The Marine Biological Association

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EMS Recreation Study Document 01: A brief investigation into the possible interaction and sensitivity of priority species and habitats to recreational activity within the Tamar Estuaries Management Plan area.

Charly Griffiths, Matt Arnold & Joseph Butler (September 2016).

Preface

This work was commissioned by the Natural Infrastructure Team, Plymouth City Council and closely overseen by Kaja Curry (Natural Infrastructure Officer and Tamar Estuaries Consultative Forum Co-ordinator). The project was steered by the Plymouth Sound and Tamar Estuaries Recreation Mitigation Task Group which consisted of Plymouth City Council, Cornwall Council, South Hams District Council, West Devon Borough Council and was advised by Natural England.

The purpose of the work is to inform the Habitats Regulations Assessment of the local plans for all four local planning authorities in relation to potential impacts on the Plymouth Sound and Tamar Estuaries European Marine Site. This report investigates the possible interaction and sensitivity of priority species to recreational activity. The findings of the report will be used to inform the design of a survey into recreational activities across the marine site.

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Royal Charter

Date: December 2016

Version: Final v2

Recommended citation: Griffiths, C; Arnold, M and Butler, J. (2016) EMS Recreation Study Document 01. A brief investigation into the possible interaction and sensitivity of priority species and habitats to recreational activity within the Tamar Estuaries Management Plan area. A report for Plymouth City Council.

Contents

1. Introduction

1.1.Plymouth Sound and Estuaries European Marine Site

The Tamar Estuaries Consultative Forum (TECF) was established to promote the delivery of integrated management of the Tamar estuaries and nearby coastal areas to ensure long term sustainability. A major component of TECF's work involves implementing Plymouth Sound and Estuaries European Marine Site (EMS) management.

The EMS consists of the Plymouth Sound and Estuaries Special Area of Conservation (SAC), and the Tamar Estuaries Complex Special Protection Area (SPA) (Figure 1), designated for those habitat and species features listed in Table 1 and Table 2**.**

Figure 1. The Plymouth Sound and Estuaries European Marine Site, incorporating the Plymouth Sound and Estuaries Special Area of Conservation (SAC), and the Tamar Estuaries Complex Special Protection Area (SPA)

Table 1. Designated Features of the Plymouth Sound and Estuaries SAC

Designation Type	Feature	Subfeature
SAC Annex I habitat	Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*)	
	Estuaries	Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*)
		Circalittoral rock
		Infralittoral rock
		Intertidal mixed sediments
		Intertidal mud
		Intertidal rock
		Intertidal seagrass beds
		Subtidal mixed sediments
		Subtidal mud
		Subtidal sand
		Subtidal seagrass beds
	Large shallow inlets and bays	Circalittoral rock
		Infralittoral rock
		Intertidal rock
		Subtidal coarse sediment
		Subtidal mixed sediments
		Subtidal mud
		Subtidal sand
		Subtidal seagrass beds
	Mudflats and sandflats not covered by seawater at low tide	Intertidal coarse sediment
		Intertidal mixed sediments
		Intertidal mud
		Intertidal sand and muddy sand
		Intertidal seagrass beds
	Reefs	Circalittoral rock
		Infralittoral rock
		Intertidal rock
	Sandbanks which are slightly covered by sea water all the time	Subtidal coarse sediment
		Subtidal mixed sediments
		Subtidal mud
		Subtidal sand
		Subtidal seagrass beds
SAC Annex II species	Allis shad (*Alosa alosa*)	
	Shore dock (*Rumex rupestris*)	

Table 2. Designated Features of the Tamar Estuaries Complex SPA

Designation Type	Feature	Subfeature
SPA Bird features	Non-breeding Avocet (*Recurvirostra avosetta*)	
	Non-breeding Little egret (*Egretta garzetta*)	
SPA Supporting habitat	Annual vegetation of drift lines	
	Coastal reedbeds	
	Freshwater and coastal grazing marsh	
	Intertidal mixed sediments	
	Intertidal mud	
	Intertidal sand and muddy sand	
	Intertidal seagrass beds	
	Water column	
	Saltmarsh	Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*)

1.2.Conservation features and impacts from recreation

The Plymouth Sound and Estuaries EMS is a complex site of marine inlets and larger bays which can provide ideal conditions for a number of coastal and marine recreational activities. The sites proximity to the city of Plymouth provides water users with infrastructure to support boating communities and many access points for users to undertake a number of activities such as swimming, bait digging, crab tiling and kayaking.

Recreational activities can adversely affect habitats and disturb species, primarily through noise, abrasion / penetration of the seabed, litter, organic enrichment, contamination (synthetic compounds / organo - metal / hydrocarbon / PAH), spread of non-indigenous species; physical change (to other seabed type) and introduction of light.

1.3.Aims, objectives and approach

As the estuary management partnership, TECF is responsible for management of the EMS and must have regard to direct and indirect effects on all interest features. TECF commissioned the Marine Biological Association of the UK (MBA) to conduct a brief spatial investigation into areas of possible interaction between a number of common recreation activities as defined by data available through Plymouth City Council and EMS features of conservation importance. This report presents the method and results of this project.

2. Methods

The adopted approach aimed to determine which conservation features have possible interactions with recreational activity across the EMS, and the sensitivity that those features have to the particular recreational activity acting upon them.

2.1.Potential feature / recreation interaction

The project utilised the best available and accessible habitat, species and recreation distribution data (Table 3) to run spatial overlay analysis using ArcGIS v10.3 software. Overlay analysis determines where features overlap (Figure 2), in this case where recreational activity overlaps designated habitats and species within each management area within the EMS. The distribution of the designated features of the SAC and SPA are presented in Figures 3 and 4 and the overlap with activities is provided in Figure 5.

Table 3. Data sources for spatial analysis (see Figure 3 , Figure 4 and Figure 5 for mapping results)

Theme	Data layer	Source
Habitats	EMS_Habitats	EMODnet (2016) - all relevant datasets
Species	EMS_Species	Marine Recorder (2015) JNCC
		NBN (2015)
	SPA_Birds	Wetland Birds Survey (2003) British Trust for Ornithology
Recreation	Crab tiling	Devon and Severn IFCA
	High speed boating areas	Plymouth City Council
	Marinas	Plymouth City Council
	Mooring areas	Plymouth City Council
	Small craft anchorage	Plymouth City Council
	Swimming area	Plymouth City Council
	Slipways	Plymouth City Council

To facilitate analysis of differing spatial data types (point, line, polygon) a 200 meter diameter hexagonal cell, regular grid was created and each cell assigned a unique ID. By combining the habitat, species and recreation layers with the 200m grid using Union Analysis, attribute data from all layers were joined to the overlaying 200m cell. This data was then interrogated to determine what features might be impacted by particular recreational activities at any given location across the EMS.

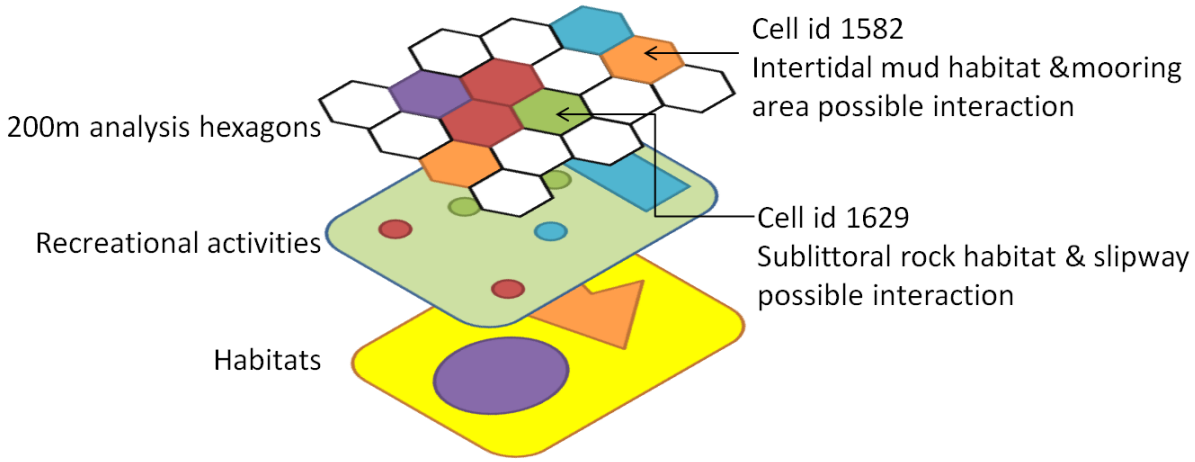

Figure 2. Schematic of overlay analysis using ArcGIS v10.3. Individual Habitat and Recreational activities layers are spatially joined to the hexagon analysis grid. Each hexagon cell then receives the attributes names of the habitat and activity.

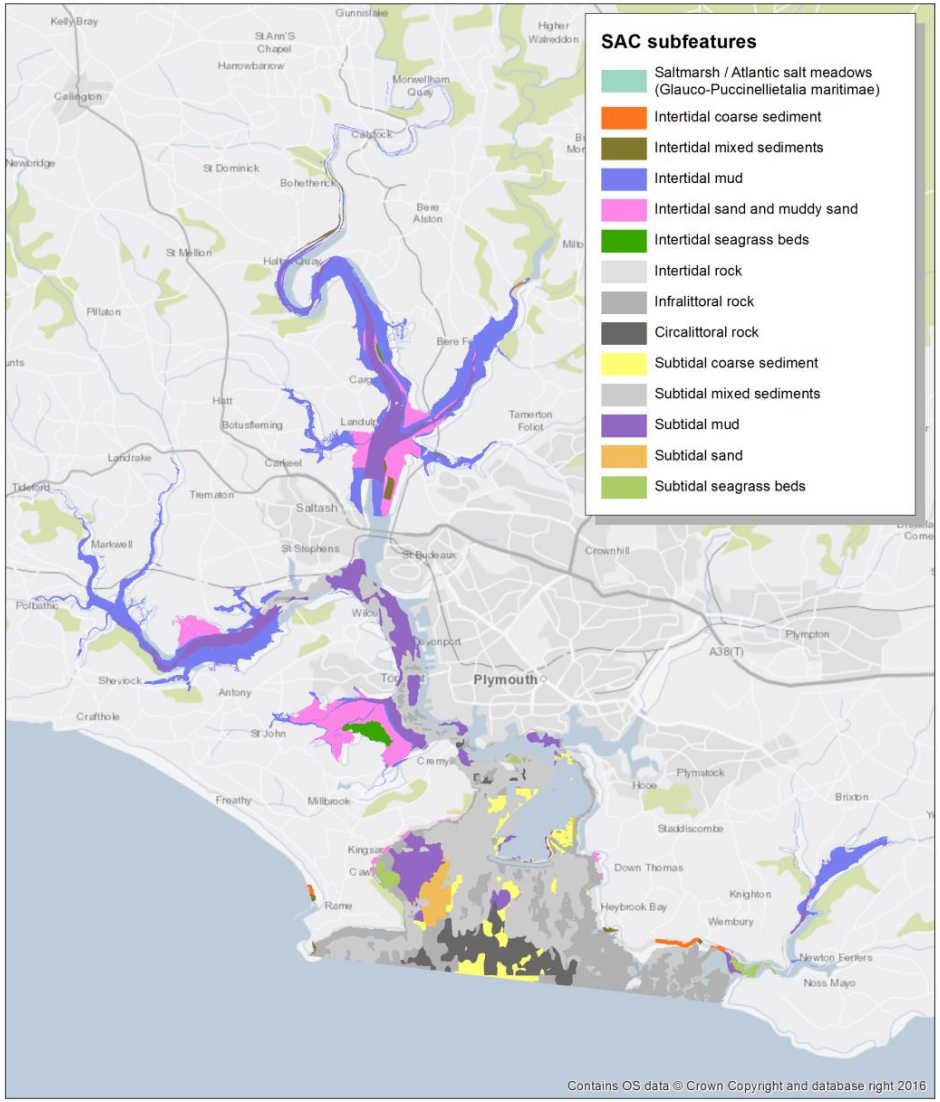

Figure 3. Designated habitat features of the SAC

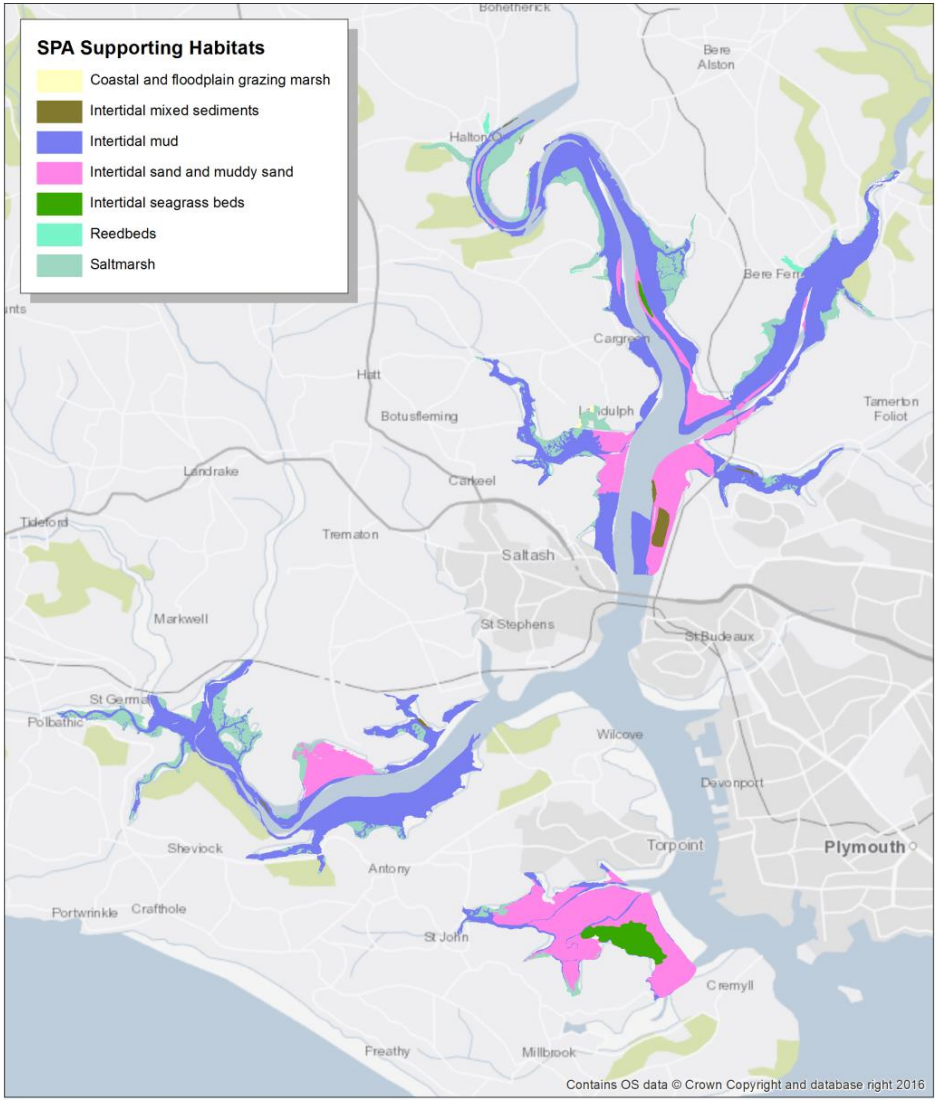

Figure 4. Designated habitat features of the SAC

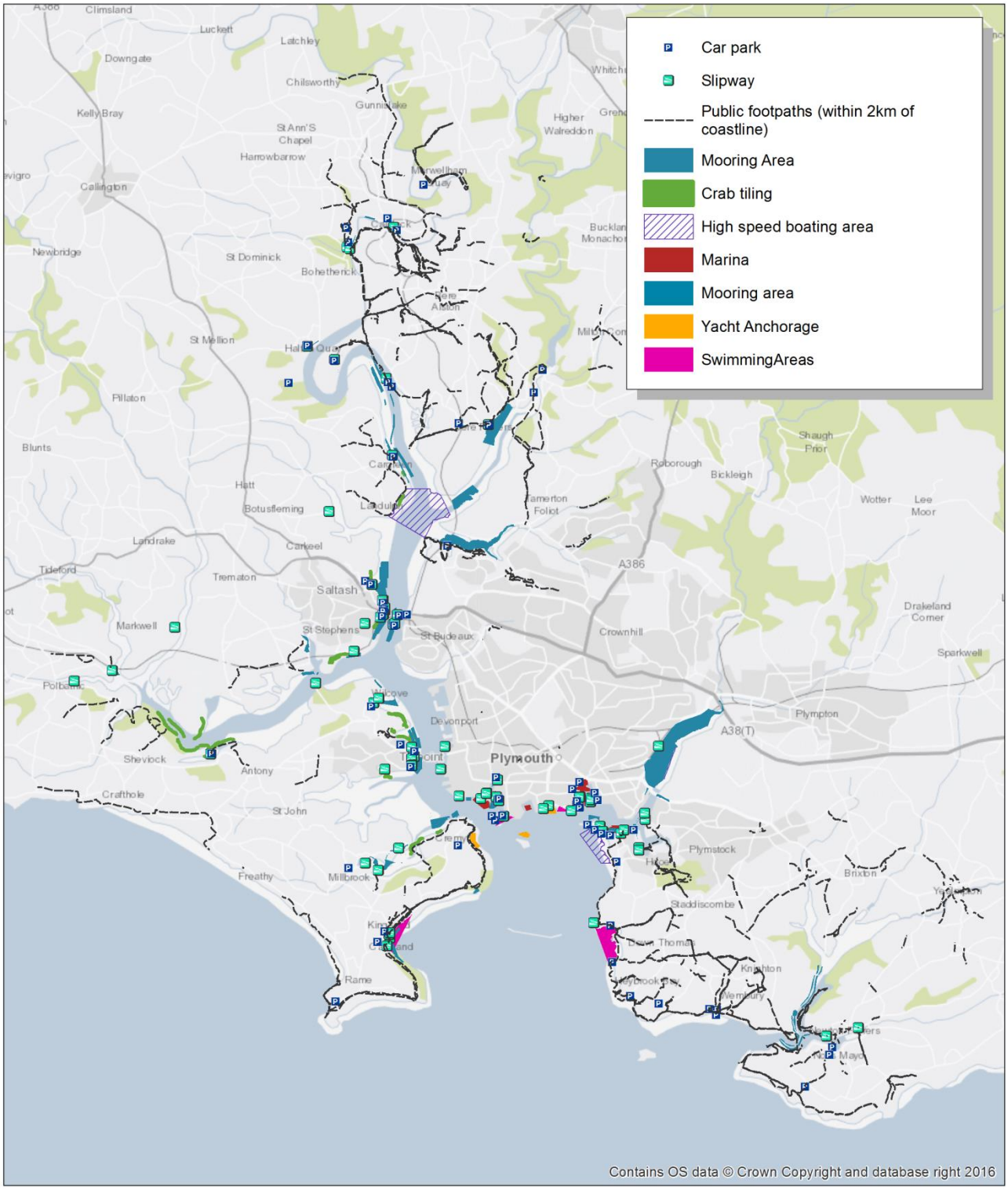

Figure 5. Recreational activities or infrastructures within the EMS

2.2.Sensitivity Assessments

The conservation advice packages for SAC and SPA sites within England are currently being updated by Natural England. The Plymouth Sound and Estuaries SAC conservation advice package (Natural England, 2015[1]) and The Tamar Estuaries Complex SPA conservation advice package (Natural England, 2015[2]), contain Advice on Operations tables which have formed the basis for our sensitivity assessment. The Advice on Operations table links activities to pressures and the sensitivity of features to these pressures at a given benchmark.

The advice states that "The sensitivity of a feature to activity-derived pressures has been assessed using information collected on their resilience (an ability to recover) and resistance (the level of tolerance) to physical, chemical and biological pressures (APEM, 2014; MarLIN, 2014 in Natural England[3], 2016, citation not provided).

All habitat, species and bird features within the EMS have been assessed against the draft Advice on Operations sensitivity assessments to identify possible pressures arising from those recreational activities outlined previously in this report. Assessment sensitivity scores are provided in Table 4. Assessment to sensitivity scores (Natural England, 2015).

Table 4. Assessment to sensitivity scores (Natural England, 2015)

SENSITIVE: The evidence base suggests the feature is sensitive to the pressure at the benchmark and taken to further assessment	S
INSUFFICIENT EVIDENCE TO ASSESS: Evidence base not developed enough for assessments to be made.	IE
NOT ASSESSED: A sensitivity assessment has not been made for the feature	NA
NOT SENSITIVE AT THE BENCHMARK: Evidence suggests the feature is not sensitive to the pressure at the benchmark	NS
Evidence suggests there is no direct interaction between the pressure and the feature under assessment OR, the activity and the feature could not interact.	

3. Results

3.1.Recreational intensity across the EMS

A cell count was run on raw recreational activity data to give a crude proxy for the number of recreation activities that co-occur across the EMS. The cell count simply adds the number of individual recreational activities that occur within a given cell (Figure 6) to show the number of activities that take place. The Kingsand / Cawsand Bay area, for example, displays high recreation intensity due to the number of slipways, moorings and swimming areas within the bay.

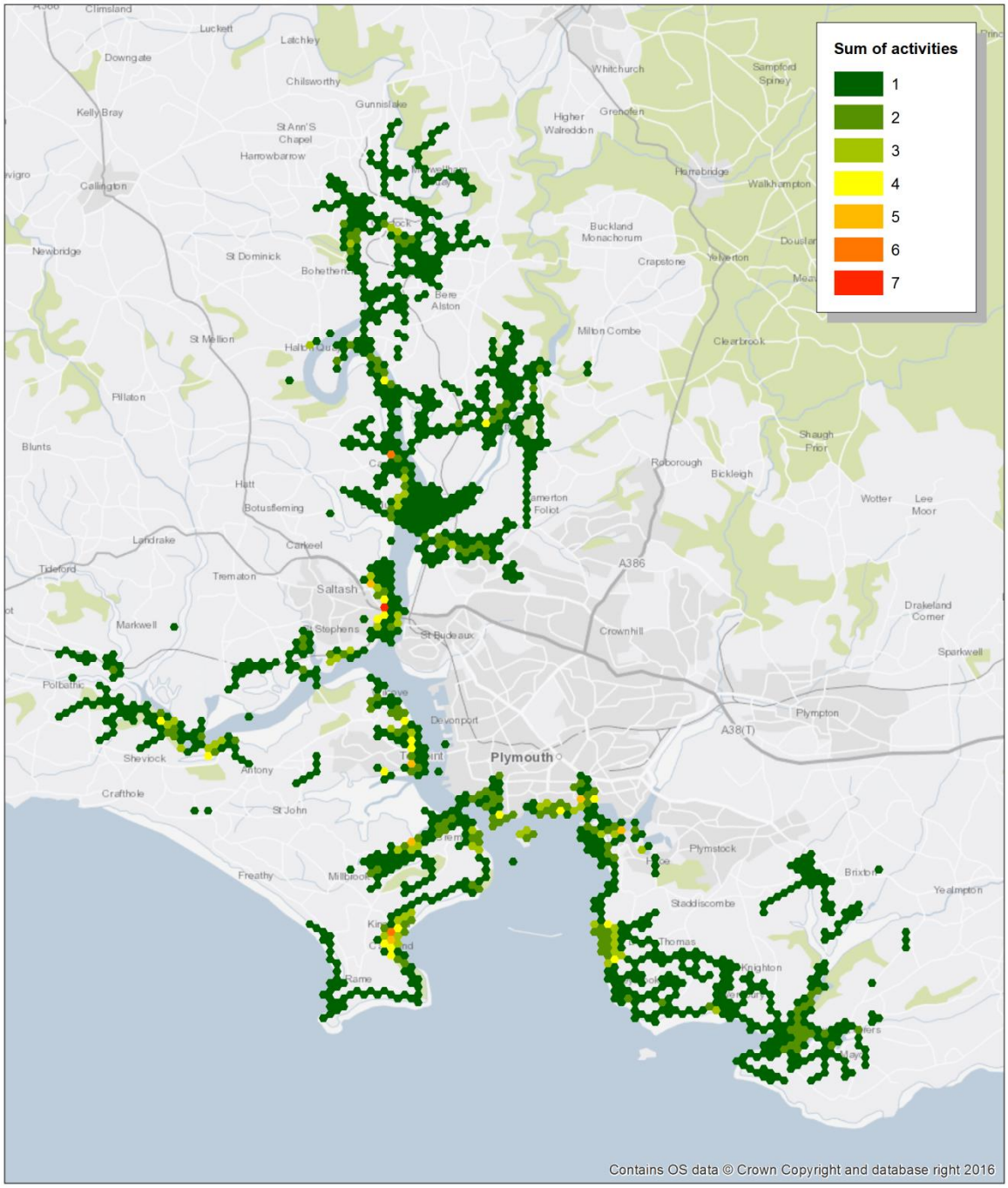

Figure 6. Location and intensity of recreational activity across the EMS

3.2. Plymouth Sound and Estuaries SAC

3.2.1. Habitat / recreation interaction

Individual maps have been created to display the distribution of each of the features across the SAC and the potential interaction between the feature and the number of recreational activities that occur across the distribution. Figure 7 provides an example of this and shows the distribution of intertidal mud and the number of recreational activities that occur within each relevant grid cell. The complete distribution maps for the Plymouth Sound and Estuaries SAC can be found in Appendix A.

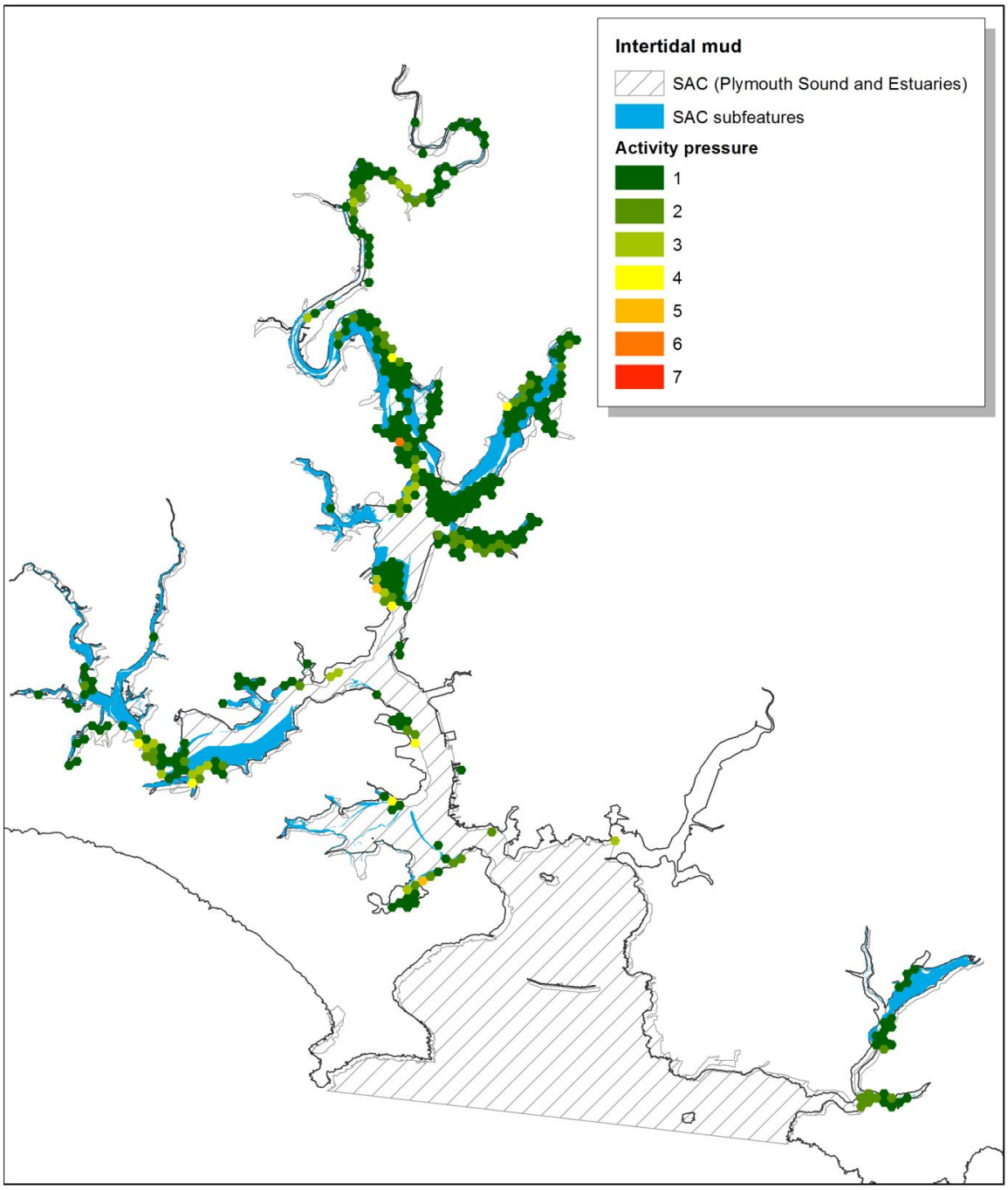

Figure 7. Distribution of intertidal mud habitat (in blue) across the SAC; the hexagons represent locations in which recreation is likely to interact with the habitat along with a crud indication of recreational pressure (green to red)

3.2.2. SAC habitat sensitivity assessment

Based on the overlay hexagon analysis we have identified individual hexagon cells in which subfeature habitat and recreational activity overlap, a summary of these interactions for the SAC is presented in Table 5.

Infralittoral rock, Intertidal mixed sediments, Intertidal mud, Intertidal rock, Intertidal sand and muddy sand, Saltmarsh, Subtidal mixed sediments, Subtidal mud and Subtidal seagrass beds all overlap with a number of recreational activities considered within this assessment. Infralittoral rock and intertidal mud, rock and sand and muddy sand all have a significant number of interactions. Circalittoral rock, intertidal seagrass beds and subtidal mixed sediments each only interact with one recreational activity.

Table 5. Summary of features assessed as directly interacting with particular recreational activities within the Plymouth Sound and Estuaries Special Area of Conservation

	Circalittoral rock	Infralittoral rock	Intertidal coarse sediment	Intertidal mixed sediments	Intertidal mud	Intertidal rock	Intertidal sand and muddy sand	Intertidal seagrass beds	Saltmarsh	Subtidal coarse sediment	Subtidal mixed sediments	Subtidal mud	Subtidal seagrass beds
Car park		X	X	X	X	X	X		X				
Crab tiling				X	X	X	X		X				
Footpaths		X	X	X	X	X	X		X				
High Speed		X			X	X	X		X	X		X	X
Marina		X			X	X	X				X	X	
Mooring area		X		X	X	X	X	X	X		X	X	X
Slipway		X		X	X	X	X		X		X	X	X
Small Craft Anchorage	X	X				X					X	X	X
Swimming Area		X		X	X	X	X				X	X	X

X	Interaction present. Habitat is sensitive to at least one pressure raised by activity.	X	Interaction present. Interaction is not relevant to sensitivity assessment
X	Interaction present. Habitat is not sensitive to any pressure raised by activity.		No interaction present.

3.2.2.1. Sensitive (S)

When considering these interactions in the context of the Natural England Advice on Operations for the site (Natural England[1], 2015) the subfeature habitats are assessed as sensitive to at least one of the following pressures that arise from the assessed activities:

- Abrasion/disturbance of the substrate on the surface of the seabed (***All activities considered***)
- Introduction or spread of non-indigenous species (***All on water / boat based activities***)
- Organic enrichment (***Car parks, footpaths, anchoring, mooring and marinas***)

- Penetration and/or disturbance of the substrate below the surface of the seabed, including abrasion (***All activities***)
- Physical change (to another seabed type) (***All anchoring or mooring activities - marina, mooring area, small craft anchorage***)
- Removal of non-target species (***Footpaths and crab tiling***)

Please see Appendix C for the full Advice on Operations table.

3.2.2.2. Not sensitive (NS)

Pressures that may arise from the assessed activities but that are not considered to impact the subfeatures (at the pressure benchmark) relate to the chemical contamination associated with all boating activities. Within this assessment those recreational activities are high speed powerboat areas, marinas, mooring areas, slipways and small craft anchorages. The Natural England specific pressures are:

- Hydrocarbon & PAH contamination. Includes those priority substances listed in Annex II of Directive 2008/105/EC.
- Synthetic compound contamination (incl. pesticides, antifoulants, pharmaceuticals). Includes those priority substances listed in Annex II of Directive 2008/105/EC.
- Transition elements & organo-metal (e.g. TBT) contamination. Includes those priority substances listed in Annex II of Directive 2008/105/EC.

Please see Appendix C for the full Advice on Operations table.

3.2.2.3. Insufficient evidence (IE)

Litter is consistently rated as having insufficient evidence to allow a sensitivity assessment within the Natural England Advice on Operations. Litter is a pressure that can be associated with all activities but sensitivity to this pressure is difficult to assess hence the lack of sensitivity assessment (Tillin & Tyler-Walters, 2015).

3.2.3. SAC species sensitivity assessment

3.2.3.1. Allis shad (*Alosa alosa*)

As a rare and under researched species the sensitivity of Allis shad (*Alosa alosa*) to pressures induced by human activity is is difficult to assess due to the paucity of data and literature (Langston et al, 2003 and Coterell & Hillman, 2016). The Advice on Operations sensitivity spreadsheet states that the following pressures have insufficient evidence to assess their potential impact on the Allis shad:

- Hydrocarbon & PAH contamination. Includes those priority substances listed in Annex II of Directive 2008/105/EC. (***All boat based activities***)
- Introduction or spread of non-indigenous species (***All on water / boat based activities***)
- Litter (***All assessed activities***)
- Synthetic compound contamination (incl. pesticides, antifoulants, pharmaceuticals). Includes those priority substances listed in Annex II of Directive 2008/105/EC. (***All boat based activities***)
- Transition elements & organo-metal (e.g. TBT) contamination. Includes those priority substances listed in Annex II of Directive 2008/105/EC. (***All boat based activities***)
- Visual disturbance (***All boat based activities***)

Allis shad is assessed as sensitive to collision below the water with static or moving objects not naturally found in the marine environment (e.g., boats, machinery and structures), and underwater noise changes. Within this assessment those recreational activities producing sensitivity are high speed powerboat areas, marinas, mooring areas, slipways and small craft anchorages.

3.2.3.2. Shore dock (*Rumex rupestris*)

Shore dock (*Rumex rupestris*) is found well above the high water mark and as such many activities were assessed as **Not Relevant** to this coastal plant.

The following pressures however were **Not Assessed** under the Natural England Advice on Operations and should be considered under any further work:

- Abrasion/disturbance of the substrate on the surface of the seabed (***Land based and the launching and recovery phases of boat based activities***)
- Hydrocarbon & PAH contamination. Includes those priority substances listed in Annex II of Directive 2008/105/EC. (***The launching and recovery phases of boat based activities***)
- Introduction of light (***The launching and recovery phases of boat based activities***)
- Introduction or spread of non-indigenous species (***The launching and recovery phases of boat based activities***)
- Litter (***Land based and the launching and recovery phases of boat based activities***)
- Organic enrichment (***The launching and recovery phases of boat based activities***)
- Penetration and/or disturbance of the substrate below the surface of the seabed, including abrasion (***Land based and the launching and recovery phases of boat based activities***)
- Removal of non-target species (***Land based activities***)
- Synthetic compound contamination (incl. pesticides, antifoulants, pharmaceuticals). Includes those priority substances listed in Annex II of Directive 2008/105/EC. (***The launching and recovery phases of boat based activities***)
- Transition elements & organo-metal (e.g. TBT) contamination. Includes those priority substances listed in Annex II of Directive 2008/105/EC. (***The launching and recovery phases of boat based activities***)

3.3. Tamar Estuaries Complex SPA

3.3.1. Species and supporting habitat recreation interaction

Individual maps have been created to display the distribution of each of the features across the SPA and the location of potential interaction between the features and recreational activities. These distribution maps can be found in Appendix B.

British Trust for Ornithology (BTO) Wetlands Bird Survey data (BTO, 2015) were interrogated to indentify locations of sightings of the Avocets (*Recurvirostra avosetta)* and Little Egrets (*Egreta garzetta*) within the SPA. Sightings are reported here in mean density of sightings, that is, the count of all sightings divided by the number of days recordings took place. The areas of blue in Figure 8 and Figure 9 represent those BTO reporting areas in which the birds were counted during the 1997 - 1998 and 2002 - 2003 recording seasons. By overlaying the habitat and recreation information to these known areas of bird use we can determine what areas may require management of recreational activities to reduce impact and disturbance to the birds and their supporting habitats.

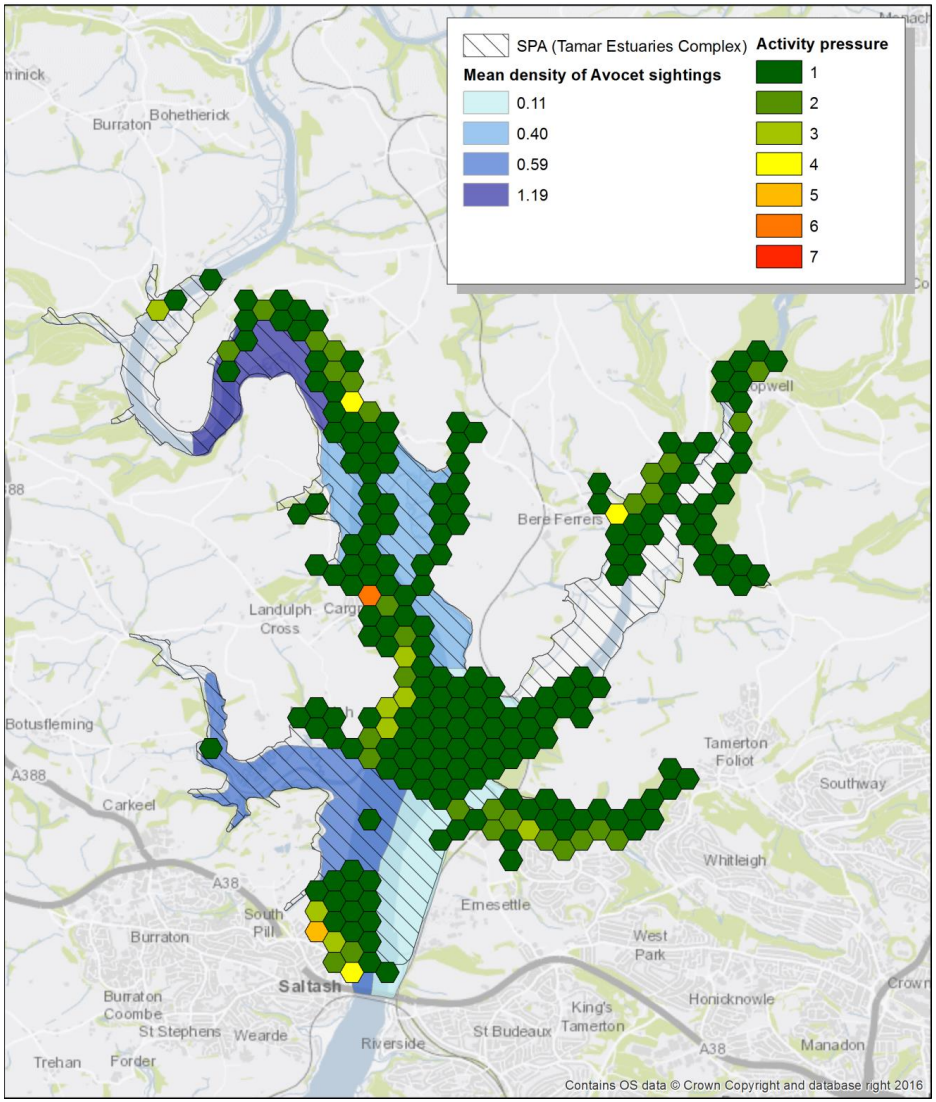

Figure 8. Mean density of Avocet sightings overlaied with location of recreational pressure within the Northern part of the Tamar Estuaries Complex SPA

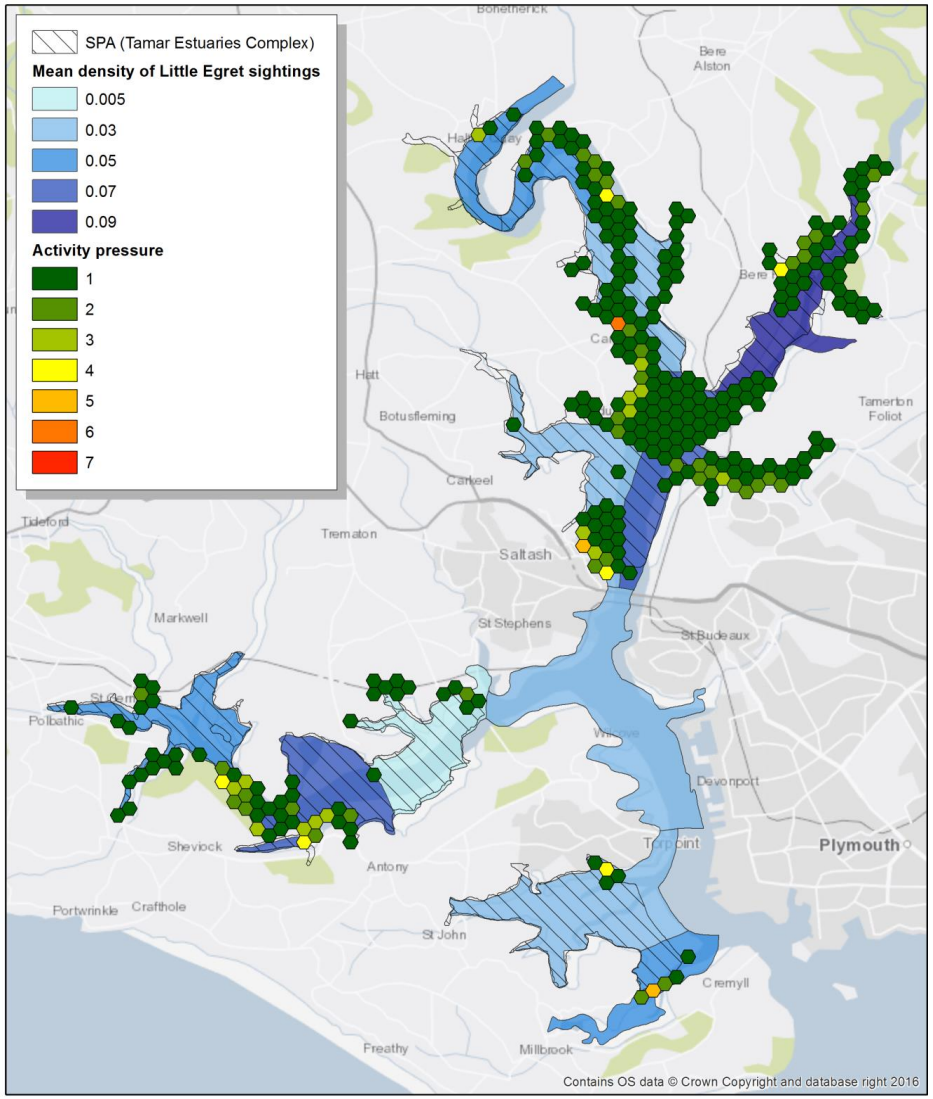

Figure 9. Mean density of Little Egret sightings overlaid with the location of recreational pressure within the Tamar Estuaries Complex SPA

3.3.2. SPA supporting habitat features sensitivity assessment

Based on the overlay hexagon analysis we have identified individual hexagon cells in which supporting habitat features and recreational activity are present, a summary of these interactions for the Tamar Estuaries Complex SPA is presented in Table 6.

Intertidal mixed sediments, Intertidal mud, Intertidal sand and muddy sand, reedbeds and Saltmarsh, all interact with a number of recreational activities considered within this assessment. Intertidal mud, Intertidal sand and muddy sand, and Saltmarsh all have a significant number of interactions. Coastal grazing marsh and Intertidal seagrass beds only interact with one recreational activity (footpaths and mooring areas respectively).

Table 6. Summary of features assessed as directly interacting with particular recreational activities within the Tamar Estuaries Complex SPA

	Coastal and floodplain grazing marsh	Intertidal mixed sediments	Intertidal mud	Intertidal sand and muddy sand	Intertidal seagrass beds	Reedbeds	Saltmarsh
Car park		X	X	X		X(NA)	X
Crab tiling		X	X	X			X
Footpaths	X(NA)	X	X	X		X(NA)	X
High Speed			X	X			X
Marina			X	X			
Mooring area		X	X	X	X	X	X
Slipway			X	X		X	X

X	Interaction present. Habitat is sensitive to at least one pressure raised by activity.	X	Interaction present. Interaction is not relevant to sensitivity assessment
X	Interaction present. Habitat is not sensitive to any pressure raised by activity.	X(NA)	Interaction present. Sensitivity not assessed but should not be excluded from future work.
	No interaction present.		

3.3.2.1. Sensitive (S)

When considering these interactions in the context of the Natural England Advice on Operations for the site (Natural England[2]) the supporting habitats were assessed as sensitive to the following pressures:

- Abrasion/disturbance of the substrate on the surface of the seabed (***All activities***)
- Introduction or spread of non-indigenous species (***All on water / boat based activities***)
- Organic enrichment (***All boat based activities***)

- Penetration and/or disturbance of the substrate below the surface of the seabed, including abrasion (***All activities***)
- Physical change (to another seabed type) (***All anchoring or mooring activities - marina, mooring area, small craft anchorage***)
- Removal of non-target species (***Footpaths and crab tiling***)

Please see Appendix D for the full Advice on Operations table.

3.3.2.2. Not sensitive (NS)

The pressures assessed as not giving rise to sensitivity across the board of Annex 1 subfeatures relate to the chemical contamination associated with all boating activities. Within this assessment those recreational activities are high speed powerboat areas, marinas, mooring areas, slipways and small craft anchorages. The Natural England specific pressures are:

- Hydrocarbon & PAH contamination. Includes those priority substances listed in Annex II of Directive 2008/105/EC.
- Synthetic compound contamination (incl. pesticides, antifoulants, pharmaceuticals). Includes those priority substances listed in Annex II of Directive 2008/105/EC.
- Transition elements & organo-metal (e.g. TBT) contamination. Includes those priority substances listed in Annex II of Directive 2008/105/EC.

Please see Appendix D for the full Advice on Operations table.

3.3.2.3. Insufficient evidence (IE)

Litter is consistently rated as having insufficient evidence to allow a sensitivity assessment within the Advice on Operations. Litter is a pressure associated with all activities.

3.3.3. SPA species sensitivity assessment: Non-breeding Avocet (*Recurvirostra avosetta*) and Non-breeding Little egret (*Egretta garzetta*)

3.3.3.1. Sensitive (S)

When considering these interactions in the context of the Natural England Advice on Operations for the site (Natural England[2]) the two bird species are assess as sensitive to the following pressures:

- Above water noise (***All activities***)
- Introduction of light (***All boat based activities***)
- Removal of non-target species (***Footpaths and crab tiling***)
- Transition elements & organo-metal (e.g. TBT) contamination. Includes those priority substances listed in Annex II of Directive 2008/105/EC. (***All boat based activities***)
- Visual disturbance (***All activities***)

Please see Appendix D for the full Advice on Operations table.

3.3.3.2. Not sensitive (NS)

The birds have been assessed as not sensitive to the introduction or spread of non-indigenous species which arises from the deployment of any craft in the water, whether sailing boat, power boat or paddle launch.

3.3.3.3. Insufficient evidence (IE)

Litter is consistently rated as having insufficient evidence to allow a sensitivity assessment within the Advice on Operations. Litter is a pressure associated with all activities. Chemical contamination arising from all boating activities is also classed as having insufficient evidence to assess, these pressures arise from high speed powerboat areas, marinas, mooring areas, slipways and small craft anchorages.

- Litter
- Hydrocarbon & PAH contamination. Includes those priority substances listed in Annex II of Directive 2008/105/EC.
- Synthetic compound contamination (incl. pesticides, antifoulants, pharmaceuticals). Includes those priority substances listed in Annex II of Directive 2008/105/EC.

Please see appendix D for the full Advice on Operations table.

3.3.3.4. Not relevant (blank)

The following pressures were assessed as not relevant under the Advice on Operations. Not relevant is defined as "The evidence base suggests that there is no interaction of concern between the pressure and the feature OR the activity and the feature could not interact":

- Abrasion/disturbance of the substrate on the surface of the seabed (***All activities***)
- Collision BELOW water with static or moving objects not naturally found in the marine environment (e.g., boats, machinery, and structures)
- Organic enrichment (***All boat based activities***)
- Penetration and/or disturbance of the substrate below the surface of the seabed, including abrasion (***All activities***)
- Physical change (to another seabed type) (***All anchoring or mooring activities - marina, mooring area, small craft anchorage***)
- Underwater noise changes (***All activities***)

Please see appendix D for the full Advice on Operations table.

4. Conclusions and Recommendations

The following points should be taken into consideration when planning the next phases of the recreational assessment for the Plymouth Sound and Estuaries European Marine Site.

- Update the 1999 Natural England EMS habitat features map with the data drawn on within this report and any additional data that may be relevant, in consultation with Devon and Severn IFCA and Natural England
- Include habitat quality information from monitoring activities within the EMS
- Consider extending the assessment to the Start Point to Eddystone and Plymouth Sound SAC
- Include additional recreational activities: Diving / Snorkelling; sailing areas; deep water channel; recreational angling; bait digging; stand up paddle boarding; Kayak; gig racing
- Full recreational use assessment to be undertaken at key sites across the EMS to gauge actual recreational intensity and identify additional activities taking place within the area.

5. References

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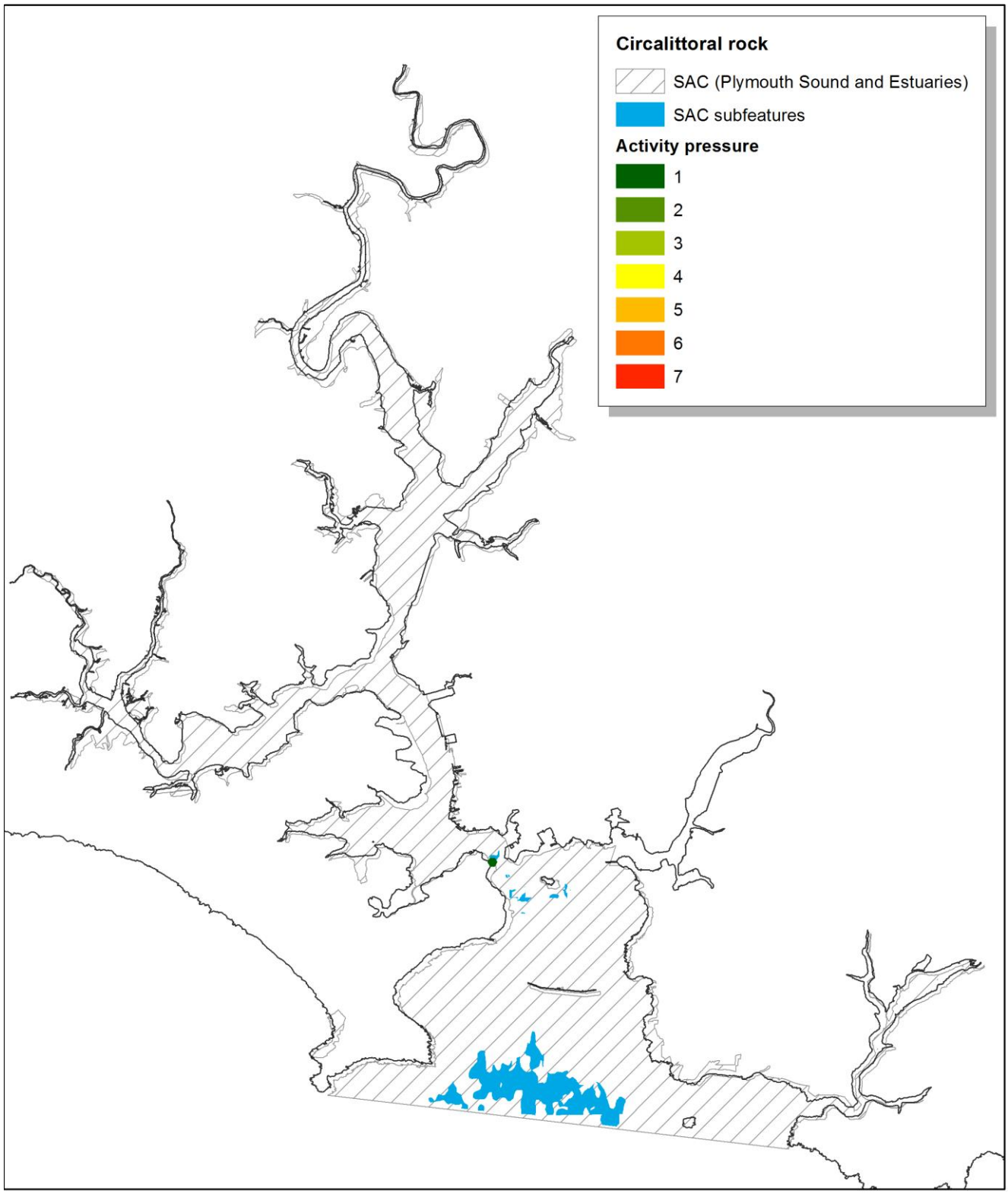
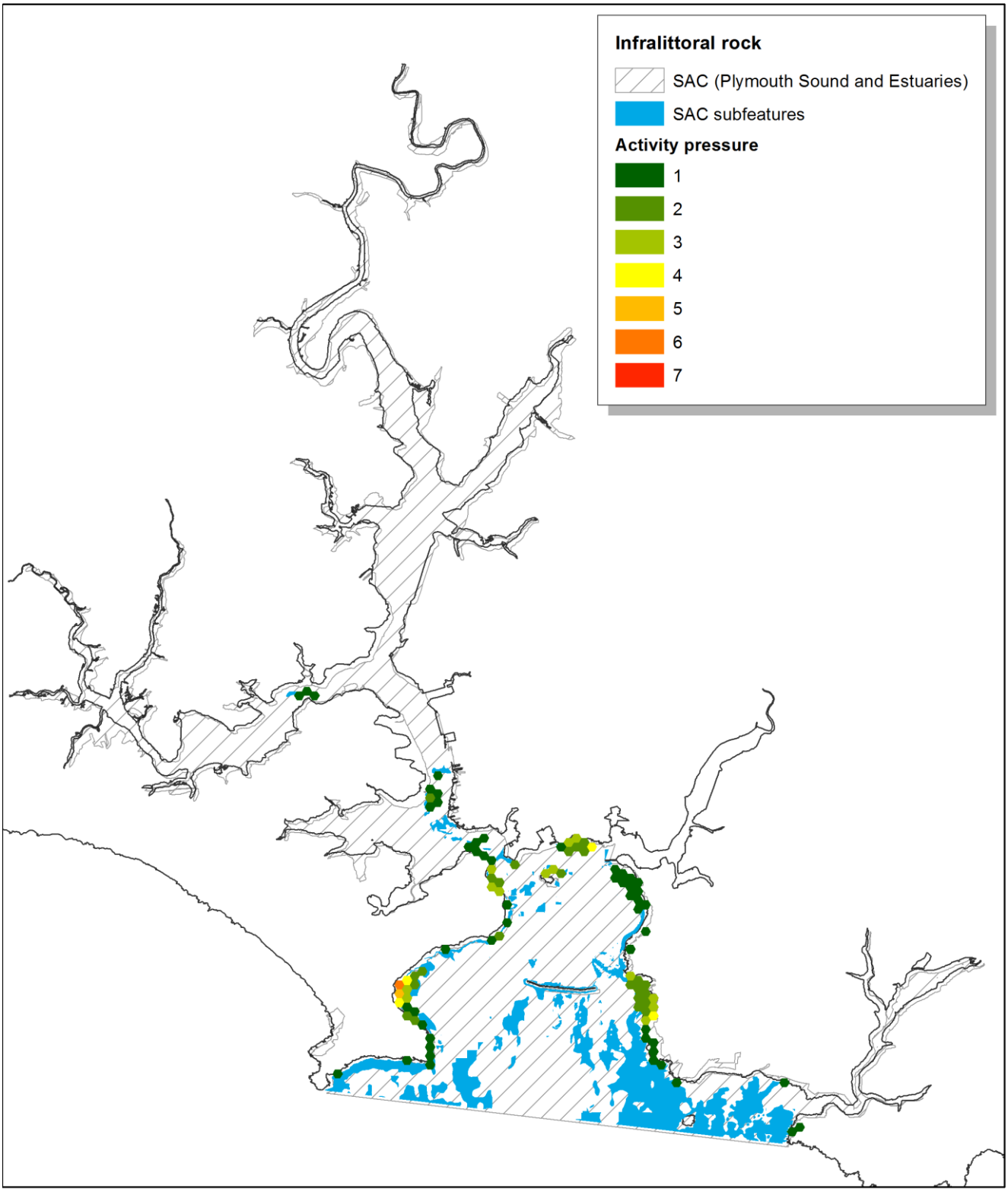
Appendix A. Habitat / Activity interaction maps for the Plymouth Sound and Estuaries SAC




Infralittoral rock
SAC (Plymouth Sound and Estuaries)
SAC subfeatures
Activity pressure
1
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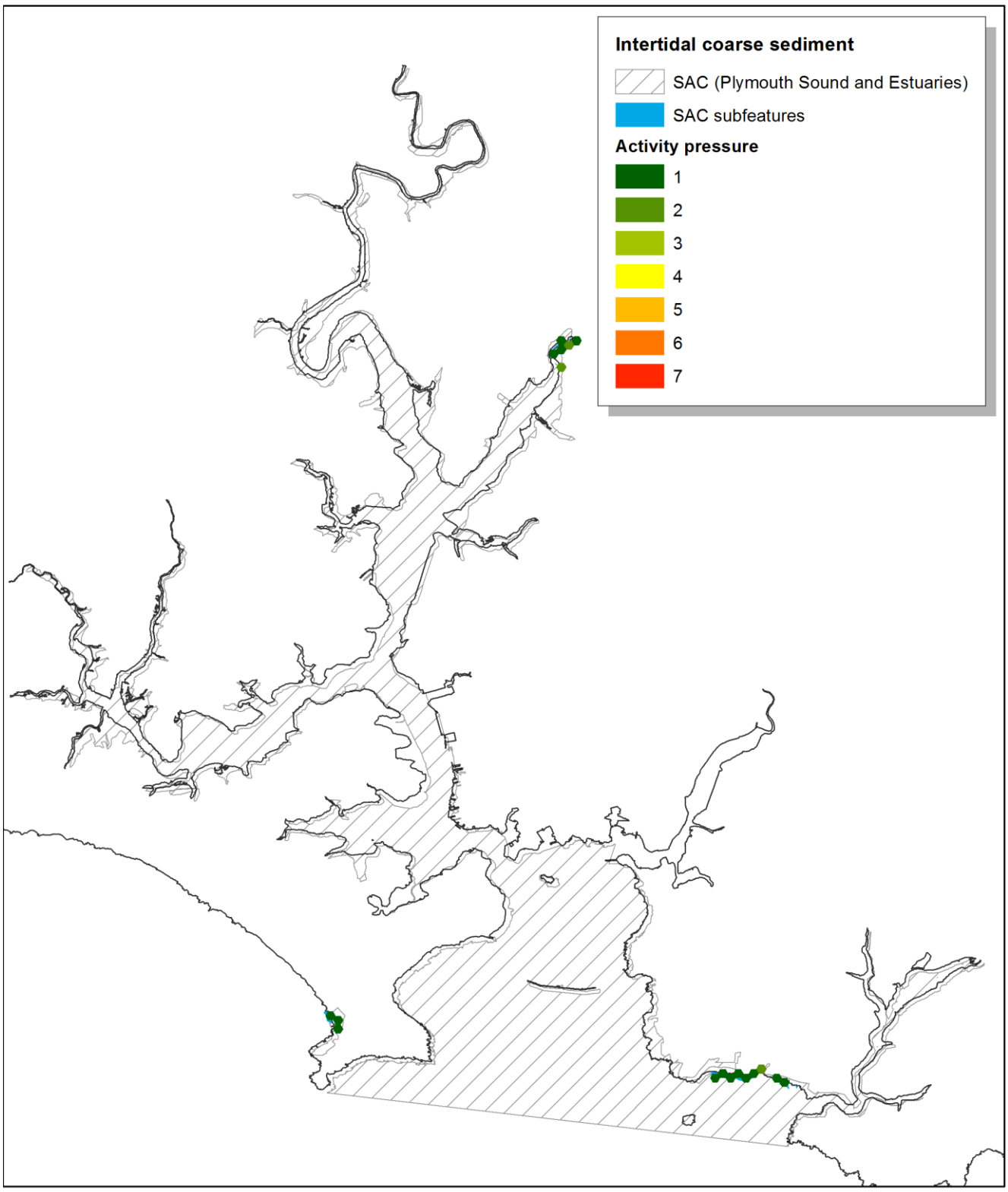
Intertidal coarse sediment
SAC (Plymouth Sound and Estuaries)
SAC subfeatures
Activity pressure
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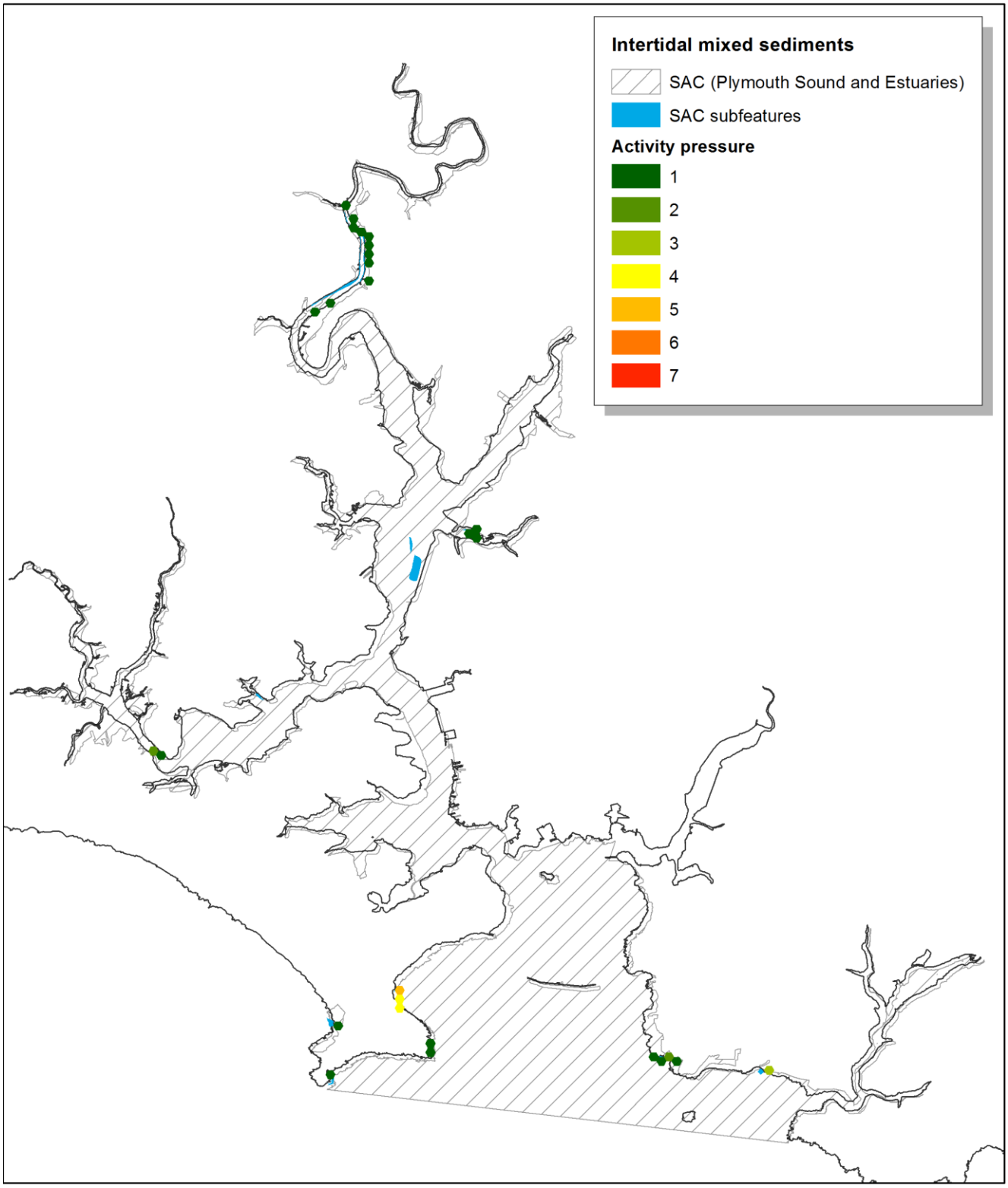
Intertidal mixed sediments
SAC (Plymouth Sound and Estuaries)
SAC subfeatures
Activity pressure
1
2
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4
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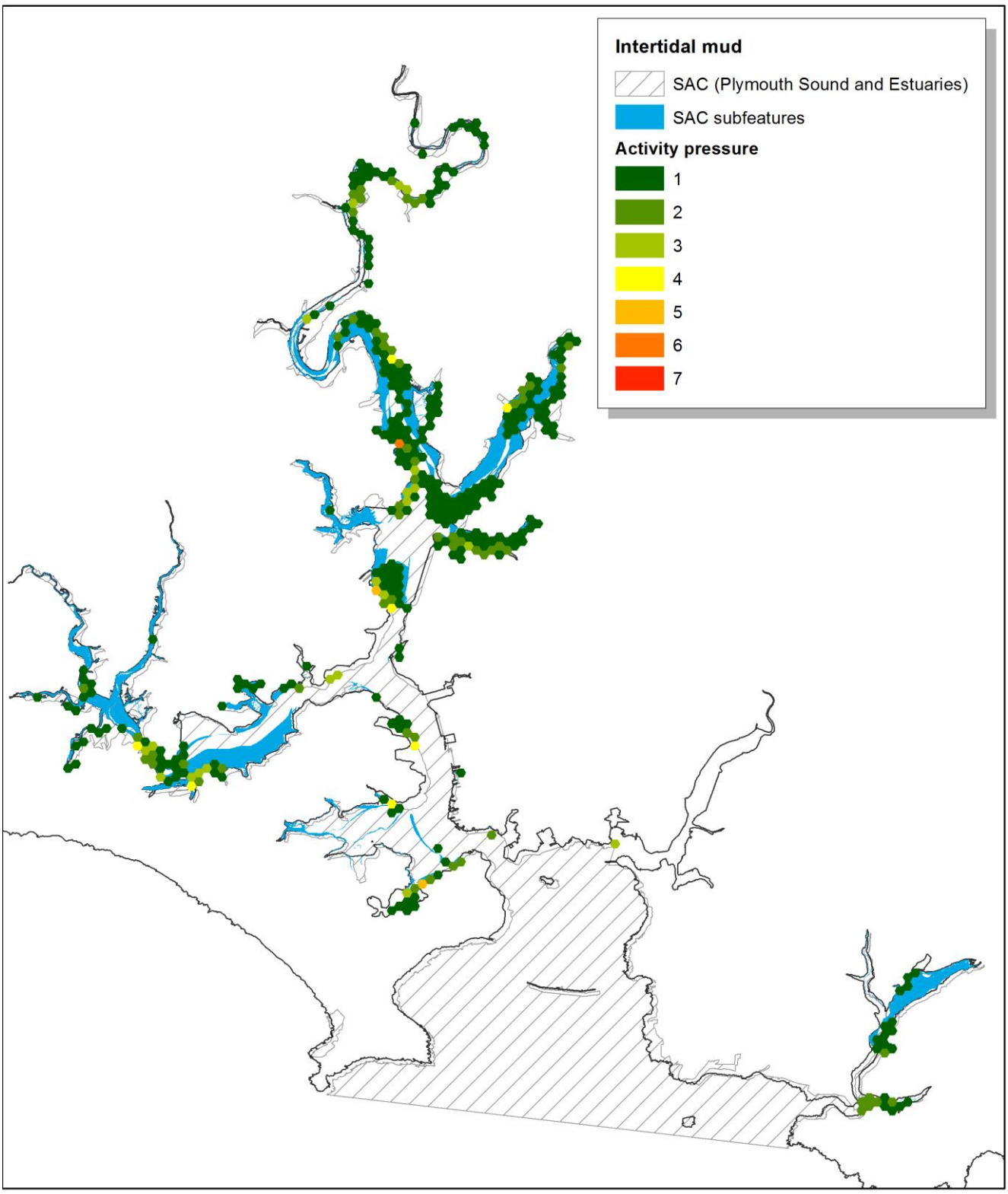
Intertidal mud
SAC (Plymouth Sound and Estuaries)
SAC subfeatures
Activity pressure
1
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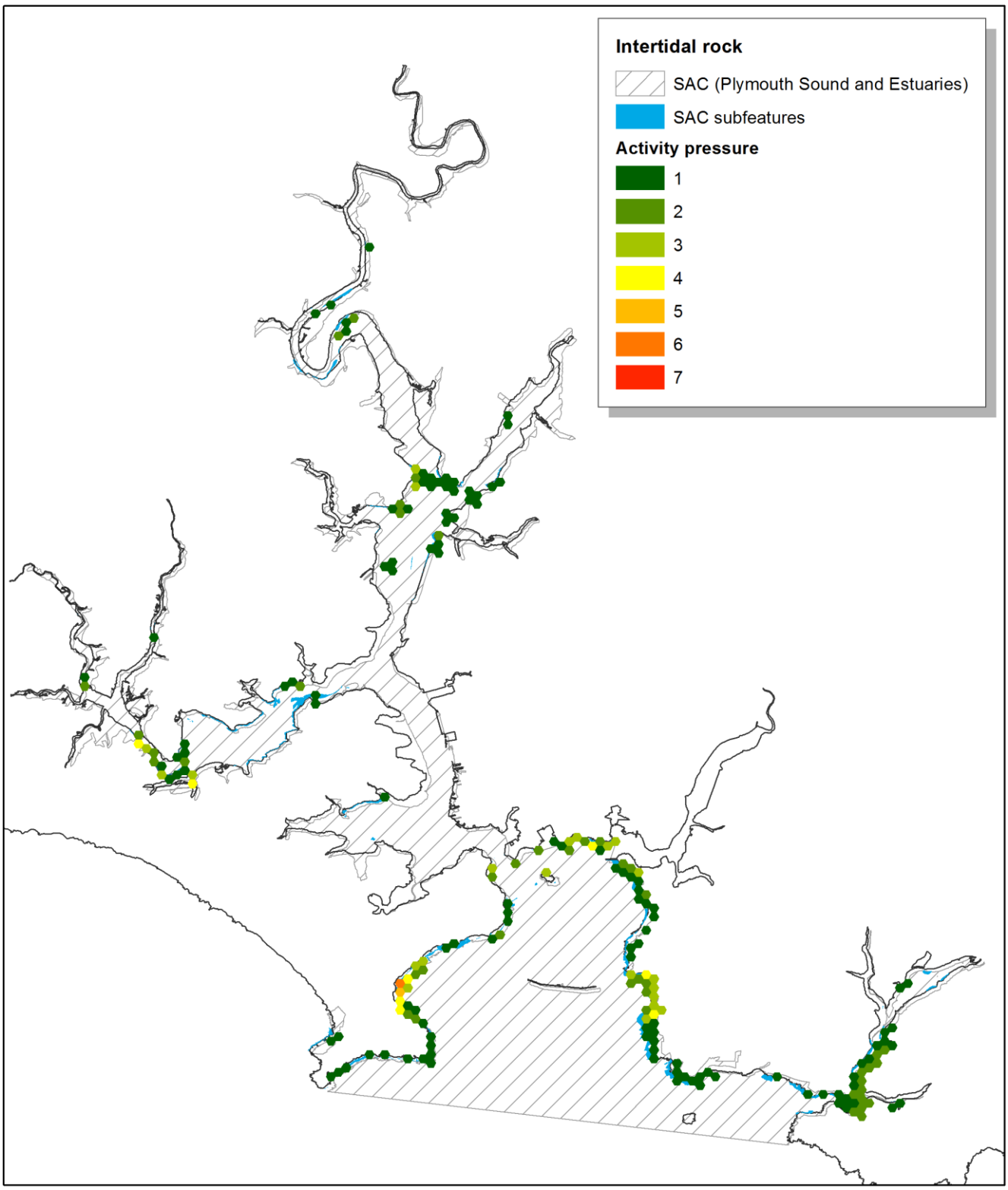
Intertidal rock
SAC (Plymouth Sound and Estuaries)
SAC subfeatures
Activity pressure
1
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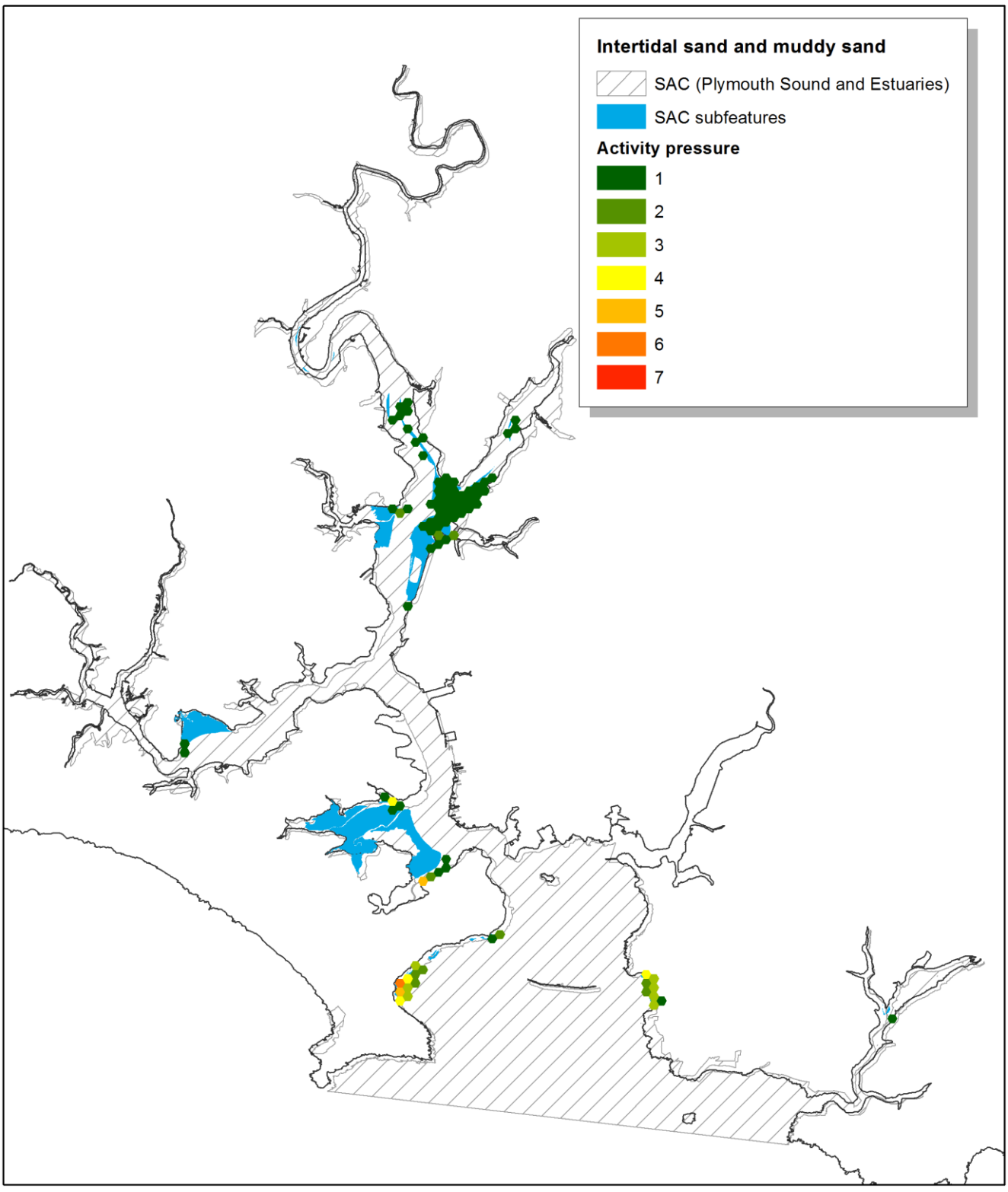
Intertidal sand and muddy sand
SAC (Plymouth Sound and Estuaries)
SAC subfeatures
Activity pressure
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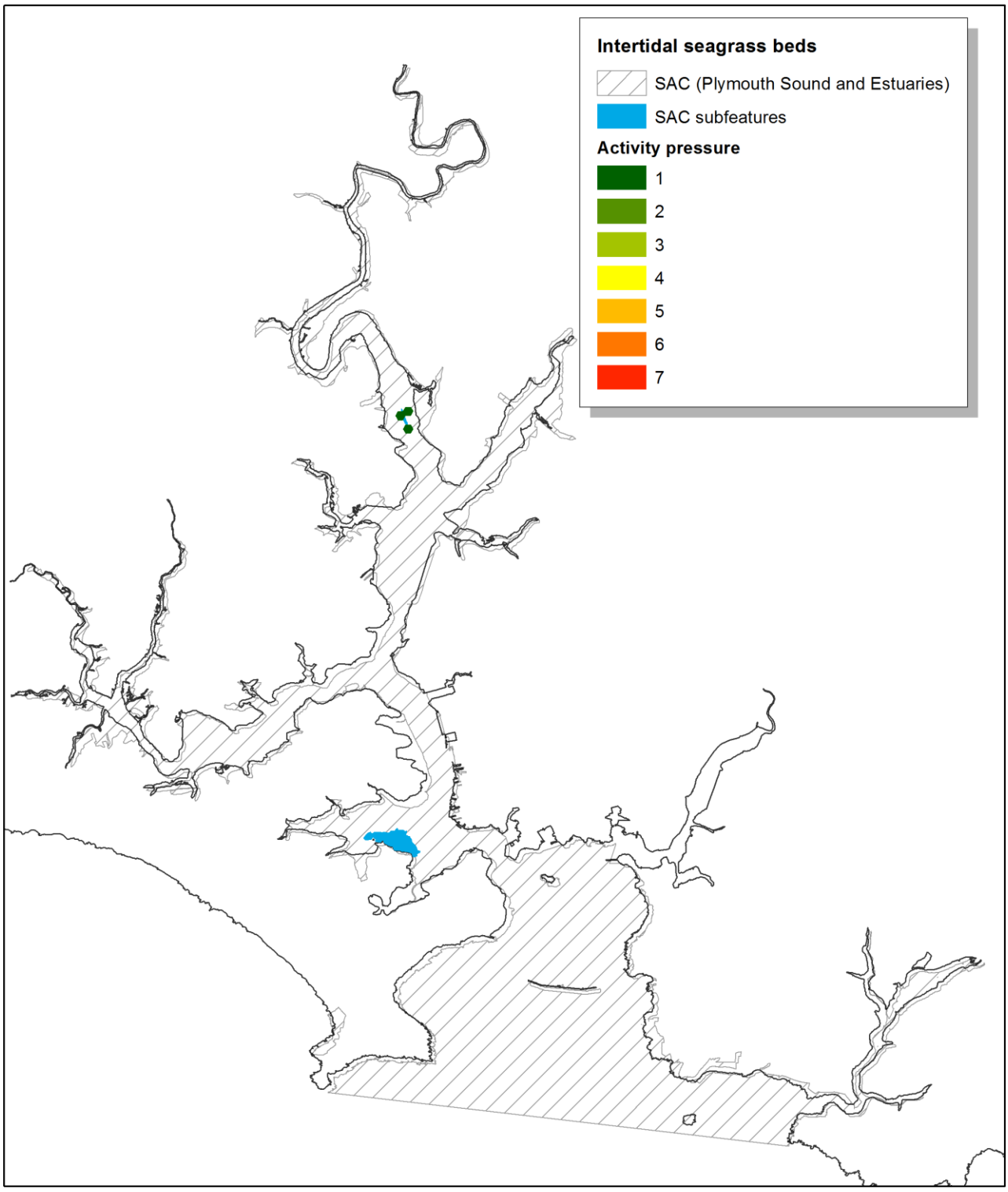
Intertidal seagrass beds
SAC (Plymouth Sound and Estuaries)
SAC subfeatures
Activity pressure
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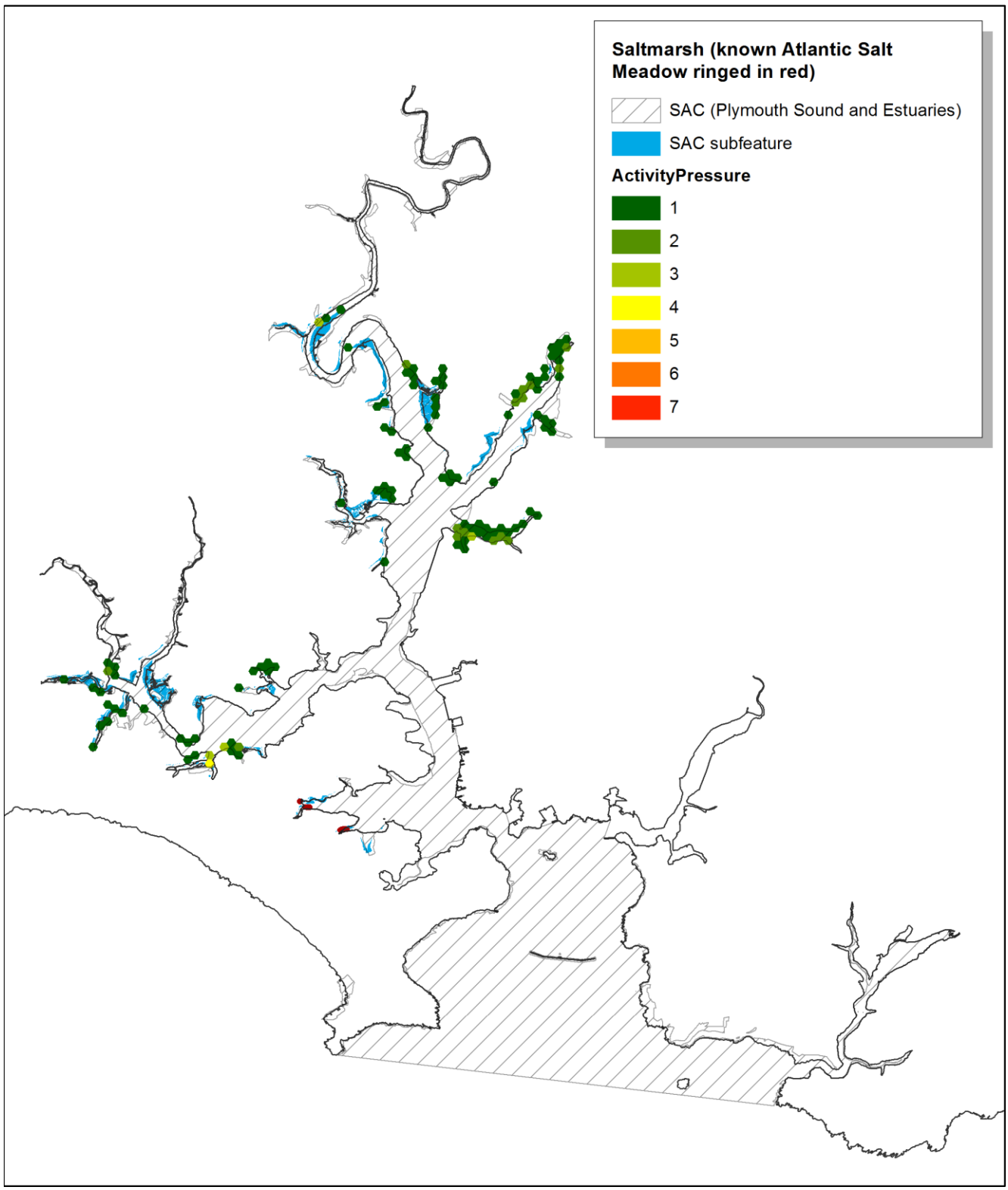
Saltmarsh (known Atlantic Salt Meadow ringed in red)
SAC (Plymouth Sound and Estuaries)
SAC subfeature
ActivityPressure
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6
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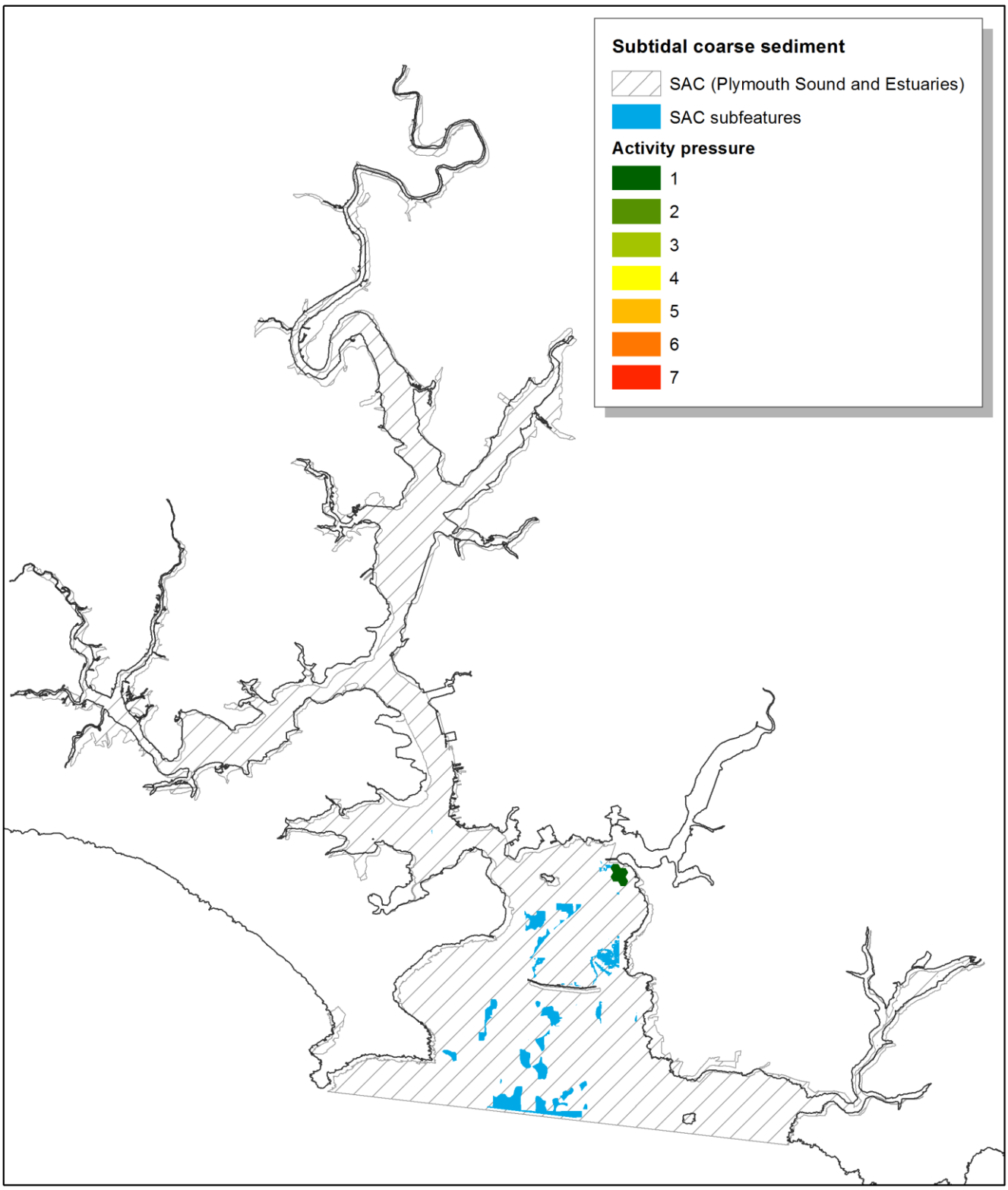
Subtidal coarse sediment
SAC (Plymouth Sound and Estuaries)
SAC subfeatures
Activity pressure
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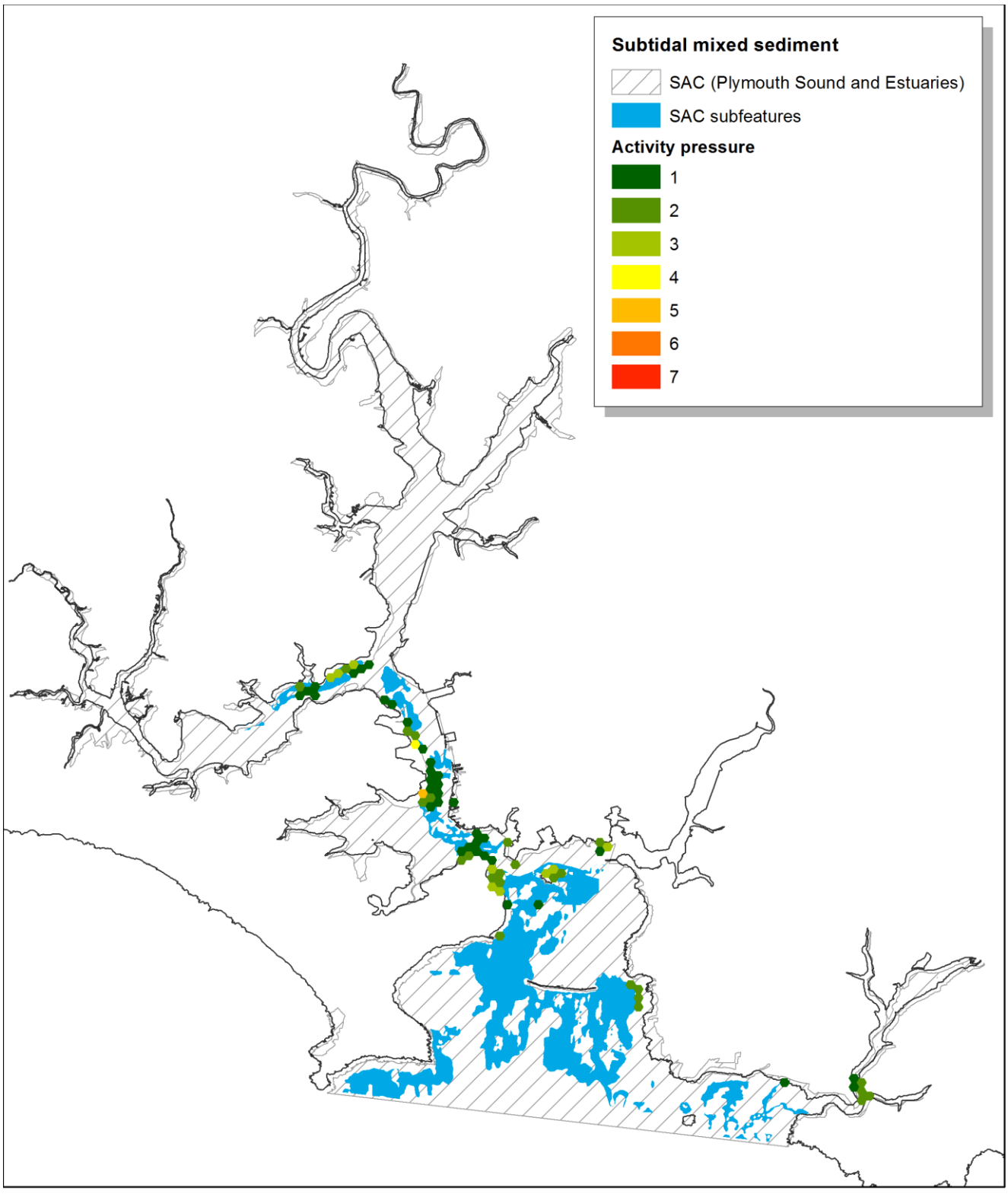
Subtidal mixed sediment
SAC (Plymouth Sound and Estuaries)
SAC subfeatures
Activity pressure
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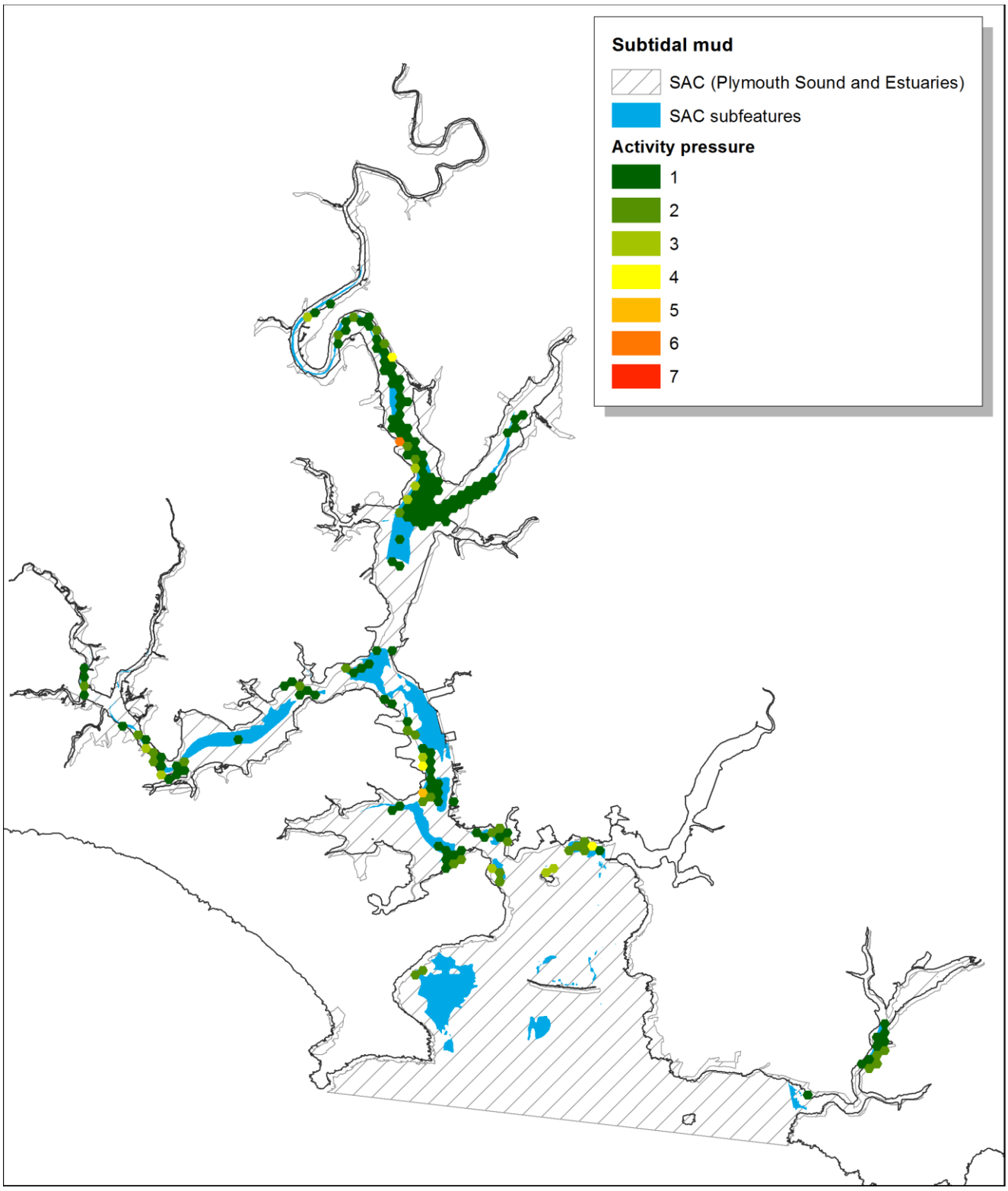
Subtidal mud
SAC (Plymouth Sound and Estuaries)
SAC subfeatures
Activity pressure
1
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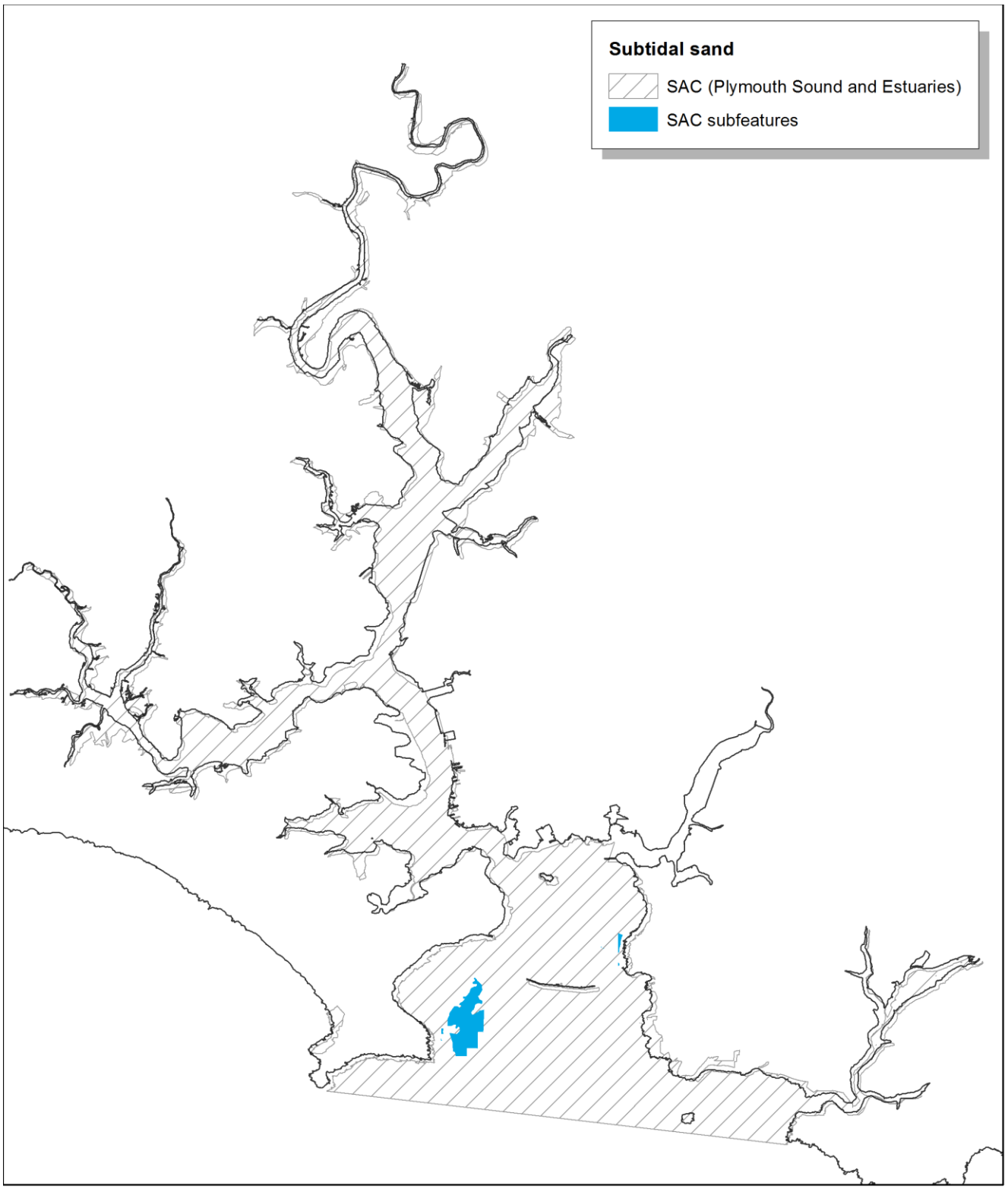
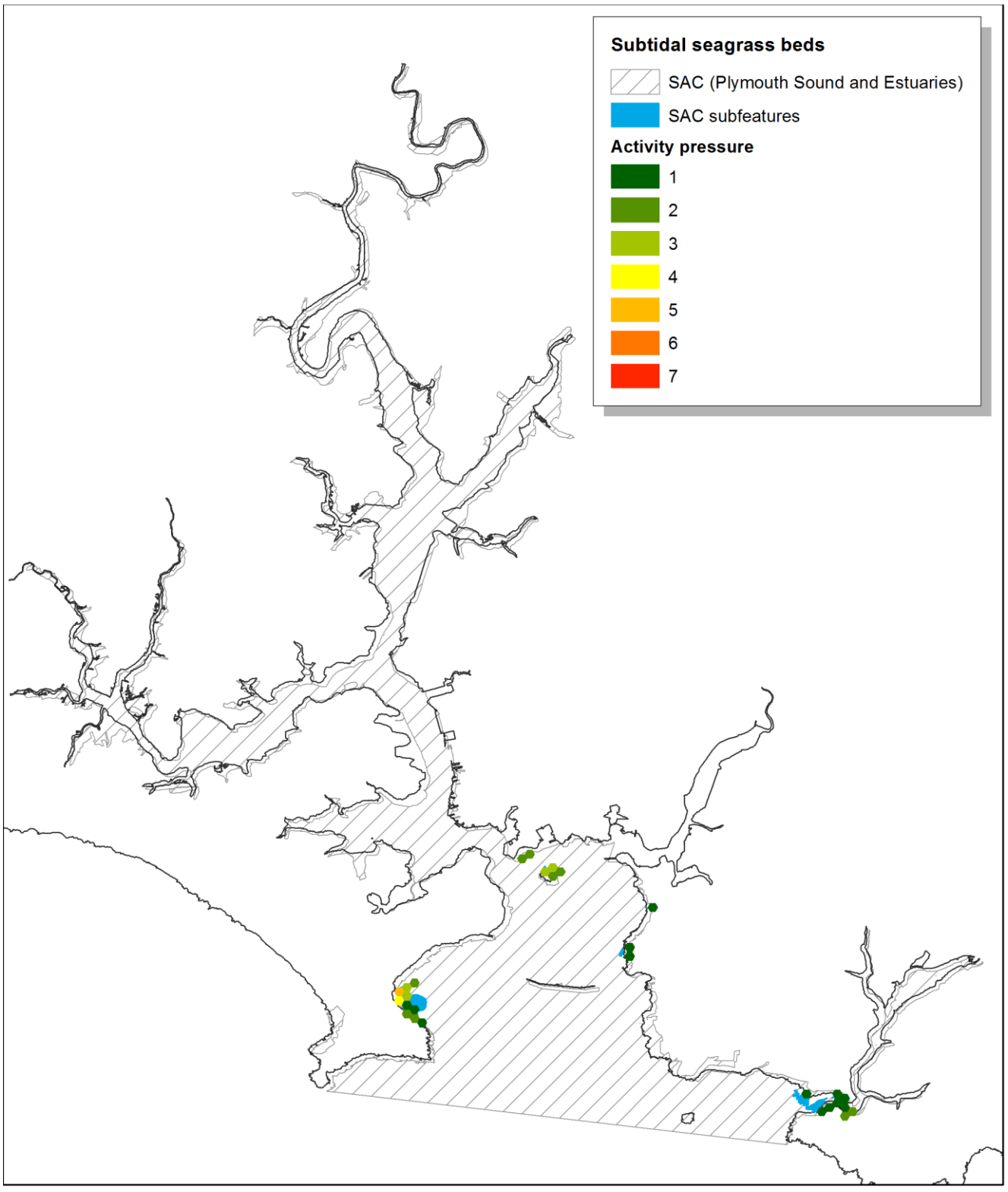

Subtidal sand
SAC (Plymouth Sound and Estuaries)
SAC subfeatures


Subtidal seagrass beds
SAC (Plymouth Sound and Estuaries)
SAC subfeatures
Activity pressure
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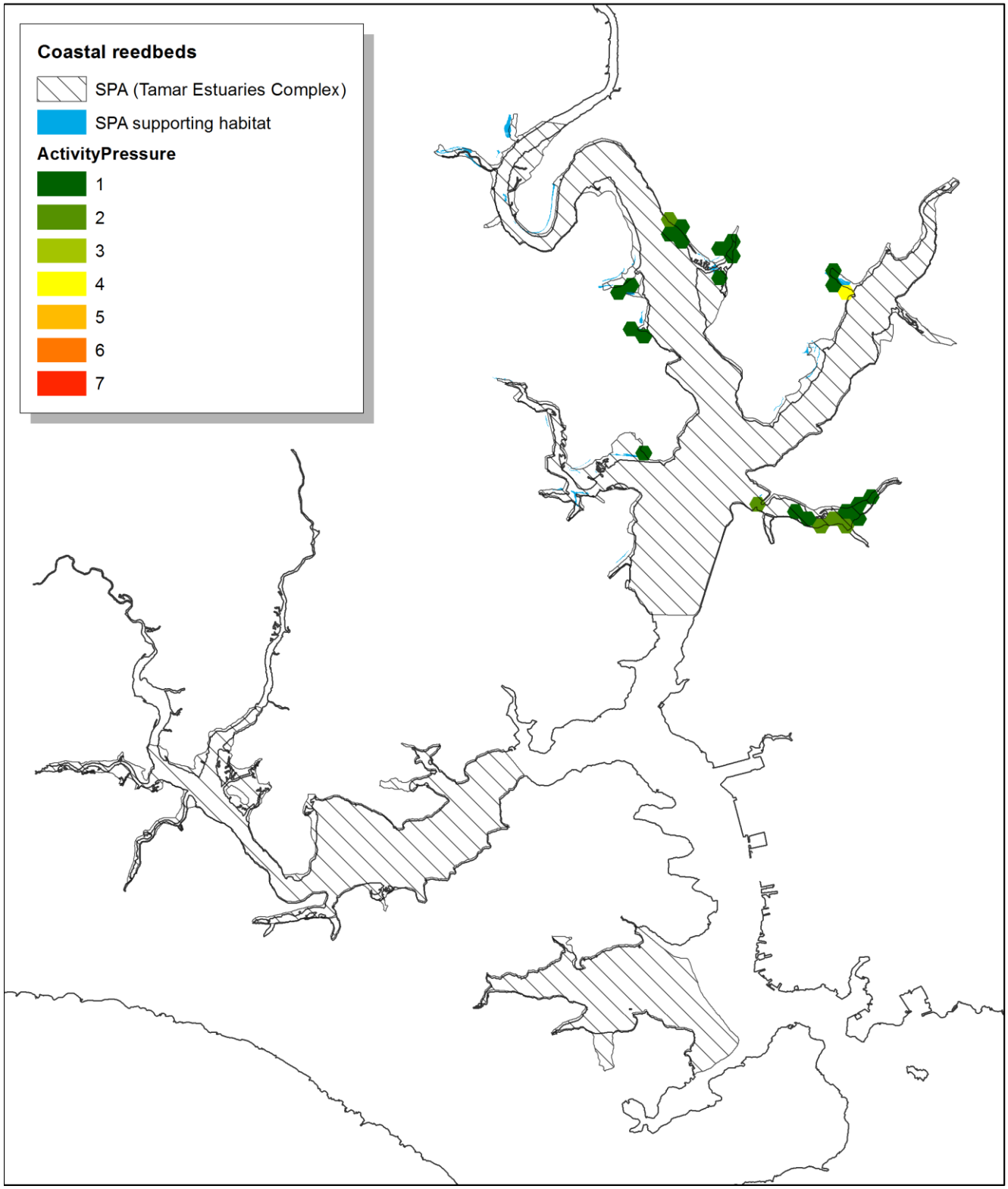
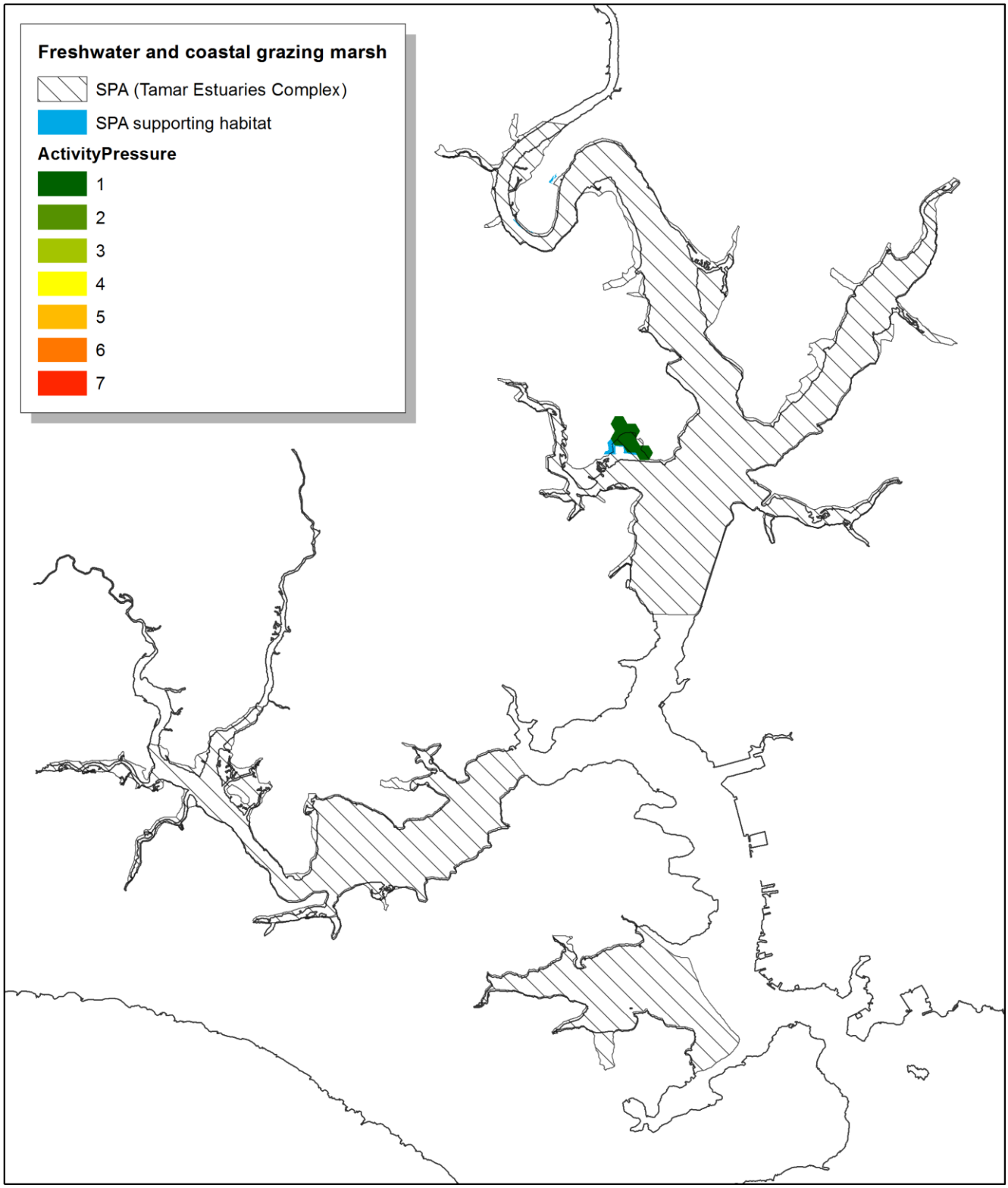
Appendix B. Habitat / Activity interaction maps for the Tamar Estuaries Complex SPA




Freshwater and coastal grazing marsh
SPA (Tamar Estuaries Complex)
SPA supporting habitat
ActivityPressure
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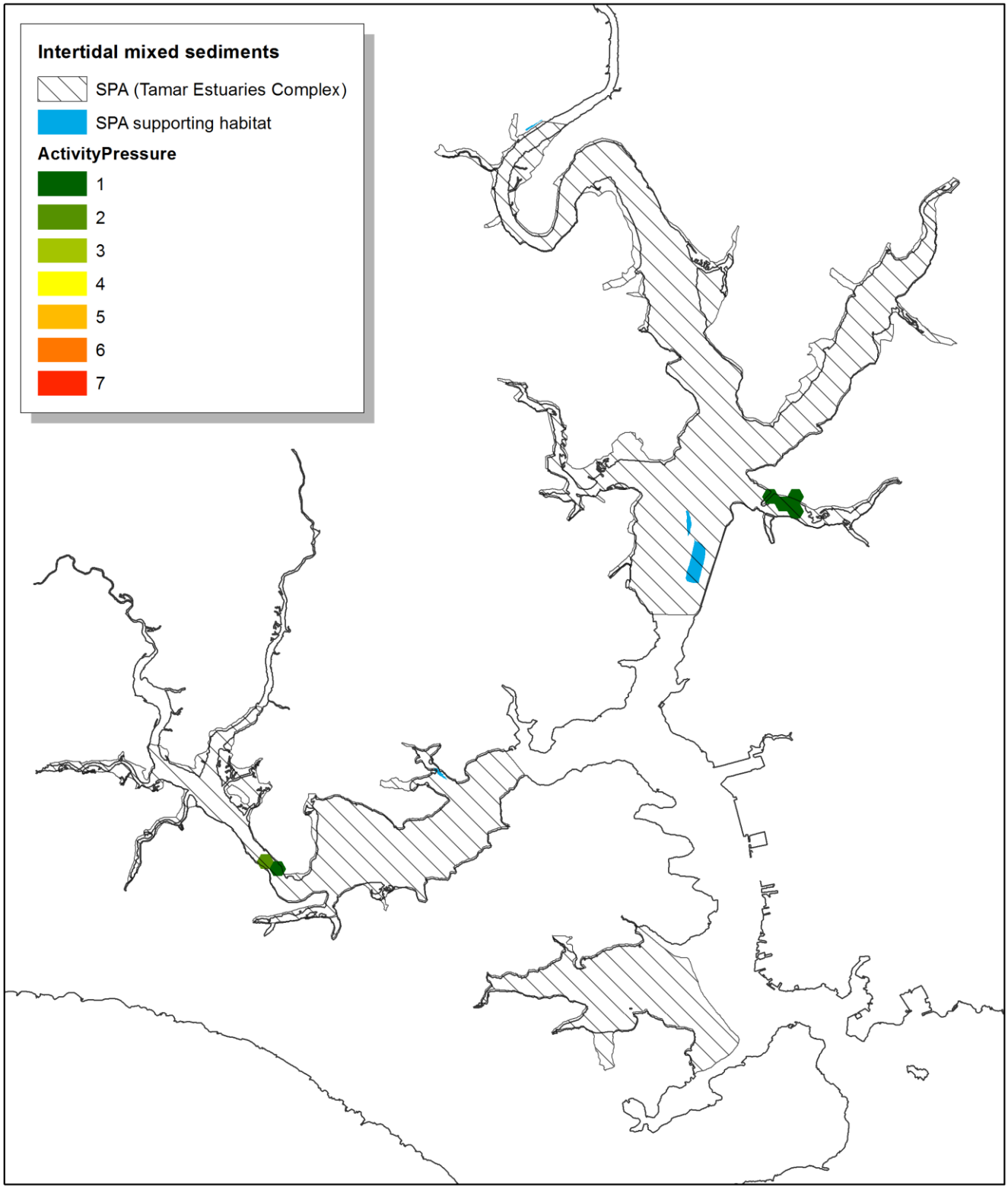
Intertidal mixed sediments
SPA (Tamar Estuaries Complex)
SPA supporting habitat
ActivityPressure
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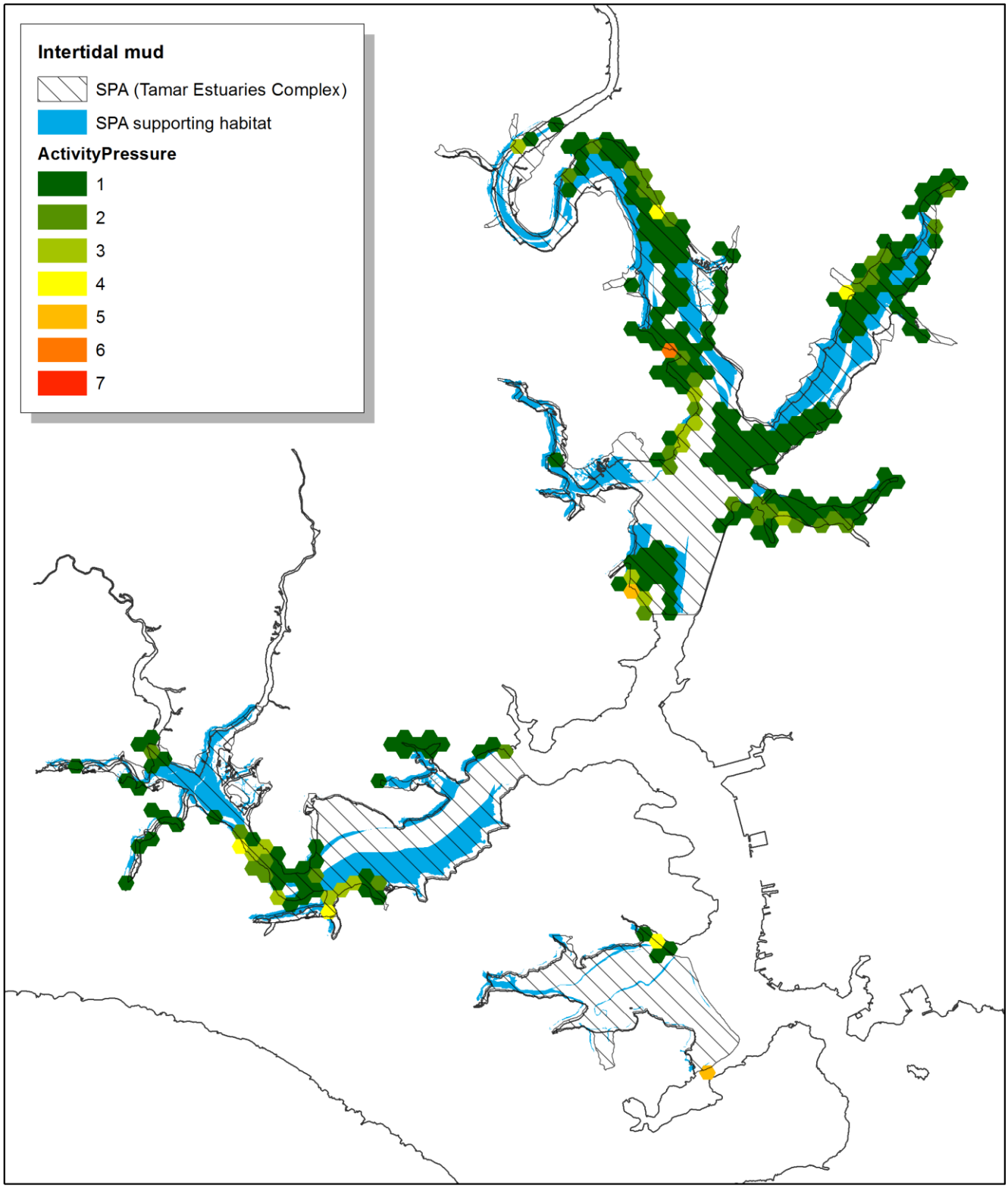
Intertidal mud
SPA (Tamar Estuaries Complex)
SPA supporting habitat
ActivityPressure
1
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4
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6
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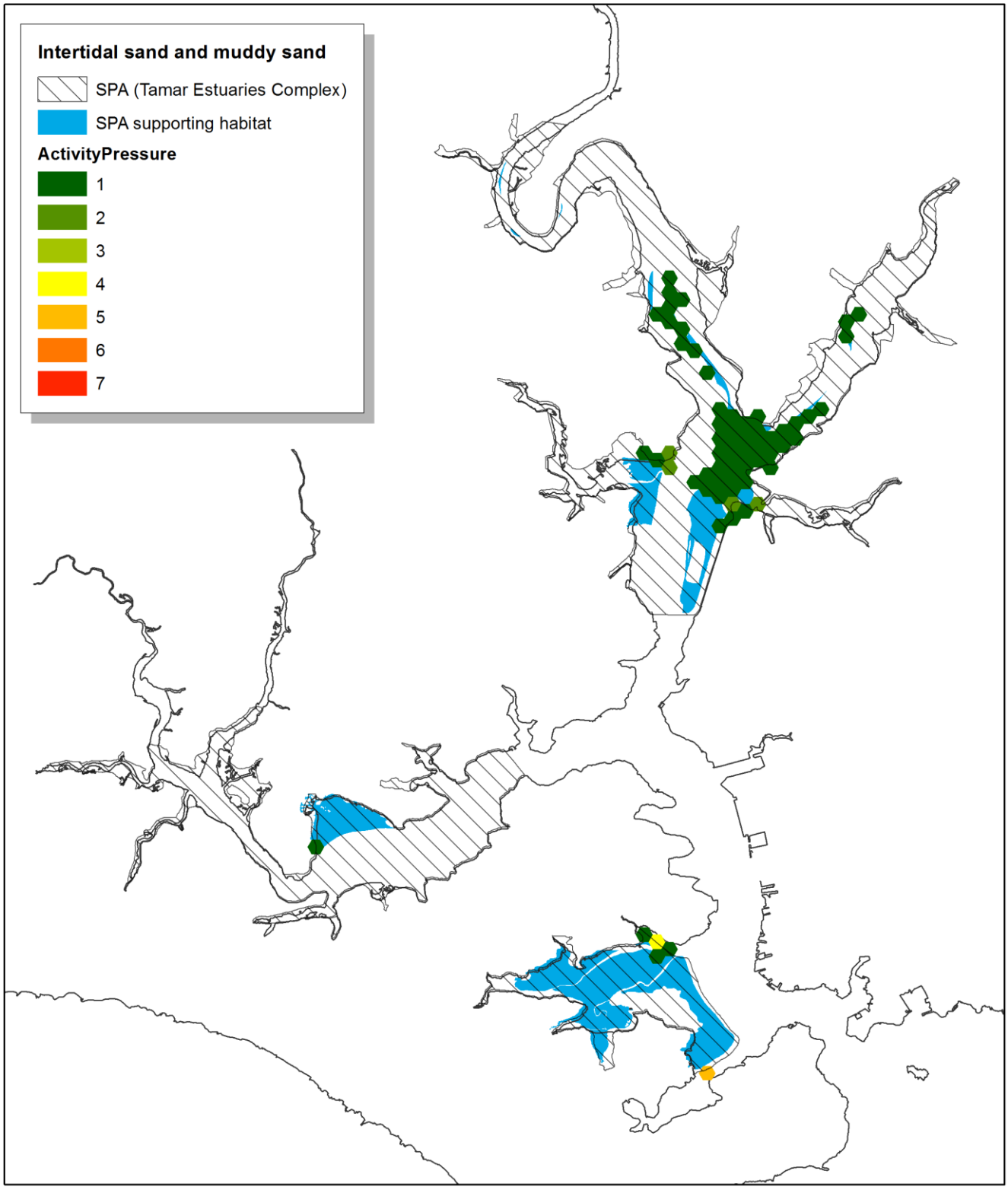
Intertidal sand and muddy sand
SPA (Tamar Estuaries Complex)
SPA supporting habitat
ActivityPressure
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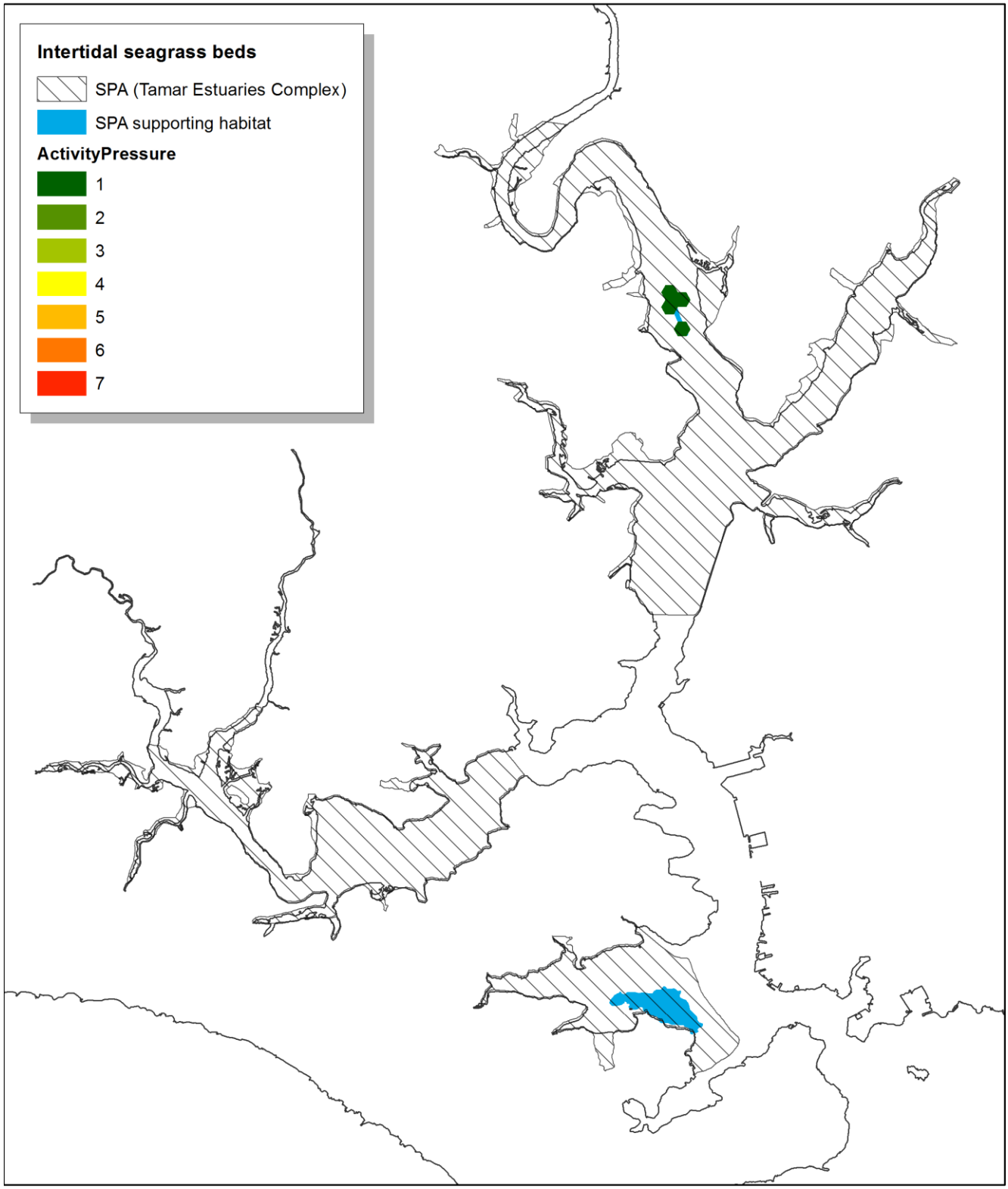
Intertidal seagrass beds
SPA (Tamar Estuaries Complex)
SPA supporting habitat
ActivityPressure
1
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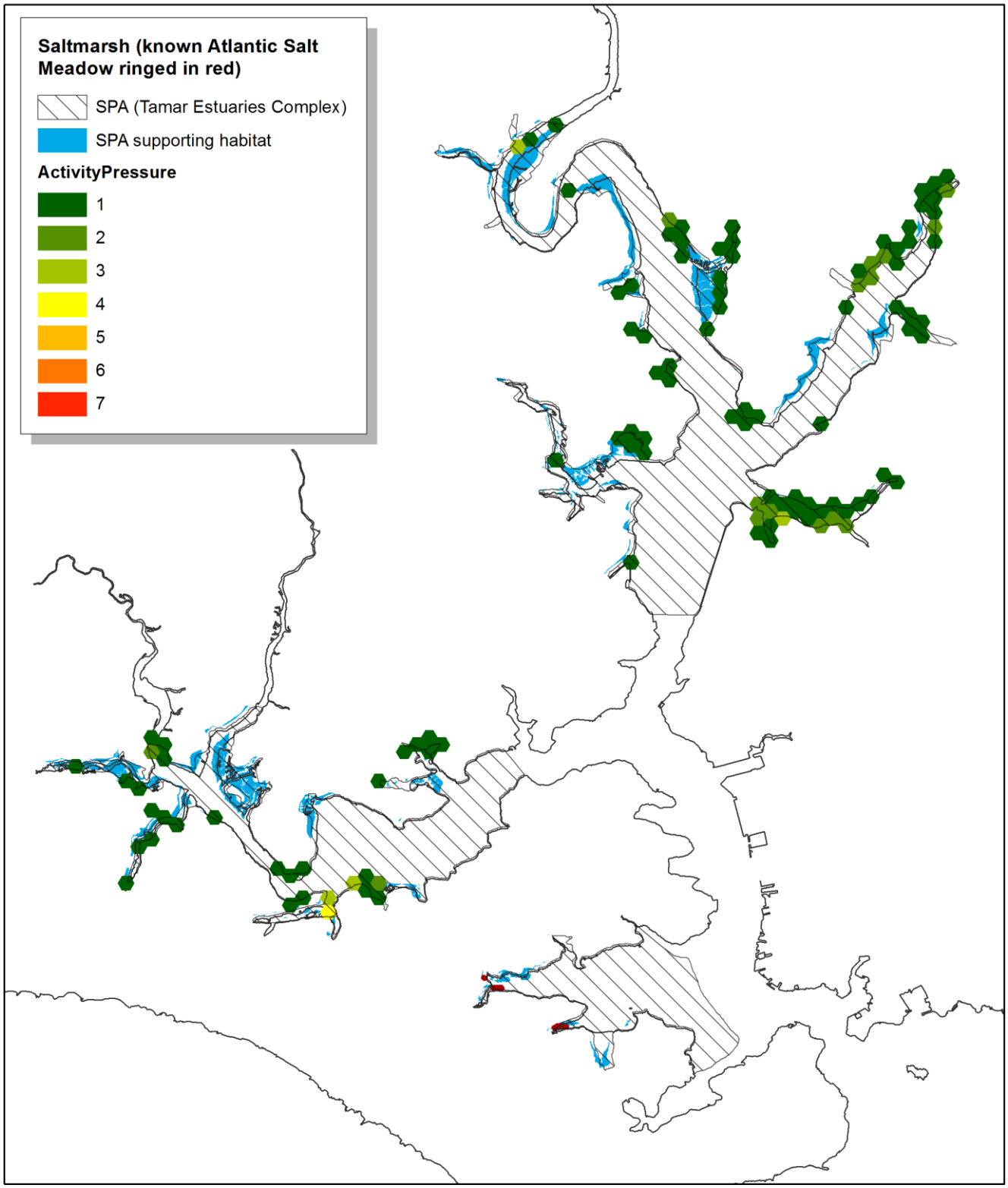
Saltmarsh (known Atlantic Salt Meadow ringed in red)
SPA (Tamar Estuaries Complex)
SPA supporting habitat
ActivityPressure
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Appendix C. Natural England Regulation 33 Advice on Operations sensitivity for all species and habitat sub-features of the Plymouth Sound and Estuaries Special Area of Conservation

Council Activity	NE activity	Pressure	Allis shad (Alosa alosa)	Atlantic salt meadows (Glauco-Puccinellietalia maritimae)	Circalittoral rock	Infralittoral rock	Intertidal coarse sediment	Intertidal mixed sediments	Intertidal mud	Intertidal rock	Intertidal sand and muddy sand	Intertidal seagrass beds	Shore dock (Rumex rupestris)	Subtidal coarse sediment	Subtidal mixed sediments	Subtidal mud	Subtidal sand	Subtidal seagrass beds
Footpaths	Horse riding & dog walking	Abrasion/disturbance of the substrate on the surface of the seabed		S			NS	S	S	S	S	S	NA					
		Litter		IE			IE	IE	IE	IE	IE	IE	NA					
		Organic enrichment		S			IE	IE	NS	S	IE	S	NA					
		Penetration and/or disturbance of the substrate below the surface of the seabed, including abrasion		S			NS	S	S	S	S	S	NA					
		Removal of non-target species										S	NA					
Small craft anchorage / mooring area / marina / yacht anchorage / slipways / on water participation	Hovercraft	Abrasion/disturbance of the substrate on the surface of the seabed		S		S	NS	S	S	S	S	S	NA	S	S	S	S	S
		Hydrocarbon & PAH contamination. Includes those priority substances listed in Annex II of Directive 2008/105/EC.	IE	NS		NS	NS	NS	NS	IE	NS	NS	NA	NS	NS	IE	NS	NS
		Introduction or spread of non-indigenous species	IE	S		S	IE	S	IE	S	S	S	NA	IE	S	S	S	S
		Litter	IE	IE		IE	IE	IE	IE	IE	IE	IE	NA	IE	IE	IE	IE	IE
		Penetration and/or disturbance of the substrate below the surface of the seabed, including abrasion		S		S	NS	S	S	S	S	S	NA	S	S	S	S	S
		Synthetic compound contamination (incl. pesticides, antifoulants, pharmaceuticals). Includes those priority substances listed in Annex II of Directive 2008/105/EC.	IE	NS		NS	IE	NS	NS	IE	NS	NS	NA	NS	NS	IE	NS	NS
		Transition elements & organo-metal (e.g. TBT) contamination. Includes those priority substances listed in Annex II of Directive 2008/105/EC.	IE	NS		NS	IE	NS	NS	IE	NS	NS	NA	NS	NS	IE	NS	NS
		Underwater noise changes	S															
		Visual disturbance	IE															
Swimming / crab tiling	Leisure (e.g. swimming, rock pooling)	Abrasion/disturbance of the substrate on the surface of the seabed		S			NS	S	S	S	S	S						
		Litter		IE			IE	IE	IE	IE	IE	IE						
		Penetration and/or disturbance of the substrate below the surface of the seabed, including abrasion		S			NS	S	S	S	S	S						

Council Activity	NE activity	Pressure	Allis shad (Alosa alosa)	Atlantic salt meadows (Glauco-Puccinellietalia maritimae)	Circalittoral rock	Infralittoral rock	Intertidal coarse sediment	Intertidal mixed sediments	Intertidal mud	Intertidal rock	Intertidal sand and muddy sand	Intertidal seagrass beds	Shore dock (Rumex rupestris)	Subtidal coarse sediment	Subtidal mixed sediments	Subtidal mud	Subtidal sand	Subtidal seagrass beds
slipways / on water participation	Non-motorised water craft (e.g. kayaks, windsurfing, dinghies)	Abrasion/disturbance of the substrate on the surface of the seabed		S			NS	S	S	S	S	S						
		Introduction or spread of non-indigenous species		S			IE	S	IE	S	S	S						
		Litter		IE			IE	IE	IE	IE	IE	IE						
		Penetration and/or disturbance of the substrate below the surface of the seabed, including abrasion		S			NS	S	S	S	S	S						
slipways / on water participation	Powerboating or sailing with an engine: launching and recovery, participation	Abrasion/disturbance of the substrate on the surface of the seabed		S		S	NS	S	S	S	S	S	NA	S	S	S	S	S
		Collision BELOW water with static or moving objects not naturally found in the marine environment (e.g., boats, machinery, and structures)	S															
		Hydrocarbon & PAH contamination. Includes those priority substances listed in Annex II of Directive 2008/105/EC.	IE	NS		NS	NS	NS	NS	IE	NS	NS	NA	NS	NS	IE	NS	NS
		Introduction of light											NA					
		Introduction or spread of non-indigenous species	IE	S		S	IE	S	IE	S	S	S	NA	IE	S	S	S	S
		Litter	IE	IE		IE	IE	IE	IE	IE	IE	IE	NA	IE	IE	IE	IE	IE
		Penetration and/or disturbance of the substrate below the surface of the seabed, including abrasion		S		S	NS	S	S	S	S	S	NA	S	S	S	S	S
		Synthetic compound contamination (incl. pesticides, antifoulants, pharmaceuticals). Includes those priority substances listed in Annex II of Directive 2008/105/EC.	IE	NS		NS	IE	NS	NS	IE	NS	NS	NA	NS	NS	IE	NS	NS
		Transition elements & organo-metal (e.g. TBT) contamination. Includes those priority substances listed in Annex II of Directive 2008/105/EC.	IE	NS		NS	IE	NS	NS	IE	NS	NS	NA	NS	NS	IE	NS	NS
		Underwater noise changes	S															
		Visual disturbance	IE															
Small craft anchorage / mooring area / marina / yacht anchorage / slipways	Powerboating or sailing with an engine: mooring and/or anchoring	Abrasion/disturbance of the substrate on the surface of the seabed			S	S	NS	S	S	S	S	S		S	S	S	S	S
		Hydrocarbon & PAH contamination. Includes those priority substances listed in Annex II of Directive 2008/105/EC.	IE		IE	NS	NS	NS	NS	IE	NS	NS		NS	NS	IE	NS	NS
		Introduction or spread of non-indigenous species	IE		S	S	IE	S	IE	S	S	S		IE	S	S	S	S

Council Activity	NE activity	Pressure	Allis shad (Alosa alosa)	Atlantic salt meadows (Glauco-Puccinellietalia maritimae)	Circalittoral rock	Infralittoral rock	Intertidal coarse sediment	Intertidal mixed sediments	Intertidal mud	Intertidal rock	Intertidal sand and muddy sand	Intertidal seagrass beds	Shore dock (Rumex rupestris)	Subtidal coarse sediment	Subtidal mixed sediments	Subtidal mud	Subtidal sand	Subtidal seagrass beds
		Litter	IE		IE	IE	IE	IE	IE	IE	IE	IE		IE	IE	IE	IE	IE
		Organic enrichment			S	S	IE	IE	NS	S	IE	S		S	IE	S	S	S
		Penetration and/or disturbance of the substrate below the surface of the seabed, including abrasion			S	S	NS	S	S	S	S	S		S	S	S	S	S
		Physical change (to another seabed type)			S	S	S	S	S	S	S	S		S	S	S	S	S
		Synthetic compound contamination (incl. pesticides, antifoulants, pharmaceuticals). Includes those priority substances listed in Annex II of Directive 2008/105/EC.	IE		IE	NS	IE	NS	NS	IE	NS	NS		NS	NS	IE	NS	NS
		Transition elements & organo-metal (e.g. TBT) contamination. Includes those priority substances listed in Annex II of Directive 2008/105/EC.	IE		IE	NS	IE	NS	NS	IE	NS	NS		NS	NS	IE	NS	NS
		Visual disturbance	IE															
slipways / on water participation	Sailing without an engine: launching and recovery, participation	Abrasion/disturbance of the substrate on the surface of the seabed		S		S	NS	S	S	S	S	S	NA	S	S	S	S	S
		Collision BELOW water with static or moving objects not naturally found in the marine environment (e.g., boats, machinery, and structures)	S															
		Introduction of light											NA					
		Introduction or spread of non-indigenous species	IE	S		S	IE	S	IE	S	S	S	NA	IE	S	S	S	S
		Litter	IE	IE		IE	IE	IE	IE	IE	IE	IE	NA	IE	IE	IE	IE	IE
		Penetration and/or disturbance of the substrate below the surface of the seabed, including abrasion		S		S	NS	S	S	S	S	S	NA	S	S	S	S	S
		Synthetic compound contamination (incl. pesticides, antifoulants, pharmaceuticals). Includes those priority substances listed in Annex II of Directive 2008/105/EC.	IE	NS		NS	IE	NS	NS	IE	NS	NS	NA	NS	NS	IE	NS	NS
		Transition elements & organo-metal (e.g. TBT) contamination. Includes those priority substances listed in Annex II of Directive 2008/105/EC.	IE	NS		NS	IE	NS	NS	IE	NS	NS	NA	NS	NS	IE	NS	NS
Small craft anchorage / mooring area / marina / yacht anchorage	Sailing without an engine: mooring and/or anchoring	Abrasion/disturbance of the substrate on the surface of the seabed			S	S	NS	S	S	S	S	S		S	S	S	S	S
		Introduction or spread of non-indigenous species	IE		S	S	IE	S	IE	S	S	S		IE	S	S	S	S
		Litter	IE		IE	IE	IE	IE	IE	IE	IE	IE		IE	IE	IE	IE	IE
		Organic enrichment			S	S	IE	IE	NS	S	IE	S		S	IE	S	S	S

Council Activity	NE activity	Pressure	Allis shad (Alosa alosa)	Atlantic salt meadows (Glauco-Puccinellietalia maritimae)	Circalittoral rock	Infralittoral rock	Intertidal coarse sediment	Intertidal mixed sediments	Intertidal mud	Intertidal rock	Intertidal sand and muddy sand	Intertidal seagrass beds	Shore dock (Rumex rupestris)	Subtidal coarse sediment	Subtidal mixed sediments	Subtidal mud	Subtidal sand	Subtidal seagrass beds
		Penetration and/or disturbance of the substrate below the surface of the seabed, including abrasion			S	S	NS	S	S	S	S	S		S	S	S	S	S
		Physical change (to another seabed type)			S	S	S	S	S	S	S	S		S	S	S	S	S
		Synthetic compound contamination (incl. pesticides, antifoulants, pharmaceuticals). Includes those priority substances listed in Annex II of Directive 2008/105/EC.	IE		IE	NS	IE	NS	NS	IE	NS	NS		NS	NS	IE	NS	NS
		Transition elements & organo-metal (e.g. TBT) contamination. Includes those priority substances listed in Annex II of Directive 2008/105/EC.	IE		IE	NS	IE	NS	NS	IE	NS	NS		NS	NS	IE	NS	NS
		Visual disturbance	IE															

Appendix D. Natural England Regulation 33 Advice on Operations sensitivity for all species and habitat sub-features of the Tamar Estuaries Complex SPA.

Council Activity	NE activity	Pressure	Non-breeding Avocet (*Recurvirostra avosetta*)	Non-breeding Little egret (*Egretta garzetta*)	Annual vegetation of drift lines	Coastal reedbeds	Freshwater and coastal grazing marsh	Intertidal mixed sediments	Intertidal mud	Intertidal sand and muddy sand	Intertidal seagrass beds	Water column	Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*)
Footpaths	Horse riding & dog walking	Above water noise	S	S									
		Abrasion/disturbance of the substrate on the surface of the seabed			NA	NA	NA	S	S	S	S		S
		Litter	IE	IE	NA	NA	NA	IE	IE	IE	IE		IE
		Organic enrichment			NA	NA	NA	IE	NS	IE	S		S
		Penetration and/or disturbance of the substrate below the surface of the seabed, including abrasion			NA	NA	NA	S	S	S	S		S
		Removal of non-target species	S	S	NA	NA	NA				S		
		Visual disturbance	S	S									
Small craft anchorage / mooring area / marina / yacht anchorage / slipways / on water participation	Hovercraft	Above water noise	S	S									
		Abrasion/disturbance of the substrate on the surface of the seabed			NA	NA		S	S	S	S		S
		Hydrocarbon & PAH contamination. Includes those priority substances listed in Annex II of Directive 2008/105/EC.	IE	IE	NA	NA		NS	NS	NS	NS	S	NS
		Introduction or spread of non-indigenous species	NS	NS	NA	NA		S	IE	S	S	S	S
		Litter	IE	IE	NA	NA		IE	IE	IE	IE	S	IE
		Penetration and/or disturbance of the substrate below the surface of the seabed, including abrasion			NA	NA		S	S	S	S		S
		Synthetic compound contamination (incl. pesticides, antifoulants, pharmaceuticals). Includes those priority substances listed in Annex II of Directive 2008/105/EC.	IE	IE	NA	NA		NS	NS	NS	NS	S	NS
		Transition elements & organo-metal (e.g. TBT) contamination. Includes those priority substances listed in Annex II of Directive 2008/105/EC.	S	S	NA	NA		NS	NS	NS	NS	S	NS
		Underwater noise changes										S	
		Visual disturbance	S	S								S	
Swimming / crab tiling	Leisure (e.g. swimming, rock pooling)	Above water noise	S	S									
		Abrasion/disturbance of the substrate on the surface of the seabed						S	S	S	S		S
		Litter	IE	IE				IE	IE	IE	IE		IE

Council Activity	NE activity	Pressure	Non-breeding Avocet (*Recurvirostra avosetta*)	Non-breeding Little egret (*Egretta garzetta*)	Annual vegetation of drift lines	Coastal reedbeds	Freshwater and coastal grazing marsh	Intertidal mixed sediments	Intertidal mud	Intertidal sand and muddy sand	Intertidal seagrass beds	Water column	Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*)
		Penetration and/or disturbance of the substrate below the surface of the seabed, including abrasion						S	S	S	S		S
		Visual disturbance	S	S									
slipways / on water participation	Non-motorised water craft (e.g. kayaks, windsurfing, dinghies)	Above water noise	S	S									
		Abrasion/disturbance of the substrate on the surface of the seabed						S	S	S	S		S
		Introduction or spread of non-indigenous species	NS	NS				S	IE	S	S		S
		Litter	IE	IE				IE	IE	IE	IE		IE
		Penetration and/or disturbance of the substrate below the surface of the seabed, including abrasion						S	S	S	S		S
		Visual disturbance	S	S									
slipways / on water participation	Powerboating or sailing with an engine: launching and recovery, participation	Above water noise	S	S									
		Abrasion/disturbance of the substrate on the surface of the seabed			NA	NA		S	S	S	S		S
		Collision BELOW water with static or moving objects not naturally found in the marine environment (e.g., boats, machinery, and structures)											
		Hydrocarbon & PAH contamination. Includes those priority substances listed in Annex II of Directive 2008/105/EC.	IE	IE	NA	NA		NS	NS	NS	NS	S	NS
		Introduction of light	S	S	NA	NA						S	
		Introduction or spread of non-indigenous species	NS	NS	NA	NA		S	IE	S	S	S	S
		Litter	IE	IE	NA	NA		IE	IE	IE	IE	S	IE
		Penetration and/or disturbance of the substrate below the surface of the seabed, including abrasion			NA	NA		S	S	S	S		S
		Synthetic compound contamination (incl. pesticides, antifoulants, pharmaceuticals). Includes those priority substances listed in Annex II of Directive 2008/105/EC.	IE	IE	NA	NA		NS	NS	NS	NS	S	NS
		Transition elements & organo-metal (e.g. TBT) contamination. Includes those priority substances listed in Annex II of Directive 2008/105/EC.	S	S	NA	NA		NS	NS	NS	NS	S	NS
		Underwater noise changes										S	
		Visual disturbance	S	S								S	

Council Activity	NE activity	Pressure	Non-breeding Avocet (*Recurvirostra avosetta*)	Non-breeding Little egret (*Egretta garzetta*)	Annual vegetation of drift lines	Coastal reedbeds	Freshwater and coastal grazing marsh	Intertidal mixed sediments	Intertidal mud	Intertidal sand and muddy sand	Intertidal seagrass beds	Water column	Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*)
Small craft anchorage / mooring area / marina / yacht anchorage / slipways	Powerboating or sailing with an engine: mooring and/or anchoring	Above water noise	S	S									
		Abrasion/disturbance of the substrate on the surface of the seabed						S	S	S	S		
		Hydrocarbon & PAH contamination. Includes those priority substances listed in Annex II of Directive 2008/105/EC.	IE	IE				NS	NS	NS	NS	S	
		Introduction of light	S	S								S	
		Introduction or spread of non-indigenous species	NS	NS				S	IE	S	S	S	
		Litter	IE	IE				IE	IE	IE	IE	S	
		Organic enrichment						IE	NS	IE	S	S	
		Penetration and/or disturbance of the substrate below the surface of the seabed, including abrasion						S	S	S	S		
		Physical change (to another seabed type)						S	S	S	S	S	
		Synthetic compound contamination (incl. pesticides, antifoulants, pharmaceuticals). Includes those priority substances listed in Annex II of Directive 2008/105/EC.	IE	IE				NS	NS	NS	NS	S	
		Transition elements & organo-metal (e.g. TBT) contamination. Includes those priority substances listed in Annex II of Directive 2008/105/EC.	S	S				NS	NS	NS	NS	S	
		Visual disturbance	S	S								S	
slipways / on water participation	Sailing without an engine: launching and recovery, participation	Above water noise	S	S									
		Abrasion/disturbance of the substrate on the surface of the seabed			NA	NA		S	S	S	S		S
		Collision BELOW water with static or moving objects not naturally found in the marine environment (e.g., boats, machinery, and structures)											
		Introduction of light	S	S	NA	NA						S	
		Introduction or spread of non-indigenous species	NS	NS	NA	NA		S	IE	S	S	S	S
		Litter	IE	IE	NA	NA		IE	IE	IE	IE	S	IE
		Penetration and/or disturbance of the substrate below the surface of the seabed, including abrasion			NA	NA		S	S	S	S		S
		Synthetic compound contamination (incl. pesticides, antifoulants, pharmaceuticals). Includes those priority substances listed in Annex II of Directive 2008/105/EC.	IE	IE	NA	NA		NS	NS	NS	NS	S	NS

Council Activity	NE activity	Pressure	Non-breeding Avocet (*Recurvirostra avosetta*)	Non-breeding Little egret (*Egretta garzetta*)	Annual vegetation of drift lines	Coastal reedbeds	Freshwater and coastal grazing marsh	Intertidal mixed sediments	Intertidal mud	Intertidal sand and muddy sand	Intertidal seagrass beds	Water column	Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*)
		Transition elements & organo-metal (e.g. TBT) contamination. Includes those priority substances listed in Annex II of Directive 2008/105/EC.	S	S	NA	NA		NS	NS	NS	NS	S	NS
		Visual disturbance	S	S								S	
Small craft anchorage / mooring area / marina / yacht anchorage	Sailing without an engine: mooring and/or anchoring	Above water noise	S	S									
		Abrasion/disturbance of the substrate on the surface of the seabed						S	S	S	S		
		Introduction of light	S	S								S	
		Introduction or spread of non-indigenous species	NS	NS				S	IE	S	S	S	
		Litter	IE	IE				IE	IE	IE	IE	S	
		Organic enrichment						IE	NS	IE	S	S	
		Penetration and/or disturbance of the substrate below the surface of the seabed, including abrasion						S	S	S	S		
		Physical change (to another seabed type)						S	S	S	S	S	
		Synthetic compound contamination (incl. pesticides, antifoulants, pharmaceuticals). Includes those priority substances listed in Annex II of Directive 2008/105/EC.	IE	IE				NS	NS	NS	NS	S	
		Transition elements & organo-metal (e.g. TBT) contamination. Includes those priority substances listed in Annex II of Directive 2008/105/EC.	S	S				NS	NS	NS	NS	S	
		Visual disturbance	S	S								S	