

The Distribution and Abundance of Elasmobranch Fish in Tralee, Brandon and Dingle Bays in 2018-2019

*Biodiversity
Conservation Status
Critically Endangered*



Lead Partner: Marine Institute

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Skate and Ray Surveys

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Skate and Ray Surveys

Executive Summary

Surveys of skates and rays were undertaken in Tralee, Brandon and Dingle Bays in north Kerry during 2018 and 2019. The area was previously shown, from angling records and more recent shore surveys of egg cases, to support a high diversity of these species some of which are critically endangered in Ireland, the Atlantic or globally. Twelve species were recorded in the area and their geographic and seasonal distribution is described in this report. Their relative abundance in the surveys confirms their presence in the Tralee Bay area and the importance of that area as a refuge for them. Three of the species recorded, angel shark, blue skate and flapper skate are critically endangered globally. White skate was not recorded in the surveys but a single individual was captured separately in commercial tangle nets in 2018 in the area. This species is critically endangered in the Atlantic. Data from other broad scale fisheries surveys and fisheries sampling at sea, not reported here, confirm that these species are rarely found elsewhere. In addition, and in order of abundance, thornback ray, painted ray, sting ray, undulate ray, blonde ray, spotted ray, spurdog, tope and greater spotted dogfish were recorded.

Endangered species of skates and rays are listed on various species red lists internationally and are prohibited species (from being landed) under Common Fisheries Policy regulations. The main source of mortality is from fishing. The current regulations, however, do not necessarily remove this source of impact because accidental by-catch and mortality can still occur. Populations that are at critically low levels locally are unlikely to be able to sustain this additional mortality and there is an ongoing risk of local extinction. Effective protection and restoration will need to consider additional measures such as marine protected areas or other mitigations of the effects of fisheries where they pose a high risk to the viability of local populations. Waters off north Kerry are important internationally as they hold some of the last remaining refuges for angel shark and white skate.

Introduction

The Tralee Bay area off the south west coast of Ireland is known to support a high diversity of Elasmobranch fish species. Some of these species are now critically endangered and in danger of local, Atlantic area and global extinction. Sting Ray and Undulate Ray are on the Irish Red List. Angel Shark (*Squatina squatina*), White Skate (*Rostroraja alba*), Common/Blue Skate (*Dipturus batis* - Complex A (=flossada) and Flapper Skate (*Dipturus batis* - Complex B (=intermedia) are critically endangered in the Atlantic or globally. They have been extirpated throughout much of their former range mainly through over fishing including unintentional by-catch mortality. Angel Shark is critically endangered globally, the last remaining stronghold for the species is in the Canary Islands and there is a significant extinction risk due to continued pressures on small local populations (Lawson et al 2019, ICES 2019). The decline of Angel Shark off the south west coast of Ireland has been reported by Shepherd *et al* (2019). White Skate may already be extirpated from the NE Atlantic other than for two known refuge locations in Ireland. Common Skate and Flapper Skate were historically one of the most abundant and widely distributed skates in the NE Atlantic. These species are now extirpated from the Irish Sea and North Sea and their status is regarded as endangered or critically endangered in Ireland given that fishing pressures, which have resulted in their decline, have not ceased (Clarke *et al.* 2016).

Skate and Ray Surveys

In the 1950s and 1960s Angel shark were targeted in angling competitions and angling mortality alone may have been unsustainable. In the late 1970s mortality from commercial fisheries increased with the introduction of large mesh tangle nets targeting spiny lobster (*Palinurus elephas*) which had previously been targeted using traps. All Elasmobranchs known to occur in the area are vulnerable to entangling nets. Species catch composition in tangle nets was reported in 2007 (Power *et al.* 2007) at which time 11 fishing vessels operated a directed tangle net fishery for spiny lobster in north Kerry between Ballydavid Harbour and Kerry Head. By-catch of elasmobranchs, seals and cetaceans were reported. More recent (2017-2020) work with the commercial fishery in the area confirmed continued by-catch of endangered and protected species.

Elasmobranch fish are vulnerable to overfishing because they are long-lived, slow growing, late to mature, have protracted breeding cycles and produce few young. Their large size, morphology and aggregating nature also make them susceptible to capture in mixed demersal fisheries and in entangling nets.

Objectives

The project set out to assess the distribution, diversity and monthly relative abundance of Elasmobranch fish in the Tralee Bay area off the south west coast of Ireland; an area of known diversity of Elasmobranchs and to establish, within the limits and scope of the surveys undertaken, the current status of these species in relation to international conservation status assessments and ICES management advice. The project provides data confirming the critically endangered status of some species and provides up to date information for the development of fishery mitigation measures to eliminate by-catch.

Conservation Status and Management

The conservation status (measured as risk of extinction) of elasmobranch species listed in this report is assessed by a number of international organizations and they appear on various international and national red lists (Table 1). Of the species reported here only cuckoo ray is indigenous to Europe. Two species are on the International Union for Conservation of Nature (IUCN) critically endangered list, 3 are critically endangered in the Irish red list, 4 are critically endangered in the NE Atlantic. Lists are updated at various frequencies. The global and NE Atlantic lists (the latter for elasmobranchs only) are updated roughly at 10-yearly frequencies by the IUCN. The first European red list (of all marine and freshwater fish) was completed recently under the auspices of the European Commission. The first Irish red list (elasmobranchs only) was completed in 2016, under the auspices of the National Parks and Wildlife Service.

The Convention on the Conservation of Migratory Species of Wild Animals (CMS; <https://www.cms.int/>) is an international convention that specializes in the conservation of migratory species, including their habitats and migration corridors. Migratory species that are considered as being threatened with extinction are listed on Appendix I (and CMS parties should strictly protect such species), whilst those migratory species that require international co-operation are listed on Appendix II. Angel Shark is listed in both Appendix I and II. None of the species are protected by the EU Habitats Directive.

Skate and Ray Surveys

Under the Common Fisheries Policy (CFP) it is prohibited for EU vessels to fish for, retain on board, tranship, land, store, sell, display or offer for sale species listed in Annex I of Regulation (EU) 2019/1241 (EU, 2019b). Four of the elasmobranch species listed in this report are on this prohibited species list (PSL, Table 1). This measure effectively allows discarding of dead or alive specimens, and does not in itself regulate mortality on these species. Several other species are included in a generic ray TAC for ICES Sub-areas 6 and 7, and some species are not dealt with under the CFP at all, and are hence un-managed (Table 1). Finally, undulate ray is excluded from the generic ray TAC in ICES Divisions 7b and 7j, which is effectively the same degree of management as being listed on the CFP PSL, in those areas only.

ICES has recently provided advice on the current status of various elasmobranch species (ICES, 2020). The advice is provided in the context of fishing opportunities. Species/stocks are reported as being variously depleted, declining or recovering. Species that are severely depleted are listed by Conservation Organizations as endangered to varying degrees as described above (Table 2).

The ICES advice for endangered species and the inclusion of designation of species as prohibited under Regulation (EU) 2019/1241 may, however, be insufficient to protect their status or to improve their future prospects. For instance, although the ICES advice (Table 2) may be for zero TAC, for no targeted fishing and for discarding of individuals that are caught as by-catch some species are at such a low level that any extra mortality that may be caused by incidental by-catch in fisheries may increase the risk of extinction locally and regionally. Populations that are in a severely depleted state, which are exposed to any fishing mortality and where inward migration is effectively zero are at risk of extinction.

The OSPAR List of Threatened and Declining Species is based on reviews of those species that were nominated by parties (countries) to OSPAR. This list of fish, largely developed in 2008, has not generally changed over time, is not comprehensive, and affords no management/ protection beyond what is already in place in other designations.

Table 1. Conservation status listing of Elasmobranch species described in this report.

Species	Indigenous to Europe	IUCN Global Redlist	Irish Redlist	European Redlist	NE Atlantic Redlist	OSPAR TDSL	CFP	CMS (Bonn)
Thornback Ray	No	Near threatened	Least concern	Near threatened	Near threatened	Yes	Generic ray TAC	No
Painted Ray	No	Least concern	Least concern	Near threatened	Near threatened	No	Generic ray TAC	No
Stingray	No	Data deficient	Endangered	Least concern	Least concern	No	-	No
Undulate Ray	No	Endangered	Endangered	Near threatened	Endangered	No	Excluded from generic TAC	No
Blonde Ray	No	Near threatened	Near threatened	Near threatened	Near threatened	No	No	No
Spotted Ray	No	Least concern	Least concern	Least concern	Least concern	Yes	Generic ray TAC	No
Spurdog	No	Endangered	Vulnerable	Endangered	Critically endangered	Yes	PSL	App II

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Angel Shark	No	Critically endangered	Critically endangered	Critically endangered	Critically endangered	Yes	PSL	App I, II
Common Skate	No	Critically endangered	Critically endangered	Critically endangered	Critically endangered	Yes	PSL	No
Tope	No	Vulnerable	Vulnerable	Vulnerable	Data deficient	No	Longline only	App II
Gt. spotted dogfish	No	Near threatened	Least concern	Near threatened	Near threatened	No	-	No
White skate	No	Endangered	Critically endangered	Critically endangered	Critically endangered	Yes	PSL	No
Cuckoo ray	Yes	Least concern	Vulnerable	Least concern	Least concern	No	Generic ray TAC	No

Table 2. ICES Advice on Elasmobranch species listed in this report

Species	ICES advice
Thornback Ray	No advice for this species in ICES Division 7j
Painted Ray	No advice for this species in ICES Division 7j
Stingray	No advice for this species in any area.
Undulate Ray	Stock is very low. There should be zero catches on this stock in each of the years 2021 and 2022.
Blonde Ray	No advice for this species in ICES Division 7j
Spotted Ray	The stock is decreasing. Based on precautionary approach landings should not exceed 51 tonnes in each of the years 2021 and 2022. ICES cannot quantify the corresponding catches.
Spurdog	Based on precautionary approach there should be no targeted fisheries on this stock in 2021 or 2022 (ICES 2020). ICES currently carries out a Category 1 assessment for spurdog. In 2019 ICES reported that “All analyses presented in previous reports of WGEF have indicated that the NE Atlantic stock of spurdog declined over the second half of the 20th century, but now appears to be increasing. The current stock size is thought to be ca. 24% of virgin biomass. Although spurdog are less frequently caught in groundfish surveys than they were 20 years ago, there is some suggestion that spurdog are now being seen more frequently in surveys and survey catch rates are starting to increase”.
Angel Shark	There should be zero catch in each of the years 2020–2023. Reported landings of angel shark declined between the mid-1970s and early 1990s. Landings have been very low since then (ICES 2019). ICES (2008) states “Angel shark has a localized and patchy distribution, and is extirpated from parts of its former range. It should receive the highest possible protection. Any incidental bycatch should not be landed, but returned, to the sea, as they are likely to have a high survival rate.”. Studies showed that the species had disappeared from most of its former range. No new information has become available to alter the ICES’ advice first adopted in 2008, that the species is depleted in the Northeast Atlantic.
Common Skate	First advice for the Celtic Seas eco-region in 2008. The species complex was depleted. No information has become available to ICES to suggest that the species complex has recovered. ICES now classifies its status in that area as unknown (ICES 2019), and no longer provides advice relating to fishing opportunities.
Tope	

Skate and Ray Surveys

	<p>The stock status is unknown When the precautionary approach is applied landings should be no more than 301 tonnes in each of the years 2021 and 2022.</p>
Greater spotted dogfish	<p>The stock is increasing but ICES cannot provide advice on fishing opportunities for this stock owing to a lack of reliable catch or landings data. ICES notes that the change in stock size indicator implies that catches for the years 2020 and 2021 should be reduced by 20% compared to catches in 2017 and 2018. ICES cannot quantify the resulting catches or landings</p>
White skate	<p>The white skate has disappeared from most areas of former habitat in the Northeast Atlantic. There are very few recent, authenticated records of white skate in this region; these isolated records are from the English Channel, western Irish waters and Portuguese waters. According to historical literature, white skates appear to have occurred more frequently in previous decades. ICES therefore considers this stock to be depleted (ICES 2019a). ICES advises that, when the precautionary approach is applied, there should be zero catches in each of the years 2020–2023.</p>
Cuckoo ray	<p>ICES advises that this stock is increasing and that when the precautionary approach is applied, landings should be no more than 3150 tonnes in each of the years 2021 and 2022. ICES cannot quantify the corresponding catches.</p>

Skate and Ray Surveys

Survey methods

Surveys were conducted monthly by commercial inshore fishing vessels MFV Lady K and MFV Realt na Mara. The Skippers had significant knowledge and experience of local fishing grounds. Scientific observers were on board during surveys but some data were reported by the Skippers. Surveys were undertaken in Apr-Sept and Nov-Dec 2018 and Jan-Feb 2019. No surveys were undertaken in January or October.

The survey objectives were to record and report on the diversity of Elasmobranch fish in Tralee, Brandon and Dingle Bays (Figure 1). Synoptic surveys covering all the area in all months were not possible. Although the same general area was surveyed each month the survey stations were not fixed and were adjusted according to the knowledge of Skippers involved and to increase the overall spatial coverage and possibility of recording all species that may have been present. This constraint in spatial coverage in each month means that interpreting the seasonal presence and absence of species is limited especially for species that may be present only in specific locations, habitats and depths.

Data on the date, net length and mesh size, GPS position for the start and end of the net, soak time, size and sex of fish and photographic evidence of species caught were reported. Mesh size was 26cm (10.5 inch), net length was generally 0.92km (0.5nm) and soak time was usually 5-6hrs. Images of rare species in particular or where identification was in doubt were provided at time of capture using the Fulcrum App® operating on mobile phones and which geotagged the location of capture.

Total survey effort included 158 net deployments involving 79nm of net and given an average soak time of 5hrs a total survey effort of 477nmhrs. There were 88 deployments in Brandon/Tralee and 70 in Dingle Bay (Figure 1).

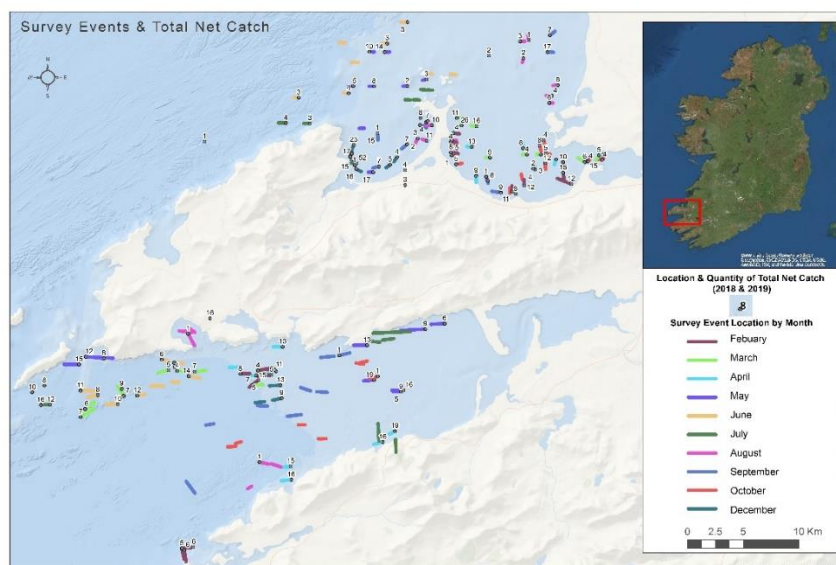


Figure 1. Survey haul locations in Dingle, Brandon and Tralee Bays in 2018-2019. Total catches of Elasmobranch fish in hauls with catches are shown. Hauls are colour coded by month

Skate and Ray Surveys

Diversity, distribution and relative abundance

A total of 1243 elasmobranch fish and 12 species were captured during the survey (Table 3). Of these 769 fish and 10 species were captured in Tralee/Brandon Bay (Table 4) and 474 and 6 species were captured in Dingle Bay (Table 5). Angel Shark, Common Skate, Flapper Skate, Greater Spotted Dogfish, Sting ray and Undulate Ray were recorded in Tralee/Brandon Bay but not in Dingle Bay. Tope and Spurdog were recorded in Dingle Bay but not in Tralee/Brandon Bay.

Species not recorded in the surveys

White Skate - *Rostroraja alba*

A single dead specimen was recorded in the commercial tangle net fishery in outer Tralee Bay in 2018 (Figure 2). This was the only specimen reported in 4 years in the commercial fishery in the Tralee, Brandon and Dingle Bay area and was not recorded in dedicated skate and ray surveys in 2018-2019 reported here. White Skate is endangered in the eastern Atlantic according to the IUCN. Varian *et al.* (2020) recorded the presence of live egg cases of white skate in Tralee Bay.

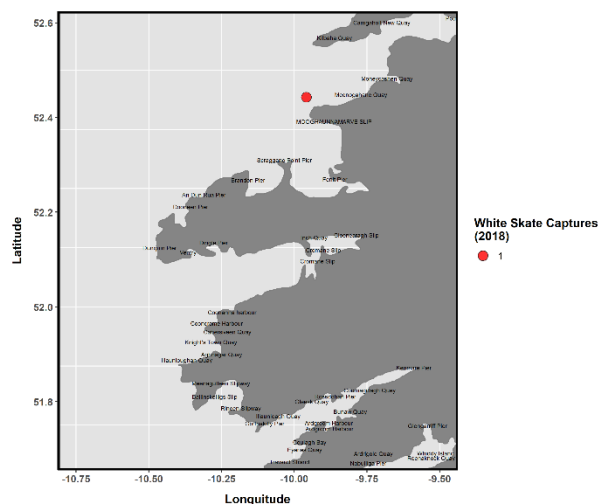


Figure 2. White Skate (*Rostroraja alba*) captured in a commercial tangle net north of Tralee Bay in 2018. White skate were not recorded in Skate and Ray surveys in 2018-2019 in the area.

Lesser spotted dogfish – *Scyllorhinus canaliculi*

Cuckoo ray – *Leucoraja naevus*

Cuckoo ray is an offshore species and despite a record of an egg case in Tralee Bay (Varian et al 2020) it is unlikely to occur in the survey area

Skate and Ray Surveys

Table 3. Relative abundance, in descending order, of Elasmobranch fish recorded by month in set net surveys in north Kerry in 2018-2019.

Species	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Nov	Dec	Total
Thornback Ray	84	121	86	121	79	127	32	57	39	64	810
Painted Ray	26	19	31	56	33	12	0	0	1	21	199
Stingray	5	0	96	0	0	0	32	5	0	2	140
Undulate Ray	17	0	28	0	2	0	0	0	0	0	47
Blonde Ray	0	0	11	3	2	1	0	0	0	1	18
Spotted Ray	0	0	3	1	1	4	0	0	0	1	10
Spurdog	0	0	7	0	0	0	0	0	0	0	7
Angel Shark	0	1	1	0	0	0	2	0	0	0	4
Flapper Skate	0	0	0	0	1	0	0	2	0	0	3
Tope	0	0	0	0	0	0	1	1	0	0	2
Greater spotted dogfish	0	0	0	2	0	0	0	0	0	0	2
Common Skate	0	0	0	0	0	1	0	0	0	0	1
Total	132	141	263	183	118	145	67	65	40	89	1243

Skate and Ray Surveys

Table 4. Relative abundance, in descending order, of Elasmobranch fish recorded by month in set net surveys in Brandon/Tralee Bays in 2018.

Species	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Nov	Dec	Total
Thornback Ray	55	88	22	56	31	93	31	57	39	64	536
Stingray	5	0	96	0	0	0	32	5	0	2	140
Undulate Ray	17	0	28	0	2	0	0	0	0	0	47
Painted Ray	5	0	0	9	10	1	0	0	0	1	26
Spotted Ray	0	0	0	1	1	4	0	0	0	0	6
Angel Shark	0	1	1	0	0	0	2	0	0	0	4
Blonde Ray	0	0	0	3	1	0	0	0	0	0	4
Flapper Skate	0	0	0	0	1	0	0	2	0	0	3
Greater spotted dogfish	0	0	0	2	0	0	0	0	0	0	2
Common Skate	0	0	0	0	0	1	0	0	0	0	1
Total	82	89	147	71	46	99	65	64	39	67	769

Table 5. Relative abundance, in descending order, of Elasmobranch fish recorded by month in set net surveys in Dingle Bay in 2018.

Species	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Nov	Dec	Total
Thornback Ray	29	33	64	65	48	34	1	0	0	0	274
Painted Ray	21	19	31	47	23	11	0	0	1	20	173
Blonde Ray	0	0	11	0	1	1	0	0	0	1	14
Spurdog	0	0	7	0	0	0	0	0	0	0	7
Spotted Ray	0	0	3	0	0	0	0	0	0	1	4
Tope	0	0	0	0	0	0	1	1	0	0	2
Total	50	52	116	112	72	46	2	1	1	22	474

Species Accounts

Species recorded

Thornback Ray - *Raja clavata*



Biology and Life History

Kingdom: Animalia > **Phylum:** Chordata > **Class:** Elasmobranchii >
Order: Rajiformes > **Family:** Rajidae > **Genus:** *Raja* > **Species:** *Raja clavata*

Thornback Ray is a medium sized ray, distributed throughout eastern Atlantic, from the Faroe Islands, Iceland, and Norway to South Africa, in the Mediterranean, western Black sea and in the south-western Indian Ocean. It is a bottom-dwelling species mainly found on hard seabed (e.g. gravel and rocky areas), in coastal waters as deep as 300m but occurs mainly from 7 to 192m. The species remains in inshore waters during spring/summer and moves offshore during winter. It is sexually dimorphic. Size ranges from 10–89cm TL and 10–98cm TL for males and females respectively. Maximum age is reported at 12 years, maturing at age 6 and at a length of 65–71cm. The species is oviparous with females migrating further inshore to lay their eggs. Egg-laying occurs between March and September. Mature females can lay between 60 and 140 eggs in a single year.

Conservation Status

Species	IUCN Global Redlist	Irish Redlist	European Redlist	NE Atlantic Redlist
Thornback Ray	Near threatened	Least concern	Near threatened	Near threatened

Size Distribution

Female modal size was larger than that of males (Figure 3) and size ranged from 12-89 cm in females and 16-93 cm in males. Approximately 64% of females were above the maturity size (65 cm).

Species Accounts

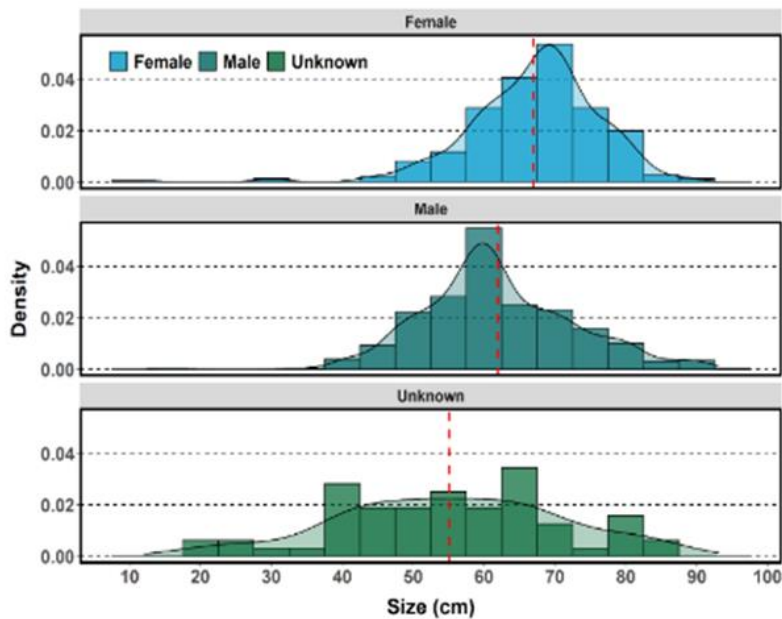


Figure 3. Size distribution of Thornback Ray in 2018-2019 survey data. The mean size by sex is shown in red.

Spatial Distribution

Concentrations of Thornback ray were found in shallow waters of Tralee, Brandon Bay and Dingle Bays (Figure 4). It was caught in a total of 124 of 158 tows carried out during the survey.

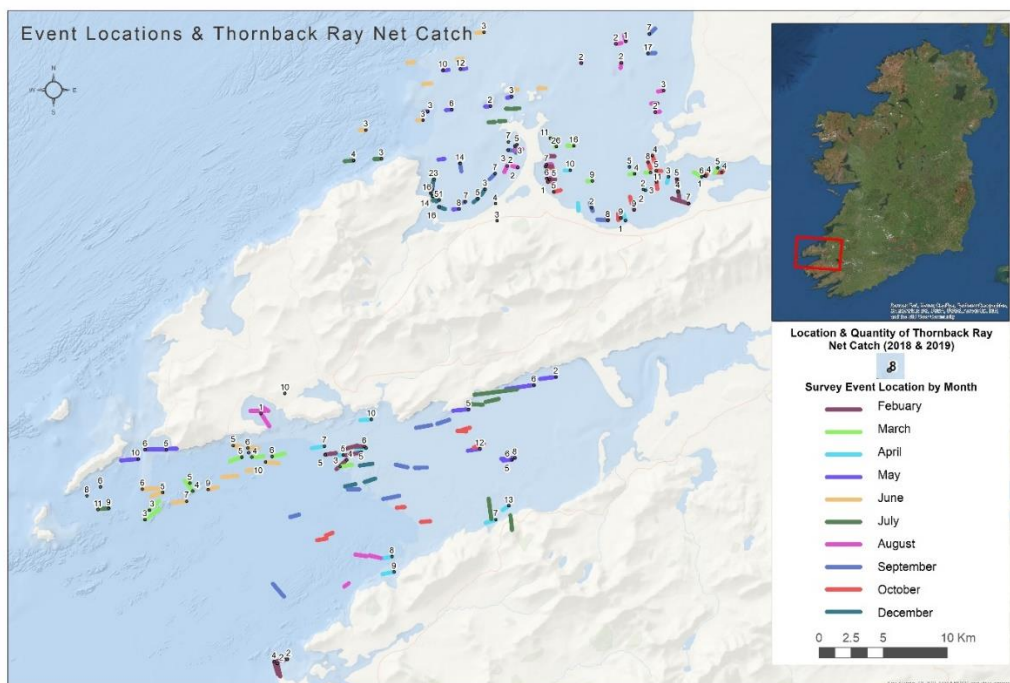


Figure 4. Location of net hauls and quantity of Thornback Ray per net haul in Dingle, Brandon and Tralee Bays. Survey net hauls are colour coded by month

Species Accounts

Relative Abundance by Month

Catch rates of Thornback Ray varied between 1 to 10 fish per haul (Figure 5). A peak in abundance were observed in July (~10 fish per haul). The lowest abundance (~2 fish per haul) was recorded in August.

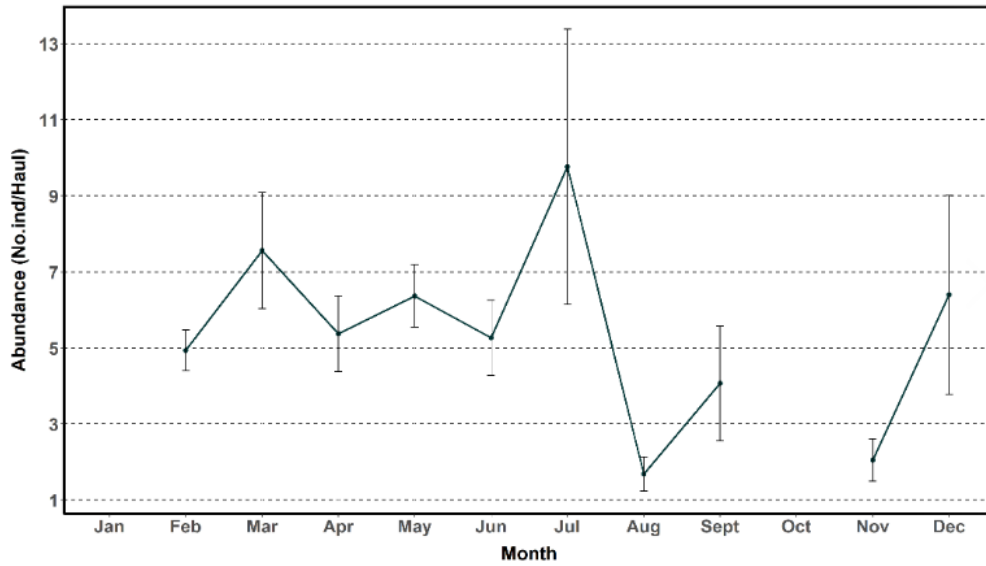


Figure 5. Monthly relative abundance of Thornback Ray in 2018-2019 survey data. Bars shown standard errors.

Species Accounts

Stingray - *Dasyatis pastinaca*



Biology and Life History

Kingdom: Animalia > **Phylum:** Chordata > **Class:** Elasmobranchii > **Order:** Myliobatiformes > **Family:** Dasyatidae > **Genus:** *Dasyatis* > **Species:** *Dasyatis pastinaca*

The Stingray is a wide ranging species throughout the North East Atlantic Ocean, occurring from southern Norway south to the Mediterranean and Black Seas and onwards via the Canaries to South Africa. It is a benthic species found in sandy-muddy substrates. It is generally coastal but occurs from shallow water to about 200m depth. It enters lagoons, shallow bays, estuaries, and sometimes rocky reefs. It has a low abundance in the North East Atlantic compared to the Mediterranean. Maximum reported width is 140cm. The maximum reported age is 10 years in the Mediterranean. Males mature at 43cm total length (TL) (22cm disc width (DW)) and females at 46cm TL (24cm DW). Reproduction is ovoviparous with 4-9 young twice per year after a gestation period of four months. Young are born from May to September.

Conservation Status

Species	IUCN Global Redlist	Irish Redlist	European Redlist	NE Atlantic Redlist
Stingray	Data deficient	Endangered	Least concern	Least concern

Size Distribution

There were two modes in the male size distribution at 44 cm and 76 cm and a size range from 41-90 cm. Female modal size was 51 cm and size ranged from 41-134 cm. (

Figure 6). Approximately 97% of females and 89% of males were above the maturity size of 46 and 43 cm, respectively.

Species Accounts

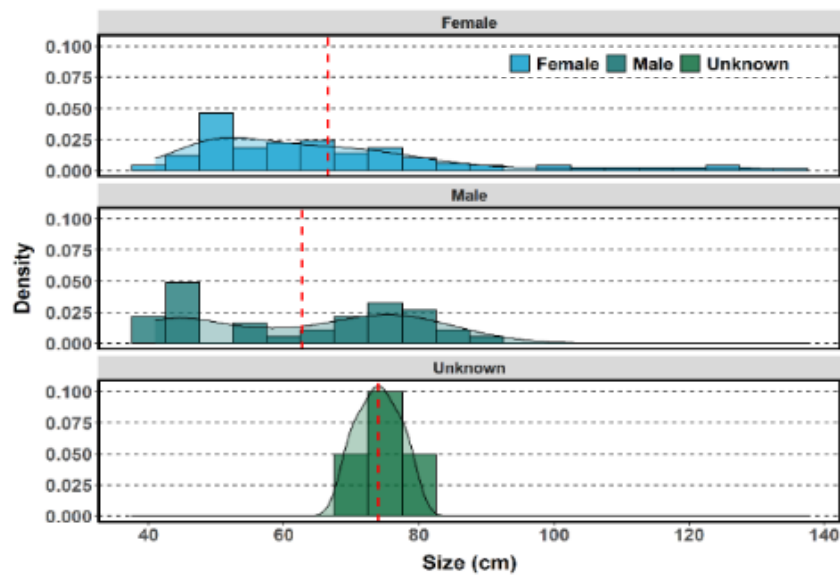


Figure 6. Size distribution of Sting Ray in 2018-2019 survey data. The mean size by sex is shown in red.

Spatial Distribution

Sting Ray occurred in shallow waters of Tralee Bay and Brandon Bay and was caught in a total of 17 of the 158 net hauls (Figure 7).

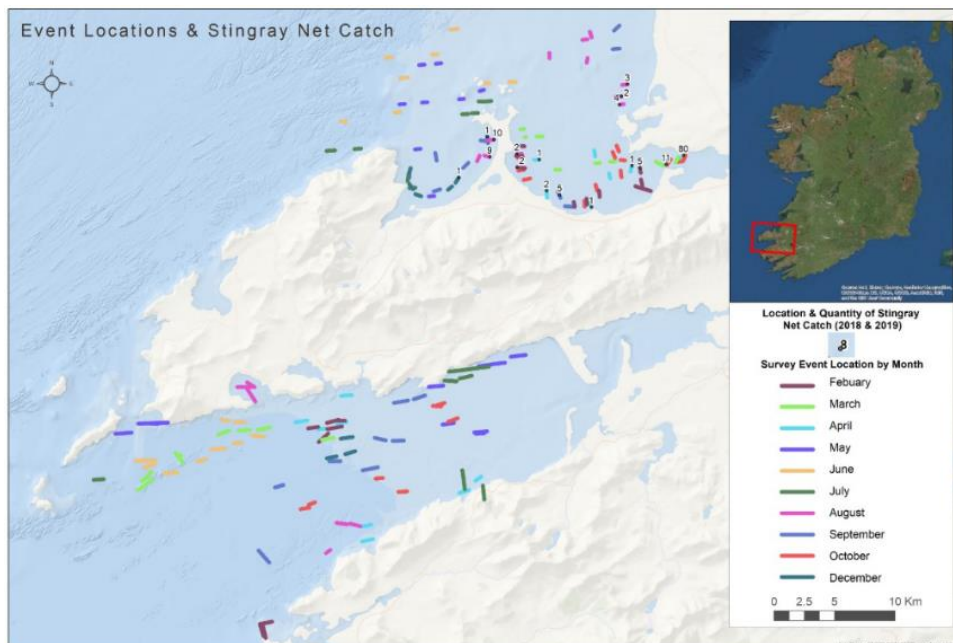


Figure 7. Location of net hauls and quantity of Sting Ray per net haul in Dingle, Brandon and Tralee Bays. Survey net hauls are colour coded by month

Species Accounts

Relative Abundance by Month

Catch rates of Sting Ray varied between 0-6 fish per haul (Figure 8). Highest catches were observed in April and August.

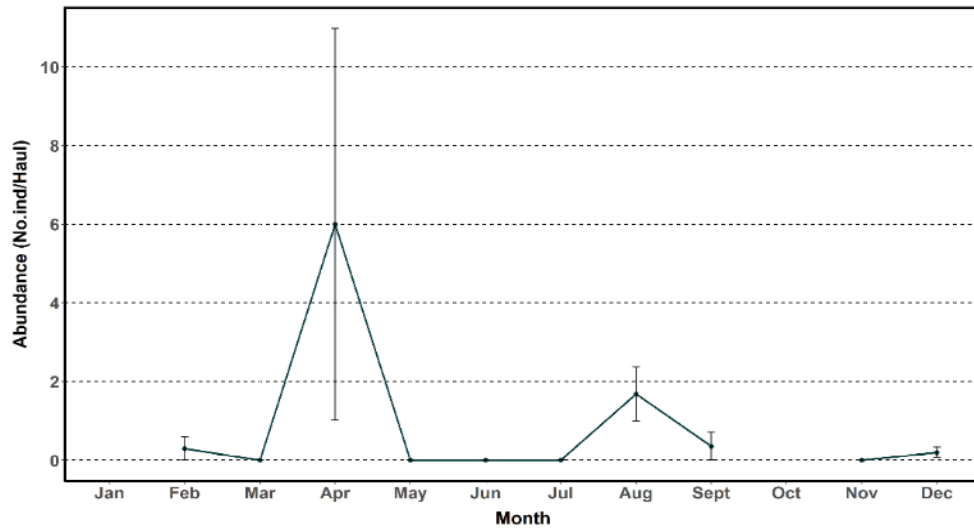


Figure 8. Monthly relative abundance of Sting Ray in 2018-2019 survey data. Bars shown standard errors.

Species Accounts

Undulate Ray - *Raja undulata*



Biology and Life History

Kingdom: Animalia > **Phylum:** Chordata > **Class:** Elasmobranchii >
Order: Rajiformes > **Family:** Rajidae > **Genus:** *Raja* > **Species:** *Raja undulata*

The Undulate Ray is a medium-sized species occurring mainly in inshore waters but with a patchy distribution in the northeast and eastern central Atlantic, with discrete areas where it may be locally common (southwest Ireland, eastern English Channel, south Portugal). It also occurs in the Mediterranean Sea, where it appears to be rare. The Undulate Ray is found on sandy bottoms as deep as 200m, although it tends to be more common in shallow waters (100 – 50m). In the North Sea and Celtic Sea, the length-at-first-maturity has been estimated to be 80cm and 79cm for males and females, respectively. In common with most elasmobranchs, it matures relatively late in its life cycle as its maximum estimated age is just over 20 years. Total length can reach up to 100cm. It is oviparous and breeds between March and June although the spawning period could depend on water temperature. One female may lay up to 88 egg cases.

Conservation Status

Species	IUCN Global Redlist	Irish Redlist	European Redlist	NE Atlantic Redlist
Undulate Ray	Endangered	Endangered	Near threatened	Endangered

Size Distribution

Female modal size was smaller than male modal size (**Error! Reference source not found.**) and size ranged from 58-89 cm in females and 66-83 cm in males. Only 14% of females and 5% of males were above the size at maturity (79 and 80 cm, female and male respectively).

Species Accounts

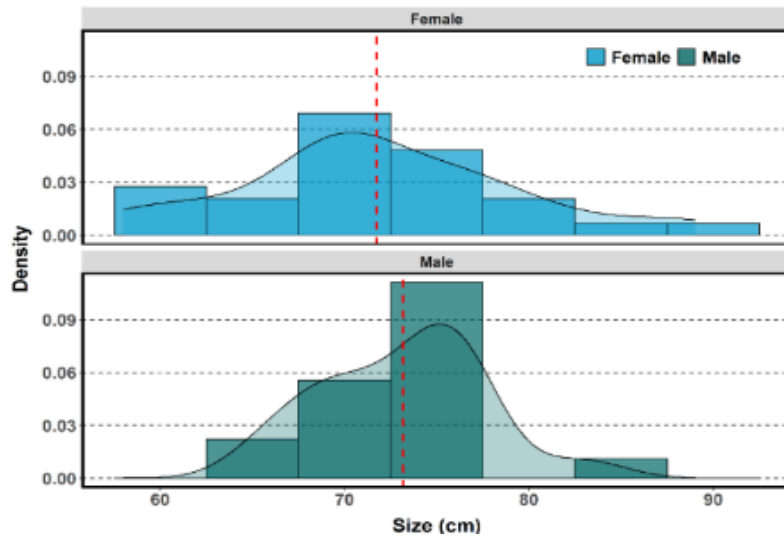


Figure 9. Size distribution of Undulate Ray in 2018-2019 survey data. The mean size by sex is shown in red.

Spatial Distribution

Catches of Undulate Ray occurred mainly in shallow waters of Tralee Bay (Figure 10). Two catches were recorded further offshore north west of Brandon. It was caught in a total of 13 of 158 net hauls.

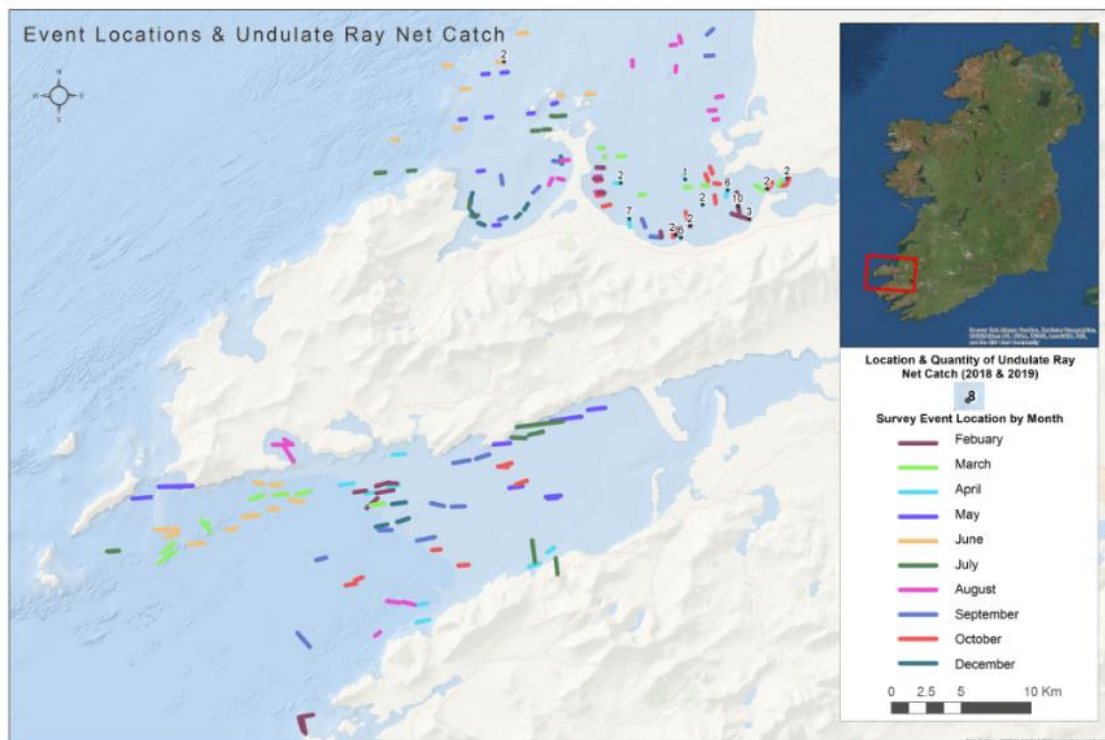


Figure 10. Location of net hauls and quantity of Undulate Ray per net haul in Dingle, Brandon and Tralee Bays. Survey net hauls are colour coded by month

Species Accounts

Relative Abundance by Month

Catch rates of Undulate Ray varied from 0 to 2 fish per haul (Figure 11). The highest abundance (~2 fish per haul) was recorded in February. This species was only caught in February, April and June.

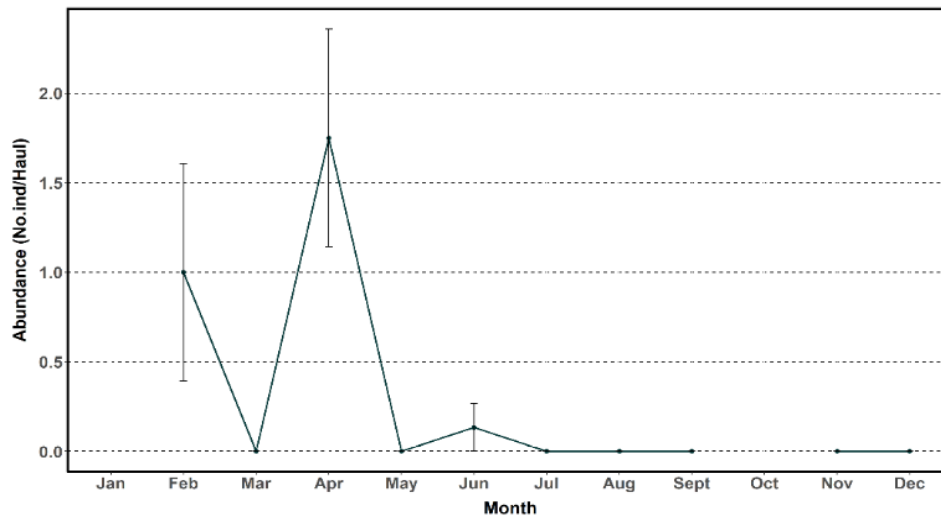


Figure 11. Monthly relative abundance of Undulate Ray in 2018-2019 survey data. Bars shown standard errors.

Species Accounts

Painted Ray - *Raja microocellata*



Biology and Life History

Kingdom: Animalia > **Phylum:** Chordata > **Class:** Elasmobranchii >
Order: Rajiformes > **Family:** Rajidae > **Genus:** *Raja* > **Species:** *Raja microocellata*

The Painted or Small-Eyed ray inhabits inshore and coastal waters down to about 100m. It is found on soft substrates favouring bays and other inshore sandy areas to which its camouflage is perfectly suited. It occurs along the Atlantic coasts of northwest Europe. Occasional specimens are caught in the southern Irish Sea and the species is common in the Bristol Channel. It is absent from the North Sea and the Mediterranean Sea. The length-at-maturity (L_{50}) has been estimated as 69 cm and 78 cm for males and females, respectively. It is oviparous, with egg-laying activity peaking between June and September. Between 54-61 eggs are laid annually.

Conservation Status

Species	IUCN Global Redlist	Irish Redlist	European Redlist	NE Atlantic Redlist
Painted Ray	Least concern	Least concern	Near threatened	Near threatened

Size Distribution in the Survey Area

The dominant modal size in males and females was similar, around 70-73 cm (Figure 12) and size ranged from 31-86 cm in females and 44-84 cm in males. Only 18% of females were above the maturity size (77.9 cm).

Species Accounts

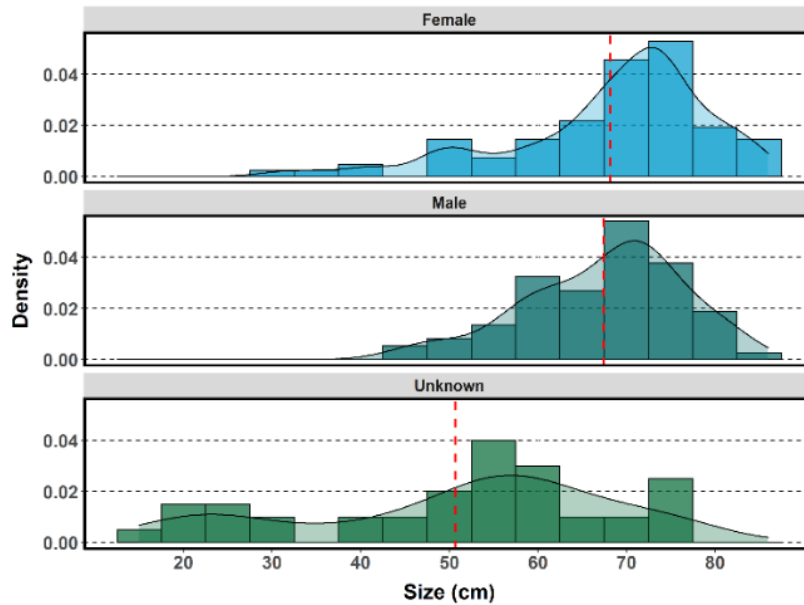


Figure 12. Size distribution of Painted Ray in 2018-2019 survey data. The mean size by sex is shown in red.

Spatial Distribution

Concentrations of painted ray occurred in shallow waters of Tralee and Brandon Bays and in outer Dingle bay (Figure 13). It was caught in a total of 53 of 158 net hauls carried out during the surveys.

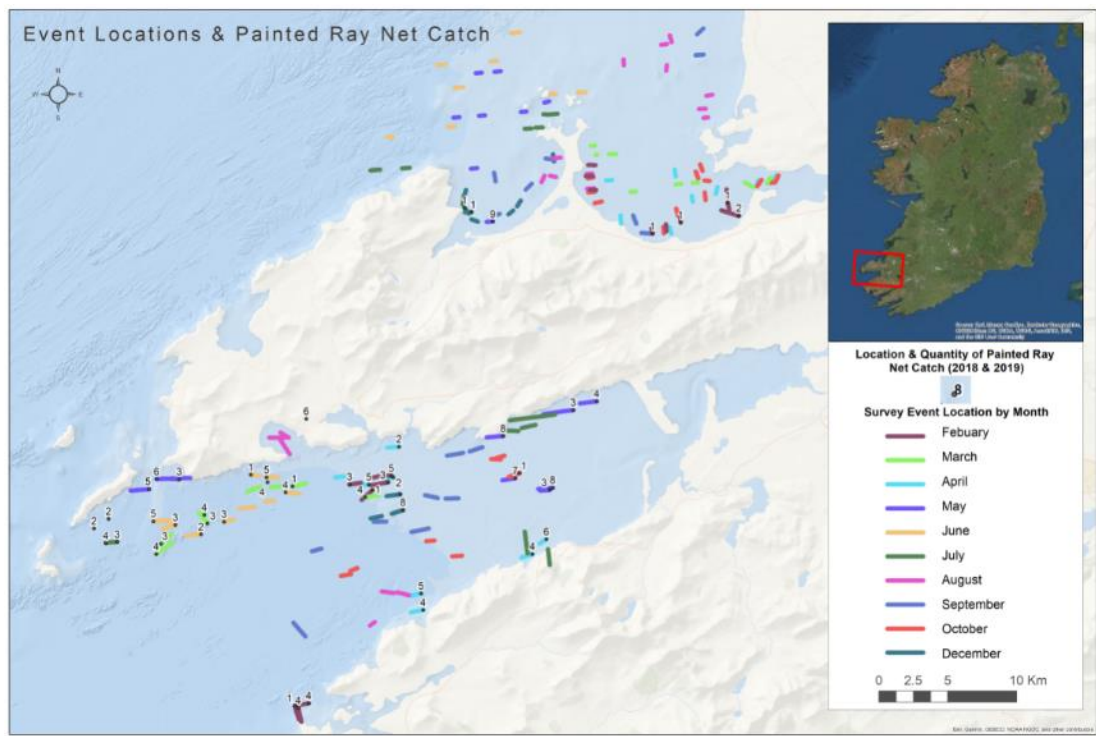


Figure 13. Location of net hauls and quantity of Painted Ray per net haul in Dingle, Brandon and Tralee Bays. Survey net hauls are colour coded by month

Species Accounts

Relative Abundance by Month

Catch rates of painted ray to the south west of Ireland vary between 0 to 3 fish per haul (Figure 14). After recording the highest abundance value in May (~3 fish per haul), catches decreased to zero fish per haul in August. A smaller peak was recorded in December (~2 fish per haul). Surveys did not occur for January and October.

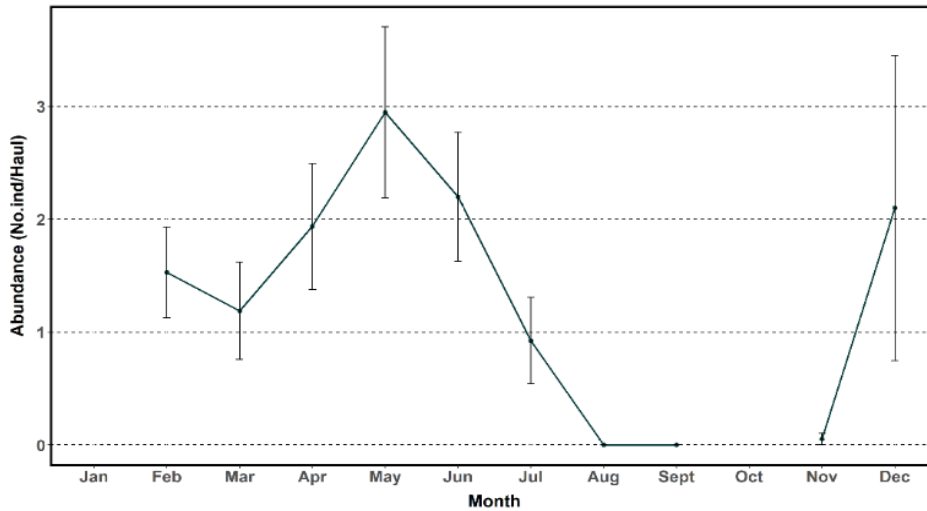
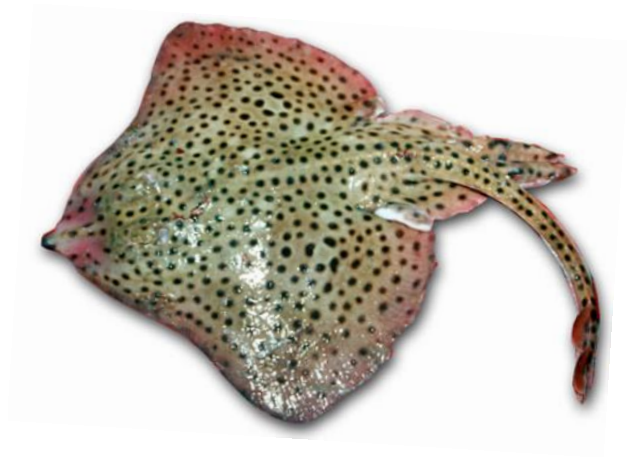


Figure 14. Monthly relative abundance of Painted Ray in 2018-2019 survey data. Bars shown standard errors.

Species Accounts

Spotted Ray - *Raja montagui*



Biology and Life History

Kingdom: Animalia > **Phylum:** Chordata > **Class:** Elasmobranchii >
Order: Rajiformes > **Family:** Rajidae > **Genus:** *Raja* > **Species:** *Raja montagui*

Spotted Ray is a small-bodied, diamond shaped species and is one of the most common ray species in Irish Waters. It is widely distributed within the Northeast Atlantic and Mediterranean. In the Northeast Atlantic, it tends to occur in inshore waters and shallow shelf seas, in depths of 8 - 283m, although it is most abundant in waters less than 100m. Juveniles tends to inhabit shallow sandy inshore areas with adults further offshore on sand or sand-gravel substrates. In the Irish Sea the length and age at 50% maturity for males and females was reported as 53.7 and 57.4cm TL and 3.4 and 4.1 years, respectively. Maximum age is reported to be 18 years. It is oviparous, with females laying between 25-60 eggs during summer.

Conservation Status

Species	IUCN Global Redlist	Irish Redlist	European Redlist	NE Atlantic Redlist
Spotted Ray	Least concern	Least concern	Least concern	Least concern

Size Distribution

Female modal and mean size was smaller than that of males (Figure 15) and size ranged from 36-60 cm in females and 36-77 cm in males. Two of the 4 females caught were above the maturity size (57.4 cm). Approximately 83% of male were above the maturity size (53.7 cm).

Species Accounts

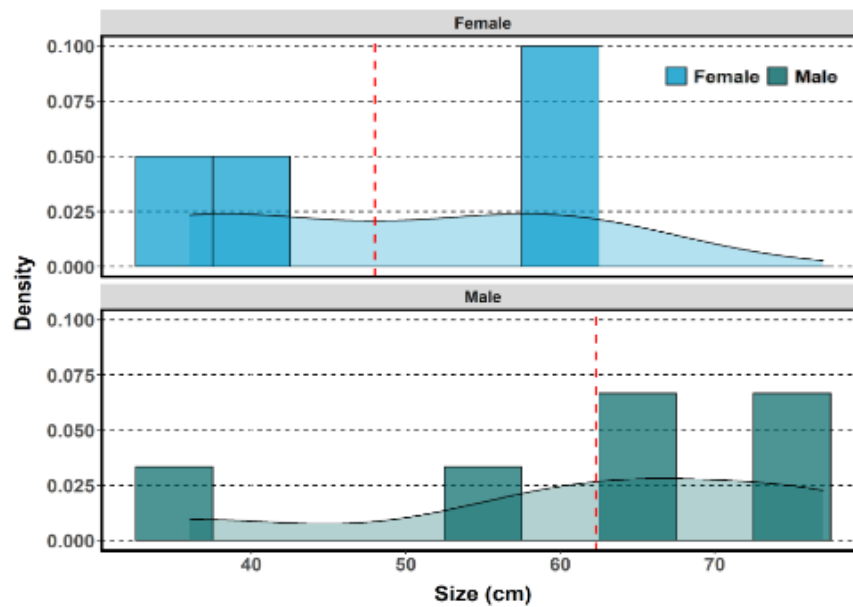


Figure 15. Size distribution of Spotted Ray in 2018-2019 survey data. The mean size by sex is shown in red

Spatial Distribution

Spotted Ray were captured in Brandon Bay and north west of Brandon and in north of Dingle Bay (Figure 16).

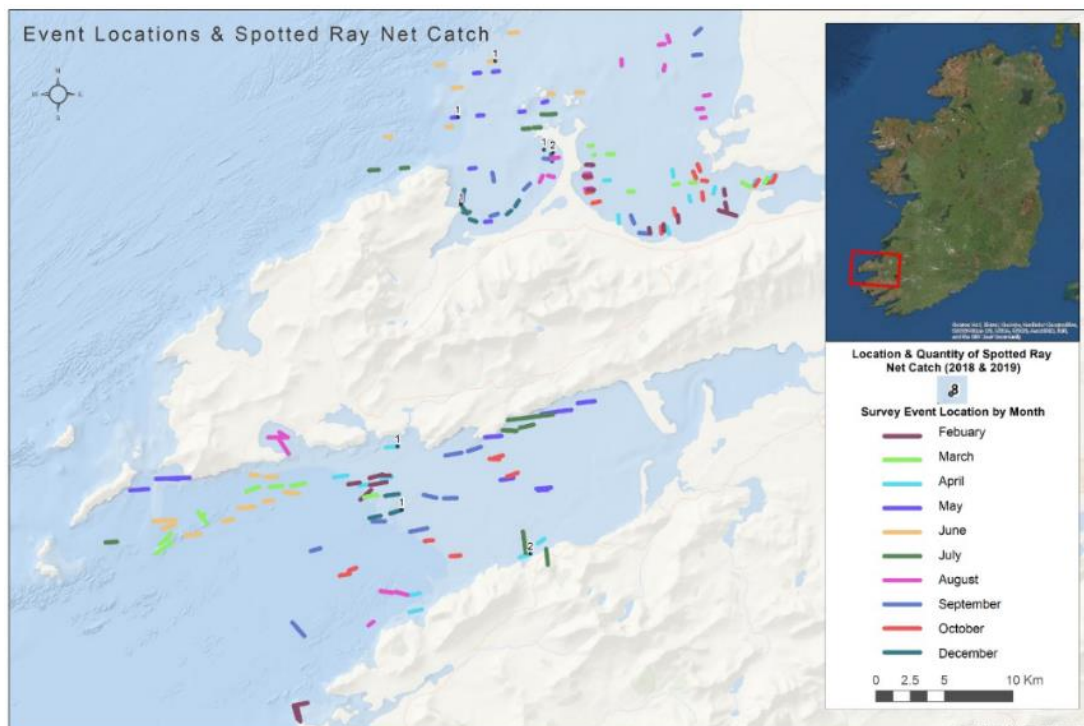


Figure 16. Location of net hauls and quantity of Spotted Ray per net haul in Dingle, Brandon and Tralee Bays. Survey net hauls are colour coded by month

Species Accounts

Relative Abundance by Month

Catch rates were low and most Spotted Ray were captured in April-July (Figure 17) (~1 fish per haul). No captures occurred in February-March or August-November.

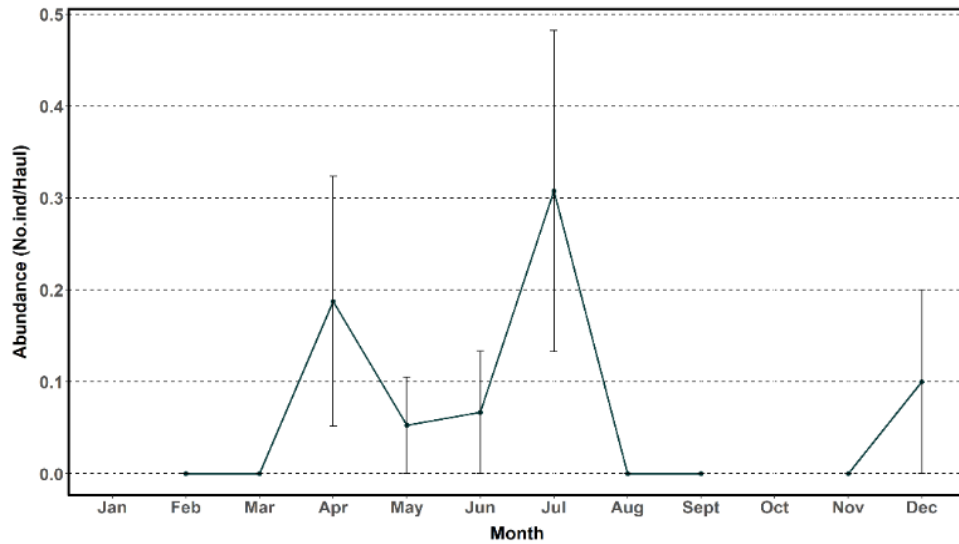


Figure 17. Monthly relative abundance of Spotted Ray in 2018-2019 survey data. Bars shown standard errors.

Species Accounts

Blonde Ray - *Raja brachyura*



Biology and Life History

Kingdom: Animalia > **Phylum:** Chordata > **Class:** Elasmobranchii >
Order: Rajiformes > **Family:** Rajidae > **Genus:** *Raja* > **Species:** *Raja brachyura*

The Blonde Ray is mainly found in the Northeast Atlantic and is considered rare in the Mediterranean, where it is often confused with other congeneric species such as *R. asterias* and *R. montagui*. It is relatively common in the inshore and shelf waters (down to about 150m) in the English Channel and Irish Sea, Bristol Channel and St George's Channel. It is a demersal species found on sandy and sand-rock bottoms at depths from 14 - 146m. In the Irish Sea the length and age at 50% maturity for males and females is reported to be 82 cm and 84 cm total length and 4.6 and 5.5 years, respectively. It is oviparous, spawning mainly from February to August. Mature females lay about 30 egg-cases per annum.

Conservation Status

Species	IUCN Global Redlist	Irish Redlist	European Redlist	NE Atlantic Redlist
Blonde Ray	Near threatened	Near threatened	Near threatened	Near threatened

Size Distribution

Female modal size was smaller than male modal size (Figure 18). Size ranged from 37-98 cm in females and 19-87 cm in males. Only 25% of females and 10% of males were above the maturity size (84 cm and 82 cm respectively).

Species Accounts

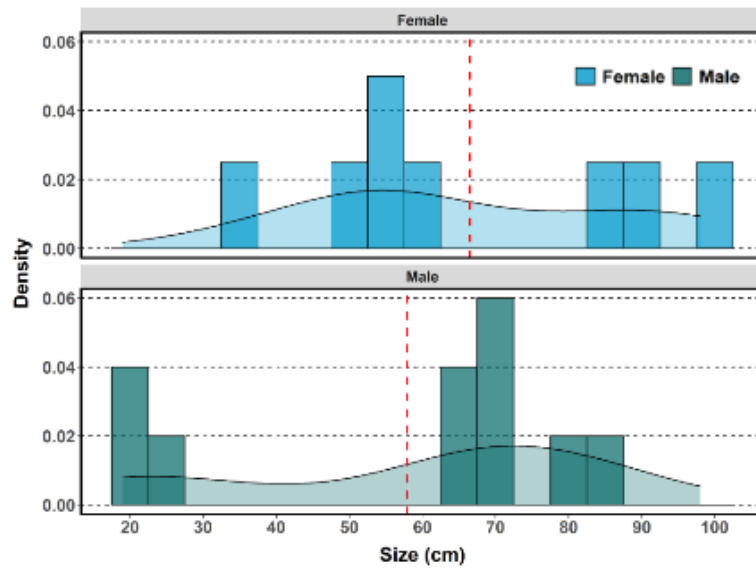


Figure 18. Size distribution of Blonde Ray in 2018-2019 survey data. The mean size by sex is shown in red.

Spatial Distribution

Blonde Ray was caught in a total of 9 of a total of 158 net hauls carried out during the survey. These occurred in outer Brandon and Dingle Bays (Figure 19).

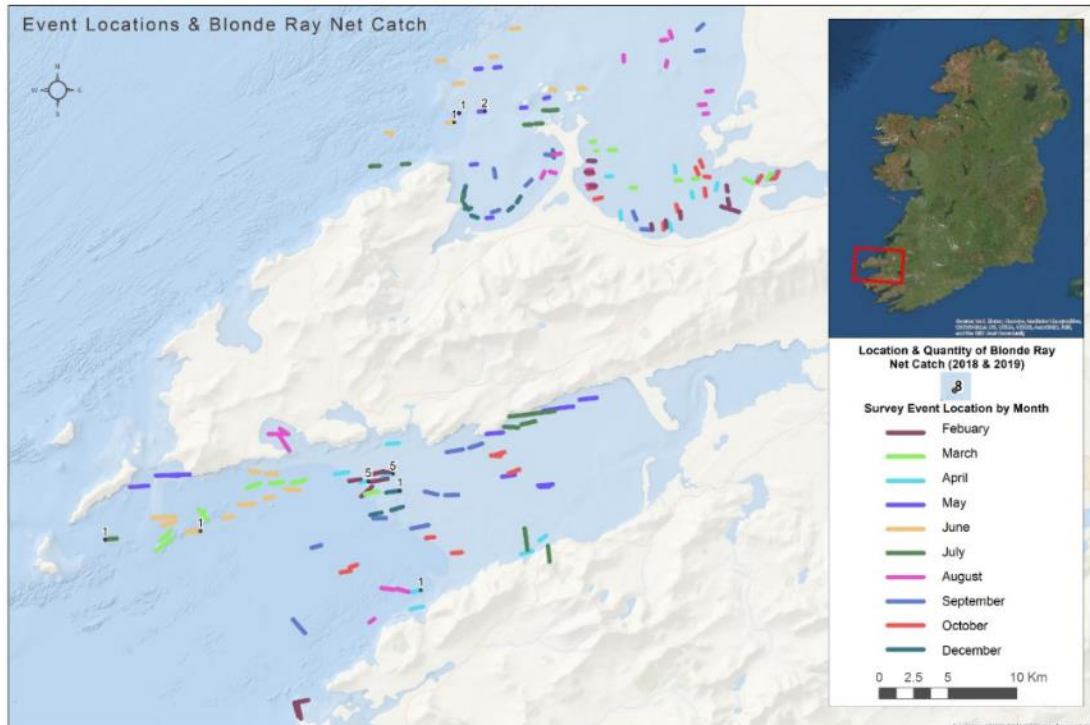


Figure 19. Location of net hauls and quantity of Blonde Ray per net haul in Dingle, Brandon and Tralee Bays. Survey net hauls are colour coded by month.

Species Accounts

Relative Abundance by Month

Catch rates of Blonde Ray varied between 0 to 1 fish per haul (Figure 20). Apart from a peak in abundance observed in April (~1 fish per haul), survey catch rates were low between May-July and December. No catches occurred in February-March and August-September.

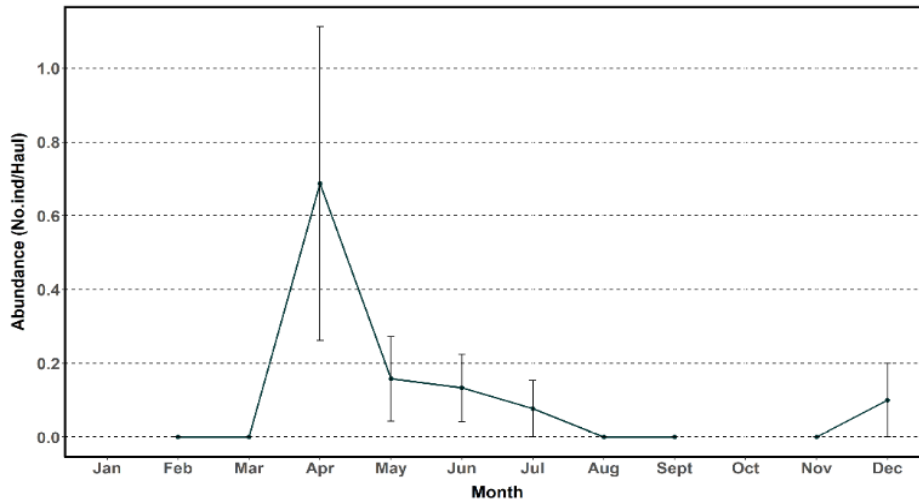


Figure 20. Monthly relative abundance of Blonde Ray in 2018-2019 survey data. Bars shown standard errors

Species Accounts

Common Skate – *Dipturus batis*



Biology and Life History

Kingdom: Animalia > **Phylum:** Chordata > **Class:** Elasmobranchii >
Order: Rajiformes > **Family:** Rajidae > **Genus:** *Dipturus* > **Species:** *Dipturus spp*

Since 2010 species previously reported as *D. batis* was recognised as two separate species of *Dipturus* – provisionally *D. cf. flossada* (smaller-bodied, blue skate) and *D. cf. intermedia* (larger-bodied, flapper skate). Two species are now recognised; *Dipturus batis* (common skate) and *Dipturus intermedius* (flapper skate). Historical life history data are confounded by misidentification and taxonomic issues. *D. batis* was historically common over large areas of coastal, continental and insular shelf water of the Northeast Atlantic, from Madeira and the coast of northern Morocco in the south, to Iceland in the north. The bathymetric ranges of the *Dipturus spp* are poorly known generally, as is their western distribution ranges, but Blue skate has been taken from depths between 54 and 422m. *Dipturus* species are susceptible to exploitation due to their large size, aggregating behaviour, low productivity and late age at maturity. The length at 50% maturity is estimated to be 115 cm and 123 cm total length for males and females, respectively. The age at 50% maturity is estimated as 11 years.

Conservation Status

Species	IUCN Global Redlist	Irish Redlist	European Redlist	NE Atlantic Redlist
Common Skate	Critically endangered	Critically endangered	Critically endangered	Critically endangered

Size Distribution

Although one individual of *D. batis* was caught during this period time, size values and sex identification were not recorded.

Species Accounts

Spatial Distribution

Spatial distribution shows catches of Common Skate in shallow waters of the Brandon Bay (Figure 21). Common skate was caught in 1 of the 158 tows carried out during the survey.

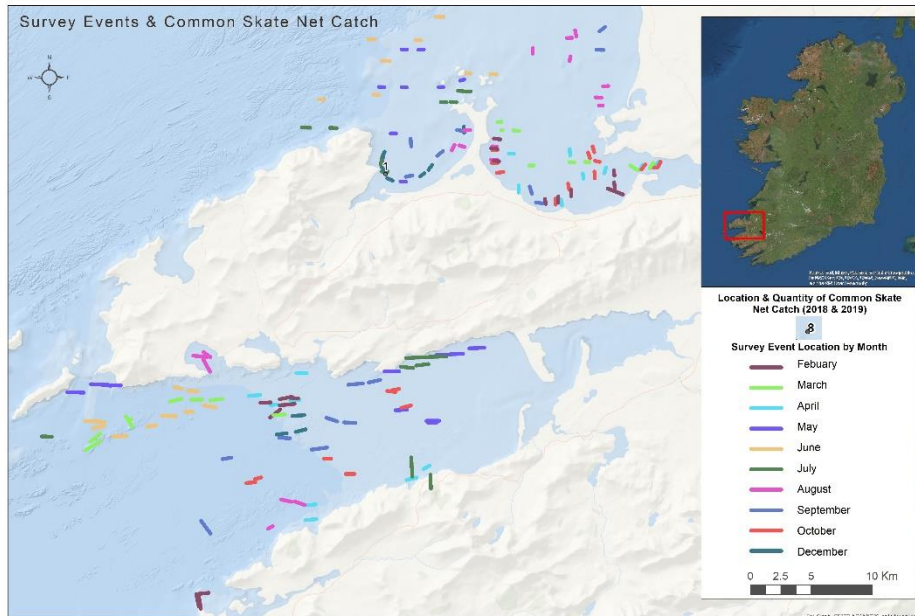


Figure 21. Location of net hauls and quantity of Common Skate per net haul in Dingle, Brandon and Tralee Bays. Survey net hauls are colour coded by month.

Relative Abundance by Month

Common skate species were only caught during July ().

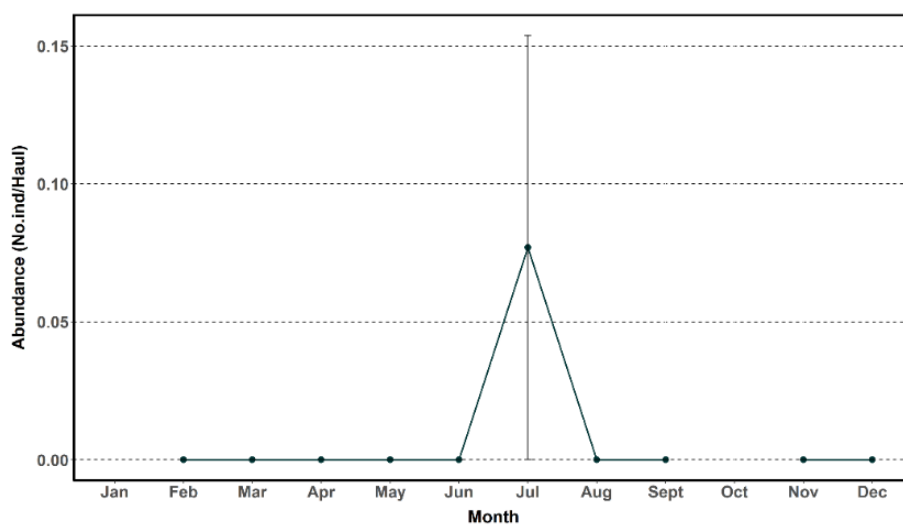


Figure 22. Monthly relative abundance of Common Skate in 2018-2019 survey data. Bars shown standard errors

Species Accounts

Flapper Skate – *Dipturus intermedius*



Biology and Life History

Kingdom: Animalia > **Phylum:** Chordata > **Class:** Elasmobranchii >
Order: Rajiformes > **Family:** Rajidae > **Genus:** *Dipturus* > **Species:** *Dipturus intermedius*

Since 2010 species previously reported as *D. batis* was recognised as two separate species of *Dipturus* – provisionally *D. cf. flossada* (smaller-bodied, blue skate) and *D. cf. intermedia* (larger-bodied, flapper skate). Two species are now recognised; *Dipturus batis* (common skate) and *Dipturus intermedius* (flapper skate). These two species differ in size and general distribution, with the flapper skate being considerably larger and with a more coastal affinity. The historical geographical range of *Dipturus* spp. may have covered much of the continental shelf of the North-east Atlantic, from Madeira and the coast of northern Morocco in the south, to Iceland in the north. At the start of the twentieth century it was considered to have a wide distribution over the shallower waters of the continental shelf surrounding the British Isles, albeit more common in western regions. Based on records of egg cases of *Dipturus* spp Tralee and Dingle Bays are nursery areas. The length at 50% maturity is estimated to be 185 and 197cm total length for male and females, respectively. The age at 50% maturity is estimated as 19-20 years. The maximum length is 229cm. It is oviparous, with egg cases being laid in spring/summer.

Conservation Status

Species	IUCN Global Redlist	Irish Redlist	European Redlist	NE Atlantic Redlist
Common Skate	Critically endangered	Critically endangered	Critically endangered	Critically endangered

Species Accounts

Size Distribution

The size of two female skate measured was 135cm and 105cm. No males were recorded (Figure 23).

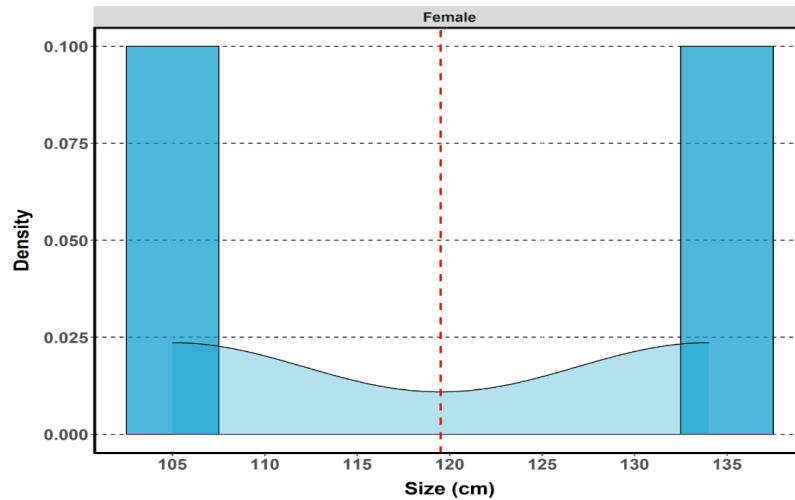


Figure 23. Size distribution of Flapper Skate in 2018-2019 survey data. The mean size by sex is shown in red

Spatial Distribution

Flapper skate was caught in a total of 3 of a total of 158 net hauls carried out during the survey. These occurred in inner Tralee Bay, Brandon Bay and in deeper water north west of the Dingle peninsula (Figure 24).

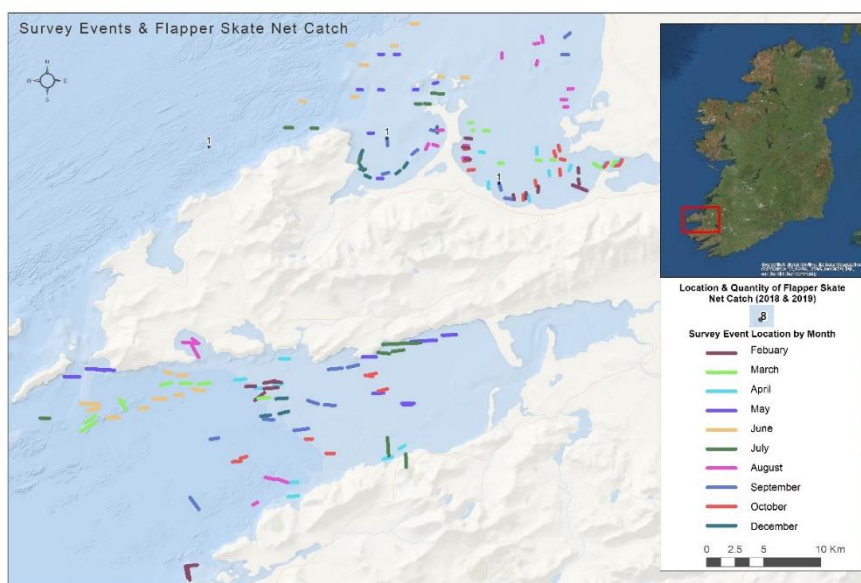


Figure 24. Location of net hauls and quantity of Flapper Skate per net haul in Dingle, Brandon and Tralee Bays. Survey net hauls are colour coded by month.

Species Accounts

Relative Abundance by Month

Flapper skate species were only captured in June and September (~1 fish per haul) (Figure 25). Not catches occurred in February-May, July-August and November-December.

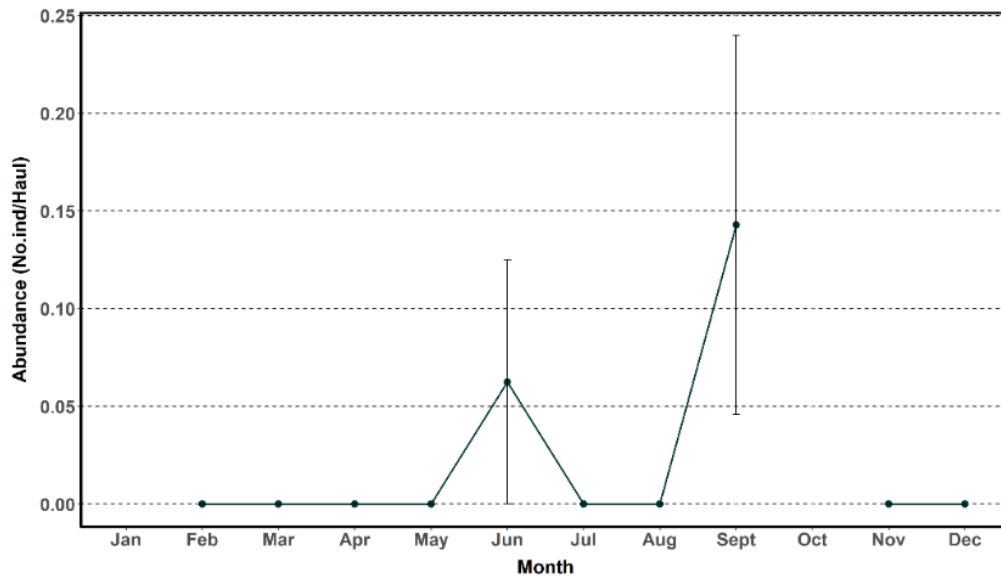


Figure 25. Monthly relative abundance of Flapper Skate in 2018-2019 survey data. Bars shown standard errors.

Species Accounts

Angel shark – *Squatina squatina*



Biology and Life History

Kingdom: Animalia > **Phylum:** Chordata > **Class:** Elasmobranchii > **Order:** Squatiniformes > **Family:** Squatinidae > **Genus:** *Squatina* > **Species:** *Squatina Squatina*

The Angel Shark is a medium bodied shark which has a skate-like appearance. It inhabits sandy and muddy bottoms, ranging from the shallow subtidal zone (5m) to depths of 100m. Its distribution formerly covered the Atlantic coast of Europe from Ireland and Britain to Morocco, the Canary Is, the Mediterranean coasts of Europe, Africa and the Levant, and the Black Sea but the area occupied is now extremely limited and fragmented. In terms of recent information on their habitats, small specimens have been reported in Cardigan Bay (summer) and the west coast of Ireland (Tralee Bay and Clew Bay). These areas may be important "summer areas" for the species. The maximum authenticated total length (TL) of *S. squatina* is 183cm (for males) and 244cm (for females). Angel sharks are ovoviparous (give birth to live young), producing 7-25 embryos (20-30cm TL) during December to February in the Mediterranean and later in the eastern North Atlantic. Its gestation period is 10 months, but the reproductive cycle may be two (or more) years.

Conservation Status

Species	IUCN Global Redlist	Irish Redlist	European Redlist	NE Atlantic Redlist
Angel Shark	Critically endangered	Critically endangered	Critically endangered	Critically endangered

Size Distribution

A male of 126 cm and a female of 135 cm were captured during the survey (). Two other Angel Shark that were captured were not measured.

Species Accounts

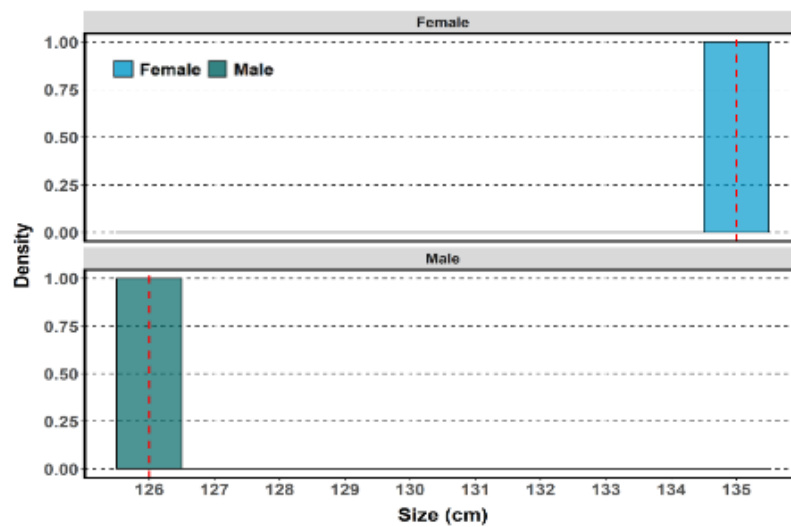


Figure 26. Size distribution of Angel Shark in 2018-2019 survey data. The mean size by sex is shown in red.

Spatial Distribution

Squatina squatina was caught in a total of 4 tows out of the 158 tows carried out during the survey (Figure 27). Three were captured in shallow water close to the coast in inner Tralee Bay and a fourth was caught in deeper water north of Tralee Bay.

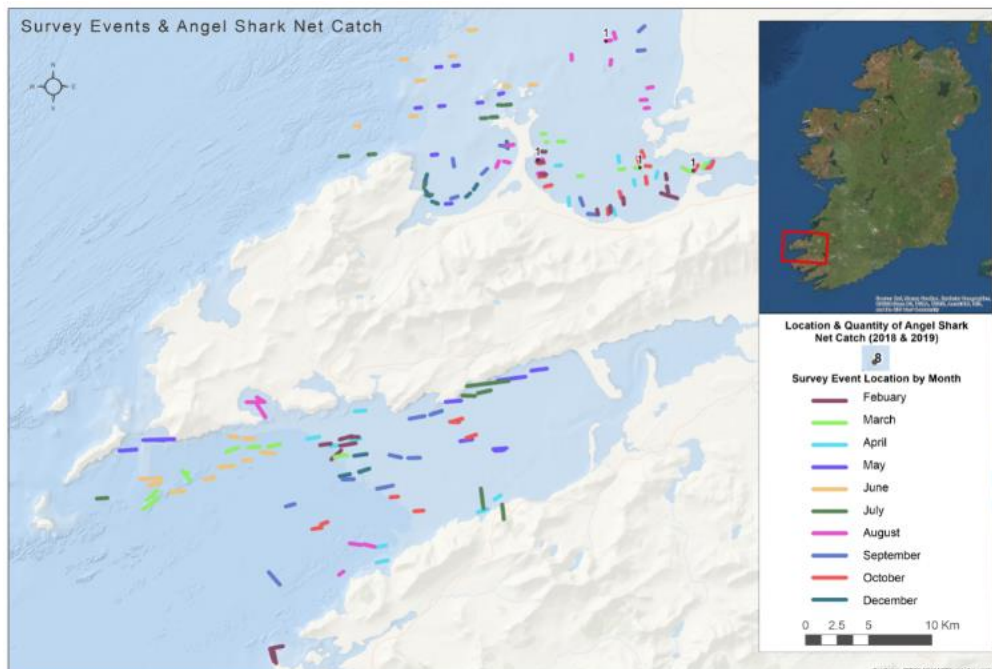


Figure 27. Location of net hauls and quantity of Angel Shark per net haul in Dingle, Brandon and Tralee Bays. Survey net hauls are colour coded by month.

Species Accounts

Relative Abundance by Month

Angel Shark were caught during the surveys in March, April and August (Figure 28).

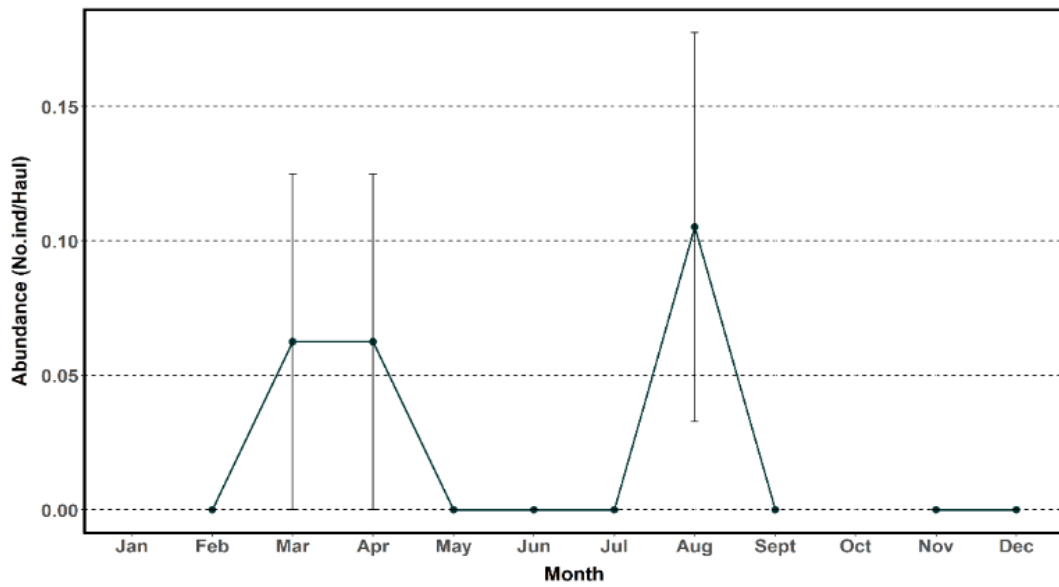


Figure 28. Monthly relative abundance of Angel Shark in 2018-2019 survey data. Bars shown standard errors.

Species Accounts

Spurdog – *Squalus acanthias*



Biology and Life History

Kingdom: Animalia > **Phylum:** Chordata > **Class:** Elasmobranchii > **Order:** Squaliformes > **Family:** Squalidae > **Genus:** *Squalus* > **Species:** *Squalus acanthias*

Spurdog is a small, temperate, coastal shark species with a circum-global distribution. In Irish waters, the Spurdog belongs to the northeast Atlantic population, which stretches from Portugal to Norway, including the North Sea. It is found in inshore and offshore waters over the continental shelf to depths of 900 m. This is a benthopelagic species. It is not known to associate with any particular habitat and is tolerant of a wide range of salinities. In the Northeast Atlantic, spurdog mature at 74 cm to 92cm (females) and 57 cm to 64cm (males). The maximum age is at least 40 years. Mating typically occurs in offshore waters with fertilization occurring internally. This is followed by ovoviparous development. The gestation period ranges from 18 to 25 months. The embryonic development starts in November. The length at birth ranges from 19-31cm and pupping occurs from late August to December.

Conservation Status

Species	IUCN Global Redlist	Irish Redlist	European Redlist	NE Atlantic Redlist
Spurdog	Endangered	Vulnerable	Endangered	Critically endangered

Size Distribution

Size ranged from 98 to 129 cm (Figure 29). Individuals recorded on the survey were not identified as male or female although they seem to be above the maturity size established; 74 cm to 92cm (females) and 57 cm to 64cm (males).

Species Accounts

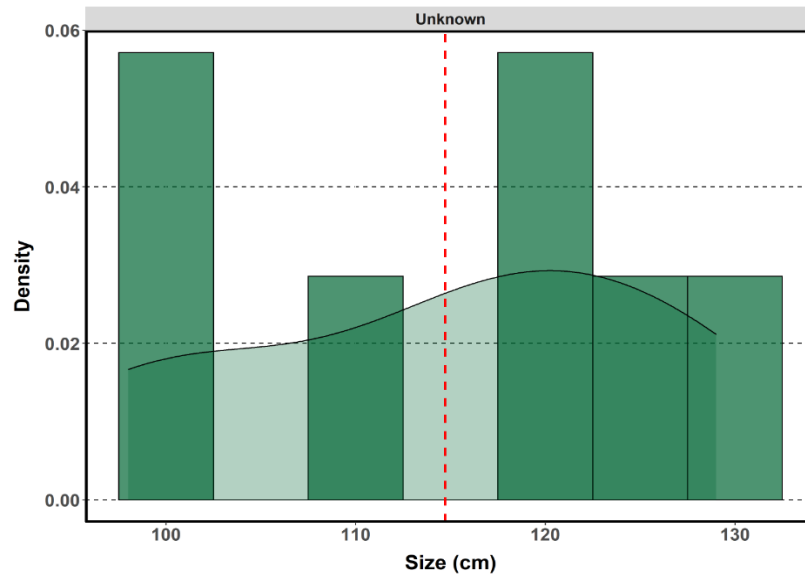


Figure 29. Size distribution of Spurdog in 2018-2019 survey data. The mean size by sex is shown in red.

Spatial Distribution

Spurdog was caught in a total of 3 of 158 net hauls during the survey along the south shore of Dingle Bay (Figure 30).

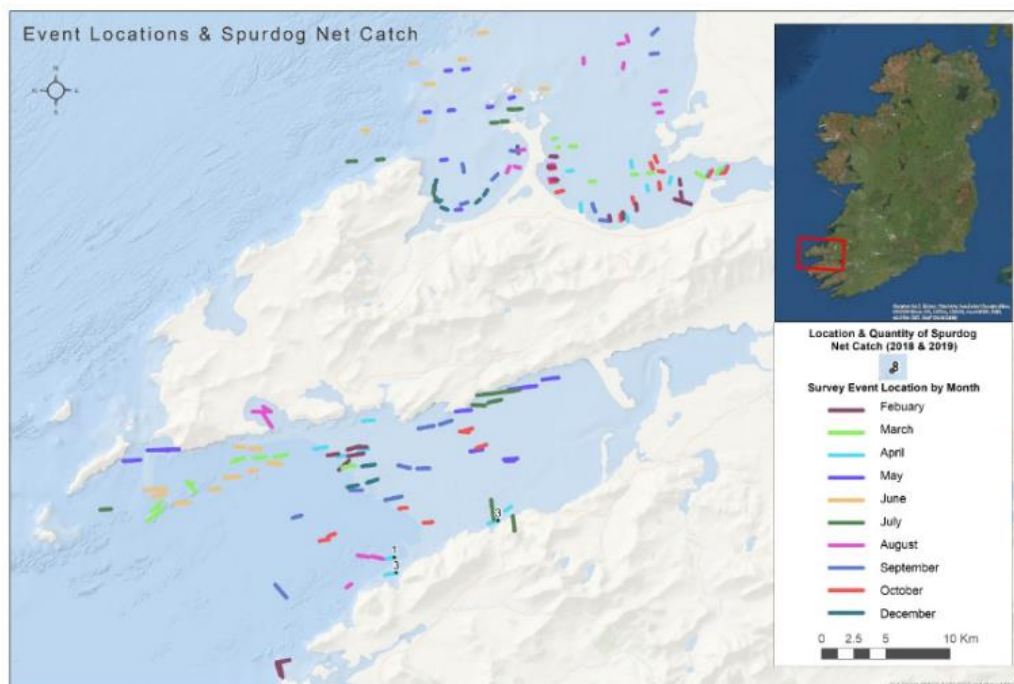


Figure 30. Location of net hauls and quantity of Spurdog per net haul in Dingle, Brandon and Tralee Bays. Survey net hauls are colour coded by month.

Species Accounts

Relative Abundance by Month

Spurdog were only captured in April (Figure 31).

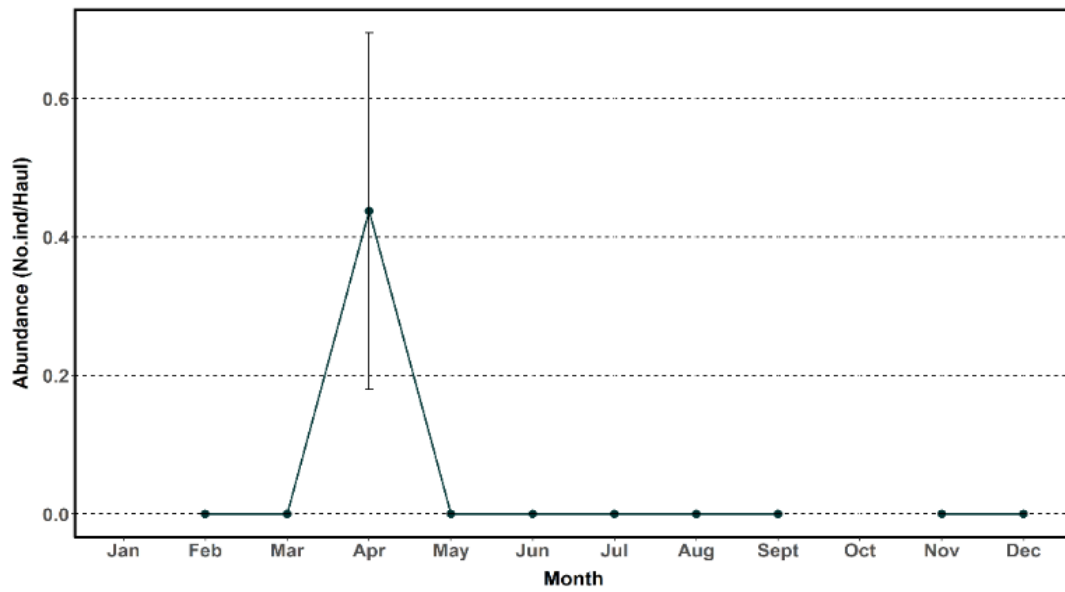


Figure 31. Monthly relative abundance of Spurdog in 2018-2019 survey data. Bars shown standard errors.

Species Accounts

Tope – *Galeorhinus galeus*



Biology and Life History

Kingdom: Animalia > **Phylum:** Chordata > **Class:** Elasmobranchii > **Order:** Carcharhiniformes > **Family:** Tryakidae > **Genus:** *Galeorhinus* > **Species:** *Galeorhinus galeus*

The Tope shark is widespread in the eastern Atlantic, ranging from Iceland and Norway to South Africa, including the Mediterranean Sea. It also occurs off Australia and New Zealand, the southwest Atlantic (Brazil to Argentina) and the eastern Pacific. It is mainly demersal on continental and insular shelves, but also on the upper slopes, at depths from near shore to 550 m but has been shown to be pelagic in the open ocean. The maximum reported length in the northeast Atlantic area was 169cm TL for a female in the North Sea. The length at maturity of this species in the Northeast Atlantic is 155 cm for females and 121cm for males. On this basis the age at 50% maturity is estimated as 21 years for females and 12 years for males. Longevity of tope in the Northeast Atlantic is estimated to be 55 years. This species is ovoviviparous without a yolk sac placenta. After an approximately year-long gestation period, the females move into shallow estuaries and bays to give birth. Each pup measures 30-35 cm in length. The pups remain in the shallow nursery areas for one to two years before moving offshore.

Conservation Status

Species	IUCN Global Redlist	Irish Redlist	European Redlist	NE Atlantic Redlist
Tope	Vulnerable	Vulnerable	Vulnerable	Data deficient

IUCN status assessment: Ireland: Vulnerable. **NE Atlantic:** Vulnerable. **Global:** Vulnerable.

Size Distribution

Two individuals of *Tope* were caught during the survey but only one was measured at 104 cm (Figure 32). Sex identification was not recorded for either.

Species Accounts

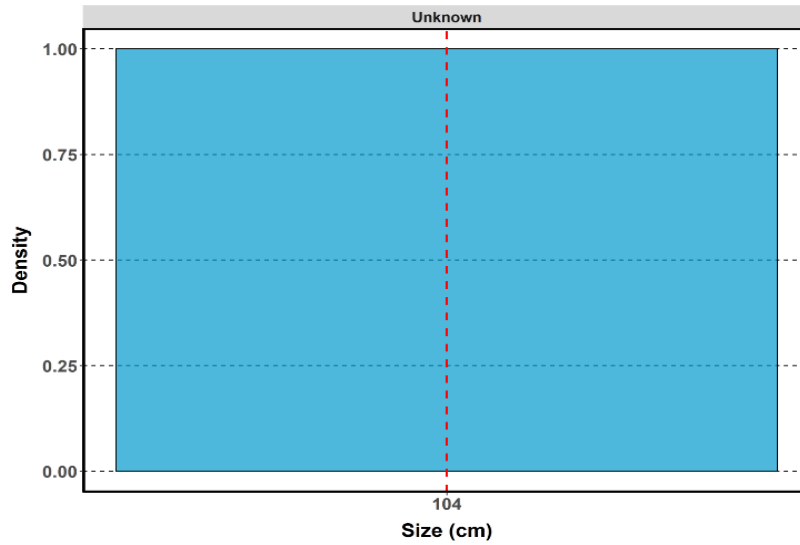


Figure 32. Size distribution of Tope in 2018-2019 survey data. The mean size by sex is shown in red.

Spatial Distribution

Tope was caught in a 2 of 158 net hauls taken during the surveys. Both were in Dingle Bay (Figure 33).

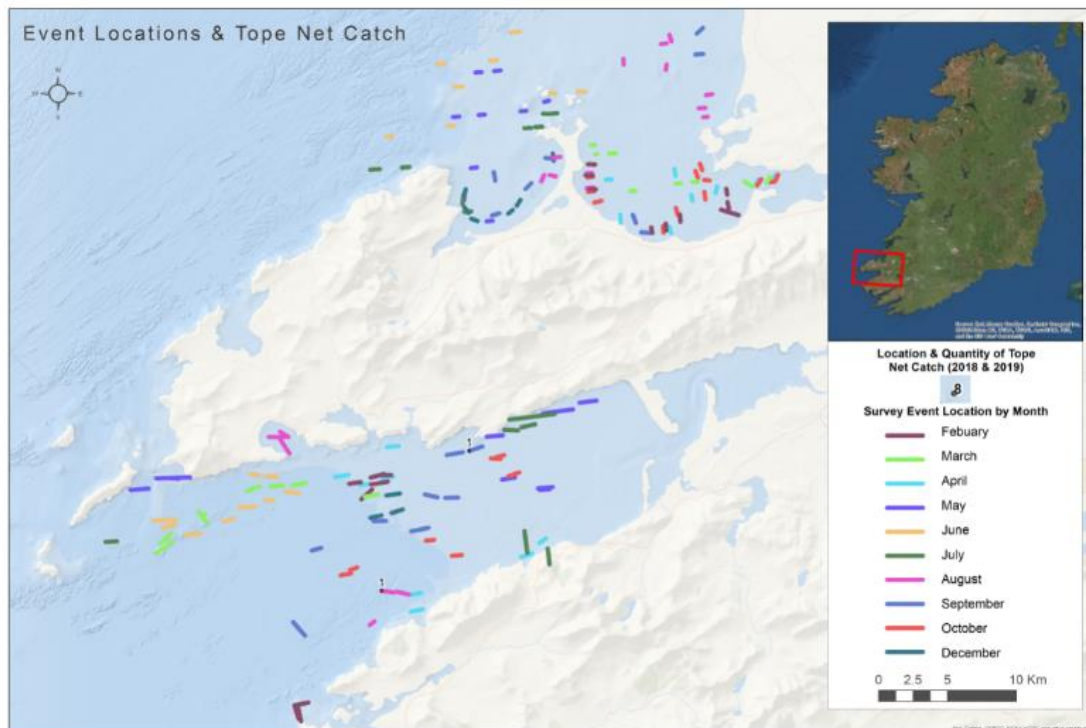


Figure 33. Location of net hauls and quantity of Tope per net haul in Dingle, Brandon and Tralee Bays. Survey net hauls are colour coded by month.

Species Accounts

Relative Abundance by Month

Tope was only caught in August and September (Figure 34).

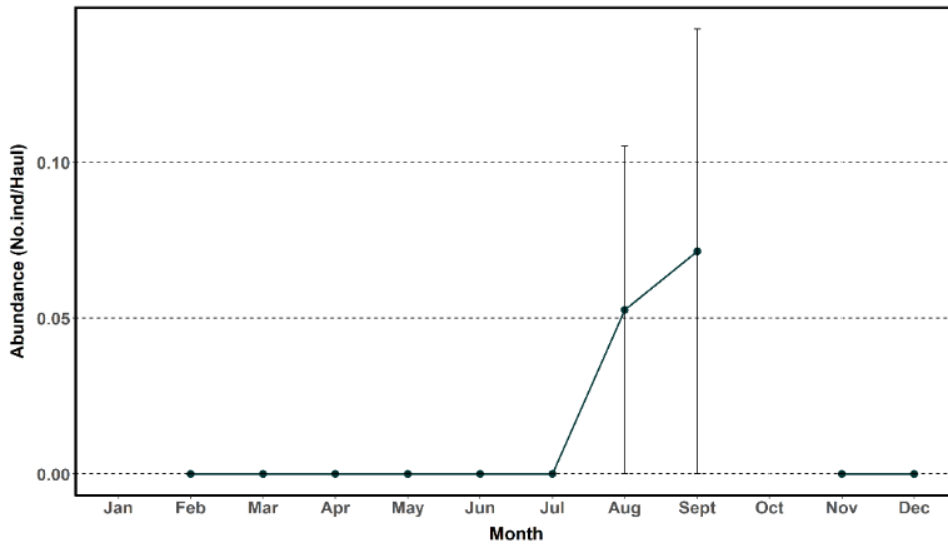


Figure 34. Monthly relative abundance of Tope in 2018-2019 survey data. Bars shown standard errors.

Species Accounts

Greater spotted dogfish – *Scyliorhinus stellaris*



Biology and Life History

Kingdom: Animalia > **Phylum:** Chordata > **Class:** Elasmobranchii >
Order: Carcharhiniformes > **Family:** Scyliorhinus > **Genus:** *Scyliorhinus* >
Species: *Scyliorhinus stellaris*

Great Spotted Dogfish is mainly found around the coasts of Ireland and Britain, the southern North Sea to Morocco and throughout the Mediterranean. It is a demersal species generally found from shallow water to depths of about 125 m but is commonest in depths of 20 to 65 m. It often occurs on rough or rocky bottoms, including areas with algal cover (e.g. kelp forests). This medium bodied shark reaches 130-162cm TL. Females mature at about 79 cm and male at 77 cm. It is an egg laying species. Egg-cases of *S. stellaris* are deposited on algae in the subtidal or extreme lower intertidal in spring and summer and may take 9 months to hatch. Size at hatching about 16 cm.

Conservation Status

Species	IUCN Global Redlist	Irish Redlist	European Redlist	NE Atlantic Redlist
Tope	Vulnerable	Vulnerable	Vulnerable	Data deficient

Size Distribution

Although two individuals of *S. stellaris* were caught during this period time, size values and sex identification were not recorded.

Spatial Distribution

Greater Spotted Dogfish was caught in a total of 1 of 158 net hauls during the surveys (Figure 35).

Species Accounts

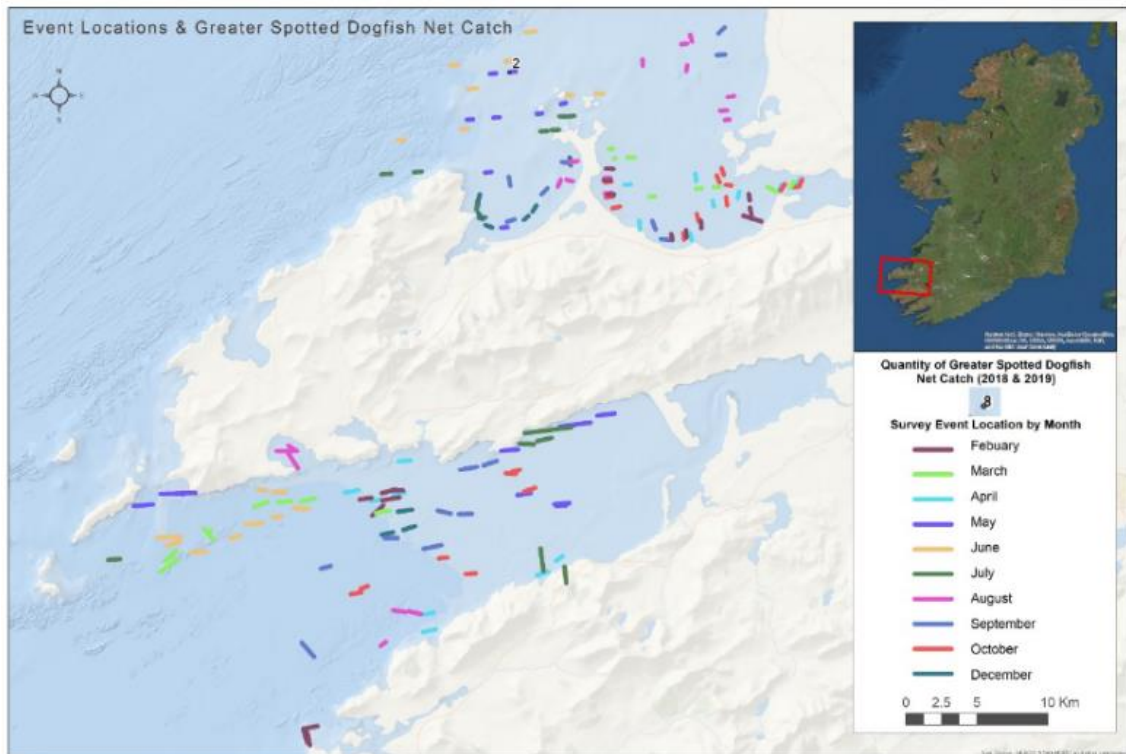


Figure 35. Location of net hauls and quantity of Greater Spotted Dogfish per net haul in Dingle, Brandon and Tralee Bays. Survey net hauls are colour coded by month.

Relative Abundance by Month

Survey catch rates of greater spotted dogfish to the south west of Ireland show zero or very low abundance (Figure 36). This species was only caught in May. Non-existent catches for the rest of the monthly surveys carried out during this period time. Surveys did not occur for January and December.

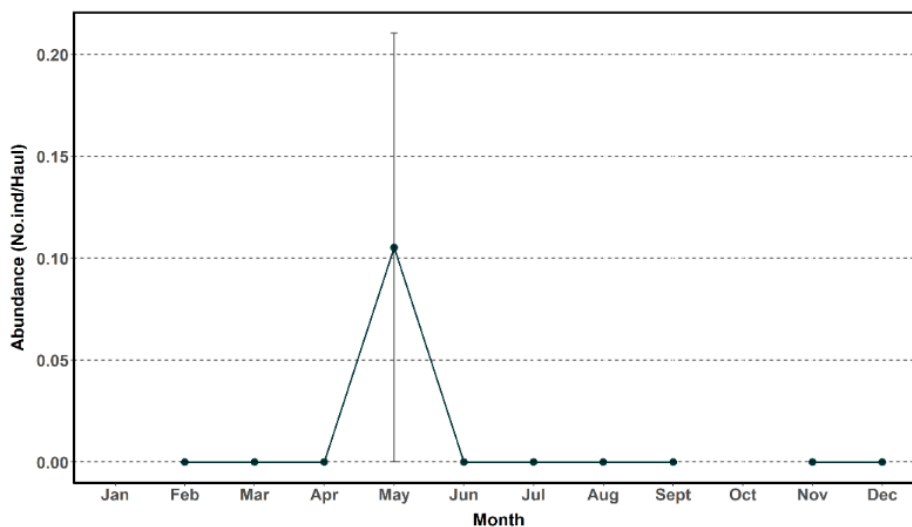


Figure 36. Monthly relative abundance of Greater Spotted Dogfish in 2018-2019 survey data. Bars shown standard errors.

Species Accounts

Acknowledgements

The surveys were carried out by Skippers Peter Hennessy and crew on the MFV Lady K and by Michael Hennessy and crew on the MFV Realt na Mara. Eugene Farrelly worked as observer on the Lady K. Troy Francis worked as observer on the Realt na Mara.

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Species Accounts

Further details available on www.emff.marine.ie

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