollissima</i>	27.3.b.23	2020	Nets	76	4714	1.61%	10	12
	<i>Somateria mollissima</i>	27.3.d.29	2020	Nets	18048	27780	64.97%	5	26
	<i>Somateria mollissima</i>	27.3.d.30	2020	Nets	38	22701	0.17%	1	3
	<i>Somateria mollissima</i>	27.3.d.32	2020	Nets	15239	20036	76.06%	1	1
	<i>Uria aalge</i>	27.3.b.23	2019	Nets	224	6088	3.68%	35	50
	<i>Uria aalge</i>	27.3.d.24	2019	Longlines	6	847	0.71%	1	1
	<i>Uria aalge</i>	27.3.d.25	2019	Nets	5	13991	0.04%	3	6

Ecoregion	Species	GSA*/ICES statistical area	Year	Level 3 métier	Monitored days-at-sea	Fishing effort days-at-sea	Fishing effort monitored (%)	Total number of incidents	Total number of specimens
Bay of Biscay and the Iberian Coast	<i>Uria aalge</i>	27.3.b.23	2020	Nets	76	4714	1.61%	7	9
	<i>Uria aalge</i>	27.3.d.29	2020	Nets	18048	27780	64.97%	2	2
	<i>Aves</i>	27.3.c.22	2019	Nets	182	15191	1.20%	1	1
	<i>Alca torda</i>	27.8.a	2019	Nets	164	220741	0.07%	1	1
	<i>Alcidae</i>	27.9.a	2020	Nets	434	170840	0.25%	1	1
	<i>Gavia stellata</i>	27.8.a	2019	Nets	164	220741	0.07%	1	1
	<i>Larus michahellis</i>	27.9.a	2019	Nets	302	167598	0.18%	3	4
	<i>Larus michahellis</i>	27.9.a	2019	Surrounding nets	45	15715	0.29%	1	5
	<i>Larus michahellis</i>	27.9.a	2020	Longlines	617	28721	2.15%	1	1
	<i>Larus michahellis</i>	27.9.a	2020	Nets	434	170840	0.25%	3	3
	<i>Larus</i>	27.9.a	2019	Nets	302	167598	0.18%	1	1
	<i>Larus</i>	27.9.a	2020	Nets	434	170840	0.25%	1	1
	<i>Melanitta nigra</i>	27.8.b	2019	Nets	162	128345	0.13%	2	2
	<i>Morus bassanus</i>	27.8.b	2019	Bottom trawls	164	123485	0.13%	5	11
	<i>Morus bassanus</i>	27.8.b	2019	Nets	162	128345	0.13%	2	3
	<i>Morus bassanus</i>	27.8.c	2019	Rods and lines	32	7538	0.42%	1	9
	<i>Morus bassanus</i>	27.8.d.2	2019	Rods and lines	75	2278	3.29%	1	2
	<i>Morus bassanus</i>	27.9.a	2019	Longlines	185	29165	0.63%	10	11
	<i>Morus bassanus</i>	27.9.a	2019	Nets	302	167598	0.18%	4	7
	<i>Morus bassanus</i>	27.8.a	2020	Nets	228	206685	0.11%	2	2
	<i>Morus bassanus</i>	27.8.b	2020	Bottom trawls	118	96867	0.12%	2	3
	<i>Morus bassanus</i>	27.8.b	2020	Nets	81	124019	0.07%	1	1
	<i>Morus bassanus</i>	27.8.c	2020	Bottom trawls	62	14730	0.42%	1	1
	<i>Morus bassanus</i>	27.8.c	2020	Nets	49	27969	0.18%	1	3

Ecoregion	Species	GSA*/ICES statistical area	Year	Level 3 métier	Monitored days-at-sea	Fishing effort days-at-sea	Fishing effort monitored (%)	Total number of incidents	Total number of specimens
	<i>Morus bassanus</i>	27.9.a	2020	Longlines	617	28721	2.15%	11	26
	<i>Morus bassanus</i>	27.9.a	2020	Nets	434	170840	0.25%	2	4
	<i>Phalacrocorax aristotelis</i>	27.9.a	2019	Nets	302	167598	0.18%	1	1
	<i>Phalacrocorax aristotelis</i>	27.9.a	2020	Nets	434	170840	0.25%	2	2
	<i>Phalacrocorax carbo</i>	27.8.a	2020	Nets	228	206685	0.11%	2	2
	<i>Puffinus mauretanicus</i>	27.9.a	2019	Longlines	185	29165	0.63%	1	1
	<i>Uria aalge</i>	27.8.a	2019	Nets	164	220741	0.07%	10	11
	<i>Uria aalge</i>	27.8.b	2019	Nets	162	128345	0.13%	12	439
	<i>Uria aalge</i>	27.8.a	2020	Nets	228	206685	0.11%	17	22
	<i>Uria aalge</i>	27.8.b	2020	Nets	81	124019	0.07%	3	6
Celtic Seas	<i>Fulmarus glacialis</i>	27.6.a	2020	Longlines	31	5549	0.56%	9	12
	<i>Larus argentatus</i>	27.7.f	2019	Surrounding nets	11	209	5.25%	1	1
	<i>Morus bassanus</i>	27.6.a	2019	Bottom trawls	372	42212	0.88%	1	2
	<i>Morus bassanus</i>	27.7.f	2019	Bottom trawls	72	34875	0.21%	1	1
	<i>Morus bassanus</i>	27.7.g	2019	Bottom trawls	172	65121	0.27%	1	1
	<i>Morus bassanus</i>	27.6.a	2020	Bottom trawls	168	37179	0.45%	8	14
	<i>Morus bassanus</i>	27.6.a	2020	Longlines	31	5549	0.56%	5	7
	<i>Phalacrocorax carbo</i>	27.7.f	2019	Nets	59	2326	2.55%	1	1
Greater North Sea	<i>Uria aalge</i>	27.7.f	2019	Nets	59	2326	2.55%	5	7
	<i>Alca torda</i>	27.3.a.20	2019	Nets	311	9318	3.34%	1	1
	<i>Alca torda</i>	27.3.a.21	2019	Nets	51	3989	1.28%	15	35

Ecoregion	Species	GSA*/ICES statistical area	Year	Level 3 métier	Monitored days-at-sea	Fishing effort days-at-sea	Fishing effort monitored (%)	Total number of incidents	Total number of specimens
	<i>Alca torda</i>	27.3.a.21	2020	Nets	19	4567	0.42%	1	2
	<i>Alcidae</i>	27.3.a.21	2019	Nets	51	3989	1.28%	2	3
	<i>Fulmarus glacialis</i>	27.4.a	2019	Longlines	78	8555	0.91%	28	92
	<i>Gavia arctica</i>	27.3.a.21	2019	Nets	51	3989	1.28%	1	1
	<i>Melanitta fusca</i>	27.3.a.21	2019	Nets	51	3989	1.28%	4	4
	<i>Melanitta fusca</i>	27.3.a.21	2020	Nets	19	4567	0.42%	1	1
	<i>Morus bassanus</i>	27.4.a	2019	Bottom trawls	813	52396	1.55%	2	2
	<i>Morus bassanus</i>	27.4.a	2019	Longlines	78	8555	0.91%	1	1
	<i>Morus bassanus</i>	27.4.c	2019	Bottom trawls	58	37545	0.16%	1	8
	<i>Morus bassanus</i>	27.7.d	2019	Bottom trawls	185	180730	0.10%	1	1
	<i>Morus bassanus</i>	27.7.e	2020	Bottom trawls	65	249313	0.03%	1	1
	<i>Phalacrocorax aristotelis</i>	27.7.e	2019	Nets	170	81971	0.21%	2	2
	<i>Phalacrocorax carbo</i>	27.3.a.20	2019	Nets	311	9318	3.34%	1	1
	<i>Phalacrocorax carbo</i>	27.3.a.21	2019	Nets	51	3989	1.28%	1	1
	<i>Phalacrocoracid ae</i>	27.7.d	2020	Nets	45	36571	0.12%	2	2
	<i>Somateria mollissima</i>	27.3.a.21	2019	Nets	51	3989	1.28%	2	2
	<i>Somateria mollissima</i>	27.3.a.20	2019	Nets	311	9318	3.34%	1	1
	<i>Stercorarius skua</i>	27.4.a	2019	Longlines	78	8555	0.91%	1	1
	<i>Uria aalge</i>	27.3.a.20	2019	Nets	311	9318	3.34%	13	14
	<i>Uria aalge</i>	27.3.a.21	2019	Nets	51	3989	1.28%	39	283
	<i>Uria aalge</i>	27.7.e	2019	Nets	170	81971	0.21%	3	3

Ecoregion	Species	GSA*/ICES statistical area	Year	Level 3 métier	Monitored days-at-sea	Fishing effort days-at-sea	Fishing effort monitored (%)	Total number of incidents	Total number of specimens
	<i>Uria aalge</i>	27.3.a.21	2020	Nets	19	4567	0.42%	4	26
	<i>Uria aalge</i>	27.4.b	2020	Nets	54	7848	0.69%	2	2
	<i>Uria aalge</i>	27.7.e	2020	Nets	44	64844	0.07%	1	1
	<i>Aves</i>	27.3.a.20	2019	Nets	311	9318	3.34%	1	1
	<i>Aves</i>	27.4.b	2020	Nets	54	7848	0.69%	2	2
Icelandic Waters	<i>Alca torda</i>	27.5.a	2020	Nets	105	8240	1.27%	1	1
	<i>Cephus grylle</i>	27.5.a	2019	Nets	112	8242	1.36%	6	27
	<i>Cephus grylle</i>	27.5.a	2020	Nets	105	8240	1.27%	25	82
	<i>Gavia immer</i>	27.5.a	2019	Nets	112	8242	1.36%	1	1
	<i>Gavia immer</i>	27.5.a	2020	Nets	105	8240	1.27%	1	1
	<i>Phalacrocoracid ae</i>	27.5.a	2019	Nets	112	8242	1.36%	1	4
	<i>Phalacrocoracid ae</i>	27.5.a	2020	Nets	105	8240	1.27%	6	8
	<i>Somateria mollissima</i>	27.5.a	2019	Nets	112	8242	1.36%	5	20
	<i>Somateria mollissima</i>	27.5.a	2020	Nets	105	8240	1.27%	22	105
	<i>Uria aalge</i>	27.5.a	2019	Nets	112	8242	1.36%	15	36
	<i>Uria aalge</i>	27.5.a	2020	Nets	105	8240	1.27%	20	39
Adriatic Sea	<i>Phalacrocorax aristotelis</i>	17	2019	Bottom trawls	8	769	1.04%	1	1
Aegean-Levantine Sea	<i>Phalacrocorax aristotelis</i>	25	2020	Nets	818	64971	1.26%	1	1
Western Mediterranean Sea	<i>Calonectris diomedea</i>	6	2019	Longlines	23	8736	0.26%	1	1
	<i>Calonectris diomedea</i>	6	2020	Longlines	23	10434	0.22%	2	3
	<i>Larus audouinii</i>	6	2019	Longlines	23	8736	0.26%	1	1

Ecoregion	Species	GSA*/ICES statistical area	Year	Level 3 métier	Monitored days-at-sea	Fishing effort days-at-sea	Fishing effort monitored (%)	Total number of incidents	Total number of specimens
	<i>Larus michahellis</i>	6	2019	Longlines	23	8736	0.26%	1	2
	<i>Puffinus mauretanicus</i>	6	2019	Longlines	23	8736	0.26%	2	3
	<i>Puffinus mauretanicus</i>	6	2020	Longlines	23	10434	0.22%	1	1

* GSA = FAO geographical subarea.

Table A3 Bycatch information for marine turtle bycatch numbers, including the number of bycatch incidents and observed bycatch rates in 2019 and 2020 obtained through the ICES data call. Bycatch information is grouped by ecoregion and gear type. The number of incidents is defined as monitored days-at-sea with bycatch. Fishing effort monitored corresponds to $([\text{monitored days-at-sea}] \times [\text{fishing effort}]^{-1}) \times 100$.

Ecoregion	Species	GSA*/ICES statistical area	Year	Level 3 métier	Monitored days-at-sea	Fishing effort days-at-sea	Fishing effort monitored (%)	Total number of incidents	Total number of specimens
Adriatic Sea	<i>Caretta caretta</i>	17	2019	Pelagic trawls	417	12004	3.47%	21	25
	<i>Caretta caretta</i>	18	2019	Longlines	167	n/a	n/a	15	15
	<i>Caretta caretta</i>	17	2020	Pelagic trawls	261	9347	2.79%	9	10
Aegean-Levantine Sea	<i>Caretta caretta</i>	25	2020	Longlines	149	34425	0.43%	1	1
	<i>Caretta caretta</i>	25	2020	Nets	818	64971	1.26%	14	20
	<i>Chelonia mydas</i>	25	2019	Nets	266	73620	0.36%	1	1
	<i>Chelonia mydas</i>	25	2020	Nets	818	64971	1.26%	3	6
Azores	<i>Dermochelys coriacea</i>	27.10.a	2019	Longlines	89	556	16.01%	1	1
	<i>Caretta caretta</i>	27.10.a	2020	Longlines	107	199	53.77%	12	26
	<i>Dermochelys coriacea</i>	27.10.a	2020	Longlines	107	199	53.77%	3	3
Bay of Biscay and the Iberian Coast	<i>Caretta caretta</i>	27.9.a	2020	Nets	434	170840	0.25%	2	2
Ionian Sea and the Central Mediterranean Sea	<i>Caretta caretta</i>	15	2019	Surrounding nets	10	249	4.02%	1	1
Western Mediterranean Sea	<i>Caretta caretta</i>	11.2	2019	Longlines	86	30	n/a	3	3

Ecoregion	Species	GSA*/ICES statistical area	Year	Level 3 métier	Monitored days-at-sea	Fishing effort days-at-sea	Fishing effort monitored (%)	Total number of incidents	Total number of specimens
	<i>Caretta caretta</i>	7	2020	Bottom trawls	113	256277	0.04%	1	1

* GSA = FAO geographical subarea.

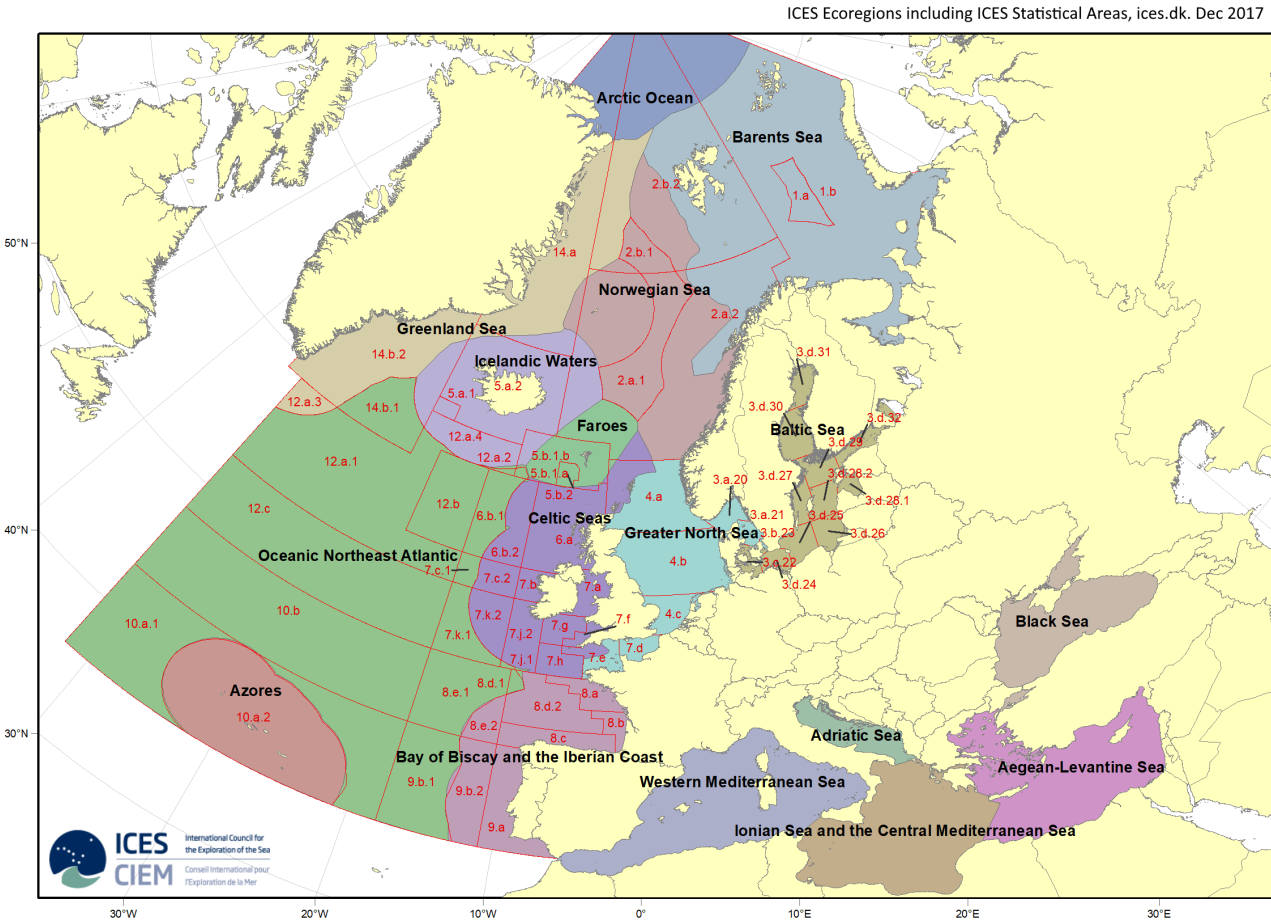


Figure A1 ICES ecoregions, including statistical areas.

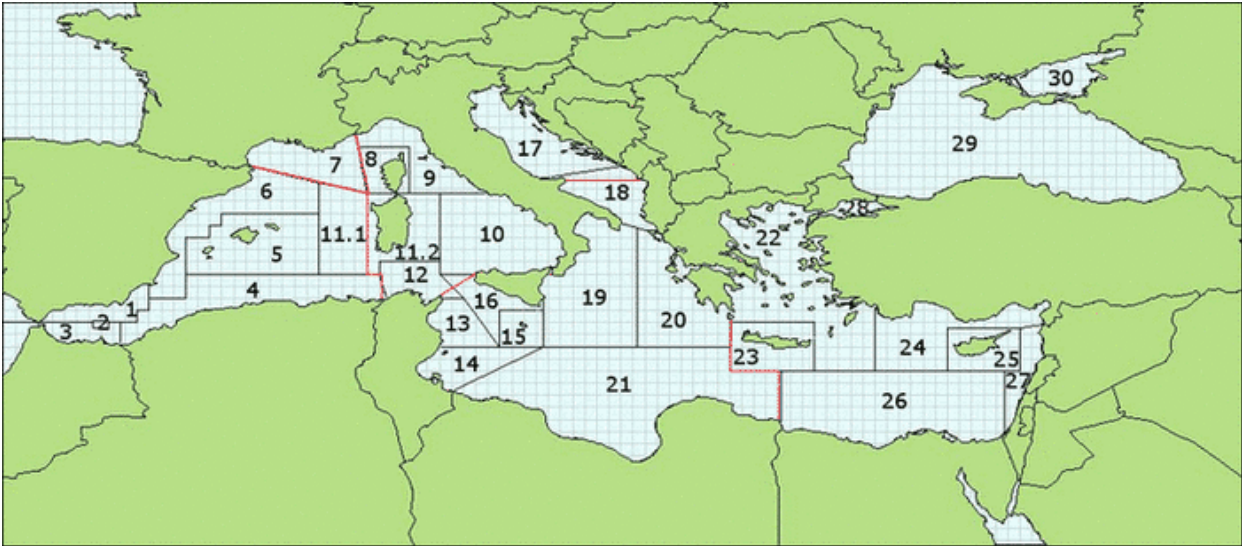


Figure A2 FAO Major Fishing Area 37. Mediterranean and Black Sea. including FAO geographical subareas (GSAs). Source: <http://www.fao.org/gfcm/data/maps/gsas>.