Marine recreation evidence briefing: motorised watercraft

This briefing note provides evidence of the impacts and potential management options for marine and coastal recreational activities in Marine Protected Areas (MPAs). This note is an output from a study commissioned by Natural England and the Marine Management Organisation to collate and update the evidence base on the significance of impacts from recreational activities. The significance of any impact on the Conservation Objectives for an MPA will depend on a range of site specific factors. This note is intended to provide an overview of the evidence base and is complementary to Natural England's *Conservation Advice* and *Advice on Operations* which should be referred to when assessing potential impacts. This note relates to motorised watercraft (vessels) in marine waters. Other notes are available for other recreational activities, for details see *Further information* below.

Motorised watercraft (powerboating and sailing with an engine)

Definition

The use of motorised vessels, including motorboats (powerboats) and yachts in marine waters. This category also includes watersports that are towed behind a motorised vessel including wakeboarding, waterskiing and parascending.

Distribution of activity

In general, these activities take place in coastal, inshore and offshore waters all around the UK and English coastline where marina and berthing facilities, or launch facilities (slipways), are available. Although these activities are widespread, activity in England is most concentrated around the South East and South Coast, where there is the highest concentration of Royal Yachting Association (RYA) marinas and clubs (RYA, 2016).

Levels of activity

Powerboating and sailing take place all year round, although the intensity of these activities is generally higher in the summer. An indication of the number of people participating in this activity is reflected in the number of RYA and British Marine (BM) members. In 2016, the RYA had 107,000 personal members, 1,400 affiliated clubs and other affiliated organisations. It is estimated that there are approximately 350,000 boat owners who are members of clubs that are not necessarily members of the RYA (Emma Barton, RYA, pers. comm. 20.01.17).

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The Watersports Participation Survey 2015 (Arkenford, 2015) estimated that 253,000 people participated in yacht cruising, 94,000 in yacht racing, 421,000 in motorboat/cruising, 297,000 in powerboating and 273,000 in waterskiing and wakeboarding (note, these statistics may include participants undertaking more than one activity).

Pressures

This Information Note summarises the evidence on the pressures and impacts arising from the launch/recovery of vessels (if not kept on the water) and from the use of the vessel at sea. It does not include the impacts of use of motorised personal watercraft (which are covered in a separate Information Note) or of mooring or anchoring of motorised vessels.

The direct pressures considered to arise from each functional aspect of the activity are shown in Table 1 and the potential biological receptor groups affected by the pressures are shown in Table 2. The information presented on pressures associated with the activity builds upon, and is complementary to, Natural England's Conservation Advice and Advice on Operations which should be referred to for MPA specific information and sensitivities of specific MPA features to those pressures[1].

The main pressure-receptor impact pathways arising from this activity are considered to be:

- Abrasion/disturbance of the surface and sub-surface sediment in shallow subtidal habitats through propeller/engine wash.
- Underwater noise disturbance of marine mammals and birds, related to engine operation during the activity.
- Above water noise and visual disturbance, of hauled out seals and birds related to people and/or vehicle noise during vessel launch/recovery from slipways and from people noise, engine operation and the vessel moving through waves (craft striking waves or 'hull slap') during the activity.
- Visual disturbance of marine mammals and birds, related to the presence of people and the vessel during launch/recovery and during the activity.

There is the potential for abrasion/disturbance of surface and sub-surface sediments in intertidal and shallow subtidal habitats from the launch and recovery of vessels from 'unofficial access' points, for example using a vehicle and a trailer to launch a vessel from a location without a slipway. For example, in a review of the impacts of marine recreation, UK CEED (2000) noted that damage may accrue through trampling and/or erosion (eg use of trailers/vehicle) at access points. However, this has been judged unlikely to be a frequent pressure based on expert opinion that launching or recovery of a motorised vessel via trailer is unlikely to be undertaken anywhere other than a slipway. Established slipways/access points have been chosen to be accessible at high and low tides which minimises disturbance to sediment (UK CEED, 2000). Hence where craft are launched from established slipways and launch points, it is unlikely that significant additional impacts will occur from the

[1] https://www.gov.uk/government/collections/conservation-advice-packages-for-marine-protected-areas

launching itself. As such, although this pressure-receptor impact pathway is acknowledged, it has been considered negligible (expert judgement).

Underwater noise changes relating to any engine use during launch/recovery of the watercraft has been considered negligible (expert opinion) as vessels are generally floated off trailers. Any use of the engine once the vessel is floated will be very controlled initially, and the main pressure of changes in underwater noise and/or abrasion of any subtidal substratum associated with engine use has been considered during 'operation' of the vessel.

Note: Assessing potential collision risk pressure from motorised watercraft was not within the scope of this project and is therefore not considered here.

For table 1 and 2 please see page 16 & 17.

Impacts

Where an impact pathway has been identified between the pressures arising from the activity and a biological receptor group, a summary of the evidence of impacts has been presented below.

Shallow subtidal habitats

Penetration/disturbance below surface – from engine/propeller wash

In general, motorised vessels can cause propeller damage to the seabed when they operate in shallow water. This can lead to localised scouring/erosion at slipways. Boat wash may cause localised erosion of marine features but its impact is generally minimal in the context of natural effects (UK CEED, 2000).

Seagrass (*Zostera* species) can be damaged when motorised vessels are piloted across meadows during low water conditions. Turbulence from propeller wash and boat wakes can break off leaves, dislodge sediments and uproot plants. Repeated shearing of leaves may reduce the productivity of meadows and in severe cases, propellers cutting into the bottom may completely denude an area (McCarthy and Preselli, 2007; study from the USA). In areas where boat traffic is relatively frequent, permanent reductions of abundances of macroinvertebrates in seagrass may occur (Bishop, 2008; study in Australia).

Fish

Underwater noise changes and visual disturbance

Small motorised craft (including recreational craft) produce relatively low levels of noise (75-159 dB re 1µPa m) with the output characteristics highly dependent on speed and other operational characteristics (OSPAR, 2009). Many of these sources have greater sound energy in higher frequency bands (ie above 1,000 Hz) than large ships.

With respect to recreational vessel movements, few specific scientific studies have been undertaken on the impacts of vessel noise on fish although vessels have been shown to increase stress response and potentially mask vocalizations (Celi *et al*., 2015; Neenan *et al.,* 2016). The response of fish will be dependent on sensitivity of these species with fish with a swimbladder generally considered to have better hearing than those without (Nedwell *et al.,* 2004).

In general, fish species are generally not considered sensitive to visual disturbance. However, the foraging and courtship behaviour of basking sharks occurs at the surface in UK waters (particularly South West England) in the spring and summer (Sims, 2008), making them potentially sensitive to the visual presence of a motorised vessel as well as to noise stimuli. Although basking sharks are not a feature of any MPAs, they are protected under Schedule 5 of the Wildlife and Countryside Act 1981, making it illegal to intentionally kill, injure or recklessly disturb or harass them in British Waters. It is very difficult to separate out the relative contribution of noise and visual stimuli in causing a disturbance response to basking sharks due to motorised vessels and the available literature generally makes no distinction. Therefore, these pressures are reviewed collectively.

Compared with cetaceans, basking sharks are considered more difficult to disturb (Speedie and Johnson, 2008). However, specific research on the impacts of vessel related disturbance on basking sharks is limited. One study documented that short-term displacement responses occurred when a basking shark was in the vicinity of a small motorised boat. The observations only recorded a reaction to the approach of a vessel at a maximum distance of approximately 10 m. The study also found that the angle of approach and engine noise were contributory factors to disturbance. In addition, repeated approaches appeared to increase the disturbance response (Wilson, 2000).

Marine mammals

Underwater noise changes and visual disturbance

It is considered difficult to disentangle the combined effects of noise and boat physical/visual presence which could in combination or separately cause disturbance (Pirotta *et al.,* 2015). Therefore, these pressures are reviewed collectively.

Small motorised craft (including recreational craft) produce relatively low levels of noise (75-159 dB re 1μ Pa m) with the output characteristics being highly dependent on speed and other operational characteristics (OSPAR, 2009). Many of these sources have greater sound energy in higher frequency bands (i.e. above 1,000 Hz) than large ships. Noise injury at these levels is considered unlikely although a range of studies have demonstrated that vessels can cause behavioural responses in marine mammals and also mask important acoustic cues (Pirotta *et al*., 2015).

Typical adverse behavioural responses are associated with evasion and include changes in travel direction (Nowacek *et al*., 2001), dive duration (Janik and Thompson, 1996; Lusseau, 2003) and changes in behavioural state such as decrease in feeding or resting activity (Lusseau, 2003; Constantine, *et al*., 2004). These responses may interrupt social interactions, carry energetic costs and in the long term could affect individual fitness (Lundquist *et al.,* 2012).

Vessel speed, manoeuvring and approach angle are all important factors in cetacean responses with high impact approaches (crossing path of the animals and boats approaching closely and with high speed generally resulting in increased disturbance of the animals (Peters *et al*., 2013). The effects are typically most pronounced when boats deliberately seek direct interactions (eg whale watching).

The effects of towed watersports are likely to be more pronounced due to the speed of the vessel and the additional visual stimuli of the towed equipment/participant (expert judgement).

Responses towards vessels that are not considered adverse (typically involving moving towards a vessel to bow ride) are also regularly observed in a range of cetacean species. For example, monitoring of bottlenose dolphins in Cardigan Bay, Wales found that the species generally showed a neutral or positive response to vessels (primarily tourist boats) (Gregory and Rowden, 2001).

Above water noise changes and visual disturbance (hauled out seals only)

It is very difficult to separate out the relative contribution of noise and visual stimuli in causing a disturbance response to seals due to motorised vessels and the available literature generally makes no distinction. Therefore, these pressures are reviewed collectively.

Seals which are hauled out on land, either resting or breeding, are considered particularly sensitive to visual disturbance (Hoover-Miller *et al*., 2013). The level of response of seals is dependent on a range of factors, such as the species at risk, age, weather conditions and the degree of habituation to the disturbance source.

Hauled out seals have been recorded becoming alert to powered craft at distances of up to 800 m although seals generally only disperse into the water at distances <150-200m (Wilson, 2014; Young, 1998; Suryan and Harvey, 1999; Henry and Hammill, 2001). For example, Strong and Morris (2010) observed that grey seals in Pembrokeshire, Wales responded by flushing to the water at distances of 20–70 m with no detectable disturbance at 150 m. The study also found that seals responded more to boat speed than to distance. In a study focusing on a colony of grey seals on the South Devon coast, vessels approaching at distances between 5 m and 25 m resulted in over 64% of seals entering the water, but at distances of between 50 m and 100 m only 1% entered the water (Curtin *et al*., 2009). With respect to common seals, Henry and Hammill (2001) observed that flushing as a result of motorboats occurred with 200 m (with approximately 70 % with 100 m).

The effects of towed watersports (particularly parascending) are likely to be more pronounced due to the additional visual stimuli of the towed equipment/participant (expert judgement).

Birds

Above water noise changes and visual disturbance

It is very difficult to separate out the relative contribution of noise and visual stimuli in causing a disturbance response in birds due to motorised vessels and the available literature generally makes no distinction. Therefore, these pressures are reviewed collectively.
During the launch/recovery of a motorised watercraft from a slipway, the presence of people/vehicle/vessel has the potential to cause disturbance to feeding, roosting and nesting coastal waterbirds. In general, the primary responses observed are likely to include increased vigilance, avoidance walking and flight responses.

The level of response will vary depending on a range of factors including the frequency of disturbance and the level of habituation as a result of existing activity (IECS, 2009).

Evidence suggests that waterbirds generally show a flight response to human presence on the foreshore at approach distances of between 20 m and 100 m. However, distances over 200 m have been recorded for some sensitive species (McLeod, *et al.,* 2013; IECS, 2009; Dwyer, 2010; Glover *et al*., 2015). Repetitive disturbance events can result in possible long-term effects such as loss of weight, condition and a reduction in reproductive success, leading to population impacts (Durell *et al.,* 2005; Gill, 2007; Goss-Custard *et al*., 2006; Belanger and Bedard, 1990). Birds typically show a dispersive response to disturbance, with prolonged disturbance causing displacement (Dwyer, 2010; Navedo and Herrera, 2012). Literature suggests that in general, human presence is considered to cause greater disturbance (in terms of response distances) than vehicles or watercraft (Glover *et al*., 2015; McLeod, *et al*., 2013; Guay *et al*., 2014; IECS, 2009a; Schlacher *et al*. 2013).

With regard to impacts during the activity, most disturbance events from powered vessels occur within 50-100 m of the receptor with vessels approaching at faster speeds eliciting higher disturbance (Rodgers and Schwikert, 2002; Bellefleur *et al.,* 2009; Burger, 1998; Schwemmer *et al*., 2011). Chatwin (2013) found that motorboats generally caused disturbance to birds at greater distances than non-powered craft.

Predictability and randomness are also factors which may explain variation in waterbird response. For example, literature also suggests that vessels consistently using defined routes (such as ferries or cargo ships) elicit less of a disturbance response than recreational craft which are more unpredictable in terms of speed and course and thus their disturbance potential for birds may be enhanced (Rodgers and Schwikert, 2002; Burger, 1998; Schwemmer *et al.,* 2011).

The effects of towed watersports (particularly parascending) are likely to be more pronounced due to the additional visual stimuli of the towed equipment/participant (expert judgement).

Underwater noise changes

Hearing is considered likely to be an important underwater sense for diving birds although information on the sensitivity of birds to underwater noise and responses to vessel disturbance is limited (Dooling, 2012). However, underwater noise from recreational motorised vessels is likely to cause evasion responses in diving birds.

Assessment of significance of activity-pressure

The following assessment uses the evidence base summarised above, combined with generic information about the likely overlap of the activity with designated features and the sensitivity range of the receptor groups, to provide an indication of the likelihood of:

i) an observable/measurable effect on the feature group; and

ii) significant impact on Conservation Objectives based on the effect on the feature group.

The assessment of significance of impacts has been based on the potential risk to the achievement of the conservation objectives for the features for which a site has been designated. The assessment is made using expert judgement and is designed to help identify those activities that are likely to be of greatest or least concern, and, where possible, suggest at what point impacts may need further investigation to determine potential management requirements within MPAs to reduce the risk of an adverse effect on the integrity of the site. Note, the assessment only considers the impact pathways considered in the evidence section (pressures which were considered negligible in Tables 1 and 2 are not considered in this assessment).

The outputs are shown in Table 3. The relative ratings of likelihood of significant impact on Conservation Objectives (COs) are defined as:

- Low – possible observable/measurable effect on the feature group but unlikely to compromise COs.
- Medium – observable/measurable effect on the feature group that potentially could compromise COs.
- High – observable/measurable effect on the feature group that almost certainly would compromise COs.

The relative risk ratings are based on the activity occurring without any management options, which would be considered current good practice, being applied. The influence that such management may have on the risk rating is discussed in the *Management options* section below.

It must be noted that the above assessment only provides a generic indication of the likelihood of significant impacts, as site-specific factors, such as the frequency and intensity of the activity, will greatly influence this likelihood. As such, further investigation of the risk to achieving COs will need to be done on a site specific basis, considering the following key site-specific factors:

- the spatial extent of overlap between the activity/pressure and the feature, including whether this is highly localised or widespread;
- the frequency of disturbance eg rare, intermittent, constant etc.;
- the severity/intensity of disturbance;
- the sensitivity of specific features (rather than the receptor groups assessed in Table 3) to pressure, and whether the disturbance occurs when the feature may be most sensitive to the pressure (e.g. when feeding, breeding etc.)
- the level of habituation of the feature to the pressure; and
- any cumulative and in-combination effects of different recreational activities.

For Table 3 see page 18

Management options

Potential management options for marine recreational activities (note, not specific to motorised watercraft activity) include:

On-site access management, for example:

- designated areas for particular activities (voluntary agreements or underpinned by byelaws)
- provision of designated access points eg slipways, in locations likely to be away from nature conservation access (voluntary or permit condition or underpinned by byelaw)

Education and communication with the public and site users, for example:

- signs, interpretation and leaflets
- voluntary codes of conduct and good practice guidance
- wardening
- provision of off-site education/information to local clubs/training centres and/or residents

Legal enforcement of, for example:

- byelaws which can be created by a range of bodies including regulators, Local Authorities and landowners (collectively referred to as Relevant Authorities);
- permitting or licence conditions

Specific examples of management measures which have been applied to motorised watercraft activities are described further in a Management Toolkit which can be accessed from **Marine evidence > Marine recreational activities** and include:

- codes of Conduct and Good Practice Guidance for boaters;
- voluntary zonation – for example, exclusion zones for craft and defined boat landing areas; and
- statutory zonation – for example, high speed areas, underpinned by byelaws.

Based on expert judgement, it is considered that where management measures, which would be considered current good practice, are applied to motorised watercraft activities, adhered to and enforced, the likely risk of significant impact on a site's Conservation Objectives would be **Low** in relation to all activity/pressure impact pathways.

For further information and recommendations regarding management measures, good practice messaging dissemination and uptake, refer to the accompanying project report which can be accessed from **Marine evidence > Marine recreational activities**.

National governing body and good practice messages for surfing

National governing body

The Royal Yachting Association (RYA) is the National Governing Body for all forms of boating, including dinghy and yacht racing, motor and sail cruising, rigid inflatable boats and sports boats, powerboat racing, windsurfing, canal and river boat cruising, and personal watercraft.

The RYA works closely with The Green Blue, an environmental charity part funded by the RYA and British Marine (the membership organisation for the leisure, superyacht and small commercial marine industry), which produces good practice guidance and environmental education, including in relation to wildlife and disturbance for marine recreational boat users. Good practice resources relating to abrasion, noise and visual disturbance produced by The Green Blue are:

- The Green Wildlife Guide for Boaters: a guidance document which educates participants regarding what disturbance is, what may cause it, signs of disturbance and what to do/not to do in certain situations. The guidance also includes signposting to information about legislation and reporting wildlife sightings. **http://thegreenblue.org.uk/~/media/TheGreenBlue/Files-and-Documents/Leaflets/The-Green-Wildlife-Guide-for-Boaters.ashx?la=en**
- A guide to Writing a Green Wildlife Guide for Boaters: an accompanying leaflet with guidance on how to produce local guidance that is specific to the local audience and area. **http://thegreenblue.org.uk/~/media/TheGreenBlue/Files-and-Documents/Leaflets/Writing-a-Green-Wildlife-Guide-for-Boaters.ashx?la=en**

There are a number of other national level Codes of Conduct relating specifically to the activity of wildlife watching but relevant for motorised watercraft (the WiSe Scheme and Scottish Natural Heritage's Marine Wildlife Watching Code) and these are summarised in the *Wildlife watching* Information Note.

Good practice messaging

The guidance document above promotes conduct to minimise all of the main pressures arising from motorised watercraft. Key messages to minimise impacts include:

Abrasion/disturbance of habitats:

- use designated launch and landing spots;
- keep a depth of water under the boat;
- keep wake to a minimum;

Noise (above and below water) and visual disturbance:

- For wildlife over 100m away in the water, stay on course at a steady speed but be prepared to slow down and let it move out of the vessel path.
- For wildlife less than 100m away in the water, stay on course and slow down but be prepared to stop to avoid collision.
- Stay at least 50m away from wildlife on cliffs and rocks and consider slowing to a speed that reduces noise.
- Do not turn the propeller towards the animals, chase, change course, steer directly towards them, overcrowd, box them in, split or steer through a group.
- Do not follow marine animals that appear alongside your vessel.
- If observing animals at distance that minimises disturbance, spend no more than 15 minutes observing quietly; leave immediately if you notice any sign of distress.

The guide also raises awareness of:

- elements of boating that may cause disturbance;
- how to recognise signs of disturbance;
- sensitive times for particular receptors (eg breeding, pupping, feeding seasons) and the potential impacts of disturbance at these times;
- information on legislation and citizen science programmes for recording wildlife sightings;
- looking for site-specific advice, marine codes and local designations in area boating.

Further information

Further information about the National Governing Body for motorised watercraft, good practice messaging resources, site specific conservation advice and management of marine recreational activities can be found through the following links:

- National Governing Body: The Royal Yachting Association: **http://www.rya.org.uk/Pages/Home.aspx**
- The Green Blue: **http://thegreenblue.org.uk/**
- Conservation Advice - Advice on Operations
- For site specific information, please refer to Natural England's conservation advice for each English MPA which can be found on the Designated Sites System **https://designatedsites.naturalengland.org.uk/** This includes Advice on Operations which identifies pressures associated with the most commonly occurring marine activities, and provides a broad scale assessment of the sensitivity of the designated features of the site to these pressures.
- For further species specific sensitivity information a database of disturbance distances for birds (Kent et al, 2016) is available here: **http://www.fwspubs.org/doi/abs/10.3996/082015-JFWM-078?code=ufws-site**
- Some marine species are protected by EU and UK wildlife legislation from intentional or deliberate disturbance. For more information on the potential requirement for a wildlife licence: **https://www.gov.uk/guidance/understand-marine-wildlife-licences-and-report-an-incident**
- The Management Toolkit which can be accessed from **Marine evidence > Marine recreational activities**.

Evidence notes for other marine recreational activities can be accessed from **Marine evidence > Marine recreational activities** and include the following activities:

- boardsports with a sail (windsurfing and kitesurfing)
- boardsports without a sail (surfing)
- coasteering
- diving and snorkelling
- drones (recreational use at the coast)
- general Beach Leisure
- hovercraft

- motorised and non-motorised land vehicles (including: the use of quad bikes, scramble bikes and cars on the foreshore and the activities of sand yachting, kite buggying and landboarding)
- light aircraft (including small planes and helicopters, microlights, paramotors and hang gliding)
- non-motorised watercraft (including dinghy, day boats or other small keelboat without a motor and the paddlesports sea kayaking, surf kayaking, sit-on-top kayaking, Canadian canoeing and stand up paddle boarding)
- personal watercraft
- wildlife watching (from land and from vessels)

Natural England Evidence Information Notes are available to download from the Natural England Access to Evidence Catalogue **http://publications.naturalengland.org.uk/** For information on Natural England contact the Natural England Enquiry Service on 0300 060 3900 or e-mail **enquiries@naturalengland.org.uk**.

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Table 1 Potential direct pressures arising from use of motorised watercraft at sea

	Abrasion/disturbance of the substrate surface	Abrasion/disturbance below substrate surface	Underwater noise changes	Above water noise changes	Visual disturbance
Access (launch/recovery)	Negligible	Negligible	Negligible	✓[3]	✓[4]
Activity (boating)	✓[1]	✓[1]	✓[2]	✓[3]	✓[4]

X - No Impact Pathway

1 – Pressure relates to the potential abrasion/disturbance of the substratum surface and sub-surface through scour created by the propeller/engine wash in shallow water

2 – Pressure relates to changes in underwater noise created by engine/propeller operation

3 – Pressure relates to changes in air-borne noise created by people and/or vehicles during launch/recovery of vessel and from engine operation and the vessel moving through waves (craft striking waves or 'hull slap') during the activity

4 – Pressure relates to the presence of people and the vessel during launch/recovery of the vessel and during the activity

Table 2 Biological receptors potentially affected by the pressures arising from launch/recovery and use of motorised watercraft at sea

<table>
<tr><th></th><th>Abrasion/disturbance of the substrate surface</th><th>Abrasion/disturbance below substrate surface</th><th>Underwater noise changes</th><th>Above water noise changes</th><th>Visual disturbance</th></tr>
<tr><td>Intertidal Habitats</td><td>Negligible</td><td>Negligible</td><td rowspan="2">Impact pathways scoped out</td><td rowspan="3">Impact pathways scoped out</td><td rowspan="2">Impact pathways scoped out</td></tr>
<tr><td>Subtidal Habitats</td><td>✓ (during activity)</td><td>✓ (during activity)</td></tr>
<tr><td>Fish</td><td rowspan="3">Impact pathways scoped out</td><td rowspan="3">Impact pathways scoped out</td><td>✓</td><td>✓ (basking sharks)</td></tr>
<tr><td>Marine Mammals</td><td>✓</td><td>✓ (hauled out seals)</td><td>✓ (</td></tr>
<tr><td>Birds</td><td>✓</td><td>✓</td><td>✓</td></tr>
</table>

Table 3 Assessment of indicative likelihood of significant impacts from motorised watercraft activity

Pressure	Likely overlap between activity and feature (confidence)	Evidence of impact (confidence)	Sensitivity of feature to pressure (confidence)	Likelihood of observable/measurable effect on the feature	Likelihood of significant impact on Conservation Objectives
Sub-surface sediment disturbance in shallow subtidal habitats (from engine/propeller wash)	**Low** for larger vessels – as required to stay within navigational channels within shallow water environments (high) **Low – Medium** for smaller vessels with a shallow draft (e.g. Rigid Inflatable Boats). Whilst such boats can access very shallow water, this is generally avoided to prevent grounding (medium)	Direct evidence of impact on seagrass habitats (medium)	**Low–High** Sensitivity will depend on habitat type and therefore will be site- specific. An example of a feature with high sensitivity is seagrass.	**Low-Medium** based on evidence of impact on sensitive habitat and potential for pressure and feature to overlap	**Low-Medium**
Underwater noise changes and visual disturbance– Fish	**Low–High** depending on location of activity e.g. coastal, inshore or offshore (low) Increased likelihood of overlap with basking sharks in some areas at certain times, especially as likely to be seeking interaction with feature (expert judgement)	Little direct evidence of vessel noise on fish, although some evidence of increased stress response and masking of vocalisations from this pressure (medium) Basking shark - evidence of short-term displacement response to small motorised vessel from one study (low)	**Low–High** (fish general) depending on species **Medium** (basking shark) during sensitive periods (low)	**Low–Medium (fish general)** based on known vessel noise and predicted responses **Medium –** based on the potential of overlap between pressure and feature (in some locations) during periods of important feature behaviour	**Low (fish general and basking sharks)**
Underwater noise changes and visual disturbance – Marine mammals (seals and cetaceans)	**Low-Medium** depending geographical location of activity (high)	Evidence of pressure causing 'evasive' behavioural responses, changes in behavioural state (e.g. decreased feeding or resting activity) and masking acoustic cues, with potential to interrupt social interactions and affect individual fitness in the long term (high)	**Medium–High**	**Medium–High** based on high confidence in evidence base showing disturbance effects and sensitivity to pressure. Impact likely to be most pronounced when boats deliberately seek direct interaction with feature	**Low-Medium**

Pressure	Likely overlap between activity and feature (confidence)	Evidence of impact (confidence)	Sensitivity of feature to pressure (confidence)	Likelihood of observable/measurable effect on the feature	Likelihood of significant impact on Conservation Objectives
		Effect of towed watersport likely to be more pronounced (further visual stimuli in addition to vessel noise and presence) (expert opinion) However, neutral or positive responses to pressure also observed in some locations (high)			
Above water noise changes and visual disturbance – seals (hauled out only)	**Low–High** depending on geographical location of activity e.g. high overlap where seals haul out on beaches (e.g. Horsea); less likely on rocky coastlines (e.g. North Devon) (high)	Evidence of seals dispersing into sea (flushing) when motorised vessels generally within 150-200m and response being more influenced by boat speed of approach rather than distance (high)	**High** - hauled out seals sensitive to visual disturbance (medium) Evidence suggests common seals more sensitive to pressure than grey seals (high)	**Medium–High** based on wide range of likely overlap between pressure and feature. Where overlap occurs, strong evidence base for impact and high feature sensitivity	**Low-Medium**
Above water noise changes and visual disturbance – Birds	**Low–High** depending on geographical location of activity (high)	Evidence of disturbance to birds by motorised vessels with greater disturbance caused by vessels approaching at higher speeds (high) Vessels consistently using defined routes likely to cause less disturbance due to habituation (high) Effect of towed watersport (particularly parascending likely to be more pronounced (expert judgement) Direct evidence of impact on diving seabirds limited, however, pressure is likely to cause an evasion responses (expert judgement)	**Low-High** Sensitivity will differ between species. Some species e.g. red-throated diver, curlew, are highly sensitive to disturbance; other species e.g. gulls, have high thresholds (low sensitivity) to disturbance. Certain behavioural activities are considered more susceptible to disturbance e.g. nesting seabirds or breeding birds (expert judgement)	**Medium–High** based on wide range of overlap between pressure and feature	**Low-Medium**

Visual disturbance – birds	**Low** - popular surfing locations (large exposed sandy beaches with high levels of activity) generally do not overlap with nesting seabird colonies or large numbers of birds roosting/loafing on the foreshore or coastal infrastructure. Such beaches are generally utilised by low numbers of waterbirds compared with other habitats (e.g. mudflats and estuaries) (expert judgement)	No direct evidence of visual disturbance from surfers accessing sea Evidence of disturbance (increased vigilance, avoidance walking and flight responses) from general human presence on the foreshore (analogue pressure; high confidence)	**Low–High** (medium) Sensitivity will differ between species. Some species e.g. red-throated diver, curlew, are highly sensitive to disturbance; other species e.g. gulls, have high thresholds (low sensitivity) to disturbance Certain behavioural activities are considered more susceptible to disturbance e.g. nesting seabirds or breeding birds (expert judgement)	**Low –** based on low likelihood of overlap of pressure and feature	**Low**