Cyfoeth Naturiol Cymru
Natural Resources Wales

Skomer Marine Conservation Zone Annual Report 2021

NRW Evidence Report No: 590

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Report series:	NRW Evidence Reports
Report number:	590
Publication date:	April 2022
Title:	**Skomer Marine Conservation Zone Annual Report 2021**
Author(s):	Lock, K, Burton, M Jones, J.
Quality assurance:	Tier 2
Peer Reviewer(s):	[Enter name and surname here]
Approved By:	Mike Camplin
Restrictions:	None

Distribution List (core)

NRW Library, Bangor	2
National Library of Wales	1
British Library	1
Welsh Government Library	1
Scottish Natural Heritage Library	1
Natural England Library (Electronic Only)	1

Distribution List (others)

Skomer Marine Conservation Zone Advisorty Committee members

Recommended citation for this volume:

Lock, K, Burton, M Jones, J.(2022) Skomer Marine Conservation Zone, Annual Report 2021. NRW Evidence Report 590.

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1. Crynodeb Gweithredol

Dyma Adroddiad Blynyddol Parth Cadwraeth Morol Sgomer (GNFS) i'w Phwyllgor Ymgynghorol. Mae'r Pwyllgor Ymgynghorol yn cynnwys sefydliadau ac unigolion sydd â diddordeb yn yr ardal y mae GNFS yn ymdrin â hi.

Fe fydd yr adroddiad yn crynhoi pob agwedd ar waith GNFS, gan gynnwys dadansoddiad o amser gwaith maes y staff, gwaith stad, y defnydd a wneir o'r warchodfa wrth hamddena, digwyddiadau, gwaith cydgysylltu, wardenio, patrolio, monitro a gwaith ymchwil. Hefyd, mae canlyniadau rhai prosiectau monitro a rhai o grynodebau adroddiadau sydd wedi eu cyhoeddi, wedi eu cynnwys yma.

1. Executive Summary

This is the Skomer Marine Conservation Zone Annual Report to its Advisory Committee. The Advisory Committee is made up of organisations and individuals with an interest in the area covered by the MCZ.

The report summarises all aspects of the work of the MCZ including a breakdown of staff fieldwork, estate work, recreational use of the reserve, incidents, liaison, wardening, patrol, monitoring and research. Also included are results of some monitoring projects and summaries of published reports.

2. SMCZ and Sustainable Management of Natural Resources

The Environment (Wales) Act and the Wellbeing of Future Generations (Wales) Act provide the framework for NRW's work to pursue the sustainable management of natural resources (SMNR) as defined in the former, whilst maximising our contribution to the well-being goals set out in the latter.

Sustainable management of natural resources follows nine main principles and the work of Skomer MCZ can be shown to apply (and to have been applying for many years) these principles:

Adaptive management – the management of Skomer MCZ is not set in stone. Our monitoring programme provides the evidence we need to review our management actions and where necessary change them.

Scale – whereas the boundary of the site was decided decades ago, our extensive knowledge of the MCZ allows us to apply aspects of our management to specific and appropriate areas. For instance, we are confident that the seabed in South Haven and parts of North Haven can tolerate current and historical levels of recreational anchoring, but the rest of the site cannot. This allows us to identify areas where recreational anchoring can happen rather than try to impose a blanket ban on anchoring. Similarly we would not wish to restrict access to the coastline of Skomer without good reason when it is specific small areas that are more sensitive to disturbance at different times of year. For this reason our seasonal access restrictions are designed to protect breeding seals and birds at the most sensitive sites in the autumn and spring respectively.

Collaboration and engagement – this report demonstrates the importance we place upon liaison with academic institutions to increase our knowledge of the site by providing help with research projects. This report further documents our connections with regulatory and recreational organisations to ensure legal and voluntary measures are effective in protecting the site. The Skomer MCZ Advisory Committee is pivotal in this respect.

Public participation – without public participation we would be unable to carry out nearly as much monitoring work as we do. From teams of volunteer divers carrying out intensive surveys of species and habitats like scallops and eelgrass to individuals making up our own dive team to allow work to continue in the absence of staff, we are dependent on volunteers. Our voluntary controls would be unworkable without public support and the local community provide valuable help in safeguarding the site through their vigilance.

Evidence – gathering evidence is our bread and butter, whether we are collecting it ourselves or relying on our extensive collaborative network to provide it to us.

Multiple benefits – we are fully aware of the intrinsic value of a site such as Skomer MCZ where people can come to enjoy wildlife in as unspoilt a marine area as we are likely to have anywhere in Wales. We can only theorise on the level of benefits to the wider marine environment of larval export from communities and species deriving a high level of protection as a result of the fishery byelaws we have.

Long term – at Skomer MCZ we are in an almost unique position to be able to report on the long-term consequences of marine conservation management actions taken over two decades ago.

Preventative action – the site-based nature of the team at Skomer MCZ is a major contributory factor in the protection of the site. We are able to respond quickly to potentially damaging events and intervene. Sometimes this is by our mere presence acting as a deterrent, sometimes by educating those who might cause harm unknowingly.

Building resilience – by applying nature conservation principles we can help to build diversity, populations, and connectivity; all of which contribute to the maritime ecosystem's resilience in the face of anthropogenic change.

3. Introduction and Foreword

As in 2020, 2021 began with covid guidelines continuing to force the team to be home working, with restrictions on numbers both in the office and working on boats. Finally, working under strict rules, we were able to get our fieldwork started at the beginning of June.

There was lots of catching up to do, and we were keen to get on the water and also be back on Skalmey with its new engine and deck. The first challenge was to find our underwater sites: many are marked with pitons and ring bolts which are annually checked and replaced when needed, however with a 2 year interval this proved more difficult as many were grown over, buried in silt or missing. Thankfully we had a new underwater drill to try out which proved easy to use, so lots of re-marking was possible.

Our top priority was to return to the sea fan sites. In 2019 we reported 7 fans were missing to be confirmed, 3 of these were re-found in 2021, but sadly there are a further 16 missing fans to be confirmed next year. This is a huge concern, and we are working through our full photo monitoring data set to look at the condition of each individual sea fan over the years.

The combination of a late start to the fieldwork season and limited 'good spring' tides meant that the shore monitoring work was not completed this year, although we did complete the Marclim shore surveys at both the Skomer and Pembrokeshire sites. It will be a priority in the 2022 season to complete all our shore monitoring work.

Again due to Covid restrictions it was not possible to run the volunteer diving survey, so the scallop populations survey is now being planned for 2022. Visitors to the site were also not allowed, but we did manage to have one day with the NRW Fisheries Assessment Team on board who completed a biosonic acoustic map of the North Haven eelgrass bed.

Skomer MCZ's seal pups continued to do well in both 2020 and 2021, with over 400 births at island and mainland sites combined.

In September and October 2021, the team supported other NRW marine monitoring surveys, completing the infauna grab sampling at both Milford Haven waterway and Carmarthen Three Rivers locations. These surveys utilise both the expertise of the team and the versatility of Skalmey, being able to access very remote sampling sites. We also supported the WFD fish survey team in the Tyfi estuary, utilising 'Suzimar' the smallest boat in our fleet.

4. Staff

4.1 Staffing

The staff complement at Skomer MCZ remained the same for the start of 2021: Phil Newman, Kate Lock, Mark Burton and Jen Jones made up the NRW team based at Martins Haven.

Figure 4.1 Skomer MCZ staff

In October after 30 years of dedicated work at Skomer MCZ Phil Newman retired. His retirement was marked by a farewell Advisory Committee gathering in Marloes village hall with a fun presentation looking back at Phil's contributions since 1992.

Kate has now replaced Phil as the senior officer and recruitment was completed in January for Kate's post. We will be welcoming Ali Massey to the team in March ready for the 2022 fieldwork season.

The Skomer MCZ team is part of the Marine Environmental Assessment and Reporting Team within NRW's Marine Service. The team is responsible for delivering all marine monitoring work in Wales and has a team of skilled staff that supports each others work. In 2021 our team helped with SAC infauna and intertidal surveys and WFD fish surveys. We were provided with diving assistance by Matt Green when we were low on staff and Adam Leyshon has also helped with boat maintenance work on Skalmey.

4.2 Volunteers

The numbers of staff working on boats was limited to allow covid rules to be followed. This affected having volunteers join the team as regularly as would be normally allowed.

Diving volunteers continued to supplement our own diving team when we were short-handed and ensured that our core diving projects were completed. A big thank you to Blaise and Ross Bullimore, Rob Spray and Francis Bunker.

The annual volunteer diving project did not go ahead in either 2020 or 2021, but if restrictions allow plans are being made to welcome back the teams of volunteer divers that have supported these projects.

4.3 Development and training

Mark and Jen completed an online Primer statistics course in February 2021 which will support their work with data analysis.

The whole team completed sea survival training and Kate, Jen and Mark did their first aid refresher training.

Mark, Kate and Jen joined WFD saltmarsh survey training on the Gann saltmarsh delivered by collegues from the Marine Environmental Assessment and Reporting Team.

In February 2022 Mark and Jen attended online training provided by Marine Coastguard Agency on oil pollution management and Kate has completed training in contract management.

Kate attended the online virtual Porcupine Marine Natural History Society conference in March 2021, hosting a breakout room on intertidal recording.

Dive and boat safety training planned in 2020 was cancelled due to covid, but training is now being planned for April 2022.

4.4 Health and Safety

MCZ staff continue to maintain health and safety documentation linked to diving and boat operations as well as more routine office-based safety elements. We have also advised on corporate boat working procedures and policies.

New working rules were put into place following current covid guidelines. During lock-down periods the MCZ staff worked from home. Since April 2021 there has been a booking system for using desks in the office with 2 people present at any one time, this allowed the team to be able to attend to site based jobs. During the field season covid guidelines were followed with limited numbers working from the boats and all staff completing lateral flow tests bi-weekly. Following full closure of the office and all fieldwork being stopped in 2020 the team were happy at least to be able to function and complete essential work in 2021.

4.5 Diving Operations

Diving operations at Skomer MCZ continue to operate under the Scientific and Archaeological Diving Agreed Code of Practice, with staff assuming the legal responsibilities associated with the role of diving supervisor and Phil acting as NRW's Diving Project Manager.

Phil also acts as NRW's representative on the Scientific Diving Supervisory Committee, which is the HSE-recognised representative body for the Scientific and Archaeological diving sector.

Dive times and numbers of dives in 2021 were much lower than in 2019. Due to the late start of diving in June only the essential annual monitoring projects were completed. There were no additional surveys and no dive time to prepare for the annual volunteer diving survey. Some injuries in the Skomer MCZ team also meant that we were heavily reliant on volunteers helping to allow diving operations to take place, this is reflected in the increased number of dives completed by volunteer divers.

Table 4.1 Summary of MCZ Diving Activity 2021

	MCZ staff	Volunteer divers	Total
Dives	85	43	128
Dive time (mins)	3377	1887	5264
Dive time (hours)	56.28	31.45	87.73
Average dive time (mins)	40	44	41.13
Diving days	n/a	n/a	36

Figure 4.2 Summary of MCZ diving activity 1992 to 2021

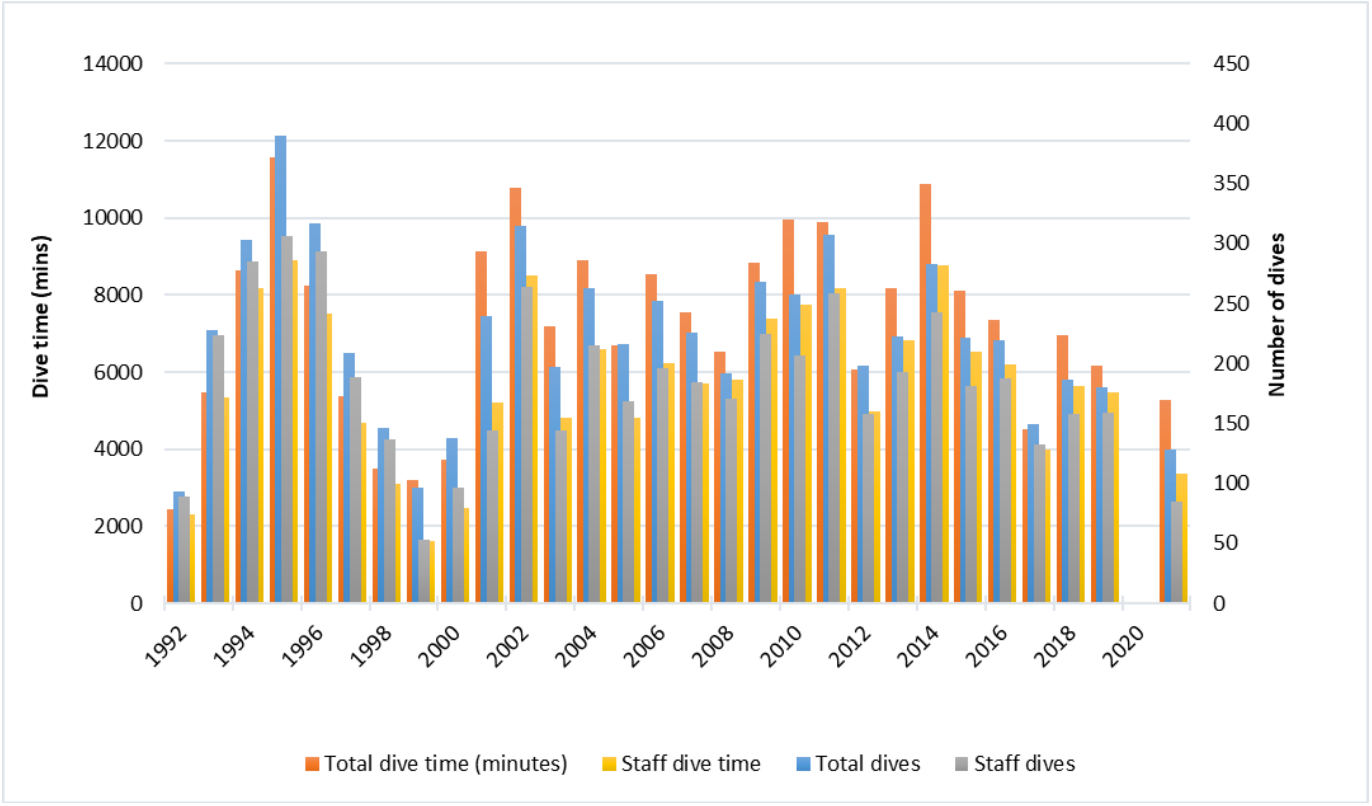


Figure 4.3 Skomer MCZ Diving Operations 2021, dive time

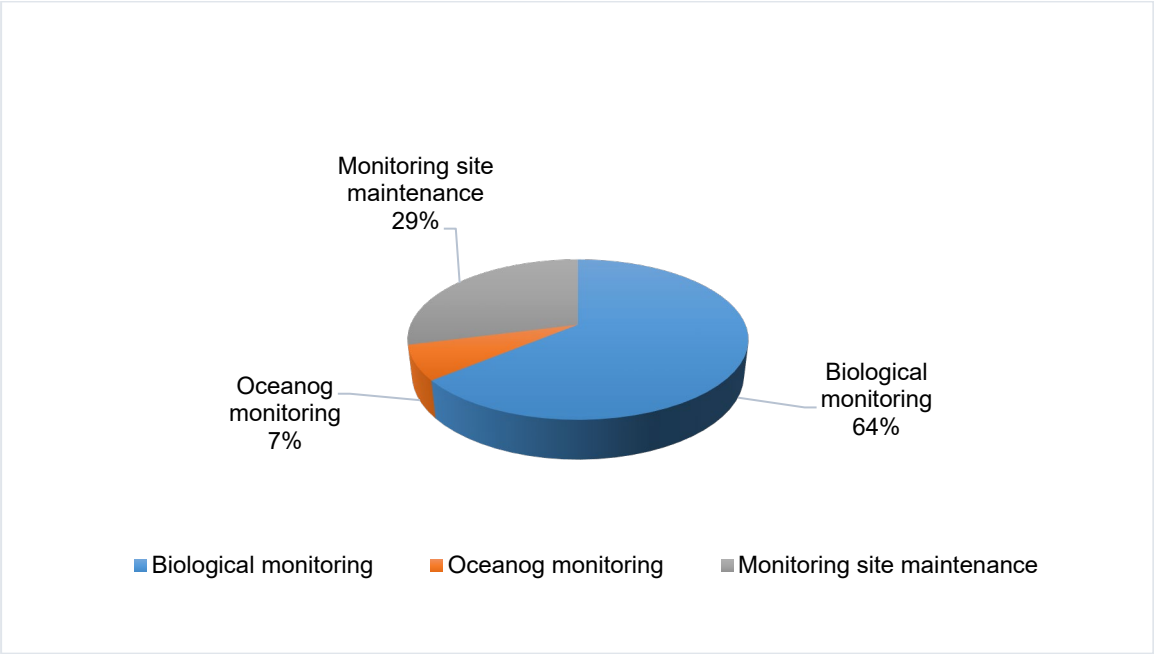
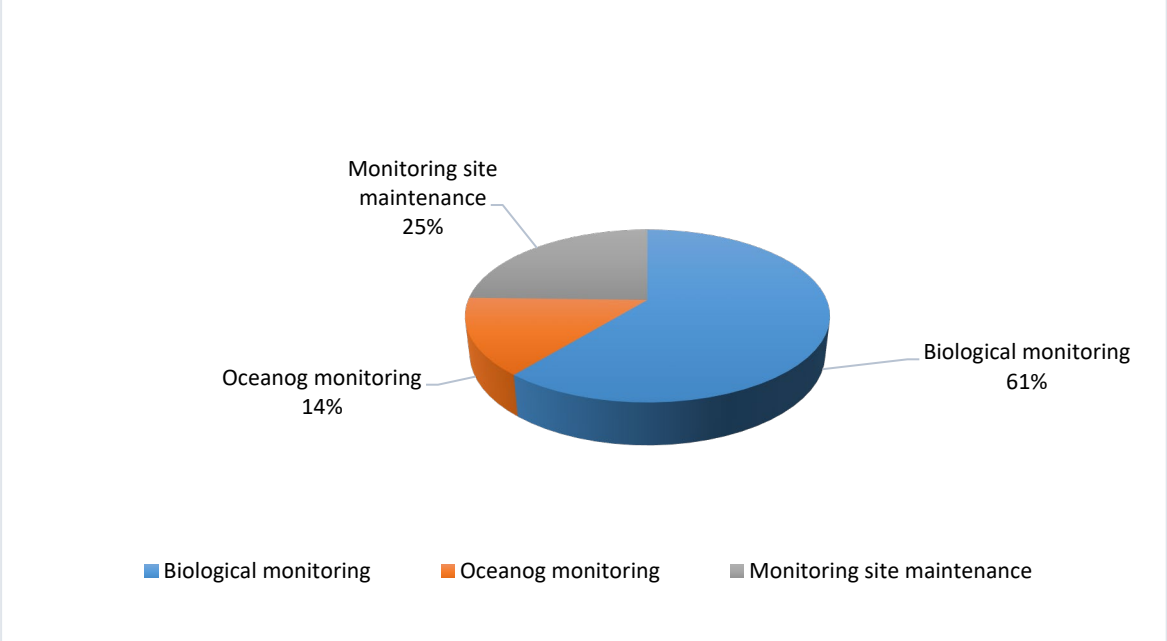


Figure 4.4 Skomer MCZ Diving Operations 2021, number of dives



5. Estate

5.1 Buildings

MCZ buildings include the office and exhibition building at Fisherman's Cottage in Martins Haven and the industrial unit in Milford Haven, where larger and more robust items of equipment are stored. All waste handling for MCZ buildings, use of consumables and energy are monitored in accordance with the ISO14001 environmental standard.

The old Coastguard lookout hut on the Deer Park is used to host the NRW automatic weather station.

The area at the back of Fisherman's cottage continued to be used frequently by the cows which graze on the Deer Park. The cows are a nuisance as they damage the table, wash tank and leave the area in a complete mess. In previous years National Trust staff have attempted to put up a low electric fence but this has been knocked down by the cows. More drastic measures were needed so we were very grateful for the offer by Pembrokeshire based NRW NNR wardens to erect a fence. The fence was completed in January 2022 and we hope this will keep the cows out.

Figure 5.1 Fencing at Fisherman's cottage

In February 2022 Pembrokeshire County Council started works on improving the access road to Matins Haven. This work will also include improvements to the drainage and signage at Martins Haven.

Figure 5.8 Refurbishments works ongoing to Matins Haven access road

5.2 Boats

Skalmey spent 57 days at sea in 2021 and logged 209 engine hours. A summary of MCZ boating activity from 2002 to 2021 is summarised in table 5.1.

Following a detailed survey of the hull and the equipment of the boat at the end of 2019 considerable remedial action was recommended. The work was contracted to Cardiff Marine services and included replacement of the deck beams, decking and replacement of windows, replacement of the fuel tanks and overhaul of the engine in preparation for the 2020 season.

No boat work was allowed in 2020 due to covid restrictions. NRW approved funding to replace the engine and time was invested in the tendering process and installation. Dale sailing installed a CAT C7.1 engine (rated at 450hp) ustilisaing the existing gearbox and jet drive. The engine ran well over the 2021 season and proved to be more economic on fuel than the last engine.

Figure 5.2 *Skalmey* new engine

In the winter of 2021to 22 the Hamilton jet drive was given a full overhaul and the impeller was sent away for refurbishment and rebalancing.

Figure 5.3 *Skalmey* Jet drive

The MCZ rigid hull inflatable *Morlo* spent 24 days at sea and logged 83 engine hours in 2021. *Morlo* was mainly used on weekend patrols as no boat based intertidal was completed. A resident bull seal again adopted the boat for hauling out.

Figure 5.4 Bull seal hauled out on *Morlo*

The small inflatable tender *Suzimar* was, as ever, useful for our lagoon sampling efforts, especially at Carew millpond and was used very effectively to help with the WFD fish survey on the Teifi. (see Section 10.4).
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Table 5.1 Summary of MCZ Boating Activity 2002 to 2021

Staff = MCZ staff, other NRW Staff and Volunteers,
Staff seatime = total of each member of staff's seatime.
Staff days at sea = total days on which each member of staff went out in a boat.

Days at Sea	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2021
Skalmey	73	77	52	48	58	72	58	61	69	99	95	65	70	73	69	49	79	65	57
RIB Morlo	37	32	40	43	40	38	36	38	48	36	35	30	43	32	34	36	40	33	24
Total	100	109	92	91	98	110	94	99	117	135	130	95	113	105	103	85	119	98	81

Staff seatime (hours)	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2021
Skalmey	1087	865	717	693	854	1190	791	973	1109	1162	1022	825	1034	893	973	563	847	805	871
RIB Morlo	367	348	568	493	473	416	392	355	452	313	284	227	388	277	337	275	403	280	159
Total	1454	1213	1285	1186	1328	1606	1183	1328	1561	1475	1634	1051	1422	1170	1310	838	1250	1085	1030

Staff days at sea	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2021
Skalmey	248	226	169	176	195	228	196	246	277	327	336	213	268	243	256	175	3314	256	212
RIB Morlo	102	85	125	116	108	96	102	91	128	87	89	74	113	88	108	97	115	83	44
Total	329	311	294	292	303	324	298	337	405	414	425	287	381	331	364	272	429	319	256

Engine hours	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2021
Skalmey	245	284	171	150	169	244	169	224	241	322	266	222	249	284	237	145	259	207	209
RIB Morlo	118	96	162	160	141	120	145	139	157	118	110	139	137	98	105	97	129	105	83
Total	263	380	334	310	310	365	313	363	398	440	376	361	386	382	342	242	388	312	292

5.3 Optical, photographic and scientific

Photographic equipment continues to be serviced by a contractor on an annual basis with routine maintenance carried out by MCZ staff.

Scientific equipment is serviced and calibrated according to manufacturer recommendations with minor maintenance (battery replacement, etc.) carried out by MCZ staff.

In March 2021 the weather station was serviced, and the relative humidity probe was changed. The new probe failed again in October 2021 and was replace with a new probe in November 2021.

Figure 5.6 Weather station maintenance work.

5.4 Vehicles

Skomer MCZ took delivery at the end of 2020 of a new Izuzu 4-wheel-drive pickup truck. The boot of the truck came installed with a sliding tray which has made loading and unloading much easier.

Figure 5.7 Izuzu pickup truck with sliding boot tray.

The ‘new’ fuel bowser with its powered pump has made fuelling Skalmey at Martins Haven much easier and was a particular asset when fuelling at Llansteffan during the SAC infauna survey. The tank is double-skinned to prevent spillages and we carry absorbent materials if the worst should happen.

Other trailers in the MCZ “fleet” are serviced annually by a local contractor.

5.5 Marine estate work

The moorings for MCZ vessels in Martins Haven and the visitor moorings at North Haven were maintained at the beginning of the season through a contract with Dale Sailing Company using their barge *KitKat* to haul the moorings to the surface for shackle replacement. The mooring risers and buoys are prepared by MCZ staff who also continue to complete routine mooring checks during the season.

Skomer MCZ staff continue to maintain visitor moorings in North Haven as part of the site’s management to protect the eelgrass bed in the bay. The moorings normally operate from Easter through to autumn at which point the buoys and riser ropes are replaced with temporary marker buoys advising “no mooring”. The North Haven “no-anchoring” buoys are deployed at the same time as the visitor moorings and maintained by MCZ staff.

Monitoring site maintaintenace work was carried out and mapping and marking was completed to establish a new survey site at Martins Haven East. A new underwater battery-powered drill was tested and proved to make drilling much easier and simpier than the previous air-powered drill.

Figure 5.8 New underwater battery-powered drill used for survey site marking (photo: Ross Bullimore)

6. Management

6.1 Wardening and Patrol

Skomer MCZ staff carried out boat patrols on 14 Sundays and bank holiday weekend days between the end of May and September 2021. This is a lower number of days than usual due to covid rules not allowing patrols to start until the second bank holiday in May and three Sundays lost due to bad weather, as were two days on the August bank holiday. Observations of visiting recreational and commercial users are also made during routine monitoring surveys throughout the season.

The patrols are not just for us to keep a eye on visitors, but serve a valuable purpose in providing a point of contact for visiting vessels to obtain information about the MCZ and a way for MCZ staff to promulgate the byelaws and codes of conduct to visiting recreational users. We are fortunate that the majority of recreational users and sightseeing commercial users are coming to the site to enjoy its wildlife and therefore well disposed towards the aims of the MCZ. However, our visible presence helps deter those whose activities may be illegal (under fishery or conservation byelaws) or at least contrary to the voluntary codes of conduct.

Volunteer assistance was restricted due to covid rules limiting numbers on Morlo to just two. Rob Gibbs helped on one weekend when we were short staffed.

In the interest of efficiency, mapping of fishing effort (see Section 8.1) and sampling for water quality and plankton monitoring (see Sections 10.2.4 and 10.1.7) are carried out during weekend patrols.

See Section 8 for all data relating to visitors and use of the MCZ.

6.2 Information

In addition to the information available for Skomer MCZ via NRW's website, paper copies of the zone map and the safety information are also made available to visitors out on the water. We are still using a stock of waterproof zone map leaflets printed in 1996 as they have proved to be almost indestructible and many regular visitors still have them aboard their boats years after being given them. The MCZ booklet and seal watching guide are dispensed via the MCZ exhibition room (see section 11.1).

6.3 Management Issues

6.3.1 Dredging/beam trawling

No illegal dredging or beam trawling was recorded or reported to MCZ staff in 2021.

6.3.2 Potting

Commercial fishing vessels operating in the MCZ are listed in Section 7.1 and fishing effort records are presented in Figures 7.1 and 7.2.

6.3.3 Tangle and gill netting

No tangle or gill netting was observed in 2021.

6.3.4 Collection of shellfish by divers

No collection of shellfish by divers was observed in 2021.

6.3.5 Collection of curios

No collection of curios was observed in 2021.

6.3.6 Collection of specimens for education and research

No permits were issued in 2021.

6.3.7 Disturbance or entanglement of seals

Seal disturbance in 2021 is shown in table 7.1. Only one significant disturbance to seals was recorded where at end of August several snorkelers were seen swimming very close to South Haven beach which had several females with pups on it. The next day one of the pups which had been attended by its mum had disappeared but it is unknown if the disturbance was the cause.

Table 6.1 Seal disturbance on Skomer Island in 2021

Date	Time	Location	Type	Severity	Comment
27/8/21	14:33	RRK	RIB	1	disturbed seals hauled-out on RRK
22/8/21	13:47	CBY	Airplane	1	disturbed seals hauled-out on CBY
20/8/21	12:00	RRK	Diving boat	2	8 snorkelers went through the middle of RRK at low tide
29/8/21	16:36	SHV	Snorkelers	1-3	5 snorkelers very close to SHV beach with pups, females in water, next day a pup on W-side was gone
9/9/21	13:30	RRK	Kayak	2	2 kayaks
14/9/21	16:19	RRK	Kayak	2	2 Kayaks disturbing haul-out, seals enter water in panic

Level of disturbance: 1 = little disturbance (lifting of heads); 2 = Seals enter water in response to perceived threat; 3 = major disturbance involving abandonment of pup or similar.

Monofilament line and netting were the most obvious pollutants affecting seals in 2021. 40 individual seals on Skomer (four males, 32 females and four immatures) were photographed with obvious signs of being entangled in nets at some time in their lives, most commonly a deep scar around their necks, often with netting still embedded

With the visitor exhibition room being shut during the 2021 season it was not possible to dispense seal watching leaflets to the public. The National Trust put up a new seal sign at Martins Haven to inform visitors on how to minimise disturbance.

Figure 6.1 National Trust seal sign located at Martins Haven.

6.3.8 Disturbance to cliff-nesting birds

In 2021 there were no observations of bird disturbance by MCZ staff and just one incident by Skomer Island staff who reported a motorboat entering the Wick in May driving through rafting birds.

6.3.9 Spear-fishing

No spear-fishing was recorded in 2021.

6.3.10 Angling

See Section 8.2 for records of visiting anglers.

Although numbers of anglers recorded in Skomer MCZ was at an all-time low, especially for shore anglers, sea bed angling litter still presents a problem where angling gear gets snagged on the seabed.

Neptune's Army of Rubbish Collectors (NARC) have continued to clear seabed litter, including lost angling tackle, from the MCZ. They have also provided information advising anglers how best to avoid snagging and losing tackle in the Martins Haven area, both on-line and in the form of paper leaflets. Leaflet dispensers are positioned next to the two 'angling bins' positioned at the entrance to the Deer Park and besides the coastpath at Martins Haven beach. The bins are occasionally used by anglers to dispose of waste gear and emptied annually by MCZ staff.

6.3.11 Mooring and anchoring

All vessels appear to be complying well with the no-anchoring code of conduct and there have been no reports of vessels anchoring other than in the permitted areas of North and South Haven.

The visitor moorings in North Haven continue to be popular with all visiting vessels.

6.3.12 General boating

Most incidents of speeding are covered in Sections 7.3.7 and 7.3.8 above. A couple of other observations of excessive speed, but without disturbance, were recorded in 2021; both involved commercial fishing vessels.

6.3.13 Wrecks

Pembrokeshire boat charters relocated and temporarily marked the buoy rope attached to the wreck of the *Lucy*, allowing MCZ to put in a new buoy.

6.3.14 Oil pollution

No oil pollution was recorded at Skomer MCZ during the 2020/21 season.

6.3.15 Litter

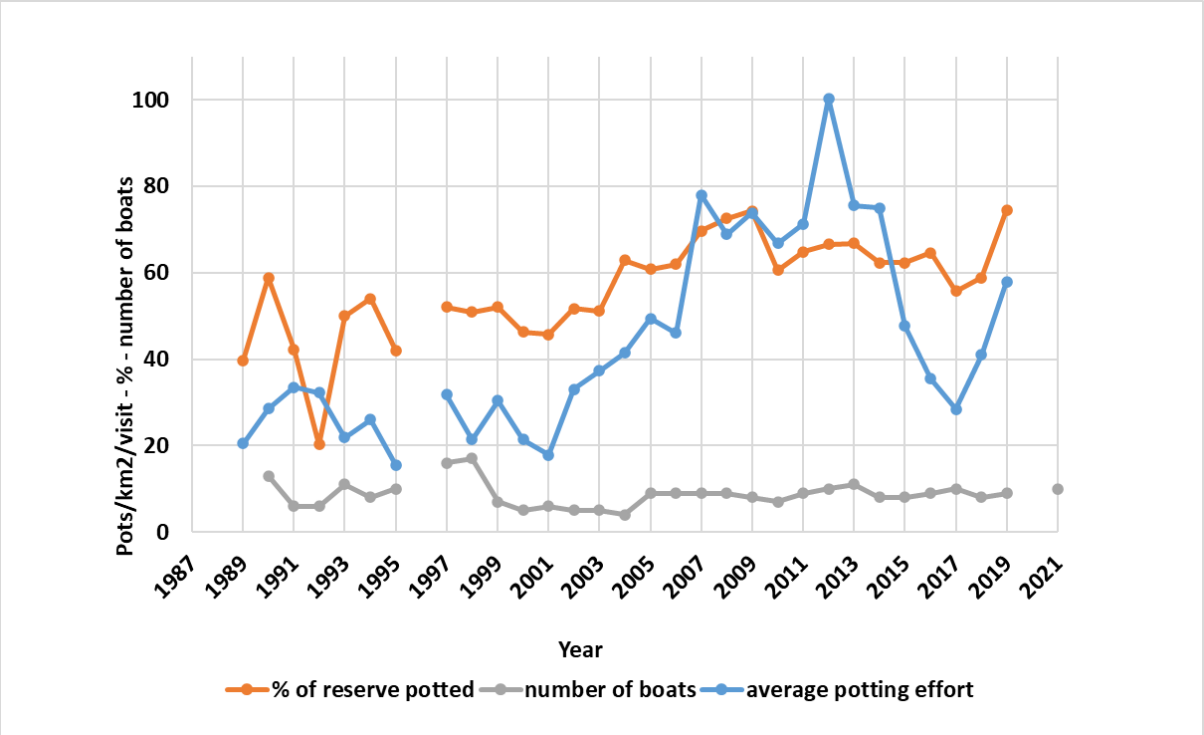
Litter has been picked up from Martins Haven beach and at sea throughout 2021. Sadly the annual clean-up with Skomer Island staff at the Wick was not able to go ahead due to covid rules.

7. Visitors and Use of the MCZ

7.1 Commercial use

Fishing vessels recorded (or whose gear was recorded) operating within Skomer MCZ during 2021 included *Warren Edwards* (M15), *Stephanie R* (M150), *Marie Louise* (M36), *Our Hazel* (M38) and *Martha Rose* (M75)

Figure 7.1 Summary of fishing effort within Skomer MCZ



The number of commercial fishing vessels operating within Skomer MCZ has remained constant over the past 15 years. However, fishing effort has increased substantially over the last three years to levels that are close to those for the peak year of 2012 and the proportion of the site that is fished is at an all-time high.

The distribution of fishing effort is shown in figure 7.2 and the potting intensity at the main Skomer MCZ survey areas from 1989 to 2021 is shown in figure 7.3.

The highest density of fishing taking place along the north-east coast of Skomer and around the Bull Hole area on the west coast, these areas cover a high proportion of the sea fan *Eunicella verrucosa* and ross coral *Pentapora foliacea* monitoring sites. Thorn Rock on the south side of the neck is is also the main sponge monitoring site, another fishing hotspot is along the north Marloes Peninsula, the location of two *Pentapora* sites.

Figure 7.2 Pot fishing intensity within Skomer MCZ 2021

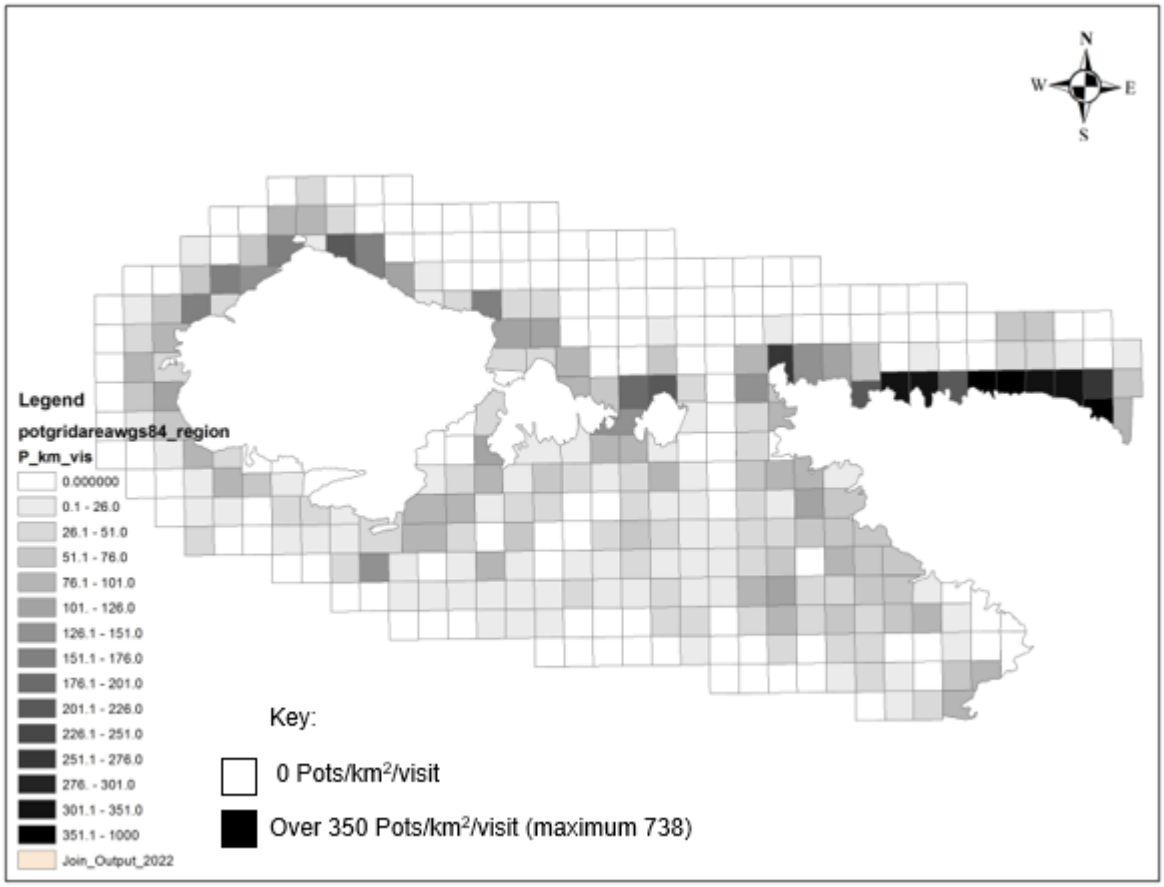
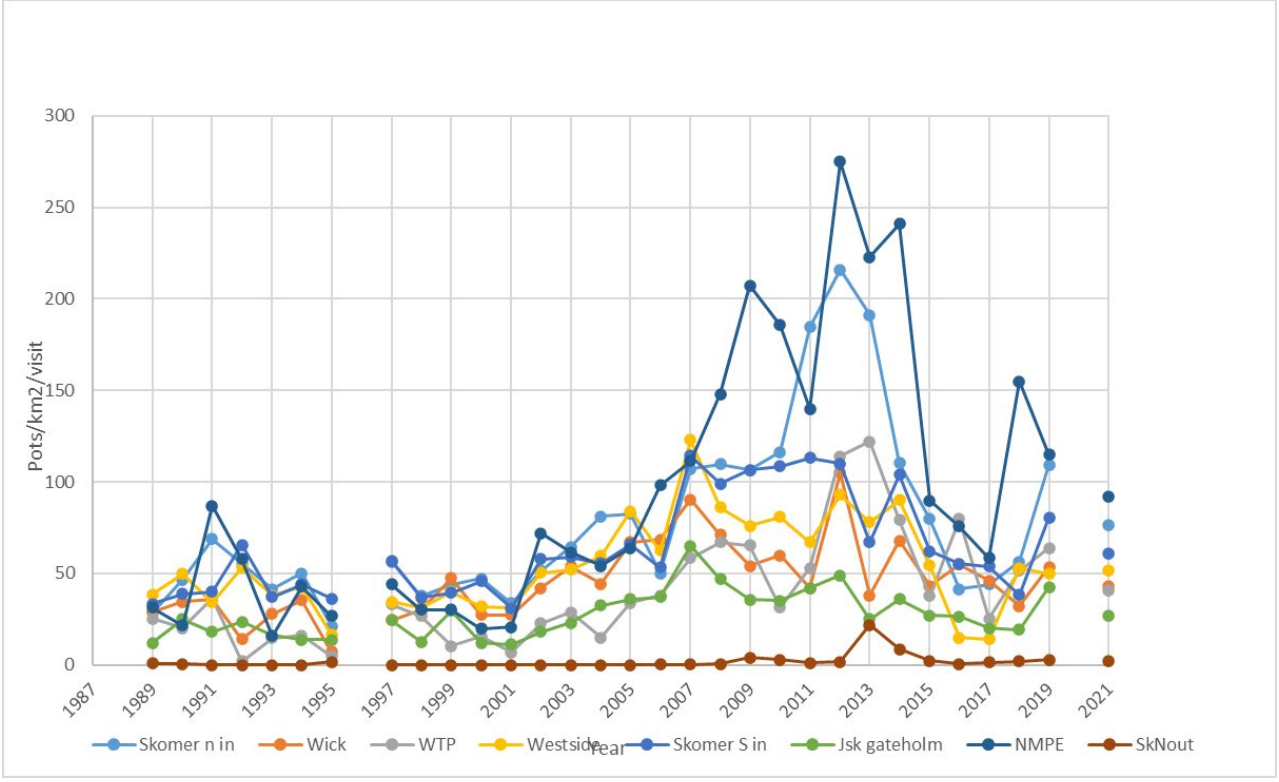


Figure 7.3 Potting intensity around Skomer MCZ split into the main monitoring areas 1989 to 2021

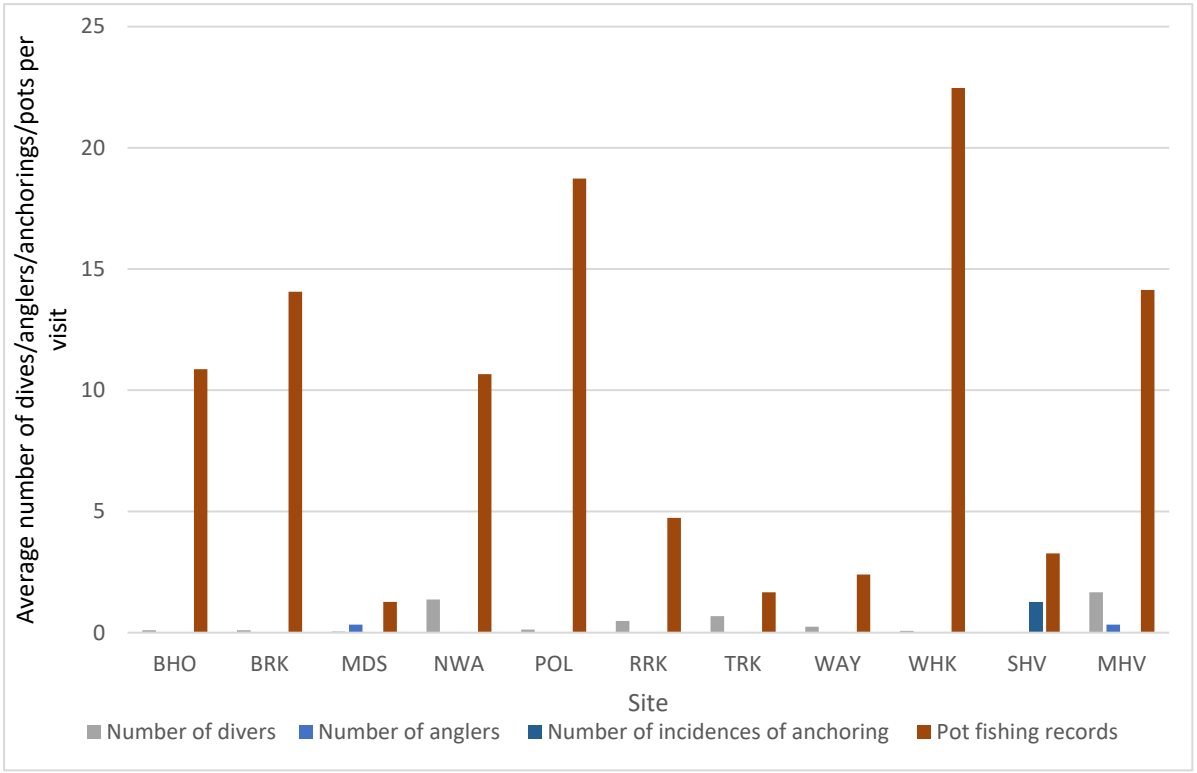


All activities in the MCZ during 2021 with the potential to make contact with the seabed that have been recorded at monitoring sites for fragile species (sea fan *Eunicella verrucosa*, ross coral *Pentapora foliacea* and erect sponge species) are shown in figure 7.4. Activities include numbers of divers, anglers, incidences of anchoring and pot fishing.

The data presented is corrected for differences in the numbers of days on which data were collected for different activities and at different sites to allow comparisons between years to be made. Data for South Haven (SHV) has been included for context as it is a highly popular (and permitted) anchorage. Diving numbers include Skomer MCZ monitoring dives.The activity most often recorded at all monitoring sites is lobster potting.

It should be noted that all data are likely to be an underestimate of actual activity, but more so for commercial fishing effort, which is only usually recorded once per week between May and September.

Figure 7.4 Seabed activity recorded at Skomer MCZ monitoring sites corrected for recording effort 2021.



Another major commercial presence at Skomer MCZ are sightseeing and other charter vessels. More effort is now going into recording these vessels due to their economic importance, but they have not yet been separated out from other vessel records.

Tanker movements within St Brides Bay have been logged for many years by Skomer MNR/MCZ staff and now automated methods are used to record use of this anchorage that lies within Pembrokeshire Marine Special Area of Conservation.

7.2 Recreational use

Recreational use of Skomer MCZ is presented in figures 8.3 to 8.6. Recreational use figures are lower for all activites in 2021 than in previous years and likely to be due to the reduced recording effort influenced by covid restrictions.

Recreational craft are recorded by both MCZ staff whilst out on the water and by Skomer island staff observations. In 2021 MCZ staff time on the water was reduced due to a late start in June of boat based work and we are indebted to the Skomer island records provided for April and May. Skomer island records also had reduced effort throughout the season due to reduced numbers of volunteers..

May, June and July continue to be the most active months for recreational craft and diver numbers. The highest number of boat anglers was recorded in May, whereas shore angler numbers were low but consistent through the season. It is expected that the number of shore anglers is higher as many come in the evenings and these are not recorded, this is also likely to be true for shore divers.

Figure 7.5 Recorded Recreational Use Skomer MCZ

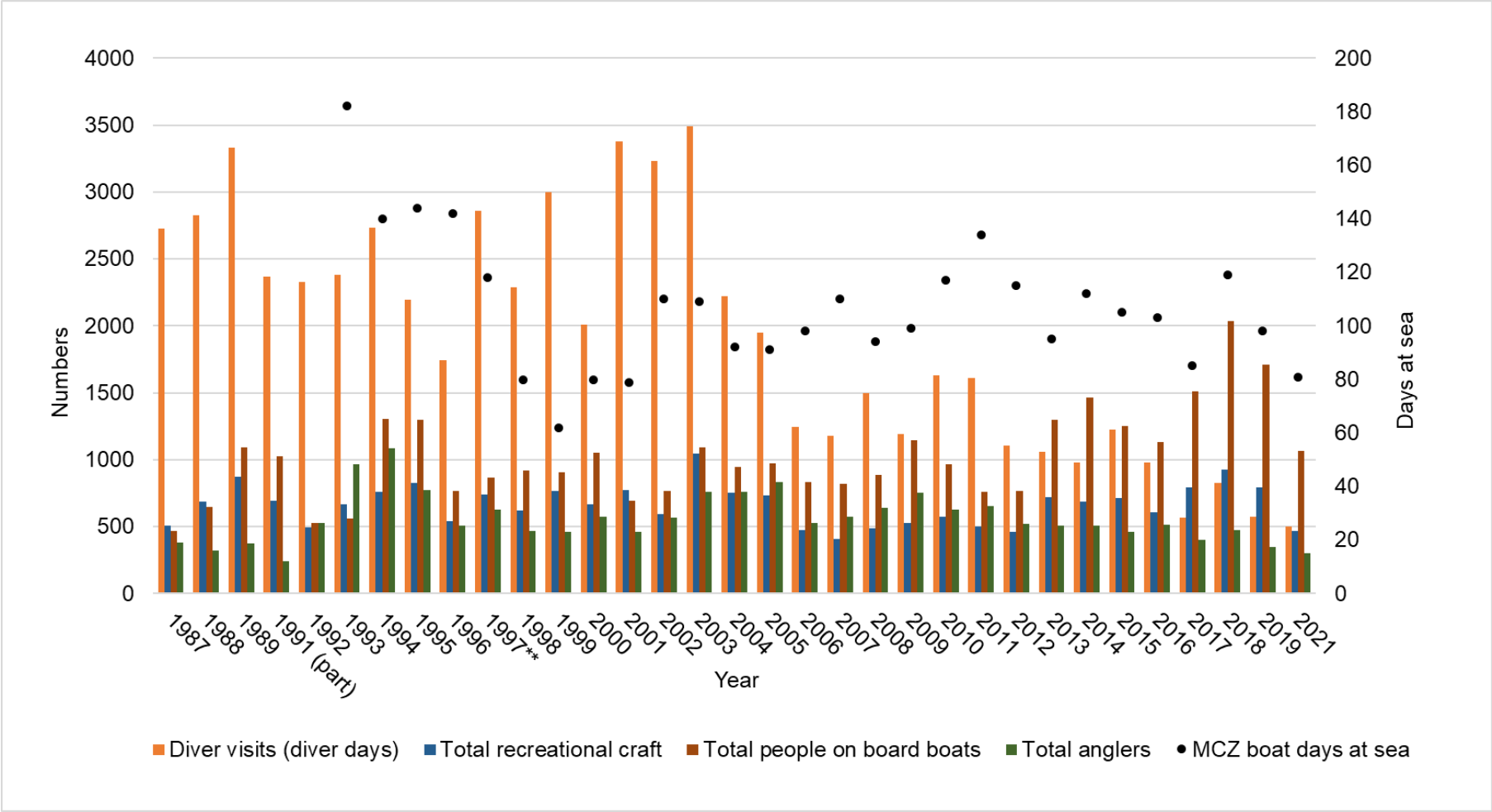


Figure 7.6 Skomer MCZ 2021 Recreational Craft

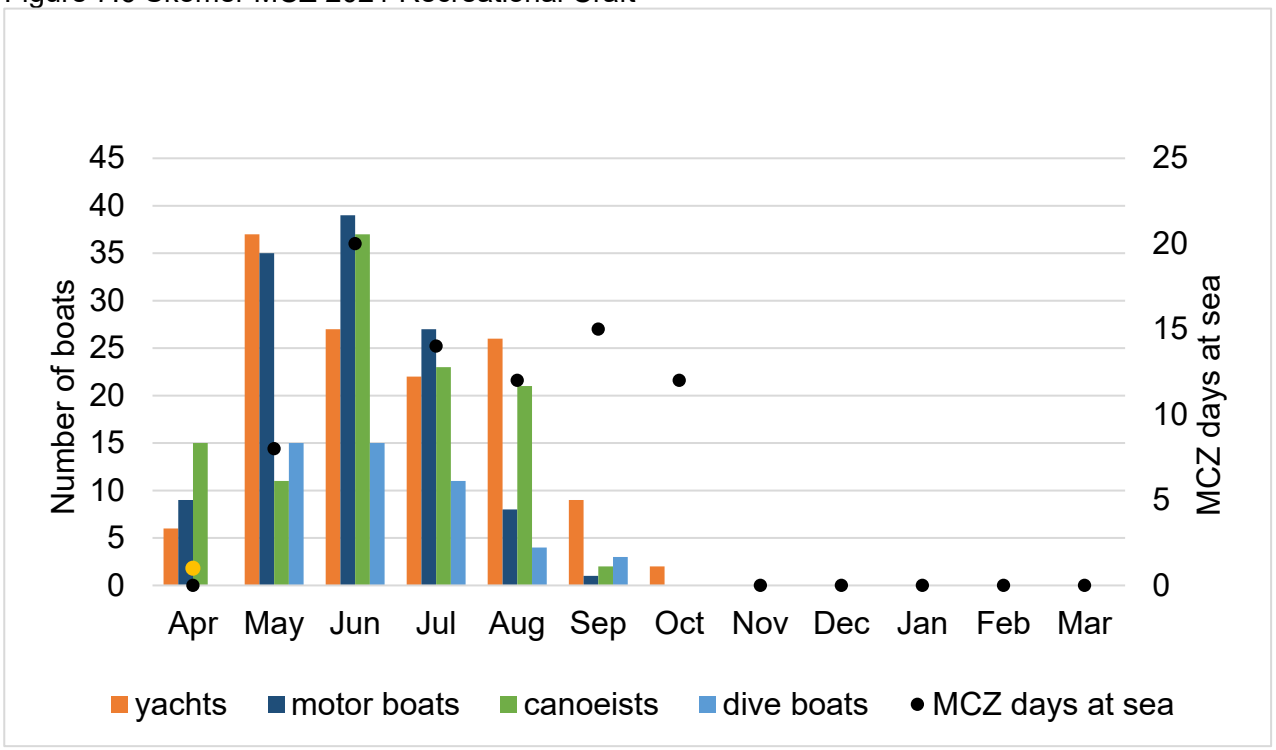


Figure 7.7 Skomer MCZ 2021 SCUBA divers

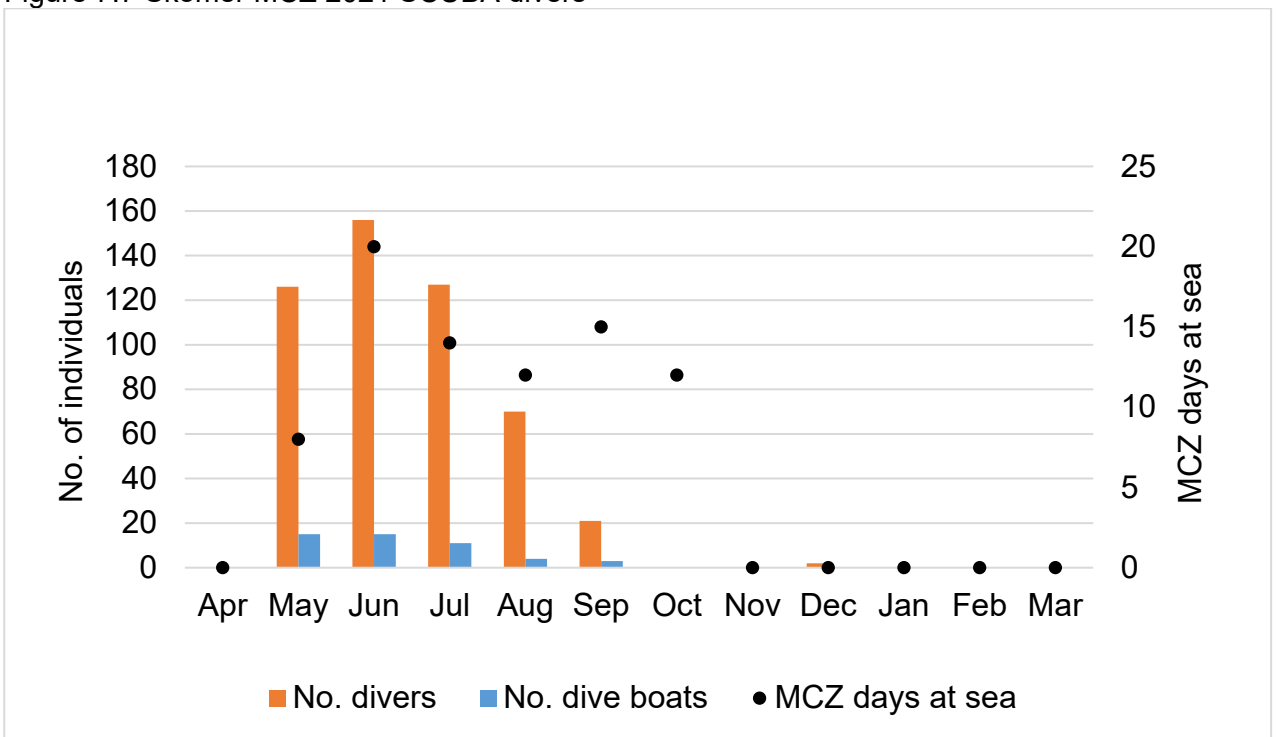
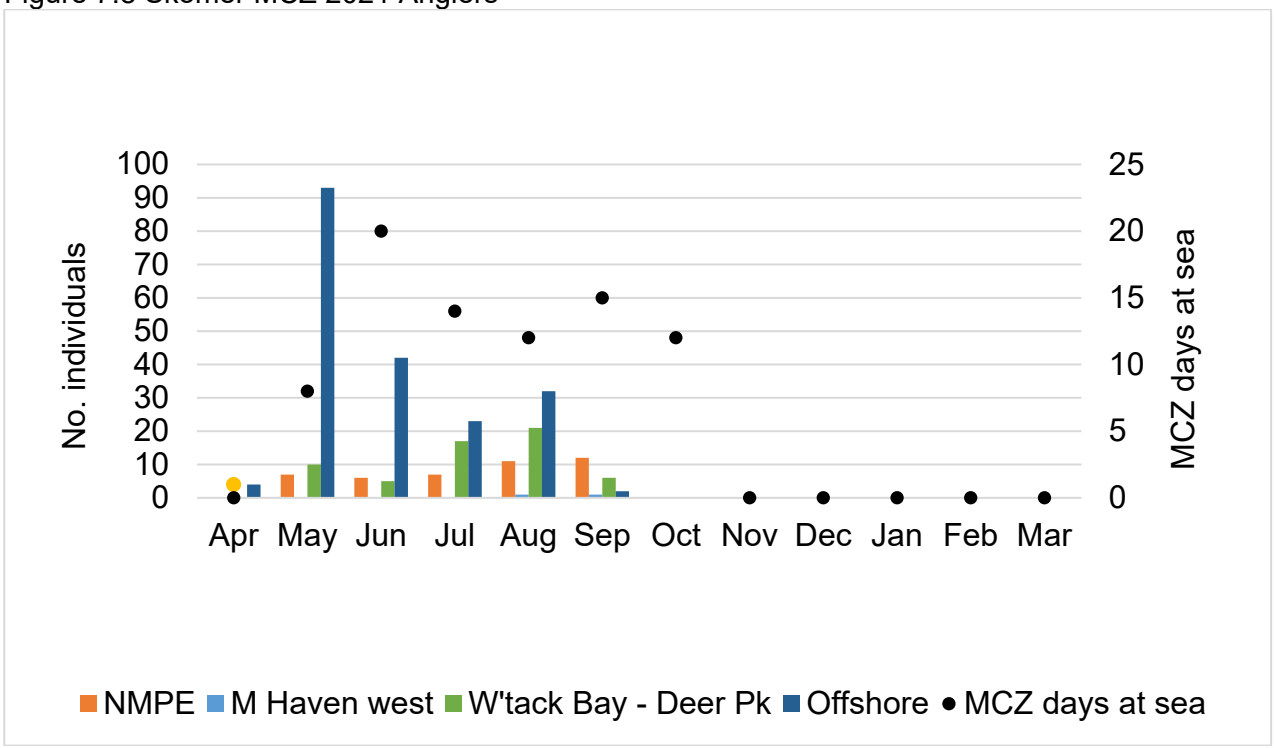


Figure 7.8 Skomer MCZ 2021 Anglers



8. Liaison and Advisory Committees

8.1 Advisory Committee

The Skomer MCZ Advisory Committee meeting was held virtually in May 2021, chaired by Dr Madeline Havard. The meeting worked well and it allowed a number of members to attend who often cannot come to the annual meeting due to other commitments and distance. At the meeting we were delighted to be able to thank Robin Crump for his huge input and service to the MNR/MCZ, and particularly for his great leadership as Chair of the Advisory Committee for the past 17 years.

27 members attended together with 4 MCZ staff. Members discussed a range of issues and presentations were made by MCZ staff to update committee members on MCZ management and monitoring work.

An update was provided on the MNR to MCZ transition by NRW staff on behalf of Welsh Government Marine Ecosystems and Conservation Branch. It has been 6.5 years since Skomer became an MCZ with a commitment of no reduced protection and still operating under the original MNR bylaws. The Advisory Committee were concerned with the delays with the transition process but there is reassurance that site management and core work at Skomer MCZ continues.

In October an Advisory Committee gathering was organised in Marloes village hall where members were able to thank Phil Newman in person for his 30 years dedicated work at the Reserve and wish him a happy retirement. Dale and Marloes Women's Institute were, as ever, pivotal to the success through the judicious application of cake.

8.2 Wildlife Trust South and West Wales

Skomer Island NNR Wardens Nathan Wilkie and Sylwia Zbijewska had their second season in charge of the Island in 2020 where they found themselves in lockdown and no vistors allowed to land on the island. The visitor officer and assistant warden were furloughed leaving Nathan and Sylwia to manage and complete the island monitoring work on their own. This included completing the monitoring of seals on Skomer under contract to NRW (see Section 9.1 and Appendix 1).

In 2021 Leighton Newman became the new warden with Ceri Aston as assistant warden. Leighton had previously worked as the islands visitor manager so was already familiar with the workings of the island. In August Bee Buche returned to the island to complete the seal monitoring on Skomer, Bee's experience was welcome as she had completed this work previously when she worked as the island warden.

MCZ staff also liaised with the wardening staff on Skokholm during MarClim intertidal surveys (see Section 10.4) and with the Pembrokeshire Islands Manager Lisa Morgan both locally and via the Advisory Committee.

8.3 Welsh Government Marine Enforcement

Skomer MCZ staff did not make contact with Marine Enforcement staff in 2021, which could be taken as a positive in that there were no observations of fishery byelaw infractions for us to report.

8.4 Pembrokeshire Coast National Park

Skomer MCZ staff continue to liaise with Pembrokeshire Coast National Park (PCNPA) staff locally and via the Advisory Committee.

8.5 National Trust

Liaison with National Trust staff continues through the Advisory Committee and also directly with Matt Thompson, local Ranger, and Mark Underhill.

Kate Lock provided advice to Jame Roden, Lead Ranger in North Pembrokeshire regarding the management of the Blue Lagoon at Abereiddy during the seal pupping season.

National Trust seal signs were put up at Martins Haven to inform visitors on how to minimise disturbance (see Section 6.3.7)

8.6 Academia

A number of academic institutions and students have worked with MCZ staff during 2020 and 2021.

Jess Vevers, a masters student at Swansea University worked on the North wall rocky reef community photo dataset that commenced in 1982. All images were analysed using BIIGLE which is used for underwater imagery analysis with the aim to investigate temporal changes. See appendix 1 for report abstract.

James Middleton, an undergraduate student from Cardiff University collated all the cetacean records from the MCZ from 3 sources; Skomer MCZ staff, Skomer NNR and Dale Princess records. The data was corrected for observer effort and analysed for temporal and spatial trends. See appendix 2 for report abstract.

In 2021 MCZ staff provided boat support for a Bangor University research project field testing an Remote Operated Vechicle (ROV) to assess scallop densities. Video was taken along along transects lines and will be used to count the number of scallops comparing to Seasearch volunteer divers counts completed along the same transects.

8.7 Other organisations and individuals

Visitors to the Skomer MCZ in 2021 were limited to covid rules restricting people both in the office and on the boats. NRW chief executive Clare Pillman on her holiday to Pembrokeshire was unable to have her annual visit on the boat patrol but did meet up with Phil and Jen for tea in a local café.

The second generation “Sea-Hives” continue to be deployed at OMS and having survived the winter appear to still being colonised successfully by a variety of marine organisms. These modular glass structures are intended to provide shelter to marine organisms and provide a foothold for natural habitats to re-establish in damaged seabed areas. This project is one of a number we have carried out over the years where there is no impact on the MCZ and where the minimal amount of effort is required on our behalf to collaborate in innovative work.

Figure 8.1 Sea-Hives at OMS site

NRW colleagues formerly known as the Fishery Assessment Team have continued to provide valuable support for our work in monitoring the eelgrass bed in North Haven by providing an annual estimate of the extent of the bed using their acoustic imaging systems as shown in figure 8.2. This supplements the 4-yearly volunteer diver surveys (last carried out in 2018). In 2021 the method was also used to test out mapping kelp areas in North Haven, figure 8.3.

Figure 8.2 Mapping the eelgrass bed in North Haven using acoustic imaging systems 2018, 2019 and 2021.

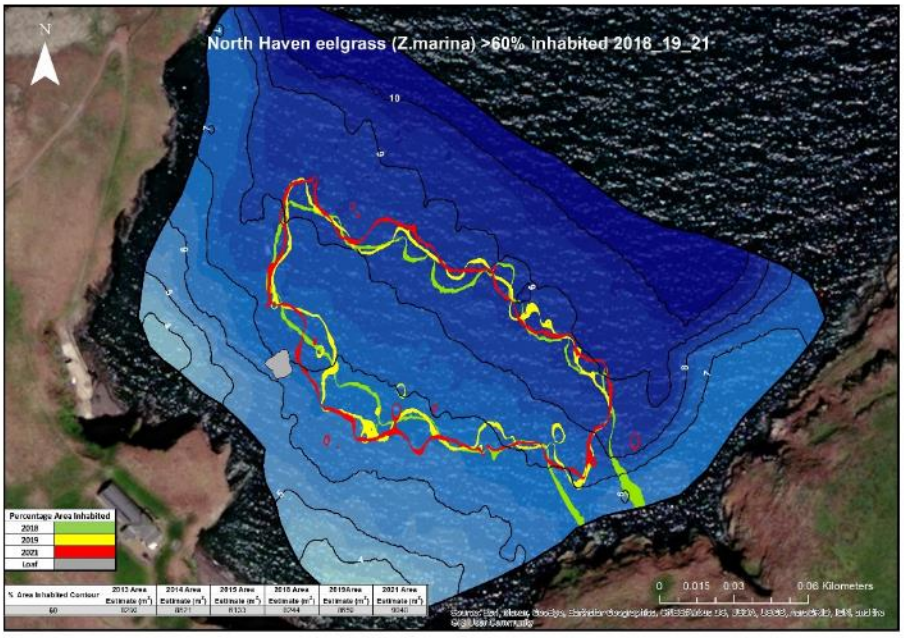
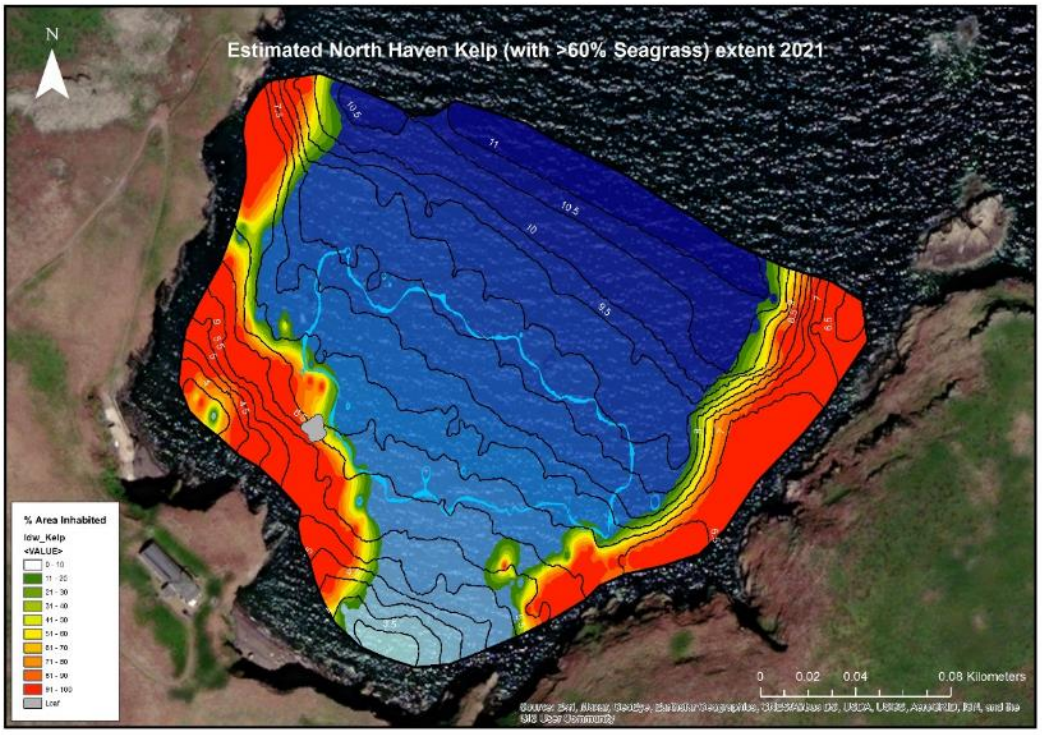


Figure 8.3 Mapping the kelp in North Haven using acoustic imaging systems 2021.



The local community has continued to be very supportive of the Skomer MCZ team, helping to protect the MCZ by reporting potential incidents and by their active participation in the Advisory Committee.

Skomer MCZ has worked with Pembrokeshire Coastal Forum, and Kate was a speaker at online events to both the public and water-based activity providers organised in 2020.

Other organisations and individuals that Skomer MCZ staff have worked alongside include the National Coastwatch Institution, who maintain watches at the former Coastguard lookout on the Deer Park.

8.8 Wider marine environmental initiatives

Kate continues to be the local coordinator for the Marine Conservation Society Seasearch volunteer diving surveys that continue to make valuable additions to the knowledge of our marine habitats in Wales (and the UK).

9. Science

All science monitoring and recording projects completed in the 2021 season are reported in detail in the Skomer MCZ Project Status Report 2021/22 (NRW evidence Report number 589), which is available via the NRW website. A brief summary of these projects are provided below.

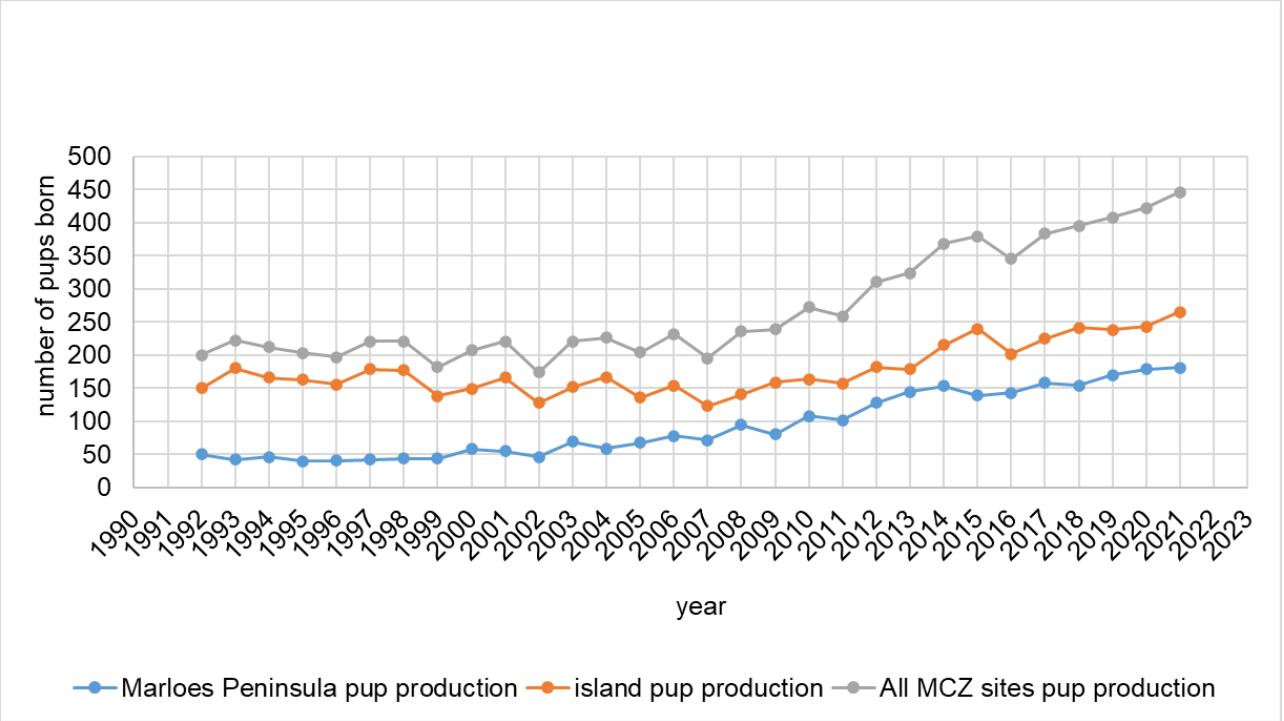
9.1 Biology

9.1.1 Monitor Seals

Grey seal monitoring was carried out for Skomer Island sites by Wildlife Trust of South and West Wales workers under contract to NRW (see Appendix 1 for the contract report executive summary). Sites on the mainland within the MCZ were monitored by the NRW Skomer MCZ team.

In 2021, 265 pups were born at Skomer Island sites and 181 pups at mainland sites giving a total of 446 pups born in the MCZ.

Figure 9.1. Skomer MCZ pup production 1992 - 2021



Pup production in the Skomer MCZ for the past 5 years has shown the highest totals recorded for the area with average production for 2017-21 at 410 pups. The pup production from 1992 to 2008 remained fairly consistent, within expected natural fluctuations, and with an average of 208 pups. Since 2009 there has been a steady increase in pup production at both the island and mainland sites.

In 2021, pup survival through to moult was recorded as 74% for Skomer sites and 79% for Marloes Peninsula sites, with a combined survival for the Skomer MCZ of 76%.

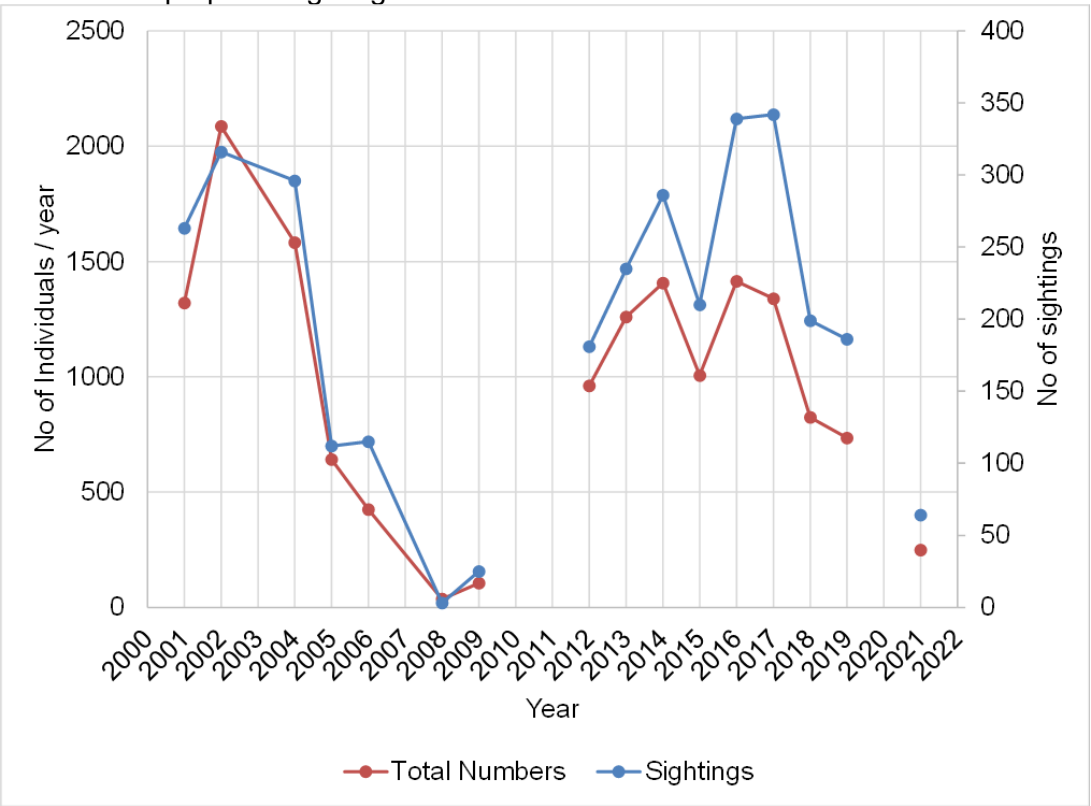
Monofilament line and netting were the most obvious pollutants affecting seals in 2021. 40 individual seals on Skomer (four males, 32 females and four immatures) were photographed with obvious signs of being entangled in nets at some time in their lives, most commonly a deep scar around their necks, often with netting still embedded.

9.1.2 Monitor Cetaceans

MCZ staff collate all sightings of cetaceans collected by Skomer Island staff, MCZ staff and *Dale Princess* crew.

The total numbers of harbour porpoise sightings between 2001 and 2021 is shown in figure 9.2.

Figure 9.2 Harbour porpoise sightings Skomer MCZ 2001 - 2021



Common dolphin (*Delphinus delphis*) use the area infrequently but they can appear in large numbers. In 2021 sightings were made by Skomer Island staff, most being seen off the Garland stone and Skomer head.

There were no sightings of Bottlenose dolphin (*Tursiops truncatus*) or Risso's dolphin (*Grampus griseus*) within the MCZ in 2021

9.1.3 General Species recording

There are many species in the Skomer MCZ that do not have a dedicated monitoring project. However, it is important that species lists are maintained, particularly for phyla that are under-recorded or of particular conservation importance. Recording of species of principal importance as defined under Section 7 of the Environment Act (Wales) 2016 and

‘Alien’ invasive and non-native species (INNS) are just two examples. Records are entered into the JNCC-administered Marine Recorder database for acces via the National Biodiversity Network on-line gateway. General recording of unusual, rare, scarce or vagrant species are also maintained.

Sunfish *Mola mola* was recorded in August 2021.

Crawfish *Palinurus elephas* became a national Biodiversity Action Plan species in 2008 and is an Environment Act (Wales) 2016, Section 7 species of principal importance. From 2009 to 2021 it was recorded in low numbers in Skomer MCZ by staff and volunteers. These records have been submitted to the i-record online recording scheme in an effort to gain better knowledge of the current status of this species in the UK.

Figure 9.3 Crawfish, *Palinurus elephas*

9.1.4 Monitor Littoral Habitats / Communities

Littoral habitat and community surveys are completed using different methods at a range of sites as summarised in table 10.3. Viewpoint photos are also taken to provide long term records of shore condition. In 2020 and 2021 only Marclim fieldwork was completed

Table 9.1 Summary of methods completed at each littoral site.

Site	Permanent Quadrats	Shore zone quadrats, Limpets, Barnacles	Lichen quadrats	MarClim	Shore clingfish
North Haven	No	No	No	Yes	Yes
South Haven	Yes	No	No	Yes	Yes
South Stream	Yes	Yes	Yes	No	No
The Lantern	Yes	Yes	Yes	No	No
The Wick	Yes	Yes	Yes	No	No
Double Cliff	Yes	Yes	No	No	No
Pig Stone	No	Yes	Yes	No	No
Wooltack	No	Yes	Yes	No	No
Martins Haven	No	Yes	Yes	Yes	Yes
Hopgang	No	No	Yes	No	No

The MarClim project offers an opportunity to compare Skomer MCZ shores to the rest of the UK and contribute to the assessment of the effects of climate change on shore communities. Martins Haven, North Haven and South Haven were selected as suitable sites for the project. Community Temperature Index (CTI) is used to look for temperature related changes in communities. The CTI scores derived from Marclim data for the 3 shores surveyed at Skomer show no significant change averaging a CTI of 12ºC which would match the ambient sea surface temperatures (from temperature probes at Skomer MCZ) for the same period. This result shows there is no evidence of any shift in the community due to climate change.

9.1.5 Plankton Recording

Zooplankton samples continued to be taken at Skomer MCZ in 2021 using methods recommended following a review by Plymouth Marine Laboratory in 2014. Zooplankton sampling was completed alongside the collection of phytoplankton samples using the Water Framework Directive methodology. This also included the collection of nutrient and chlorophyll samples.

Zooplankton identification was conducted by the Marine Biological Association (MBA) and data entered into the DASHH Pelagic Lifeforms Tool. The annual variation of major zooplankton groups showed that in 2021 general abundances were lower for all groups except decapods.

Phytoplankton identification is currently being completed by CEFAS. The adoption of the WFD methodologies will allow results to be compared with samples all across the UK.

9.1.6 Monitor Sponge Assemblages

In 2021 quadrats at all sponge monitoring transects were photographed.

Improvement in image quality and resolution has meant that more sponge entities have been recorded from 2009 onwards than in previous years. However, in 2012 and 2014 there was a noticeable drop in the numbers of sponges across all transects. In 2019 all sites decreased in abundance, despite good image quality. This lower number was still present in 2021.

Statistical analysis of what types of sponge (based on their morphology) make up the communities at Skomer shows similar results to previous years.

The sponge assemblage at Thorn Rock is a “hot spot” for sponges within the MCZ. The community at Thorn Rock is quite dynamic in terms of total number of sponges visible but the overall community structure appears stable.

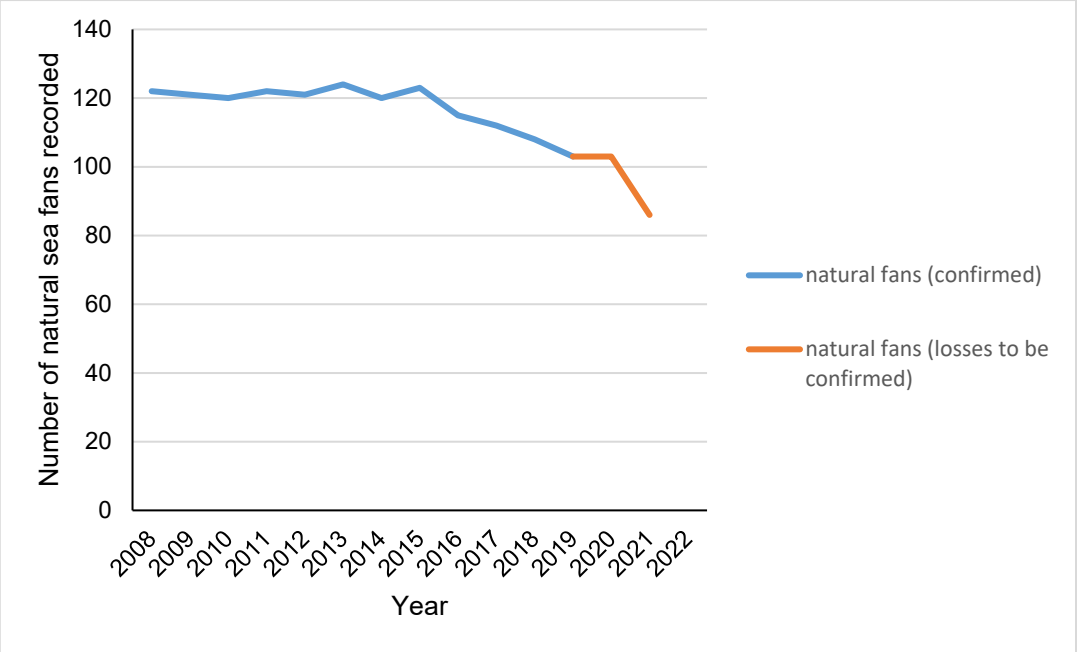
9.1.7 Monitor Pink Sea Fan Population

All sea fan monitoring sites were visited and individual colonies were photographed in 2021.

A total of 36 losses of natural sea fans and 6 losses of artificially attached fans have been recorded throughout the period of this project. In 2019, six natural sea fans and two of the

cluster of baby fans at Bullhole were missing, in 2021 three of these sea fans and the two baby fans at Bullhole were confirmed as losses. Fourteen additional fans were absent in 2021, and the last of the original 5 Bullhole baby fans. These will be checked, and their status confirmed in 2022.

Figure 9.7. Total number of natural sea fans recorded 2005 to 2021 (artificially attached sea fans not included in this data)



In 2016 'Bullhole 22' was reduced to a stump, however, new growth was observed in 2018 and this growth has continued in 2021. Other fans which have been lost but where a base or stump is still present are being checked for any new growth.

Sea fan condition assessment methods were reviewed in 2021. The full data set was revisited to track the condition of each individual sea fan and to assess the overall condition looking at levels of necrosis, epiphytes growing on the fans, damage and branch loss and entanglement of catshark eggs. Further analysis of the data is required but preliminary findings are detailed in the Skomer MCZ Project Status Report 2021/22.

In 2022 a desktop study to review pink sea fans in Wales has begun by contractors through the Natur am Byth project. The Natur am Byth partnership is Wales' flagship Green Recovery project. It unites nine environmental charities with NRW to deliver the country's largest natural heritage and outreach programme to save species from extinction and reconnect people to nature. The marine programme which includes the pink sea fan is being led by Marine Conservation Society

The study aims to collate current information on techniques suitable for sea fans restoration in Wales, including possible management options for natural recovery as well as more active restoration techniques. The study will use Skomer MCZ sea fan data to look at growth, spawning, sex ratios and genetic connectivity. Consideration will also be given to known information regarding factors that could impact sea fan restoration including disease and impacts (e.g. shark egg entanglement and anthropogenic seabed activities). The researchers will work closely with MCZ staff and a virtual workshop with

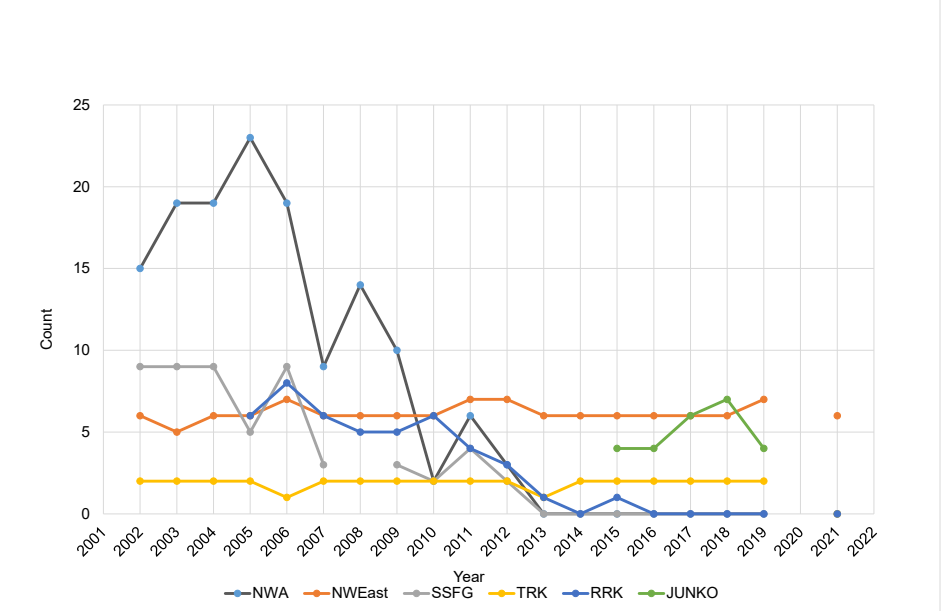
stakeholders planned for May/June 2022 will be used to highlight outputs of the review and determine how best to proceed with recovery options developed with the stakeholders.

9.1.8 Monitor Alcyonium glomeratum Population

The abundance of *A. glomeratum* at the monitoring sites continues to decline at all sites except for Thorn Rock and Junko's reef, which have sizable colonies. North Wall main, Rye Rocks and Sandy sea fan gully now have no visible colonies.

The reason for this decline is unknown. There is no evidence of disease or physical damage at the monitoring sites and changes in environmental conditions are not thought to be significant enough to cause colony loss.

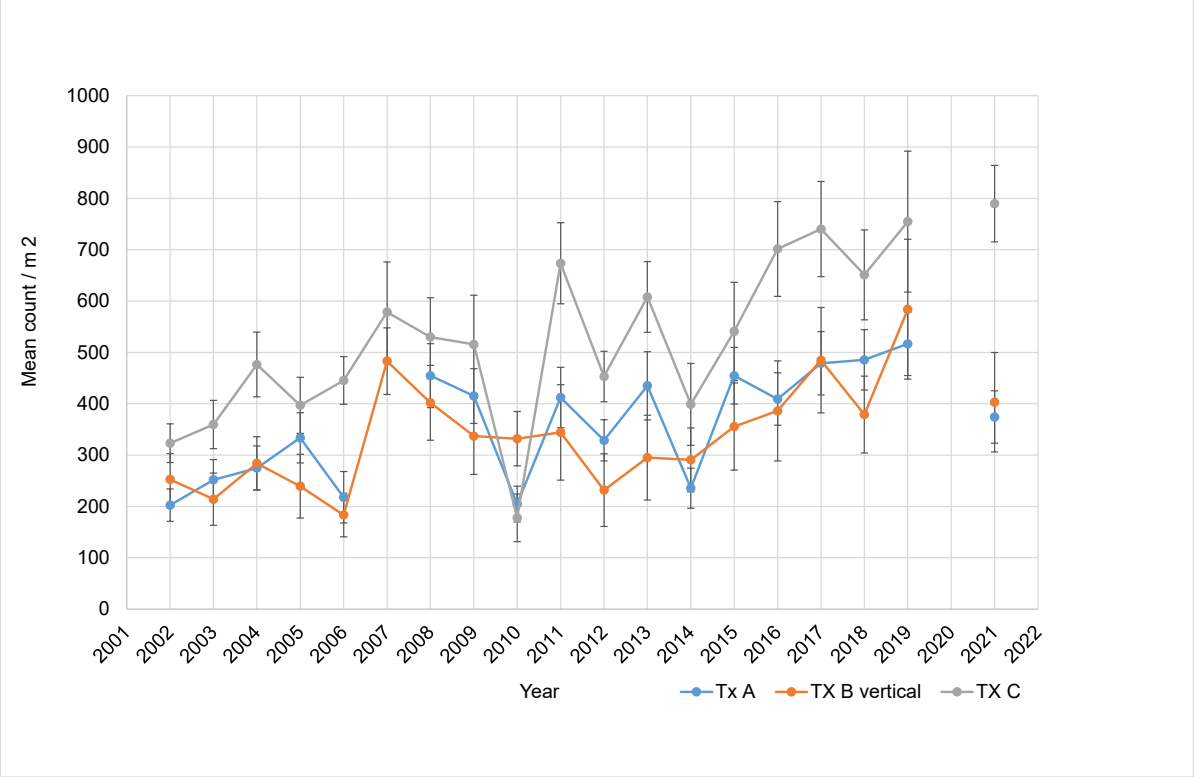
Figure 9.8 Number of quadrats with *A. glomeratum* present at Skomer MCZ sites 2002 – 2020.



9.1.9 Monitor Cup Coral Populations

Quadrats were photographed for both Devonshire cup corals (*Caryophyllia smithii*) and the Lusitanian scarlet and gold cup coral (*Balanophyllia regia*).

Figure 9.9 *Balanophyllia regia* abundance at Transects A, B and C at the Wick

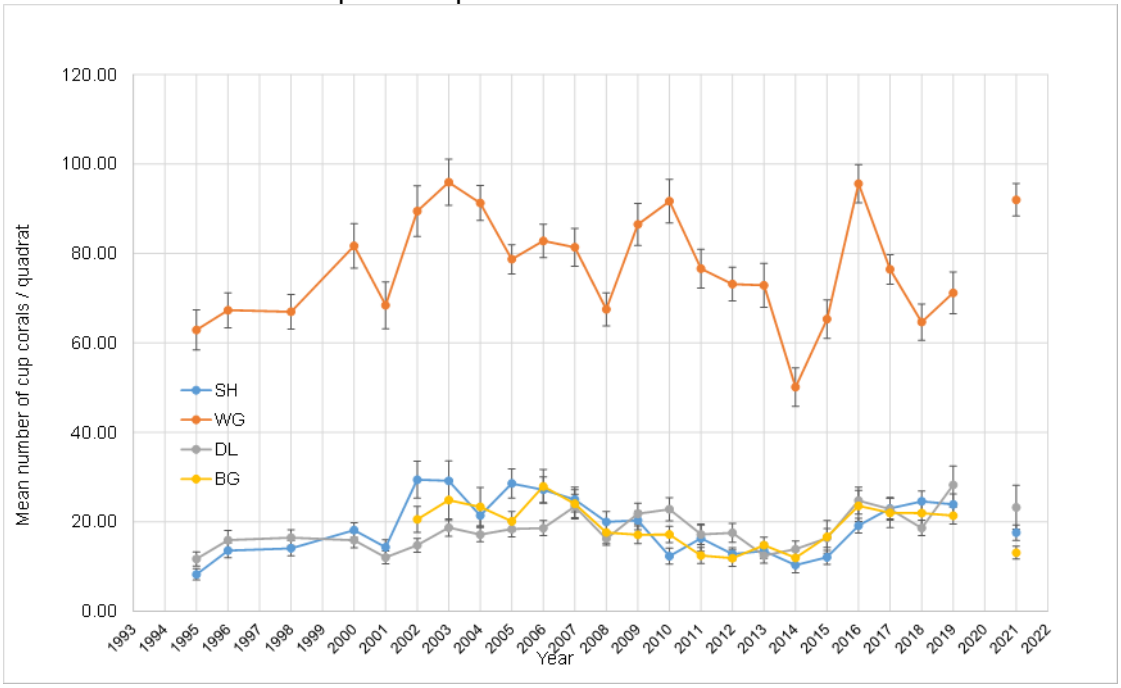


The average number/m^2 of *B. regia* has fluctuated at transects A, B and C. The variability is most likely to be caused by variations in the covering of silt across the site from year to year. Deep silt can hide individual cup corals and occasionally cause very poor photographic conditions (e.g. 2010). Some evidence of a general increase in cup coral population between 1998 and 2021 can be seen for the Wick and for Thorn Rock.

Caryophyllia smithii

The average number/m^2 of *C. smithii* has fluctuated at each of the Thorn Rock sites. This may be due to variable levels of surface sediment affecting the actual numbers visible during recording. The Windy gully (WG) quadrats show significantly higher counts compared to the other sites. This is most likely due to it being the only vertical wall site where less surface sediment accumulates. The other three sites are all on horizontal rock.

Figure 9.10 Mean Number of Cup Corals per Quadrat at Thorn Rock 1996 - 2021

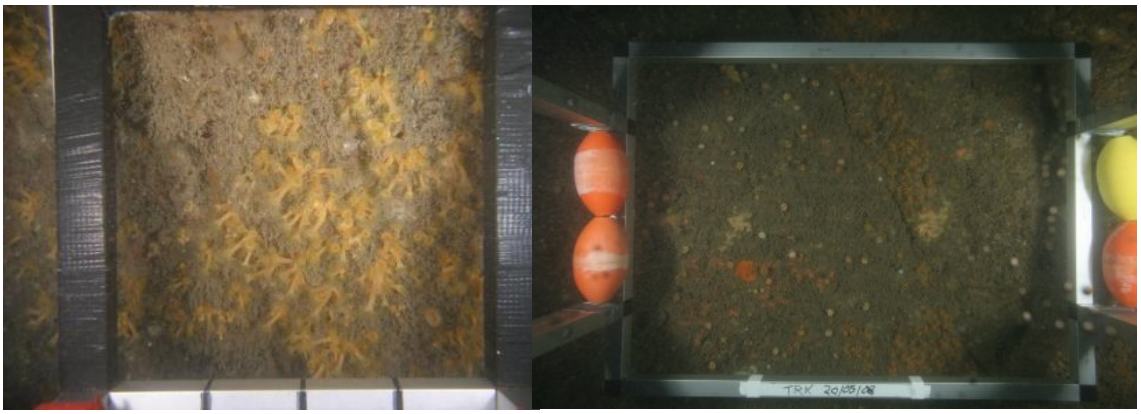


The drop in abundance in 2018 is notable as the silt levels were very low and the photograph quality was very good. It is not known how long these cup corals live and how variable their numbers are.

9.1.10 Monitor *Parazoanthus axinellae*

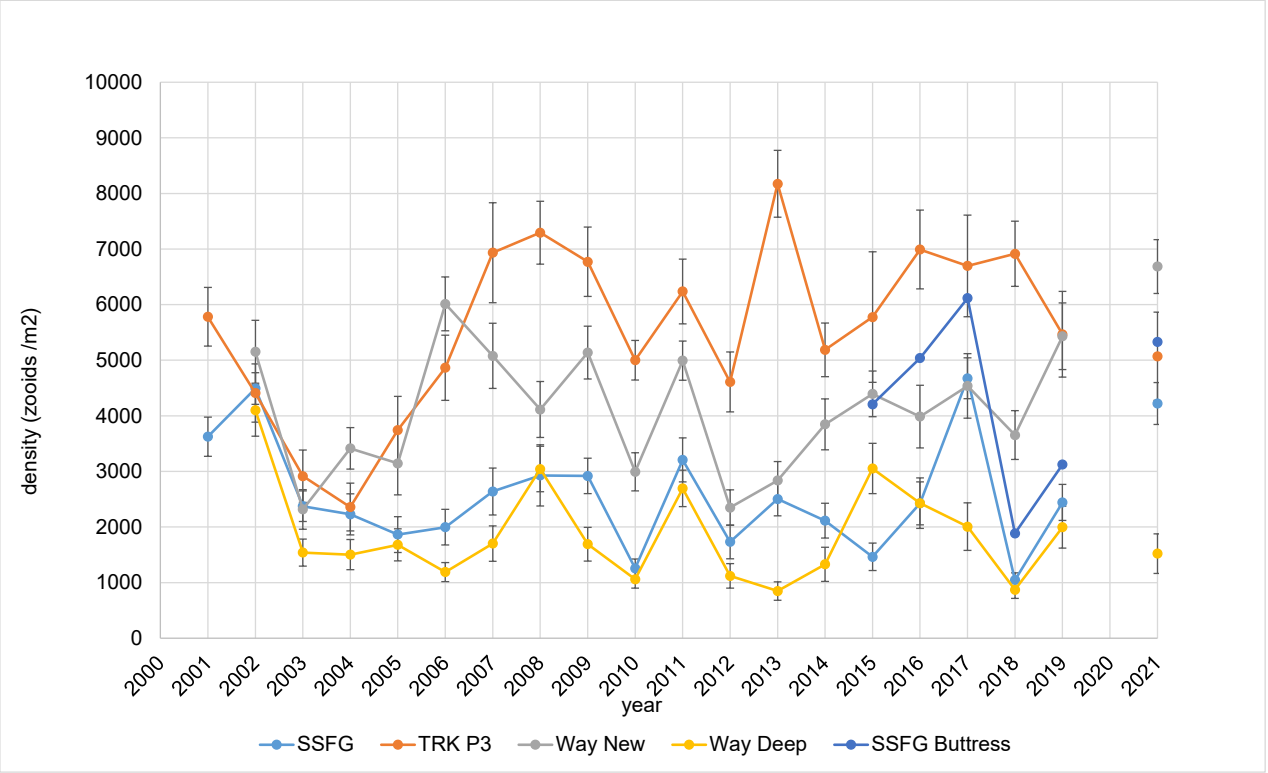
All monitoring sites were visited and all yellow trumpet anemone, *P. axinellae* colonies were still present.

Figure 9.11 Density method: 20 x 20cm framer and Colony area method: 50 x 70cm framer



The mean density of *P. axinellae* polyp (numbers of polyps /m^2) at all sites has shown fluctuations year to year, but overall show a stable density. In 2021 there was a slight decline in density recorded at Thorn Rock (TRK) and Way Deep sites, whereas an increase in density was recorded at both Sandy Seafan Gully (SSFG) sites and Way New.

Figure 9.12 Density of polyp (numbers of polyps /m^2) at Skomer MCZ sites 2001 to 2021



The frequency of *P. axinellae* at all sites has shown fluctuations year to year, but overall show a stable population. In 2021 little change was observed of colony coverage except at Thorn Rock mooring where a sharp decline was recorded, this is not of great concern as this is a small colony that has fluctuated in size over the years.

9.1.11 Monitor *Pentapora foliacea* Population

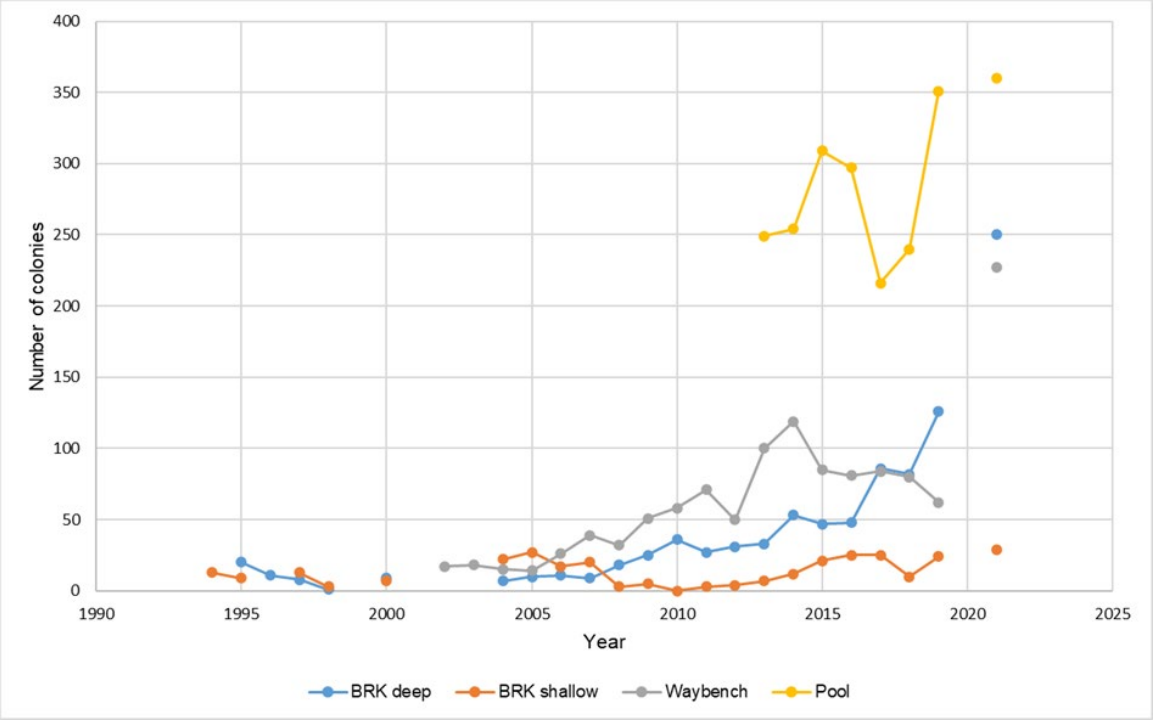
In 2021 all *Pentapora* sites were visited and photographed. The classification system developed in 2006 and revised in 2010 has been used to characterise the population at Skomer.

Figure 9.13. *Pentapora foliacea* - examples of Class 4 and Class 5b colonies.

By comparing numbers of class 2-4 colonies, which represent healthy growing colonies, with class 5 colonies, which represent those with deterioration from either natural or anthropogenic factors, it can be demonstrated that there are more class 2-4 colonies than class 5, which might indicate a population with more healthy growing colonies than degraded colonies. However, without comparing this ratio to that for an unimpacted area of seabed, no definite conclusion can be made.

Waybench, Pool and Bernies Rock are the largest sites surveyed, the total number of colonies (all classes) recorded in each survey year is shown in Fig 37. The total numbers recorded at each of these sites increased between 2019 and 2021.

Figure 9.14 Total number of *Pentapora foliacea* colonies (all classes) recorded for each year surveyed at Waybench, Pool and Bernies Rock.



9.1.12 Sediment Infauna Communities

A sediment infauna survey was completed in 2020 with field work completed by the EA Coastal Vessel at the 12 established sampling stations in the Skomer MCZ.

The average species richness, average number of individuals and average taxonomic diversity for Skomer MCZ for surveys completed from 1993 to 2020 is shown in the following table.

Table 9.2. Average species richness, average number of individuals and average taxonomic diversity at Skomer MCZ.

Year	Species richness	Average number of individuals	Average taxonomic diversity
1993	310	580.1	48.6
1996	246	175.7	47.4
1998	368	704.6	56
2003	382	773.4	57.3
2007	506	1304.2	70.4
2009	517	915.6	75.7
2013	491	784.4	73.5
2016	427	708.0	64.9
2020	532	1046.5	76.4

The 2020 survey had the highest number of species and a high abundance of individuals Since 2007 there have consistently been 400+ species recorded in each survey.

9.2 Meteorology/Oceanography

9.2.1 Record Meteorological Factors

Weather data at Skomer MCZ continues to be collected via an automatic weather station, which is compatible with other Environmental Change Network sites across Wales.

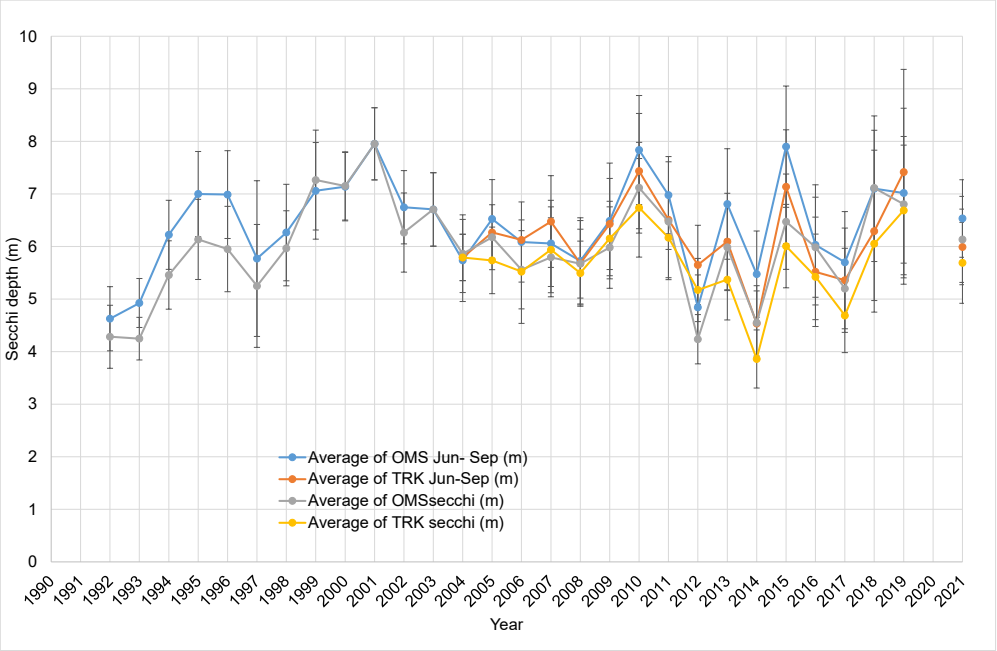
Table 9.3 The highs and lows of temperature and wind recorded in 2021:

Maximum temperature (‘C)	26.8 (July)
Minimum temperature (‘C)	-2.03 (February)
Annual maximum gust (knots)	93.2 (December)
Direction of maximum gust (degrees)	210

9.2.2 Monitor Seawater Turbidity / Suspended Sediment

Seawater turbidity was measured using a Secchi disk weekly between May to October at Thorn Rock and 20 times at OMS. Turbidity at Skomer MCZ in 2021 was average when compared with previous years. TRK and OMS follow a very similar trend over time suggesting that the waters on the north and south side of the island are well mixed.

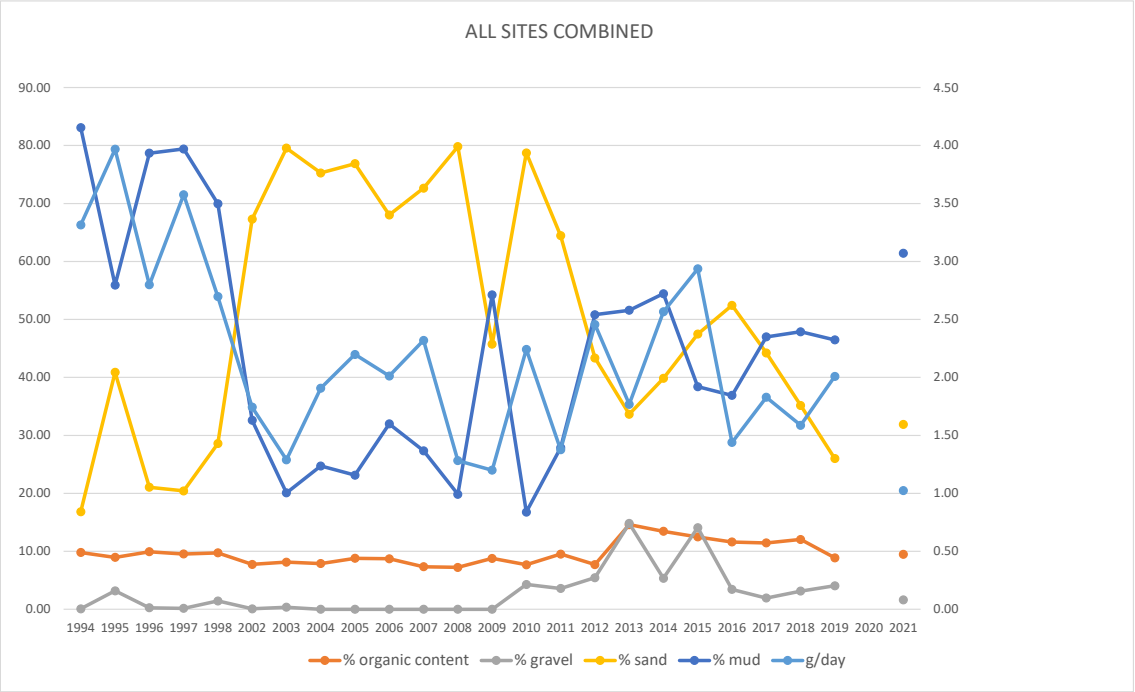
Figure 9.15 Skomer MCZ summary of annual mean Secchi disc data (m) with 95% S.E. bars



9.2.3 Monitor Seabed Sedimentation

Seabed sedimentation samples were collected at OMS and Thorn Rock sites using passive sediment traps. Analysis of the samples is carried out by NRW laboratories for dry weight, organic content, grainsize analysis and metal content.

Figure 9.16 Skomer MCZ sediment trap sample total sediment, PSA and organic content analysis at OMS and Thorn Rock sites combined



In general mud-sized particles have increased as a proportion of the total sediment since 2009, whereas the proportion of sand has reduced.

9.2.4 Record Seawater Temperature

Seawater temperature data was collected from an automatic logger located at 19m below chart datum at the OMS site and from vertical temperature, salinity profiles carried out from surface to near seabed at the same time as plankton sampling.

Maximum and minimum seabed temperature from the logger are presented in Table 9.3.

Table 9.3 Maximum and minimum seabed temperature from OMS logger

Year	Minimum Temperature (‘C)	Maximum Temperature (‘C)
2000	8.4	16.27
2001	7.27	16.3
2002	8.7	15.1
2003	7.6	17.1
2004	7.7	16.76
2005	7.36	16.4
2006	7.5	16.3
2007	8.8	16.3
2008	8.4	16.3
2009	7	16.8
2010	6.9	16.8
2011	7.6	15.9
2012	8.0	16.6
2013	6.98	16.82
2014	8.14	16.72
2015	7.8	15.98

Year	Minimum Temperature (‘C)	Maximum Temperature (‘C)
2016	8.5	16.8
2017	8.3	16.4
2018	6.6	16.6
2019	8.7	17.2
2020	8.4	16.3
2021	7.3	Logger not retrieved

The logger deployed October 2019 was retrieved in June 2021 and a replacement logger deployed, this logger has yet to be retrieved so the 2021 maximum temperature is still unknown.

9.3 Data handling developments

As a remote site with very poor internet connection at Martins Haven all our documents, data and images are stored on site, but with back-ups made regularly to portable hard drive for storage off-site.

MCZ reports continue to be available via the NRW website, go to www.naturalresources.wales and search for “marine evidence reports”.

9.4 Other work

As team members of the Marine Monitoring Assessment and Reporting team (MMART), MCZ staff continues to support the work of the all Wales monitoring programme especially where it is most efficient logistically for us to carry out the work or where the MCZ staff have the necessary skills or equipment. In 2021 this included:

- WFD Winter DIN (Dissolved inorganic nitrate) sampling at Fishguard and Solva sites;
- Jen supported Cardigan Bay SAC intertidal fieldwork completed in May;
- Mark continued to service a number of temperature loggers around the Pembrokeshire coast and the whole team has continued to fulfil NRW’s commitment to the UK-wide MarClim project, carrying out shore surveys throughout Pembrokeshire, including on Skokholm Island;
- The whole team along with James King completed the Pembrokeshire SAC infauna grab sampling survey in the Milford Haven waterway in September, this survey included sampling at Milford Haven Monitoring and Survellance group sites;

Figure 9.17 Milford Haven infana grab sampling survey team September 2021

- Mark and Kate supported the WFD Fish survey in the Teifi estuary completed in September.
-

Figure 9.18 The small RIB Suzimar on the Teifi for WFD Fish survey September 2021

- Camarthen Bay SAC infana grab sampling survey in Three Rivers estuary was completed in October using Skalmey, team members included Mark and Kate with Matt Green, Adam Leyshion and James King.

Figure 9.19 Skalmey moored in Llansteffan for the Three Rivers infauna grab sampling survey, October 2021

- Skomer MCZ provided boat support for bird counting work at Stackpole to support NRW’s Senior Reserve Manager, Paul Culyer

10. Education and Interpretation

10.1 Fisherman's Cottage MCZ exhibition

The Skomer MCZ exhibition room at Martins Haven was closed throughout 2020 and 2021 due to covid restrictions. Plans will be to reopen in 2022, however the interactive touch screen will be turned off.

10.2 Talks and presentations

In 2021 face to face talks and presentations were not possible due to covid restrictions.

Virtual online events and activities have become popular through 2020 and 2021. Mark and Kate were guests twice on the weekly 'Skomer Live' during 2020 organised by the Wildlife Trust of South and West Wales (WTSWW). Mark talked about the underwater life around Skomer and how we monitor it and together Kate and Mark gave an interview on grey seals.

Pembrokeshire Coastal Forum also organised online virtual events in 2020. Kate was invited as an expert speaker on seals for events organised for both the public and water-based activity providers.

10.3 Media

Skomer MCZ team continue to work with the NRW's Communications Team. A new NRW podcast was launched in September, and Skomer MCZ stars in the first two episodes. In the first episode Phil talks generally about the MCZ and in episode 2 Mark and Kate talk about the long-term shore monitoring programme. You can follow this link if you would like to listen Cyfoeth: The Natural Resources Wales Environment Podcast (buzzsprout.com)

MCZ staff also posted various articles on NRW's internal social medium, "Yammer", and on Skomer MCZ's Facebook page, including topics such as information on visitor moorings, long-term photo monitoring, celebration of National Marine week and visitor information on seal watching.

During December NRW had a Christmas 'Elf on the shelf' theme on their social media channels, the elf was seen all over Wales helping NRW staff at work and this was used as a fun way to promote NRW work. The elf came on some dives with the MCZ team helping with our work underwater.

Figure 10.1 Christmas elf helping Skomer MCZ with underwater monitoring work

11. Acknowledgements

Skomer MCZ staff wish to thank all those who have supported our work or contributed directly to it over the past year.

Special thanks to:

- Members of the Advisory Committee
- All of our volunteers;
- Skomer Island NNR Warden, Leighton Newman and the rest of the Skomer Island team;
- Blaise Bullimore, Ross Bullimore, Rob Spray, Matt Green and Francis Bunker for diving support;
- The crew of the *Dale Princess and Lady Helen;*
- Neptune's Army of Rubbish Collectors for helping to keep the MCZ (and indeed the waters of Pembrokeshire) less full of rubbish;

With apologies to anyone missing from the list above.

Appendix 1. Vevers J (2020, Investigating temporal change in marine vertical wall epibenthic communities: analysis of a long-term photo-quadrat survey

Abstract

In the last century, increased pressure from anthropogenic influences has led to the degradation of marine ecosystems and a rise in marine extinctions and species turnover. This has highlighted the need for long-term monitoring studies, in order to detect any changes in diversity and community composition of marine communities and the drivers of these changes. This study aimed to [1] access the temporal stability of a subtidal epibenthic community at Skomer Marine Conservation Zone (MCZ) in west Wales, UK, and (2) to relate any changes to environmental variables including summer seabed temperature, turbidity and commercial potting effort. Photo-quadrats of an epibenthic community inhabiting a vertical wall were taken at three depths at Skomer MCZ, annually from 1985-2019 and analysed using a web-based platform. Species richness and Shannon diversity displayed opposite trends over time and drivers affecting them differed with depth. Community composition varied between earlier and later years. Dissimilarity between years was caused by a significant decline in the soft coral *Alyconium digitatum* and increases in *Bugula spp* and tall erect hydroids in later years. Decline of *A.digitatum* was linked to increases in commercial potting effort and increases in turbidity. Increases in tall hydroids and *Bugula spp* were mainly associated with an increase in potting effort due to the available substratum provided by the decline of *A.digitatum*. These results contribute to global findings that biodiversity of epibenthic communities are changing through time due to multiple drivers. From these findings, it is recommended that future studies compare epibenthic communities in potted versus unpotted areas to further investigate the effect of commercial potting. It is also recommended that further research is conducted on colonies of *A.digtiatum* surrounding Pembrokeshire to determine whether the decline is more widespread.

Appendix 2. Middleton J (2021), Harbour porpoise (Phocoena phocoena) distributions, monitoring practice and avoidance with common dolphin (D. delphis) in the Skomer Island Marine Conservation Zone

Abstract

The temporal and spatial distribution of *P. phocoena* around the Skomer Island Marine Conservation Zone (MCZ) has not yet been described.

This study aimed to examine sightings from 2008-2019 to identify temporal and spatial patterns, using time series plots and heatmaps, while evaluating surveillance effort and methodologies, through regression analysis and accumulative normalised saturation plots, to examine the robustness of the findings. Evidence of habitat partitioning between harbour porpoise and common dolphin (*D. delphis*) was also investigated. *P. phocoena* distribution was not consistent throughout years, showing an overall increase across the study period. Within years, winter months were significantly underreported leading to continued bias, while a marked drop in abundance occurred frequently in June. Sightings were concentrated at four key sites situated at widespread locations around the MCZ with no significant seasonal changes, and it was accepted that findings were biased towards these sites. Survey time provided an inaccurate representation of surveillance for incidental practices. This led to issues in the normalisation process whereby several factors (sea state, dedicated watch time, site surveyed) were not accounted for, reducing confidence in results, and calling for more robust standardised methods. However, dedicated surveys reported a strong relationship between survey time and sightings from regression analysis and saturation of sampling effort occurred at 32 hours (4 days) per month. Saturation of effort was not achieved by incidental sighting groups. Dolphin and porpoise displayed markedly different distributions: porpoise were sighted frequently throughout the season (March-October), with a drop in abundance in June, while peak dolphin sighting occurred in August-September. Findings agreed with the understood ecology of D. delphis as a primarily offshore species undertaking summer inshore migration to UK coastal waters. Findings were not considered robust enough to provide reliable evidence of habitat partitioning between the species. monitoring practices can aid this research such as acoustic monitoring, which has been trailed within the MCZ. This study highlights how essential it is to identify sources of uncertainty affecting cetacean monitoring and develop robust methodologies to examine species distributions reliably.

Appendix 3. Büche, B. 2021. Grey Seal Breeding Census Skomer Island 2021. NRW Evidence Report number 588. The Wildlife Trust of South and West Wales.

The Grey Seal (*Halichoerus grypus*) is an Annex ll species for which Special Areas of Conservation can be designated and a primary reason for the selection of the Pembrokeshire Marine SAC. They are also recognised as a feature of the Skomer Marine Conservation Zone (MCZ).

In 1983, a systematic approach to seal monitoring on Skomer was established and continued using the same or at least similar methodology, albeit at varying levels of intensity until 1996 when Jim Poole standardised the seal monitoring on Skomer further by introducing the Seal Monitoring Handbook (Alexander (2015). In 2021, as in previous years, the breeding activities of the grey seals on Skomer Island were observed and recorded using this methodology.

265 pups were born on Skomer, which is 22 more than in 2020 and the highest total on record. On the Marloes Peninsula 181 pups were born giving a total of 446 pups for the Skomer MCZ as a whole. The first pup of the season was born at Castle Bay on 07/08/21. 22 pups were born in August, 184 in September, 56 in October and three in November. The most productive beaches were South Haven (52 pups), North Haven (48 pups) and Matthew's Wick (41 pups).

195 pups are known, or assumed, to have survived on Skomer. The fate of seven pups is unknown, giving a survival rate of 76%. On the mainland 143 pups are known, or assumed to have survived, giving a survival rate of 79%The overall survival rate for the whole of the Skomer MCZ is 77%.

In 2021 the maximum haul-out of 378 seals was recorded on 13/11/21. North Haven had its peak haul-out count on 14/11/21, Driftwood Bay on 13/11/21, Castle Bay on 02/11/21 and Matthew's Wick on 13 and 18/11/21.

40 scarred seals (37 cows and three bulls) were re-identified from previous photos using the Skomer seal catalogue.The oldest returning cow was HD-014. She was rescued from Penberth, Cornwall in February 2002. From 2010 until 2012 she was seen annually on Skomer. The observation in 2021 is the first one since 2012.The oldest bull to have returned to Skomer in 2021 was 12.NHV.B06. He was observed on North Haven beach in September and October 2012 and had not been identified since then. In October 2021 he was the dominant bull on South Haven beach.

Of the 265 cows which pupped on Skomer in 2021, 38 had scars. 14 of the scarred cows were identified, hence 37% of identifiable breeding cows were returning cows.

40 individual seals (four males, 32 females and four immatures) were photographed with obvious signs of being entangled in nets at some time in their lives, most commonly a deep scar around their necks, often with netting still embedded.

Data Archive Appendix

No data outputs were produced as part of this project.