Cyfoeth Naturiol Cymru
Natural Resources Wales

Skomer Marine Conservation Zone Annual Report 2019

Phil Newman, Kate Lock, Mark Burton, Jen Jones

NRW Evidence Report 398

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- Securing our data and information;
- Having a well-resourced proactive programme of evidence work;
- Continuing to review and add to our evidence to ensure it is fit for the challenges facing us; and
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Report series: NRW Evidence Reports
Report number: 398
Publication date: January 2021

Title: **Skomer Marine Conservation Zone Annual Report 2019**

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Peer reviewer(s): M. Camplin, E. Venus-Evans

Restrictions: None

Distribution List (core)

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

Distribution List (others)

Skomer Marine Conservation Zone Advisory Committee members

Recommended citation for this volume:

Newman, P, Lock, K, Burton, M, Jones, J. (2020). Skomer Marine Conservation Zone Annual Report 2019. NRW Evidence Report No: 398, 74pp.

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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.

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.

SMCZ and SMNR

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.

1. Introduction and Foreword

As mentioned at last year's Advisory Committee meeting NRW has undergone a period of reorganisation, so it is with some relief that I am able to report that the Skomer MCZ team has remained intact and is now part of NRW's Marine Environmental Assessment and Reporting Team.

Our first collective activity was to get together for a diving safety refresher and then the MCZ hosted a boat safety day for the relevant staff in the team and a number of our volunteers.

However, our first event involving the whole team was rather more creative and shall hereafter be known as the Great Bubble Festival of Stackpole!

We have continued to build links within NRW through the "Doris Day" events with visits from a range of teams from all over the organisation.

Networking outside NRW also continued, with a visit from the Welsh Assembly Climate Change, Environment and Rural Affairs Committee organised by Wales Environment Link. This Committee was carrying out a review of the Welsh

Government's management of Marine Protected Areas and has recently produced a report.

Other collaborations include work with Swansea University to collect seagrass seed from North Haven for their restoration projects and with Bangor University looking at the scallop populations in St Brides Bay.

Closer to home we have been working with the new Wardens on Skomer and helping out where we can with transport of materials – although I'm sure no one mentioned attack geese in the risk assessment!

The biggest thank you, as ever, goes to our volunteers, whether as teams carrying out the urchin surveys this year or individuals helping with other diving and shore monitoring projects. We welcomed Sam Hurst this year as the first volunteer appointed under NRW's new procedure and apologies to him for using him as a guinea pig.

The rest of the monitoring programme was carried out successfully with help from some very pleasant diving conditions and included our 4-yearly sponge species “inventory”, which is being worked up by Jen at this very moment.

At the risk of sounding like a stuck record, we continue to monitor the decline of the pink sea fan population at Skomer with 6 more fans confirmed as lost and another 7 missing, to be confirmed next year.

Some of the sea fans confirmed lost this year

One of these sea fans has been photographed annually since 1994, which may explain the sense of loss the MCZ team feels. Sea fan losses at Skomer are now being taken up by other staff in NRW as a matter for investigation.

Skomer MCZ’s seal pups, on the other hand, did well in 2019 and the final total for births, at island and mainland sites combined, topped the 400 mark for the first time ever (see section 10.1.1 for full details, including survival rates).

Social media interest in seals was high with Kate’s Facebook post on our seal work getting 15000 visits.

Other media “exposures” for Skomer MCZ included several whole seconds of fame on BBC’s Wales Land of the Wild series (for our sea slugs and a Skomer lobster, at least) and local newspaper and radio interest in our work on sponges and seagrass.

Finally, a huge thankyou to Dr Robin Crump, who stood down as Chair of the Advisory Committee this year after 17 years, but who has graciously accepted the role of Honorary President because we can’t let him get away that easily!

At the time of writing the Skomer MCZ team are experiencing lock-down due to the Covid-19 viral pandemic. Currently all plans for marine fieldwork in Natural Resources Wales in 2020 are on hold with the presumption that no field work is likely to take place this summer. Instead Skomer MCZ staff will be assisting with other more desk-based (or kitchen table-based, depending on individual home-working circumstances) work in support of the Marine Environmental Assessment and Reporting Team's wider duties.

In the meantime, I hope you enjoy the following summary of our work in 2019 before the "new normal" took over…

2. Staff

2.1. Staffing

The staff complement at Skomer MCZ has remained the same: Phil Newman, Kate Lock, Mark Burton and Jen Jones make up the NRW team based at Martins Haven.

NRW has now completed its reorganisation and the good news (from our point of view at least) is that the Skomer MCZ team is now part of the Marine Environmental Assessment and Reporting Team within NRW's Marine Service.

This new team is led by Mike Camplin, so we have had to say farewell to Charlotte Gjerlov, our former team leader, with thanks for guiding us safely through the last few years.

The new team has been able to recruit a number of temporary workers in 2019 and they have been a great help to us at Skomer, helping out with intertidal surveys and other non-diving projects.

2.2. Volunteers

We have been fortunate to be able to retain many of our long-term volunteers through the transitional arrangements for NRW's new system for volunteer and other placements. We have, however tested the new system by recruiting Sam Hurst to help out with a variety of diving and other projects. As with any new process there are teething problems, but we have learnt from the experience, so apologies to Sam for using him as a guinea pig!

2019 saw the completion of the latest 4-yearly sea urchin and starfish surveys at Skomer MCZ and as ever a huge thank you to the teams of volunteer divers who scoured the monitoring sites looking for sea urchins and starfish.

A big thank you as always to our other diving volunteers who continue to supplement our own diving team at times when we are short-handed and ensure that we can maintain such an intensive monitoring programme.

2.3. Development and training

In 2019 dive safety refresher training involved diving-qualified staff from throughout the new Marine Environmental Assessment and Reporting Team as well as a number of our volunteer divers. Because of the numbers involved training took place in, around and under the charter vessel *Overdale* in Dale bay.

Skomer MCZ staff also hosted a boat safety day aboard *Skalmey* for those NRW marine staff and volunteers most likely to be involved in boat fieldwork.

Kate Borrowdale from our Llandarcy office became the latest person to endure the ritual indignity of “ordeal by Sked” (folding stretcher) when she was trussed up and carried ashore (safely) as our “casualty”.
All Skomer staff took part in Geographical Information Systems (GIS) training in November.

Phil did his first aid refresher in February 2020 and attended the Coastal Futures Conference in January 2020.

For the second time in two years the whole Skomer MCZ team was shortlisted for the “Environment Champion” award at NRW’s #TeamNRW day, but got pipped to the post – again!

2.4. 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.

Jen and Mark were both subject to hearing tests as part of NRW's health screening programme. Both have excellent hearing, so proving that they are just ignoring the rest of us.

2.5. 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 2019 are very similar to those for 2018, with sponge survey dives in place of the nudibranch survey of 2018. Also, some time was available for surveying and beginning to mark the site at High Court Reef after many delays. This site has a number of species that feature in monitoring at other sites, so makes a valuable addition to those projects.

DIVING ACTIVITY	MCZ STAFF	VOLUNTEER DIVERS	TOTAL
Dives	159	21	180
Dive time (min)	5488	674	6162
Dive time (hrs)	91.47	11.23	102.7
Average dive time (mins)	35	32	34.23
Diving days	36	16	36

Table 2.1 Summary of MCZ Diving Activity 2019

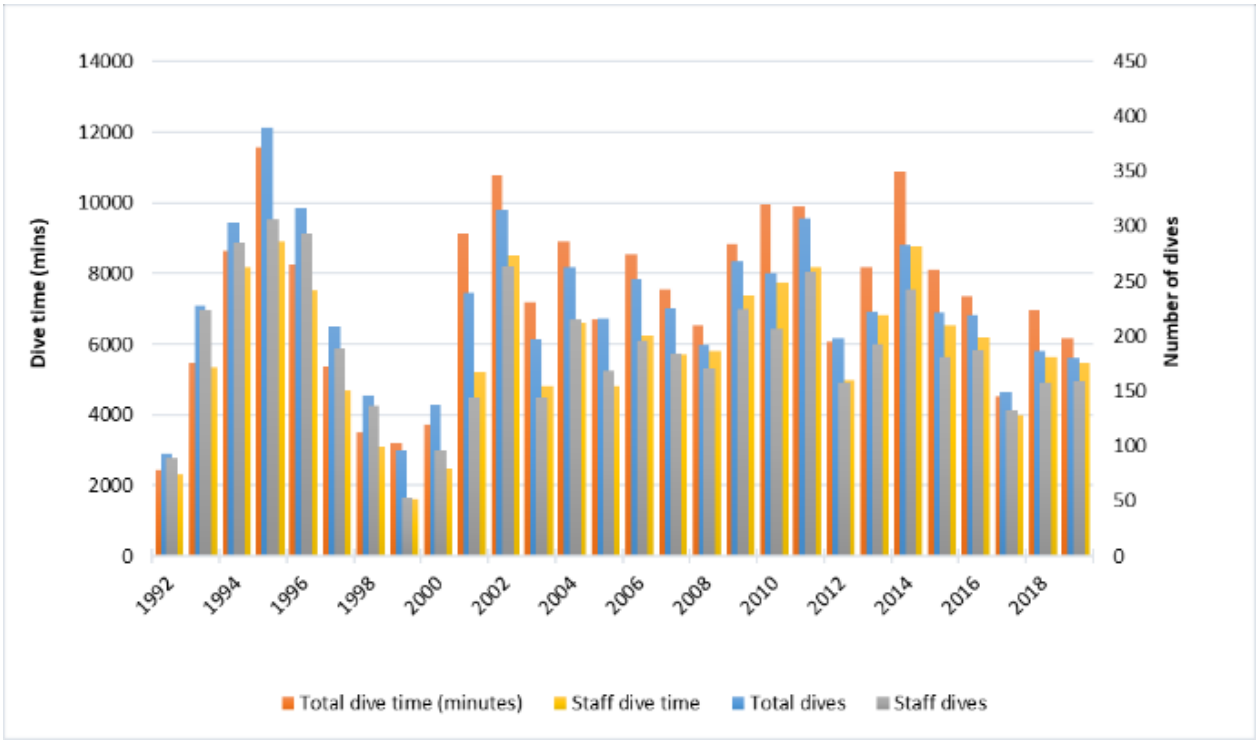


Figure 2.1 Summary of MCZ Diving Activity 1992 to 2019

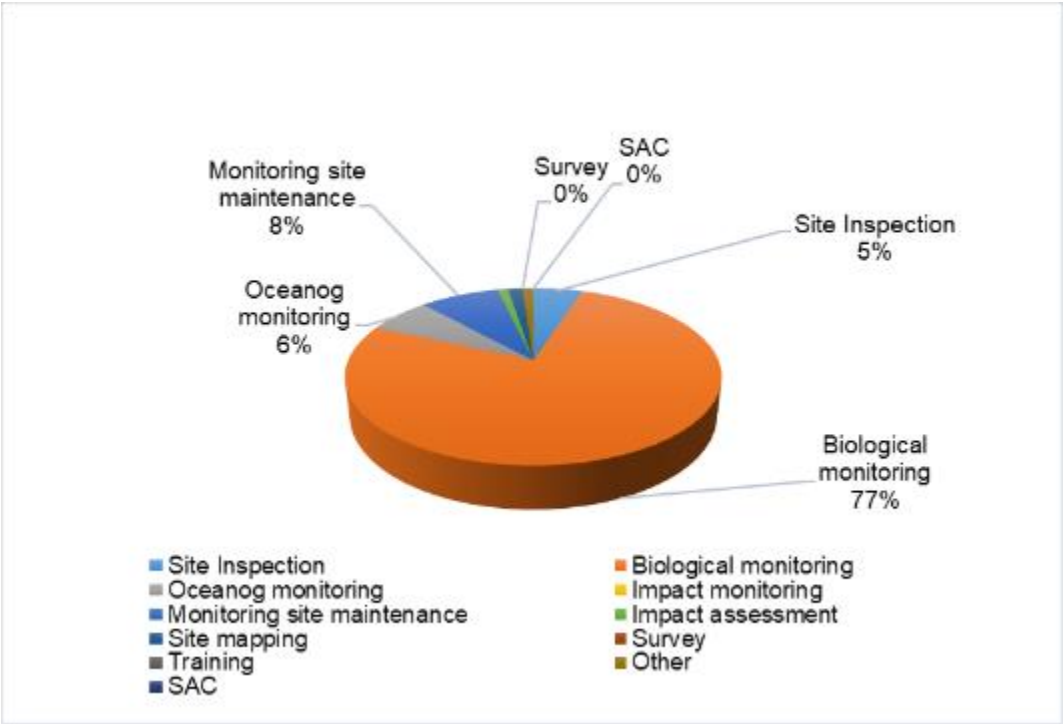


Figure 2.2 Skomer MCZ Diving Operations 2019 – dive time

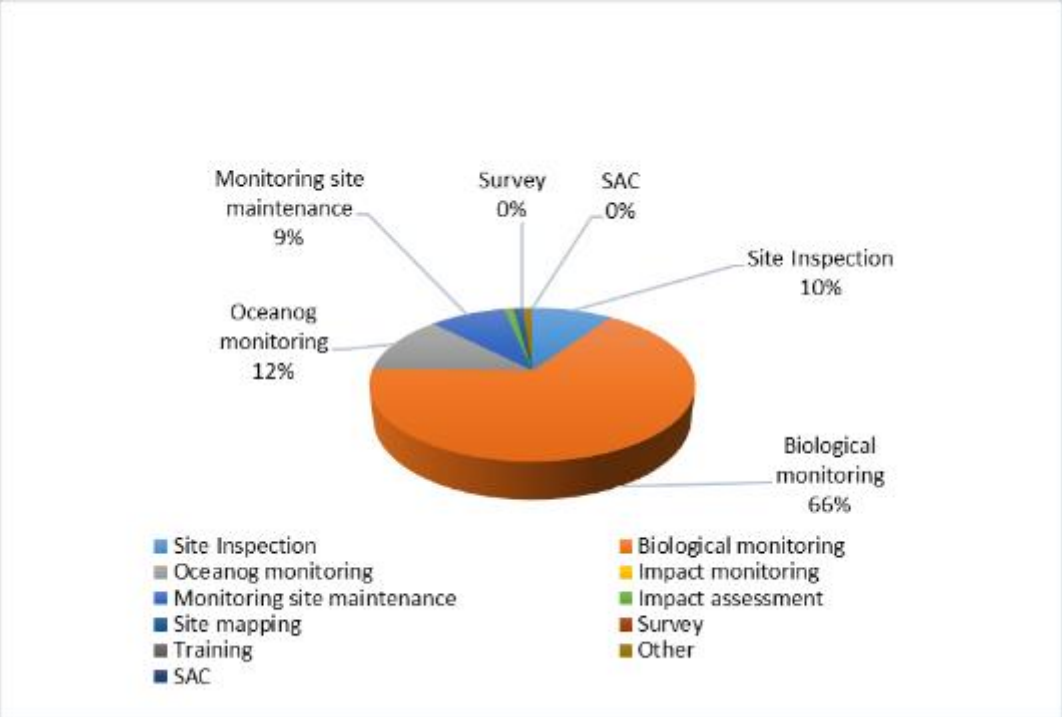


Figure 2.3 Skomer MCZ Diving Operations 2019 – number of dives

3. Estate

3.1. 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.

In 2019 the old Coastguard lookout hut on the Deer Park was refurbished as the outer timber "skin" had rotted quite badly. This entailed the temporary removal of the NRW automatic weather station by MCZ staff and its replacement following the building work.

3.2. Boats

Skalmey spent 65 days at sea in 2019 and logged 207 engine hours.

Skalmey has now served the MCZ (and MNR before that) for 27 years and so a thorough "health check" seemed in order. After a detailed professional survey of the hull and the equipment of the boat considerable remedial action was recommended. This included replacement of the deck and deck beams (now distinctly soggy and saggy in parts), replacement of windows (dribbly), replacement of the fuel tanks (crusty) and thorough overhaul of the engine (wheezy).

The surveyor also examined the hull and, barring a few areas to have minor repairs, pronounced it to be in good condition and a validation of the original decision to have a heavier build for the fibreglass hull back in 1991/92.

The work was contracted to Cardiff Marine services following a competitive tendering exercise and the engine entrusted to the tender loving care of Andrew Aldred.

The MCZ rigid hull inflatable *Morlo* spent 33 days at sea and logged 105 engine hours in 2019.

Morlo was mainly used for intertidal monitoring, seal work and weekend patrols, but also as an occasional seal haul-out.

The small inflatable tender was, as ever, very useful for our lagoon sampling efforts, especially at Carew millpond (see Section 10.4).

Even the dinghy gets a mention this year as it served as a floating wheelbarrow to *Skalmey's* floating dumper truck role transporting fencing materials to Skomer Island.

Activity	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Days at sea																		
Skalmey	73	77	52	48	58	72	58	61	69	99	95	65	70	73	69	49	79	65
SkalmeyII/Morlo	37	32	40	43	40	38	36	38	48	36	35	30	43	32	34	36	40	33
Total	**110**	**109**	**92**	**91**	**98**	**110**	**94**	**99**	**117**	**135**	**130**	**95**	**113**	**105**	**103**	**85**	**119**	**98**
MCZ Staff seatime (hrs)																		
Skalmey	883	777	640	618	621	933	685	747	718	942	743	684	815	743	753	467	609	616
SkalmeyII/Morlo	277.4	279	461	405	331	339	278	278	295	313	234	188	288	188	219	220	246	220
Total	**1160**	**1056**	**1101**	**1023**	**952**	**1272**	**962**	**1025**	**1013**	**1255**	**977**	**872**	**1103**	**931**	**972**	**687**	**856**	**836**
MCZ Staff days at sea																		
Skalmey	225	205	154	158	165	202	170	189	183	279	253	178	211	193	198	143	208	183
SkalmeyII/Morlo	80	70	104	99	86	84	73	73	93	76	75	65	89	60	72	78	76	69
Total	**305**	**275**	**254**	**257**	**251**	**286**	**243**	**262**	**276**	**355**	**328**	**243**	**300**	**253**	**270**	**221**	**284**	**252**
Other Staff seatime (hours)																		
Skalmey	204	88	76.7	75.25	233	257	107	225	390.4	220	279	140	220	150	220	96	238	189
SkalmeyII/Morlo	89.7	69	107	88	142.5	77	113	77.5	157	51	50	39	100	89	118	55	156	60
Total	**293**	**157**	**184**	**163**	**376**	**334**	**220**	**303**	**547**	**271**	**329**	**179**	**320**	**239**	**338**	**151**	**394**	**249**
Other Staff days at sea																		
Skalmey	23	21	15	18	30	26	26	57	94	48	83	35	57	50	58	32	106	53
SkalmeyII/Morlo	22	15	21	17	22	12	29	18	35	11	14	9	24	28	36	19	39	14
Total	**45**	**36**	**36**	**35**	**52**	**38**	**55**	**75**	**129**	**59**	**97**	**44**	**81**	**78**	**94**	**51**	**145**	**67**
Total Staff seatime (hours)																		
Skalmey	1087	865	717	693	854	1190	791	973	1109	1162	1022	825	1034	893	973	563	847	805
SkalmeyII/Morlo	367	348	568	493	473	416	392	355	452	313	284	227	388	277	337	275	403	280
Total	**1454**	**1213**	**1285**	**1186**	**1328**	**1606**	**1183**	**1328**	**1561**	**1475**	**1634**	**1051**	**1422**	**1170**	**1310**	**838**	**1250**	**1085**

Activity	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Total Staff days at sea																		
Skalmey	248	226	169	176	195	228	196	246	277	327	336	213	268	243	256	175	314	236
Morlo	102	85	125	116	108	96	102	91	128	87	89	74	113	88	108	97	115	83
Total	**329**	**311**	**294**	**292**	**303**	**324**	**298**	**337**	**405**	**414**	**425**	**287**	**381**	**331**	**364**	**272**	**429**	**319**
Engine hours																		
Skalmey	245.3	284.54	171.07	150.16	169	244.38	168.62	224	241	322	266	222	249	284	237	145	259	207
SkalmeyII/Morlo	118	96	162.7	160	141.25	120.5	144.67	139	157	118	110	139	137	98	105	97	129	105
Total	**363.3**	**380.54**	**333.8**	**310.2**	**310.25**	**364.9**	**313.3**	**363**	**398**	**440**	**376**	**361**	**386**	**382**	**342**	**242**	**388**	**312**

Table 3.1 Summary of MCZ Boating Activity 2002 to 2019

MCZ Staff = Philip Newman, Kate Lock, Mark Burton, Jen Jones
Other Staff = NRW Staff and Volunteers

Staff days at sea = total days on which each member of staff went out in a boat.

Staff seatime = total of each member of staff's seatime.

Boat days at sea = number of times the boat left its moorings.

3.3. Other Equipment

3.3.1. Safety, diving and protective equipment

All safety-critical, diving or protective equipment is serviced and maintained to regulatory or manufacturer's requirements.

3.3.2. Optical, photographic and scientific

Photographic equipment continues to be serviced by 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.

As mentioned in Section 6.1 the automatic weather station had to be dismantled to allow repairs to the coastguard hut. At the same time MCZ staff took the opportunity to improve cabling and replace the backup battery. Further improvements are also planned to ensure compatibility with the latest computer operating systems installed on NRW computers and to make data available via the internet.

3.3.3. Vehicles

Skomer MCZ continue to operate a 4-wheel-drive pickup truck, which has developed so much "patina", as the classic car fraternity would say, that other vehicle owners shy away from parking near it in case it is contagious. Negotiations are under way to declare the vehicle's roof a SSSI for lichen and bryophyte species.

We do, however have a very shiny (albeit a cast off from another part of NRW) fuel bowser. This came with a powered pump, which makes fuel delivery to *Skalmey* at Martins Haven rather easier than the previous gravity powered system. The tank is double-skinned to prevent spillages and we carry a full spill kit if the worst should happen.

Other trailers in the MCZ "fleet" are serviced annually by local contractor.

3.4. Marine estate work

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 were deployed at the same time as the visitor moorings and maintained by MCZ staff.

The moorings for MCZ vessels in Martins Haven were also maintained with the generous assistance of Dale Sailing Company using their barge *KitKat* (in Martins Haven to carry out maintenance to the jetty) to haul the *Skalmey* mooring to the surface for shackle replacement. *Morlo's* mooring was checked and had shackles changed by MCZ staff.

The greatly reduced seabed frame at Thorn Rock functioned perfectly well as a mount for the sediment trap (Newman Poot Collector – pat. pending) with new mounting arrangements made from recycled parts from the seabed settlement plate studies carried out in previous years.

The sediment traps at Thorn Rock and at OMS are both brought ashore during the winter.

4. Management

4.1. Wardening and Patrol

Skomer MCZ staff carried out boat patrols on 21 Sundays and Bank Holiday weekend days between the beginning of May and September 2019. One weekend was lost to bad weather and two Sundays were taken up with the sea urchin and starfish surveys, but even then, staff were able to record recreational use from the vantage of the dive charter vessels. 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 beady eye on visitors, but serve a valuable purpose in providing a point of contact for visiting vessels to get information about the MCZ. They are also 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 are 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.

Volunteers helped out on three occasions, including one rather grim day over the May bank holiday, when NRW CEO Clare Pillman took the helm again (under close supervision, of course).

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.

4.2. 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 (see section 11.1).

4.3. Management Issues

4.3.1. Dredging/beam trawling
No illegal dredging or beam trawling was recorded or reported to MCZ staff in 2019.

4.3.2. Potting
Commercial fishing vessels operating in the MCZ are listed in Section 8.1 and fishing effort records are presented in Figures 8.1 and 8.2.

4.3.3. Tangle and gill netting
No tangle or gill netting was observed in 2019.

4.3.4. Collection of shellfish by divers
No collection of shellfish by divers was observed in 2019.

4.3.5. Collection of curios
No collection of curios was observed in 2019.

4.3.6. Collection of specimens for education and research
A permit for the collection of specimens for research was issued to workers from the National Museum of Wales to collect specimens of the eyelash worm (*Myxicola infundibulum*) from Martins Haven. The intention of the project was to collect specimens of both the eyelash and non-eyelash (*M. sarsi*) varieties, from different sites around the UK, and attempt to determine if they are the same or different species. It is hoped that it will prove possible to definitively identify each species in the field by photography alone, in which case collation of photo records from divers could then be used to create new, more accurate distribution maps for the species.

"Spooning" for worms

A permit was also issued for Swansea University to collect eelgrass (*Zostera marina*) seed from North Haven to contribute to the eelgrass recovery projects the University is engaged with at a number of sites in Wales.

4.3.7. Disturbance or entanglement of seals

No incidents of seal disturbance were recorded on the mainland in 2019. On Skomer Island a number of minor incidents were recorded, but a notable disturbance occurred in August when a RIB caused 10 seals to enter the water, including a pregnant female. On another occasion a commercial fishing vessel flushed up to 28 seals into the water at Matthew's Wick, but the seals gradually came back to the beach after the boat had left.

Entanglement of seals is recorded as part of the Skomer seal monitoring contract and by MCZ staff. In 2019, 16 seals on Skomer (9 females, 3 males and 4 immature) 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. Four seals with scars caused by netting, all adult females, were known from previous years.

Seal watching leaflets and information were given to the visiting public during the seal pup season and signs were put up to alert the public to seal pups on Martins Haven beach. The signs stolen in 2018 were replaced.

4.3.8. Disturbance to cliff-nesting birds

MCZ staff recorded one potential seabird disturbance (and health and safety) incident when Phil and Mark intercepted a group from a yacht anchored in South Haven as they attempted to climb up onto the island at a point between South Stream and South Haven beach.

Skomer island staff have recorded a number of bird disturbance incidents involving commercial fishing vessels, including several thousand guillemots being flushed from the cliffs when one boat dropped pots in the entrance to the Wick. The same vessel disturbed birds in the Wick on a number of occasions and also flushed birds from the cliffs at Bull Hole due to excessive speed.
Another fishing vessel was observed fishing in the Wick in contravention of the exclusion area.

Sightseeing boats also caused disturbance: Examples include a large RIB, which entered the Wick at speed; inflatables from a cruise ship flushed birds from ledges at the Garland Stone; a kayak flushed birds from the ledges at Bull Hole, causing a razorbill egg to be lost.

Ironically it appears to be commercially operated vessels that cause more disturbance than the general public.

4.3.9. Spear-fishing

No spear-fishing was recorded in 2019.

4.3.10. 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.

The shocking effects of angling gear on wildlife were forcibly brought home to us when someone left us a rather unpleasant surprise hanging from the office doors. This unfortunate guillemot had swallowed a very large hook and whether this angling gear had been lost or was being actively fished at the time this happened the outcome is still pretty grim.

Fortunately for us 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 dispensed in Martins Haven.

4.3.11. 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.

4.3.12. 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 2019; both involved commercial fishing vessels.

4.3.13. Wrecks

An incident that started in December 2019 and extended into 2020 was part wreck and part littering. In severe storms off the Pembrokeshire coast a number of containers were lost overboard from a cargo vessel. The shores of Pembrokeshire became covered in a bewildering mixture of bags of organic apples, packets of organic rice cakes and white plastic buckets (which soon became white plastic flakes).

The remains of one of the containers was spotted on South Haven, Skomer, and, as part of the clean-up operation, Dale Sailing Company's barge *Kit Kat* was sent to attempt to retrieve what it could of the container. Kate and Chris Taylor (PCNPA) accompanied the barge to assess the environmental impacts and to provide "amphibious" assistance as they were kitted out in dry suits. The container that came ashore at South Haven was a refrigerated unit, which meant that not only was there a large and heavy "lump" of metal (the refrigeration unit) to recover from the beach, but the beach was littered with broken up insulation material.

A follow-up trip was made to Skomer in January to see if any further debris had come ashore and to carry out biosecurity measures for the island in case unwanted animals had come ashore too.

4.3.14. Oil pollution

No oil pollution was recorded at Skomer MCZ during the 2019/20 season.

4.3.15. Litter

MCZ staff again assisted Skomer Island Wardens with a clean-up of the Wick beach before seal pup season got underway (see Section 9.2). Litter has been picked up from Martins Haven beach and at sea throughout 2019.

5. Visitors and Use of the MCZ

5.1. Commercial use

Fishing vessels recorded (or whose gear was recorded) operating within Skomer MCZ during 2018 included *Warren Edwards* (M15), *Stephanie R* (M150), *Marie Louise* (M36), *Lady of Lundy* (BD267), *Calon y Mor* (M91), *Lucifer* (M666), *Shirley Betty* (M500), Ambition (M85), *Sapphire* (M24) and Sapphire II (M33).

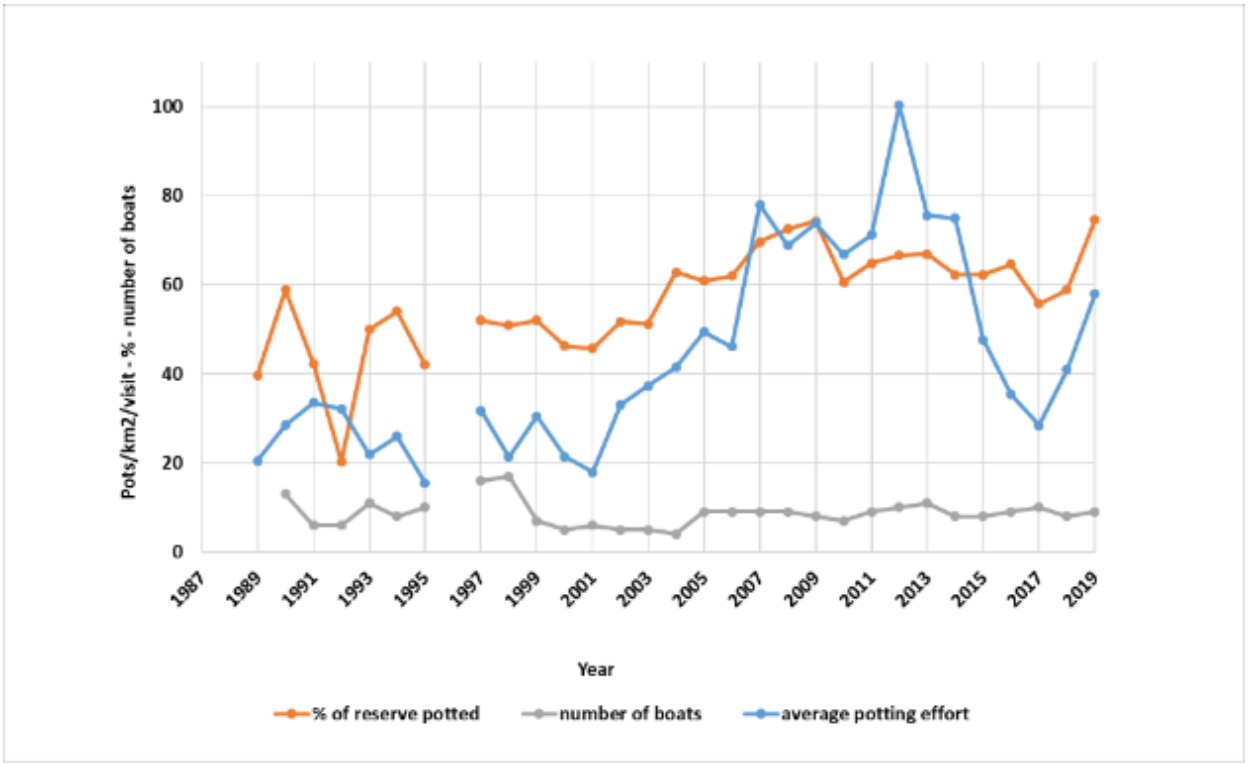


Figure 5.1 Summary of fishing effort within Skomer MCZ 1989 to 2019

The number of commercial fishing vessels operating within Skomer MCZ has remained constant over the past 15 years. However, fishing effort has increased rapidly over the last two years to levels that are higher than they have been for the last 5 years and the proportion of the site that is fished is at an all-time high.

The distribution of fishing effort has also changed since last year with a greater proportion of fishing taking place along the north-east coast of Skomer, around the Bull Hole area on the west coast, and along the north Marloes Peninsula. The area around our monitoring site at Thorn Rock remains a hot-spot (see Figure 8.2 below.

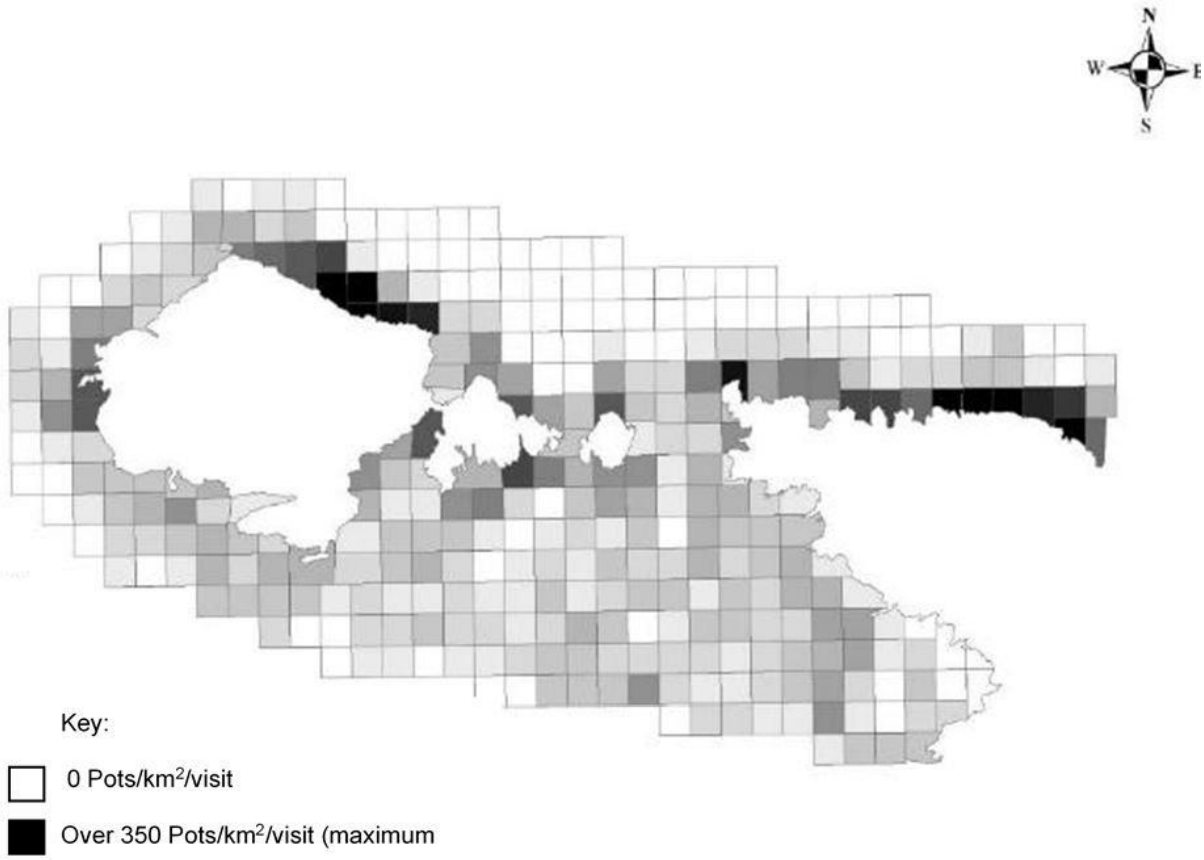


Figure 5.2 Pot fishing intensity within Skomer MCZ

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.

5.2. Recreational use

Recreational use of Skomer MCZ is presented in Table 8.1 and figures 8.3 to 8.7.

Recreational use figures are generally lower compared to 2018, but still similar to, or higher than, the figures for 2017. However, numbers of boat anglers and divers in Martins Haven are both lower than the previous two years; June and July figures for boat anglers were much lower in 2019 than in 2018, whereas shore angler numbers followed a similar seasonal pattern to 2018 with totals somewhere between those for 2017 and 2018. Diver numbers did not show the same peak in June as in 2018, although visibility was still quite good in 2019. Overall diver numbers are the same as 2017, but the total number of divers at Martins Haven is the lowest ever recorded. Anecdotal reports indicate that divers, particularly local divers, are visiting more in the evenings to avoid parking fees at the National trust car park.

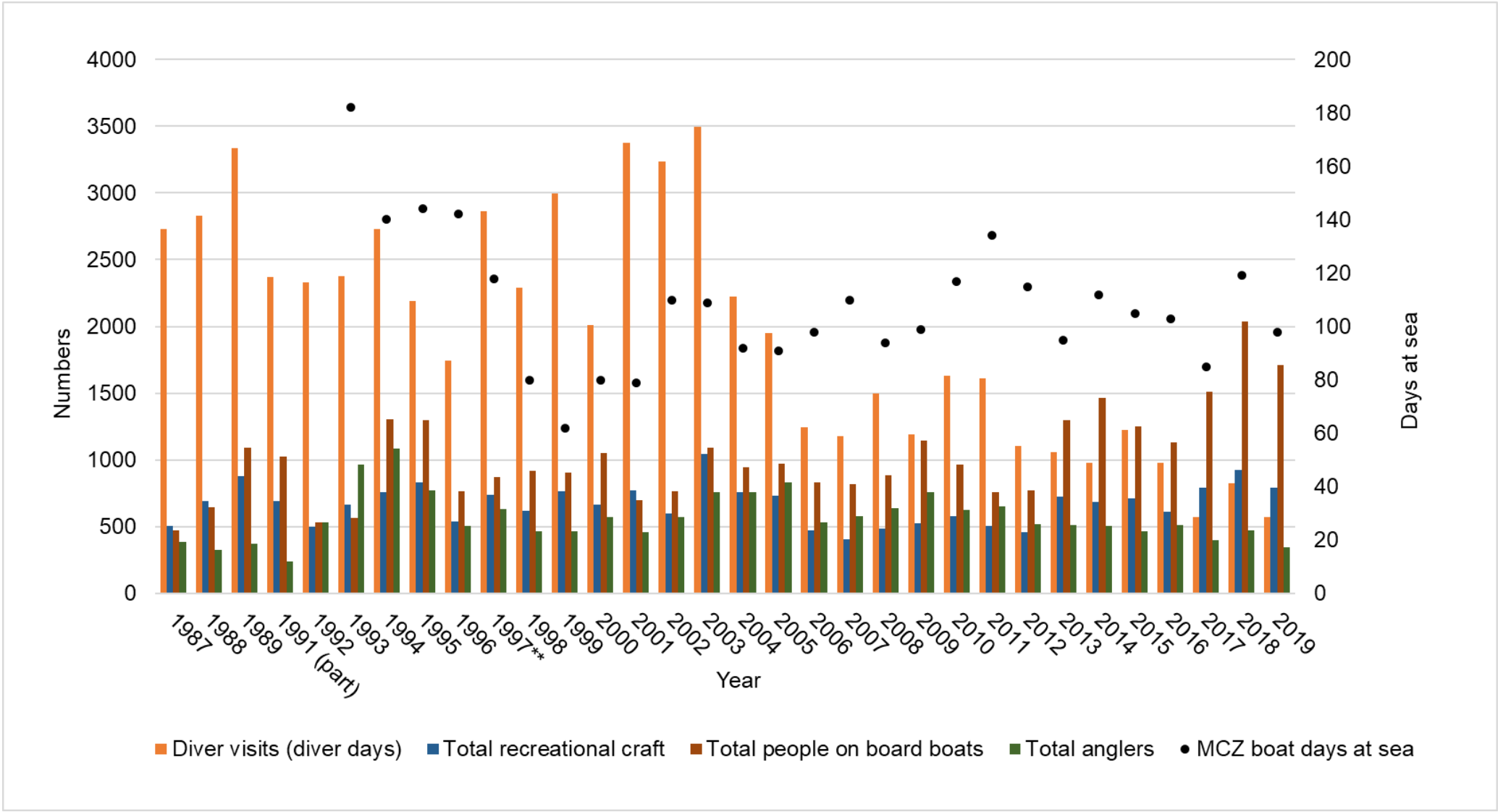


Figure 5.3 Recorded Recreational Use Skomer MCZ

Recreation Category	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Diver visits (diver days)	2996	2008	3378	3234	3492	2224	1950	1244	1179	1496	1189	1632	1611	1106	1059	976	1228	980	570	827	573
Shore dives @ Martins Haven	503	537	555	575	522	666	492	474	439	478	293	428	368	347	242	291	237	313	177	162	109
Dive boat visits	380	278	349	367	389	234	258	132	152	140	92	128	149	90	89	83	134	80	79	84	51
Total yachts	223	232	252	119	335	224	188	129	92	119	115	139	132	117	247	230	218	190	180	245	241
Total motor boats (not angling boats)	66	93	119	49	190	165	114	76	59	85	73	74	29	45	127	98	98	70	177	211	190
Canoes	82	63	37	39	81	100	111	101	72	67	186	166	126	140	176	202	195	210	289	308	255
Angling boats	16		15	22	49	33	61	35	31	76	62	69	67	66	84	74	68	60	66	80	53
Total recreational craft (D, Y, M, C & A)	767	666	772	596	1044	756	732	473	406	487	528	576	503	458	723	687	713	610	791	928	790
Total people on board boats (Y, M, C & A) not D	904	1051	696	764	1093	944	975	834	817	887	1143	967	757	769	1297	1465	1253	1129	1508	2038	1713
Shore anglers	354	501	396	458	519	556	569	379	398	344	448	313	321	202	160	220	219	264	144	187	161
Boat anglers	109	72	65	112	243	206	266	150	178	294	308	315	333	316	350	285	244	247	256	286	184
Total anglers	463	573	461	570	762	762	835	529	576	638	756	628	654	518	510	505	463	511	400	473	345

Table 5.1 Recorded Recreational Use Skomer MCZ (Figures are for financial year April to end of March, as represented in Fig 8.3 data goes back to 1987, but Table 8.1 has been curtailed for clarity).

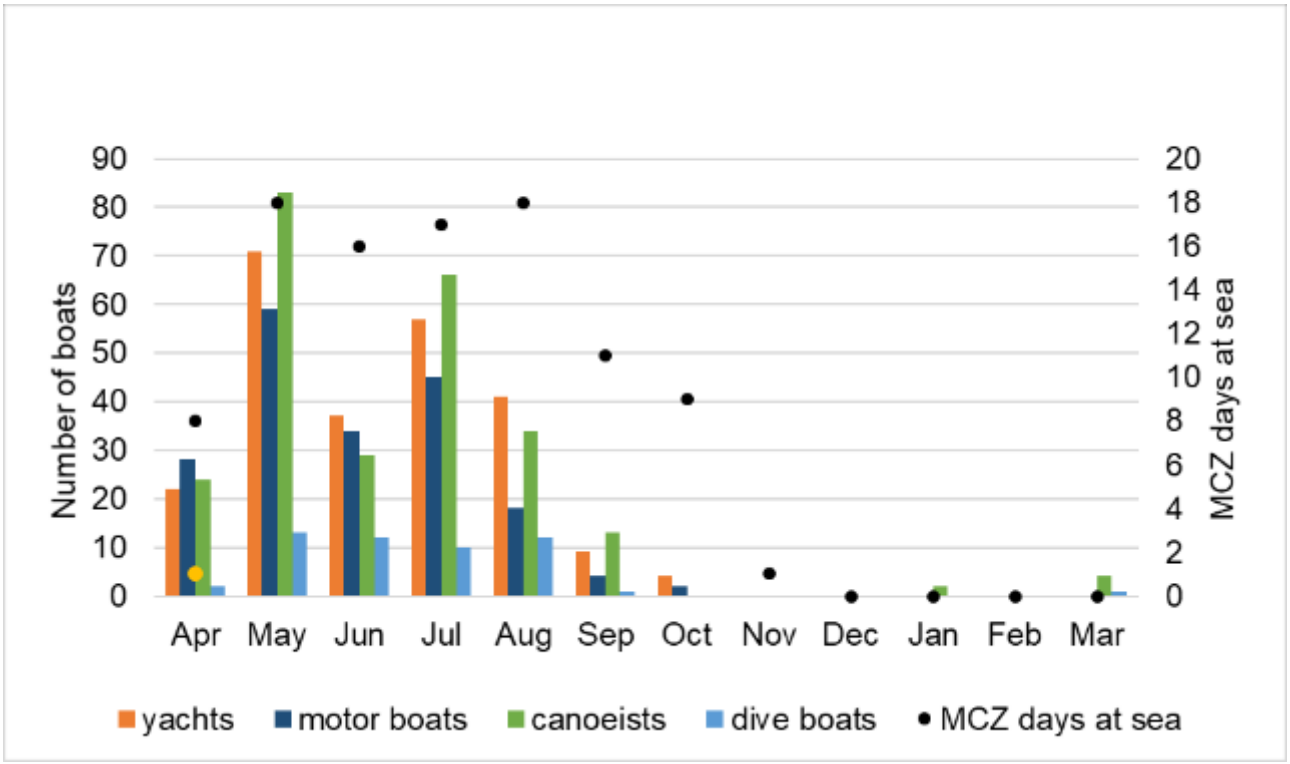


Figure 5.4 Skomer MCZ 2019 Recreational Craft

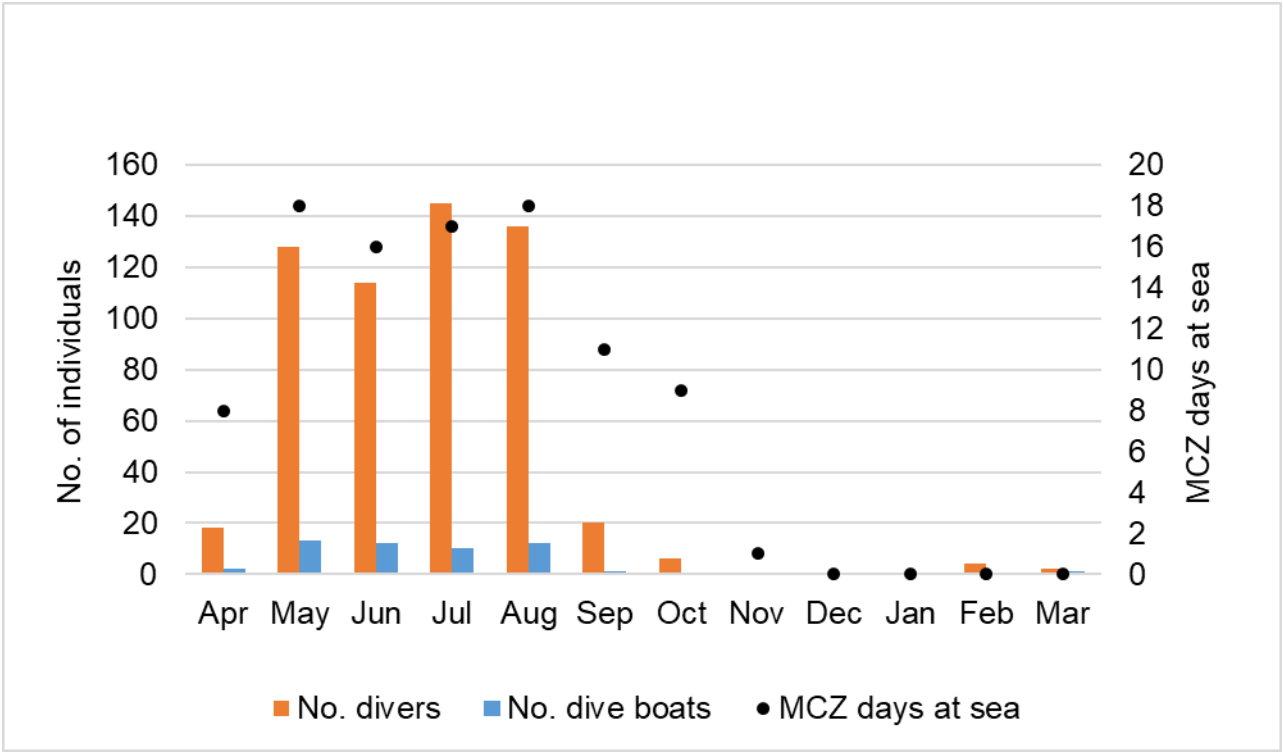


Figure 5.5 Skomer MCZ 2019 SCUBA divers

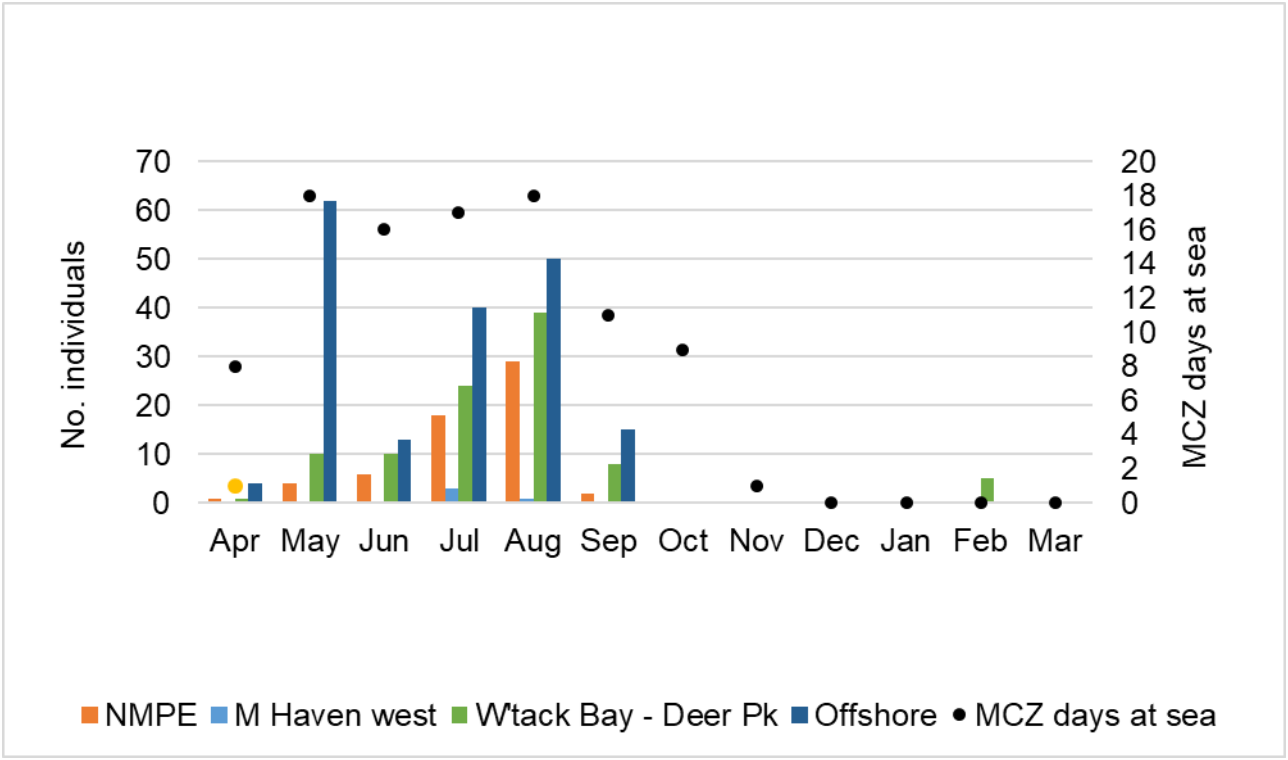


Figure 5.6 Skomer MCZ 2019 Anglers

6. Liaison and Advisory Committees

6.1. Advisory Committee

Skomer MCZ Advisory Committee meeting was held at Marloes Village Hall in April 2019, chaired, for the last time, by Dr Robin Crump, who announced his retirement from the position. In recognition of his 17 years as Chair the committee have appointed him as Honorary President of the committee.
17 members, including new members from Swansea and Aberystwyth Universities and Canoe Wales, 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.

Correspondence regarding the future of Skomer MCZ was discussed: Some reassurance was taken from the response by NRW's Chief executive, but members were unhappy with what they regarded as the non-committal responses from Welsh Government. The committee heard about Welsh Government's plans to involve the committee in work to bring Skomer MCZ's features and conservation objectives in line with the requirements of the Marine and Coastal Access Act (MaCAA). However, progress on this was likely to be delayed until late 2019 due to priority work on Brexit preparedness. In the meantime, under the transition arrangements included in MaCAA, Skomer MCZ management and monitoring was continuing as before.

Dale and Marloes Women's Institute were, as ever, pivotal to the success and harmonious atmosphere of the Advisory Committee meeting through the judicious application of cake.

Following Dr Crump's retirement, Dr Madeleine Havard has been appointed as the new chair of the Advisory Committee. Dr Havard is an environmental scientist with experience of working for voluntary and statutory environmental organisations, and as an academic, lecturing in environmental studies with research interests in conservation and marine and coastal management. She has been a member of a number of National Advisory Committees and Boards of organisations in the fields of environment, education and heritage including: Natural Resources Wales, the UK Joint Nature Conservation Committee, National Lottery Heritage Fund Committee for Wales and Marine Conservation Society. She has been Chair of a number of committees including Wales Coastal and Maritime Partnership, Wales Environment Link and Flood Risk Management Wales and has long experience of working with cross-sectoral groups. She is currently a Trustee of Amgueddfa Cymru-National Museum Wales, and a member of Pembrokeshire Coast National Park Authority.

6.2. Wildlife Trust South and West Wales

Skomer Island NNR Wardens, Nathan Wilkie and Sylwia Zbijewska had their first season in charge of the Island in 2019. They and the island staff contributed significantly to the recreational records for the MCZ, for which we are very grateful.

Following success in 2018 and 2019 as floating bin lorry, helping to clear rubbish from the Wick (see section 7.3.15), and as floating dumper truck (see Section 6.2), *Skalmey* graduated to removal lorry at the end of the 2019 season to help some of the staff move off the Island for the winter.

Skomer staff also carried out monitoring of seals on Skomer under contract to NRW (see Section 9.1 and Appendix 1).

The assistance of the Trust staff at the Wildlife Trust shop at Lockley Lodge, with opening up the MCZ exhibition, was very much appreciated again in 2019. This enabled us to maximise the number of days the exhibition was open, even when MCZ staff were off-site (see Section 11.1 for 2019 visitor numbers).
MCZ staff also liaised with the wardening staff on Skokholm during MarClim intertidal surveys (see Section 10.4).

6.3. Welsh Government Marine Enforcement

Skomer MCZ staff did not make contact with Marine Enforcement staff in 2019, which could be taken as a positive, in that there were no observations of fishery byelaw infractions for us to report.

6.4. Pembrokeshire Coast National Park

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

6.5. National Trust

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

6.6. Academia

A number of academic institutions and students have worked with MCZ staff during 2019:

Aberystwyth University students visited Skomer MCZ to hear about the practicalities of managing an MPA.

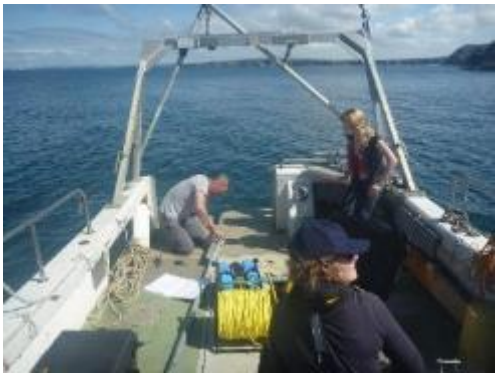
Swansea University researchers looking into the potential for restoring eelgrass beds approached Skomer MCZ staff for help in collecting seed from the bed in North Haven.

Also, MCZ staff helped to deploy a Photosynthetically Active Radiation (PAR) logger in the eelgrass bed to continuously record how much light was available to the eelgrass for photosynthesis. We had managed to kill a previous model, so it was with some relief that we found this unit had remained dry inside.

Olivia Norris, University of Gloucestershire, accompanied MCZ staff during plankton sampling for a study she was carrying out looking at microplastics in the marine food web. See Appendix 2 for her poster presentation.

Melanie Baker, from Leeds University, who deployed miniature underwater video cameras with the help of MCZ staff, supplied a copy of her Honours project on fauna living on sediment seabeds. See Appendix 3 for her project abstract.

MCZ staff helped with a collaborative research project between Bangor University and Pembrokeshire Scallops, by taking extra plankton samples to look for scallop larvae. Under the auspices of the new Shellfish Centre at Bangor University, the work aims to investigate scallop distribution, maturation and spawning, identify sources and sinks of scallop spat through oceanographic modelling and potential genetic analysis in the St Brides Bay area. The Bangor researchers were also interested to see what effect the management of the MCZ had on potential scallop spat sources for the area.



Other University liaison included Exeter University and a paper on grey seal diet and microplastic ingestion to be published in *Methods in Ecology and Evolution,* and work being undertaken by Bangor University looking at by-catch in lobster pots.

6.7. Other organisations and individuals

Notable visitors to the Skomer MCZ in 2019 included most of the Welsh Assembly Climate Change, Environment and Rural Affairs Committee, who were hosted aboard our two boats during a Wales Environment Link event during their consideration of the Welsh Government's progress on Marine Protected Area management.

Phil was invited to speak to the Lundy MPA advisory group and to the Lundy Management Forum in Ilfracombe. Both groups were interested in (and dare I say a little jealous of) the levels of monitoring NRW manage to maintain at Skomer. Phil compared notes with the Lundy management team on seal pup mortalities and the Skomer team have been invited to take part in the Lundy Marine Festival during the summer of 2020.

The second generation “Sea-Hives” continue to be deployed at OMS and having survived the winter appear to be 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.

Within NRW the “Doris Day” scheme continues, as a way to encourage different teams to familiarise themselves with other aspects of the organisation’s work and the personnel that are involved. Skomer MCZ remains a popular choice as a site to visit, especially when the puffins are around. In 2019 we welcomed colleagues from the Energy Delivery Team, the Environment Advice and Analysis Team based at St Mellons and Operations Team Leaders.

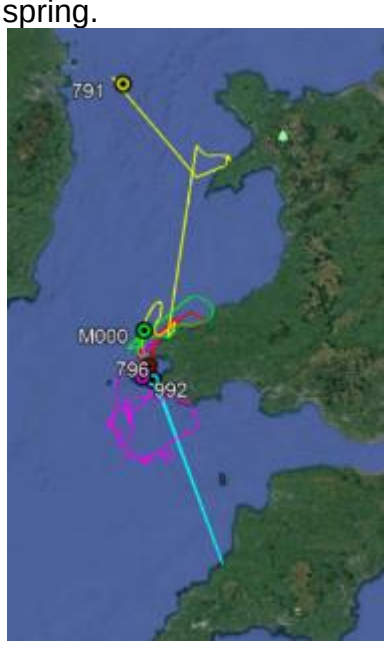
NRW colleagues formerly known as the Fishery Assessment Team have continued to provide valuable support for our work in monitoring the eelgrass bed in North Haven by providing an annual estimate of the extent of the bed using their acoustic imaging systems. This supplements the 4-yearly volunteer diver surveys (last carried out in 2018).

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.

Other organisations and individuals that Skomer MCZ staff have worked with include the Wales Activity Mapping project managed by Pembrokeshire Coastal Forum, the National Coastwatch Institution, who maintain watches at the former Coastguard lookout on the Deer Park, the Biology and Ecosystems Panel of the Global Ocean Observing System (GOOS BioEco), and an enquiry from a fascinating Torbay creative/science project about seahorses and seagrass beds called “The Offering”.

6.8. Wider marine environmental initiatives

Sea Mammal Research Unit visited Skomer to carry out satellite-tagging of adult grey seals in 2019, while MCZ staff watched from a safe distance. Seven devices were deployed on seals (5 males, 2 females) caught at sites on Skomer and Ramsey, including two bull seals caught on North Haven beach on Skomer. The satellite tags are glued to the fur on the seal’s neck. This keeps the devices streamline as the seal dives and allows the devices’ aerials to be exposed when the seal comes to the surface to breathe, allowing a connection with satellites. The tags then detach when the seal moults the following spring.



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

7. Science

All the following projects are reported on in greater detail in the Skomer MCZ Project Status Report 2018/2019 (NRW evidence Report number 324), which is available via the NRW website.

7.1. Biology

7.1.1. Project code: RA03/01 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 2019, 238 pups were born at Skomer Island sites and 170 pups at mainland sites giving a total of 408 pups born in the MCZ.

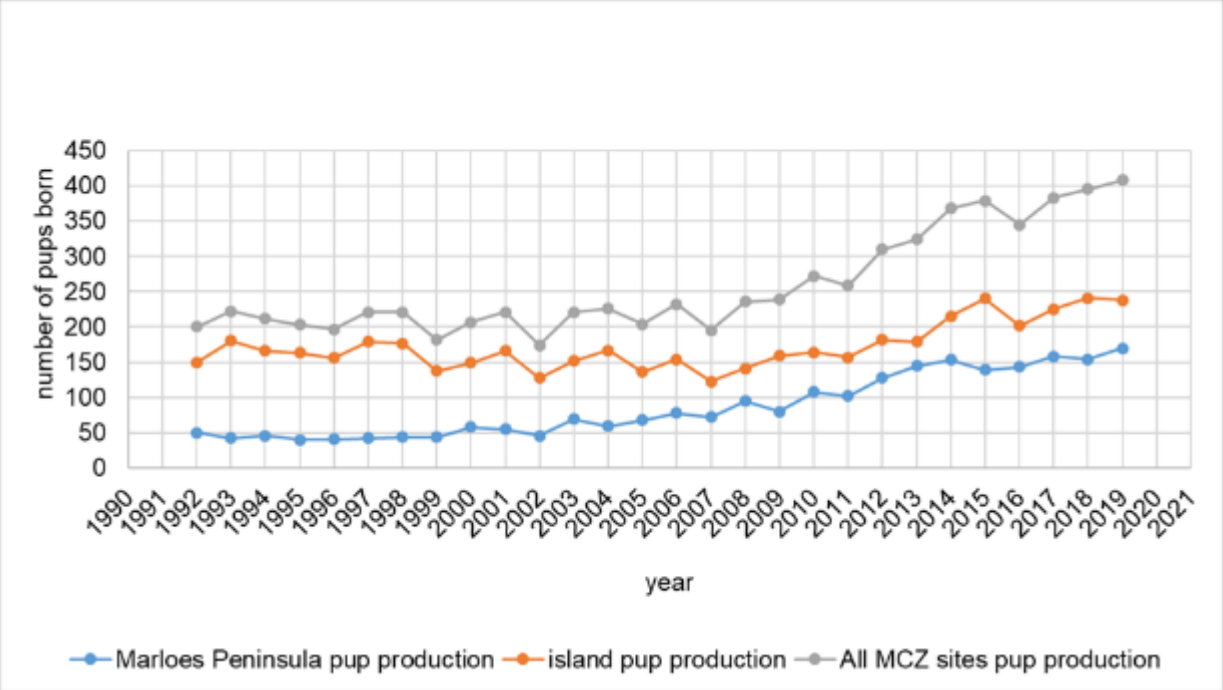


Figure 7.1 Skomer MCZ pup production 1992 - 2019

Pup production in the Skomer MCZ for the past 5 years has shown the highest totals recorded for the area with average production for 2015-19 at 382 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.

From 1992 to 2002 Marloes peninsula contributed an average of 22% of total production. This has then gradually increased to a peak of 45% in 2013 and the average over the last five years is 40% of total production.

In 2019, 8.5% of pup production occurred in July/August, 64% in September, 26% in October and 1.5% in November. The highest number of births was 80 pups in week 38 (17th – 23rd September). The trend over the last 23 years shows that the mode week of production has fluctuated between weeks 38 to 40 (17th September to 7th October).

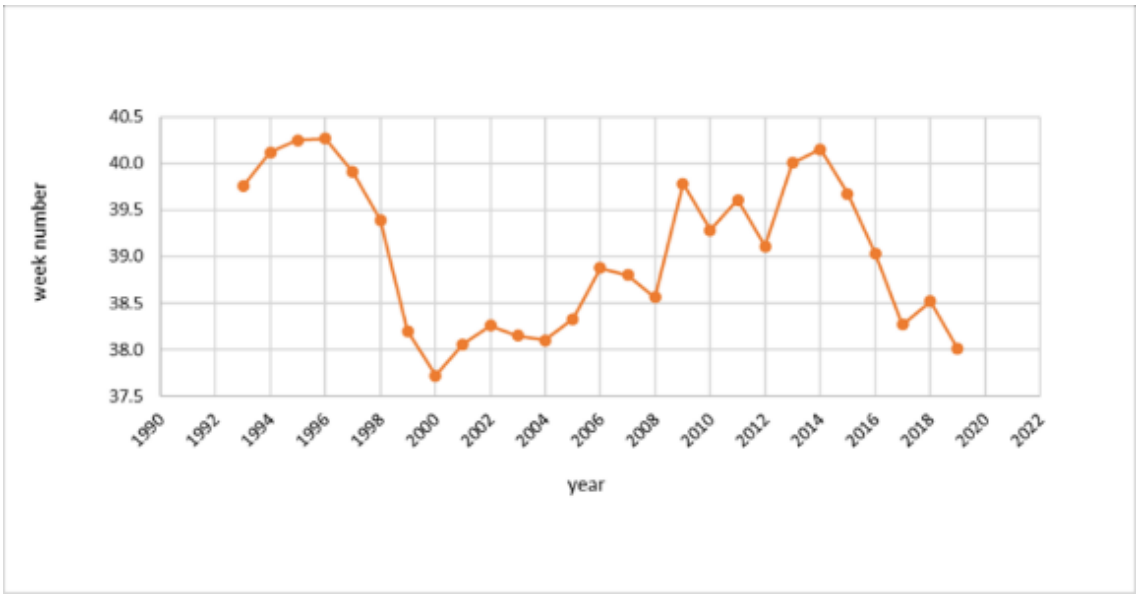


Figure 7.2 Skomer MCZ pup production – peak seal birth number seasonality

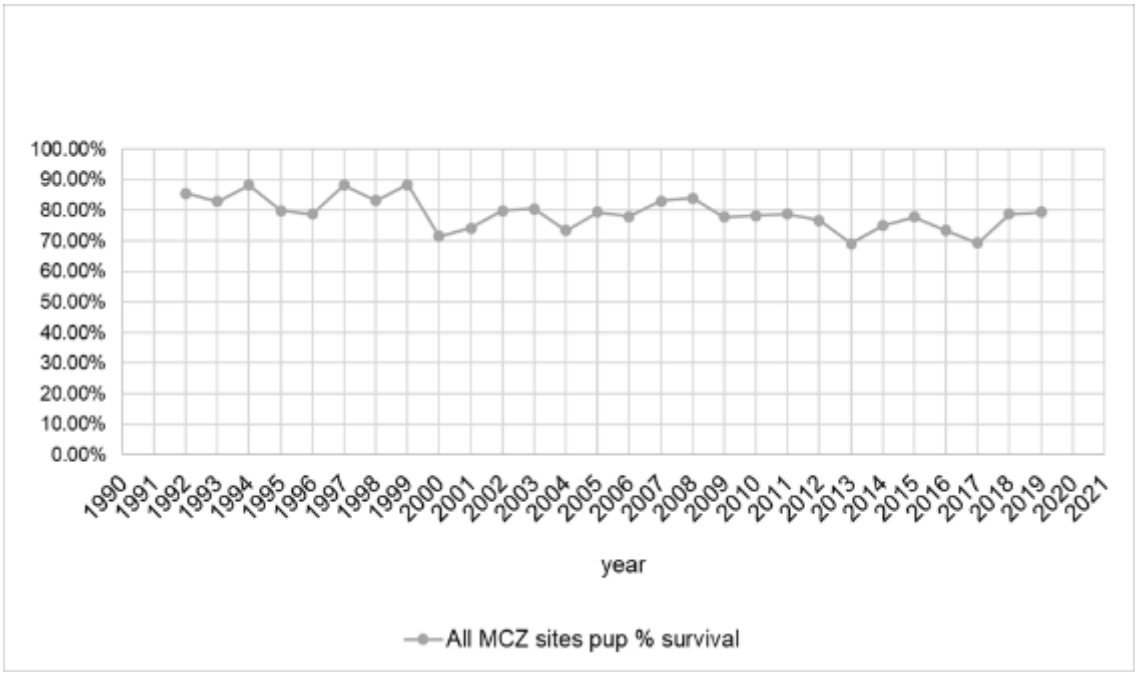


Figure 7.3 Skomer MCZ pup survival 1992 - 2019

In the Skomer MCZ pup survival from 1992 to 2019 has fluctuated between 69% and 88% with an average of 79%.

In 2019 pup survival through to moult was recorded as 81% for Skomer sites and 78% for Marloes Peninsula sites, with a combined survival for the Skomer MCZ of 79%.

7.1.2. Project code: RM73/01 Echinoderm populations

Echinus esculentus

The mean sea urchin density for the Skomer MCZ for each survey year is shown in Table 10.1. A similar number of transects and area surveyed was completed for each survey.

Category	2007	2011	2015	2019
Transects completed	140	139	151	144
Area covered (m^2)	8400	8340	9060	8640
Total number of Urchins	602	755	879	953
Mean density / 100 m^2	6.87	9.05	9.70	11.11

Table 7.1 Summary of density results for *Echinus esculentus* in each survey year

In 2019 the mean density of *E. esculentus* for all sites surveyed was 11.11/100m^2. Density of *E. esculentus* at different sites in 2019 is shown in Figure 10.4. A wide range of mean densities were found at the different sites. The highest mean density of 28.33 per 100m^2 was recorded at Castle Bay and the lowest was 0.9 per 100m^2 at Thorn Rock.

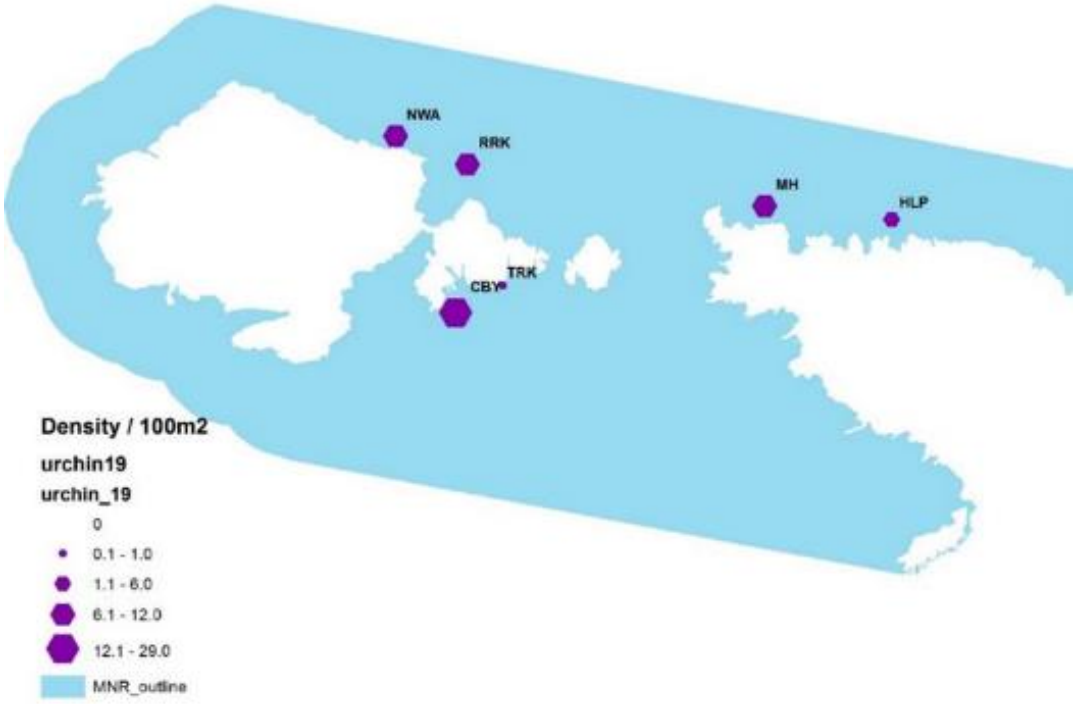
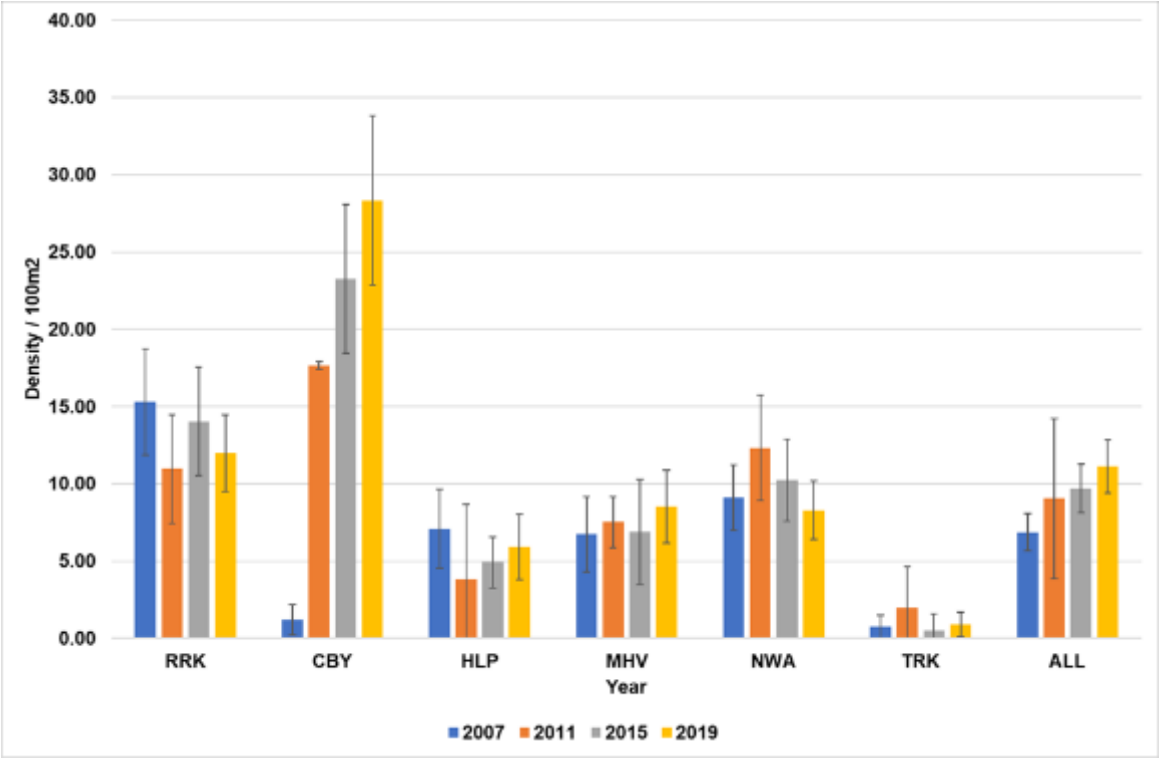


Figure 7.4 Graduated bubble map of *E. esculentus* density in Skomer MCZ 2019.

These results can be compared to the 2007, 2011 and 2015 surveys (Figure 10.5).



Thorn Rock (TRK), North Wall (NWA), Rye Rocks (RRK), Martins Haven Point (MHV), High/Low Point (HLP) and Castle Bay area (CBY).
Figure 7.5 Mean *E. esculentus* density (per 100m^2) at each site for 2007, 2011, 2015 & 2019.

The pattern of variation in density between the sites has not varied much between the years. It is only the Castle Bay site which has shown any significant change (**p<0.1%).**

In 2007 an unsuitable location was used in Castle Bay before relocating it in 2011, this accounts for the comparatively low density recorded in 2007.

Statistical tests show that there was no significant difference between the densities of *E. esculentus* found at each of the depth zones surveyed. This is consistent with results from the previous surveys.

The population of *E. esculentus* shows a normal size frequency distribution. Mean, maximum and minimum diameters were 13.4 cm, 24.3 cm and 2.3 cm respectively.

2019 has seen the highest occurrence of 'bald' *E. esculentus* since 2003. One record was from Thorn Rock, three records from Rye Rocks and seventeen records from the Castle Bay site. The numbers found are still very low, accounting for only 2.2% of the total.

Starfish Species

In 2019 the spiny starfish, *Marthasterias glacialis,* was the only species from the targeted list to be recorded and had a mean density of 2.79/100m^2. There were no records of either seven-armed starfish, *Luidia ciliaris,* or sun stars, *Crossaster*

papposus. Crossaster papposus has not been recorded on a survey since 2003. *Luidia ciliaris* was recorded in 2007, 2011 and 2015 but in very low numbers and mainly as juveniles.

Figure 7.6 Graduated bubble map of *M. glacialis* density / 100m^2 Skomer MCZ 2019

Plankton

Planktonic echinoderm larvae are seen regularly in the plankton samples taken within Skomer MCZ. In 2019 four groups of echinoderm larvae could be identified: echinopluteus (urchins), ophiopluteus (brittlestars), auricularia (Holothorians/sea cucumbers) and brachiolaria (starfish). Their occurrence during the year each peaked at different times. The starfish larvae were found from mid-May to mid- July, peaking in June whilst urchin larvae were found over a longer period from mid-May to mid- September, peaking in July.

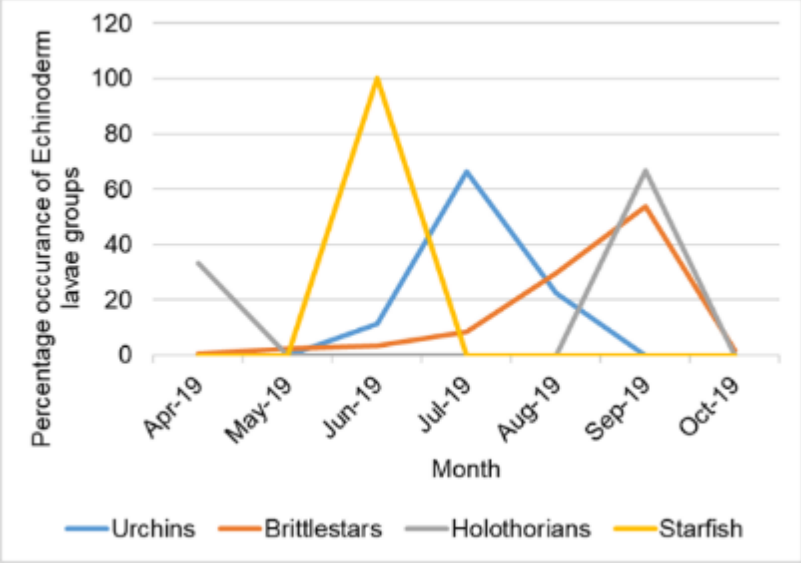


Figure 7.7 Percentage abundance of echinoderm larvae in plankton samples within Skomer MCZ 2019

Further details in Skomer Marine Conservation Zone, Distribution and Abundance of *Echinus esculentus* and selected starfish species 2020. NRW Evidence Report No.400

7.1.3. Project code: RA01/01 Record Cetaceans

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

Total numbers of harbour porpoise sightings between 2001 and 2018 is displayed in Figure 10.8.

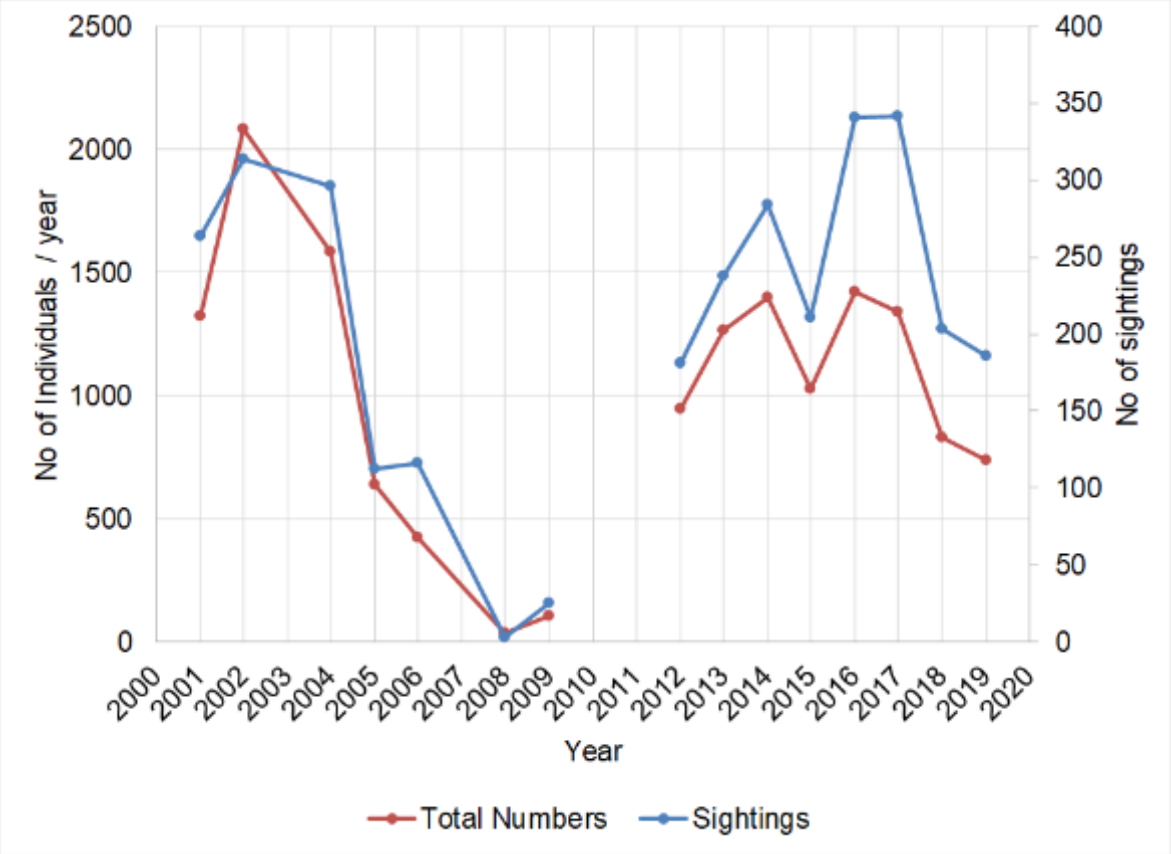


Figure 7.8 Harbour porpoise sightings Skomer MCZ 2001 - 2019

Common dolphin (*Delphinus delphis*) use the area infrequently but they can appear in large numbers. In 2019 there were a similar number of sightings compared with 2018, with most seen off the Garland stone and Skomer head – see Figure 10.9.

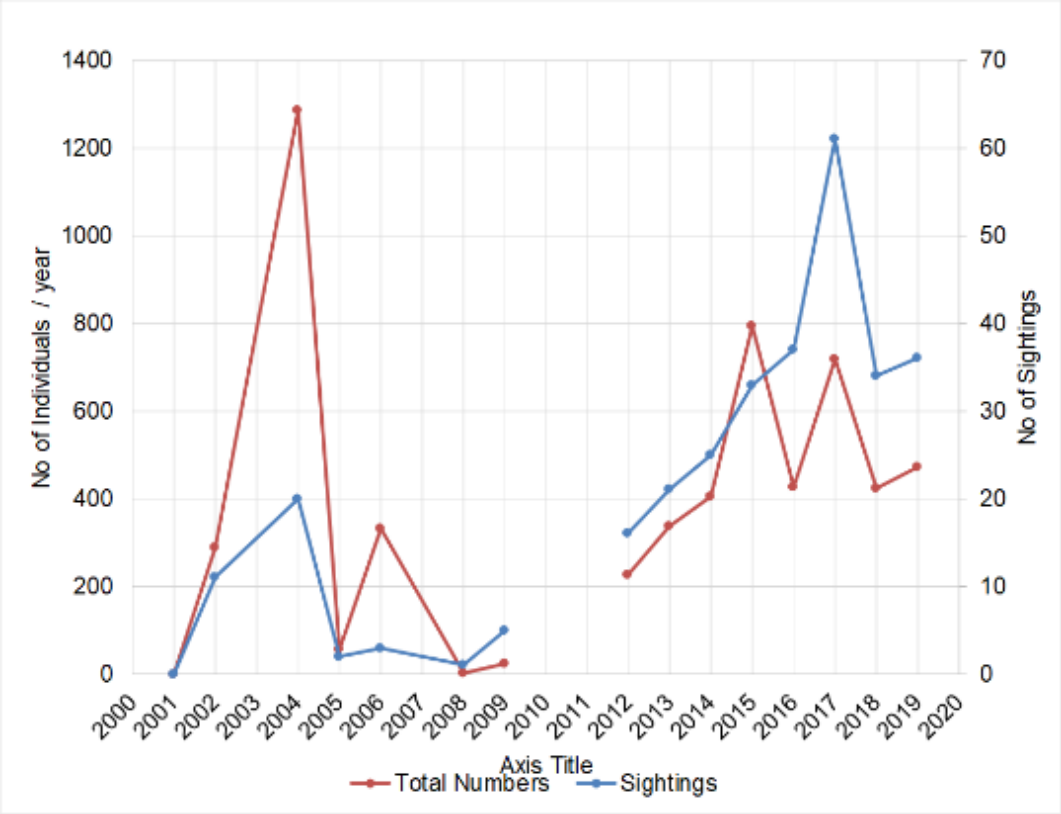


Figure 7.9 Common dolphin sightings within Skomer MCZ 2001 - 2018

Bottlenose dolphins (*Tursiops truncatus*) are not often seen within the MCZ, but in 2019 there were 2 sightings of individuals off the Garland stone.

Risso's dolphin (*Grampus griseus*) are regularly seen around Ramsey Island, 8 miles to the north but there are only infrequent sightings within the MCZ. However, there were 3 sightings in 2019 including a young animal off North of the Neck in April.

7.1.4. Project code: RB01/01 Record Vagrant & Alien (Non-native) Species

Vagrant and alien species were recorded by MCZ staff and the crew of the Dale Princess. Vagrant species recorded in 2019 included sunfish *Mola mola*; of which there were 2 records in August and 2 in September.

Another vagrant, the Portuguese man-o-war *Physalia physalis*, washed up on Martins Haven beach on 3 occasions following storms during the winter of 2019. They were also spotted on Musselwick beach and Marloes sands which are adjacent to the Skomer MCZ.

P. physalis, is a marine hydrozoan of the family Physaliidae found in the Atlantic, Indian and Pacific Oceans. Despite its outward appearance, it is not a jellyfish but a siphonophore, which is a colonial organism made up of specialised polyps. These polyps are specialised for movement, catching prey, feeding and breeding. The individual polyps are dependent on each other for survival, each having a distinct role. A large, purple, gas filled float (the pneumatophore) reaching up to 30 cm in height allows it to float on the surface and the crest running along the top acts as a sail. Its venomous tentacles can deliver a painful sting, which in very rare cases can be fatal.

The non-native kelp, Wakame (*Undaria pinnatifida*), which was found for the first time on Skomer and Skokholm shores during 2018 surveys, was not found again in 2019.

7.1.5. Project code: RB06/01 General Species recording

A record of a crab in the family Atelecyclidae was made by Jon Moore on a night dive at Martins Haven. It was suggested that the crab might be *Atelecyclus undecimdentatus*. However, it could also have been the more common circular crab *Atelecyclus rotundatus* which has a narrower carapace which is usually reddish brown.

There is only one UK record of *Atelecyclus undecimdentatus*, when one was collected during the Skomer MNR sediment infauna survey in 1998. This specimen was preserved and is curated at the National Museum Wales.

Figure 7.10 *Cancer pagurus*, alongside *Atelecyclus undecimdentatus, (collected from* Galicia Spain) - photo comparison, Ulster museum 2020.

Following comparisons with other specimens held at national Museum Wales and at Ulster Museum it became apparent that the 1998 sample is most likely to be a juvenile *Cancer pagurus* (Edible crab). None of which helped with the identification of the crab seen in Martins Haven other than to suggest that it was more likely to be *A. rotundatus* (unless of course another crab is found and photographed from all angles…).

This episode demonstrates how important it is for unusual species to be verified and checked and the importance of museum collections and voucher specimens (photographic or the actual specimen) when verifying records of species, especially those at the edge of their ranges.

7.1.6. Project code: RB03/01 Monitor Littoral Habitats / Communities


Viewpoint photographs of shore communities were taken for all sites.

All sites at which permanent quadrats were established were surveyed in 2019.

All data from 2003 to 2019 are displayed on a multi-dimensional scaling (MDS) plot (Figure 10.11), which represents how similar sites are to each other for each year.

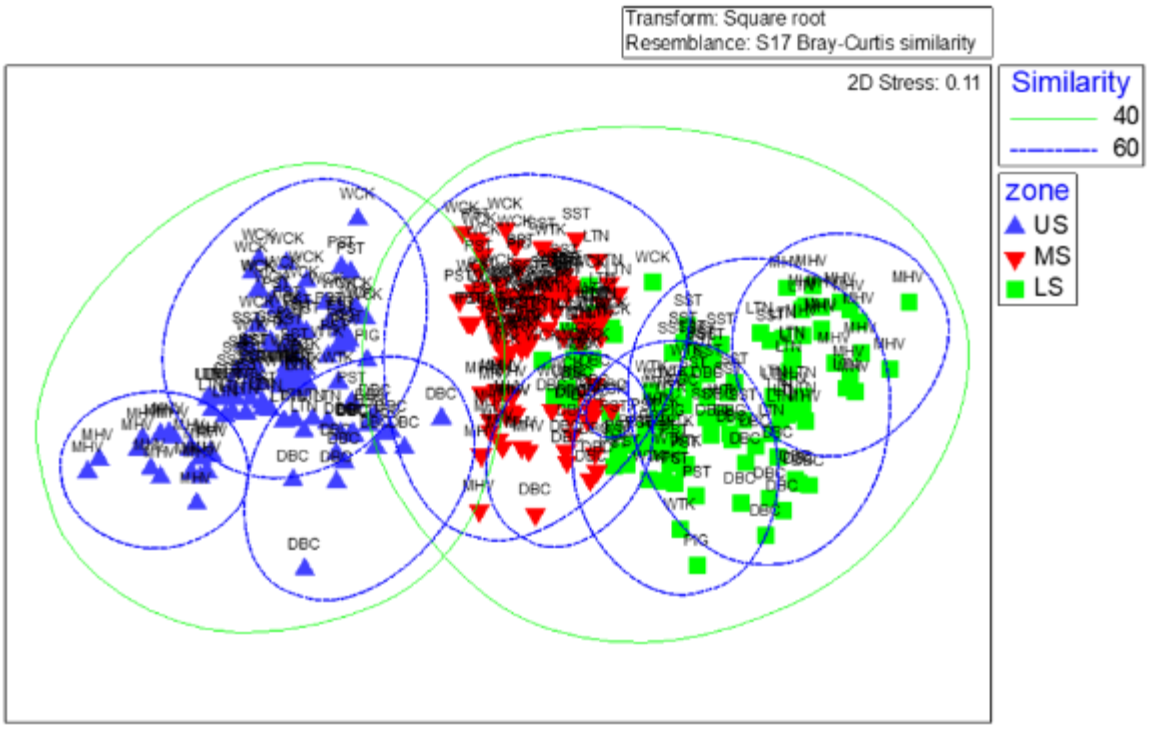


Figure 7.11 Multi-dimensional scaling (MDS) plot of all littoral community data 2003 – 2019

In summary:

- Upper shore sites group neatly on the right.
- Lower shore sites are much more disparate and grouped on the left.
- Middle shore sites sit in between with some overlap (at 60% similarity) with the lower shores.
- Some sites form distinct clusters e.g. MHV Upper, MHV Lower.
- Some sites are very variable from year to year e.g. PST Lower & WTK Lower.
- 2019 did not show any major variations from the overall trends seen since 2004.
- A statistical test for differences between years showed no significant difference between any of the years.
- The communities on the shores have not shown any major changes during the monitoring period 2003 to 2019.

A range of techniques is used to assess the shore communities within Skomer MCZ:

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

Table 7.2 Summary of methods completed at each littoral site.

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. Martin's Haven, North Haven and South Haven were selected as suitable sites for the project.

Another way of looking for temperature related changes in communities is to use a technique called Community Temperature Index (CTI).

The Community Temperature Index approach characterises each species by its thermal affinity, the Species Temperature Index (STI). The average of species thermal affinity across an entire community is obtained by weighting each STI value by the average abundance of that species, to give the Community Temperature Index (CTI). CTI values can be calculated for each site and averaged across all sites to give an average index for each year of the survey. Changes in annual CTI can be directly compared to annual changes in temperature, with the relationship between CTI and temperature showing the climate change response of the community.

The CTI scores derived from Marclim data for the 3 shores surveyed at Skomer show no significant change averaging a CTI of between 11º and 12ºC which would match the ambient sea surface temperatures (from temperature probes at Skomer MCZ) for the same period. In other words; there is no evidence of any shift in the community due to climate change.

7.1.7. Project code: RB04/01 Plankton Recording

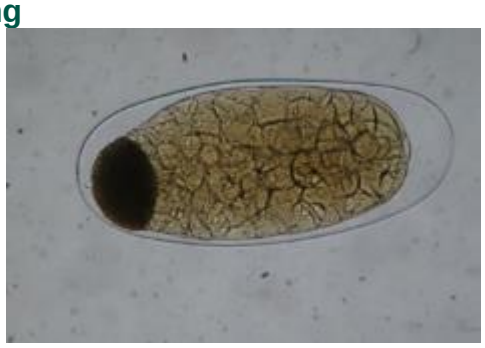


Figure 7.12 *Anchovy egg* (D. Conway 2019).

Zooplankton samples continued to be taken at Skomer MCZ in 2019 using methods recommended following a review by Plymouth Marine Laboratory in 2014. Also, in 2019 phytoplankton sampling was resumed.

The July 14th 2019 phytoplankton sample was an interesting record with species such as *Leptocylindrus mediterranea* suggesting an oceanic influence. This coincided with a zooplankton sample containing an anchovy egg (figure 10.13) another record that would not normally be found in the coastal waters around Skomer.

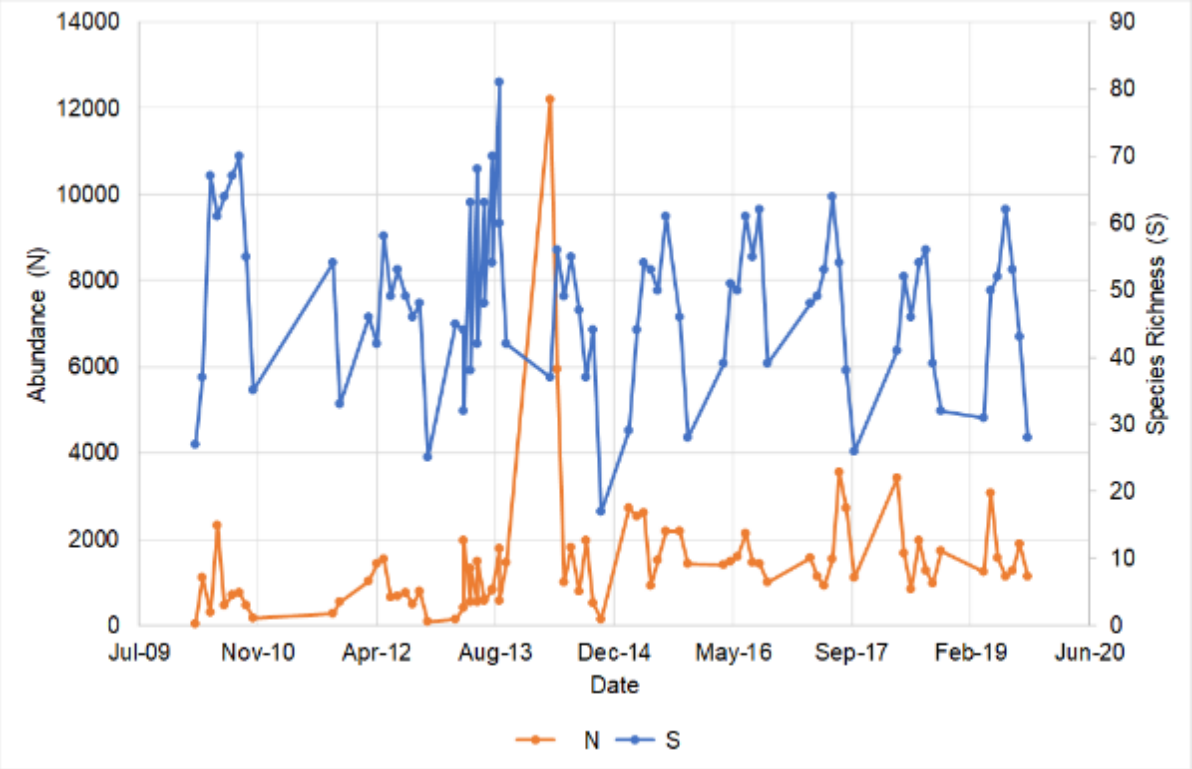


Figure 7.13 Average zooplankton species richness (S) and total number of individuals (N) 2009- 2019

7.1.8. Project code: RM13/01 Monitor Sponge Populations

In 2019 quadrats at all sponge monitoring transects were photographed and the four-yearly sponge species monitoring was also completed.

Improvement in image quality and resolution has meant that more sponge entities have been recorded on the transects 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, and in 2019 all sites decreased in abundance, despite good image quality.

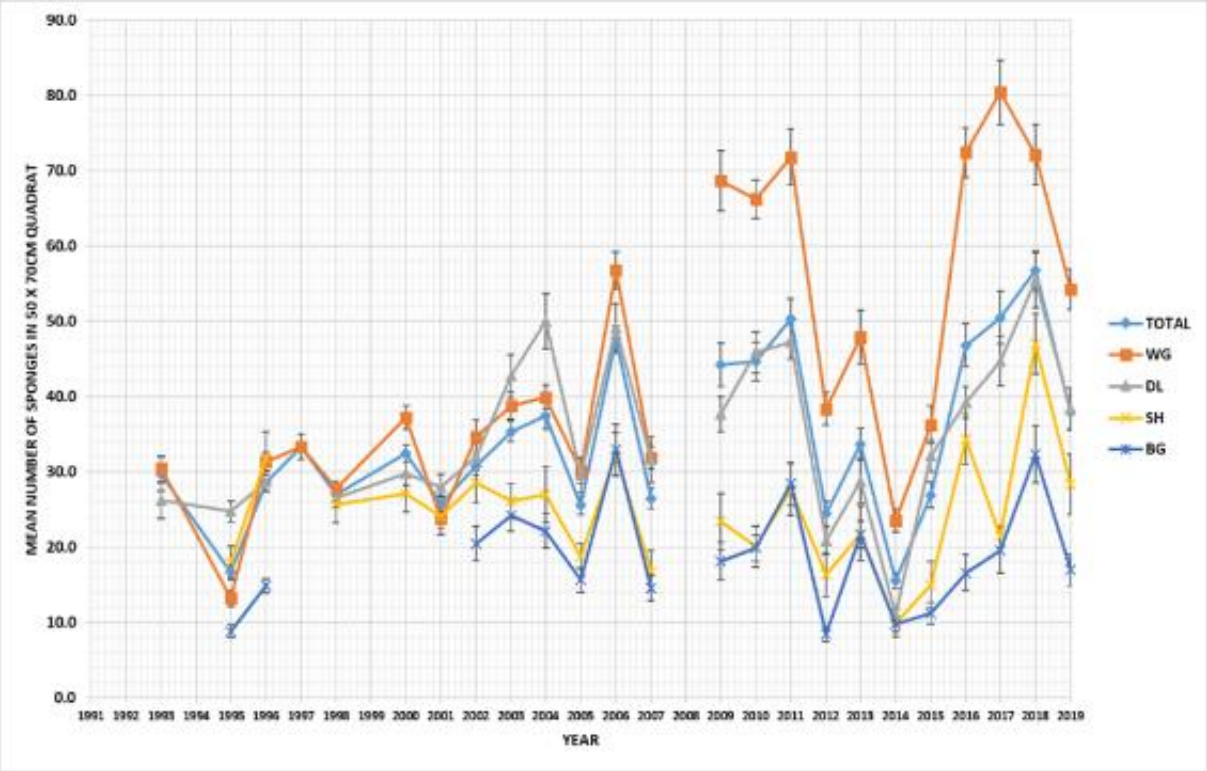


Figure 7.14 Mean number of sponges counted in each quadrat at 4 sites –Thorn Rock 1993-2019

The four-yearly species survey resulted in 72 species or entities being recorded in total. One of these (*Spongosorites* sp. 'A'), has not been previously recorded from the MCZ, and research suggests that it is an undescribed species. The only other *Spongosorites* species currently known to exist in the UK is the recently described *Spongosorites calcicola*, which is also present in the MCZ. This species was recorded for the first time during the 2015 species survey and found again in 2019. Another species of note found during this survey is a previously un-recorded *Eurypon* sp., bringing the total number of as yet un-named *Eurypon* spp. in the MCZ to 8.

The most frequently recorded species were: Cliona celata, Dysidea fragilis, Hemimycale columella, Pachymatisma johnstonia, Plocamionida ambigua, Stelligera stuposa and Stelligera rigida, which were recorded from all six sites.

Broad Gully (Thorn Rock) was the richest site in terms of diversity, with a total of 42 species being recorded. Dog Leg (Thorn Rock) was the least diverse, with 31 species.

A total of 130 sponge species (34 of which have been named to genus level only) have now been recorded from the Skomer MCZ, including records from previous surveys conducted before 2003, when the first of the four-yearly full species surveys took place.

The species surveys show that Skomer has a very diverse range of sponge species, one of the highest in the UK.

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.

7.1.9. Project code: RM23/01 Monitor Pink sea fan Population

All sea fan monitoring sites and remaining individual colonies were visited and photographed in 2019.

In 2018, 5 natural sea fans (BH8, BH18, BRK7 and POL8 and POL9) and 1 of the cluster of 5 small fans at BH were missing, in 2019 these were all confirmed as losses.

In 2016 BH21, was reduced to a stump, however, new growth was observed in 2018 and this growth has continued in 2019. Other fans which have been lost but where a base or stump is still present are being checked for any new growth.

Five additional fans were absent in 2019, BH22, WAY7, NWA3, POL10 and RRK25 these will be checked, and their status confirmed in 2020. Only two of the cluster of 5 small fans at Bull Hole were present, one was recorded as lost in 2018 and now a further two are missing.

Year	Sites surveyed	Total fans recorded	Total natural fans	Total attached fans	New recruits	Natural fan Losses (confirmed)	Attached fan losses	Missing (to be confirmed)
1994	4	34	34	0	0	0	0	0
1995	4	33	33	0	0	1	0	0
1996	4	33	33	0	0	0	0	0
1997	5	39	39	0	0	0	0	0
1998	5	39	39	0	0	0	0	0
1999	0	0	0	0	0	0	0	0
2000	5	54	54	0	0	0	0	0
2001	5	55	55	0	0	1	0	0
2002	9	86	86	0	0	1	0	0
2003	9	99	99	0	1	0	0	0
2004	9	101	100	0	0	0	0	0
2005	10	114	111	3	1	1	0	0
2006	10	119	116	3	7	0	0	0
2007	10	121	118	3	1	2	0	0
2008	10	126	122	4	0	0	0	0
2009	10	128	121	7	0	1	0	0
2010	10	126	120	6	0	3	1	0
2011	10	126	122	4	0	0	2	0
2012	10	126	121	5	0	0	0	0
2013	10	129	124	5	0	0	0	0

Year	Sites surveyed	Total fans recorded	Total natural fans	Total attached fans	New recruits	Natural fan Losses (confirmed)	Attached fan losses	Missing (to be confirmed)
2014	9	124	120	4	0	0	0	0
2015	10	125	123	2	0	3	2	0
2016	10	118	115	3	1	9	0	0
2017	10	114	112	2	0	3	1	0
2018	10	110	108	2	1	6	0	0
2019	10	104	102	2	0	0	0	7
				totals	11	31	6	0

Table 7.3 Survey results 1994 -2019

The loss of natural sea fans has increased in the last 5 years. From 2008 to 2014 the total number of natural sea fans recorded were between 120-124 fans. During this period 4 confirmed losses were made, however since 2015 the losses have significantly increased. Between 2015 and 2019 there have been 21 natural fans and 3 artificially attached fans confirmed missing and a further 5 natural fans and 2 of the cluster of small fans at Bull Hole were absent in 2019 to be confirmed as losses in the 2020 field season.

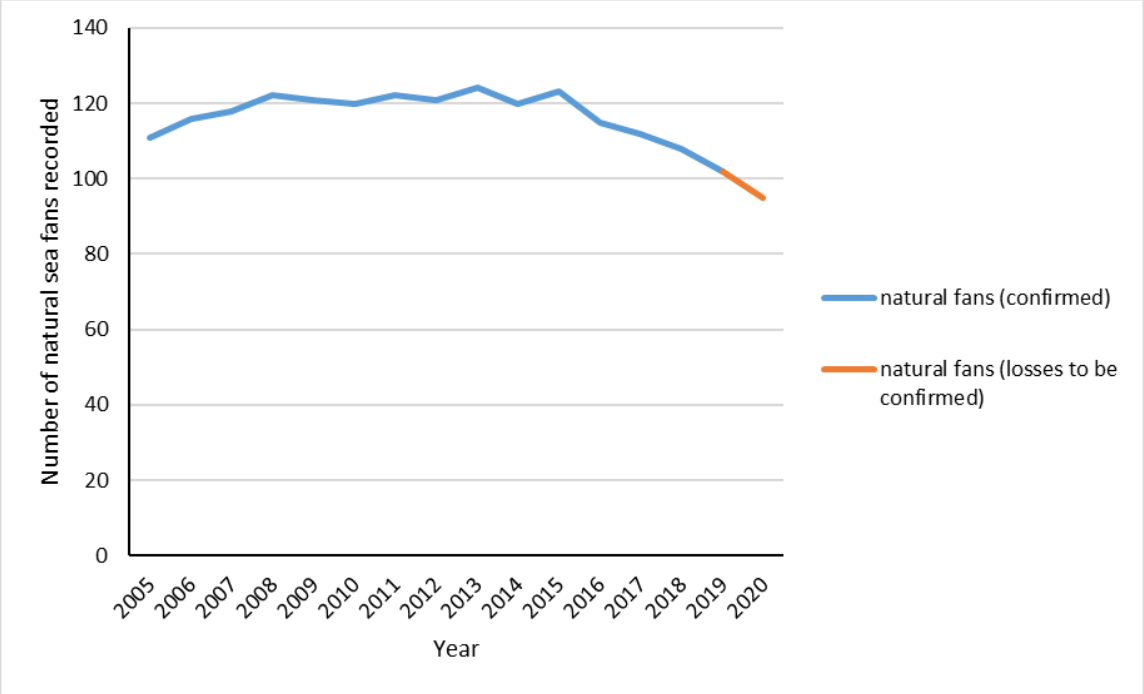


Figure 7.15 Total number of natural sea fans recorded 2005 to 2019 (artificially attached sea fans not included in this data)

In an attempt to understand potential causes behind the loss of sea fans at Skomer MCZ, human activity data for 2018 (for which sea fan losses are confirmed) has been analysed in more detail (Fig 10.17), concentrating on those activities with the potential to make contact with the seabed or sea fans and the sites where sea fans are monitored.

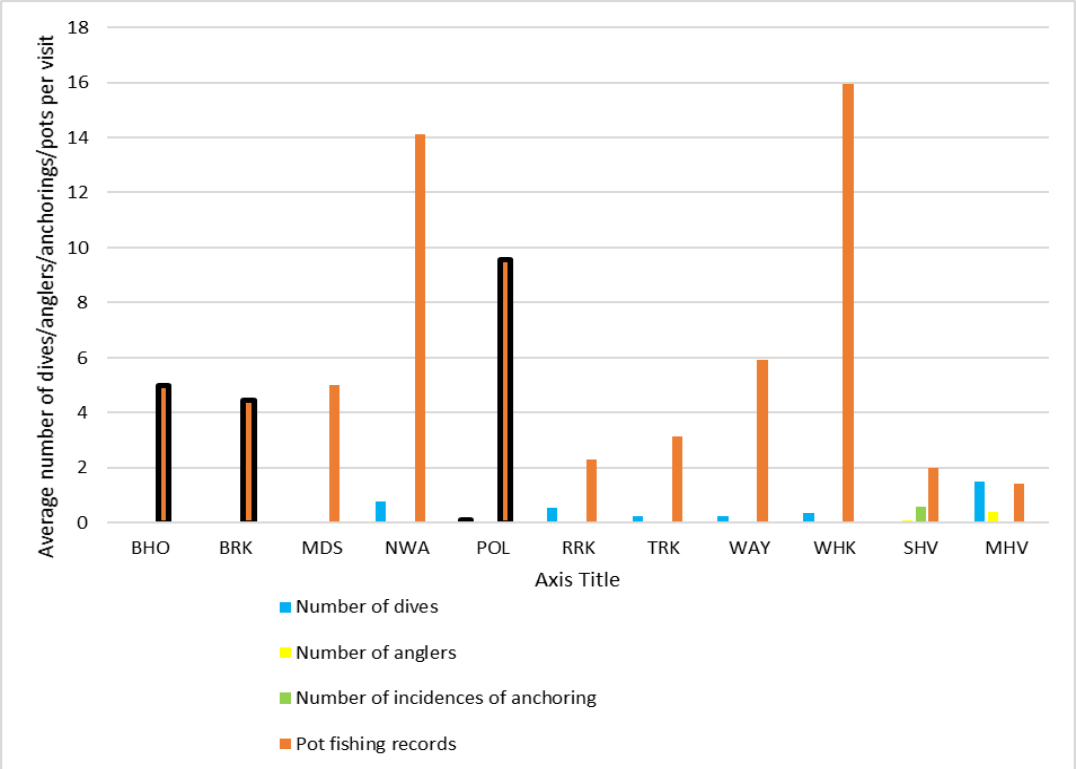


Figure 7.16 “Seabed contact” activities at Skomer MCZ sea fan monitoring sites in 2018 (data bars for sea fan loss sites outlined in black).

Data presented in Fig 10.17 are 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) and Martins Haven (MHV) are included for context; neither are sea fan monitoring sites, but one is a highly popular (and permitted) anchorage and the other is popular with divers. Diving numbers include Skomer MCZ monitoring dives.

Of the sites that suffered losses in 2018 (BHO, BRK and POL) most have very low levels of diving (only TRK has dives recorded additional to those carried out by MCZ staff), no anchoring or angling was recorded at any site and angling was only recorded at MDS. The activity most often recorded at all monitoring sites is lobster potting.

It can be seen from the bar chart that lobster potting is also recorded at sites where there were no sea fan losses, but at these sites there are either very low numbers of seafans (MDS, TRK, WHK) or the seabed topography may be such that seafans are protected from “seabed contact” activities by being in gullies or below overhanging rock formations.

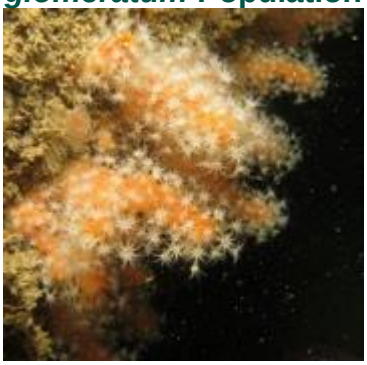
It should be noted that all data is likely to be an underestimate of actual activity, but more so for commercial fishing effort, which is only usually recorded once per week between May and September.

One previously unrecorded sea fan was found at Middleholm in 2018.

In 2019 one sea fan sea slug, *Tritonia nilsodhneri*, was recorded on a sea fan at the sea fan monitoring site at Bernie's Rocks.

In terms of sea fan condition, necrosis increased to 66.3% in 2019, higher than the average level of necrosis since 2002 of 46%. Most of the records were of small areas of necrosis on tips, only 8.2% had large areas of necrosis. An annual average of 59% of sea fans have been recorded with attached or entangled epibiota for the last 18 years of surveys. In 2019 this was on 68% of the sea fans, equalling the highest level ever recorded (1995). Also, 8.2% of the sea fans had heavy fouling.

7.1.10. Project code: RM23/03 Monitor *Alcyonium glomeratum* Population



The abundance of *A. glomeratum* at the monitoring sites is declining: North Wall East and Junko's reef have sizable colonies of *A. glomeratum*, whereas 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 mechanical damage at the monitoring sites and changes in environmental conditions are not thought to be significant enough to cause colony loss.

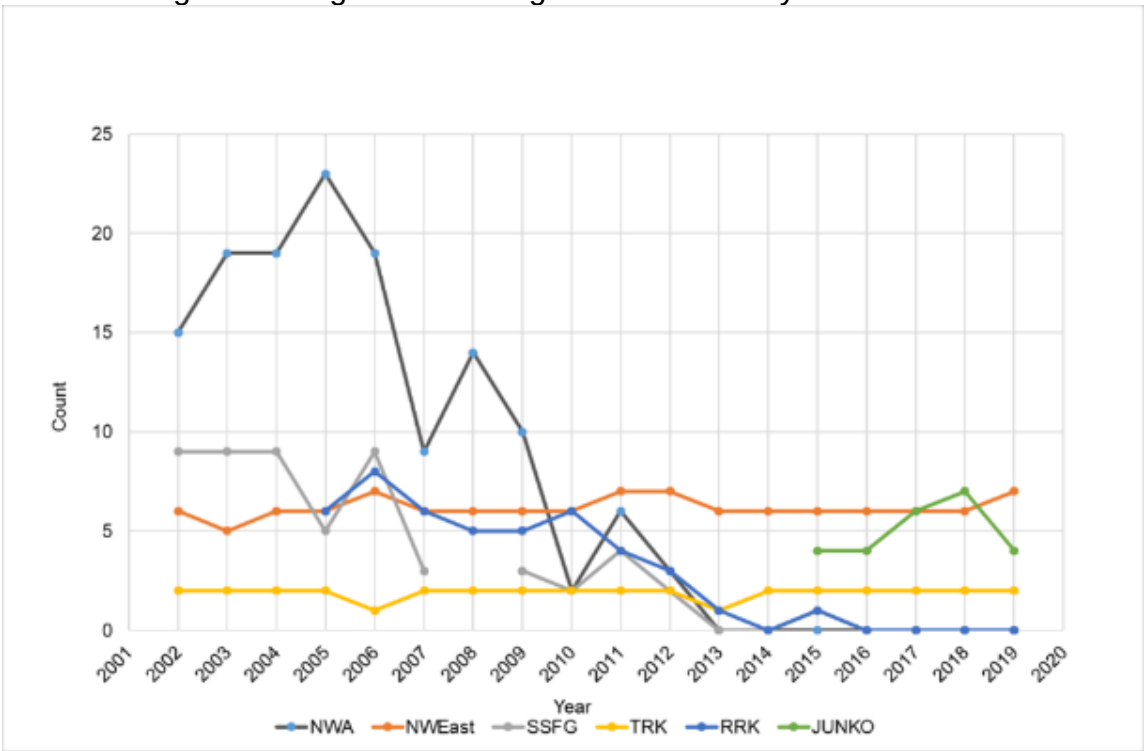
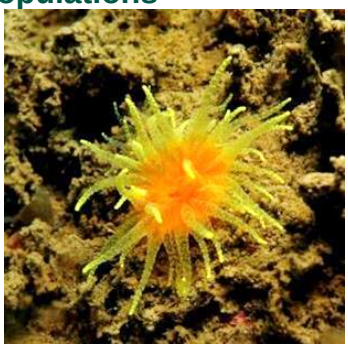


Figure 7.17 Number of quadrats with *A. glomeratum* present at Skomer MCZ sites 2002 – 2019.

7.1.11. Project code: RM23/04 Monitor Cup Coral Populations



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

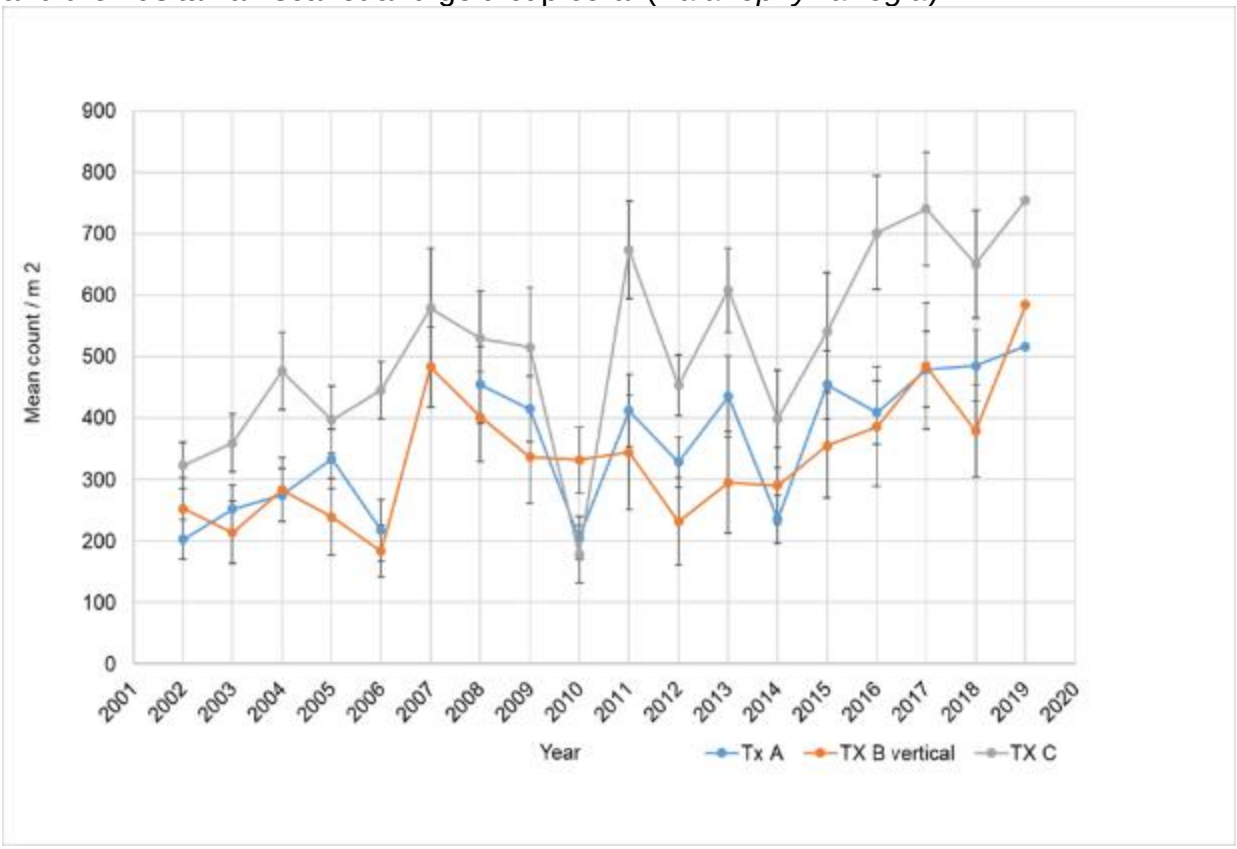


Figure 7.18 *Balanophyllia regia* abundance at Transects A, B and C at the Wick

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 the dense covering of silt that occurs across the site from time to time and occasional very poor photographic conditions (e.g. 2010). In 2019 there was very little silt and the cup corals were visible, even very tiny ones could be seen, which might explain why counts were their highest for each of the transects.

A record number of 541 individuals were counted in one 50 x 70cm framer (see image above).

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.

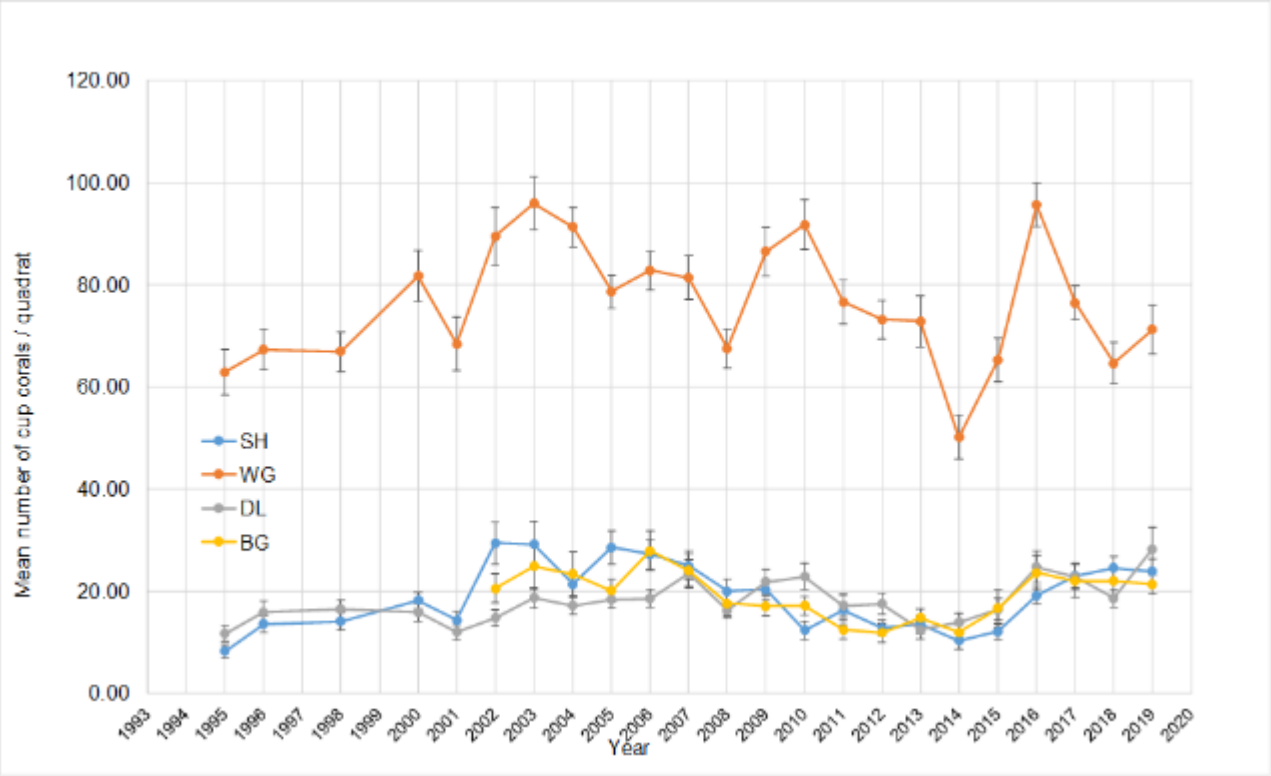


Figure 7.19 Mean Number of Cup Corals per Quadrat at Thorn Rock 1996 - 2019

The abundance has fluctuated at Windy gully (WG), but has been reasonably stable at the other three sites. It is not known how long these cup corals live and how variable their numbers are.

7.1.12. Project code: RM23/05 Monitor *Parazoanthus axinellae*

All monitoring sites were visited and all yellow trumpet anemone colonies were still present.

Following drops in polyp density at Sandy Seafan Gully (SSFG) and Way Deep in 2018, all sites, except Thorn Rock (TRK), increased in 2019. Overall the polyp density is considered stable.

Colony coverage of *P.axinellae* at all sites has shown fluctuations year to year, but overall shows a stable population.

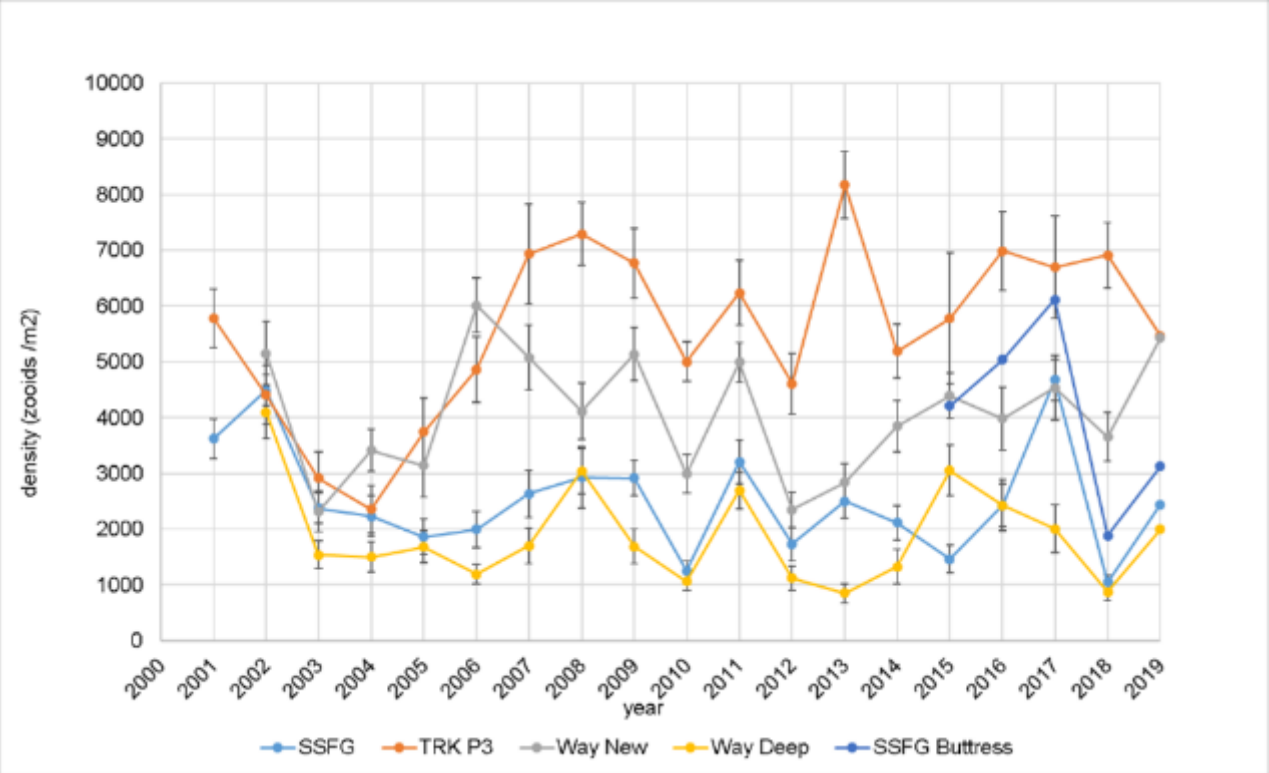
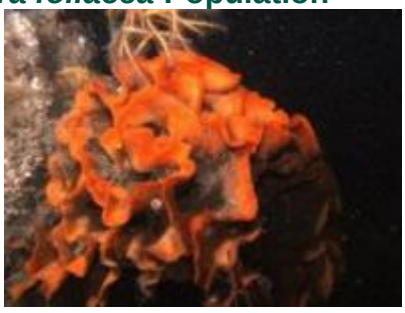


Figure 7.20 Density of polyp (numbers of polyps /m^2) at Skomer MCZ sites 2001 – 2019

7.1.13. Project code: RM63/01 Monitor *Pentapora foliacea* Population



In 2019 all Ross coral sites were visited and photographed. The classification system developed in 2006 and revised in 2010 has been used to characterise the population at Skomer.

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.

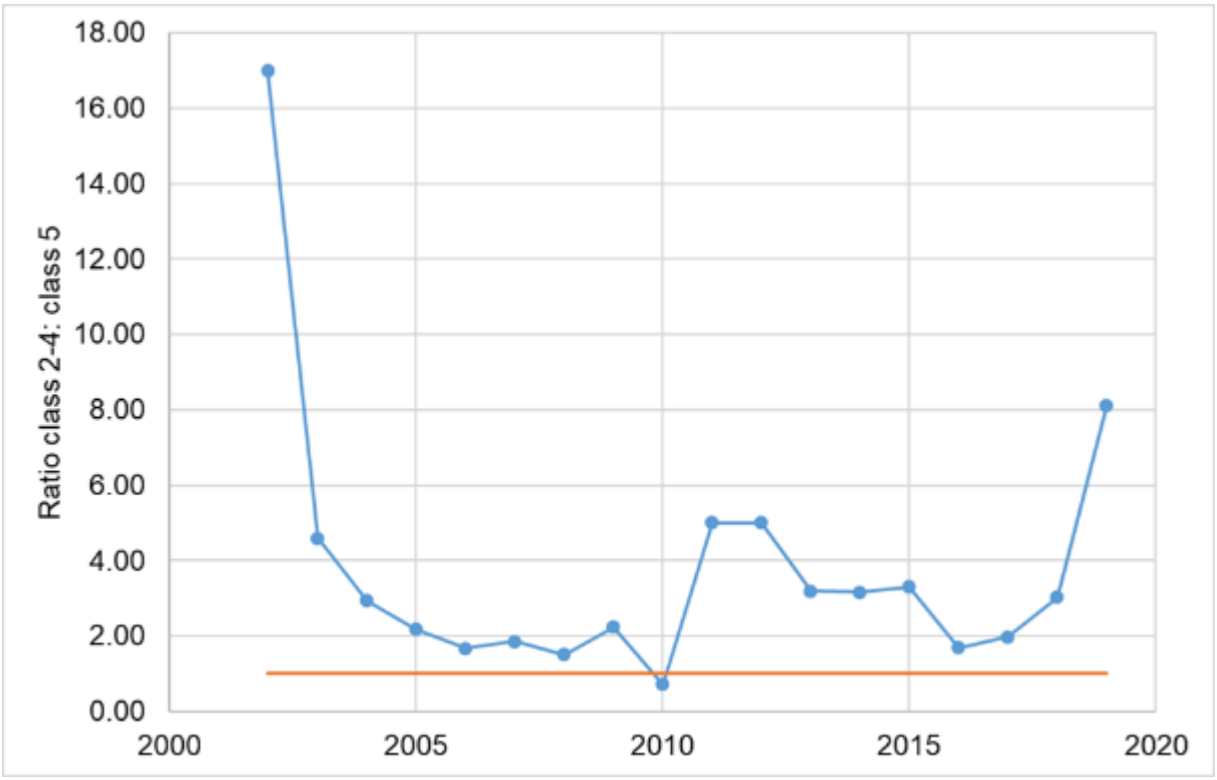


Figure 7.21 *Pentapora foliacea* - ratio of class 2-4 colonies to class 5 colonies - all Skomer sites

However, without comparing this ratio to that for an unimpacted area of seabed, no definite conclusion can be made.

7.2. Meteorology/Oceanography

7.2.1. Project code: RP04/01 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.

The highs and lows of the weather for 2019:

Maximum temperature (ºC)	24.7 (June)
Minimum temperature (ºC)	-0.24 (Feb)
Annual Maximum gust (knots)	86.6 (Dec)
Direction of Maximum gust	289 degrees

7.2.2. Project code: RP63/01 Monitor Seawater Turbidity / Suspended Sediment

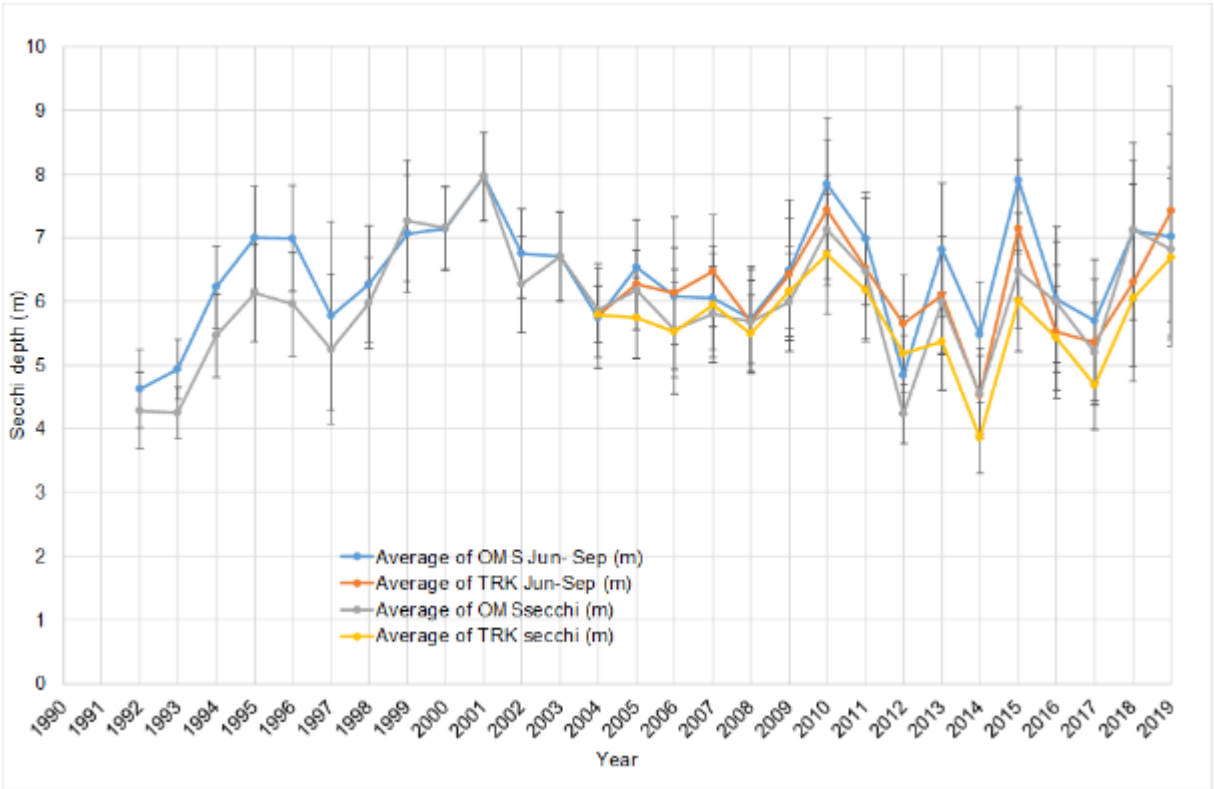


Figure 7.22 Skomer MCZ summary of annual mean Secchi disc data (m) with 95% S.E. bars

Seawater turbidity was measured using a Secchi disk at Thorn Rock and at OMS. Turbidity at Skomer MCZ in 2019 appears to be decreasing (increased water clarity) compared with 2017.

7.2.3. Project code: RP63/04 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.

Samples taken in 2019 are yet to be analysed, but 2018 data has been included in Figure 7.23 below:

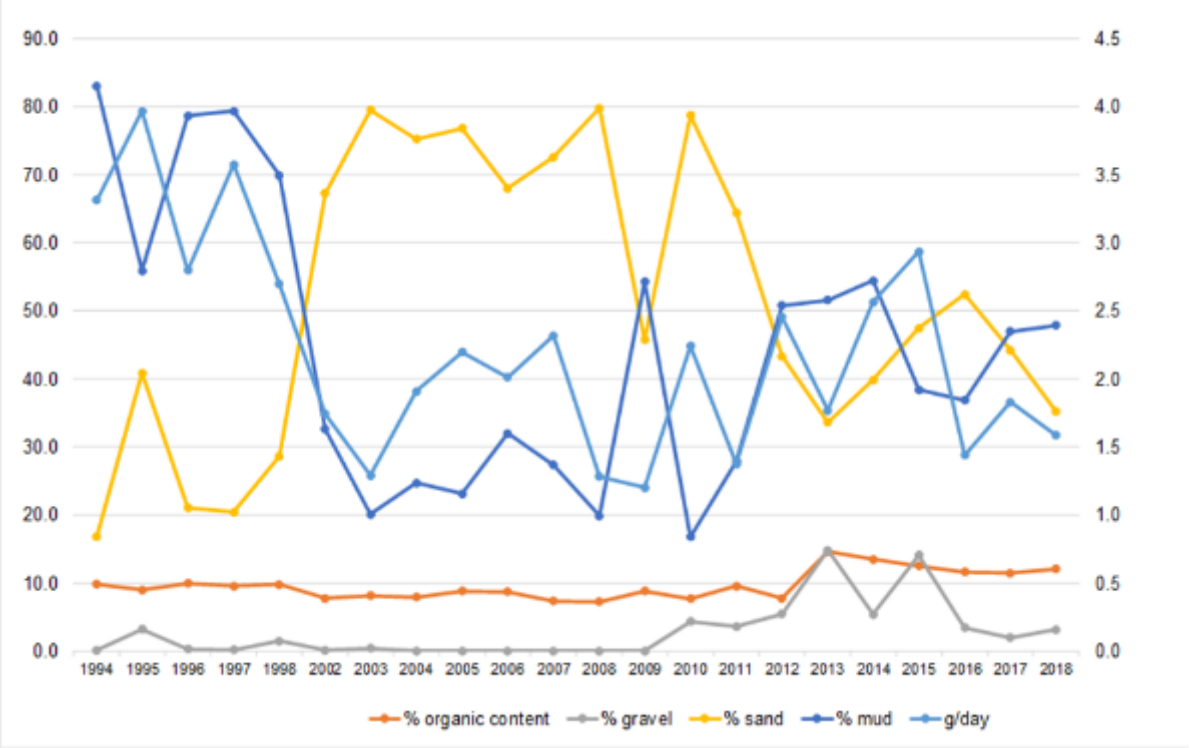


Figure 7.23 Skomer MCZ sediment trap sample total sediment, PSA and organic content analysis – OMS and Thorn Rock sites combined

In general, overall sediment deposition has continued to reduce since 2015, even though the mud content has risen over the last two years of analysed data. Sand content has continued to decrease, whereas organic and gravel content appear stable.

7.2.4. Project code: RP64/01 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 7.4.

Year	Minimum temperature ^{o}C	Maximum temperature ^{o}C
2000	8.4	16.27
2001	7.27	16.3
2002	8.7	15.6
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	7.0	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
2016	8.5	16.8
2017	8.3	16.4
2018	6.6	16.6
2019	8.7	17.2

Table 7.4 Maximum and minimum seabed temperature from OMS logger

The winter for 2017 -2018 had the lowest sea temperature recorded for the last 18 years (6.6^{o}C) with March temperatures 1^{o}C below the average. 2019 was much warmer in comparison with a very mild 8.7 ^{o}C in the winter and the warmest summer record since 2003 - 17.2 ^{o}C. At time of writing the logger deployed in autumn 2019 had not yet been recovered, so data for winter 2019/2020 is not included.

7.3. 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 internet site (go to www.naturalresources.wales and search for “marine reports”).

7.4. Other work

MCZ staff continue to be involved in NRW projects outside of the Skomer MCZ itself, especially where it is most efficient logistically for us to carry out the work or where the MCZ team have the necessary skills or equipment:

MCZ staff have also continued to support the work of NRW's specialist monitoring team, carrying out lagoon sampling surveys at Pickleridge, Neyland and Carew.

The MCZ team also took part in Water Framework Directive fish surveys in Milford Haven with *Skalmey* supporting another of NRW's boats *Salar Vie*.

Mark continues 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 (see Section 10.1.7).

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

MCZ staff have also contributed to NRW's marine evidence audit and to the work towards Marine Area Statements.

8. Education and Interpretation

8.1. Fisherman's Cottage MCZ exhibition

2019 was another record-breaking year for the Skomer MCZ exhibition room at Martins Haven, with nearly 32000 visitors recorded and a new single day record of over 600 visitors recorded over the end of May Bank Holiday. Other peaks coincided, unsurprisingly with other school and Bank Holidays. Thanks again to WTSWW staff at Lockley Lodge for opening the exhibition when MCZ staff away from the site.

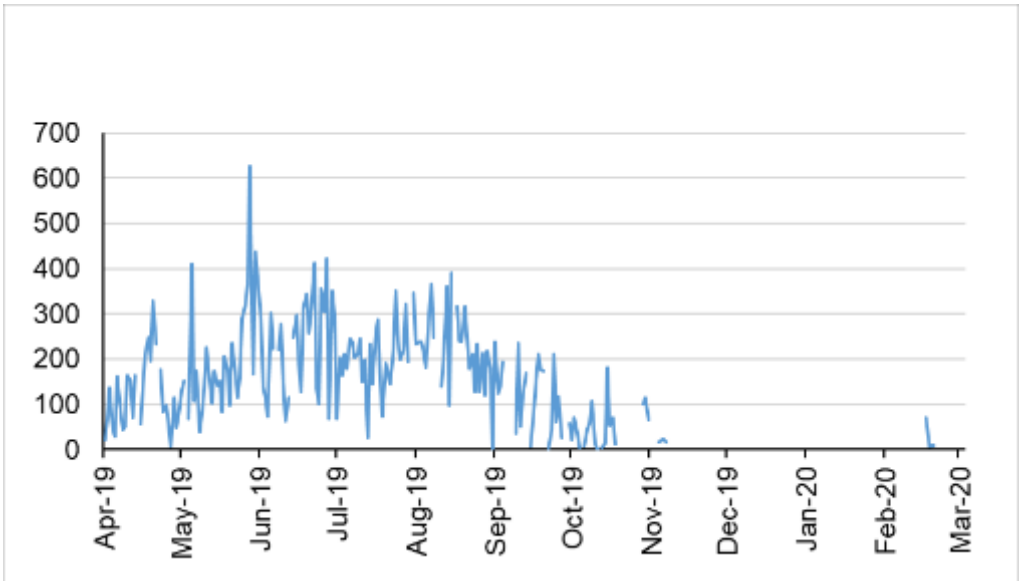


Figure 8.1 MCZ Exhibition Visitor numbers 2019

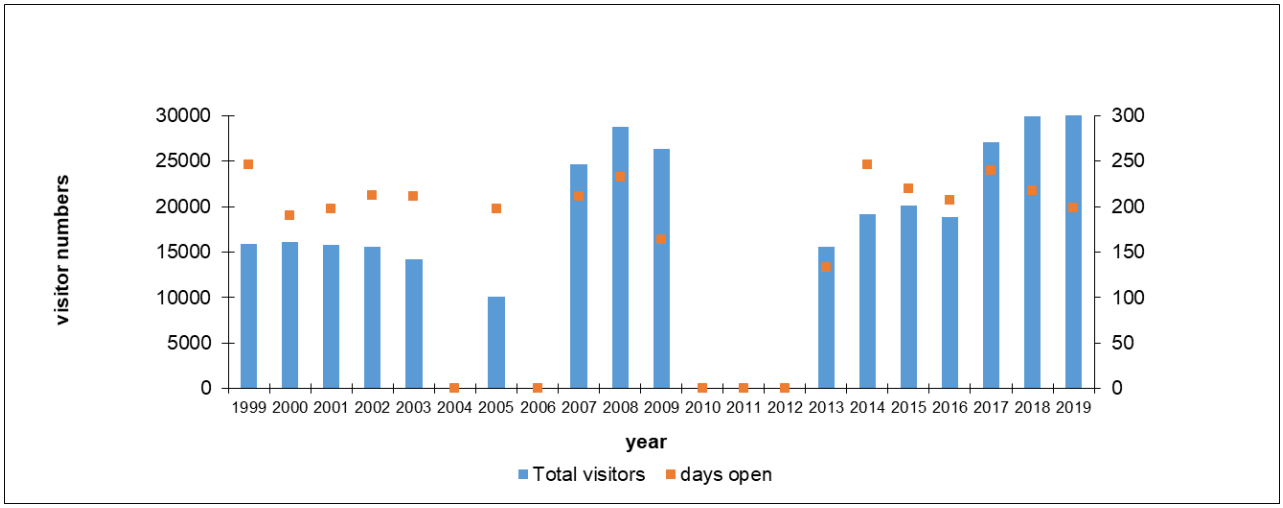


Figure 11.2 MCZ Exhibition Visitor numbers and days open 1999 to 2019

8.2. Other initiatives

Skomer MCZ staff welcomed a respectable number of seashore explorers to the Martins Haven Marine Day in 2019 with several dozen very enthusiastic participants of all ages.

8.3. Talks and presentations

Phil gave talks on the work of Skomer MCZ to the Lundy MPA advisory group and to the Lundy Management Forum in Ilfracombe (see Section 9.7) and to Fishguard Rotary Club. He also attended a meeting of European Marine Site officers and Welsh Government marine staff at Dale Fort and shared some of the positive and negative results from the Skomer MCZ monitoring programme with them.

Mark has been busy on the public speaking circuit in 2019 with talks to Summerhill WI, Leuven University (from Belgium), the Skomer Island shearwater event, Reynalton WI, and Milford Marina berth holders. However, the highest praise came for his talk to Milford Haven Probus Club in October, via a press release describing him as “An expert, passionate and enthusiastic in his subject, a polished presenter and photography to rival anything David Attenborough and the Blue Planet team can offer.” Way to go, Mark!

8.4. Media

The BBC Wales production “A Wild Year – Pembrokeshire” featured some of Skomer MCZ’s underwater video footage.

Local media picked up the NRW press release and short videos produced to publicise the work being done on the North Haven eelgrass bed and our 2019 sponge survey and Phil was interviewed for Radio Pembrokeshire. A video interview with NRW’s communications team was produced for YouTube and the article featured on the Welsh language website for Lleol Cymru.

MCZ staff also posted various articles on NRW’s internal social medium, “Yammer”, and on Skomer MCZ’s Facebook page, including topics such as the seal survey work (15000 views), the volunteer diver urchin and starfish surveys, the seal in our boat, the sponge survey, cup coral monitoring, the efforts to clear up the debris from the Elbe carrier lost cargo containers and collecting eelgrass seed to help the restoration projects in Milford Haven. Skomer MCZ team also worked with NRW’s Communications Team to produce video blogs for YouTube and posts for Twitter about our work.

9. 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, especially Dr Robin Crump who has chaired the Committee for so many years;
- All of our volunteers;
- Skomer Island NNR Wardens, Nathan Wilkie and Sylwia Zbijewska and the rest of the Skomer Island team;
- John Archer Thomson, Blaise Bullimore, Jon Moore and Sam Hurst for diving support;
- The crew of the *Dale Princess;*
- Neptune's Army of Rubbish Collectors for helping to keep the MCZ (and indeed the waters of Pembrokeshire) less full of rubbish;
- Our amazing volunteer diving teams without whom we would not have been able to carry out the eelgrass surveys;
- Skippers of the dive charter vessels for getting our volunteers to and from the survey sites safely.

With apologies to anyone missing from the list above.

10. Appendices

Appendix 1 – Grey Seal Breeding Census Skomer Island 2019, Nathan Wilkie and Sylwia Zbijewska, Wildlife Trust of South and West Wales. NRW Evidence Report 399.

Summary

238 pups were monitored on Skomer Island in 2019, of which 237 were born on Skomer and one pup turned up either just before the start of moult, or moulting (wanderers), in this case the pup was moulting.

The total of 238 pups born on Skomer Island is slightly less than 2018's 241, which was the highest total ever recorded.

A total of 408 pups were born within the Skomer Marine Conservation Zone, of which 170 were born on the Marloes Peninsula.

In 2019 the busiest period was evenly spread over three weeks with 42 pups born in week 38 (17/9-23/9), 41 pups born in week 39 (24/9-30/9) and 42 pups born in week 40 (01/10-07/10). The busiest week in 2018 was week 38 with 51 pups born.

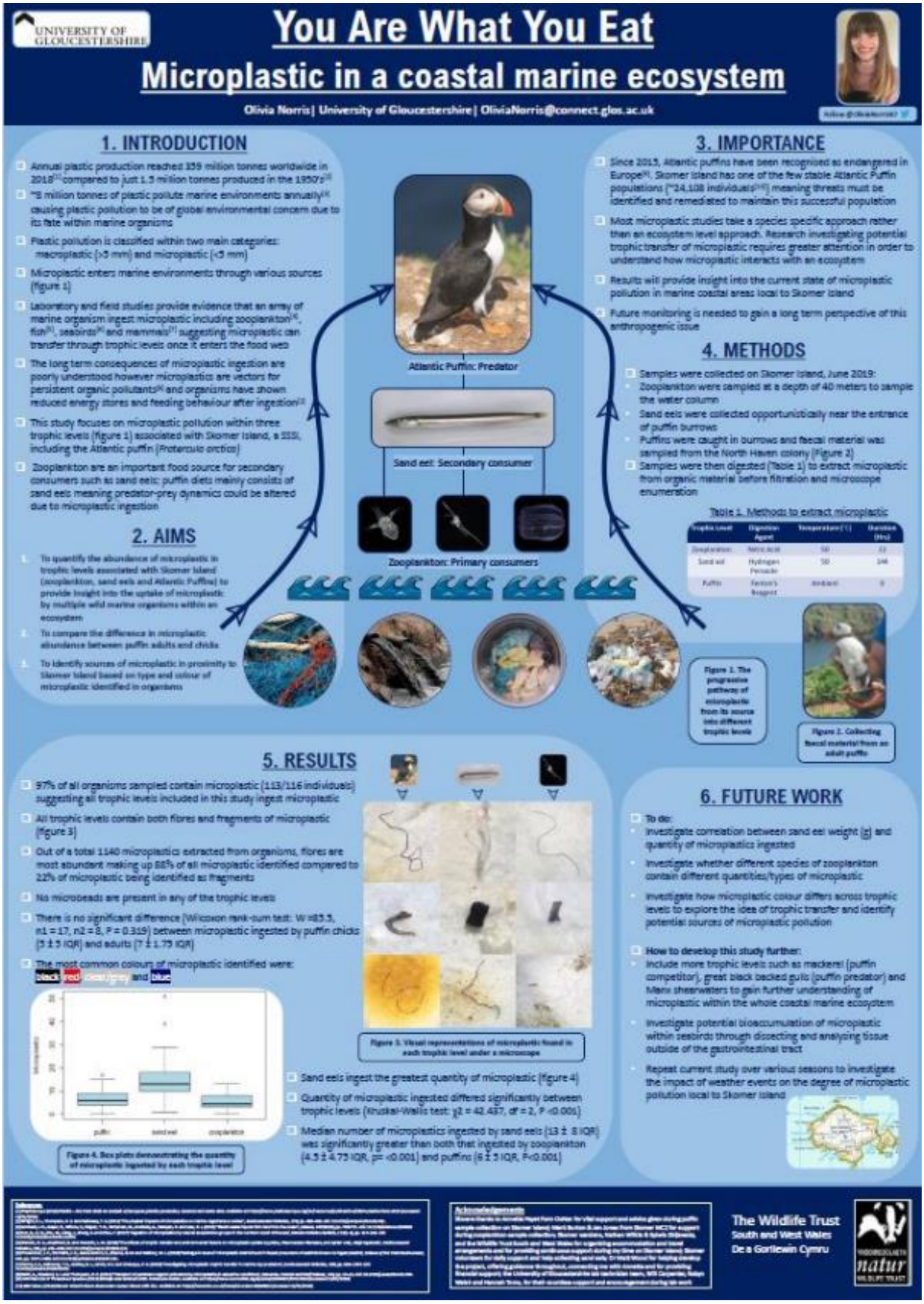
The most productive beaches were South Haven (54 pups), North Haven (42 pups), Matthew's Wick (39 pups), Driftwood Bay (29 pups) and The Wick (21 pups).

177 pups are known, or assumed, to have survived on Skomer giving a survival rate of 77%.

In 2019 the maximum haul-out (on the main haul-out sites) of 285 animals was recorded on 6 October 2019, 38 days earlier than in the previous year. This is 34 less than last year's maximum count.

In 2019 18 seals (12 females, 2 males and 4 immature) were photographed with obvious signs of being entangled in nets at some time in their lives.

Appendix 2 – Olivia Norris Microplastic in a coastal marine ecosystem poster



Appendix 3 – BSc Zoology Dissertation - Spatial distribution and abundance of marine biodiversity in soft sediment habitats at Skomer Marine Conservation Zone - Melanie Baker, Faculty of Biological Sciences, University of Leeds.

ABSTRACT

Marine soft sediments are one of the largest habitats on earth, and despite appearing relatively homogenised; small changes in the sediment's composition can significantly alter species composition and interactions.

The Skomer Marine Conservation Zone (MCZ) in Wales, UK, supports a high level of biodiversity, and until this study, little was known about the region's soft sediment epifauna.

Using underwater time lapse footage, epifauna were identified and their abundance recorded at two sites; a single sediment site comprising well sorted mud, and a mixed sediment site composed of sand, pebbles and shells. A PERMANOVA proved that habitat type significantly affected species assemblages and species richness of epifauna is highest at the mixed sediment site.

Food webs structure and food web centrality measures indicated that trophic interactions varied between both sites. The mixed sediment site produced more niches to allow the persistence of a greater range of species. Highly connected food webs and the presence of apex predators, threatened species, ecological engineers, and bio-indicator species strongly suggest the soft sediments of Skomer MCZ can sustain species rich epifauna communities.

In future studies, the patterns identified in this study can be used as a baseline, within the MCZ and as a comparison to other regions around the UK.

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