Movement of a pair of Spiny Seahorses (*Hippocampus guttulatus*) seen during the summer of 2010 at Studland Bay in Dorset.

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The territories and movement of British Seahorses are little understood and all work so far has been conducted by The Seahorse Trust through the British Seahorse Survey's sub project the Studland Seahorse Tagging Project and its partners at Southampton University. The Studland Seahorse Tagging Project has followed a number of pairs of seahorses during the life of its survey and a number of pairs have shown some interesting movements and dedication to a set territory. The pair in this study has displayed interesting movements and pair bonding which has led to a greater understanding of Spiny Seahorses. This will be vital in the implementation of their protection in the wild as we will be able to advise on seasonal changes in the pattern of their movements.

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Introduction

The British Isles are home to two species of seahorse, the Spiny (*Hippocampus guttulatus)* and the Short Snouted (*Hippocampus hippocampus*) which range from the northern most Shetland Isles down (predominantly) the western coastline; including around the Irish coastline down to and along the south coast, across to the eastern seaboard and up into southern Norfolk. They have also been found down the east coast of Scotland, and out into the North Sea, onto the Dogger Bank. It is possible their range continues all the way down the east coast but a lack of confirmed data (although there is a lot of anecdotal evidence) stops us completing this picture, further study is needed.

The Studland Tagging Project is a sub project of the British Seahorse Survey that was set up in 1994 by Seahorse Trust founder Neil Garrick-Maidment and is now run by The Seahorse Trust; the work of the survey and the data held on the National Seahorse Database (also run by The Seahorse Trust) led to both British Seahorses being protected under the Wildlife and Countryside Act 1981 (schedule 5, section 9) on the 6th of April 2008.

During the summers of 2009, 2010 and 2011 The Seahorse Trust as part of its Studland Seahorse Tagging Project tagged a number of individual seahorses in the seagrass meadow at South Beach, Studland Bay in Dorset. This tagging of individuals allows for better

understanding about the ecology of the animals and their interaction with others, other species and their placement within the environment, and the habitats they occupy.

Fig 1
Spiny Seahorse (Hippocampus guttulatus) showing necklace tag (no.172) moved to the side for the purposes of identification; when not being read the tag lies under the neck out of the way and becomes difficult to see, so it does not interfere with the cryptic nature of the seahorse.

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Although there is a greater understanding of the ecology of the seahorses on the site due to the longevity of the project, which in turn will relate to the two species of seahorse throughout the British Isles. Further study for a number of years will be required to allow for the gathering of more data about the individual and group interactions, and behaviour throughout the year, taking into account seasonal migration of both British species in and out of deeper water.

Seahorses are known to migrate at different times of the year either into deeper or shallower water depending on the season, and it is thought that temperature fluctuation and photoperiod and food availability play a key role in this. The exception to this are the seahorses that are found in protected areas such as manmade and natural harbours where there does not appear to be a seasonal migration; although it is not known whether defended territories are held permanently throughout the year.

This paper focuses on one pair that were repeatedly seen and logged as they moved throughout their territory over a 6 week period. The male and female Spiny Seahorses (*hippocampus guttulatus*) numbered 064 and 053 respectively were first spotted on the 31st of July 2010 and like all the seahorses at Studland Bay during 2010 were late arriving. This was due to the severity and coldness of the 2009/2010 winter. Both were spotted on the

same day and dive session within a short period of time of each other by the same survey team working on the Studland Bay Tagging Project. This does not mean this was the date they returned from deeper water as they might have been there but not seen. However this site had been fully covered with survey teams a number of times. It is also known that seahorses move slowly over the seagrass meadow (known as transient animals) until they find a suitable site to set up a territory in. They are also known to move territories during the season should a disturbance happen making them feel unsafe in their territory.

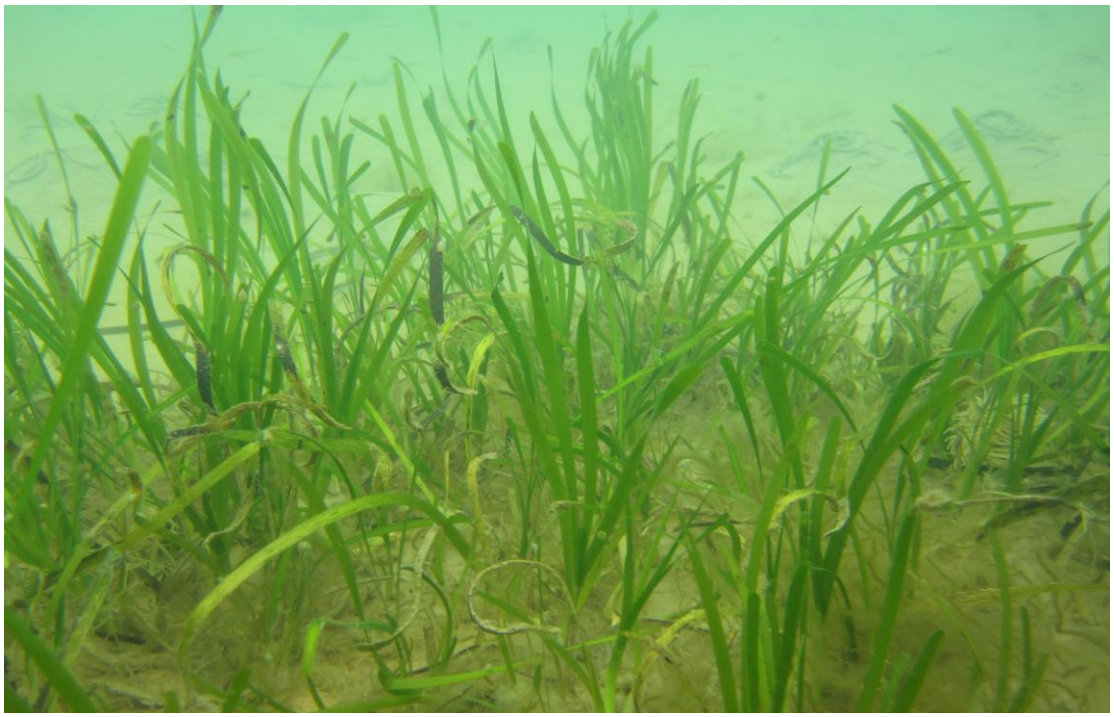

Fig. 2. Typical seagrass bed at Studland where the Spiny seahorses are found.

Another pair that was recorded during 2010 that had an established territory moved approximately 100 metres away because the site they originally had chosen became swamped with blanket weed following a large sewage leak into the bay. The nutrients from the leak increased the scale of the existing blanket weed making large areas of the bay unusable for the seahorses and many other species. This pair had been recorded a number of times together, when they were refound after an absence of 2 weeks, they were only 1 metre apart. This shows that at least in the period they have formed a pair bond they will stick together even through disturbance.

Fig. 3.
Male seahorse surrounded by blanket weed.

We do know that the paired and tagged seahorses do not move back to exactly the same territories in subsequent years; although this project has only been running for a comparatively short time we do observe the same sites occupied. In each of the years we have not observed tagged animals returning to the same spot.

The study pair

The pair that is the subject of this paper lived in and around a mooring scar known as the 'gully', which has been used by other pairs before in previous years. It is assumed that the preference for this site is due to many reasons including thick seagrass to hide in and fragmented areas of seagrass to search for food and conduct courtship displays.

The male was initially found on the 31st of July and a further search on the same dive in the surrounding area found his mate only a couple of metres away. Neither was easy to find as they were well into the thick seagrass that surrounded the mooring chain scour. Although their territory was around the scar, and both were spotted once or twice venturing into the open sand area, it is not assumed that the scar was anything more than just coincidence in the location of the territory [this is based on other data gathered on the seahorses at Studland]. The camouflage afforded by the thick seagrass in this area offers superb protection for the seahorses and their colours matched the location extremely well, whereas if they were adapted to live in open sandy areas they would have different colouration and body appendages. In the Short Snouted Seahorse (*Hippocampus hippocampus*), which can on occasions be found on open sand or silt, there is usually a piece of algae or rock or some other holdfast nearby for them to anchor to. This gives security and a point of reference for the pair.

When either of the pair were found on the edge of the mooring chain scar they were usually tucked under the overhanging seagrass and it was only by moving the seagrass to one side that their initial locations were found.
There were a couple of occasions when the female and the male were found in an open patch; both looked highly stressed and the female in particular used the mooring chain to hide from prying eyes (see Fig 4.)

Fig 4
Female 053 hiding behind the mooring chain, her dark, almost black colouration indicates stress and her curled up body posture supports this.

They did not show themselves to the diver and it was quickly decided to leave them undisturbed to lessen the stress of divers being near them.
These and other observations of the other seahorses at Studland have confirmed the need for dense seagrass to allow the seahorses to lead a stress free existence.

Territorial area

The size of the area the pair occupied was approximately a maximum of 200 square metres, 7m x 29m, in a maximum average depth of 3 metres. As seen in the image below they utilised the site extensively but never ventured further afield than the dots shown on the image, in particular the south side of the anchor scar, which was their main area of territory.

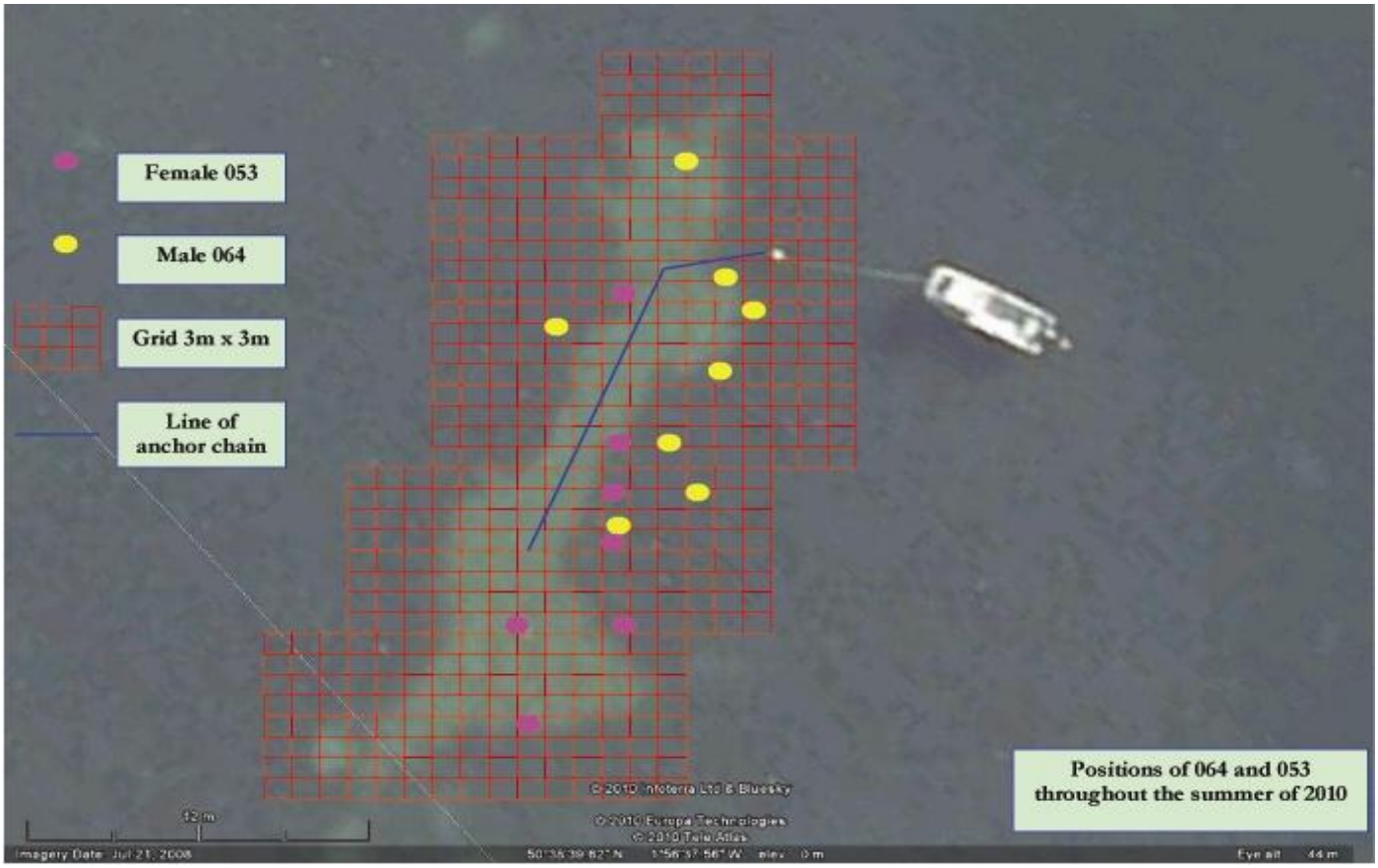

Fig 5
Movement of the pair of Seahorses 064 and 053 during the summer of 2010, the dots represent sightings but do not show all the positions they were seen throughout the summer as many of the sightings were too close to others to be distinguishable on this scale of map.

Each of the marked squares is 1 metre squared and the centre part of the image shows the immense scour (known as the 'Gully') caused by the mooring chain (in blue). This mooring chain laid in a west to east trajectory, with its fixed point on the west end of the chain. The average depth of water was 3 metres maximum, the chain was in fact 16 to 17 metres long which is the reason why this scour is so large and has caused so much damage

Observations by the dive team saw that the chain was frequently on the move and was dragged in and out by the tidal movement, which is why the scour was formed into the long, narrow grove.
Where it was below the buoy it 'bounced' up and down off the seabed, not only stirring up the sand, but also clearing the site of any living thing. It also produced a lot of underwater sound from the jangling of the chain which would have had a negative effect on the seahorses and other species in the area.
Quite what effect this might have on the species at Studland is not fully known but work elsewhere in recent years has shown that loud noise underwater is responsible for creating deafness in cetacea leading to strandings, and stress in seahorses, which can lead to death.

Observations

Although this pair was only observed for a month, the male did give birth and get pregnant twice, and the dive team visited them at least twice a week (usually two, 2 hour dives on each dive day) and spent many hours each week observing them and their behaviour. They were seen on every dive once they had been found with the exception of one dive where the female could not be located in the seagrass but she did return on subsequent dives.

Chart 1.
Dates for appearance and disappearance of the pair of tagged seahorses 064 and 053.

First seen	Sex/tag number	Last seen
31st July 2010	Male 064	25th August 2010
31st July 2010	Female 053	16th August 2010

The pair was usually quickly located when their territory was located by doing linear dives across the site with the divers in a row and/or one team behind the other to give a more thorough, intense search.

Although during 2010 no other seahorse were found in this pairs territory we know that other territories often have juvenile, unpaired individuals within it, often only metres from the resident pair. There has never been an observation of another adult within the territories which suggest that the territory is held for breeding purposes only. Mature, potentially breeding individuals would present a threat to the resident pair so they will not be tolerate, however immature, non-paired individuals do not pose a threat and so are tolerated. They have been seen feeding within the territory, which shows that the territory is solely for securing area for the breeding pair and not held for securing food for the resident pair.

A curious observation by volunteer diver John Newman is the presence of large Bass in any area where seahorses are found. The supposition from this is that if an area has sufficient food for seahorses it can also accommodate other species such as Bass and other species. More work is needed on this theory.

Conclusion / Issues on the site

Studland Bay is a multi-use site and one of interest to man and animal alike, for a variety of different, varying reasons. There is the potential for all to exist harmoniously, however the needs of all, will need to be considered and acted upon to make this a non-confrontational experience.

By the shear fact of up 350 boats anchoring and mooring on this site it will and does cause a detrimental effect on the fragile seagrass as can be observed in the study site for the pair of seahorses in this article where they exist around a large anchor scar.
The anchors on the site cause different sort of problems to the mooring chains in that they rip up small areas of the seagrass which then leave holes that can and do become larger forming unsustainable holes which in the long term can join up. This expanding and continuous degradation of the seagrass will have long term effects on the size and viability of the site and ultimately will reduce the diversity of species within the seagrass meadow as a whole.
The mooring chains scour large areas creating underwater deserts where nothing is able to establish and live or grow as it keeps the sand fluid, prohibiting the settling of algae species such as seagrass.
In the long term environmentally friendly moorings will solve this problem but meanwhile the seahorses and seagrass is under threat of loss or reduced viability.
The constant moving of the anchor chain also causes problems on the site in the form of noise pollution which as has been proven by Paul Anderson in his paper on sound and stress in seahorses, and can and does have a detrimental effect on seahorses in captivity. There is no reason to suggest this is not the same in the wild.
A secondary problem with moving chains is also the possibility of crushing the seahorses; although this is not considered a major priority there is good reason to be concerned about this based on observations of the movement of chains and near proximity of seahorses to them.

The territorial area of this study pair was edged along a mooring scour but there is no reason to suggest this is why the pair established their territory on this spot. Dense and less dense seagrass and the availability of food types in the area were the reasons for establishing a territory.

It has been observed with this pair and many other pairs that to be caught in the open causes them stress which is observed by colour change and body posture, so it can reasonably be assumed that open sandy areas are only areas where the seahorses transit over and would not choose to reside.

The overall territory of the study pair was primarily in the seagrass and the ongoing erosion caused by the mooring chain will in all probability mean that this site will become non-viable for seahorses.

Figures

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