Marine recreation evidence briefing: motorised and non-motorised land vehicles

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 the use of land-based motorised and non-motorised vehicles. Other notes are available for other recreational activities, for details see *Further information* below.

Motorised and non-motorised land vehicles

Definition

The use of motorised vehicles on the foreshore including quad bikes, scramble bikes or cars. The use of non-motorised vehicles (craft) with sails on the foreshore including sand yachting, kite buggying and landboarding

Levels of activity

Motorised vehicle use of the foreshore is generally not permitted under the Road Traffic Act 1988 (as amended) and would require landowner permission. Non-motorised vehicles, with a sail, are typically ridden on flat, expansive sandy beaches with suitable access. No publically available information was sourced regarding the levels of these activities occurring in England.

Pressures

This note summarises the evidence on the pressures and impacts of the use of motorised and non-motorised vehicles (ie powered by a kite or sail) on intertidal areas. Where evidence relates to a specific type of vehicle, this will be highlighted.

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The direct pressures considered to arise from the activity are shown in Table 1 and the potential biological receptor groups affected by these 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 intertidal habitats (surface and potentially sub-surface substratum) from participation in the activity; and
- noise and visual disturbance, of hauled out seals and birds, related to the presence and movement of people and the vehicle/craft during the activity.

As the activity is undertaken on land, no underwater noise changes will occur and hence this impact pathway has not been considered further.

For Tables 1 & 2 see page 12.

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.

Intertidal habitats

Abrasion/disturbance of intertidal habitats (surface and sub-surface substratum) during the activities (motorised and non-motorised vehicles)

In a review of the literature on trampling impacts, Tyler-Walters and Arnold (2008) noted that there were very few studies of vehicles in the intertidal area, the majority of literature focussed on terrestrial habitats. From the evidence that was available, the authors summarised that vehicles are generally considered to cause about 5 to 30 fold more damage than walking due their greater weight and power but that the level of damage varied based on the vehicles used, how they are driven and the nature of the receiving habitat.

Vehicular access on seagrass *Zostera angustifolia* beds in Wales, (associated with cleaning up after an oil spill), resulted in patchy beds with wheel ruts up to a metre deep (Hodges and Howe, 1997). Packham and Willis (1997) noted that the longevity of ruts caused by vehicles resulted in abrupt changes in the vegetation favouring damp tolerant plants. Brodhead and Godfrey (1979) noted that only a few passes of off-road vehicles (ORVs) were sufficient to severely damage salt marsh plants while in the low marsh, ORV traffic destroyed natural vegetation and the peat substratum, slowing subsequent recovery (as summarised in Tyler-

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

Walters and Arnold, 2008). Based on this evidence, seagrass beds and saltmarsh were assessed as the most sensitive habitats to vehicle access, judged by the authors to have high sensitivity even to low intensities of vehicular trampling, while seagrass was judged to have medium sensitivity to vehicle access on a single occasion.

The authors highlighted that evidence on the effects of vehicular access on intertidal rock and sedimentary habitats is lacking and further studies are required urgently if vehicular access continues to be a concern.

A study in Eastern Australia sought to determine how different volumes off ORV traffic translated into physical beach disturbance, by assessing the extent of beach disturbance (the fraction of an ocean-exposed beach surface with visibly rutted tyre tracks) at different experimental traffic volumes (Schlacher and Morrison, 2008). The results showed disturbance effects ranging from 15% of the intertidal zone being rutted after 10 vehicle passes, up to 85% after 100 passes. A study of the impact of ORVs on intertidal invertebrate assemblages of a sandy beach showed that macrobenthic assemblages on ORV-impacted beaches had significantly fewer species at substantially reduced densities, resulting in marked shifts in community composition and structure. These shifts were particularly strong on the middle and upper shore where vehicle traffic was concentrated. Strong effects of ORVs were detectable in all seasons, but increased towards the summer months as a result of heavier traffic volumes (Schlacher *et al*. 2008).

No evidence was sourced relating to the impacts of un-motorised vehicles on intertidal habitats.

Marine mammals

Visual disturbance and above water noise changes

Hauled out seals can be vulnerable to disturbance as a result of human access on the foreshore (Bishop *et al.,* 2015; Anderson *et al.,* 2012). However, both grey and common seals typically haul out along remote rocky coasts, islands and sandbanks in the UK (SCOS, 2015). These isolated locations generally have difficult access for vehicles and are away from popular tourist leisure beaches therefore limiting potential disturbance.

Nevertheless, several seal colonies are present on beaches with potential access to vehicles. In particular, there has been considerable expansion of grey seal breeding colonies along beaches in the eastern coast of England (at sites such as Donna Nook, Lincolnshire and Horsey, Norfolk). However, these sites are popular wildlife watching tourist attractions and specific haul outs have been actively managed for many years to prevent disturbance and limit access to vehicles (through the uses of fences) (Bishop *et al.,* 2015).

Birds

Visual disturbance and above water noise changes

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

Vehicle activities have the potential to cause disturbance to feeding, roosting and nesting coastal waterbirds. The primary responses observed are likely to include increased vigilance, avoidance walking and flight responses. Some disturbance effects may have more direct negative impacts (loss or failure of eggs or chicks leading to decreased breeding productivity) to birds than others (temporary displacement from feeding or roosting areas leading to increased but non-lethal energetic expenditure).

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).

In general, vehicles are considered to cause less severe disturbance responses than walkers. Birds are also typically more easily disturbed by irregular movements than the regular and defined presence of vehicles. For example, Guay *et al.,* 2014 compared the flight-initiation distances evoked by a car versus a single walker for 38 species of waterbird (through 657 standardised approaches). The study found that motor vehicles elicited response at shorter distances after controlling for starting distance.

Similarly, McLeod *et al*., (2013) conducted 730 experimental approaches to 39 species of waterbird, using five stimulus types (single walker, three walkers, bicycle, car and bus). Across species, where differences existed, motor vehicles always evoked shorter flight-initiation distances than humans on foot. This is thought to be because of the reduced perceived risk associated with vehicles 'hiding' the presence of humans. Nevertheless, vehicles still have the potential to cause disturbance to birds (typically within 100 m of a receptor) especially when they are driving at speed (Guay *et al.,* 2014; McLeod, *et al*., 2013).

Assessment of the 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 an observable/measurable effect on the feature group and the likelihood of 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 e.g. 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 (eg when feeding, breeding etc).
- The level of habituation of the feature to the pressure.
- Any cumulative and in-combination effects of different recreational activities.

For Table 3 see page 13.

Management options

Potential management options for marine recreational activities (note, not specific to motorised and non-motorised land vehicle activities) 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 best 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 non-motorised land vehicle activities are described further in a Management Toolkit which can be accessed from **Marine evidence > Marine recreational activities** and include:

- codes of conduct;
- licensing (of a local club);
- voluntary zonation – designated area for activity;
- voluntary temporal restrictions – related to tidal state and season; and
- self-policing of voluntary agreements by a local club.

The main risk of significant impact on a site's COs from motorised land vehicles relate to abrasion/disturbance of sensitive habitats and noise and visual disturbance of birds. Given that motorised vehicle use of the foreshore is not likely to be an activity which is generally permitted[2] and would require landowner permission, it is considered that lowering the risk of significant impact from these activity/pressure impact pathways would require statutory management which is enforced. Alternatively, measures which physically limit vehicular access to the shore could be used (eg fences).

Based on expert judgement, it is considered that where management measures, which would be considered current good practice, are applied to non-motorised land vehicle activities (i.e. sand yachting. Kite buggying and landboarding), 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 regarding management measures, best practice messaging dissemination and uptake, refer to the accompanying project report which can be accessed from **Marine evidence > Marine recreational activities**.

[2] For example, the Humber Estuary Management Scheme states that "Without the landowner's permission, it is illegal to drive a mechanically propelled vehicle off a road or other public right of way used as a road (Road Traffic Act 1988) (as amended)" (source: http://www.humbernature.co.uk/admin/resources/codes-of-conduct-pdf.pdf)

National governing body and good practice messages for motorised and non-motorised land-vehicle activities

National governing body

The types of vehicles grouped in this Information Note would not necessarily be governed, advised or trained by the same National Body. Information about the relevant National Bodies for motorised and non-motorised land vehicle activities, and any good practice resources, are listed below where the information was available:

- To the best of knowledge there are no National Governing Bodies for the types of motorised land-vehicles included in this assessment.
- British KiteSports is the National Governing Body for all forms kite-powered sports, including the land-based activities kite buggying and kite landboarding. British KiteSports has a code of conduct however, this predominately relates to safety. The code of conduct is available here: **http://www.britishkitesports.org/join-british-kitesports/code-of-conduct/** .
- The British Federation of Sand and Land Yacht Clubs (BFSLYC) - is the Advisory Body for land yachting (also referred to as sand yachting) activities. A Code of Practice for Recreational [land] Sailing was referred to in the BFSLYC procedural handbook, but was not readily accessible on the website.

Good practice messaging

The key pressures arising from the activities related to surface/sub-surface abrasion of intertidal habitats and above water noise (from motorised land vehicles primarily) and visual disturbance (both motorised and non-motorised vehicles).

The British KiteSport Code of Conduct referred to above does include the following messaging which may contribute to minimising impacts on the environment:

- keep your lines away from people, animals and craft on land or water; and
- make sure the activity is allowed at the location used.

However, the code does not include messaging specifically related to minimising visual disturbance to wildlife and hence does not address this key pressure which has been judged to have a relatively high likelihood of impacting on features and COs. Hence, this is considered to be a gap. Furthermore, as this activity was anecdotally reported by several stakeholders as an activity of concern within designated sites, a good practice Code of Conduct is considered desirable to help reduce the likelihood of significant impacts. Such a code could be developed by the NGB (for kite-powered land vehicles) in collaboration with stakeholders with expert knowledge of the potential feature(s) affected.

Further information

Further information about the National Bodies listed above for non-motorised land-vehicles, good practice messaging resources, site specific conservation advice and management of marine recreational activities can be found through the following links:

- British Kitesports: **http://www.britishkitesports.org/**

- The British Federation Of Sand And Land Yacht Clubs: **http://www.britishlandsailing.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 been accessed via **Marine evidence > Marine recreational activities.**

Notes for other marine recreational activities can be found online here: **Marine evidence > Marine recreational activities** and include the following activities:

- Boardsports with a sail
- Boardsports without a sail
- Coasteering
- Diving and snorkelling
- Drones
- General beach leisure
- Hovercraft
- Motorised watercraft
- Light aircraft
- Non-motorised watercraft
- Personal watercraft
- Wildlife watching

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 motorised and non-motorised land vehicles

	Abrasion/disturbance of the substrate surface	Abrasion/disturbance below substrate surface	Underwater noise changes	Above water noise changes	Visual disturbance
Motorised vehicle use – participation in activity	✓[1]	✓[1]	X	✓[2]	✓[2]
Non-motorised vehicle use – participation in activity	✓[1]	✓[1]	X	✓[2]	✓[2]

X - No Impact Pathway

1 - Pressure relates to use of a vehicle on the shore (intertidal area)

2 – Pressure relates to changes in air-borne noise created by people and/or the vehicles (where motorised) or due to the kite/sail (non-motorised_ during the activity

3 – Pressure relates to the presence of people and the vehicle/craft during launch/recovery of the vessel and during the activity

Table 2 Biological receptors potentially affected by the pressures arising from motorised and non-motorised land vehicles

	Abrasion/disturbance of the substrate surface	Abrasion/disturbance below substrate surface	Underwater noise changes	Above water noise changes	Visual disturbance
Intertidal Habitats	✓	✓	Impact pathways scoped out	Impact pathways scoped out	Impact pathways scoped out
Subtidal Habitats	Impact pathways scoped out	Impact pathways scoped out			
Fish					
Marine Mammals				✓ (hauled out seals)	✓ (hauled out seals)
Birds				✓	✓

Table 3 Assessment of indicative likelihood of significant impacts from motorised and non-motorised land vehicle 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
Surface and sub-surface sediment disturbance – intertidal habitats	**High** Use of vehicles on the foreshore (expert judgement)	Some direct evidence of impacts of motorised vehicles on intertidal habitats, with the level of damage dependent on the vehicle type, how it is driven and the nature of the receiving habitat (medium) No information on the impacts of non-motorised vehicle activity on the foreshore was sourced (data deficient)	**Low – High** depending on habitat (site-specific assessment will be required) Examples of features with high sensitivity to motorised vehicle access are seagrass and saltmarsh (high)	**Medium-High** (motorised vehicles) based on the range of sensitivities of intertidal habitats and the likelihood of overlap with the most sensitive habitats **Low** (non-motorised vehicles) based on the assumption that the mass and ground pressure of these vehicles is substantially lower compared to motorised vehicles and the activity occurring on less sensitive habitats (sandy foreshore)	**Medium** (motorised vehicles) **Low** (non-motorised vehicles)
Above water noise changes and visual disturbance – seals (hauled out only)	**Low-Medium** depending on geographical location of activity e.g. higher likelihood of overlap where seals haul out on beaches (e.g. east coast of England)	No direct evidence of impacts of motorised or non-motorised vehicles on feature Evidence of 'flight response' of seals to general human presence on the foreshore (high) and of seals dispersing into sea (flushing) when motorised vessels at sea generally within 150-200m (high). Impact from motorised and un-motorised craft would be expected to be greater due to the noise (motorised vehicle) and	**High** - hauled out seals are sensitive to visual disturbance (medium) Evidence suggests common seals more sensitive to pressure than grey seals (high)	**Low – High** (motorised and non-motorised vehicles) based on the range of potential for overlap. Strong evidence base for impact and high feature sensitivity where overlap occurs	**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
		speed (motorised and non-motorised vehicle) of the vehicle/craft (expert judgement)			
Above water noise changes and visual disturbance – Birds	**Low-High** depending on geographical location of activity	Direct evidence of disturbance to birds from vehicles, especially when driving at speed (medium) No direct evidence of the effect of non-motorised vehicles used in the intertidal area on birds. Assumed to have similar potential for impact as motorised vessels due to ability to travel at speed (expert judgement)	**Low-High** In general, sensitivity will differ between species 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 potential overlap between pressure and feature and occurrence of activity (intertidal areas) where certain behavioural activities are considered more susceptible to disturbance e.g. foraging birds) (expert judgement)	**Medium**