

EC request on *Raja undulata***SUBJECT Advice on *Raja undulata* in Celtic Sea and Biscay-Iberia Ecoregions****Advice Summary**

There is no basis in the current or previous ICES advice for the listing of undulate ray as a prohibited species. Therefore it should not appear on the prohibited species list in either the Celtic Seas or the Biscay/Iberia eco-region fisheries legislation. Alternative measures proposed by ICES are given separately for the English Channel, SW Ireland, and Biscay/Iberia. In view of the poor knowledge and patch distribution of these populations, ICES recommends a precautionary approach to the exploitation of these populations of undulate ray. Therefore should be no target fishing unless information is available to show that such fisheries are sustainable.

Request

“The Commission requests ICES, when providing its advice on elasmobranch species in 2010, to examine and assess the following elements regarding management considerations:

- To what extent current scientific information regarding of the state of...[Raja undulate]... in the Celtic Seas and in the Bay of Biscay/Iberian waters supports the continuation of the measures provided for in the EU fishing opportunities regulation referred to above.*
- Where appropriate, ICES is invited to recommend any alternative measures it would consider as potentially more effective than those in force, taking into account the various fisheries taking place in each area and their impact on the stocks (e.g. by metiers)”*

ICES Advice

The table below summarises the advice given for undulate ray for each area and also the legislation in place. No advice was provided for any year prior to 2009. It can be seen that no advice has ever been provided for Sub-areas VIII and IX, though the prohibition on landing undulate ray applies in these areas.

Advice has been provided for the Celtic Seas eco-region, being that there should be no target fishery.

ICES never advised that this species be added to a protected species list nor did ICES advise that all specimens being brought on board should be promptly released unharmed.

The TAC for North Sea (II and IV) only allows for undulate ray to be taken as a by-catch.

ICES Advice

- 1 In answer to the first point of the request ICES notes that there is no basis in the current or past ICES advice for *Raja undulata* being listed as a prohibited species, that must not be retained on board. Therefore it should not appear on the prohibited species list in either the Celtic Seas or the Biscay/Iberia eco-region fisheries legislation.
- 2 In answer to the second point of the request, ICES suggests the following alternative measures:
 - 2.1 It seems likely that the population of undulate ray in SW Ireland (VIIj) is a separate stock, discrete from the rest of the Celtic Seas region. In order to afford maximum protection to this discrete and very localised population, there should be no target fishery for undulate ray in VIIj and measures to mitigate by-catch in coastal fisheries should be implemented.
 - 2.2 Elsewhere in the Celtic Seas region (mainly English Channel, VIId,e) more information is required before management better advice can be provided. Available evidence is that there may be at least two discrete stocks in the English Channel. In view of the patchy distribution, and following the precautionary approach, ICES recommends that no target fisheries (defined in terms of percentage of total catch) should be permitted unless information is provided to show that these are sustainable. Such information should include information on distribution, stock identity and abundance trends. ICES points out that the current TAC regulation for rays in this eco region allows for target fisheries for species other than those that are listed as protected.

2.3 In Biscay and Iberia ICES does not have sufficient information upon which to base advice. However, ICES notes that there are evidence for several discrete stocks. Therefore, following a precautionary approach, ICES recommends that no target fisheries (defined in terms of percentage of total catch) should be permitted unless information is provided to show that these are sustainable. Such information should include information on distribution, stock identity and abundance trends. ICES points out that the current TAC regulation for rays in this eco region allows for target fisheries for species other than those that are listed as protected.

Summary of advice and management measures applicable for undulate ray.

Year	Area	Advice	Legislation
2008	All	None	None
2009	VI and VII (excl. VIId)	No target fishery	<i>See note 1</i>
2009	IV and VIId	<i>See note 2</i>	IV: None; VII d see below
2009	VIId,e	See IV and VIId above	<i>See note 1</i>
2009	VIII and IX	None	<i>See note 1</i>
2010	VI and VII (excl. VIId)	No target fishery	<i>See note 1 and note 3</i>
2010	IV and VIId	<i>See note 2</i>	IV: None; VII d see below
2010	VIId,e	See IV and VIId above	<i>See note 1 and note 3</i>
2010	VIII and IX	None	<i>See note 1 and note 3</i>
2011	VIIj	No target fishery	-
2011	VIId,e	No target fishery	-
2011	IV and VIId	No target fishery	-
2011	VIII and IX	None	-
2012	VIIj	No target fishery	-
2012	VIId,e	No target fishery	-
2012	IV and VIId	No target fishery	-
2012	VIII and IX	None	-

Note 1: From EC TAC regulation:

“Catches of these species may not be retained on board and shall be promptly released unharmed to the extent practicable. Fishers shall be encouraged to develop and use techniques and equipment to facilitate the rapid and safe release of the species.”

Note 2: From ICES advice

“Target fisheries for these species should not be permitted and measures should be taken to minimize by-catch.”

Note 3: From EC TAC regulation:

“It shall be prohibited for EU vessels to fish for, to retain on board, to tranship and to land” *Raja undulata* in “ICES zones VI, VII, VIII, IX and X”.

“It shall be prohibited for third-country vessels to fish for, to retain on board, to tranship and to land” *Raja undulata* in “ICES zones VI, VII, VIII, IX and X”.

ICES has only provided advice on this species within the Celtic Seas eco-region, as insufficient data were available for the Biscay-Iberia eco-region.

In terms of the status of undulate ray in the Celtic Seas eco-region, ICES (2008) stated: “*Uncertain. Given that this large-bodied species has a patchy distribution in the inshore waters of the Celtic Seas ecoregion, it is susceptible to localized over-exploitation*”.

Undulate ray was listed within the “*no target fisheries*” category, with the advice stating “*Undulate ray has a patchy distribution, with some of these areas showing signs of depletion. As a precautionary measure, target fisheries for this species should not be permitted unless exploitation rates are shown to be sustainable*”.

Additional Considerations

ICES suggests the following measures could be worthy of consideration:

- Localised management on a small scale (regional or local) may be more appropriate, than by ICES division.
- In terms of precautionary management measures, a nominal TAC, a trip limit for undulate ray (x kg/day) or a ratio (e.g. undulate ray should not constitute more than $x\%$ of skate catches) could in theory be potential measures to prevent targeting, but in practice could be difficult for fishermen and enforcers to achieve, particularly in inshore fisheries.

- Other potential management measures could include gear restrictions or some form of spatial management on ecologically important habitats for undulate ray, although there is currently insufficient scientific knowledge, either spatially or temporally, with which to base this on for any of the areas in which undulate ray is locally common.
- An alternative measure could include size restrictions (e.g. maximum landing length) to deter the targeting of aggregations of mature females (as observed to occur in other skate species, and which would presumably occur in undulate ray), although the utility of such a measure would be dependent on discard survival.

Basis of advice

The basis of the advice are survey and market data. Survey data are limited or unavailable for certain areas of the stock area, particularly for coastal waters. Recently supplied market data has highlighted a potentially large discrepancy between actual catch and officially reported species-specific landings (WGEF 2010, Table 3, Figure 2). These data need further investigation, and effort data for stock areas are required.

In the request to ICES it is further stated:

*“The advice issued by ICES regarding the conservation and management of elasmobranchs dates from 2008 and will be reviewed/updated this year on the basis of new information from research, survey results and data collection. In its 2008 advice, ICES indicated that the state of conservation of the undulate ray (*Raja undulata*) in the Celtic Seas is uncertain but with cause for concern. As for the common skate (*Dipturus batis*), it is assessed as depleted. ICES recommended avoiding targeted fishing for this species¹.*

Regarding the Bay of Biscay and Iberian waters stocks, no specific advice on either of these species is provided in the 2008 advice. ICES issues a general advice whereby "... a cautious approach to management should be considered, which could imply reducing landings compared to recent averages.", and "... since elasmobranch species are caught as a bycatch in demersal fisheries, they would benefit from a reduction in the overall demersal fishing effort"².

Both France (regarding stocks in the Celtic Seas) and Portugal (regarding stocks in the Bay of Biscay and Iberian waters) contest the grounds on which the fishing opportunities regulation (EU) nr 53/2010 stipulates a ban on landings for these two species and the concomitant obligation immediately to release back to sea any individuals taken as by-catches.”

Raja undulata background information:

Undulate ray *Raja undulata*, is a little known skate from the North-East Atlantic and western Mediterranean. It grows to a length of at least 114 cm, and possibly up to 120 cm (Wheeler, 1978; Bañon *et al.*, 2008), and the IUCN has classified it as Endangered (Gibson *et al.*, 2008). Since 2009, undulate ray has been listed as a species not to be retained by commercial fishing vessels, and this measure has been contentious with some fishing communities in some localised areas. Here we provide a brief overview of the species and the data that are currently available.

Undulate ray occurs in the eastern Atlantic from the British Isles southwards to north-western Africa, including the western basin of the Mediterranean Sea. It tends to occur in inshore waters and although some general fish books suggest it is most common in waters <100 m, and that it can be found as deep as 200 m (Wheeler, 1978). Bañon *et al.* (2008) reported undulate ray down to 90 m depth, but most individuals were captured in waters <20 m deep. Undulate rays are most often encountered in coastal waters and juveniles in particular tend to be found in shallow, inshore waters, including coastal lagoons, rías and estuaries.

Within the ICES area, the northern limits of undulate ray is off the coasts of south-west Ireland (ICES Divisions VIIb,g,j) and in the English Channel (VIId,e), although it may be found occasionally in the southern-most parts of the North Sea (IVc) and Bristol Channel (VIIf). It is also widely (but patchily) distributed in the Biscay-Iberian eco-region, including Divisions VIIIa,b,c, IXa.

Around the coast of Ireland, it is reported from Tralee Bay, with small numbers occasionally found in other nearby bays, including Brandon Bay and Dingle Bay (Griffith, 1966, 1968; Fahy & O’Reilly, 1990). Within the English Channel, early books on British fishes did not include undulate ray (e.g. Yarrell, 1836; Couch, 1864; Day, 1880–1884; Le Danois, 1913), and it was only after Regan Tate (1907, 1913) reported on the species off the south coast of England (Cornwall and Sussex) that it was accepted as part of the British ichthyofauna (Jenkins, 1925). Nevertheless, it’s

¹ ICES 2008, 5.4.39

² ICES 2008, 7.4.12

presence in the English Channel along the French coast was documented (Moreau, 1881; Le Danois, 1913). Recent data would suggest that undulate ray is most common around the Channel Islands (in the Normano-Breton Gulf) and from Poole, the Isle of Wight and off Beachy Head.

In French waters, Moreau (1881) stated that undulate ray was found along all French coasts, was quite common in the Mediterranean (e.g. Nice, Marseille, Sete), was common on the Atlantic coast (southern Bay of Biscay, coast of Poitou (e.g. north of La Rochelle), less common north of the Loire, off Brittany and Lorient, and in the English Channel (quite rare at Cherbourg, but less rare at other ports). Le Danois (1913) considered it common off Roscoff.

Around the Iberian Peninsula, undulate rays have been taken off Santander (Lozano Rey, 1928), and in Galician waters, including in and outside the Ría de Muros e Noia, Ría de Arousa and Ría de Pontevedra (Rodríguez-Villanueva & Vázquez, 1992; Sanmartín *et al.*, 2000; Álvarez *et al.*, 2006). Indeed, undulate ray may be locally abundant in some of the rías, and one of the main species taken in artisanal fisheries (Bañón *et al.*, 2008). Undulate ray has also been recorded around several parts of Portugal, including Matosinhos (near Porto), Buarcos (near Figueira da Foz), Tagus and Sado estuaries (including off Setúbal), and along the Algarve coast, including at Lagos and Ría Faro-Olhão (Nobre, 1935; Prista *et al.*, 2003; Neves *et al.*, 2008; Ribeiro *et al.*, 2008), with undulate ray considered to be relatively frequent along the Algarve coast (Coelho & Erzini, 2006). Further east, along the southern coast of Spain, undulate ray are also taken in the Gulf of Cádiz, such as off Mazagon (near Huelva) and in the Bahía de Cádiz (Arias, 1976; Gonçalves *et al.*, 2007).

Many of the locations from where undulate ray have been reported are inshore sites with fluvial input, suggesting that undulate rays may favour shallow habitats with less saline waters for at least part of the life cycle.

There have been few biological studies on the undulate ray, and most of these have been in Portuguese waters. Undulate ray feed mainly on brachyuran crabs, particularly swimming crabs (Portunidae), with smaller individuals also preying on natantid shrimps (e.g. Crangonidae) and larger individuals consuming a variety of fish species (Moura *et al.*, 2008). The growth of undulate rays has been examined from caudal thorns (Moura *et al.*, 2007) and vertebrae (Coelho & Erzini, 2002), and the growth parameters from the former study are given in Table 1. This study did not detect any significant differences in the growth parameters between the sexes, although there were significant differences between the main study sites (Algarve and Peniche).

In a study off the Algarve, Coelho & Erzini (2006) recorded mature females across a length range of 75.5–88.2 cm (L50 = 76.16 cm), and mature males were observed from 70.7–83.2 cm long (L50 = 73.63 cm). A subsequent study based on samples off Peniche indicated that females first matured at a length of about 83.8 cm (95% maturity at 85.2 cm), with the lengths of first and 95% maturity for males 78.1 cm and 88.0 cm, respectively (Moura *et al.*, 2007), although it should be noted that this was based on quite a small sample size. Nevertheless, such latitudinal clines in length and size at maturity have been suggested to occur in other elasmobranchs.

Undulate ray may spawn in the winter, at least in the Algarve, as shown by a high gonadosomatic index and presence of encapsulated eggs (Coelho & Erzini, 2006). Several studies have reported that the juveniles occur in inshore waters, including estuaries and coastal lagoons, such as the Sado Estuary in Portugal (Moura *et al.*, 2007)

Parasites can act as useful biological markers to understand stock structure, and although there have been studies on the parasite fauna of undulate ray captured in Galician coastal waters (Sanmartín *et al.*, 2000; Aragort *et al.*, 2005; Álvarez *et al.*, 2006; Table 2), comparable data are lacking for other areas.

Celtic Sea Ecoregion:

UK (England) Eastern English Channel Beam Trawl Survey

Undulate ray have generally been encountered at only 1–9 of the trawl stations (frequency of occurrence = 1.2–10.5%), resulting in a very low mean CPUE for the area as a whole. However, no undulate rays were reported in the years 2006–2007. Given the distinctive appearance of undulate ray and that experienced sea-going staff were present during the 2006–2007 surveys, it is not considered likely that they had been misidentified. Undulate ray re-appeared in the survey series in 2008. Average catch rates are low, and in the years that they have been present, the mean CPUE has ranged from 0.02–0.25 ind.h⁻¹.

Undulate ray are generally found in coastal waters, occurring from Poole to Dungeness along the English coastline, and off the Cherbourg Peninsula and off Dieppe along the French coast (Figure 9.3.2.3.1). Most of the undulate rays taken in this survey are immature fish, which may be due to adults inhabiting other areas at this time of the year, or a low catchability of the gear for larger sized animals (although it should be noted that large, mature undulate ray can be taken off the Isle of Wight with other gears, see below).

UK (England) Western English Channel Beam Trawl Survey

Due to the short time series available, no temporal changes have been explored, although the distribution (presence only, figures 3 and 4) is shown. This survey does catch reasonable numbers of undulate ray, including in the Normano-Breton Gulf, and also takes some larger individuals, up to 95 cm length. Undulate ray appear to be taken quite frequently in the area between the Channel Islands and the Cherbourg Peninsula.

Biscay-Iberia Ecoregion:

According to the national fishery data, the landings of the undulate ray varied around 1 t per year for the last decade.

Market sampling data

The partial data shown in Séret, 2010, indicates that French landings of *Raja undulata* are much higher than the figures given in the official fishery data (Table 3). In Basse Normandie, the undulate ray is the main skate (# 77 % of skate catches in the western English Channel and 44 % in the eastern part) caught by various fisheries: netters, coastal trawlers and off shore trawlers. The mean production for this area (based on the Cherbourg fish market records) is 318 t per year for the whole fleet (of which vessels catching more than 5 t per year made up 273 t). These figures are from records of the Cherbourg fish market, which represent only a part of the total production: skates are also landed at Port en Bessin and Granville; furthermore it is estimated that only 60 % of the production is sold through fish markets. According to the CRPM of Basse Normandie, the catches by the netters are mainly composed of large individuals, with 87 cm TL and 5 kg in average, i.e. larger than the size maturity size (76 cm TL) resulting from the large mesh size (270 mm).

Cantabrian Sea survey

The SPNGFS (the Spanish groundfish survey coordinated by the IBTS on the Northern Spanish Shelf) has captured only 35 individuals (18 males and 17 females) ranging from 35–94 cm, between 1992 and 2009. They were all captured in the Cantabrian Sea (Figure 5), although this survey cannot survey the shallower areas in Galicia where, as stated above, it is a locally abundant species.

Miscellaneous Fisheries Independent Surveys (see methods for survey data available)

The French Channel groundfish survey catches small numbers off the Cherbourg peninsula and off the south coast of England (see maps of species distributions in ICES, 2010).

Data from the EVHOE survey in the Bay of Biscay were extracted from DATRAS (02 June 2010), with only four records of this species, with single specimens recorded in 1997 and 2007 and two specimens in 2000 (Table 4). Similarly, occasional individuals are recorded in Portuguese surveys, and also in the French beam trawl survey of the Bay of Biscay (summarised in Table 4). No data from the Gulf of Cádiz survey were available.

Information from the French beam trawl survey of the Bay of Biscay would suggest that undulate ray are caught occasionally outside of the Gironde estuary and up to La Rochelle, and also further north, from Concarneau to south of Nantes, including outside of the Loire estuary. Records of undulate ray from the Portuguese IBTS, which uses a Norwegian Campelen Trawl (NCT) were typically from south-western Portugal, off Setúbal, and along the stretch of coastline near Porto and Matosinhos, confirming the locations reported in other literature sources..

Spanish and Portuguese IBTS surveys tend to occur in waters >30 m deep, and the paucity of inshore stations could result in the low number of undulate ray being caught.

The low catch rates of undulate ray in existing surveys in the Biscay and Iberian eco-regions prevents analyses of abundance trends.

An on-going Defra-funded project (conducted by UK) to examine discard survival of commercially-caught skates has undertaken some field studies off the Isle of Wight on an inshore vessel using gillnets of 10.5-12" mesh size. Due to the amount of weed in the water, soak time was restricted to ca. 24 h, and it should be recognised that soak time could be longer at other times of the year. The batoids caught in this study are summarised in Table 4. Large undulate ray were taken regularly in the study area and, numerically, constituted 27.5% of all batoids caught. Given their larger size, they would also account for a greater proportion in terms of biomass. It is also worth noting that the sex ratio was heavily skewed towards male fish, and females are likely to attain a larger size than males. All undulate rays captured were tagged with Petersen discs and released.

The main conclusion from the survey data is that too few undulate ray are caught to allow a meaningful analysis of trends in abundance.

Methods

Celtic Sea Ecoregion Fisheries Independent Surveys:

UK (England) Eastern English Channel Beam Trawl Survey

This survey is described by Parker-Humphreys (2005). The gear used is a 4 m beam trawl with a chain mat, which is used to prevent large rocks entering the net, allowing coarser ground to be surveyed, however it may be that the chain mat could restrict the capture of larger batoids. This survey has fished most stations on an annual basis, although some stations in mid-Channel have not been fished in recent years, and some tows have been made in other parts of the general area on an *ad hoc* basis when time has allowed. Overall, 87 fixed stations have been fished on at least 12 occasions over the 17 year period, with surveys conducted in July.

UK (England) Western English Channel Beam Trawl Survey

This survey has been conducted in March from 2006–2010, and uses twin 4 m beam trawls over a stratified random survey grid. Due to the short time series available, no temporal changes have been explored.

Biscary-Iberia Ecoregion Fisheries Independent Surveys:

- Cantabrian Sea Survey
- The French Channel groundfish survey
- EVHOE survey in the Bay of Biscay
- Portuguese IBTS survey
- French beam trawl survey of the Bay of Biscay
- Defra-funded project (conducted by Cefas) to examine discard survival of commercially-caught skates has undertaken some field studies off the Isle of Wight on an inshore vessel using gillnets of 10.5-12” mesh size.

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Table 9.3.2.3.1 Growth parameters for undulate ray (Adapted from Moura *et al.*, 2007).

		Von Bertalanffy			Gompertz		
		L _{inf}	K	T ₀	L _{inf}	K	T ₀
Algarve	Females	1225	0.112	-0.540	1017	0.225	0.406
	Males	1178	0.124	-0.368	985	0.249	0.471
	Combined	1193	0.120	-0.414	994	0.241	0.448
Peniche	Females	1146	0.146	-0.006	1028	0.259	0.550
	Males	1128	0.149	-0.090	1002	0.272	0.562
	Combined	1137	0.147	-0.010	1015	0.266	0.566

Table 9.3.2.3.2 Parasites reported from undulate ray taken in Galician waters (Adapted from Sanmartín *et al.*, 2000; Álvarez *et al.*, 2006).

Taxon	Species	Taxon	Species
Monogenea	<i>Merizocotyle undulate</i>		<i>Onchobothrium unc</i>
	<i>Rajonchocotyle emarginata</i>		<i>Phyllobothrium lactu</i>
Eucestoda	<i>Acanthobothrium benedeni</i>	Nematoda	<i>Proleptus sp.</i>
	<i>Acanthobothrium sp.</i>		<i>Schulmanela (Piscic</i>
	<i>Crossobothrium sp.</i>		<i>Pseudanisakis rotun</i>
	<i>Echeneibothrium beauchampi</i> ,		<i>Cystidicolidae</i>
	<i>Echeneibothrium sp.</i>	Acanthocephala	<i>Acanthocephaloides</i>
	<i>Grillotia sp.</i>		

Table 9.3.2.3.3 The number of sampled vessels (vessels that were selected by CRPMEM-BN as representative of their metier) by metiers for French vessels landing into the Cherbourg fish market, and their respective mean catches for the period 2000-2007, along with the productions of the fleet.

Métiers	Vessels	2000	2001	2002	2003	2004	2005	2006	2007	mean catch in t / Vessel / year
Netters	Number of sampled vessels	6	7	6	6	6	5	5	5	
	Mean catch in kg	4307	5071	4819	5540	5455	3735	4381	4970	4,8
Trawlers	Number of sampled vessels in W. English Channel	4	5	5	4	4	2	1	2	
	Mean catch in kg	8749	8171	7230	7115	5184	5479	5220	4334	6,4
	Number of sampled vessels in E. English Channel	4	3	3	3	3	3	2	2	
	Mean catch in kg	4736	2965	1810	989	1387	1461	779,75	1355	1,9
Large trawlers	Number of sampled vessels	12	11	11	10	9	9	9	8	
	Mean catch in kg	15263	19040	14918	13714	11020	10785	11861	8479	13,1
	Total number of sampled vessels	26	26	25	23	22	19	17	17	
Totals	Total number of vessels	65	74	69	73	71	80	75	72	
	Estimated catch in t**	537	652	496	499	409	429	417	344	
	Real catch in t***	442	515	419	308	235	228	218	176	

* "Total number of vessels" is the number of vessels for which fish market data were available.

** "Estimated catch" is the mean catch per vessel (calculated on sampled vessels) x total number of vessels.

*** "Real catch" is that obtained through the fish market (possibly only representing only a part of the total catch).

Table 9.3.2.3.4 Records of *Raja undulata* from various other internationally coordinated surveys.

(a) EVHOE survey in Bay of Biscay and Celtic Sea							
Year	Gear	Latitude	Longitude	Depth	Sex	Length	CPUE
1997	GOV	47.1233	-2.345	20	F	39	2
2000	GOV	47.1213	-2.3457	21	M	19	2
2000	GOV	47.1213	-2.3457	21	F	26	2
2007	GOV	43.8104	-1.4513	29	F	75	2
(b) Biscay beam trawl survey							
Year	Gear	Latitude	Longitude	Depth	Sex	Length	No. obs.
2007	4 m BT	47.046	-2.454	-	-	26	1
2007	4 m BT	45.772	-1.343	-	-	21	1
2007	4 m BT	45.729	-1.337	-	-	31	1
2005	4 m BT	47.652	-3.861	-	-	19	3
2008	4 m BT	47.652	-3.861	-	-	21	3
2008	4 m BT	47.652	-3.861	-	-	25	3
2008	4 m BT	46.119	-1.773	-	-	54	1
2008	4 m BT	45.782	-1.350	-	-	31	1
2008	4 m BT	45.407	-1.343	-	-	18	1
2009	4 m BT	46.554	-2.050	-	-	25	1
2009	4 m BT	46.511	-2.050	-	-	24	1
(c) Portuguese IBTS							
Year	Gear	Latitude	Longitude	Depth	Sex	Length	No. obs.
2003	NCT	37.225	-8.915	56	F	66	1
2003	NCT	37.225	-8.915	56	M	48	1
2003	NCT	37.225	-8.915	56	F	63	1
2003	NCT	37.225	-8.915	56	F	88	1
2003	NCT	37.225	-8.915	56	F	63	1
2003	NCT	37.225	-8.915	56	F	63	1
2003	NCT	37.225	-8.915	56	F	60	1
2003	NCT	37.225	-8.915	56	F	52	1
2003	NCT	41.403	-8.815	56	M	57	1
2004	NCT	37.275	-8.928	70	M	53	1
2004	NCT	37.275	-8.928	70	M	61	1
2004	NCT	37.275	-8.928	70	M	-	1
2004	NCT	37.275	-8.928	70	M	60	1
2004	NCT	37.275	-8.928	70	F	87	1
2006	NCT	38.337	-8.828	33	F	76	1
2006	NCT	41.15	-8.797	34	M	66	1
2009	NCT	37.413	-8.842	42	M	60	1

Table 9.3.2.3.5 Batoids captured whilst gillnetting off the eastern coast of the Isle of Wight (May 2010).

		Males		Females		
		N	Length range (cm)	N	Length range (cm)	
Thornback ray <i>Raja clavata</i>	57.5	57	65-85	11	81-90	1:5.3
Undulate ray <i>R. undulata</i>	27.5	27	80-97	6	79-91	1:4.5
Spotted ray <i>R. montagui</i>	10.0	9	54-65	2	63-65	1:4.5
Small-eyed ray <i>R. microocellata</i>	2.5	2	73-75	1	76	-
Blonde ray <i>R. brachyura</i>	1.7	2	87-97	0	-	-
Stingray <i>Dasyatis pastinaca</i>	0.8	-	-	1	73	-
Total	100%	99		21		

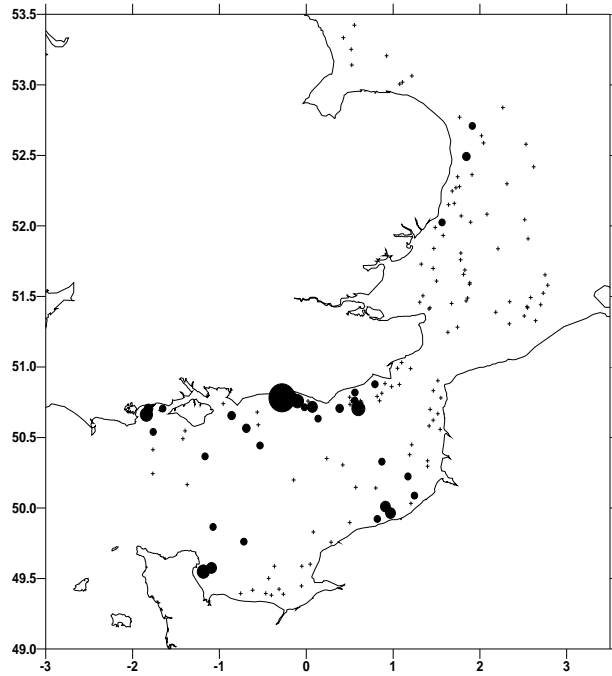


Figure 9.3.2.3.1 Total captures of undulate ray in the eastern English Channel beam trawl survey over the period 1993–2009 by prime station. Largest bubble size = a total of 35 ind.h⁻¹ over the 17 year period.

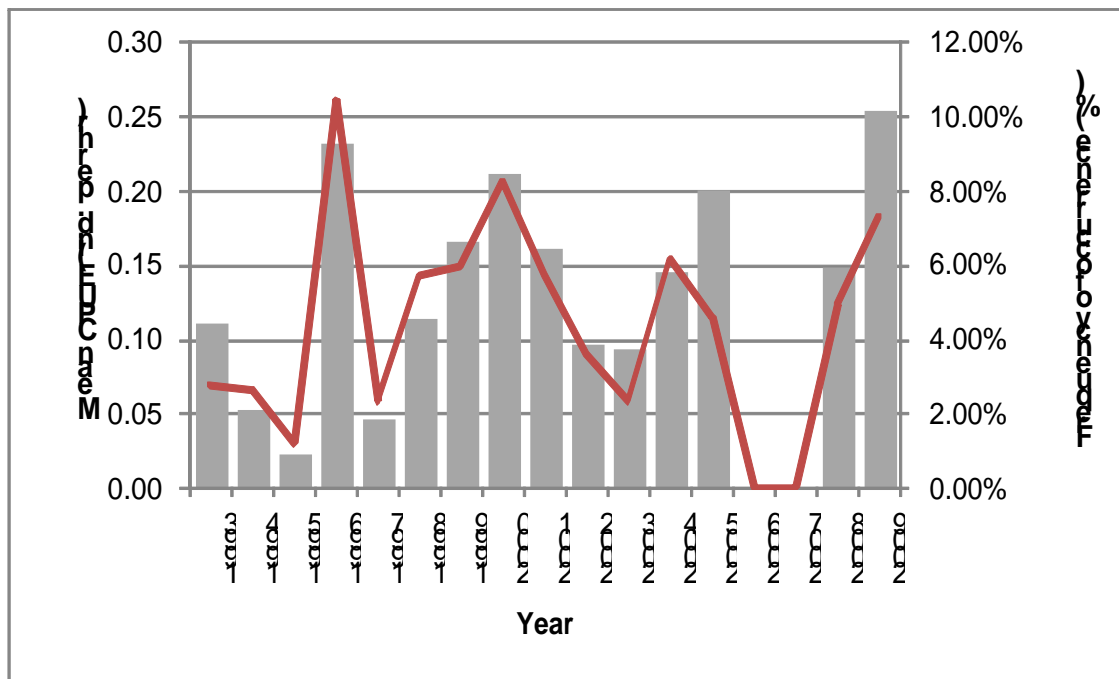


Figure 9.3.2.3.2 Mean CPUE (ind.h⁻¹; grey bars) and frequency of occurrence (red line) of undulate ray in the eastern English Channel beam trawl survey (1993–2009) for 87 stations that have been fished for at least 12 of the years within the 17 year time series.

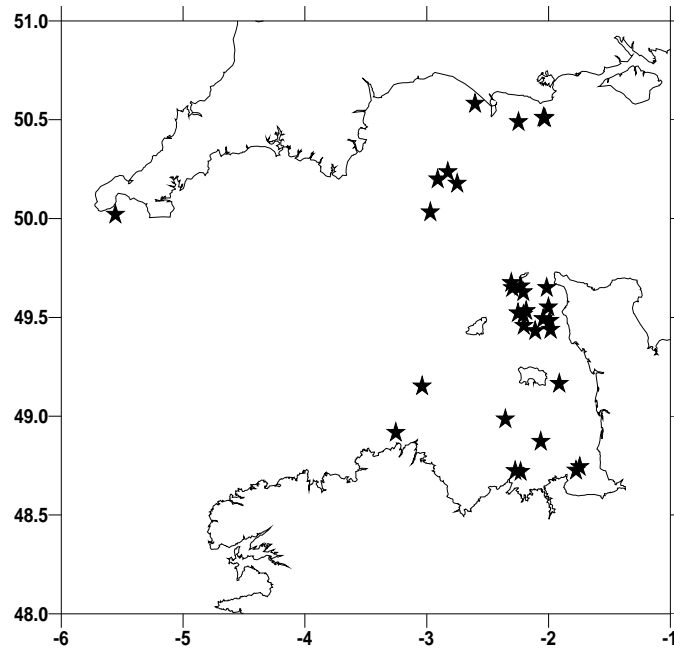


Figure 9.3.2.3.3 Captures of undulate ray in the western English Channel beam trawl survey over the period 2006–2010 (positive stations only)

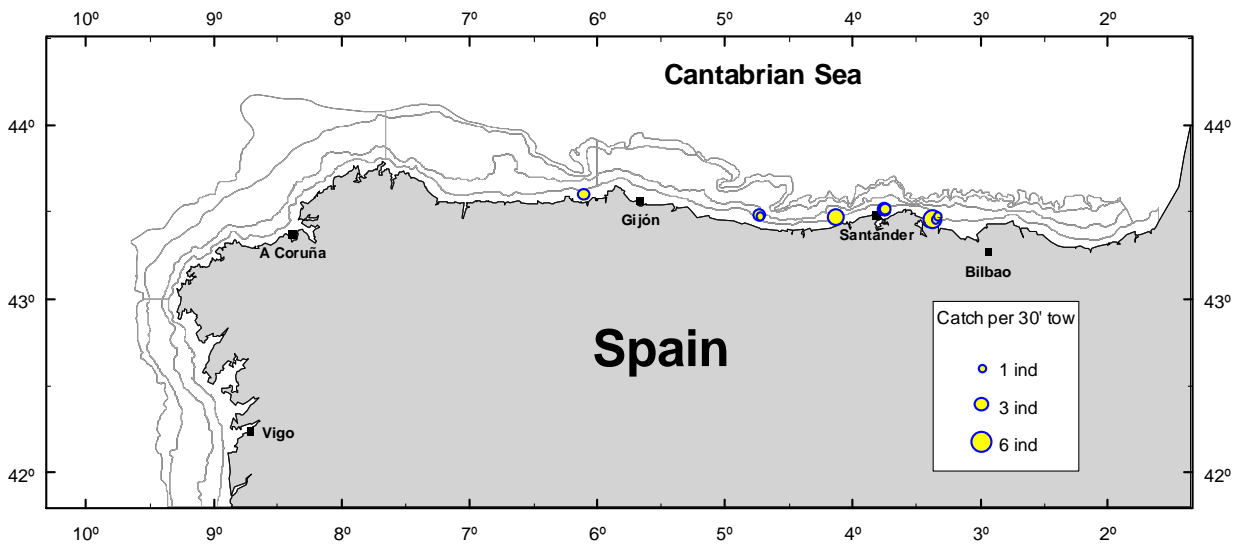


Figure 9.3.2.3.4 Total captures of undulate ray in the northern Spanish shelf groundfish survey over the period 1992–2009.