Anchoring & Mooring in MPAs: impacts, risk & management

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Marine Biological Association

Anchoring & Mooring in MPAs

Background

Anchoring and mooring activities are widespread through inshore waters. They arise from both recreational use and commercial operations.

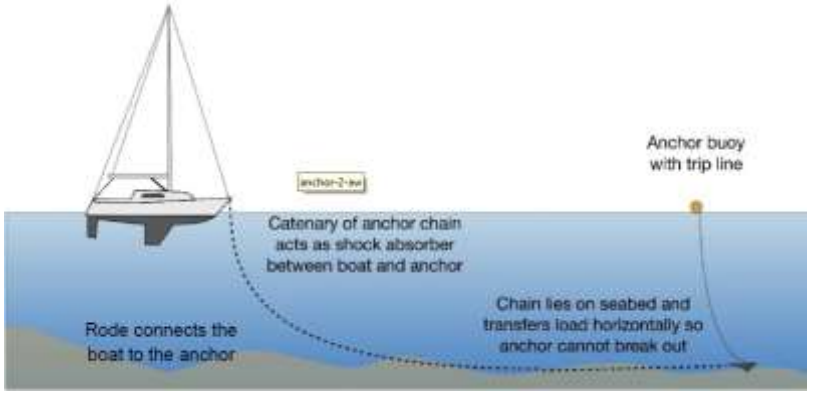
Yachts on moorings in the Cattewater, Plymouth

Small recreational vessels anchoring at Cawsand, Plymouth

Anchoring & Mooring in MPAs

Anchoring

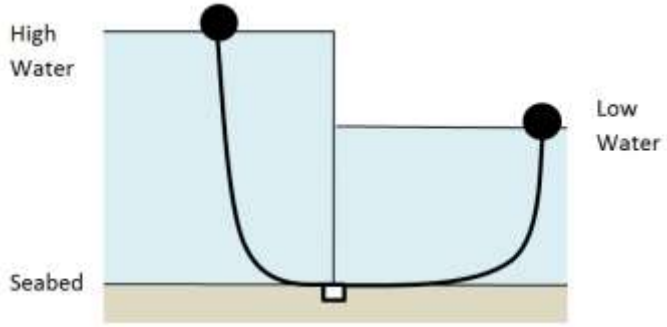
- tackle kept onboard vessel
- secure vessel temporarily to seabed



Adapted from Jollands 2015

Moorings

- gears deployed on seabed with a riser that a vessel attaches to
- permanent or semi-permanent (seasonal)



Image, J. Readman

Anchoring & Mooring in MPAs

Pressures

Recreational and commercial anchoring and mooring has the potential to damage MPA features through

- **abrasion** of the surface of the seabed
- **penetration** of the seabed (anchoring only)
- **habitat change** to another habitat type (mooring only)

Anchoring & Mooring in MPAs

Management

- legislation is completely different for anchoring and mooring
- arisen over centuries of maritime activity
- involvement of many organisations / legislative instruments
- statutory & voluntary measures

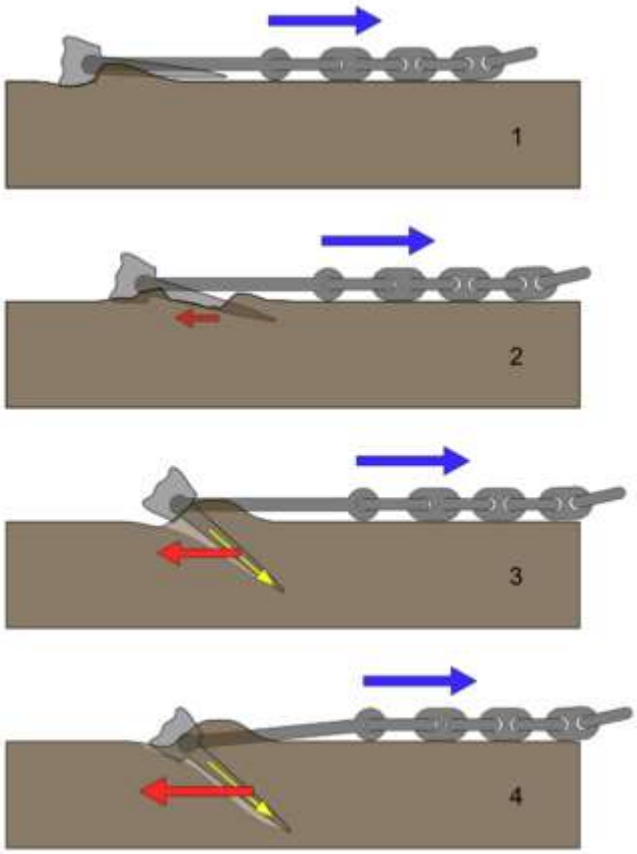
Anchoring & Mooring in MPAs

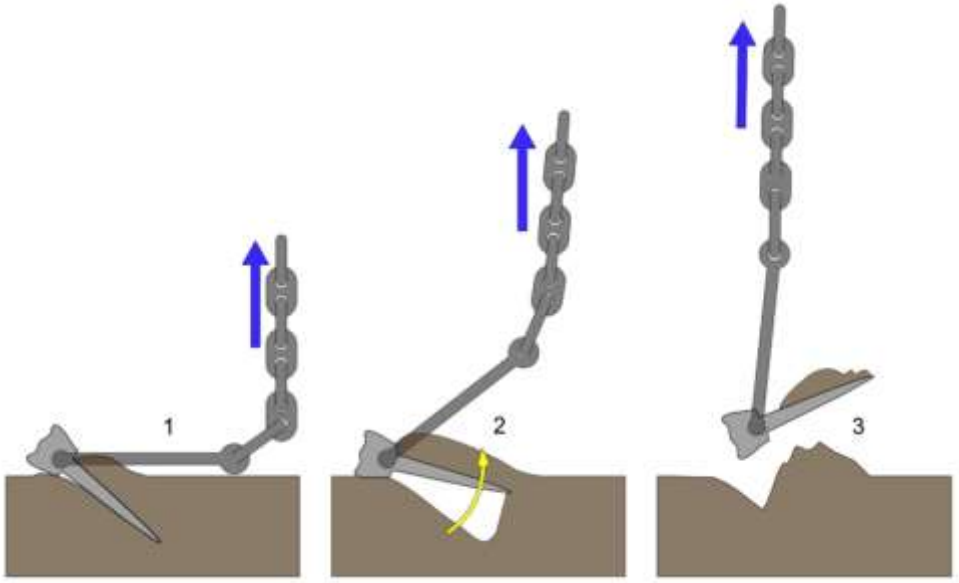
Objectives

1. Assess UK protected features for **sensitivity** to anchoring and mooring and identify MPAs with **sensitive features**
2. Quantify **exposure** to anchoring and mooring
3. Develop a **risk assessment** method to identify risk at protected sites
4. Review management of anchoring and mooring at selected MPAs
5. Summarise organisational responsibilities for control of anchoring and mooring

Anchoring & Mooring in MPAs

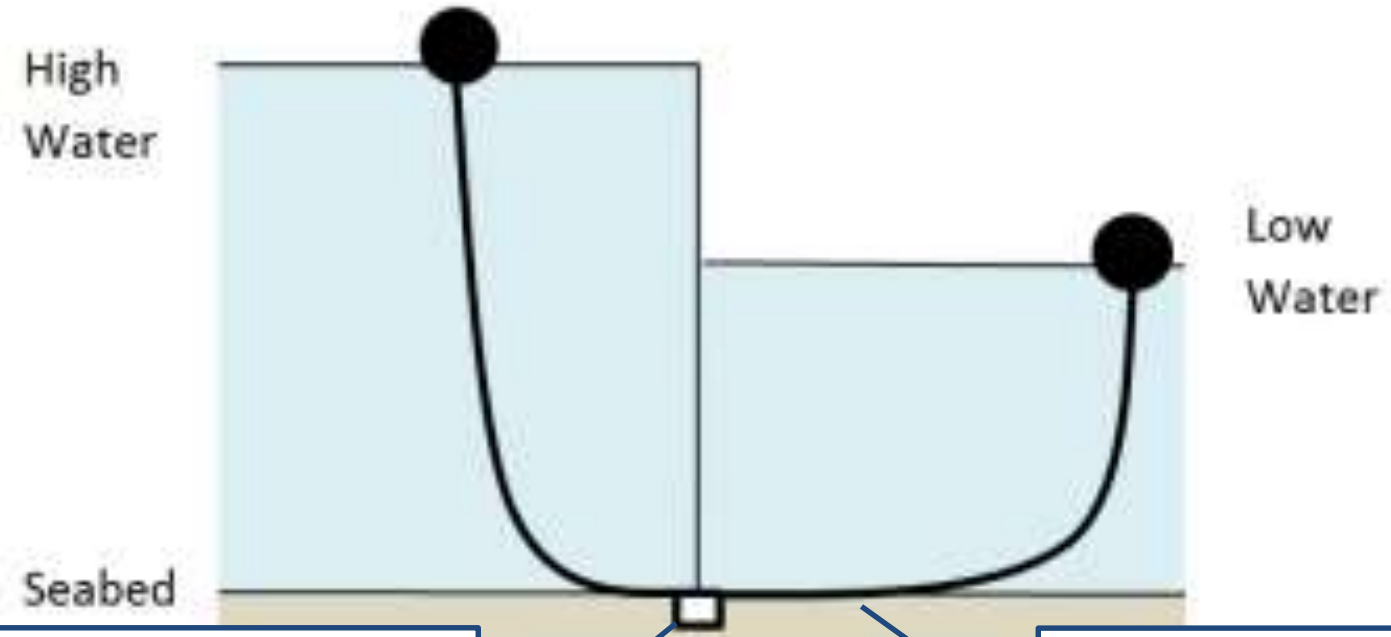
Objective 1: Sensitivity assessment





Anchoring & Mooring in MPAs

Objective 1: Sensitivity assessment



Physical change of habitat – mooring block overlies and smothers, introducing new habitat type – hard substratum to seabed

Abrasion from mooring chains as they shift with changing wind and tide

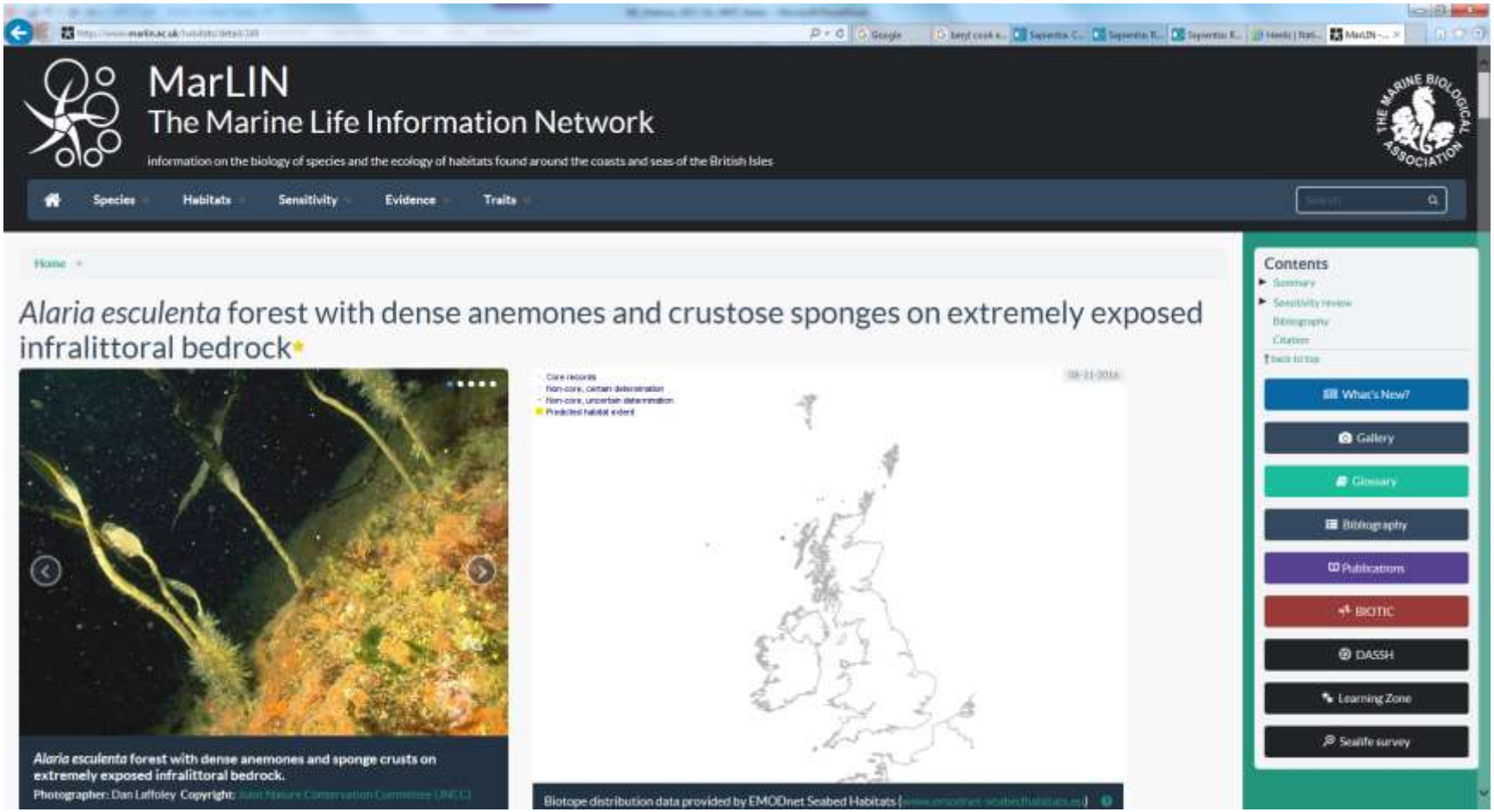
Mooring -Abrasion

Mooring scars in seagrass beds

Mooring chain abrasion on rock

Unimpacted rock habitat at same site and depth

MarESA sensitivity assessments



Anchoring & Mooring in MPAs

Objective 1: Sensitivity assessment

Resistance (Tolerance)	Description
None	Severe decline (>75%) and/or physico-chemical parameters are also affected
Low	Significant mortality (25-75%) with some effects on physico-chemical character of habitat
Medium	Some mortality of species (<25%) without change to habitat type.
High	No significant effects to the physico-chemical character of habitat and no effect on population viability of key/characterising species but may affect feeding, respiration and reproduction rates.

Step B

Resilience (Recovery)	Description
Very Low	Negligible or prolonged recovery possible; at least 25 years to recover structure and function
Low	Full recovery within 10-25 years
Medium	Full recovery between 2- 10 years
High	Full recovery within 2 years

Step C

Step D	Resistance			
Resilience	None	Low	Medium	High
Very Low	High	High	Medium	Low
Low	High	High	Medium	Low
Medium	Medium	Medium	Medium	Low
High	Medium	Low	Low	Not sensitive

Step D

- Presented as proformas by feature
- Accompanied by confidence assessment

Objective 1: Sensitivity assessment

Sensitivity to **abrasion** and **penetration** ranged widely from

- **not significant** for highly dynamic environments e.g. mobile sands
- to **high** for features with low resilience and recovery such as biogenic features (seagrass, maerl)

Sensitivity to **habitat change** was high for all features as the pressure represents a loss of habitat in the impact footprint

Mobile sands – not sensitive

Seagrass – high sensitivity

2. Exposure to anchoring and mooring

Activity Datasets collated and analysed –

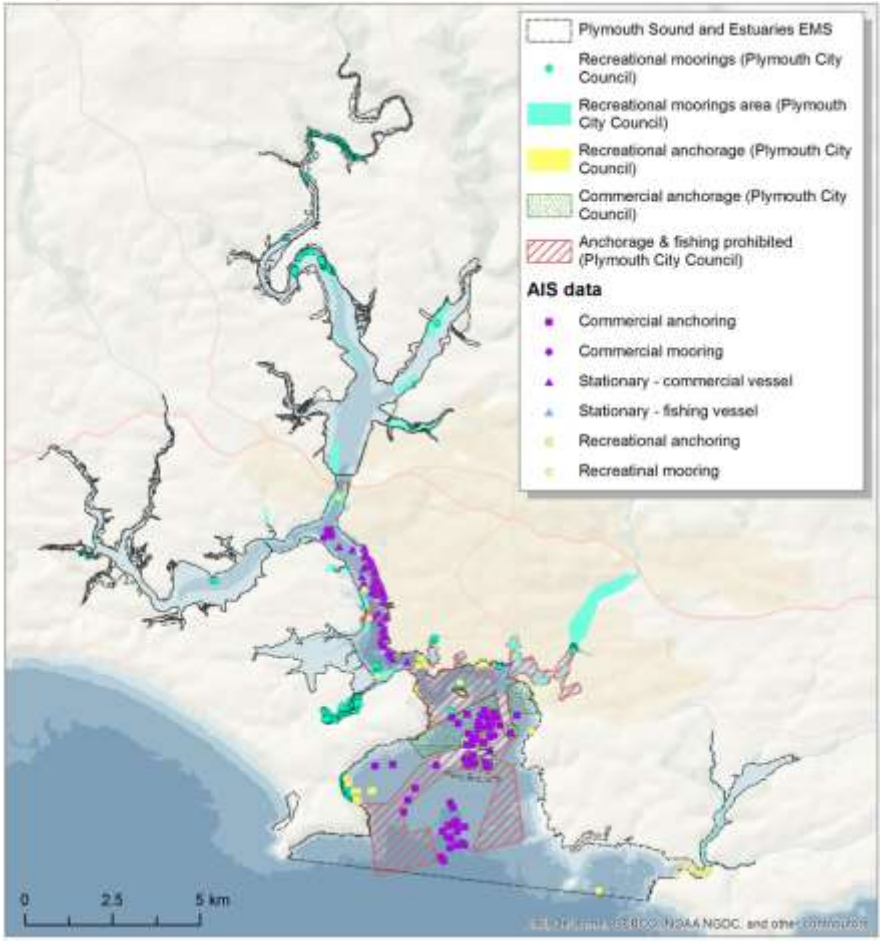
	Vessel category	Dataset
Anchoring	Commercial	**Automatic Identification System (AIS)** vessel track end points - commercial vessel categories **UKHO S57** vector data - location of commercial anchorages Aids to and other moored installations) **UKHO S5** Navigation (AtoNs) - Trinity House **UKHO S57** - (AtoNs 7 - (Mooring areas, administration boundaries)
	Recreation	**Automatic Identification System (AIS)** vessel track end points - yacht, or non commercial vessel less than 65m **StakMap** - RecMap anchoring layer **UKHO S57** - anchorages

2. Exposure to anchoring and mooring

- Anchoring and mooring activities assessed for each MPA
- **Exposure highly variable**
- No / little evidence for anchoring and mooring at some sites
- Other sites had areas that were intensely used

PSE EMS ranks #10 out of 178 MPAs with data for exposure to A&M activity

Plymouth Sound and Estuaries EMS



2. Exposure to anchoring and mooring

192 MPAs assessed

- 109 affected by **both activities** (57%)
- 19 affected by **anchoring** only (10%)
- 31 affected by **mooring** only (16%)
- 33 **not exposed** to anchoring or mooring (17%)

2,990 biotope polygons assessed

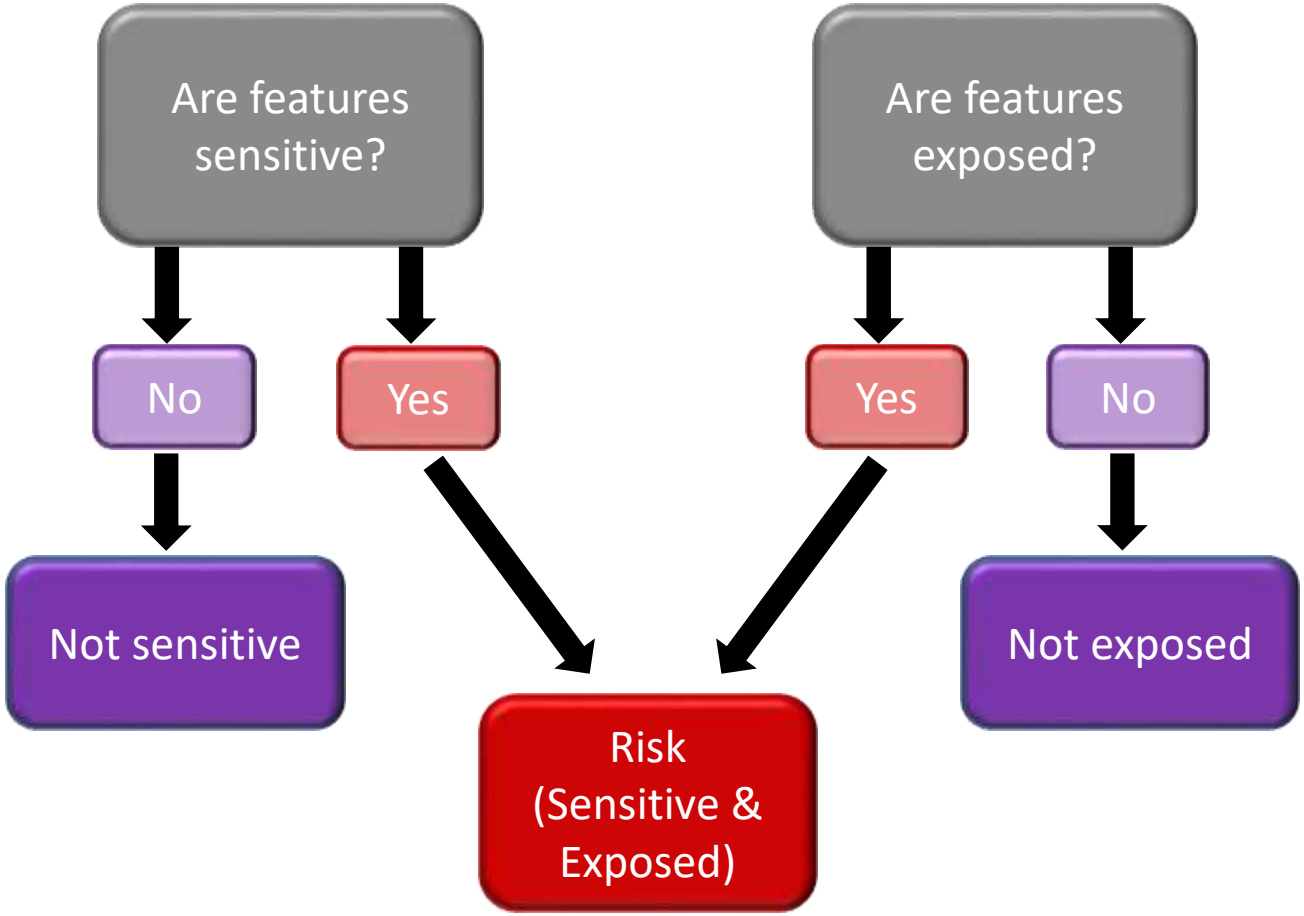
- 369 exposed to **both activities** (12%)
- 177 exposed to **anchoring** only (6%)
- 562 exposed to **mooring** only (19%)
- 1,883 (63%) biotope polygons **not exposed**

Scale of individual MPAs

Scale of biotopes

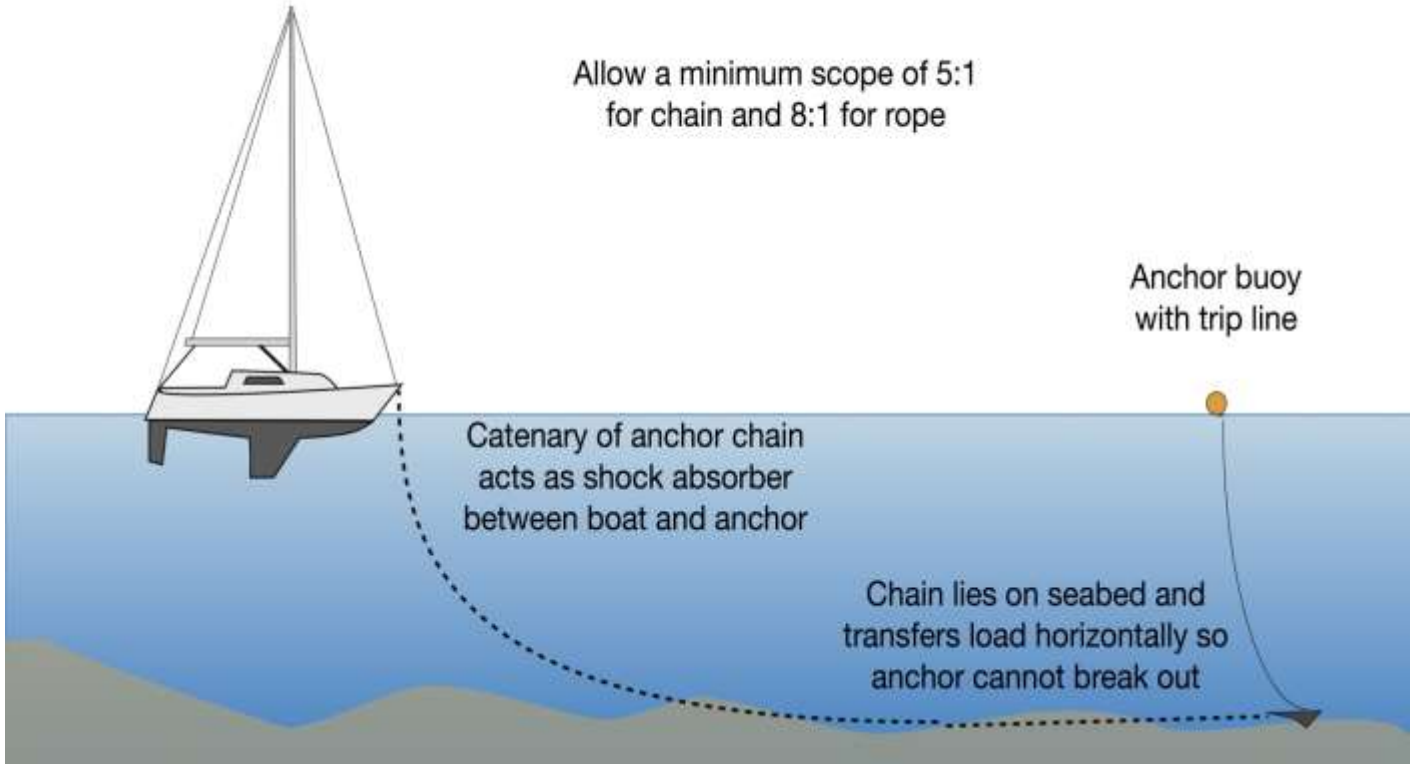
Anchoring & Mooring in MPAs

3. Risk assessment



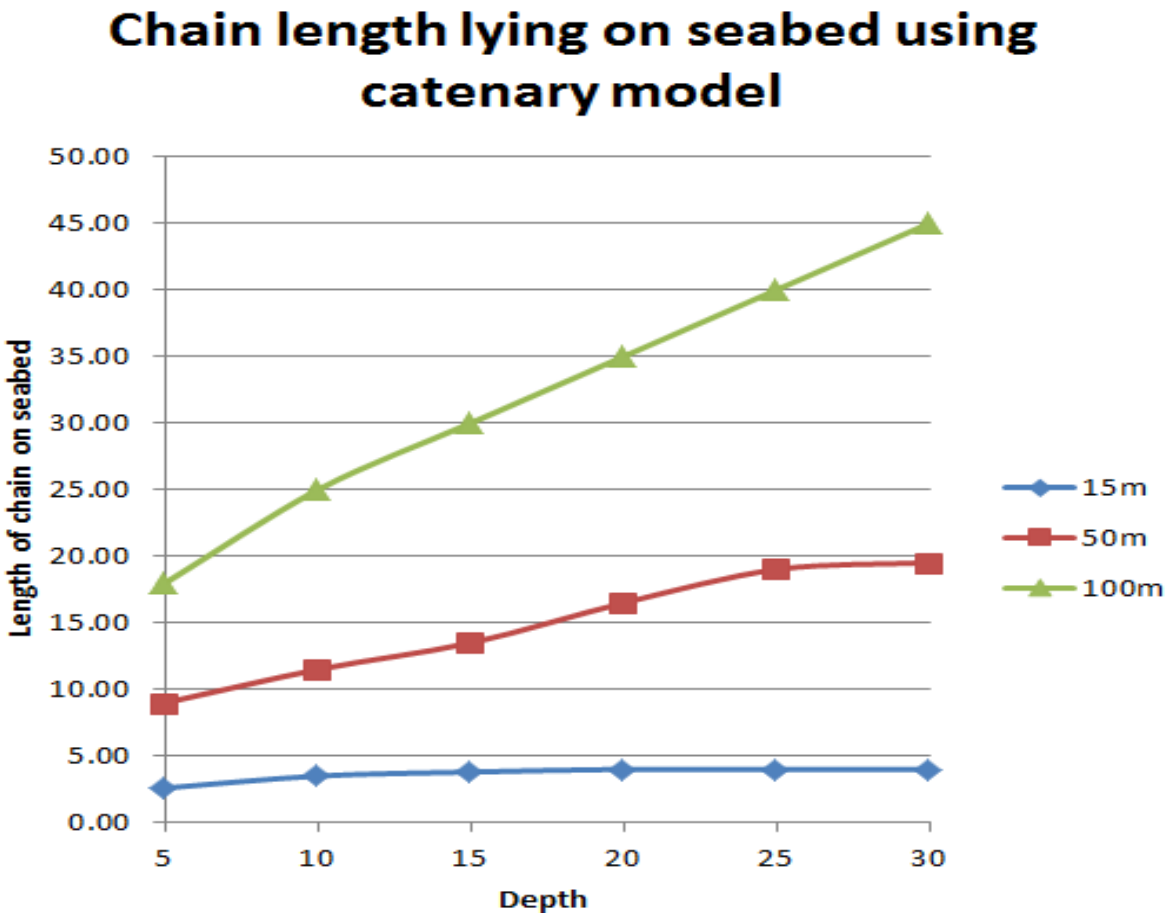
3. Risk assessment

Anchoring abrasion estimate – catenary chain calculations



Adapted from Jollands 2015

3. Risk assessment



Anchoring & Mooring in MPAs

3. Risk assessment

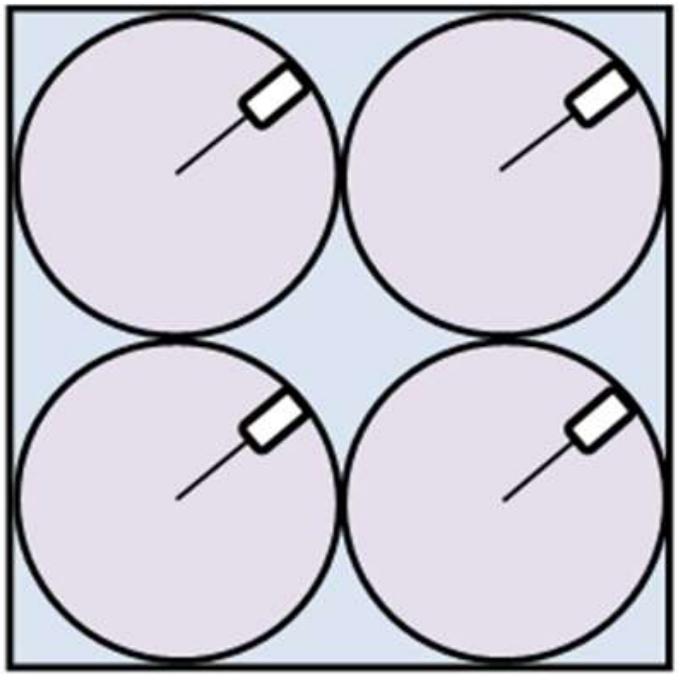
Penetration of the seabed – footprint related to vessel size

Larger vessels need larger anchors resulting in larger footprint

Estimated exposure footprints ranged from 0.5m^2 to 18m^2

3. Risk assessment

Estimating number of moorings (density)



Number of individual moorings used to weight:

- chain abrasion estimates
- number of mooring blocks to estimate physical change
- (2.4 m^2, recreational, 19m^2 commercial)

Anchoring & Mooring in MPAs

3. Risk assessment

Chain Abrasion (anchoring & mooring)

1,883 (63%) designated habitats were not exposed to anchoring / mooring

Conservative abrasion estimate

- 20 MPAs, 35 designated habitats (biotope polygons) at **high risk**

Worst case abrasion estimate

- 24 MPAs, 44 designated habitats at **high risk**

Designated features at high risk include intertidal and subtidal seagrass beds, maerl beds and subtidal sediments

Anchoring & Mooring in MPAs

3. Risk assessment

Penetration and disturbance (anchoring only)

- 2,447 (82%) biotope polygons not exposed
- 545 (18%) biotope polygons at low risk
- 12 (0.4%) biotope polygons at medium risk
- 0 biotope polygons at high risk

Physical change (mooring only)

- 2,060 (69%) biotope polygons not exposed
- 920 (31%) biotope polygons at low risk
- 10 (0.6%) biotope polygons at medium risk
- 0 biotope polygons at high risk

Anchoring & Mooring in MPAs

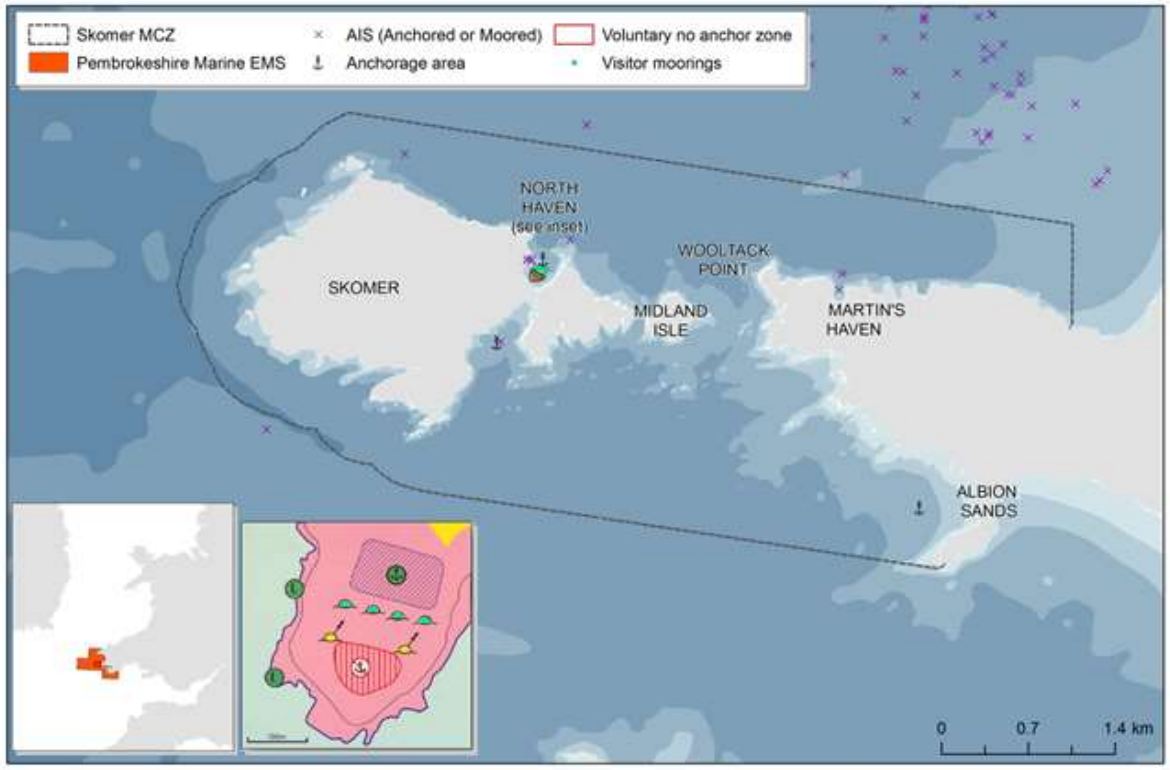
4. Review management at selected MPAs

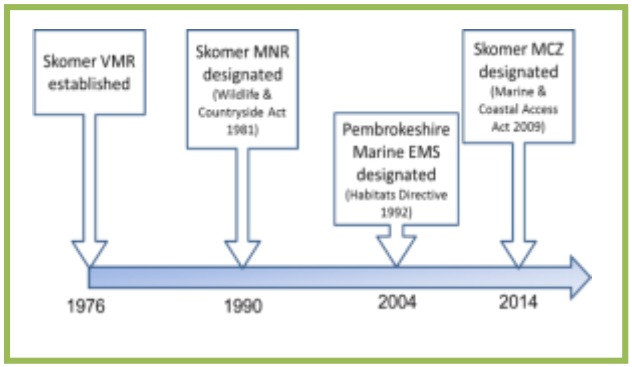
Site	Feature	Activity	Designation	Management measures
Skomer	Seagrass	Recreational anchoring	Marine Conservation Zone, European Marine Site (Pembrokeshire Marine SAC)	Voluntary No-Anchoring Zone, visitor moorings, information provision
Kingmere	Chalk & infra-littoral rock, black bream nests	Recreational anchoring (angling), commercial black bream fishery (rod and line), recreational diving	Tranche 1 Marine Conservation Zone	Engagement, Voluntary code of conduct, byelaw, zoning plan of site
Studland	Seagrass, seahorses, fan mussel	Recreational anchoring and mooring	Recommended Tranche 3 Marine Conservation Zone	Voluntary No-Anchoring Zone trials, code of conduct, engagement at site
Bembridge	Seagrass, seagrass associated features, sublittoral mud	Recreational and commercial anchoring	Recommended Tranche 3 Marine Conservation Zone	None known
Milford Haven	Seagrass, maerl	Recreational anchoring	European Marine Site (Pembrokeshire Marine SAC)	Voluntary agreement/code of conduct, visitor moorings, information provision

Anchoring & Mooring in MPAs

4. Review management at selected MPAs

Skomer MCZ (part of PM EMS)



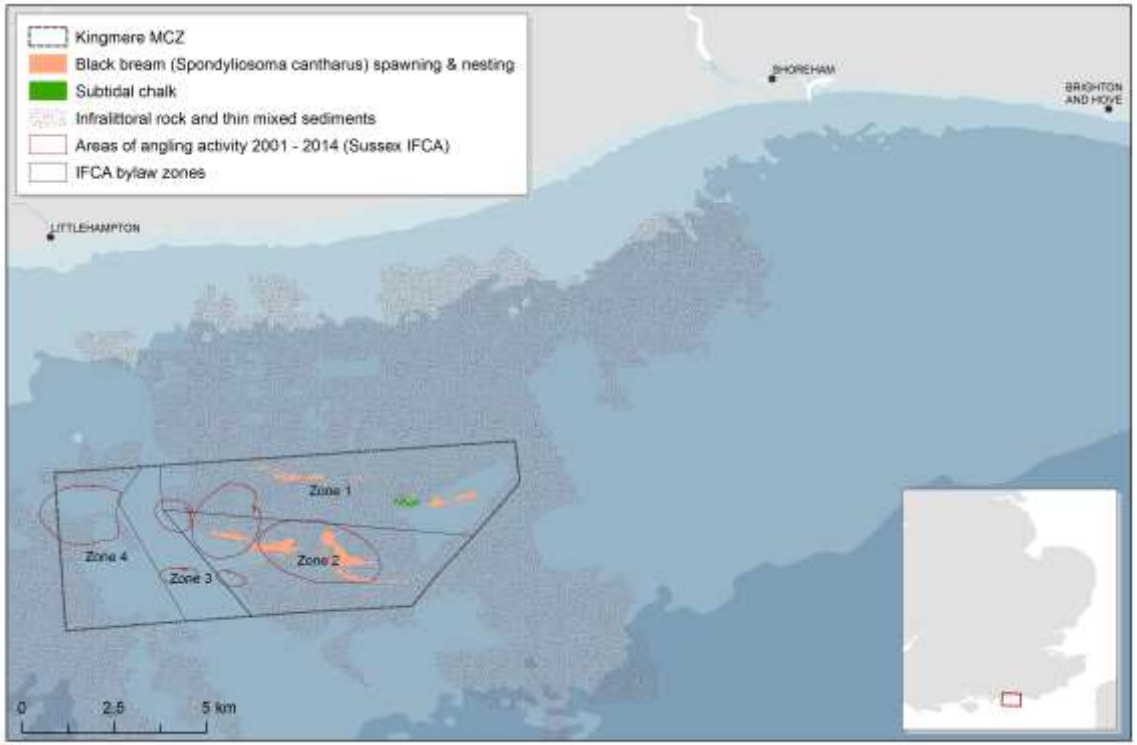


Measures

- VNAZ & AZ (zoning plan)
- Visitors moorings (seasonal)
- Water liaison patrols
- Voluntary code of conduct

4. Review management at selected MPAs

Kingmere MCZ



Anchoring of recreational angling vessels targeting black bream by both fishing charter vessels and private vessels

Features

- Black bream nesting
- Subtidal chalk
- Infralittoral mixed

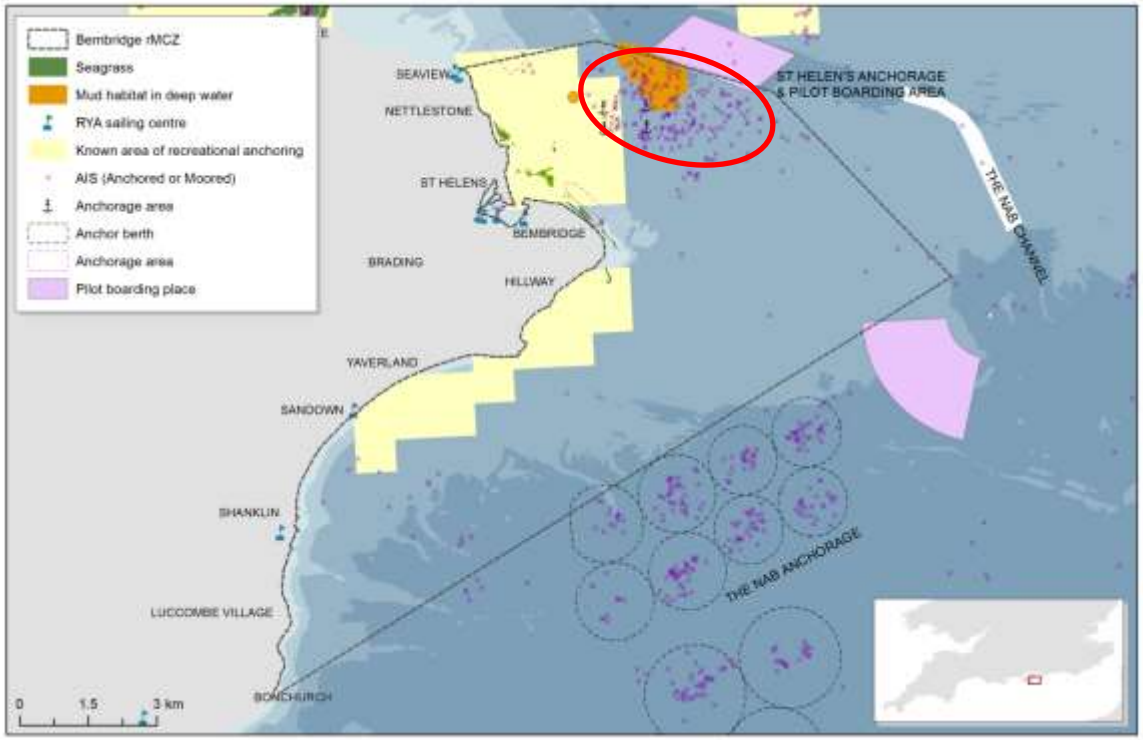
Measures

- Site zoning (SxIFCA)
- Byelaws to manage fishing (recreational & commercial, SxIFCA)
- Code of Conduct AT & SxIFCA

4. Review management at selected MPAs

Bembridge cMCZ

St Helens Road



St Helens Road – only sheltered anchorage in Solent with >1.16k vessels anchoring pa. Used by vessels awaiting instruction to proceed into Port of Southampton (ABP) or Dockyard Port of Portsmouth (QHM)

Features

- Seagrass & maerl beds
- Subtidal mud (BSH)
- Seapens with burrowing megafauna

Measures

- None known
- Proposed options include compensation for users for economic impact if anchorage closed (£22m pa)

4. Review management at selected MPAs

Stakeholder workshop held in Bristol, 8 March 2016

- Focus on management measures to control anchoring and mooring
- 10 measures presented to stakeholders

No.	Measure	Description	Source of measure
1	Voluntary No-Anchoring Zone	Areas where anchoring is prohibited to protect sensitive habitats identified as at risk from anchor damage	Milford Haven; Skomer.
2	Voluntary agreement / Code of conduct	Agreements and Codes of Conduct developed with maritime sectors or recreational users to reduce pressures on the marine environment by promoting good practice	Kingmere, Skomer.
3	Installation of visitor's moorings	Installation of visitor's moorings to reduce anchoring pressure on sensitive habitats by providing an alternative	Milford Haven; Skomer.
4	Installation of eco-moorings	Installation of eco-moorings as an alternative to either conventional swing moorings or anchoring. Eco-moorings are modified using various approaches to reduce chain swing on the seabed.	Discussions with RYA, Community Seagrass Initiative, The Crown Estate.
5	Increased information provision about sensitive areas to anchoring	Provide information about areas of the seabed that are sensitive to anchoring. This can be done via websites, leaflets, signage, liaison and engagement with recreational and commercial sea bed users or marker buoys indicating sensitive areas.	Studland, Skomer, Milford Haven.

4. Review management at selected MPAs

Stakeholder workshop held in Bristol, 8 March 2016

No.	Measure	Description	Source of measure
6	Byelaws prohibiting anchoring in sensitive areas	Introduce statutory protection in the form of byelaws to prevent anchoring (recreational or commercial) specifically for nature conservation purposes in sensitive areas.	Discussions with MMO and Harbour Authorities
7	Zoning plan indicating sensitive areas and best areas to anchor	Evaluate the seabed and requirements of seabed users to identify a way in which both conservation objectives and industry / recreational activity requirements can be met.	Kingmere (fisheries only); Skomer; Milford Haven.
8	Inclusion of MPA boundaries and anchor-sensitive areas on pilotage information and charts	Include boundaries of MPAs and the anchor-sensitive features apparent on pilotage information and charts, so that seabed users can avoid these areas unless it is necessary to anchor for safety reasons.	Cited as a possible measure to manage anchoring activity in SAC management plans (e.g. Cardigan Bay, Loch Creran).
9	Protocols when proposing new anchorages or extending existing ones	Ensure that there are protocols in place when new anchorages are proposed or existing ones are extended to identify any potential interactions with MPA conservation objectives.	Emerged from discussions with MMO and MCA on inter-sectoral conflicts involving commercial anchoring.
10	Develop an Environmental Ship Management Strategy	Develop an Environmental Ship Management Strategy in order to minimise environmental and social impacts associated with anchorage use. This may be achievable by minimising the number of vessels that sit at anchor while maintaining efficient operation of port import and export requirements	Has been developed for Great Barrier Reef World Heritage Area, Australia (GDH, 2013).

4. Review management at selected MPAs

Stakeholder workshop held in Bristol, 8 March 2016

For each measure participants were asked to identify:

- Advantages
- Disadvantages
- Likely uptake by sectors/ marine recreational users and addition burden on local managers, sectors and sea users
- Specific circumstances that may support the success of the measure
- Best practice examples and success stories, and
- Other e.g. links with regional context, Marine Plans, other initiatives, cross-sectoral issues and Welsh perspective.

In addition, each group was asked to score the measure (on a three-point ordinal scale) for:

1) Costs of implementation
2) Likelihood of compliance
3) Ease of implementation, and
4) Cost of liaison or enforcement

4. Review management at selected MPAs

Stakeholder workshop held in Bristol, 8 March 2016

Key themes that emerged to play a role in the efficacy of a measure:

1. **Simplicity** – easy to understand, communicate and implement
2. **Financial impacts on sea users** – unpopular and barrier to uptake
3. **Impacts on behaviours of sea users** – availability of alternative site and transit distance i.e. sea users can continue established behaviour patterns
4. **Distribution of target user groups** – widely dispersed users harder to target (both recreational and commercial)
5. **Presence of active local groups** - to take ownership and champion measures
6. **Linkage of measure with maritime safety** – increased safety at sea was identified as a way to increase uptake e.g. poor anchoring ground marked on charts
7. **Technological solutions may allow mooring to coexist with sensitive features**
8. **Visibility of wardens or regular patrols –** considered to foster compliance
9. **Cost of implementation and continued engagement or enforcement**
10. **Likelihood of compliance –** emergent from the above factors and variable from site to site

5. Organisational responsibilities

Approach

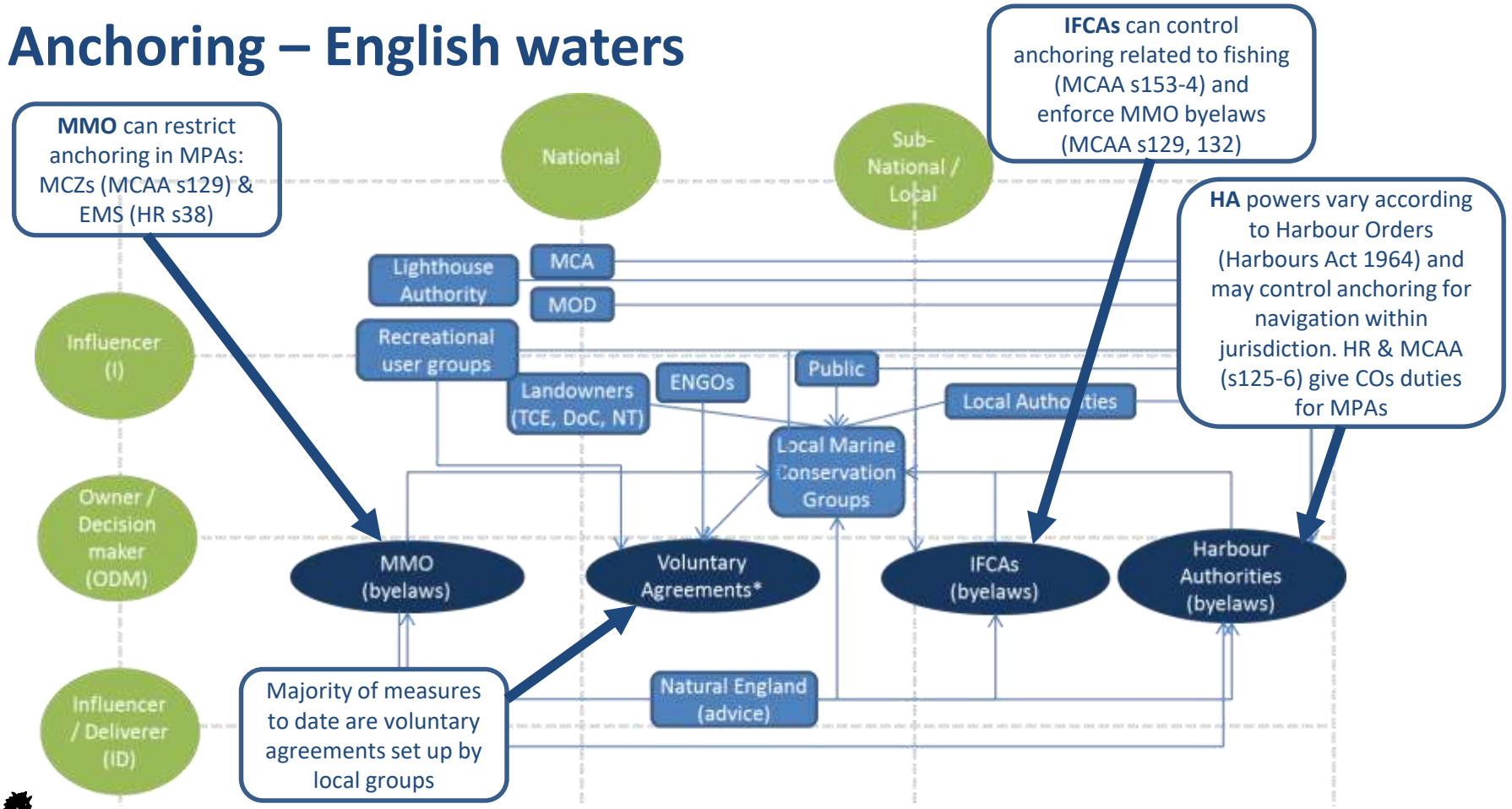
- Collate and analyse relevant legislation surrounding management of A&M
- Engage with key organisations (RYA, P&H, MMO, NRW, TCE, LAs, IFCAS)
- Rapid Policy Network Mapping (Bainbridge et al. 2011)
- Legislative mapping (across different scales of governance)

Actor	Definition
Influencer (I)	Organisation morally or practically required, invited or involved in the management decision making process. Influencers affect the outcome of the process using legitimate means based on opinions and views eg RYA, Wildlife Trusts.
Owner Decision maker (ODM)	An organisation, entity or individual which has the authority to make a management decision. Decisions may be made by Owner/Decision Makers following consultation and/or negotiation. They have the ultimate authority to decide outcomes or power to make byelaws. eg Local Authorities, IFCAs, and central licensing authorities such as the MMO and Welsh Government.
Influencer / Deliverer (ID)	An organisation, entity or individual which is legally or practically required, invited or obliged to be involved in the management process. These include statutory conservation advisors to Government (e.g. Natural England, NRW and JNCC) that develop conservation objectives for MPA features and the advice on operations and activities.

Anchoring & Mooring in MPAs

5. Organisational responsibilities

Anchoring – English waters

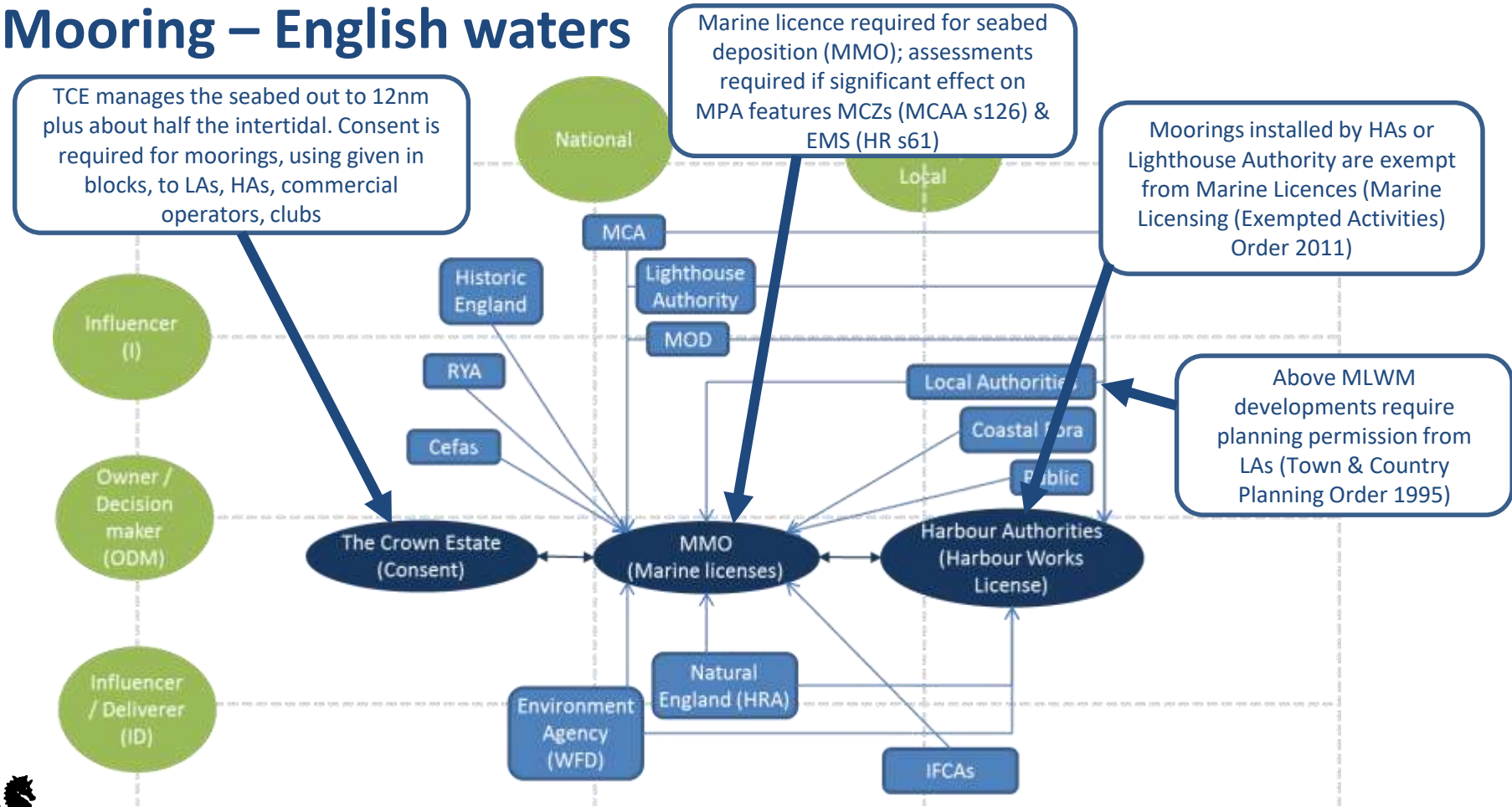


* voluntary agreements informed this diagram: Helford and Skomer VNAZs

Anchoring & Mooring in MPAs

5. Organisational responsibilities

Mooring – English waters



Anchoring & Mooring in MPAs

Conclusions

- 41 seabed habitats and 18 species were assessed for sensitivity; ranged from highly sensitive to not significant.
- Exposure to anchoring and mooring within sites was generally low, and extremely patchy.
- Risk generally low (large features, small footprint) but in some cases sensitive features may be exposed to very high levels of exposure (e.g. Bembridge, St Helen's Road Anch.)

Anchoring & Mooring in MPAs

Conclusions cont.

- Management – complex!
- No one solution
- mostly voluntary measures for anchoring (few organisations have statutory power to manage anchoring of either recreational or commercial vessels)
- Voluntary measures for the management of anchoring generally involve a diversity of sea users including responsible authorities plus recreational and commercial interests and may be ‘owned’ locally or by national organisations
- Licensing for mooring (MMO, TCE, LAs) takes into account for site designations