Stirling Mooring Trials
Salcombe (1st iteration) – Anna Luff
Cawsands (2nd iteration) – Mark Parry
Cawsands (3rd iteration) – Josh Baker
Salcombe Project Aims

• To assess the performance of the Stirling mooring in the Salcombe ria; and

• To compare the results with a swing mooring on the same seagrass bed.
Salcombe

Location
Salcombe Design

Surface buoy

Riser Chain with additional floatation
Tasks at Each sample site:
Shoot count in Quadrat
Photograph Quadrat
Measure Leaf Length – 10 leaves per quadrat
Sediment Cover over roots – stick measure into sediment (ruler, feeling root resistance).
Note conspicuous marine life present
Sample Sites – (i)0.5m, (ii)5m, (iii)9m (outside length of mooring chain)
Transect Bearings - NE, SE, SW, NW
Z. marina density
Salcombe
Traditional

Stirling
Z. marina Blade Length (cm)
Salcombe
Sediment Grain Size

- Swing mooring - fine to medium sand and fine to coarse gravel
- Stirling mooring - dominated in fine to medium sand
Salcombe
Epifaunal density and richness

Jack Sewell/MBA, (published on the MarLIN website)

Dr Keith Hiscock/MBA (published on the MarLIN website)

Judith Oakley (published on the MarLIN website)
Salcombe

To conclude

- The scale of the differences observed demonstrates the susceptibility of seagrass beds to damage from swing moorings; and

- A cost-effective modification to a swing mooring can mitigate some of the impacts on seagrass beds.
Cawsand

Location
Cawsand

Design

Surface buoy

Riser Chain with additional floatation

ocean conservation trust
Cawsand
Shoot count and canopy height
Cawsand
Canopy height
Cawsand
Shoot count
Cawsand 2
Location

Iteration 3
Ocean Conservation Trust
Marine Conservation Society
Princess Yachts
TECF
Cawsand 2
Design

Surface buoy
Riser Chain with additional floatation

ocean conservation trust
1. Conduct SCUBA surveys of seagrass around Stirling Advanced Moorings, standard swing mooring and areas of seagrass unaffected by mooring chains in late spring and summer 2019. Data relating to seagrass density and shoot length as well as sediment samples will be collected at each location.

2. Identify any differences in seagrass cover driven by variation in mooring type, distance or direction from the anchor over the sampling period using multivariate statistical techniques.
1. At the end of the sampling period, the change in seagrass characteristics at *Advanced mooring sites* will be statistically and biologically significantly *greater* than the change in seagrasses at the *Standard swing mooring sites*.

2. At the end of the sampling period, the change in seagrass characteristics at the *Advanced mooring sites* will be statistically and biologically significantly *similar* to the change in seagrasses at the *Reference sites*.

3. At the end of the sampling period, the change in seagrass characteristics at the *Reference sites* will be statistically and biologically significantly *greater* than the change in seagrass at the *Standard swing mooring sites*.
## Cawsand Data Collection

<table>
<thead>
<tr>
<th>Station Type [e.g. Standard Mooring, Eco Mooring, Control]:</th>
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<td>Date and Time of Survey:</td>
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| DISTANCE | Quadrat Depth (m) | % Total Seagrass Cover | % Total Algal Cover | No. Shoots | Leaf 1 Length (cm) | Leaf 2 Length (cm) | Leaf 3 Length (cm) | Leaf 4 Length (cm) | Leaf 5 Length (cm) | Leaf 6 Length (cm) | Leaf 7 Length (cm) | Leaf 8 Length (cm) | Leaf 9 Length (cm) | Leaf 10 Length (cm) |
|----------|-------------------|------------------------|---------------------|------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|
| SW       | 0.5 m             |                        |                     |            |                   |                   |                   |                   |                   |                   |                   |                   |                   |
|          | 5 m               |                        |                     |            |                   |                   |                   |                   |                   |                   |                   |                   |                   |
|          | 9 m               |                        |                     |            |                   |                   |                   |                   |                   |                   |                   |                   |                   |
| NE       | 0.5 m             |                        |                     |            |                   |                   |                   |                   |                   |                   |                   |                   |                   |
|          | 5 m               |                        |                     |            |                   |                   |                   |                   |                   |                   |                   |                   |                   |
|          | 9 m               |                        |                     |            |                   |                   |                   |                   |                   |                   |                   |                   |                   |
| NW       | 0.5 m             |                        |                     |            |                   |                   |                   |                   |                   |                   |                   |                   |                   |
|          | 5 m               |                        |                     |            |                   |                   |                   |                   |                   |                   |                   |                   |                   |
|          | 9 m               |                        |                     |            |                   |                   |                   |                   |                   |                   |                   |                   |                   |
| SE       | 0.5 m             |                        |                     |            |                   |                   |                   |                   |                   |                   |                   |                   |                   |
|          | 5 m               |                        |                     |            |                   |                   |                   |                   |                   |                   |                   |                   |                   |
|          | 9 m               |                        |                     |            |                   |                   |                   |                   |                   |                   |                   |                   |                   |

Seagrass shoot Pres/Abs Distance: (m) | SW: | NE: | NW: | SE:
Cawsand 2
Initial survey data results
Cawsand 2
Change from baselines over Survey periods
• Change in % cover, number of *Z. marina* shoots and average leaf lengths were all greater at Advanced sites than at Standard sites – *Hypothesis 1*.

• Advanced sites and Reference sites were similar – *Hypothesis 2*.

• *Z. marina* meadows can expand rapidly under ideal conditions (shoots at >3 cm/day, rhizome mat at 26 cm/apex/yr) – may have allowed for rapid recovery seen.

• Mean phi remained stable for all three site types, except 0.5 m from the Standard sites where grain size increased.

• A greater proportion of fine grains allows for increased organic storage capacity (Dahl et al., 2016).
This study was conducted by Anna Luff (MSc) in collaboration with the Community Seagrass Initiative and The University of Plymouth

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