# MPA Climate Profile

# Studland Bay MCZ

**Studland Bay Marine Conservation Zone (MCZ) is an inshore site which is located on the south coast of Dorset. This site encompasses Studland Bay which stretches from the edge of Shell Bay in the north to Old Harry Rocks in the south and covers an area of approximately 4 km². Studland Bay is a sheltered site which provides protection from prevailing south-westerly winds and waves. This site is protected for four features: intertidal coarse sediment, long-snouted seahorse (*Hippocampus guttulatus*), seagrass beds and subtidal sand.**

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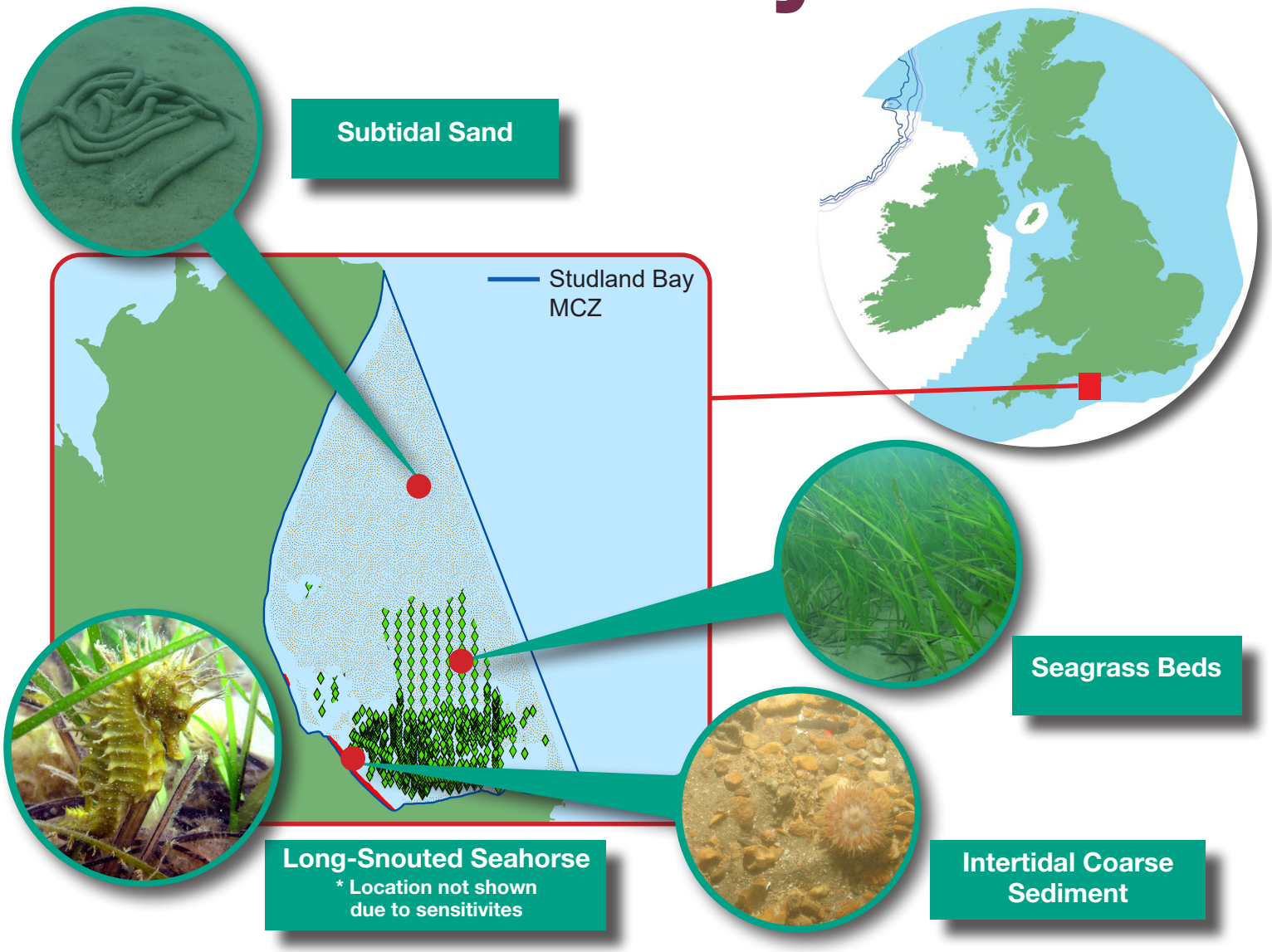


## Studland Bay MCZ protected features and climate-change climate-change related ecosystem services

| Feature | Provision of climate-change related ecosystem services |
|---|---|
| **Intertidal coarse sediment, and Subtidal sand** | **Coastal defence:** The structure of these habitats may dissipate wave energy and reduce wave height[1] and, in so doing, improves protection from the increased frequency of events associated with climate change, such as storm surges and coastal flooding[2].<br>**Carbon sequestration (carbon capture and storage):** Some of the biological communities that live within these habitats may also play a role in locking up atmospheric carbon. However, the evidence behind this is currently not well developed and further research is needed. |
| **Seagrass beds** | **Coastal defence:** Through trapping and stabilising sediments, raising the seafloor and reducing both wave energy and speed[3], seagrass beds improve coastal protection and help in mitigating impacts associated with climate change, such as an increased frequency of storm surges and coastal flooding as predicted with climate change[4].<br>**Carbon sequestration:** Seagrass beds are known to store large amounts of carbon in sediments as decomposed organic carbon and are regarded as one of the planet's most effective ecosystems for carbon sequestration[5,6].The global average sequestration rate for seagrass beds is predicted to be 83 g of carbon per year for every $m^2$[7], but has been reported at quantities over 800 g and is dependent on location and the species which characterise the habitat[8]. |

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## Potential response of Studland Bay's MPA protected features to climate change

The biotopes (a habitat and its commonly associated community of species) present within the MPA were assessed and scored for sensitivity to pressures associated with climate change, at different emission scenario benchmark levels[9]. The pressures assessed were:

**(i)** ocean warming (covering sea surface, near bottom and surface (air) temperatures);
**(ii)** marine heatwaves;
**(iii)** ocean acidification; and,
**(iv)** sea level rise.

There are other pressures related to climate change which may impact the protected features of the Studland Bay MPA, for example projected increases in storm surges. However, there was insufficient evidence to assess against at the current time. As such, the evidence here should not be considered the complete picture. Further detail is provided in the project report[10].

The sensitivity information for MPA protected features is summarised in the table below, including confidence scores for the assessments. Biotope sensitivity scores at the high emission scenario benchmark level were aggregated for MPA features, and the most precautionary (highest) score of the component biotopes was applied as the overall MPA feature sensitivity score. Full sensitivity assessments for each biotope for all emission scenarios, with associated references, are available at https://www.marlin.ac.uk.

| ***Climate change pressure (high emission scenario)*** | ***MPA protected feature*** | | | |
|---|---|---|---|---|
| | **Intertidal coarse sediment** | **Subtidal sand** | **Seagrass beds** | **Long-snouted seahorse** |
| **Ocean warming** (4°C increase in ocean temp. by end century) | Not sensitive | Medium | Medium | Not assessed |
| | Q (**L**) A (**L**) D (**L**) | Q (**L**) A (**L**) D (**L**) | Q (**M**) A (**M**) D (**H**) | |
| **Marine heatwaves** (Occurring every 2 years, mean duration 120 days) | Not sensitive | Low | High | Not assessed |
| | Q (**L**) A (**L**) D (**L**) | Q (**M**) A (**M**) D (**L**) | Q (**M**) A (**M**) D (**H**) | |
| **Ocean acidification** (0.35 decrease in annual mean pH) | Not sensitive | Medium | Not sensitive | Not assessed |
| | Q (**L**) A (**L**) D (**L**) | Q (**L**) A (**L**) D (**L**) | Q (**H**) A (**H**) D (**H**) | |
| **Sea level rise** (70 cm rise in sea level by end century) | High | Not sensitive | Medium | Not assessed |
| | Q (**L**) A (**L**) D (**L**) | Q (**L**) A (**L**) D (**L**) | Q (**L**) A (**L**) D (**L**) | |

| **Confidence assessment categories** | | **Confidence scoring** | |
|---|---|---|---|
| Q | Quality of evidence (information sources) | H | High |
| A | Applicability of evidence | M | Medium |
| D | Degree of Concordance (agreement between studies) | L | Low |

# Studland Bay MCZ

## Discussion

- Under the high emissions scenario benchmark:
  - Intertidal coarse sediment has high sensitivity to sea level rise due to the likelihood that this habitat will become eroded or lost through submersion.
  - Subtidal sand habitats have medium sensitivity to ocean warming and acidification, as increasing temperatures may exceed current biogeographic limits of some component species, and species composed of chitin may be negatively affected by decreases in pH.
  - Seagrass beds have high sensitivity to marine heatwaves, as prolonged summer high temperatures are likely to increase die-offs.
- Seagrass beds provide coastal protection and carbon sequestration services that can help provide climate change mitigation and adaptation benefits.
- Regulation of potentially damaging activities on the marine environment at a site level can support resilience of ecosystems to the impacts associated with climate change.
- Seagrass beds are further subject to pressures from activities such as fishing, aquaculture, pollutants and boating. They therefore need to be effectively managed to prevent further degradation and ecological regime shifts which can result in reduced recruitment, fragmented habitats or loss of habitat altogether.
- Examples of reactive management approaches for seagrass habitats include those relating to protection, maintenance, recovery or restoration through for example, limiting, modifying or relocating damaging activities[11].

## Further information

To find out more about this project, please see: **https://jncc.gov.uk/our-work/climate-smart-mpas/**

Sensitivity assessments were conducted for the following biotopes which make up the Studland Bay MPA protected features:

1. **Intertidal coarse sediment, and subtidal sand:** Barren littoral shingle

2. **Subtidal sand:** *Arenicola marina* in infralittoral fine sand or muddy sand, Infralittoral mobile clean sand with sparse fauna, *Nephtys cirrosa* and *Bathyporeia* spp. in infralittoral sand and *Sertularia cupressina* and *Hydrallmania falcata* on tide-swept sublittoral sand with cobbles or pebbles.

3. **Seagrass beds:** *Zostera (Zostera)* marina beds on lower shore or infralittoral clean or muddy sand.

The full list of references underpinning these sensitivity assessments are available at: **https://www.marlin.ac.uk/habitats/az**

### References


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