STUDLAND BAY MARINE PARTNERSHIP

Annual Report 2025

SBMP Research and Monitoring Group

Spiny Seahorse at Studland Bay (Image: Neil Garrick-Maidment, The Seahorse Trust)

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Summary

Monitoring Group Highlights

2025 was another exciting year for the Studland Bay Marine Partnership (SBMP) Research and Monitoring Group. This was the second year of delivering our formalised Monitoring Plan; designed to support the SBMP with high quality, evidence-based information to help deliver our seagrass restoration project. It was also the second season that the full set of eco-moorings have been out in the bay, and as a result we are really starting to see evidence of the tangible benefits this is having on the marine environment.

To understand the health and condition of the seagrass beds the SBMP uses both secondary data collated by our partners and external researchers, and primary data that is directly monitored by the partnership. This document summarises what primary data has been collated this year and what we have learnt so far. The metrics directly monitored by the SBMP include:

- **Seagrass extent and condition** (particularly around the eco-moorings and within existing anchor scars)
- **Seahorse population**
- **Biodiversity** including the presence of invasive species
- **Water quality**
- **Noise pollution**
- **Boat activity** (compliance with the Voluntary No Anchor Zone (VNAZ) and moorings usage)

A dedicated team of 28 volunteer divers participated in fortnightly surveys from May-October 2025, led by Dr Ken Collins from the University of Southampton and under a license from held by The Seahorse Trust. Like last year the team have focused their monitoring within the VNAZ around the eco-moorings installed by the SBMP and inshore. This was also the second season that we have used a time-lapse camera to monitor boat activity from June-September. Our new team of digital volunteers have been analysing the images, opening up the research group to those who wish to get involved remotely.

The data collected this year has produced some very positive results, including:

- **Continued signs of seagrass recovery and regrowth** in existing anchor scars, as a likely result of decreased anchoring within the bay.
- **A significant increase in seahorse encounters** during diving surveys compared to 2008-2024, with double the number of encounters from last season.
- **Continued high levels of VNAZ compliance** Our data shows that 73% of boats chose to use an eco-mooring this summer, up 9% on last year. Just 8% of boats were non-compliant (anchoring within the meadows), which is a reduction of 2% from last year. On average 88.4% of boats were compliant (either moored or anchored outside).

SBMP Project Progress

Outside of delivering our Monitoring Plan the broader partnership has continued to make excellent progress this year:

A significant behavioural shift

Key to our seagrass restoration strategy is the installation of publicly available 'eco-moorings', which allow boats to moor without the damage that a conventional mooring or anchor causes to the seagrass. 87 eco-moorings were installed by the SBMP between 2021 and 2024. For the second year in a row our boat monitoring camera has shown that nearly 9 out of 10 boat users are now choosing to either use an eco-mooring or anchor outside of the seagrass meadows. That is a dramatic behaviour change from a couple of years ago, and testament to the fantastic awareness-raising and engagement work that many of our partners have done within their networks. The SBMP is hugely grateful to all boat users who have chosen to support the project and played their part in helping to protect Studland's marine habitats.

Ensuring our operation is sustainable

In the background our various SBMP teams have been working hard to make sure that we can keep this project going into the future, and that the huge progress we have seen over the last few years can be sustained. This work is supported by many volunteers, and includes everything from moorings maintenance to fundraising, attending events and training our ambassadors. Our Comms Team have continued to spread the word about the project and seagrass restoration, visiting numerous sailing clubs, schools and events across the coast. The Research and Monitoring Group have also been busy sharing the latest science coming out of the bay. We have presented our work at various conferences and events including the 2025 Seagrass Symposium in Cardiff, and continue to run our popular webinar series "The Science Beneath the Surface".

Studland Watersports

Without the support of our partners, boat users and the wider public, recovery of Studland's seagrass would not be possible. We have relied heavily on peer-to-peer engagement amongst the local community and boating groups to encourage the behavioural change we've seen to reduce anchoring. This year our partners Studland Watersports and our team of On the Water Ambassadors have been boosting this even further by speaking to people out in the bay regularly throughout the season. A significant focus has also been ensuring that the moorings operation is financially sustainable. Last year (2024) payment compliance was poor, with an average of just 26.4% recorded over the sample period and 50% compliance achieved on just 15% of sample days. Our camera and payment data this year indicates that average compliance has improved to 34.5%, with 50% compliance being achieved on 25% of sample days*. **All of the money generated from moorings fees goes directly towards the cost of maintaining and reinstalling the moorings each season and is a critical component of ensuring the operation can continue.**

The true figure is likely higher when season passes and website donations are included, however we are not yet able to attribute these to specific camera images. Please see the next section for more details.

Monitoring updates

Seagrass extent and condition

Since the original ten eco-moorings were installed in 2021, the seagrass density around these moorings has been monitored by divers, towed seabed-video and side-scan sonar. 25 scars are currently being monitored across the area shown in figure 1. A series of side-scan surveys were undertaken during the 2025 season between May and October. Dr James Strong, National Oceanography Centre Southampton and his intern Arcie Ellis-Stanley produced an updated map of seagrass extent, using the side-scan data to ground-truth imagery from our drone survey undertaken last year and aerial imagery from DEFRA.

2024 surveys showed very promising evidence of seagrass recovery around the base of the eco-moorings due to reduced pressure from anchoring, with a decrease in anchor scar area across all sites (figure 2). Measurements taken this season have shown a further reduction in scar area, where bare seabed is being infilled by new seagrass shoots as a result of decreased disturbance (figure 3). Analysis of a number of seagrass scars by Kira Dunn, University of Southampton shows a decrease 2024-2025 from $2308m^2$ to $1197m^2$.

Figure 1: Side-scan sonar data is used to monitor the extent of the seagrass beds and the size of anchor scars (Image - Ken Collins).

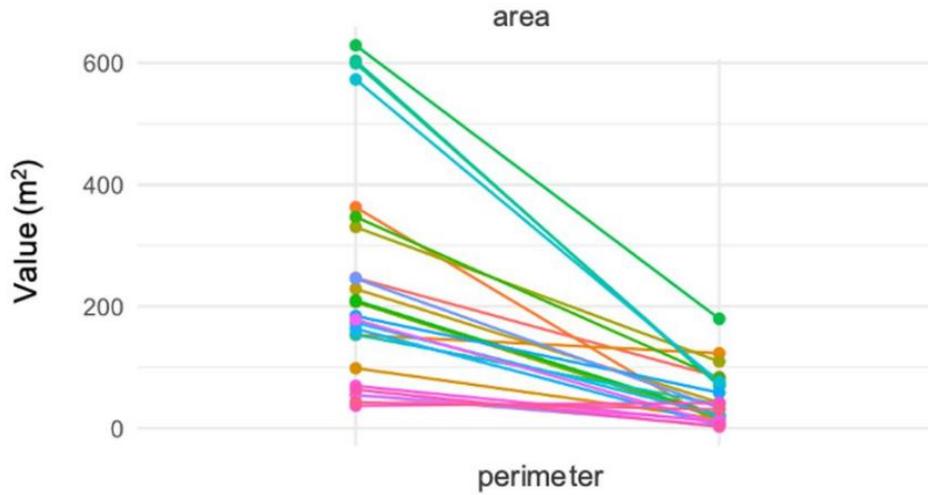## Change in Values from 2021 to 2024

area

Figure 2: Our monitoring from last season showed a significant decrease in the size of anchor scars, where seagrass is infilling these areas of bare sand (Bibra, 2024). This has continued this season (see figure 3 below).
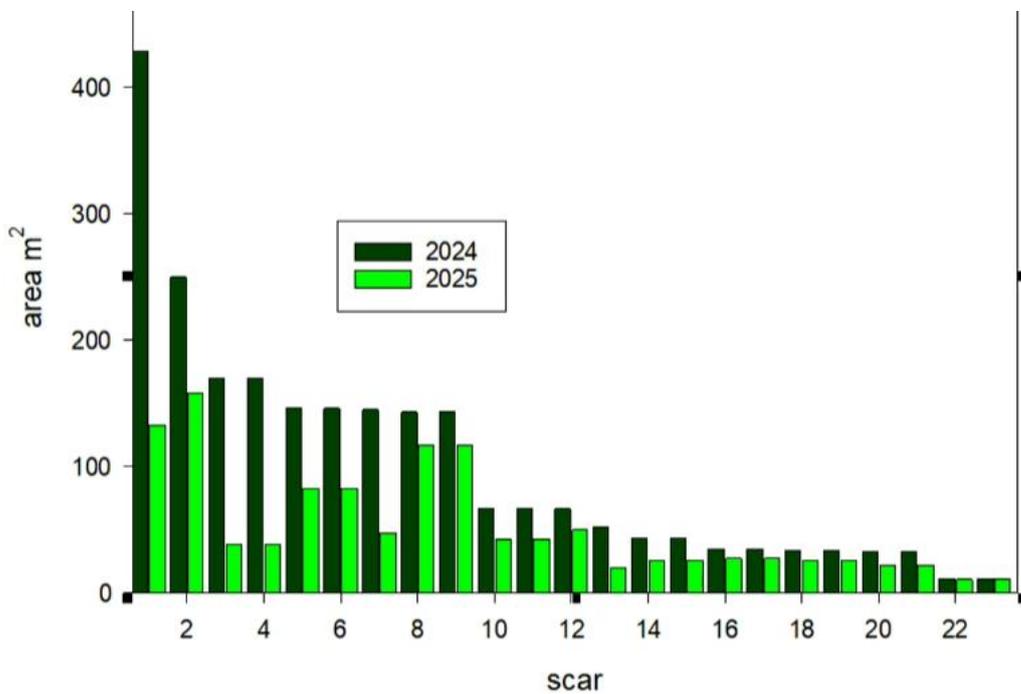

Figure 3: Our monitoring over the 2025 season showed a further decrease in the size of anchor scars across the VNAZ (Image: Kira Dunn)

Seahorse population

Two species of seahorse are found in Studland Bay - the spiny seahorse *Hippocampus guttulatus* and the short-snouted seahorse *Hippocampus hippocampus*. The Seahorse Trust have been monitoring seahorse numbers here since 2008. Since this time volunteers have spent an incredible 3000 hours undertaking seahorse surveys. In 2024 the University of Southampton took over organising

fortnightly surveys from April – October as part of our broader monitoring programme with the continued support of The Seahorse Trust and their volunteers.

To compensate for differences in monitoring hours each season prior to the commencement of the SBMP monitoring programme, the number of seahorse encounters per hour was used to compare each year's surveys. During 2025, 28 volunteer divers spent 41 hours looking for seahorses across a series of transects in the bay, encountering 84 seahorses in total. This was a slightly lower effort to 2024, and yet nearly double the number of seahorses were found. The results show a significant increase in the number of encounters this season compared to all previous years (figure 4). This is an incredibly positive sign for the population in Studland Bay. This is likely partly attributed to reduced anchoring pressure in the seagrass beds. Before the installation of the eco-moorings, the most successful year for seahorse numbers was during the 2020 pandemic when human activity in the area was significantly reduced, suggesting there is some connection. However, there could also be other factors influencing this data, such as natural fluctuations, sea and weather conditions, and our volunteers improving their searching skills each season. This is why it is vitally important surveys such as this continue, so that we can continue to build a picture of what is happening to these populations. Whilst anchoring has decreased overall there are areas, particularly on the periphery of the seagrass beds, where it is still a regular occurrence. We will continue to work with our partners to understand what impact this could be having on the seahorse population who use this area to feed and breed.
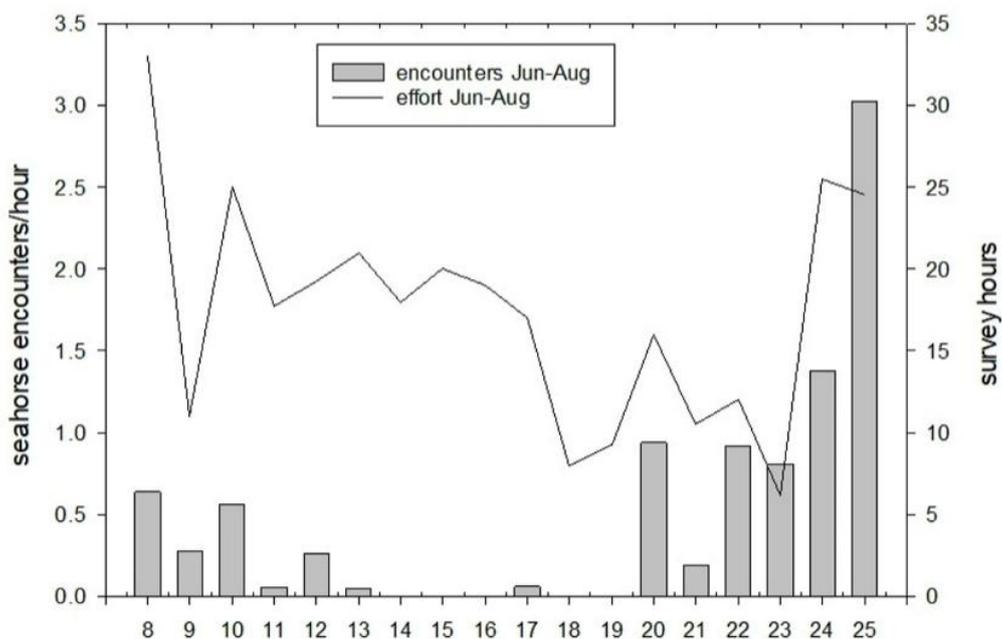

Figure 4: Our monitoring has shown a significant increase in the number of seahorse encounters, with 2025 being the most successful year so far (Image – Ken Collins).

Biodiversity and Invasive Species

Alongside seahorses our divers have been monitoring other species encountered during their surveys. Currently Ken Collins and Jenny Mallinson are collating an overall list of Studland Bay species from surveys, reports and publications. Whilst a few non-native species including potential invasives have been observed, no threat to the seagrass habitat has been noted.

In December 2025 following Storm 'Bram' there was a large 'washout' of marine life on Studland's beaches. Peter Tinsley, Dorset Wildlife Trust and SBMP partner, reported a large number of bivalves at Knoll Beach on 26 December 2025 following a period of easterly winds and spring tides. Many of these were otter shells (*Lutraria lutraria*) but also included *Mactra stultorum, Acanthocardia aculeata, Crepidula fornicata* and *Buccinum undatum*. There were also a lot of razor clam shells and piles of sandmason tubes. At Middle Beach there were piles of dead seagrass leaves more than a foot deep, and along the strandline there was a band of seagrass plants with roots attached. Peter stated "On the positive side it is an illustration of the richness and productivity of the subtidal sand habitat – something that is difficult to see normally as it largely hidden beneath the sand". Piles of seagrass at South Beach were also reported though no dead seahorses. However, there have anecdotally been more frequent episodes of such events in recent years. The Research and Monitoring Group are keen to understand more about what drives these events, and whether there are lasting impacts to marine wildlife as a result.

Similarly, the winter of 2024-25 saw an unusually high number of seahorses washed up along the UK coast, including Studland Bay. The Seahorse Trust advised this was likely due to a series of easterly storms following a very mild December and January. The mild weather and warm seas meant that the seahorses were in shallow waters earlier than normal and were then vulnerable to the sudden influx of storms later in the season. As seahorse numbers were very high this summer compared to previous years, it seems that this has not had a detrimental effect to the population. However we do know that we are experiencing more prolonged periods of easterly winds at Studland, and it is important we understand the impact this will have on marine life.

Water quality

From June to September 2024 and again in 2025 an Exo2 multiparameter sonde was deployed in the bay to provide continuous water quality data every 15 minutes (figure 5). The sonde, provided the team with 3 months of data on numerous metrics including dissolved oxygen, salinity, temperature and turbidity. The monitor suggested that Studland's seagrass produces approximately 10 tonnes of oxygen per summer's day (figure 6), equating to enough oxygen to support the entire population of the nearby coastal town of Swanage. As oxygen production is directly correlated with carbon absorption, this data also helps us better understand the important role seagrass plays in carbon sequestration and climate change mitigation. Dirk Koopmans, National Oceanography Centre Southampton is developing an eddy-covariance instrument (figure 7) that measures water velocity in three dimensions along with dissolved oxygen levels in the water at very high resolution. As part of its development, it was deployed above the Studland seagrass habitat in both September 2024 and October 2025, confirming the high oxygen production by the seagrass on a minute by minute scale.

The water quality monitor did not measure pollution metrics in the bay such as nitrates and phosphates. These are regularly monitored by the Environment Agency, however the sample site for the water body is 7km offshore of the seagrass beds. We are working with Natural England and the Environment Agency to obtain more localised samples of these metrics as part of their ongoing monitoring of the MCZ.

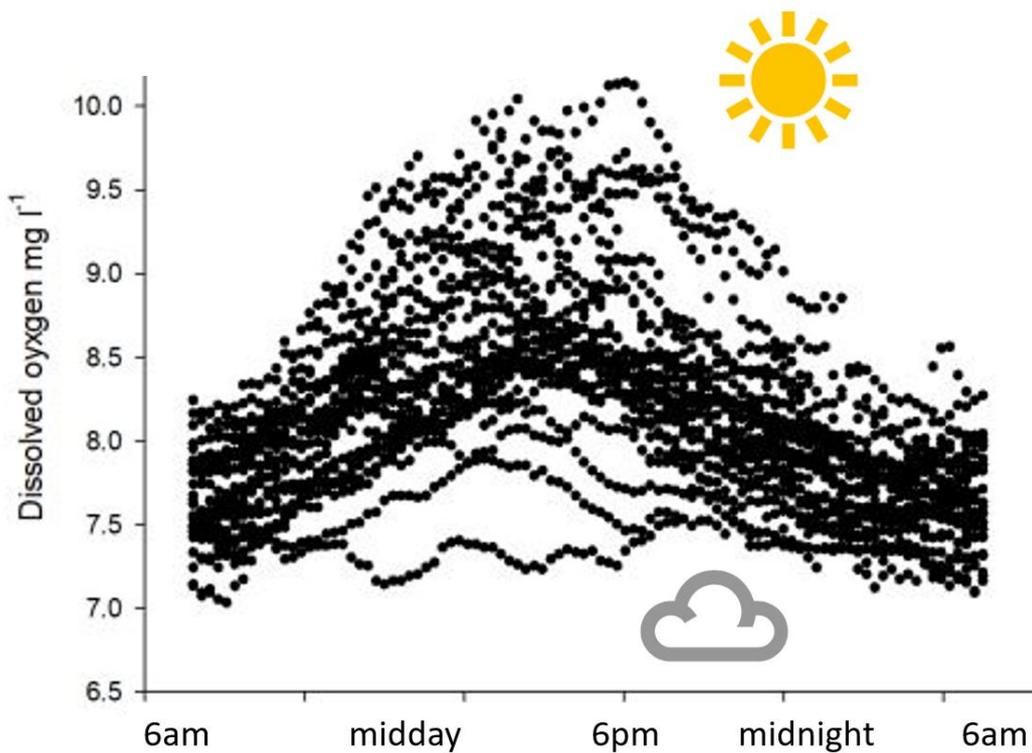*Figure 5: Water quality monitor being deployed in Studland Bay (image: Ken Collins)*

Figure 6: Continuous monitoring of dissolved oxygen levels in Studland Bay, June-July 2024 helped us to understand both the total amount of oxygen produced as well as daily fluctuation patterns (Ken Collins)

Figure 7. Dirk Koopmans' eddy-covariance instrument on deck after recovery from Studland Bay by Jane Maddocks, Lin Baldock and Mike Markey

Noise pollution

From May to September 2024 two continuously recording Soundtrap passive acoustic monitors were deployed in Studland Bay to help us better understand the impacts of boat activity on noise pollution within the seagrass beds. The data is currently being analysed by Lydia Malloy, supervised by Prof. Paul White, Institute of Sound and Vibration Research, University of Southampton.

Russ Connelly, PhD student, University of Essex has conducted preliminary studies on seahorse vocalisations in aquaria and currently analysing his underwater sound recordings this year in Studland Bay for the presence of seahorses. He is also refining EDNA (environmental DNA) methods to detect seahorses in water samples from Studland Bay.
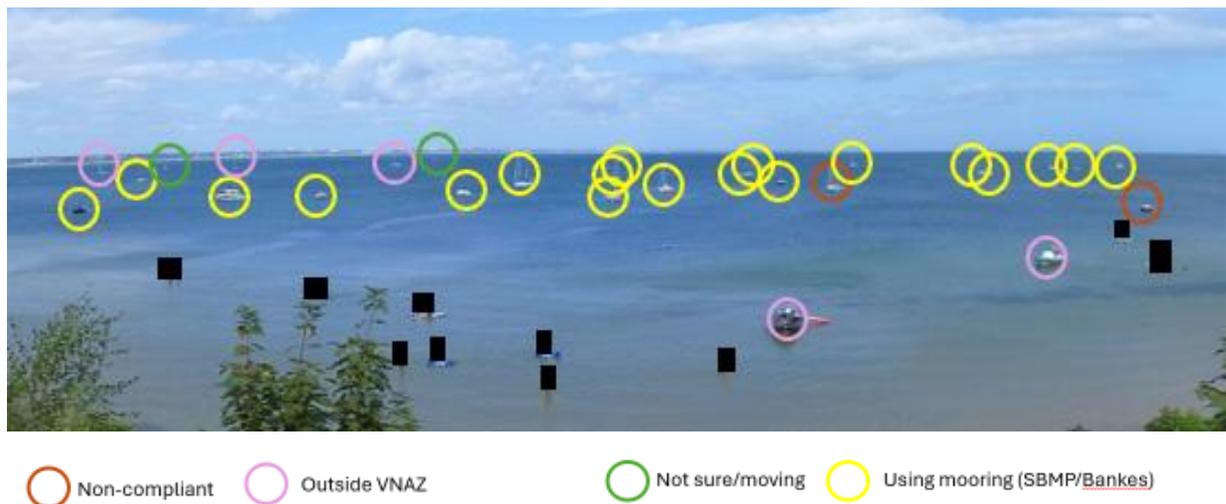
Boat activity

Figure 8: Cropped sample image from the clifftop boat monitoring camera, showing categorisation of boats in the bay as used for compliance analysis (Image – Sarah Coggins)

Boat activity was monitored using a fixed point timelapse camera situated on the cliffs above Studland Bay. This is the second season that we have had the camera installed, but this year we were able to analyse far more data thanks to our new group of digital volunteers. 89 days were sampled over the summer season from 13th June – 18th September (9 days were unable to be sampled due to vegetation obscuring the lens). 55 of those days were classed as fair weather, 27 mixed weather and 7 poor. Boats were categorised on each image as shown in figure 8, as either being compliant with the VNAZ (on a mooring or outside the VNAZ); non-compliant (anchored in the VNAZ); or not able to be identified (moving or unsure whether moored or anchored). In total 45900 images of vessels were counted over the sample period – note that this is not the total number of boats visiting the bay, as many boats stay in the same location over multiple photographs. It should also be noted that we cannot and do not wish to identify individual boats or users on the camera; the purpose is to build an overall picture of compliance in the VNAZ and usage of the moorings.

Our data shows that on average 88.4% of boats were compliant with the VNAZ. As shown in figure 9, 73% of boats have chosen to utilise a mooring, an increase of 9% compared to last season. A further 14% have chosen to anchor outside of the VNAZ. Just 8% of boats were non-compliant (anchoring within the meadows), which is a decrease of 2% compared to last season. Signs of seagrass recovery in existing anchor scars are very likely to be attributable to this ongoing decrease in anchoring, with thousands fewer anchors being dropped since the eco-moorings were installed. Just 5% of boats were unable to be categorised.

As was seen last year there are visible decreases in compliance during the peak afternoon period on busy days. There are also larger drops during heat waves and on weekends (figure 10). Analysis of the images shows that the majority of boats not complying with the VNAZ tend to be smaller vessels anchoring for short periods in the sheltered southern area of the bay.
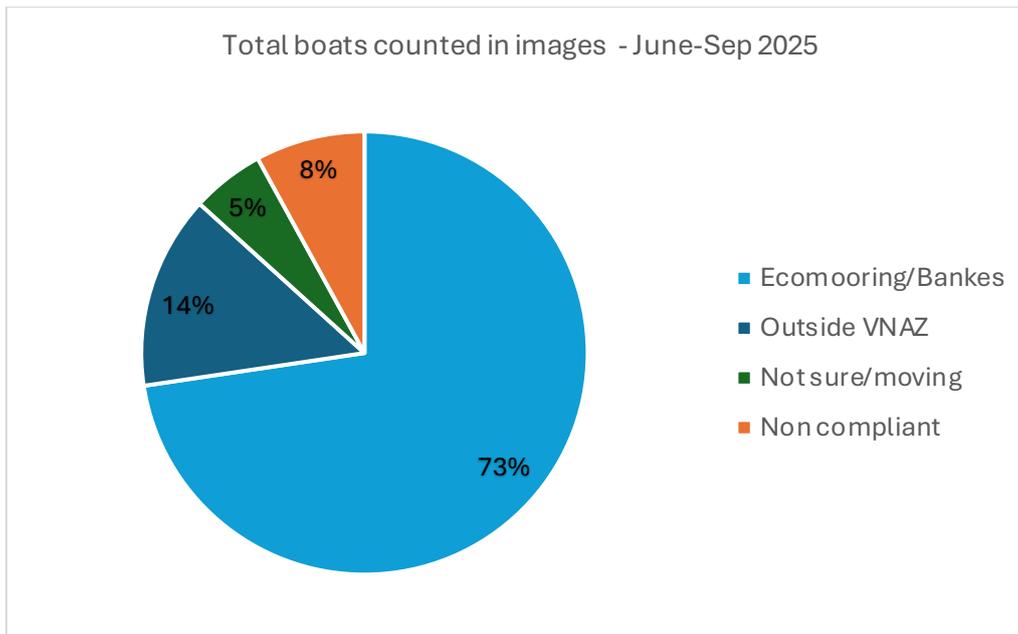
Figure 9: VNAZ compliance sample images taken June-September 2025. Nearly three quarters of boat users are now choosing to utilise an eco-mooring, with just 8% still anchoring within the meadows.
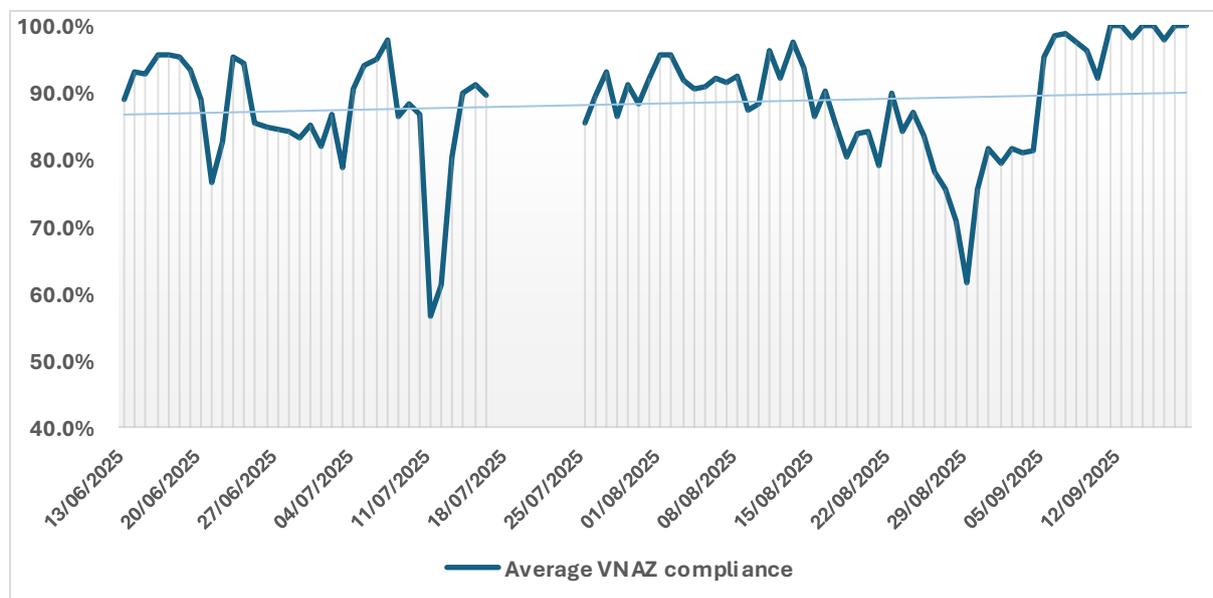

Figure 10: Daily average VNAZ compliance from June-September 2025. Average compliance over the whole season was very high at 88.4%, however there are notable dips during heatwaves and on the August bank holiday weekend. Note there is a gap from $16^{th}-24^{th}$ July due to the camera becoming obscured by vegetation.

Payment compliance was calculated using data collated by the Sippi mooring app, card transactions from Studland Watersports, and boat numbers captured by the fixed-point camera. It is important to note that last year there was just one payment method and one payment amount, making it easier to estimate daily payment compliance. This year there are multiple payment options (daily rate, overnight rate, season pass) and methods (card, app, season pass; some people also chose to use the National Trust donation page when the app would not work for them). It is not possible to identify individual boats on the camera images and therefore we are not able to identify which vessels stayed overnight, which have a season pass, and who used which payment method. Daily payment compliance this year was therefore estimated using the following method:

➢ Estimated number of transactions = (app revenue/ 11.25*) + credit card revenue
➢ Estimated payment compliance = (estimated number of transactions/ maximum number of boats moored**)

Considerations:

- **£11.25 is midway between the daily and overnight rate*
- *No allowances were made for season passes as only a few were sold, therefore this will not have a significant impact on the data.*
- *No allowances were made for donations to the NT donation page as it is not possible to say with certainty that these were moorings payments.*
- ***Payment compliance is calculated as a range to allow for the fact that we cannot differentiate on the images between SBMP moorings and the 11 privately owned moorings in the bay. One estimate is made without the 11 moorings and one with them included in the calculation.*

Despite these limitations our estimations suggest that the on the water engagement is working. Last year payment compliance was very low, with an average of just 26.4% recorded over the sample period. Our data this year indicates that average compliance has improved to 34.5% (and could be up to 52.3% when incorporating the private moorings). Last year a minimum of 50% compliance was achieved on just 15% of sample days; this year the figure has risen to 25% and is likely higher when accounting for other payment methods. The total estimated loss of income from non-compliance was £11,400 over the sample period. This equates to a loss of £128.54 a day, compared to £191.50 a day last season. Whilst payment compliance has improved significantly, it is not yet at a high enough level to ensure the moorings operation can be funded through fees alone.

Acknowledgements

References and further information

Bibra, A. (2024) Evaluating survey methods to monitor seagrass coverage and change in Studland Bay. MSci Dissertation, Ocean and Earth Science, University of Southampton, 54pp.

Tomsett, C. (2024) *Orthoimagery of Studland Seagrass Survey Report*, Environmental Sensing at Southampton, University of Southampton.

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Studland Bay Marine Partnership - Case study - GOV.UK

New Mapping Tools Helping To Protect Seagrass In Dorset | University of Southampton

Studland Ocean Meadows - the Science beneath the surface

Studland's Ocean Meadows - the science beneath the surface with the MMO

The Science Beneath the Surface - the secret life of seahorses