Hampshire Seasearch Diving Report 2021

A total of 122 dives were made across seven dates from 30/05/21 to 17/10/21. Covid-19 restrictions meant that the number of places on each boat charter was limited for the first part of the season. Appropriate additional protection measures were added to mitigate the risk of infection, in conjunction with the boat skipper and advice from BSAC.

Broadly the weather cooperated, although many dives required the team to tuck in very close to shore on marks that were out of the spring tides where data could be recorded effectively. Visibility was challenging at the beginning of the year but improved somewhat later on.

All of these dives were conducted from Wight Spirit and sincere thanks are given to skipper Dave Wendes for an excellent and safe season.

Objectives

Hampshire Seasearch had three main objectives this year. First, a focus on seaweed diversity and marine health; second, a focus on seagrass; third, to fill in some of the gaps in data acquisition around the Isle of Wight.

The Covid-19 pandemic delayed effort so effectively the work this year had been planned for 2020.

Seaweed Diversity

This seaweed diversity work was made possible through valuable funding from the **Peter Brough Fund** via the Hampshire and Isle of Wight Wildlife Trust. The funding was used to subsidise volunteer diving, greatly increasing the quantity of data that could be collected and supporting a shift in volunteer focus toward seaweeds. Because of the complexity of seaweed identification this support was particularly valuable to develop the skills of volunteers and to facilitate confirmation, where necessary, of the species observed.

A valuable sub-objective was also achieved, attracting a greater number of younger volunteers to benefit from and contribute to Seasearch activities. We now have ten young divers who have been attracted via the University route, mainly in Marine Biology, participating directly, undergoing Observer training or awaiting the next Observer course.

The high level objective was to establish a baseline for the environmental health of two marine areas in Hampshire:

- In Christchurch Bay and
- Potters Bower to Brook Ledges, south of the Isle of Wight.

In the event the Christchurch Bay target proved to be difficult to achieve, given the distance and timing of slack water. It was found to be much more productive to substitute Alum Bay

for Christchurch. This gave an excellent focus around the Needles and the south-western shore of the Isle of Wight.

The indicator for health used is the abundance and variety of seaweed around 0 to 10m depth, in the sublittoral fringe, and the upper and lower infralittoral zones. As primary producers, seaweeds are predated upon by and therefore support many other organisms at the base of the food chain. Changes in the health of the seaweed populations are therefore an important indicator of broader environmental health. Natural England has conducted surveys in the past of reef features in the South Wight Maritime SAC notably “kelp forest” and “subtidal red algae” communities. These surveys are conducted on 5-7 year cycle and our data provide interim information.

Exploratory dives in one of these areas (Brook Ledges, southwest coast of the Isle of Wight) had already uncovered the likely and exciting presence of *Flabellia petiolata*, recently recorded from sites in Alum Bay for the first time in the UK, to be confirmed through further sampling.

Twelve of the seventeen dives held in the year were targeted mainly on this work, however all dives provided valuable data concerning seaweeds.

Findings

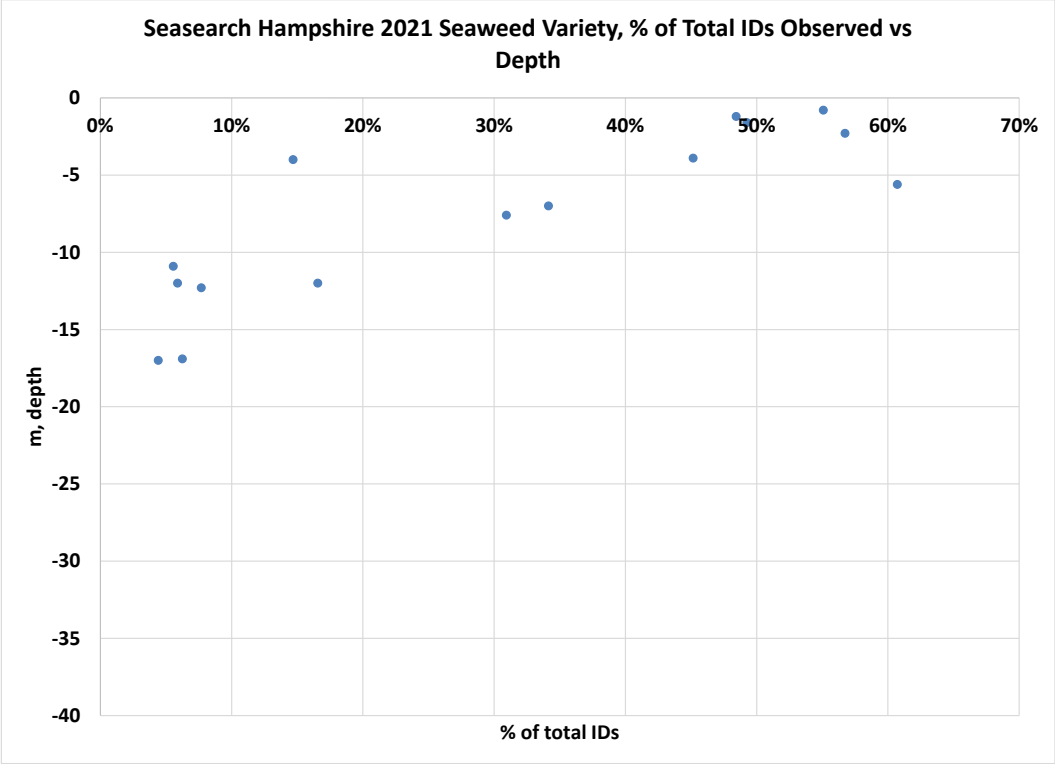
1. 103 different algae/plants (Phylum ends in *phyta) were recorded this season. This compares with 125 in total for all preceding years. This shows the effect of a determined effort to record seaweeds. It confirms that a new benchmark for seaweed diversity was required and it provides that baseline.

2. Of the algae/plants found in 2021, 23 species had not been recorded previously. Of the 125 species found before 2021, 41 of them were not found in 2021.

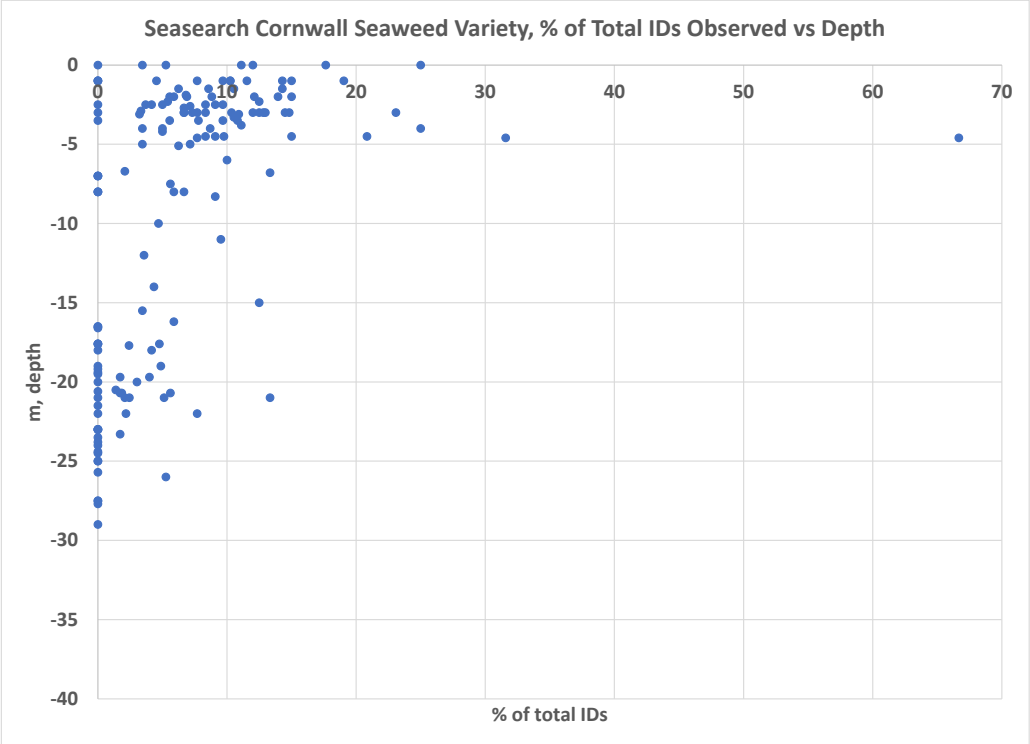
3. Seven taxa were non-native, of which the most numerous were:
    a. *Sargassum muticum*
    b. *Asparagopsis armata* - Falkenbergia phase
    c. *Grateloupia turuturu*.

4. Several seaweeds were recorded which are rarely observed so far east on the south coast, including:
    a. *Gastroclonium reflexum*
    b. *Gracilaria multipartita*
    c. *Xiphosiphonia ardreana*
    d. *Xiphosiphonia pennata*
    e. *Lychaete battersii.*

5. The rate of reduction in seaweed taxa recorded against increasing depth was surprising. There appears to be a more rapid reduction than would be expected, for instance, close to the southwest coast. In the 0 to -4m range extensive seaweed observations were made (30 to 60 per site, from all divers, which will include duplicate taxa), which were 50% to 60% of the total taxa recorded. This compares with single numbers of seaweed observations in the -10m to -15m range, which were less than 10% of the total taxa recorded. The following graph supports a possible trend, which will be targeted more precisely next season.



The lower border of the Hampshire data in the graph suggests few seaweeds below 15 to 20m depth. For rough comparison, the graph below shows the same data for typical dives in Cornwall, albeit this historic data was not specifically collected with this comparison in mind. In this case there are clear indications of seaweeds in the -25 to -30m range:



6. For future study it will be useful to:

    a) Confirm and become more precise about this trend; and
    b) Identify possible contributory factors and the extent to which these are related to human activity.

7. The area targeted around the Isle of Wight contains rare sublittoral chalk habitat. The importance of this type of habitat is (MCCIP Science Review 2013):

    - Classified as a UKBAP Priority Habitat and listed in Annex I of the EC Habitats Directive and the OSPAR list of threatened and/or Declining Species and Habitats (OSPAR, 2008a).

    - Climate warming is likely to be enhancing colonisation of intertidal chalk by non-native species, including the invasive brown alga *Sargassum muticum, Codium fragile* and *Colpomenia peregrina* on the Isle of Wight as increases in abundance across the 2000s correlate with increases in sea and air temperature[1].

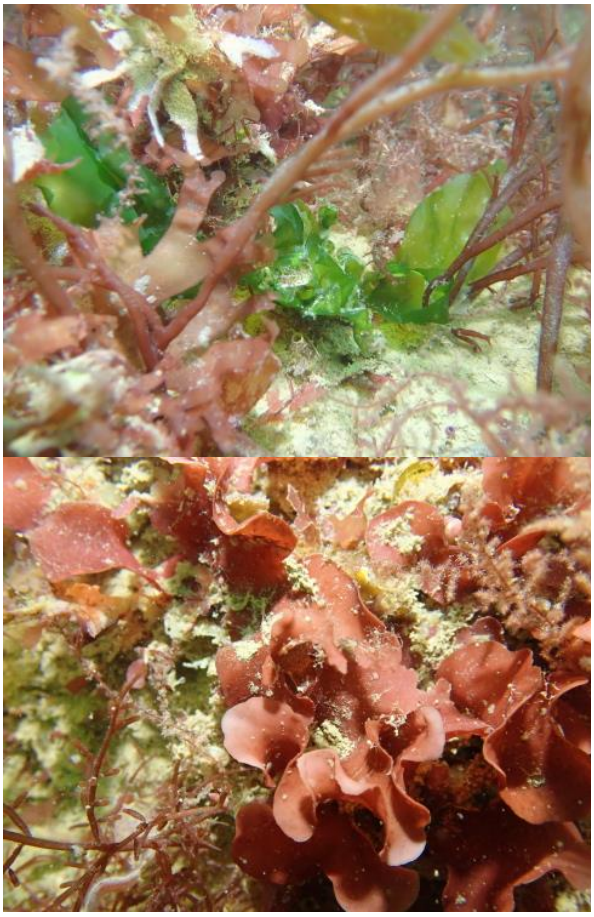
    The specific chalk habitat around the Isle of Wight is an additional parameter in the seaweed abundance and diversity equation, which would be useful to study further. In any case, understanding this scarce resource more fully would be valuable in its own right.

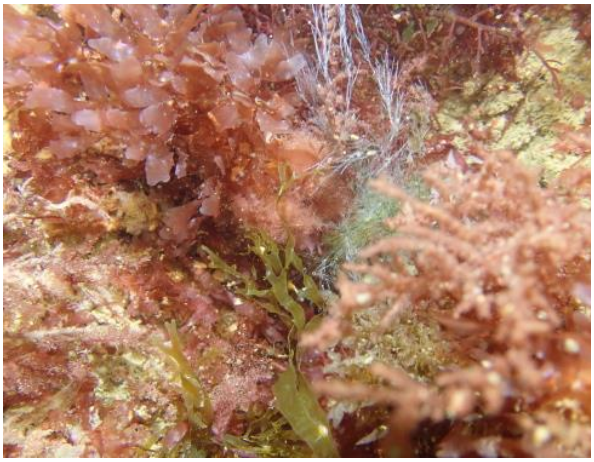
8. Conclusions:
    a. We have a new baseline for seaweed diversity around the southwest infralittoral and circalittoral of the Isle of Wight. This work entailed refocusing volunteers onto seaweed observations, an investment that it would be valuable to maintain. We aim to keep this focus in future years and monitor trends in diversity, abundance and non-native species. It will be particularly helpful to follow the apparent trend of rare species progressing eastward.

    b. There is the possibility of the relationship between seaweed diversity and depth being unusual in the region when compared with other areas. We hope to investigate this trend further to confirm that it is real and then to begin to explain it.

    c. One explanation of the anomaly might be the local chalk seabed, a factor we hope to explore further, for instance in contrast with algal diversity from other areas with chalk, e.g. north Norfolk. Chalk habitats being a scarce worldwide resource, further study would also be both valuable in its own right

[1] See e.g. . "Impacts of climate change on intertidal habitats", Nova Mieszkowska , Louise Firth and Matt Bentley; MCCIP Science Review 2013: 180-192





Diverse green, brown and red seaweeds from around the Isle of Wight.

Seagrass

Seagrass was targeted with the invaluable support of EU LIFE Recreation ReMEDIES funding. The project seeks to move Annex 1 habitats of the Habitats Directive towards Favourable conservation status by reducing the negative impacts of recreational activities on the marine environment.

The following key points highlight the direct importance of seagrass and its value as an indicator of climate change [MCCIP Science Review 2013]:

- Stabilisation of sediment and providing a habitat for epifauna, flora, juvenile fish and cephalopods;
- Provision of a major food resource;
- Breeding populations of spiny and short-nosed seahorses, two species of pipefish, *Entelurus aequoreus* and *Sygnathus typhle* are almost totally restricted to seagrass beds (OSPAR, 2008b);

- Provision of wave attenuation, buffering intertidal habitats from exposure to wave forces (Paul and Amos, 2011);

- Production of up to 2g carbon per square metre per day during the temperate growing season (OSPAR, 2008b) with high biomass of up to 5kg per m2 (Barnes and Hughes, 1982);

- Indication of climate change, being highly sensitive to the main drivers: sea surface and bed temperature, sea-level rise, storminess, precipitation, salinity, pH and suspended sediment (Jones et al., 2011);

- Direct evidence of the impact of increasing temperature on the distribution and physiological performance of seagrasses in UK coastal waters is lacking and highlighted as a key knowledge gap.

Findings

1. Typical observations:

    a. 1km east of Yarmouth Pier; 50° 42.586'N 001° 28.922'W, 27/06/21.

    A dense seagrass bed on a veneer of fine, muddy sand up to about 5cm deep over very soft, piddock-bored mudstone with a sparse understory of mixed seaweeds on occasional cobbles and *Crepidula* chains. Mudstone broken up into pebbles in places - possibly caused by anchor damage. *Zostera* rhizomes running along interface between fine sand and mudstone, also penetrating down fissures and piddock bores in the mudstone.

    Summary of human activities/impacts: "Possible evidence of anchoring damage. Seagrass with ~5% with blackened tips to older leaves. Sparsely colonised by hydroids and thin bryozoan crusts.

    b. Osborne Bay, NE Isle of Wight; 50° 44.995'N 001° 14.370'W, 11/07/21.

    A dense seagrass bed of *Zostera marina* but with numerous open areas of various sizes on firm, clean, fine sand with an anoxic layer at a depth of about 1-2cm. There was an understory of diverse but relatively sparse mixed seaweeds. Burrowing bivalves were a feature of the sediment. Some areas had short, fine growths of *Zostera* arising from rhizomes buried in the sediment and a few seedlings were reported.

    Seeds, flowers and seedlings of *Zostera marina* were recorded at the site and about 15% of the *Zostera* shoots had blackened tips. Tall robust leaves of *Zostera* were heavily epiphytised by the hydroid *Laomedea angulata*. This was not the case when the area was surveyed by Natural England about a month earlier.

Human impacts: the bay is a very popular area for anchoring by day boats, but to date there are few if any permanent moorings. A discarded, thickly colonised whelk pot was recorded.

Several non-native species were reported: wire weed (*Sargassum muticum*), slipper limpet (*Crepidula fornicata*) and a non-native species of sea squirt (*Botrylloides* sp).

c. Thorness Bay, NW Isle of Wight; dive start 50º 44.64'N 001º 21.29'W to furthest drift end 50º 44.17'N, 001º 22,46'W, 05/09/21.

Seagrass bed of *Zostera marina* throughout a distance of around 1km, with our approximate start point a Seasearch record for seagrass made in 2011. The seagrass was growing in a layer of very soft, muddy sediment 6-15cm deep over a soft mudstone bedrock, typical of several seagrass sites around the Isle of Wight. Sparse mixed seaweeds were recorded within the seagrass canopy.

Seagrass leaves were densely covered in silty epiphytes which obscured large lengths of blackened leaf blades on virtually all plants and there was a thick mat of black, fragmented dead leaves beneath the live leaf canopy. Interestingly no seeds or flowers were recorded by any of the divers in Thorness Bay though our surveys earlier in the year near Yarmouth and in Osborne Bay had done so. Divers reported only relatively small areas of bare sediment along their dive tracks, in places fragments of the soft mudstone bedrock appeared on the surface suggesting possible damage from anchoring.

Human Impacts: the bay is a popular area for anchoring by day boats, but to date there are few if any permanent moorings. No litter was reported by any of the dive teams.

Non-native species were reported in low numbers in the seagrass bed habitat and included wire weed (*Sargassum muticum*), the red weeds Devil's tongue weed (*Grateloupia turuturu*), siphoned Japan weed (*Dasysiphonia japonica*), the sporophyte phases of harpoon weed (*Asparagopsis armata*) and Bonnemaison's hook weed (*Bonnemaisonia hamifera*) as well as a non-native species of orange sea squirt (*Botrylloides* sp).

2. Conclusions
   a. **Volume**

   Extensive, dense seagrass beds of *Zostera marina* were observed. These were confirmed to extend from Osborne Bay to just east of Yarmouth on the northwest of Isle of Wight.

   In places, areas of open seabed were observed. A further question for 2022 is to attempt some quantification and to explore the extent to which these open areas relate to human activity, such as anchoring.

Exposed rhizomes – a sign of impact damage?

b. **Health**

Blackened tips were observed, varying from 5% to 15% with location and date. The next question here is the extent to which this is due to senescence, predation, physical damage and / or other human activity. We hope to make regular comparison observations through the next season in order to explore these factors.

Seeds, flowers and seedlings were observed in Osborne and near Yarmouth but not at Thorness Bay. A comparison in 2022 will be useful to indicate if this is due to seasonal variation.

Blackened blades – an indication of the presence of wasting disease?

End-of-season observations with a lot of silt and/or epiphytes on the blades.

c. **Biodiversity**; observations included:

i. Sparse colonisation by hydroids and thin bryozoan crusts
ii. Mixed seaweeds and *Crepidula* chains
iii. Piddock bores
iv. Several non-native species were also reported: wire weed (*Sargassum muticum*), slipper limpet (*Crepidula fornicata*), the red weeds Devil's tongue weed (*Grateloupia turuturu*), siphoned Japan weed (*Dasysiphonia japonica*), the sporophyte phases of harpoon weed (*Asparagopsis armata*) and Bonnemaison's hook weed (*Bonnemaisonia hamifera*) as well as a non-native species of orange sea squirt (*Botrylloides* sp).

Biodiversity associated with the seagrass beds was also recorded.

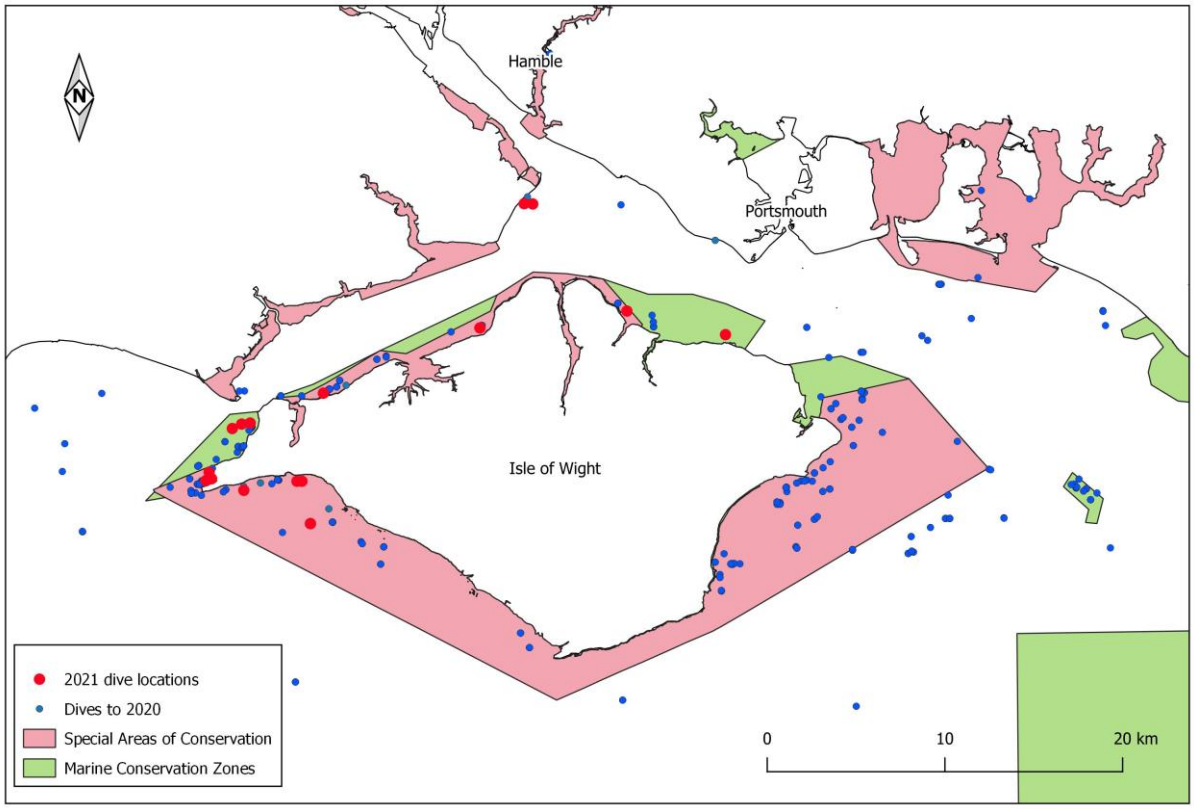
Filling In Observation Data Gaps

The following marks were dived, successfully eliminating some of the gaps in spatial coverage of our records (note that the dive on Fluent was not an official Seasearch dive with associated depth restrictions):

Location	Depth, m	Coordinates		Conditions	Date
15m Ledge	17	50Deg 38.636'N	001Deg 29.584'W	Poor condiitons	30/05/2021
Freshwtaer East Reef	9	50Deg 39.922'N	001Deg 29.977'W	Poor condiitons	30/05/2021
Yarmouth	3	50Deg 42.586'N	001Deg 28.922'W	Moderate viz and low current	27/06/2021
Long Rock, Alum Bay	10	50Deg 39.956'N	001Deg 34.567'W	Moderate viz and low current	27/06/2021
Albert Field MCZ / SS Fluent	42	50Deg 28.859'N	001Deg 51.459'W	Good vis, strong surrent at first.	10/07/2021
Alum Bay	8	50Deg 39.985'N	001Deg 34.677'W	Good vis, moderate swell.	10/07/2021
Osborne Bay	3	50Deg 44.995'N	001Deg 14.370'W	Good vis.	11/07/2021
Alum Bay - Five Fingers Rock	7	50Deg 39.984'N	001Deg 34.694'W	Good vis.	11/07/2021
North of Warden Ledge	11	50Deg 41.654'N	001Deg 32.854'W	Good vis and low current.	05/09/2021
Thorness Bay	4	50Deg 44.611'N	001Deg 21.291'W	Good vis and moderate drift.	05/09/2021
Tennyson Down Reef	16	50Deg 39.658'N	001Deg 32.757'W	Mod vis and weak W to E current	25/09/2021
Outer North Brook Reef	15	50Deg 38.636'N	001Deg 29.584'W	Dark and silty, slack.	25/09/2021
Freshwater East Reef	12	50Deg 39.923'N	001Deg 30'213'W	Calm, slack	26/09/2021
Outer Warden Ledge	14	50Deg 41.533'N	001Deg 33.287'W	Some tide at start, short slack.	26/09/2021
How Ledge	3	50Deg 41.696'N	001Deg 32.433W	Moderate viz, moderate current at start.	17/10/2021
Alum Bay	2 to 4	50Deg 40.015'N	001Deg 34.292'W	Close in, out of the tide.	17/10/2021

A total of 29 Seasearch forms were submitted at the 16 locations surveyed. Thirty divers took part, including some new to Seasearch and keen to become involved longer term. A Seasearch Observer Course was arranged for December and was attended by 18 students. There are thus excellent prospects for increasing the volunteer force that will be active in Hampshire for future years.

The divers included two students from Southampton University who were attracted via the Peter Brough Fund algae work. They are both keen to develop their diving skills through Seasearch. One additional student has been assisted to gain experience and training for UK diving conditions as a precursor to becoming involved next year.



The map above shows all Hampshire Seasearch dive locations with the 2021 sites highlighted.

Acknowledgements

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Observations collected by the lifeblood of Hampshire Seasearch, its volunteers:

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This report was compiled by Mike Rushworth. Images © Charlotte Bolton and Mike Rushworth as indicated.