Manx Wildlife Trust
Treisht Bea-Feie Vannin

The Isle of Man Shark Tagging Programme

End of Year Report 2024

Written for:

The Department of Environment, Food and Agriculture (DEFA)

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Introduction

The Small Shark Tagging Programme in the Isle of Man has been operating since May 2013, with the Manx Wildlife Trust (MWT) working in partnership with the Department of Environment, Food and Agriculture (DEFA) to collect data. Sharks, rays and skates are currently subject to multiple threats from fisheries and harvest, including small-scale subsistence fishing, large scale harvesting and unintentional bycatch. These species are therefore protected in many jurisdictions. However, little is known about the distribution, movement or population sizes of these cryptic species in Manx waters. The Small Shark Tagging Programme aims to work with local anglers to tag small sharks and rays with identification tags or streamers, on a catch and release basis. It is hoped the data will provide much needed information on the distribution and numbers of these small shark populations. Going forward, this fundamental understanding is crucial in providing effective and evidence-based data for the future management of these species and the best ways to protect them. The present report is a continuation of this programme, summarising the findings from this year.

Since the Small Shark Tagging Programme's inception, 686 individual elasmobranchs, made up of four species, have been caught and tagged in Manx waters. These species include bull huss (*Scyliorhinus stellaris*), spurdog (*Squalus acanthias*), thornback ray (*Raja clavata*) and tope (*Galeorhinus galeus*). A key success of the programme is the recapture of seven tagged tope, highlighting the mobile nature of these sharks and the need for international cooperation on their protection.

Due to the COVID-19 pandemic, the Small Shark Tagging Programme was unable to tag any small sharks or complete further training during 2020. The project resumed in 2021 and has continued in the subsequent years with further training provided. This year 8 anglers have been trained, bringing the total number of anglers trained to 103.

The Scottish Shark Tagging Programme greatly contributed to the inception of this programme and showed what can be achieved through citizen science. Although the Scottish Shark Tagging Programme disbanded in 2018, the programme was a great source of knowledge and resources to the MWT programme. This included the deployment of two officers who trained Manx local anglers in 2013 (funded by DEFA), the design of a project logo, and the annual provision of tags/tagging equipment. Then again in 2017, an officer joined MWT for further training and support. In addition, they also increased public awareness highlighting the need for shark protection, the importance of sea angler's conservation efforts, and contributed to over 26 species of sharks, skates and rays being protected in Scottish waters.

<u>Project Aims:</u>

- Promote public awareness on the importance of small shark species and the need for their protection.
- Engage with local anglers to undertake tagging and record subsequent recaptures.
- Utilise the data collected to determine the abundance and distribution of Manx small shark populations.
- Examine local threats to small shark species to inform management plans and conservation activities.

Species Overview

Bull huss

Bull huss is globally classified as 'Vulnerable' but listed as 'Near Threatened' in Europe by the IUCN Red List, with an overall decreasing population trend (Figure 1; Ellis *et al.,* 2015a; Finucci, Derrick and Pacoureau, 2021). Falling population trends are due to continuously declining numbers of mature individuals and severely fragmented populations (Finucci, Derrick and Pacoureau, 2021). Bull huss experience a high level of exploitation across the species known range, with an overall population reduction of 30% - 49% over the last 48 years (Sherley *et al.,* 2020, Winker *et al.,* 2020). Contrary to this, standardised catch-per-unit-effort (CPUE) data in the Irish Sea and Bristol Channel showed an annual rate of increase of 4.7%. Bull huss is thereby considered locally abundant with a regionally increasing population around the British Isles (ICES-WGEF, 2019).

Females lay eggs two at a time between March and October, taking between 7-12 months to hatch. Sexual maturity is attained for males at 77 cm total length (TL), and females at 79 cm TL, corresponding to an age of four years if hatchling growth rates remain constant (Capapé *et al.,* 2006). This species has a lifespan of approximately 17 - 19 years (Rodríguez-Cabello *et al.,* 2005).

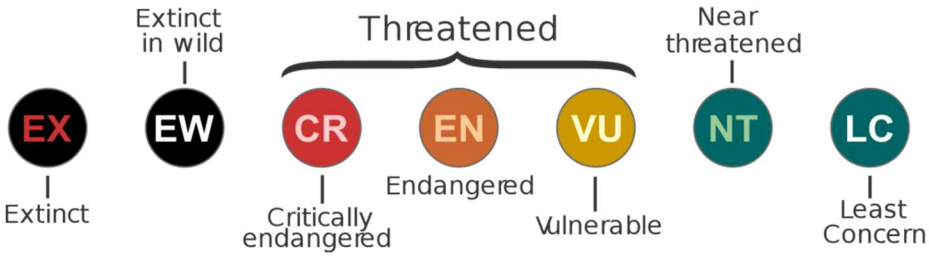

Figure 1. The IUCN Red List of Threatened Species categories.

Spurdog

Spurdog is classified as 'Vulnerable' globally by the IUCN Red List (Figure 1; Fordham *et al.,* 2016; Walker *et al.,* 2006), but 'Endangered' in Europe (Ellis *et al.,* 2015b). This assessment is based on a continuing decline in the number of mature individuals and severely fragmented populations. Population genetics has revealed little to no genetic mixing between Northern and Southern Hemisphere populations, even where stocks have overlapping geographic range mixing remains limited (Veríssimo *et al.,* 2010). Within European waters, it is suspected there are three distinct subpopulations (Northeast Atlantic, Mediterranean Sea, Black Sea; Veríssimo *et al.,* 2010). Spurdog are highly migratory, travelling in large, dense aggregations, segregated by size and sex. This aggregating behaviour makes CPUE data an unreliable indicator of population status, as a high CPUE may be maintained even when populations are severely depleted (Ellis *et al.,* 2015b).

Spurdog breed every other year (Holden and Meadows, 1962; Sosinski, 1978; Fahy, 1989), likely mating offshore in winter (Castro, 1983; Compagno, 1984), between October and February (Jones and Ugland, 2001). The central Irish Sea has been suggested as a possible key mating site (Dureuil, 2013). Females sexually mature at 74 - 92.5 cm TL and males mature at 57.5 - 64 cm TL (Henderson *et al.,* 2002). The maximum age is at least 40 years (Fahy, 1989), and fecundity increases with size (Ellis and Keable, 2008).

Thornback ray

Thornback ray is classified as 'Near Threatened', with population numbers considered stable in European waters (Ellis, 2016; Ellis *et al.,* 2016). Thornback ray is widespread and one of the more abundant elasmobranchs in the inner continental shelf seas of Europe. Scientific trawl surveys in northern European waters show that relative abundance has been stable or increasing in recent years, following long-term historical declines (McHugh *et al.,* 2011). However, catch analysis from 2000 to 2006 in the North Sea showed 38% of thornback ray were caught prior to reaching sexual maturity (64 cm/~ five years of age; Wiegand *et al.,* 2011). If current fishing patterns continue, it could result in a projected population decline of 90% within 30 years. Therefore, although research indicates that catch rates have increased in core parts of the geographic distribution, this is a recent increase following a longer-term decline.

Kadri *et al.,* (2014) found average age to be at least 15 years. The estimated size at 50% maturity for females have been estimated at 45 cm disc width (DW) and 77 cm TL (eight years), and for males at 42 cm DW and 66.6 cm TL (seven years; Walker, 1998; McCully *et al.,* 2012). This species first spawns in its fifth year (Ryland and Ajayi 1984). The fecundity in British waters has been estimated at between 100 - 140 eggs per year (Holden, 1975; Ryland and Ajayi, 1984). It may not be a continuous spawner and release around 35 eggs over four clutch episodes (Serra-Pereira *et al.,* 2011). The nursery areas used are coastal areas (e.g., the Wash and Thames estuary in the UK).

Tope

Tope is classified as 'Critically Endangered' globally but listed as 'Vulnerable' in Europe by the IUCN Red List, with an overall decreasing population trend (Figure 1; Walker *et al.,* 2020; McCully, Dureuil and Farrell, 2015). Declining population trends have been accredited to severely fragment populations and a continuing decline of mature individuals (McCully, Dureuil and Farrell, 2015). There is believed to be a single stock of tope in the Northeast Atlantic, extending from southern Norway and Scotland, southwards to the coast of northwest Africa and the Mediterranean Sea (ICES, 2012). Tope landings throughout the Northeast Atlantic region have decreased by 83% in the past twenty years (ICES, 2011). Landings off west Scotland, the Celtic Seas and the English Channel are relatively high, but highly variable (ICES, 2012). Greater abundances of mature individuals have also been found off the northern Irish coast, the southern Irish Sea and the east coast of England (Dureuil, 2013).

This species typically occurs in schools, partially segregated by size and sex (Walker *et al.,* 2008). There is regional variation in size at maturity, in the Northeast Atlantic males mature at 121 cm TL and females mature at 155 cm TL (Dureuil, 2013). Female age-at-maturity varies from 10 - 15 years (average 12.5 years) and maximum age is estimated as 40 years (tag returns suggest a possible maximum age of 60 years; Olsen, 1954; Francis and Mulligan, 1998; Walker, 1999). Tope reproductive cycles vary regionally from annual to triennial, although studies with intensive sampling indicate triennial cycles (Walker *et al.,* 2006; Ebert, Fowler and Compagno, 2013). Average litter sizes are between 20 to 35 pups, with litter sizes increasing in larger females (Ebert, 2003). Shallow, protected bays and estuaries serve as pupping and nursery area where young remain for up to two years (Walker *et al.,* 2006; Bovcon, 2018; McMillan *et al.,* 2018).

Methodology

The project is advertised locally and experienced anglers targeting small sharks are invited to partake in the programme. In 2024, 8 anglers were trained to administer tags. Since the beginning of the programme, 103 anglers have received small shark tagging training.

All trained anglers were given a minimum landing size crib sheet, recording cards and tagging equipment (Appendix 1 and 2). Prior to tag application, the condition of each shark is visually assessed to ensure normal appearance and minimum landing size. Any injured or otherwise abnormally appearing sharks, or those below the minimum landing size, are rejected from the tagging pool. Information is recorded on the species, location, date, length, girth, sex and condition. Tagging equipment consists of a micro gun, with ten micro-tags for tagging smaller sharks. Tag equipment is replaced in small quantities when required, depending on angler's likelihood of being able to fish. An external tag with imprinted unique identification numbers is applied to each fish, which is also recorded on the recording card. Anglers are able to email tagging information directly to the MWT. The micro-tags are inserted at a 45° angle, then the trigger pushed to insert the tag. The needle is removed, and the tag lightly tugged to set the dart. Following tagging, all sharks are released alive and monitored to ensure normal post capture behaviour. Currently, the data is stored with the MWT. Previously data had also been stored with the SSTP.

Results

Sharks tagged in 2024

Two training boat trips were undertaken in 2024 seeing the practical training completed for 8 new shark taggers. A total of 112 individuals were tagged, including 5 spurdog and 107 tope (Figure 2). An additional female tope was caught and reported but was not tagged. Most individuals caught and tagged for both species were female, as shown in Figure 2.

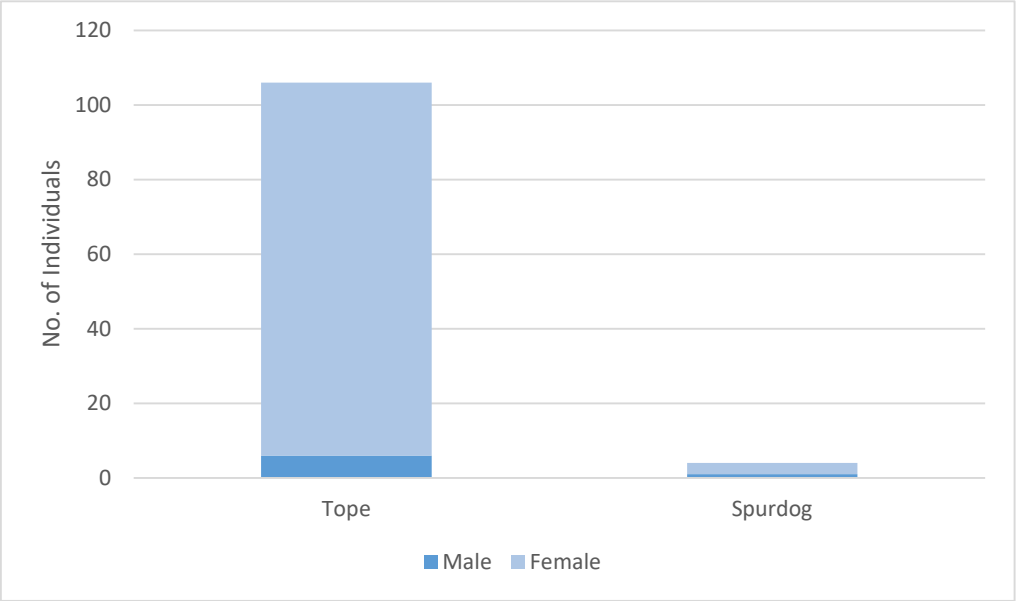

Figure 2. The number and sex of small sharks tagged in Manx waters during 2024.

The average length of spurdog was 93.00 cm (±18.1 cm), with a range of 75.00 – 110.00 cm. Tope ranged in length from 63.60 cm to 171.00 cm, with an average length of 149.64 cm

(±12.90 cm). Figure 3 shows the range and average length of tagged small sharks from 2024 (Appendix 3).

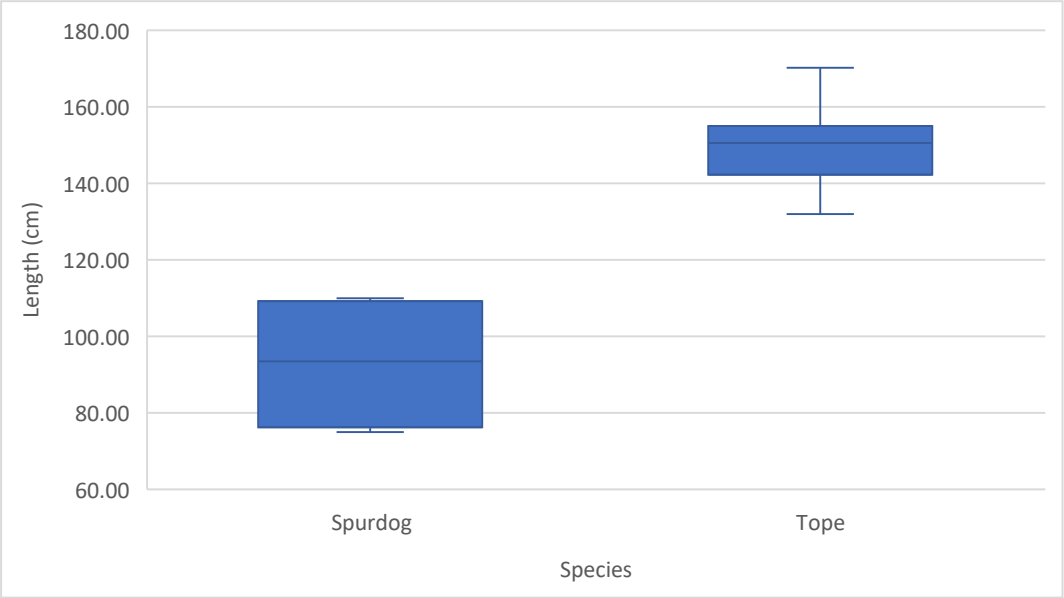

Figure 3. Box plot showing the medium length, and interquartile range (i.e., the range in values of the central 50% of the data) of tagged small sharks in 2024. Whiskers indicate the minimum and maximum lengths recorded.

Distribution of sharks tagged in 2024

Sharks were mostly tagged towards the south, southeast and southwest of the island with some also being tagged further up the west coast during the 2024 tagging season. It should be noted that this may not reflect a true species distribution. However, anglers do tend to fish in areas where certain species are known to be found. Nevertheless, in combination with data obtained in subsequent tagging years, this data may contribute to the identification of hotspots, sex aggregations and/or potential nursery areas.

Recaptures

Three Manx recaptures and one Irish were reported in 2024. One of the tope was originally caught off Langness in 2022. Due to a recording error the second tope's tagged location is unknown but was likely tagged in 2023. They were recaptured off Asturias coast and the North Spain/Bay of Biscay respectively. The third Manx recapture was a thornback ray. Orginally tagged north of Peel in 2022. Interestingly it was found inside a black mouth catshark in January off the Port of Canical, Maderia. They were all landed to market. The Irish shark was originally tagged in May of 2014 off Dunany Point, on the east coast of Ireland. The shark was recaptured September 2024 off the Niarbyl coast, Isle of Man. In that time the shark had grown from 158cm to 166.5cm and went from 16.2kg to 25.4kg.

Since 2013 this brings our known recaptures, both local and non-local, to 16. Recaptures provide interesting data, suggesting tope inhabiting Manx waters are migratory across European waters. These recaptures are substantiated by research findings, which consider there to be a single stock of tope throughout European waters (ICES, 2012).

Comparison of sharks tagged 2013-2024

A total of 686 small sharks have been tagged since 2013 (Table 1). Numbers of tagged individuals have increased over the last four years in comparison to previous years, which were predominantly tope. The 2024 season has seen further improvement of the number of sharks tagged. Such high tagging success is thanks to the continued support of several anglers and angling charters, Casey J and Gemini.

Table 1. The number of small sharks per species tagged between 2013 – 2024.

Species	**Year**										
	2013	2014	2015	2016	2017	2018	2019	2021	2022	2023	2024
Bull huss	17	1	0	0	0	0	0	0	4	2	0
Spurdog	5	1	1	4	90	14	8	31	12	3	5
Thornback ray	0	0	0	0	0	0	0	0	7	0	0
Tope	28	22	19	12	40	30	10	22	132	58	108
Total	**50**	**24**	**20**	**16**	**130**	**44**	**18**	**53**	**155**	**63**	**113**

Spurdog

Three female and one male and one unknown spurdog were tagged during the 2024 tagging effort. Females have been more frequently tagged than males across the entire programme, as shown in Figure 4. The 2024 distribution of spurdog shows they were tagged in waters around the south of the Island. Spurdog travel in large, dense aggregations, segregated by size and sex (Henderson *et al.,* 2002). This makes it unsurprising that females have been primarily tagged but highlights that Manx waters may be crucial migratory routes or potential pupping grounds for female spurdog.

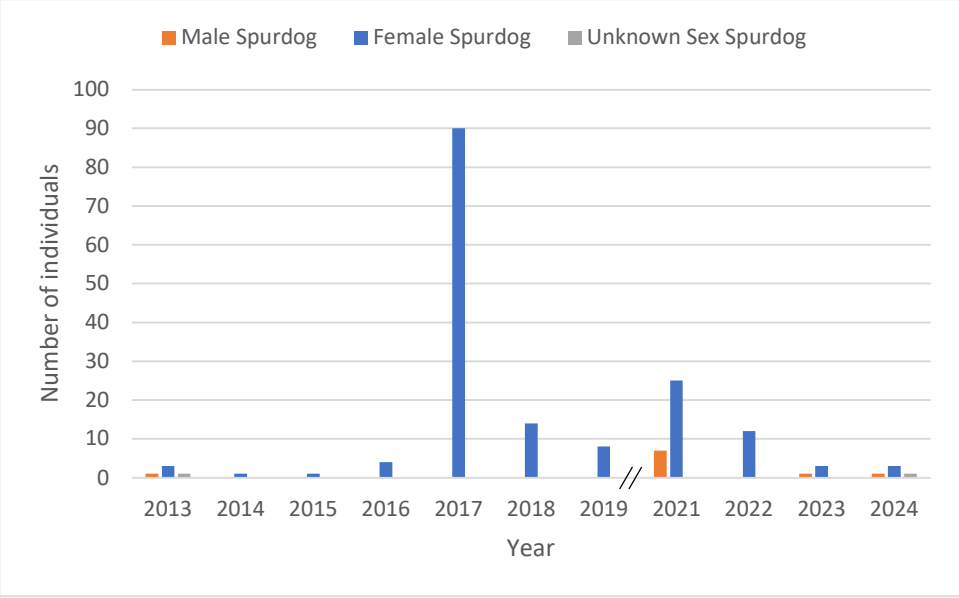

Figure 4. The number of individual spurdog females (blue) and males (orange), as well as the unidentified individuals (grey) between 2013 – 2024. The two lines denote the break in surey effort in 2020 due to COVID-19.

Figure 5 illustrates the average length of female spurdog between 2013 to 2024 (Appendix 3). The data shows the average to be consistent between 2013 and 2018 before decreasing over the period between 2018 and 2021. 2022 showed a positive increase in the average length of tagged spurdog continuing into the 2023 and 2024 season. It is also important to take the spatial distribution and number of spurdog caught and tagged into account when interpreting this data. The minimum total length for females at sexual maturity (50 % certainty) is 74 cm (Henderson *et al.,* 2002). Throughout the programme, the majority of tagged females were above this threshold and therefore likely to be sexually mature, indicating that Manx waters may provide nursery grounds for this species.

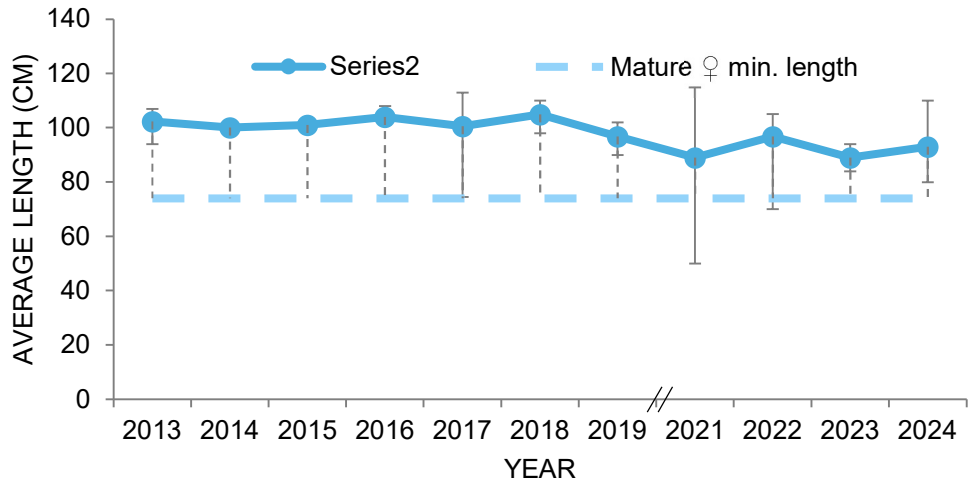

Figure 5. The minimum and maximum length (cm) of tagged female spurdog (whiskers) and average length between 2013 – 2024. Dashed line indicates minimum length of maturity (74 cm). One individual was tagged in 2014, 2015 and 2022 respectively, therefore data was modelled for these years to generate an average length.

Tope

Whilst the sex ratio of tagged tope shows annual variation, females have been more frequently tagged than males over the last six years, as shown in Figure 6. The total number of females caught and tagged has increased in the past years compared to previous years, the number of males caught is both lower and varies annually. The proportion of females to males could be interpreted to suggest that Manx waters may predominantly be used by females, perhaps utilising the area as a small shark nursery ground. However, this is deemed unlikely as the majority of tagged female tope do not meet the 50% certainty of maturity threshold of 155 cm TL (Figure 7; Dureuil, 2013). Male tope have been consistently above the equivalent threshold of 121 cm TL (Figure 7; Dureuil, 2013). This may be due to this species typically being partially segregated by size and sex (Walker *et al.,* 2008).

In terms of the distribution of tope during the 2024 survey period, individuals were caught around most of the south particularly around the Calf and The Stack they were also caught up the west coast of the Island and southeast near Derbyhaven.

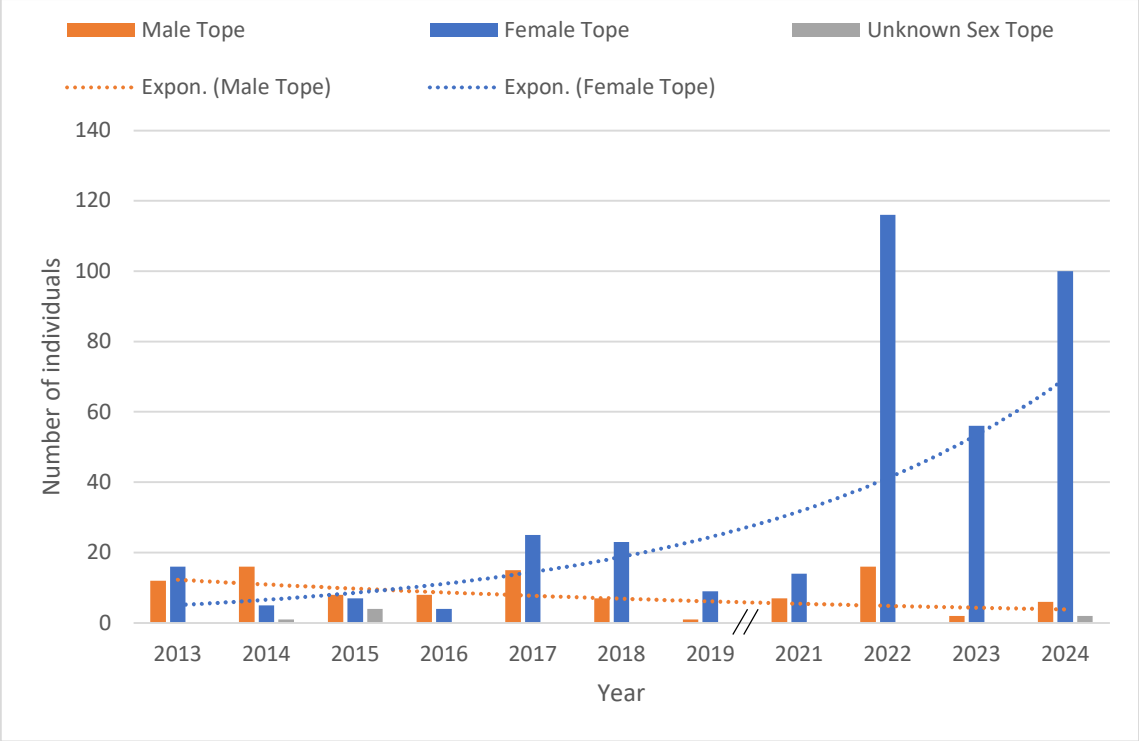

Figure 6. The number of individual tope females (blue) and males (orange), as well as the unidentified individuals (grey) between 2013 – 2024. The curved dotted line indicates average number of males and females over time.

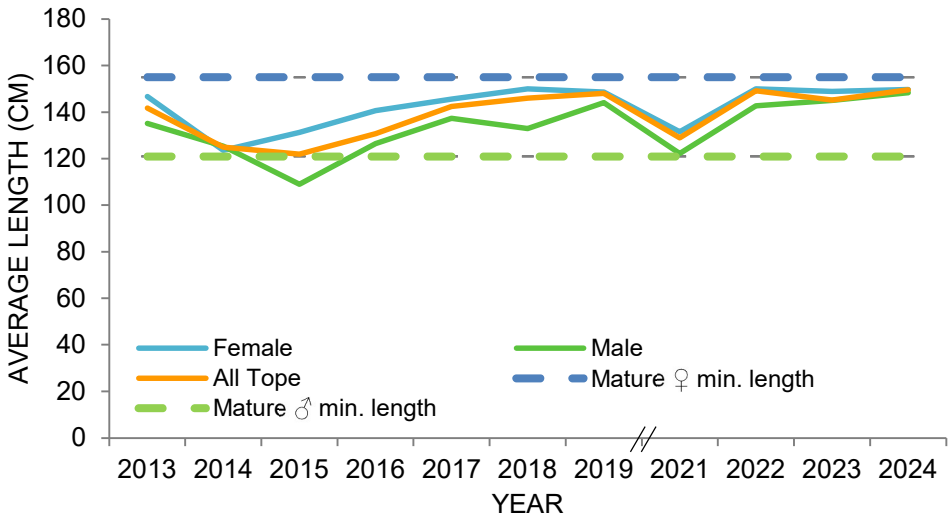

Figure 7. The average length (cm) of total tagged topes (orange); average length (cm) of female tagged topes (blue); average length (cm) of male tagged topes (green); and average length for sexually mature females (155 cm, dashed blue) and males (121 cm, dashed green) between 2013 – 2024.

Bull huss

Despite the success of the previous year, no bull huss were recorded for the 2024 season. Prior to the 2022 and 2023 tagging effort, bull huss had only been tagged in 2013 and 2014 (Table 1). It is unclear as to why more bull huss have not been tagged throughout the programme, as research suggests bull huss are locally abundant in the Irish Sea and populations are slowly increasing (ICES-WGEF, 2019).

Thornback ray

No thornback rays were caught this season.

Overview of Programme

The numbers of tagged individuals for the 2024 survey period continue to increase on past year's numbers. In 2024, tope were the species caught and tagged the most. The majority of individuals caught and tagged were female, as shown in Figure 2. Only five spurdog were caught and tagged. Bull huss and thornback ray were not recorded this year. However despite this, there was nearly double the numbers of tagged sharks on the previous year.

The average length of tope and spurdog increased from the year prior. Average size of small sharks tagged remains variable over the years across both species. Tagging a wider range of shark sizes may provide the programme with more insight into whether Manx waters are important for part of their reproductive cycles, such as for breeding or as a nursery for young.

Figure 9 illustrates shark tagging hotspots across the course of the programme. The south of the island remains a key area for small shark species and may reflect anglers preferences for certain areas. Small sharks have consistently been tagged south of the Calf of Man, north of Peel, south of Douglas and off Niarbyl. Effort was made in the 2022 survey season to tag small sharks towards the more northly parts of the Island, to gain an understanding of the sex and size ratios of species in this area. Efforts to maintain a better coverage of the island is important as it helps to remove the bias of fishing. Appendix 4 contains maps containing all tagging locations between 2013 – 2024.

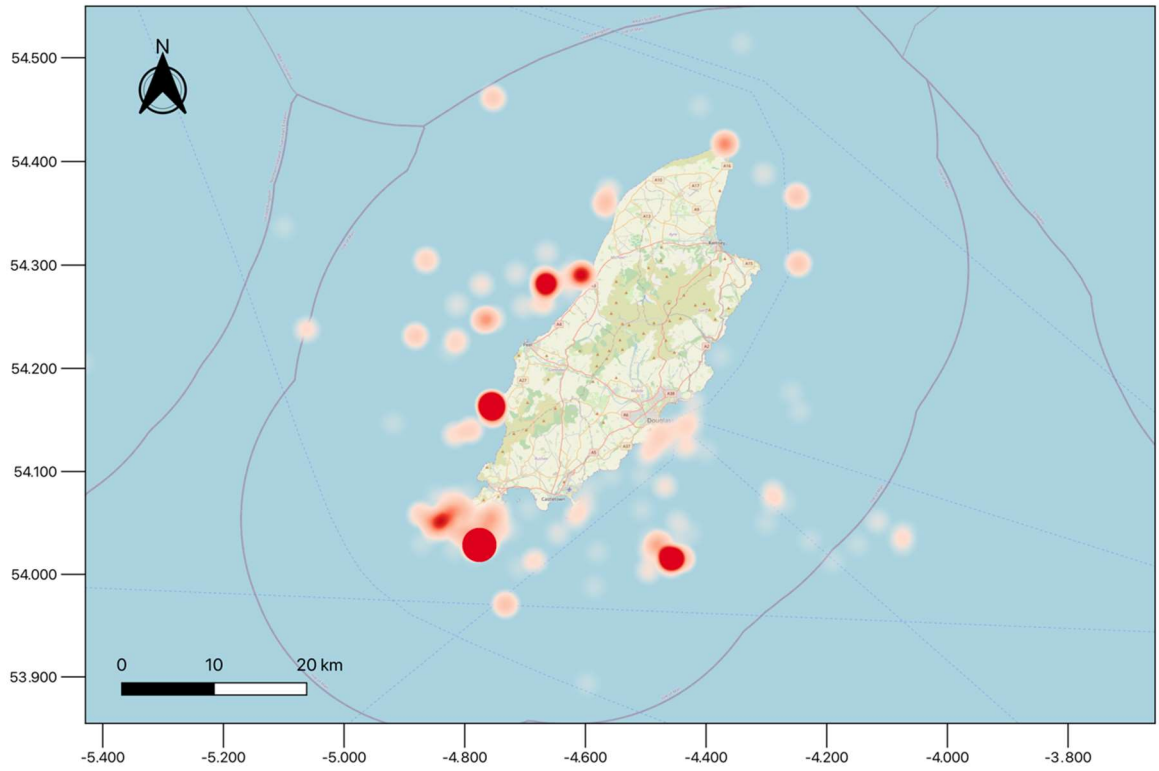

Figure 8. A heatmap indicating where small sharks have been most commonly tagging in Manx waters during 2013 – 2024.

Conclusions and Recommendations

In total, 686 small sharks have been tagged since 2013. An additional 13 small sharks were tagged prior to the formal commencement of the Small Shark Tagging Project in 2013. Increased tagging effort in 2022 and 2023 saw the tagging of bull huss, which had not been recorded as caught or tagged since 2014. For the first time in the programme, the thornback ray was also tagged in 2022 after an effort was made to fish in more northern waters surrounding the island. Thornback ray remained elusive for the 2023 and 2024 seasons however this could be due to a number of reasons including reduced fishing trips, fishing trips taking place in a less diverse range of locations as well as other environmental factors. Gaining more data on a greater variety of small shark species is hugely beneficial in furthering our understanding of where and how these species use Manx waters. This knowledge can help us to further maintain and protect our fisheries surrounding the island.

The project has recorded four recaptures this year, three of which have occurred from elasmobranches originally tagged on the Island and one recapture from Ireland. To help to increase the probability of successful recapture, it is proposed that the continuation of tagging workshops will be key to increase the number of sharks tagged in our waters. Whilst this method can be considered as invasive for the species involved, it is a good way to minimise the disruption to the sharks and rays as the fishers are able to perform the research whilst they are already fishing. In the same way it helps to reduce the monetary and environmental cost of tagging programmes. Involving fishers and educating them is also an imperative part to achieving healthier waters around our island. Overall, it is too soon to determine whether small sharks are utilising Manx waters for migrations, feed grounds or as part of their reproductive cycles. Continued tagging and recapture of previously tagged individuals are crucial to obtain useful information about the distribution and population structure of small sharks in Manx waters.

Currently, small sharks have been tagged in several Marine Nature Reserves (MNRs) including West Coast, Calf and Wart Bank, Baie ny Carrickey, Langness, Little Ness and Ramsey Bay. These sites only cover up to the 3 nm boundary of Manx waters and are not formally designated to protect small shark species. This is in part due to small shark species not receiving formal protection in the Isle of Man currently. However, small sharks will benefit from these MNRs due to restrictions against damaging fishing methods.

Based on our current understanding of the tagged shark species, we recommend greater protection in the form of restrictions or reserve formation/extension into the 3-12 nm zone of the Calf and Wart Bank, Langness and West Coast MNRs. Extending protection into the wider 3-12 nm zone around the Island is crucial to protect these areas from damaging marine developments and fishing.

The Manx Wildlife Trust is grateful for the support of this programme from the angling community, including the charter boats Casey J and Gemini, and is optimistic for future data collection.

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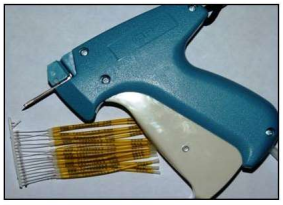
Appendices

Appendix 1. Tagging guidance crib sheet.

SSTP Micro-Tag Guidelines



Micro-tags are inserted using a tagging gun. When not in use we recommend that you use the needle guard to prevent injury!

1. Fit a strip of micro-tags into the tagging gun
2. Insert the needle at an angle of 45°
3. Push the trigger to insert a single tag into the fish
4. Remove the needle and give the tag a short tug to set the barb

Submit your data to Eleanor – eleanor@manxwt.org.uk or drop in at 7-8 Market Place, Peel, IM5 1XF or online at:

www.tagsharks.com

These tagging guidelines are for tagging guns and micro-tags ONLY.

SSTP minimum sizes are set to protect fish, if for any reason you are unsure about tagging please **do not tag the fish!**

SSTP Micro-Tag Minimum Sizes	
Common Skate (wingspan)	Canula
Tope	65cm (2.8lb)
Spurdog	65cm (2.3lb)
Smooth-hound	70cm (2.2lb)
Bull Huss	65cm (2.5lb)
Rays (wingspan)	35cm (2.1lb)

Appendix 2. Record card.

Please send details to Eleanor by email: eleanor@manxwt.org.uk
Or drop in/post to: 7-8 Market Place, Peel, IM5 1XF

Name/s: _____

Email address: _____

Date: _____ Time start: _____ Time end _____

Location (please circle): NE NW SW SE

Lat/Long (this will NOT be made public):

_____N _____W

In association with:

Tag No.	Species	Sex	Length (cm)	Girth (cm)	Condition

Appendix 3. The range and average length (cm) of tagged sharks between 2013 – 2024.

Table 1. The range and average length (cm) of tagged bull huss for 2022. N.B.: averages for 2014 were not able to be calculated as only one individual was tagged.

Year	Length range (cm)		Average length (cm)	Standard deviation (±)
	Minimum	Maximum		
2013	63.00	110.00	91.06	13.71
2014	89.00		-	-
2022	74.00	100.00	86.00	9.90
2023	96.00	107.00	101.50	7.78

Table 2. The range and average length (cm) of tagged spurdog between 2013 – 2024. N.B.: averages for 2014, 2015 and 2022 were not able to be calculated as only one individual was tagged in each of these years respectively.

Year	Length range (cm)		Average length (cm)	Standard deviation (±)
	Minimum	Maximum		
2013	75.00	107.00	94.17	11.92
2014	100.00		-	-
2015	101.00		-	-
2016	101.00	108.00	104.00	3.16
2017	74.50	113.00	100.49	6.76
2018	98.00	110.00	104.93	3.67
2019	90.00	102.00	96.75	3.83
2021	50.00	115.00	84.48	19.02
2022	70.00	105.00	96.83	9.43
2023	80.00	94.00	86.00	7.21
2024	75.00	110.00	93.00	18.06

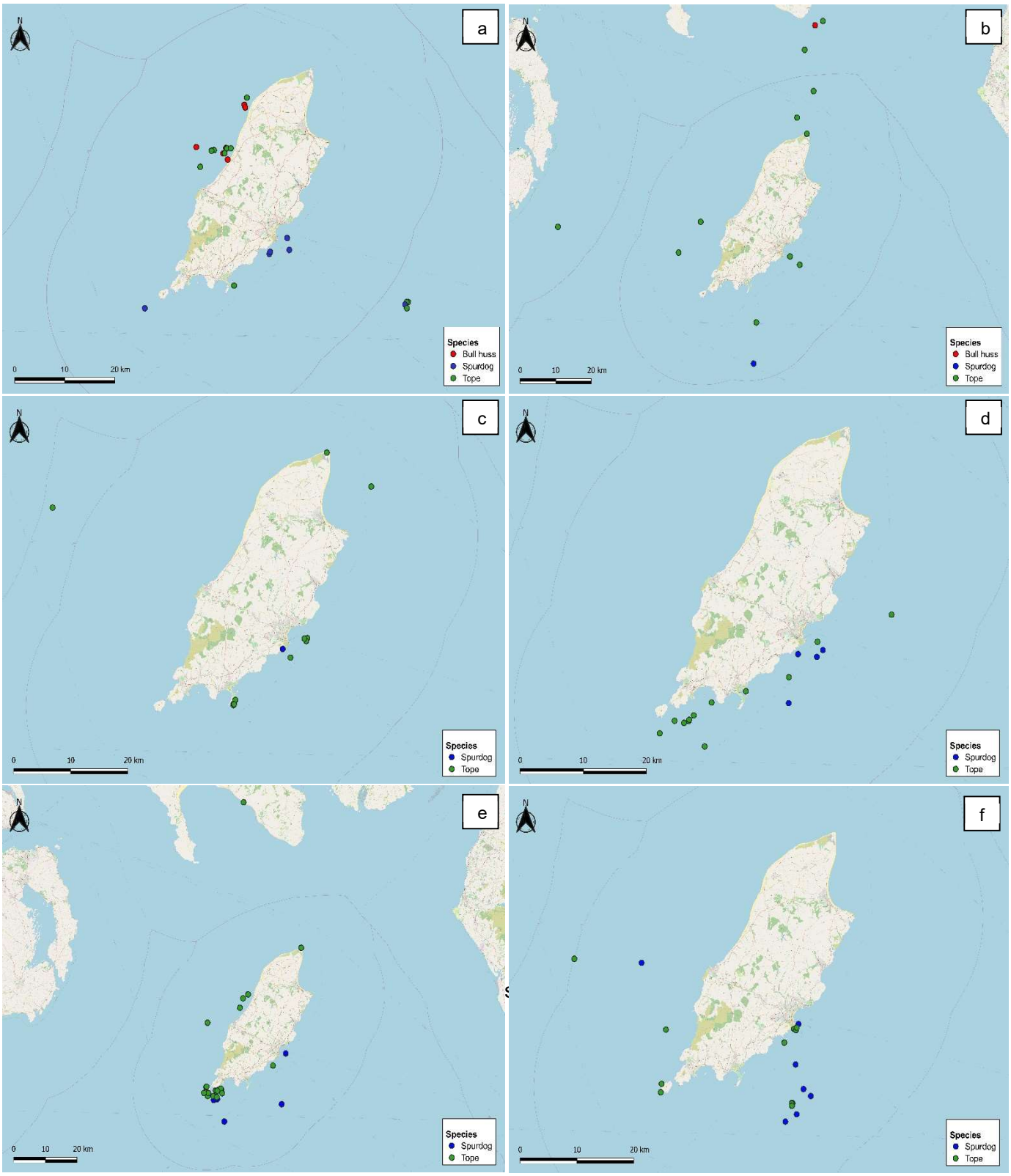
Table 3. The range and average length (cm) of tagged thornback ray for 2022.

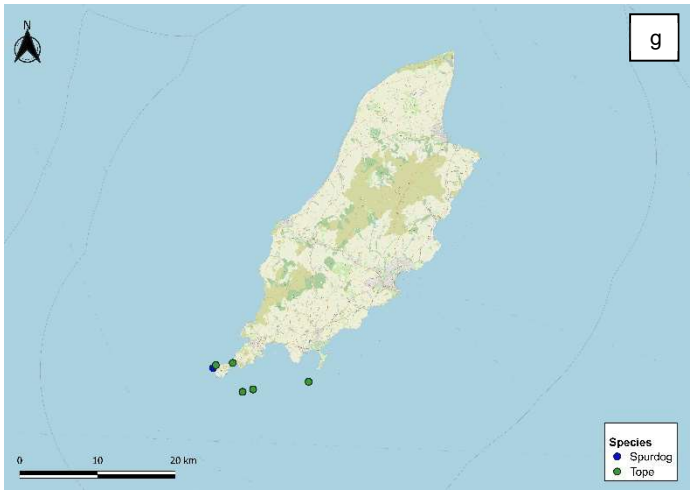
Year	Length range (cm)		Average length (cm)	Standard deviation (±)
	Minimum	Maximum		
2022	60.00	145.00	103.14	36.14

Table 4. The range and average length (cm) of tagged tope between 2013 – 2024.

Year	Length range (cm)		Average length (cm)	Standard deviation (±)
	Minimum	Maximum		
2013	110.00	156.00	141.71	12.32
2014	94.00	145.00	124.95	14.95
2015	80.00	153.00	122.00	24.10
2016	89.00	157.00	130.70	24.07
2017	99.00	168.00	142.38	14.51
2018	78.00	171.00	145.93	21.97
2019	110.00	167.00	148.10	17.88
2021	60.00	168.00	127.91	26.54
2022	99.00	173.00	149.24	14.03
2023	105.50	165.10	145.13	13.90
2024	63.60	171.00	149.64	12.90

Appendix 4. The capture location of small sharks tagged in Manx waters during 2013 (a), 2014 (b), 2015 (c), 2016 (d), 2017 (e), 2018 (f), 2019 (g), 2021 (h), 2022 (i), 2023(j) and 2024(k).

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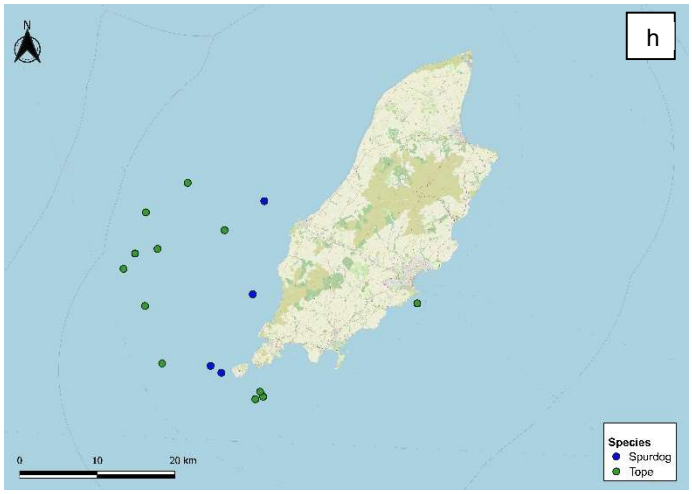
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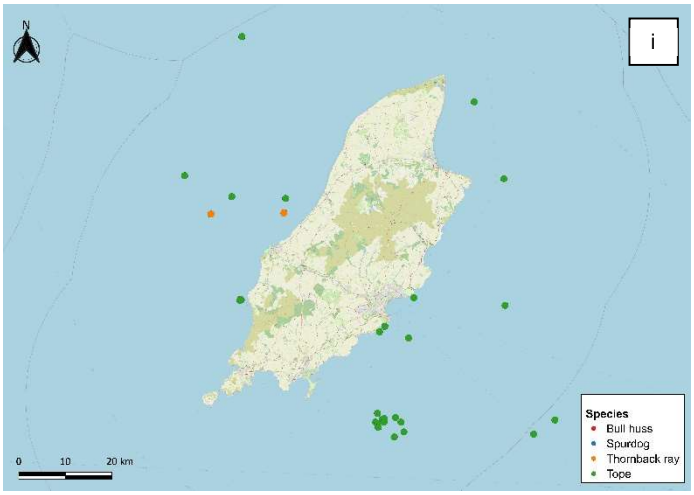
Species
Spurdog
Tope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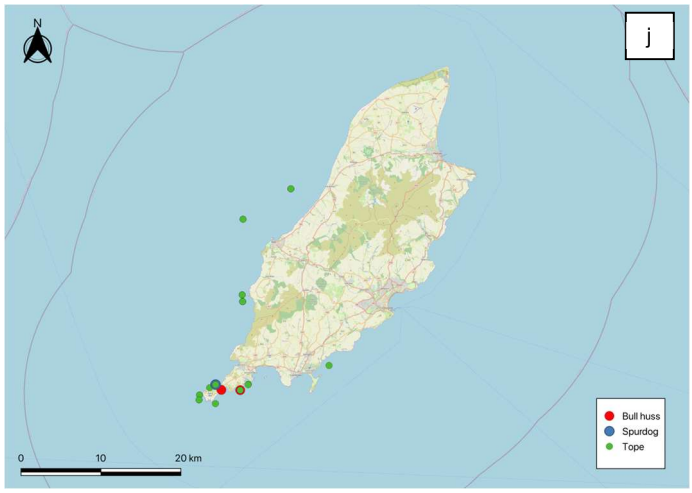
Spurdog
Thornback ray
Tope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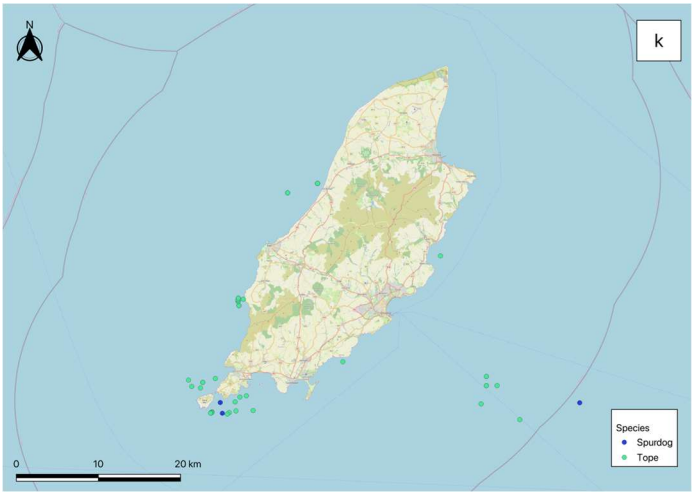
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