



Operation Oyster



Report 2022

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BSAC Operation Oyster 2022 Report

Photograph Front Page: Cluster of native flat oysters on shipwreck off the Needles, Isle of Wight

*“There is an alternative wisdom to that of the scientist, lawyer or conservationist which is no less valid, only different. It comes from first-hand observation over time, a lifetime of experience of the sea. **Divers** have it, sailors have it, fishermen and women have it and sometimes we are lucky enough that it is written down in history books.”*

*- Charles Glover, *Rewilding the Sea: How to save our oceans**

“Knowing is the key to caring, and with caring there is hope that people will be motivated to take positive actions. They might not care even if they know, but they can’t care if they are unaware.”

*- Dr Sylvia A. Earle, *The World Is Blue: How Our Fate and the Ocean's Are One**

“The Lord God placed the man in the Garden of Eden to tend and watch over it.”

- Genesis 2:15 New Living Translation (NLT)

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2. About BSAC Operation Oyster



BSAC Operation Oyster is a citizen science project that is currently supporting seabed restoration activities by locating remnant native flat oyster populations and recording where these are in databases accessible by the scientific community.

Its partners in the project are Seawilding, BLUE Marine Foundation, ZSL and the University of Portsmouth.

The data collected could help decide where to place restoration projects which in turn may require the collection of genetically diverse native flat oysters

As sport diving restarted in 2022 post COVID, the focus for the project was on diving and collecting data with BSAC members encouraged to contribute on their own dives and on a number of dedicated expeditions.

We have dived the breadth of the UK in 2022 and found evidence of native flat oysters where we weren't expecting them. To date the project has not found any live native oyster reefs or substantial beds; only glimmers of a previous age not too long ago (maybe 150 years) where the seabed would have been completely different, perhaps looking more like the cold-water equivalent of the great barrier reef than what is largely more like a desert today.

There is hope though. Live native oysters are holding on in places, but just not in the quantity they used to be. A key finding of this year's activities was a carbon store of old native flat oyster shells that that may help show us what the seabed used to look like and what we should be aiming to restore.

Useful Links:

Main landing page

www.bsac.com/operationoyster

Introductory video:

<https://youtu.be/I3sdc7QVLuc>

Update video with input from BLUE Marine Scientist, Dr Luke Helmer:

<https://youtu.be/dR71Hml781E>

3. Abbreviations

BSAC : British Sub Aqua Club www.bsac.com

BLUE : Blue Marine Foundation <https://www.blumarinefoundation.com/>

NORA : Native Oyster Restoration Alliance <https://noraurope.eu/>

SW: Seawilding <https://www.seawilding.org/>

UoP: University of Portsmouth <https://www.port.ac.uk/>

VEL : Vectis Expeditions Ltd <https://vectisexpeditions.co.uk/>

ZSL: Zoological Society London <https://www.zsl.org/>



Figure 1: Diver exploring shipwreck off the Isle of Wight for native flat oysters

4. Acknowledgements

BSAC Operation Oyster is a citizen science project and is reliant on support from a number of organisations and individuals, many of whom are volunteers.

Funding partners:

BSAC Jubilee Trust

Dr Ken Collins, University of Southampton, Marineff Project

Representations from BSAC Project Oyster partners – Seawilding, BLUE, UoP and ZSL:

Dr Luke Helmar, BLUE Restoration Science Officer, Visiting Research at UoP

Fiona Woods, Marine Scientist, BLUE

Louise Maccallum, BLUE Solent Project Manager, UK

Dr Jo Preston, Reader in Marine Ecology, UoP

Alison Debney, Senior Conservation Programme Manager at ZSL

Danny Renton, CEO and Founder of Seawilding

Katherine Knight, Science and Survey Officer, Seawilding

Eric Holden, Seawilding

BSAC HQ

Mary Tetley, BSAC CEO

Debbie Powell, BSAC Head of Community

Dominic Robinson, BSAC Head of Diving and Training

Adrian Collier, BSAC Business Development

BSAC Core Volunteer Team

Jane Maddocks

Nicola Faulks

Gerry Allen

Craig Burton

Ian Hicks

Biddy Hyde

Ella Penny

Dive Boat Skippers

Bob Anderson, Halton Dive Charters

David Ainsley, Sealife Adventures

Dave Wendes, Wight Spirit

And last but my no means least, the volunteer BSAC members from all around the UK who have come diving on the expeditions and contributed reports. Dive log sheets and Record-an-Oyster data entries indicate that at least 44 members from over 20 different BSAC branches have so far contributed to the project but that's the formal records. I know there are more!

5. Summary

BSAC Operation Oyster is a long term project that has been running for just over 2 years.

This year the focus has been on getting sport divers back into the water after the pandemic with an added environmental purpose to their dives; to seek out remnant native oyster populations around the UK, gathering data on what they find or indeed, don't find, if that is the case.

The main organised diving expeditions were organised through BSAC Centre of Excellence, Vectis Expeditions, although dives have been conducted all over the British Isles by volunteer divers in numerous clubs.

Key achievements:

- Dived on 3 'scientific sites'
 - o Newtown Creek on the Isle of Wight, location of a former native oyster fishery and early experimental restoration project
 - o Fawley Outfall Pipe, Reef Restoration project off Calshot, a project run by University of Southampton as part of the Marineff project
 - o BLUE's reef in Langstone where we had permission from their onboard scientist to gather specimens for BLUE to analyse in the laboratory
- Discovered native flat oysters on all Solent sites which comprised intact shipwrecks, wreckage and reefs
- Educated sports divers from a number of different clubs and non-diving member of the public about native flat oysters.
- Discovered a substantial carbon store (dead native oyster reef) in Loch Craignish which we intend to revisit next year and explore further. We hope this will give us an appreciation for what the seabed used to look like when native flat oysters were more prevalent.
- Received tip offs of other potential historic native flat oyster sites from former oyster fishermen.
- Worked through data collection processes, iterated the data collection form and continued to collect data (www.bsac.com/recordanoyster)
- Promoted BSAC Operation Oyster in SCUBA Magazine
- Provided opportunities and coaching for BSAC Dive Leader, BSAC Advanced Diver and BSAC First Class Diver trainees to complete some of their training, particularly experience dives.
- Discovered a rare spiny seahorse!

6. Dive Statistics

The 2022 dive season started slowly as COVID restrictions started to ease but ramped up with good weather in the summer. The statistics presented in the table below are derived from dive logs sheets from the main expeditions and also submitted oyster records. More dives have been conducted and more people involved in the project than formal official records suggest. Data points are mainly centred on the 2022 diving expedition locations – Scotland and the Solent.

Number of Divers involved	44
Number of Clubs represented by these divers	20
Average Dive Depth	22.8m
Maximum Dive Depth	42m
Minimum Dive Depth	2.4m
Logged dives	191
Total dive time	157.7hrs



Figure 2: Plot of Sites Dived as part of BSAC Operation Oyster

7. Recording Data

Divers can log their finding at www.bsac.com/recordanoyster. On successful entry of a finding the diver receives a confirmation email and the BSAC Expedition Officer is notified via email that an entry is made.

Data is logged on the BSAC Server which can export the data in the form of an Excel spreadsheet for subsequent analysis. This system is basic and does not store images. However, any images provided, are emailed to the BSAC Expeditions Officer separately who can then arrange for them to be cross correlated with the database.

The images will almost certainly form part of any QA process to enable the data to be uploaded into National Biological Network records. The work to upload information to a NBN is work in progress.

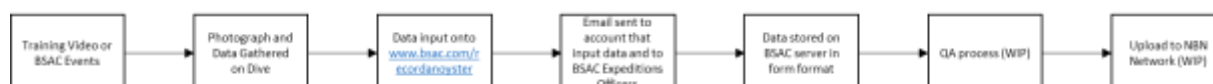


Figure 3: Operation Oyster Data Collection Process.

The data collection system was originally trialled in 2020-21 and was refined a little in 2022 so that if no native oysters are found then this can too be logged. This information could be useful for monitoring sites over time particularly in areas where there are native oyster restoration projects underway which may have the potential to regenerate native oyster populations in the surrounding areas through seed dispersal.

At the time of writing the latest iteration of the database had 60 datapoints, only 31% of the logged dives. It turns out that volunteer divers are very good at the dives but less good at reporting their findings or lack of thereof, which is equally important.

Data collection improved on some of the later projects when the expedition leader showed volunteer divers how to input the data in person rather than just providing a link to a video. To improve data capture from volunteers on later expeditions a computer tablet was provided which was linked to the BSAC www.bsac.com/recordanoyster website. Volunteer divers were actively reminded to fill in the form. Some data points have been created substantially later than the dive following a review of post-dive video footage.

8. Database Summary

The data was derived from data “form_2022-11-08_145239”

Timeframe of data points logged: 25th August 2021 to 23rd September 2022

Number of data points: 60

Percentage of dives where live native oyster were found	
Percentage of dives where more than 10 native oysters were found	18%
Percentage of dives where native oyster shells were found	58%
None found	24%
Smallest width of oyster / shell if found	3cm
Largest width of native oyster shell if found	15cm
Average width of native oyster / shell if found	9cm
Depth Range that Native Oyster (live or shells were found)	
Underwater (depth not specified)	58%
Minimum depth	0m
Maximum depth	40m
On the seashore (above the high-water mark)	7%
Intertidal (between the high-water and low water mark)	5%
Dive site	
Shipwreck or Wreckage	26%
Not a shipwreck (e.g. reef / scenic)	74%

9. Supporting Photographs Provided

The data collection form enables contributors to upload any images of their finds to support their entry. Guidance is provided on the BSAC Operation Oyster website regarding how best to capture images in the form of video and example photographs:



Figure 4: Example photographs of native flat oysters with an item to enable scaling in the image.

Images of finds are important for quality control of data to enable third parties to confirm the correct identification of species.

A selection of images received is provided below. Not all conform to the preferred requirements, but it is good to see that divers are getting tuned in and reporting findings.



Intertidal native oyster, on Rocks. Donegal, Ireland



Live native oyster on WWI shipwreck off the Isle of Wight with dive computer for scale



Live native flat oyster on 19th century shipwreck off the Isle of Wight with hand for scale



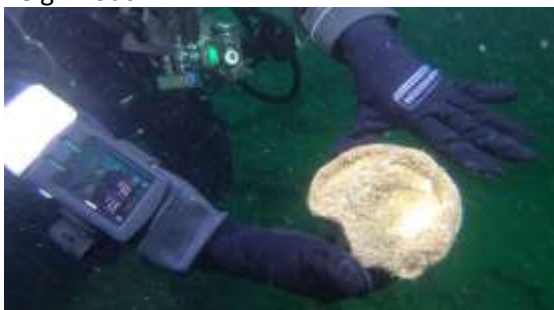
Native oyster shell on Seabed with hand for scale in Sandown Bay, Isle of Wight



Native flat oysters on shipwreck off Teignmouth.



Native flat oyster on reefs near Durdle Door



Large native oyster shell found on a deep wreck off Trevose Head, Cornwall. Diver hand and a dive computer in image for scale and information



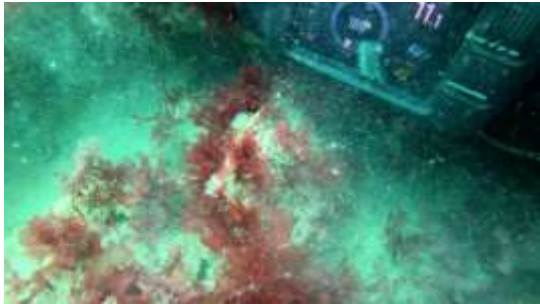
Live native oyster on collapsed pier structure of the Isle of Wight



Native oyster shell off Christchurch Ledge



Native oyster shell off Christchurch Ledge



Native oyster shell off Christchurch Ledge



Native oyster shell off Christchurch Ledge



Native oyster shell off Christchurch Ledge



Native oyster shell off Christchurch Ledge



Fragment of native oyster shell off Yarmouth, Isle of Wight



Fragment of native flat oyster shell found in the Sound of Mull

10. Marineff Project 2022

[The Marineff Project - Enhancing coastal infrastructure \(marineff-project.eu\)](http://marineff-project.eu)

“The Marineff project is a collaboration between France and the UK with the goal of developing coastal infrastructure to enhance and protect the ecological status of cross-channel coastal waters. Today, coastal infrastructure (such as the seawalls, quays, piers, groynes, and moorings) do not incorporate the enhancement of coastal and transitional water ecosystems.

The project aims to produce new ecological enhancement units to improve the ecological status of coastal and transitional watercourses, as well as professionals and stakeholders in the process. Improvements in the ecological status of the coastal infrastructure will be measured at a minimum of 15% compared to the original coastal infrastructure state.

The INTERREG VA France (Channel) – England co-funded by the ERDF and 9 French and British partners.”

The Solent Oyster expeditions focussed heavily of looking for native oysters on existing structures; predominantly shipwrecks but also other structures.

Having knowledge of the native oyster content of structures which by enlarge have been on the seabed for a known period of time, in some case over 100 years, should provide an interesting comparison for presence or otherwise of native flat oysters on other coastal infrastructure.

Shipwrecks and marine structures offer protection against destructive fishing techniques by virtue of their ability to prevent fishing gear working or the fishing vessel entering an area. Utilising such structures as future nodes for generation of native oyster spat could be a useful re-purposing of such structures.

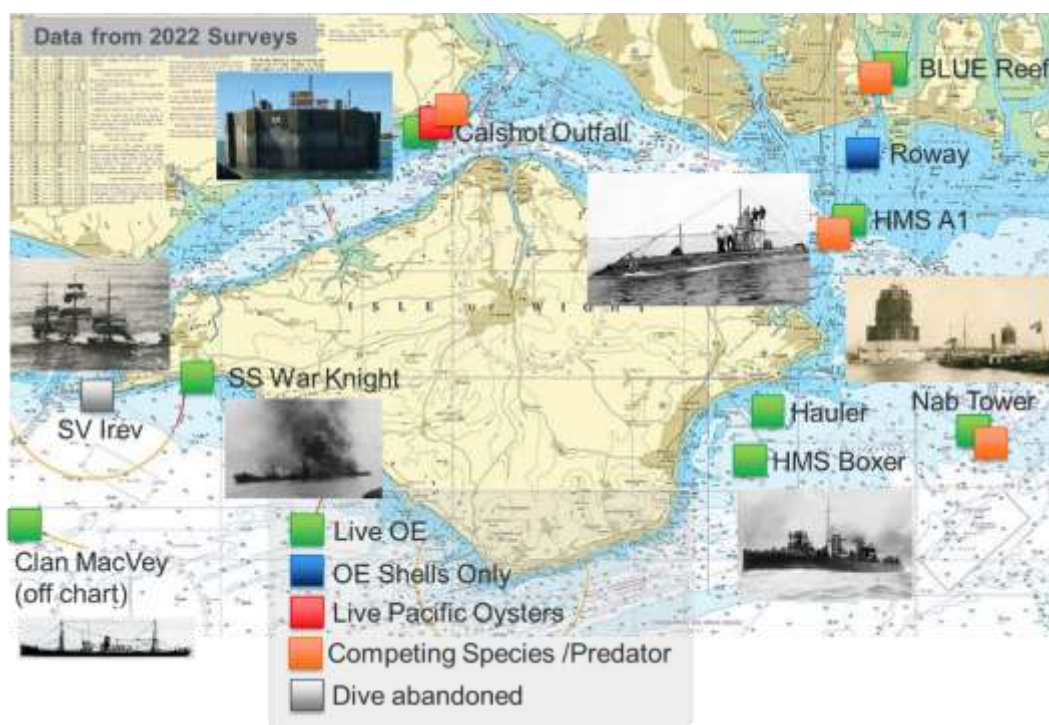


Figure 5: Dive sites supported by Marineff project.

The table below details information gathered from each of the sites dived in the Solent in 2022.

BSAC Operation Oyster 2022 Report

Name	Site	Lat	Long	Date Sunk	Substrate	Surrounding Seabed	Charted Depth	Approx. Height of Wreck	Approx. Width of Oysters Surveyed	General Notes
HMS Boxer	RN Destroyer	50°37,790'N	01°06,422'W	8th February 1918	Steel	Sand	16m	3m	8-10cm	Clusters of OE around tops of boilers. Reasonably strong tide
Hauler	Barge	50°38,951'N	01°08,642'W	20th September 1973	Steel	Sand	10m	1m	8-10cm	Wreck dispersed with explosives in 1975. Swept by tide. Wreck mostly buried. Occasional OE and shells.
Nab Tower	Steel/Concrete Structure	50°40,083'N	00°57,117'W	12th September 1920	Steel and Concrete	Mud, Sand, Gravel	15m	25m	8-10cm	OE located at multiple levels of structure. An oyster drill was spotted at around 10m.
Roway Wreck	Dredger	50°46,104'N	01°02,264'W	3rd May 1967	Steel	Sand	3m	3m	Shell only found	Demolition work in 1978. Stern and bow sections reasonably intact
SV Irex	Sailing Ship	50°39,584'N	01°35,042'W	25th January 1890	Iron	Sand	3m	1m	Approx. 8-10cm found previously	Dive Abandoned due to unsafe sea state and associated very poor visibility in shallows
SS War Knight	Cargo Ship	50°39,957'N	01°31,124'W	24th March 1917	Steel	Sand	10m	4m	4-12cm	Numerous OE found on boilers. 4-12cm. Very poor visibility
SS Clan Macvey	Cargo Ship	50°39,667'N	01°46,733'W	8th August 1918	Steel	Sand	20m	2m	8-10cm	Very well dispersed wreckage. Numerous oyster shells attached to wreckage. Reports of many juvenile native OE but no photographs to substantiate.
BLUE Reef	Prepared cultch, Reef Restoration	50°48,190'N	01°01,500'W	2021	Gravel / Cockle Shell	Muddy, Sandy, Shell	10m	0m	3-4cm	Juvenile oysters scattered across reef. Some recovered for BLUE scientific analysis
HMS A1	RN Submarine	50°44,52'N	00°55,19'W	Aug-1911	Steel	Muddy, Sandy, Shell, Slipper Limpet Shells	6m	3m	8cm	Well camouflaged OE around base of conning tower. Old OE shells buried in surrounding seabed
Calshot Outfall	Steel/Concrete Structure	50°48,25'N	01°18,81'W	1969?	Steel and Concrete	Muddy, Sandy, Shell	3m	6m	8-10cm	Pacific Oyster most numerous. Occasional OE on artificial reef. Numerous oyster drills.

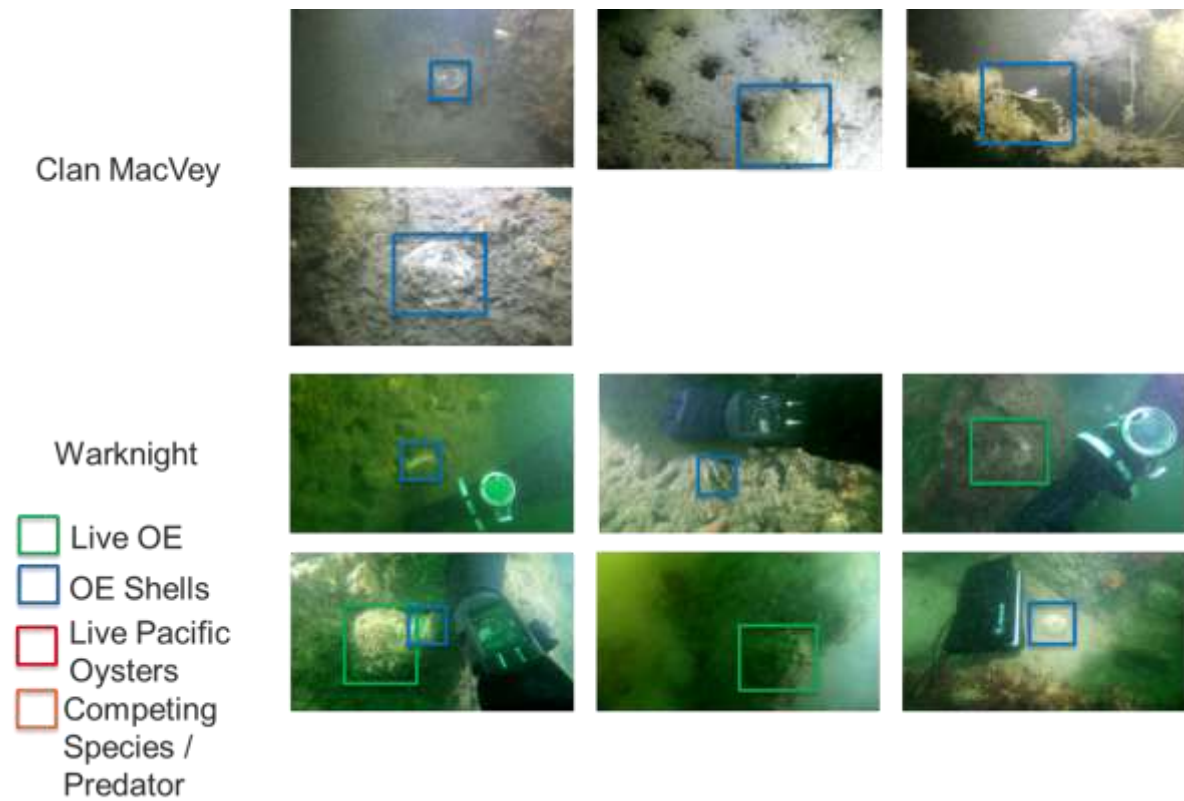


Figure 6: Photographs from dive sites SS Clan MacVey (Poole Bay) and SS Warknight (Freshwater Bay, IOW)

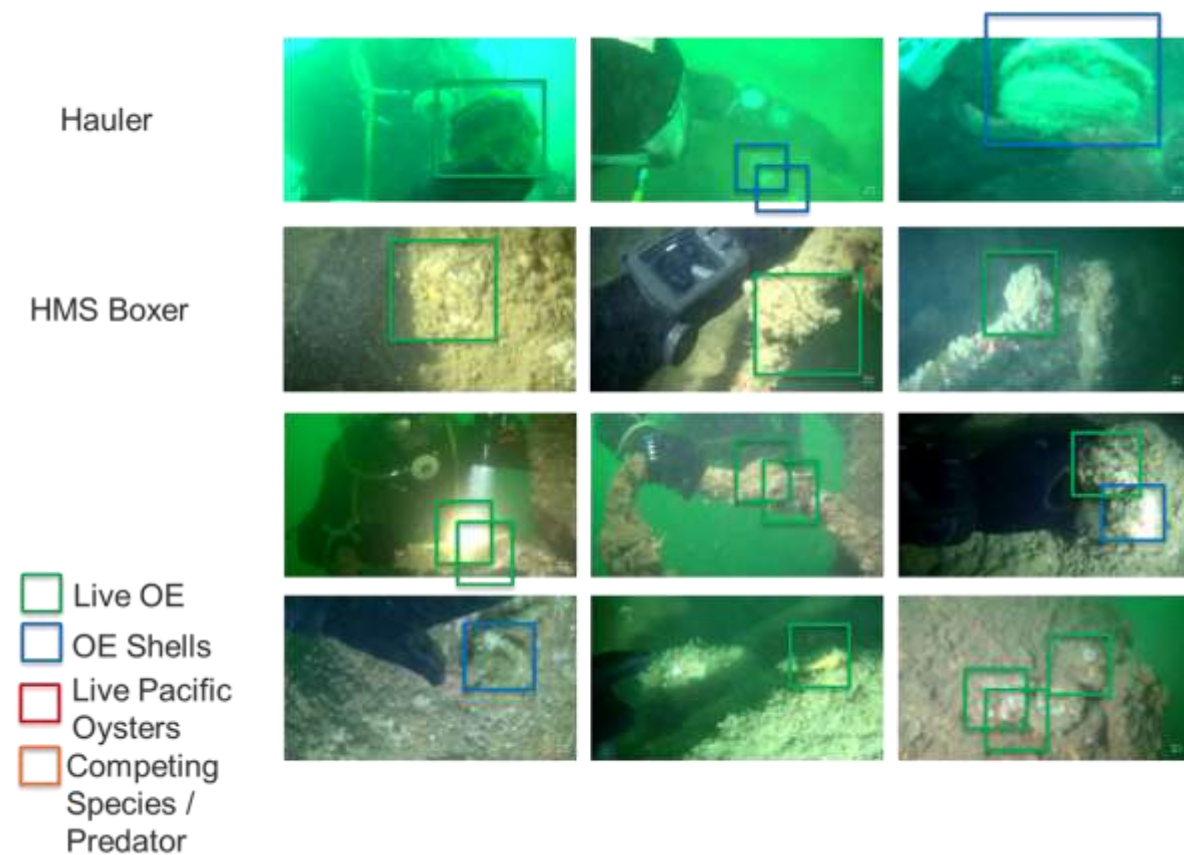


Figure 7: Photographs from dive sites Hauler and HMS Boxer in Sandown Bay, IOW



Figure 8: Photographs from dive sites Hauler and HMS Boxer in Sandown Bay, IOW

11. Marineff Project 2021

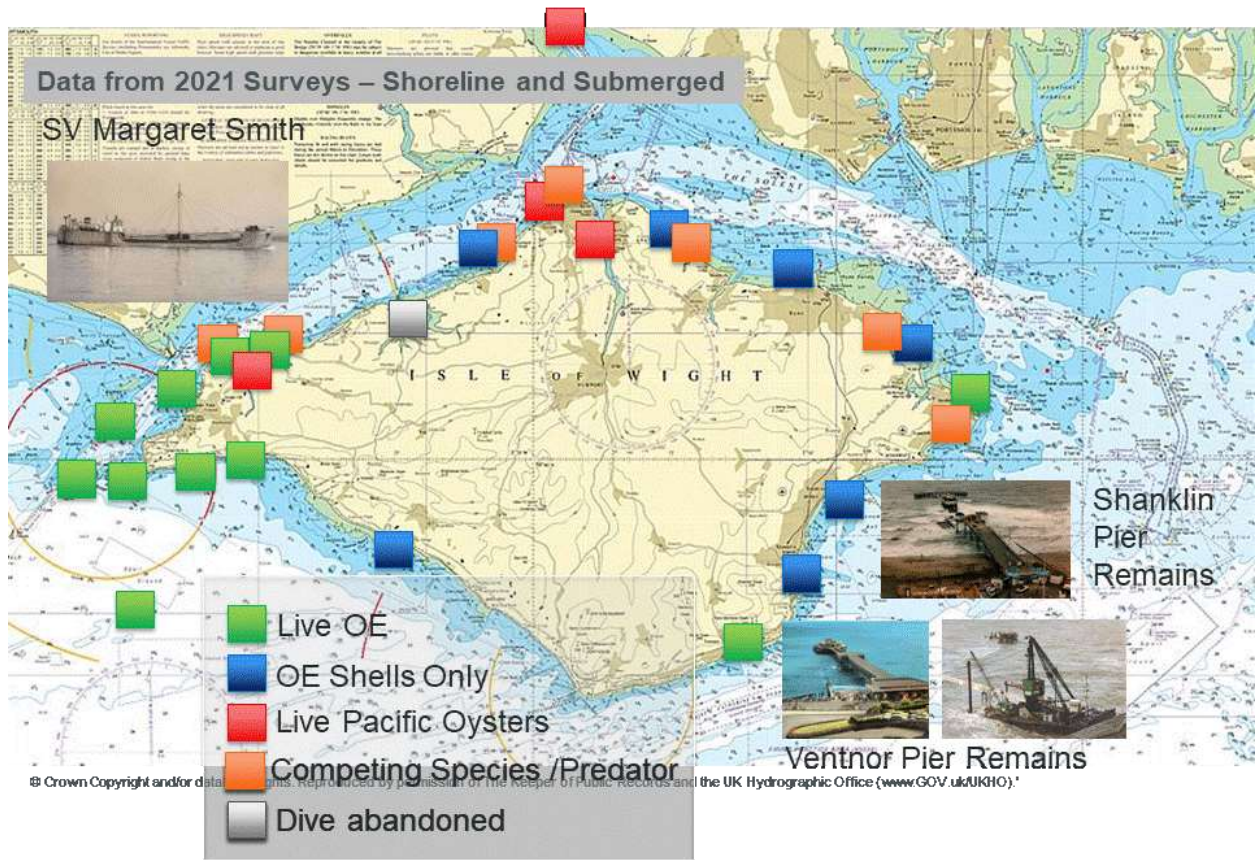


Figure 9: Dive Site Data for 2021 provided to Marineff

BSAC Operation Oyster 2022 Report

Site Name	Construction	Lat	Long	Date Sunk	Substrate	Surrounding Seabed	Charted Depth	Height of Wreck	Width of Oysters Surveyed	General Notes
Totland Pier	Wood/Iron	50°41,003'N	01°32,754'W	1880	Wood, Iron	Sand/ Seagrass	4m	To surface	8-12cm	Generally larger isolate specimens found on wood / iron members of pier. Some also found in seagrass
Fort Victoria Pier	Iron	50°42,449'N	01°31,176'W	1850	Iron/Wood	Gravel/Sand/ Mud/ Seagrass	10m	To surface	8-12cm	Generally larger isolate specimens found on wood / iron members of pier. Some also found in seagrass
Stern of SS Serrana	Steel	50°39,877'N	01°35,816'W	21st Jan 1922	Steel	Rock/Sandy Gravel/Shell	18m	5m	8-10cm	Very tidal. Single isolated OEs found across wreck amongst wreckage
Bow of SS Serrana	Steel	50°39,619'N	01°36,166'W	22nd Jan 1918	Steel	Rock/Sandy Gravel/Shell	9m	3m	10cm	Very tidal. Cluster of OE found in remains of bow chain locker
SS Warknight	Steel	50°39,957'N	01°31,124'W	24th March 1917	Steel	Sand	10m	4m	8-10cm	Numerous individual / clusters of OE and shell found spread along wreck.
Freshwater Bay	N/A	50°40,166'N	01°30,606'W	N/A	N/A	Sand/Gravel/ Rock	6m	N/A	None	Occasional shells only
Grange Chine	N/A	50°38,026'N	01°24,578'W	N/A	N/A	Rock/Sand	6m	N/A	None	Occasional shells only
SS Albion	Iron	50°38,350'N	01°03,274'W	13th January 1914	Steel	Silty Sand	30m	3m	6-12cm	Struck mine and sank. Wreckage sinking into seabed.
Ventor Pier (remains)	Iron/Rock	50°35,507'N	01°12,336'W	1993	Iron/Wood	Rock/ Sand	10m	0.5m	10cm	Isolated native oyster spotted on surrounds rocks. Remains of pier covered with weed in general. Strong tide.
Shanklin Pier (remains)	Iron	50°37,738'N	01°10,249'W	16th Oct 1987	Iron	Sand / Rock	3m	0.1m	N/A	Occasional shells only
Bembridge Lifeboat Pier	Concrete/ Steel	50°41,341'N	01°04,229'W	2011	Concrete	Sand	2m	N/A	N/A	Oyster drills spotted on concrete
Bembridge disused sewer pipe	Iron	50°41,362'N	01°04,225'W	Not known	Iron/Concrete	Sand, Rock	6m	1m to Surface	10cm	Isolated native oysters generally well camouflaged on underside of old sewer pipe
Totland Pier	Wood/Iron	50°41,003'N	01°32,754'W	1880	Wood, Iron	Sand/ Seagrass	4m	To surface	8-12cm	Generally larger isolate specimens found on wood / iron members of pier. Some also found in seagrass
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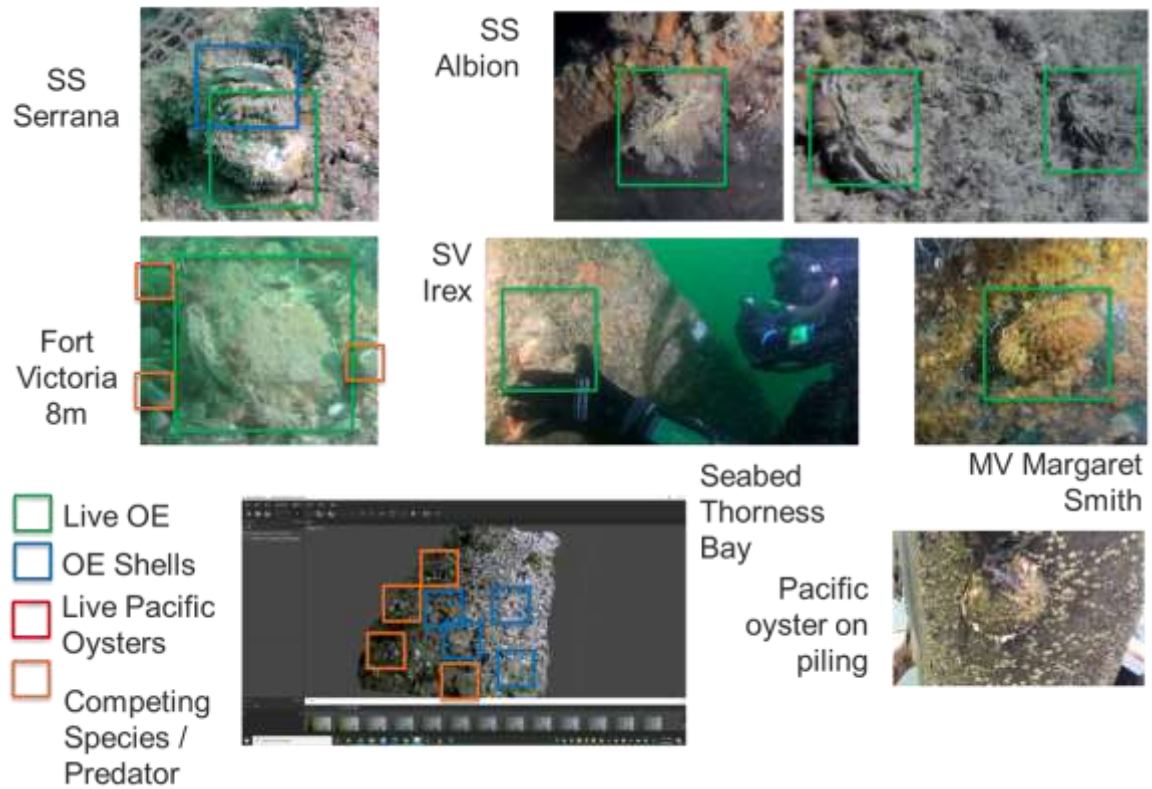


Figure 10: Support photographs for 2021 dataset

12. Discussion

This report is not meant to be a detailed scientific paper but rather one that hopefully reports back faithfully on what an embryonic citizen project has achieved to date, starting up as it did in the middle of the COVID pandemic.

This year was about diving and data, using the systems that we had put in place the previous year to start the process of gathering data which we plan to submit to national data bases in due course.

We were privileged to be given access and permission to dive on three 'scientific sites' where oyster restoration trials have taken place or are ongoing.

These included:

- Newtown Creek on the Isle of Wight, location of a former native oyster fishery and early experimental restoration project
- Fawley Outfall Pipe, Reef Restoration project off Calshot, a project run by University of Southampton as part of the Marineff project
- BLUE's reef in Langstone where we had permission from their onboard scientist to gather specimens for BLUE to analyse in the laboratory

We were particularly excited to dive Newtown Creek given its history with native oysters and the fact we had precise information on the location of site. Diving took place on the ebb tide which provided slightly more challenging conditions with 0.5knot-1knot tide running and poorer visibility (circa 1-2m or less). We were expecting to find new juvenile native oysters but instead found a barren seabed devoid of life and certainly devoid of any recently deposited native flat oysters. It was only by burying down a little by hand that any old native flat oyster shells were found. This site shows how degraded the local seabed has become. It was not only here that we found evidence of nature flat oyster shells buried under a layer of silt, but also next to the wreck site of HMS A1. At least on this site the seabed was a little more interesting albeit with the presence of a carpet of slipper limpets (*Crepidula fornicate*).



*Figure 11: Historic native oyster shells recovered from 150mm+ beneath the seabed surface
Photograph taken near to the wreck site of the HMS A1 submarine.*

Dives off the Fawley Outfall Pipe on the 20 reef prizms blocks placed there under the Marineff project were encouraging, highlighting the work being undertaken by the wider scientific community to assess marine infrastructure effects and in particular how can they enhance and protect the ecological status of European waters.

This site being quite shallow had both native flat oysters and the non-native cousins the Pacific oyster (*Magallana / Crassostrea gigas*). You most commonly see Pacific oysters in inter tidal waters, particularly the harbour walls around the Solent approximately 1-2m either side of the low water mark. On this site, there seemed to be more on the seabed than we have seen elsewhere. It could be they have simply been ripped of the nearby disused outfall pipe by wave action and deposited on the seabed. We didn't conduct any counts.

It was clear that the prizms were full of life and divers onboard the boat found evidence of juvenile native flat oysters which is encouraging as the prizms were seeded with clusters of adult native flat oysters prior to deployment. We noted an abundance of what appeared to be oyster drills, a predator of native flat oysters, present on one of the prizms.



Figure 12: *Crassostrea Gigas* (pacific oyster) at the base of one of the Prizms.

Finally, we were very excited to dive BLUE Marine reef restoration project in Langstone Harbour. A small area of the harbour has been prepared with cultch (aggregate and cockle shell) and which was then re-seeded with over 32,000 native flat oysters. The cultch in theory provides a substrate onto which juvenile oysters spat can land and gain a foothold.

Outside the re-seeded section, the seabed was quite silty and covered with slipper limpet chains. There was still a lot of silt covering the re-seeded / cultch areas but the presence of cockle shells made these areas easier to identify.

On closer inspection, the presence of aggregate helped us confirm we were in the right area before we started to spot the live native flat oysters and recently dead oysters. Samples and core samples were obtained by hand to give to the onboard research scientist for further analysis.



Figure 13: Langstone Harbour – Slipper limpets on a silty seabed.



Figure 14: Langstone Harbour – Culch – Aggregate and Cockleshells



Figure 15: Langstone Harbour – Juvenile native flat oysters in amongst the culch

For many of the sports divers onboard this was their first involvement in a reef restoration project. Although this dive was shallow and in poor visibility the sense of purpose brought the dive to life.

Having a dedicated non-diving marine scientist onboard to brief us on the scientific aspects of the project also helped.

One of the team also stumbled on a rare seahorse (*Hippocampus guttulatus*) which was initially thought to be a pipe fish until the photographs were downloaded to prove otherwise.



Figure 16: Spiny Seahorse – photographed with care (no flash) so as not to cause distress

Outside the scientific project sites, we dived a range of sites in the Solent. We discovered native flat oysters on every dive whether than was intact shipwrecks, wreckage, or reefs.

Any seabed not protected by reef or metal was generally devoid of native flat oysters. Generally, native flat oysters were difficult to spot unless you had an expertly trained eye. The more experienced divers had of spotting them, the more that they were able to identify. The record number claimed to be spotted in a single dive was 50, including juveniles. This buddy pair in this occasion included a volunteer diver whose day job is research into native flat oysters.

The fact that some native flat oysters are surviving on shipwrecks means we remain interested in exploring the future potential of use of shipwrecks which generally offer protection from destructive fishing in as part of a solution to new native oyster reefs.

Indeed, one of the WWII wrecks dived during this year's expeditions is was so well dispersed by the Royal Navy at the end of the war that what remains would probably be improved for future diving visitors by turning it into a fully fledged reef.

The expeditions to Scotland provided opportunities to educate divers who were not only onboard the liveaboard expedition boat about the native flat oyster but also visiting divers who dropped in for a cup of tea.

It was especially exciting to see some very young divers out looking for native flat oysters after that introductory talk. Plenty of saddle oysters were found instead, with a realisation that this variety of oyster is plentiful in Scottish waters, but live ones are extremely difficult to spot.

Following a tip off from Seawilding, we headed off to seek a site with both seagrass (*Zostera marina*) and native flat oysters (*Ostrea edulis*). From a purely sport diving perspective the site would have

rated as 'poor' even before entered the water as it was in an area where tidal currents are expected to be very small.

The site assessment met expectations with a very soft, silty seabed, largely devoid of life visible on the surface except for a few sea pens, very occasional scallops – perhaps survivors of historical dredging activity, very few fish and pockets of broken shell and hydroids and negligible current.

These seabed conditions are replicated in many other sheltered sea lochs on the west coast of Scotland.

We ended up discovering a substantial carbon store or in laymen speak, a dead native oyster shell reef. However, this was both exciting and disheartening at the same time. Exciting because with a little imagination one can imagine what an amazing site this could have been once up at time and disheartening because of its current state. What we think of as being natural now, is not what was 'natural' 150 years ago when native flat oysters were plentiful. Indeed, it may not have been 'natural' back then given the amount of fishing activity that has gone on over the years.

All the diving expeditions enabled the volunteer sports divers on them to complete some elements of their BSAC Diver Training should they so wish, even if it was just to log experience dives. They did not solely need to look for oysters. Indeed, it is a deliberate strategy of the project to encourage sports divers to look for native oysters on their normal dives as this is more likely encourage sustained monitoring of some more popular dive sites.

It is worth highlighting that both BSAC Dive Leader and also the next grade up, BSAC Advanced Diver (CMAS *** dive) are recognised by the HSE as diver grades suitable for scientific diving activities. At higher levels, some BSAC training such as that for the BSAC First Class Diver Preparation and BSAC Advanced Instructor embody the requirement to undertake / teach surveys of a higher quality than currently required for baseline BSAC Operation Oyster surveys.

13. Conclusions and Next Steps

This year has been a very successful year for BSAC Operation Oyster, especially given the number of ongoing crises in society in general, particularly the post COVID environment and the deepening cost of living crisis affecting the average sport's diver's disposable income for going diving.

Regarding the latter, the author is particularly grateful for the funding provided by the BSAJT and the Marineff projects to help cover the costs of booking dive charter vessels.

BSAC Operation Oyster is a long-term project and whilst a constant focus will be on going diving and getting data, it is ultimately about playing a part in restoring the cold-water equivalent of coral reefs.

To date we have found no native oyster reefs in the UK and are not aware of any found by other projects whether citizen science based or on a professional footing.

However, next year we plan to continue to consolidate effects on diving and data starting with a dedicated expedition to Loch Craignish and Jura in late March / Early April 2022.

This particular expedition will have a more targeted focus to gain an appreciation and evidence for what an oyster reefs might have looked like in UK waters 150 year ago.

Mindful of the cost-of-living crisis we also plan to seek grant funding to help cover volunteer expenses in support of this project.

If you would like further information on BSAC Operation Oyster or would like to support it, please contact expeditions@bsac.com.



Figure 17: Olsen's frequency widely cited 1883 Piscatorial Atlas Map on the distribution of the Native Flat Oyster showing where it used to be in abundance

Appendix 1: Background to BSAC Operation Oyster

Just before a global pandemic was declared on 11 March 2019 and shortly before lockdown V1.0, a newsfeed item from BSAC entitled BSAC supports Zoological Society London's native oyster quest was sent to BSAC members.

It highlighted that there has been a 95% decline in the population of the native flat Oyster (*Ostrea edulis*) over the past 200 years due to a variety of effects: historic overfishing (in the 1800s in particular), habitat loss, pollution and the introduction of diseases.

The briefing caught the interest of the BSAC Expeditions Officer, Andrew Hunt, because, as a professional engineer interested in seabed restoration, it started with a problem definition – essentially the seabed doesn't need conserving but rather needs restoring. As an engineer, his job is about solving problems.

The press release included a quote from the Zoological Society London's Senior Conservation Programme Manager, Alison Debney:

"Throughout our restoration work, one of the barriers we've come up against is not having images of native oysters in the wild. Trying to explain the importance of a species to people when they're only ever framed as a seafood dish can be a struggle.

Oysters provide enormous benefits in the form of ecosystem services; nurseries for wildlife, clean water and in abundance, removal of carbon from our environment into their shell to name a few. Whether you're a diver, photographer, fisher or simply live near a coast – we need your help. The native oyster is a forgotten British treasure that needs the public's support during this long road to recovery."

Now that the author lives down South next to the Solent, he couldn't help but be attracted to the fact that being filter feeders, oysters also clean the water. What would the water quality be like if oysters were back to full strength? He couldn't help but wonder that if an adult-sized oyster can filter up to 200 litres of water per day, how many would be required to turn the Solent gin-clear; he concluded an awful lot more than what is currently on the seabed!

After reading about ZSL's Native Oyster Quest photo competition, the author was now on a mission to find and photograph oysters in conditions that are rarely gin clear.

Oysters can form amazingly large reef structures but there are no known examples of these reefs left in the UK. They disappeared long ago, and we certainly didn't make any fantastic scientific discoveries to the contrary. They are also usually quite hard to spot, blending much better with their surroundings than say a scallop, which is also a rare find on dives around the Isle of Wight.

Once lockdown eased and shore diving was back on, the hunt for oysters became an aim of each of the dives and as we spotted more of them, the eyes of divers became more tuned in to what we were looking for.

Initially, native flat oysters were being found under local piers in amongst seagrass in particular, but also clinging on to pier legs and other hard substrates. We did find what could just about be classified as an oyster bed (>5 oysters per square metre) but most of the time, we found them in small clumps and reasonable widely spaced, and quite often covered in sponge making them even harder to find.

We looked up from the seabed and started to spot them on vertical walls, on and inside wrecks, sometimes hanging upside down away from their usual predators (starfish, crabs, seabirds and humans!)

Before long, contact was made with a fellow BSAC diver and professor at Southampton University, who in turn put Andy in contact with Dr Luke Helmer, a researcher on the Solent Oyster Restoration Project (SORP), run by the Blue Marine Foundation.

Normal branch reef and wreck dives suddenly took on an added element of a science project. Indeed, shipwrecks could be suitable to use as locations for helping restore the population of oysters in the future, but more scientific research is needed to back this up.

This is why BSAC has launched Operation Oyster.

It is hoped that this work to help continue the research for *Ostrea edulis*, particularly with regard to their location on shipwrecks and reefs but also on shore dives and indeed walks on the beach. The aim is to gather useful data for the scientific community as input for their work to determine how best to restore native oyster populations.

Looking back at the annals of club history there was an example of a similar undertaking by the organisation. That was Operation Kelp organised by the late Dr David Bellamy way back in 1967 who used kelp to monitor pollution levels in the North Sea.

Today the understanding of how crucial the oceans are is better than it was, but the challenges are also bigger. There is much work to do and volunteer divers have a part to play.

Appendix 2: About BSAC / Seawilding Shore Surveyor

[BSAC launches new Shore Surveyor course - British Sub-Aqua Club](#)

A parallel project which was completed in conjunction with BSAC partner Seawilding and launched late Summer 2022. Once completed this eLearning course enables non-divers to plan and carry out a shore survey at a safe location of their choosing. The data logged from this initiative will also be fed into BSAC Operation Oyster.

See <https://youtu.be/nFQE3G0g0Ag>



Appendix 3: Data Collection Form

Your details

Please select one person to record your oyster findings who will be the point of contact should we need to verify a record or find out more.

Full name *

Email address *

Contact phone number

Record time and location

We recommend you leave at least one grid reference record. What3words can be easily determined with your smartphone from the website.

Date of record *
(DD/MM/YY)

Approx. time of finding *
(24hr clock) eg 16:34

General location *
(site name/nearest town)

what3words
Please provide at least one grid reference record.

Latitude
(Degree,minutes,decimal)

Longitude
(Degree,minutes,decimal)

OSGB (letters + six figures)
Please provide at least one grid reference record. e.g. SD546707

Oyster details

Were native oysters or shells found? *

Yes

No

If yes, please complete the rest of the form. If no, proceed to verification.

Number of live native oysters seen during search

1-5

6-10

>10

None

Number of native oyster shells found during search

1-5

6-10

>10

None

Were the native oyster shells whole or broken up?

Whole

Broken up

We found some of both

None

Depth range that native oysters (live or shells) were found

On the seashore (above high-water mark)

Intertidal (between high-water and low-water mark)

Underwater depth (please specify below)

Live native oysters are typically expected to be found between 0m (on the surface) and 80m of water depth.

Underwater depth range (in metres)

e.g. 10-12m

Width of oyster/shell, if found (in cm)

e.g. 10-14cm

Seabed or shore type (select all that apply)

Mud

Sand

Broken shell

Gravel/cobbles/pebbles

Boulders

Rock

What are the native oysters attached to (select all that apply)

- Not attached - lying on the surface
- Embedded into seabed (e.g. mud/sand)
- Natural substrate (e.g. attached to pebbles, boulders, rock surfaces)
- Manmade concrete structure (e.g. seawall or outfall pipe)
- Metal structure (e.g. pier legs, shipwreck, outfall pipe, harbour wall, etc.)
- Wooden structure (e.g. pier or wreckage, sea defences)
- None found

Angle of surface to which they are mounted (select all that apply)

- Horizontal 0-30 degrees
- Slope 31-60 degrees
- Steep slope/vertical 61-90 degrees

Other species of interest present

- Live pacific oyster (*Magallanas/Crassostrea gigas*)
- Pacific oyster shells
- Live slipper limpet (*Crepidula fornicata*)
- Slipper limpet shells
- Live oyster drill (*Urosalpinx cinerea*)
- Oyster drill shells

Supporting information

We are particularly keen to get images of live oysters underwater with something to help size them and confirm depth.

For example...



Upload any images as a zip file


No file chosen

Any other comments or details

(e.g. other species of interest nearby, additional supporting information)

Verification

Click the box ^{*}

 I'm not a robot 
reCAPTCHA
Privacy - Terms

Please click the box to indicate you are a human rather than an automated system completing this form.

Appendix 4: Expedition Diaries

Sound of Mull

Vectis Expeditions inaugural diving expedition kicked off at the start of a couple of weeks of glorious weather in the Sound of Mull, a must dive location for the true UK diving fanatic.

The normally stunning scenery was truly magnificent both above and below the water, basking in rays of early summer sunshine. We started with shakedown dives on the SS Breda, one of Scotland most famous, intact and readily accessible shipwrecks located in Ardmucknish Bay. Aberdeen BSAC dropped by in the RHIB and we briefed them on BSAC Operation Oyster project over a cup of tea and a biscuit onboard, recruiting some environmentally conscious divers to the cause.

After overnighting in Oban in order to pick up a large oxygen supply, we then with barely a ripple in sight in the morning, headed to out to an aircraft wreck of a Catalina flying boat just outside Oban. Although damaged by fishing activity and partially obscured with a very large trawl net this is still a very interesting wreck where you can peer into the cockpit, see the propellor blades and underwing floats. We headed to the SS Ronda, a part salvaged shipwreck that fell off the rock Dubh Sgeir where it has been perched before coming to rest against the side of a steep wall. Another iconic wreck dive due to the depth and the fauna, particularly around the rudder area at decompression stop level.

The team had been keeping their eye open for native flat oysters in support of BSAC Operation Oyster, on all the dives and there was a little excitement when we found what initially could be mistaken as the shells of juvenile native oysters. Alas, they turned out to be saddle oysters shells which it turns out are quite abundant. However, it was great to see the team getting their eyes tuned into finding evidence of native oysters.

We overnighted in Tobermory taking the opportunity to see if we could access the with an obligatory visit to the Mishnish. The next day we targeted a couple of scenic sites: Auliston Wall and Aird Na Cuil. It was the optional third dive in Loch Na Droma Buidhe (which we nicknamed Loch Drambuie) that scored for BSAC Operation Oyster. On a randomly selected site we landed on a mass of mussel shells, then clam shells that were surrounded by a silty seabed. Heading down slope we came across some firework anemones before discovering remains of a very old native oyster seabed in about 10m.



Figure 18: Old Oyster shells found in Loch Na Droma Buidhe

We berthed overnight back in Dunstaffnage Marina before diving the SS Thesis. An oyster shell was found at the stern of the Thesis indicating that once upon a time there may well have been thriving populations in the area. For our final dive we returned to the SS Breda for another thumping dive.

The following week with a mostly new dive team set off once again to explore the Sound of Mull area. Travelling from all over the UK between Orkney and the Isle of Wight to get to there, the team kicked off the week with a meal in “The Oyster Inn” at Connel, which given some of the project objectives seemed very appropriate.

This week we were diving off two vessels; MV Purpoise II for the shakedown dives in the Firth of Lorn area to the south of Oban and then back onboard MV Clasina for at trip up the Sound of Mull.

We had been given intelligence from BSAC’s Operation Oyster partner, Seawilding about possible seagrass and oyster locations in Loch Craignish and so focussed day one is this area.

To mitigate the risk of transmitting potentially harmful marine life from our dive kit to the Loch Craignish area, particularly *Bonamia ostreae* parasite which attacks native flat oysters (*Ostrea edulis*) we checked, cleaned and dried kit before arriving to dive (Check, Clean, Dry).



Figure 19: Oyster shell found in Loch Craignish in comparison with one from the South Coast

Dive one was an exploratory wall dive which turned out to be a medium energy site despite its proximity to the Gulf of Corrywreckan and the Dorus Mor tide race. We found plenty of saddle oysters and also kept our eyes open for PMFs (or Marine Priority Features) that could help support an application for a highly marine protected area.

Our second dive really scored for BSAC Operation Oyster with the discovery of what is nowadays described as a carbon store; i.e. a dead reef. But what a dead reef with an abundance of dead native flat oyster shells that were approximately 3 times the size of native flat oyster shells previously found on other BSAC Operation Oyster dives and that was just for half a shell. Just imagine what the reef would have looked like when it was thriving and alive and not buried in silt.

One of the team hit the jackpot, finding a single, live native flat oyster which was measured and recorded for the BSAC Operation Oyster database.

Over the rest of the week we explored more classic wrecks including the SS Breda, SS Hispania and SS Shuna as well as exploring some scenic sites to build on the discoveries of the previous week. Once again, we found an abundance of saddle oyster shells and started to spot the live versions but this time didn't find anything to surpass the earlier oyster shell and oyster find.

We overnighed in both Tobermory and Loch Aline and were blessed with some of the best diving conditions I've known in my 30 years that I've been diving the Sound of Mull!

We also conducted some BSAC First Class Diver and BSAC Advanced Diver training during the course of the week.

Dr Karen Boswarva (Orkney Sub Aqua Club) was also onboard providing lectures on the wider benthic fauna and flora of the Mull area and details of the native flat oyster lifecycle.

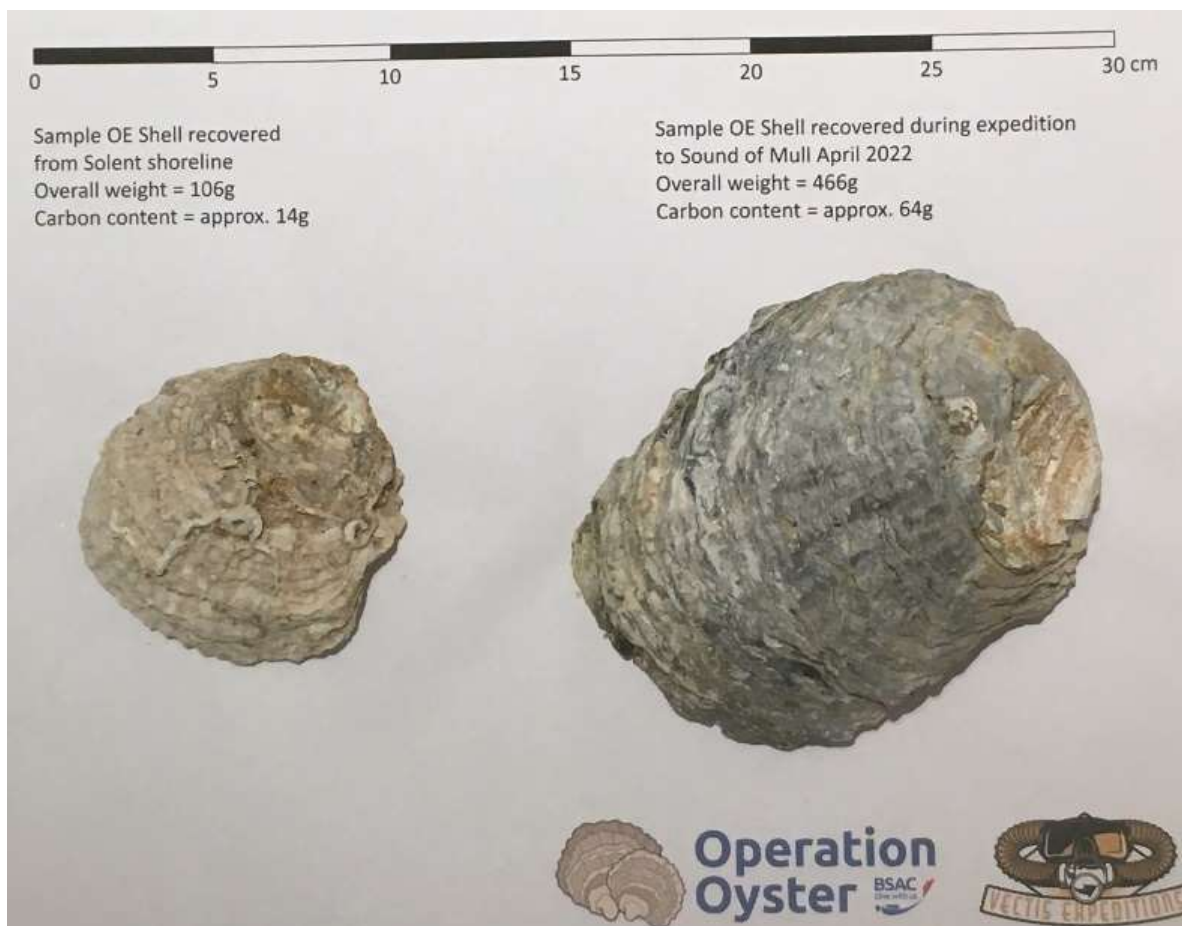


Figure 20: Oyster shell found in Loch Craignish in comparison with one from the South Coast

Solent

Citizen science dives were organised, searching for remnant native flat oyster populations around the Solent on a number of different wrecks and reefs. We were very pleased to have volunteer divers from project partners BLUE Marine Foundation on the wreck dives and later a scientist based at the University of Portsmouth marine laboratory on board the boat providing information the BLUE Marine reef project in Langstone Harbour.

On July 15th, we mobilised onboard dive boat Wight Spirit from Lymington. The sites chosen for our BSAC Operation Oyster dives focussed on waters approaching the Western Solent in depths suitable for BSAC Sports Diver. We chose to check out some more popular wrecks that most of the divers onboard had not dived previously. The first was the Clan Macvey in Poole bay, the second was the Warknight which is just west of Freshwater bay off the Isle of Wight. The third planned dived was the Irex, a shallow sailing vessel shipwreck in Scratchells Bay nearer the Needles.

After a prolonged period of settled weather we were expecting better visibility underwater than we actually encountered. Still, the visibility was good enough to find native flat oysters around the wrecks.

The dive team managed to spot numerous native flat oysters both alive and dead. The record number found by one buddy pair was about 50 but this particular pair included the lead native oyster scientist for the BLUE Marine Foundation whose eyes were clearly more attuned to spotting juvenile oysters.

Being in the middle of a heatwave the temperature and bright sunshine compensated somewhat for the lack of visibility underwater. Unfortunately, a fresh breeze developed later in the day creating a less favourable sea state which prevented a dive on the SS Irex.

Content with two good dives and lots of oyster sightings we headed back to port.

On August 4/5th we targeted sites in the eastern Solent and so the expedition base relocated to Southsea Marina for the duration.

On August 4th we headed to the Nab tower and then the wreck of the HMS A1 submarine before picking up a BLUE Marine Foundation oyster scientist and heading to be the first to dive their Oyster restoration project.



Figure 21: The Nab Tower, one of the dive sites in the Solent



Figure 22: Slipper limpet shells on the seabed underneath HMS A1 Submarine

Visibility was better than expected although still murkier than earlier in the year. Yet again the dive team were spotting native flat oysters.

We were especially grateful to Martin Davies and Alison Mayor who as licensees granted us permission to dive on HMS A1 which due to its historic importance as the Royal Navy's first operational submarine is now a protected wreck site. The few oysters spotted on the A1 were especially difficult to spot. The shot had been carefully deployed off to the side of the wreck to avoid damaging the wreck. In doing so it has left a small depression on the seabed revealing old, buried oyster shells underneath the present day seabed which is littered with *Crepidula fornicata* (slipper limpet).

Our third dive of the day was on the BLUE Marine Oyster restoration project in Langstone Harbour. We were very privileged to have onboard a BLUE marine scientist who guided us to the site and gave us permission to gather samples of juvenile oysters from the seabed for further study in the laboratory.

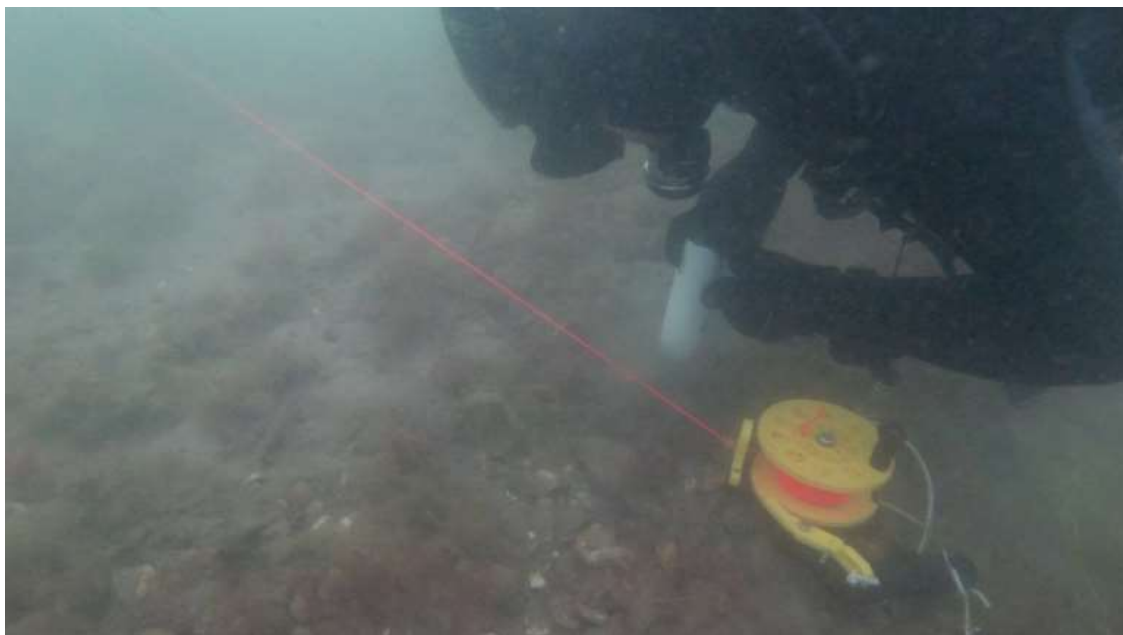


Figure 23: Collecting a seabed core sample from the BLUE Marine reef in Langstone Harbour

August 5th commenced with a dive on the wreck of HMS Boxer in Sandown Bay off the Isle of Wight. This wreck is somewhat of an oasis of life in an area of flat sand. Having used up the 'slack water' on HMS Boxer we headed inshore for the 2nd dive.

For our second dive we chose to dive on wreck of the Haulier, a barge which sank in the early 1970's and was dispersed by explosives in 1975. Not much is left standing up to look at but at least we proved there was still something there! We turned the second half of the dive into a challenge to drift off and find an adjacent area of reef.

The final dive was on the Roway wreck enroute back to Langstone Harbour. The Roway was a dredger that sank in 1967 in very shallow water on the approaches to Langstone Harbour and should be 'easy to find' with the bows being only 1-2m away from the isolated Danger mark. Once the tide turned and visibility improved, we were presented with quite a nice little wreck site surrounded by patches of seabed.

Newtown Creek and Thorness Bay

During week of the 6th June dives with conducted on number of sites in the Solent off the Isle of Wight between Yarmouth and Gurnard. Notably this included jackstay surveys in Newtown Creek on the site of an early native oyster restoration trial and a dive on the protected Wreck Site in Thorness Bay for which we are very grateful for permission to dive from the licensee Mr Gary Paddock of Wight Dolphins SAC.

Live native oysters were found on the protected site along with plenty of slipper limpets.

No native oysters we found on the site in Newtown Creek. The seabed was devoid on life, comprising about of dark grey silty/mud with a brown dusting on top. Digging down 200-300mm into the seabed revealed old native oyster shells. This dive highlighted how much the habitat has changed; the substrate on which native oysters would grow is buried under years of silt. A key

lesson from this site is that the seabed itself should be prepared prior to deploying native flat oysters in order to maximise chances of success.



Figure 24: Laying the jackstay for the quadrat survey in Newtown Creek



Figure 25: Quadrat on seabed – diver commencing local excavation by hand into seabed

Alum Bay

As the traditional South Coast diving season drew to a close, other dives were completed in Alum Bay as part of a BSAC Advanced Instructor Course. A number of native flat oysters were found as part on a reef in the bay.

Artificial Reef Project off Calshot

The MARINEFF Project (Marine Infrastructure Effects) is a collaboration between France and the UK with the goal of developing coastal infrastructure to enhance and protect the ecological status of cross-channel coastal waters.

We were invited to dive on the one of the its projects, an artificial reef project being managed by Dr Ken Collins, University of Southampton. It is constructed from 20 specially designed reef prizms which were seeded with large adult native oysters.

This shallow site, next the old Fawley power station cooling water outfall had both native flat oysters and also the non-native *Magallana / Crossatrea gigas* or Pacific oysters.

Typically we have found Pacific oysters in the intertidal an zone down to about 2-3m with native flat oysters more common past this.

On this site, more pacific oysters were found on the seabed but that may simply be a function of the proximity to the outfall pipe structure which protrudes above the water surface.

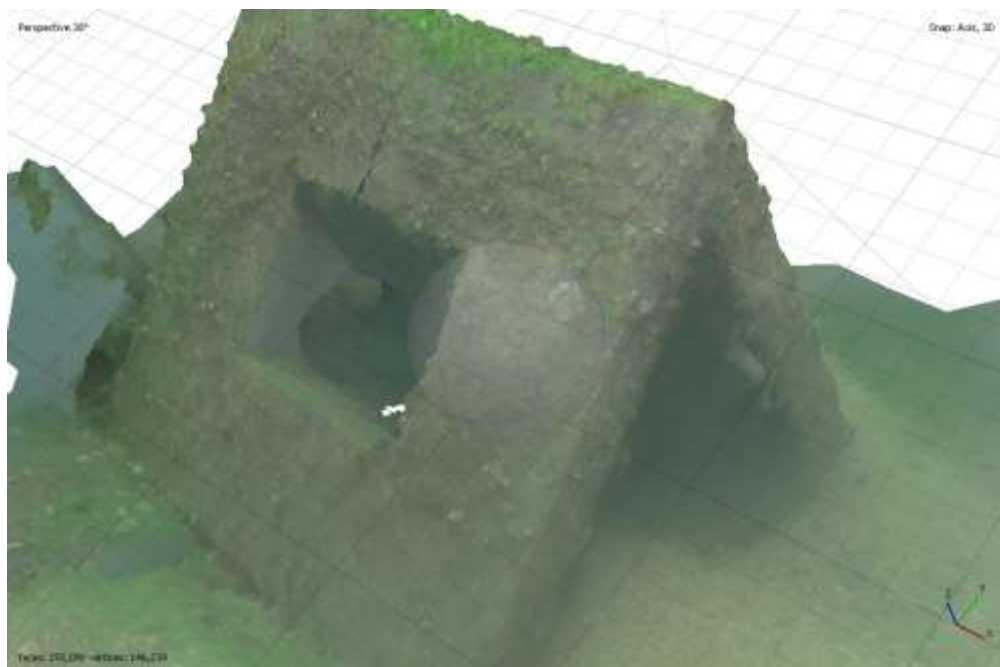


Figure 26: Photogrammetric model of artificial reef cube



Figure 27: Divers at the Calshot artificial reef site.

Cape Wrath

Cape Wrath is remote and rugged part of Scotland that is logistically a challenge to dive. Vectis Expeditions led an expedition to dive some stunning scenic and wreck dives off the beaten dive track out into the Atlantic and closer to Cape Wrath itself. This was great experience for BSAC Advanced Diver trainees and also an opportunity to contribute to BSAC Operation Oyster.

Before founding Vectis Expeditions, Andy had led diving expeditions here before. The diving then was from RHIBS and inflatables and whilst that gave a degree of flexibility to dodge the weather it limited our options in other ways. This time we had a mother ship – MV Clasina that can roam further and seek shelter overnight in picturesque sea lochs and island bays,

The expedition team mustered in Stromness from where we headed out into the Atlantic towards Cape Wrath. The weather forecast looked good. Very good. So much so that the dive sites shifted to the outlying rocks as our primary dive sites – Nun Rock, Sule Stack and North Shoal.

Day 1 – 28th August : Shakedown dive on Nipple Rock, Caves and Walls off Eilean Nan Non

Day 2: – 29th August : Nun Rock before seeking shelter at Cape Wrath with more Caves and Waves off 'Jetty'

Day 3: – 30th August: Cape Wrath – boulders the size of houses, stunning viz and pure white sandy seabed followed by more of the same but with a search for a shipwreck

Day 4: -31st August: Sule Stack and MV Manina wreck followed by backside of Sule Stack with stunning visibility, deep gulleys and seals playing plus a few spent naval shells from battleships and practice bombs from when was used for target practice

Day 5: – 1st September: North Shoal – Explored the north side for dive 1 before diving the unknown wreck on the SE side which we had located a number of years ago, before the need to return to Stromness to miss the weather

Day 6: – Relaxing dives at Ingleness and everyone’s favourite the Tabarka on the way back.

One of the Expedition aims besides great diving was to seek out remnant populations of native oysters. We had low expectations given the revised dive plans out into the Atlantic. Saddle Oysters were being spotted but it wasn’t until the very last dive than a native oyster shell was spotted on the wreck of the Tabarka on the way back to Stromness.

It is rare to get out into the Atlantic to dive even one of the sites in a week but to get the three main sites in we were very fortunate.



Figure 28: Partial OE shell found on the wreck of the Tabarka in Burray Sound.



Operation Oyster

BSAC
Dive with us



An old, large native flat oyster shell donated to Seawilding, showing the size these creatures were once allowed to grow to before overfishing, loss of habitat and disease decimated populations