Marine recreation evidence briefing: light aircraft

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 recreational use of light aircraft. Other notes are available for other recreational activities, for details see F*urther information* below.

Light aircraft

Definition

Recreational aviation involving a pilot. This group of activities includes all types of craft used for recreation in the air eg small planes and helicopters, microlights, paramotors, hang gliding. This note relates to the recreational use of such light aircraft rather than commercial operation or any military or sea rescue-related use. Given the diversity of aircraft covered in this category, some further definitions are provided below[1].

Microlight

An aeroplane restricted to 2 seats which is able to fly at low speed. There are three main types: Fixed wing (3-axis), Flexwing (comprising a delta wing similar to a hang glider with a 'trike' unit suspended underneath it) and Powered Parachutes (comprising a ram air canopy below which is suspended a wheeled power unit, often similar to the flexwing type).

Hang gliders

Unpowered wings that can be launched from hills or winches, or launched by being towed aloft behind a microlight aircraft. A hang glider can be turned into a powered hang glider by using a specially designed hang glider harness fitted with lightweight 2-stroke engine.

[1] Definitions adapted from the British Microlight Aircraft Association website: http://www.bmaa.org/index.php and the British Hang Gliding and Paragliding Association website: https://www.bhpa.co.uk/

First edition 27 November 2017

www.gov.uk/natural-england

Paragliding and paramotoring

Unpowered wings that can be launched from hills or winches. A paramotor or powered paraglider consists of a small motor driving a propeller, worn like a backpack under a paraglider wing.

This note does not consider the impact of parascending (piloted canopies that are towed into the air by a Land Rover) which is included in the note for *Land Vehicles* or parasailing (piloted kite/parachute towed behind a vessel, usually a powerboat) which is included in the note for *Powerboat and sailing with an engine*.

Distribution of activity

This note is concerned with these activities where they are undertaken over coastal habitats. In general, light aircraft/helicopter activities can be undertaken anywhere around the UK where there are suitable facilities for these craft to take off and land (ie small airports). As noted above, microlights, paramotors and hang gliders are usually launched from hills/cliffs in the coastal area.

Levels of activity

No information on the number of participants in such activities was sourced. However, the British Hang Gliding and Paragliding Association website reports that it supports around 7,000 pilots[2].

Pressures

The note summarises evidence on the pressures and impacts of recreational light aircraft activity when undertaken over coastal areas.

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[3].

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

- Above water noise changes and visual disturbance, related to the aircraft engine and/or presence of the craft, of marine mammals and birds.

Theoretically there is potential for abrasion/disturbance of intertidal habitats arising from light aircraft landing on beaches. However, this impact pathway has not been considered likely to occur from a regulatory or safety perspective, although stakeholder consultation did provide anecdotal evidence

[2] https://www.bhpa.co.uk/sport/bhpa/
[3] https://www.gov.uk/government/collections/conservation-advice-packages-for-marine-protected-areas

relating to isolated incidents of helicopters landing on beaches. As such, this impact pathway has been scoped out[4].

As the activity is aerial, no impacts on subtidal benthic habitats, and no changes in underwater noise will occur and hence these impact pathways have been scoped out.

For Tables 1 & 2 see page 10

Impacts

Marine mammals

Visual disturbance and above water noise changes

Low flying aircraft have been observed to cause behavioural responses in cetaceans such as changes in surface duration, orientation and swimming speed in response to aircraft with the level of reaction depending on activity state, situation and species of cetacean (Forest, 2001).

Aircraft flying at lower altitudes also have the potential to disturb hauled out seals. For example, Osinga *et al*., (2012) found that flying at lower altitudes (150–300 m) appeared to cause more disturbances of seals than vessels or activities on land.

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 to birds due to light aircraft and the available literature generally makes no distinction. Therefore, these pressures are reviewed collectively.

Light aircraft can elicit strong disturbance responses in birds. The disturbance response of birds to light aircraft is considered to be dependent on range of factors, particularly activity, flying altitude and level of habituation to existing disturbance pressure (Drew, 1999; IECS, 2009).

Strong behavioural reactions due to light aircraft such as small planes has been recorded in waterbirds even when flying at altitudes above 100 m (Koolhaas *et al*., 1993). The behaviour of a plane is considered important in governing the reaction of birds with flying high in a straight line leading to smaller effects than flying low or with unpredictable curves (Smit and Visser, 1993; IECS, 2009).

Few studies have investigated the effects of ultralight (microlight) aircraft with contrasting results from those that had. For example, Smit and Visser (1993) suggested ultralights may be very disturbing due to the low altitude of flights and the noise generated, referencing a dramatic reduction in roosting and foraging Bewick's Swans close to an ultralight airstrip which had been used for one year (Smit and Visser, 1993). Conversely, a study on the effects of ultralights on Pink-footed geese observed that the birds were able to habituate quickly to the ultralights that were landing and taking off only 250 m from their feeding area (Evans 1994 as summarised in Drewitt 1999).

[4] It should be noted that emergency aircraft, such as air ambulance helicopters, are not considered within the scope of the current study

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).

Assessment of risk of significant impact

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 (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 11

Management options

Potential management options for marine recreational activities (not specific to light aircraft 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); and
- permitting or licence conditions.

A specific example of a management measures applicable to light aircraft activity (provided through stakeholder consultation) included:

- A Code of Conduct (under development in a designated area);

Based on expert judgement, it is considered that where management measures, which would be considered current good practice, are applied to light aircraft 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 regulating authority, national governing body and good practice messages for light aircraft activities

National bodies

The Civil Aviation Authority (CAA) is the National Aviation Regulator in the UK. The statutory instrument regulating civil aviation in the UK is the Air Navigation Order 2016.

The British Hang Gliding and Paragliding Association (BHPA), is the National Governing Body (NGB) for hang gliding, paragliding, parascending, powered hang gliding, paramotoring and human powered flight. No good practice messaging or guidance relating to minimising impacts on the environment/wildlife were identified on the BHPA website.

Good practice messaging

No good practice messaging or guidance relating to minimising impacts from light aircraft activities on the environment/wildlife were identified and this is considered to be a gap.

The key pressure arising from these activities is airborne noise and visual disturbance which has the potential to impact on hauled out seals and birds particularly. As some forms of light aircraft activity were reported anecdotally by several stakeholders to be of concern within some designated sites, good practice messaging to minimise such impacts may be desirable. However, the difficulty in managing the impacts and disseminating any such good practice messaging (for example, identifying and engaging the people undertaking the activity) was also highlighted. A number of approaches to address these issues, such as providing a Notice to Airmen (NOTAM) and engaging with and providing guidance to local airfields are currently being used by stakeholders in some areas. This may lead to useful information in the near future to support the development of good practice messaging for this group of activities.

Further information

Further information about the NGB for light aircraft activity, good practice messaging resources, site specific conservation advice and management of marine recreational activities can be found through the following links:

- CAA: **https://www.caa.co.uk/home/**
- BHPA: **https://www.bhpa.co.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**.

Notes for other marine recreational activities can be accessed from **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 and non-motorised land vehicles
- motorised watercraft;
- non-motorised 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**.

Copyright

ISBN 978-1-78354-462-2

Marine Management Organisation

References

BELANGER, L. & BEDARD, J., (1990). Energetic cost of man-induced disturbance to staging snow geese. *Journal of Wildlife Management*, 54, 36-41.

DREWITT. A. (1999) *Disturbance effects of aircraft on birds*. English Nature Birds Network Information Note.

DURELL, S.E.A. LE V. DIT, STILLMAN, R.A., TRIPLET, P., AULERT, C., BIO, D.O. DIT, BOUCHET, A., DUHAMEL, S., MAYOT, S. & GOSS-CUSTARD, J.D. (2005).Modelling the efficacy of proposed mitigation areas for shorebirds: a case study on the Seine estuary, France. *Biol. Conserv*. 123:67–77.

EVANS, M.E. (1994). *Microlights and geese: a study of the effect of microlights operating from Tarn Farm, Cockerham, upon wintering Pink-footed geese.* English Nature and the Ribble Valley Microlight Club.

FOREST, A. (2001). *The Hawaiian spinner dolphin,* Stenella longirostris*: Effects of tourism*. Masters Thesis, Texas A&M University. 91 pp.

GILL, J. A. (2007). Approaches to measuring the effects of human disturbance on birds. *Ibis*, 149(s1), 9-14.

GOSS-CUSTARD, J. D., TRIPLET, P., SUEUR, F., & WEST, A. D. (2006). Critical thresholds of disturbance by people and raptors in foraging wading birds. *Biological Conservation*, 127(1), 88-97.

IECS. (2009). *Construction and Waterfowl: Defining, Sensitivity, Response, Impacts and Guidance.* Institute of Estuarine and Coastal Studies Report to Humber INCA.

KENT B. LIVEZEY, ESTEBAN FERNÁNDEZ-JURICIC, & DANIEL T. BLUMSTEIN (2016) Database of Bird Flight Initiation Distances to Assist in Estimating Effects from Human Disturbance and Delineating Buffer Areas*. Journal of Fish and Wildlife Management:* June 2016, Vol. 7, No. 1, pp. 181-191.

KOMENDA-ZEHNDER, S., CEVALLOS, M., BRUDERER, B. (2003). *Effects of disturbance by aircraft overflight on waterbirds - an experimental approach*

KOOLHAAS, A., DEKINGA, A., & PIERSMA, T. (1993). Disturbance of foraging Knots by aircraft in the Dutch Wadden Sea in August-October 1992. *Wader Study Group Bulletin*, 68, 20-22.

OSINGA N, NUSSBAUM SB, BRAKEFIELD PM & DE HAES HAU. (2012). Response of common seals (Phoca vitulina) to human disturbances in the Dollard estuary of the Wadden Sea. *Mammalian Biology* 77(4): 281–287.

SMIT, C.J. & VISSER, J.M. (1993). Effects of disturbance on shorebirds: a summary of existing knowledge from the Dutch Wadden Sea and Delta area*,* In: *Disturbance to Waterfowl on Estuaries*, August 1993.

Table 1 Potential direct pressures arising from light aircraft activity

	Abrasion/disturbance of the substrate surface	Abrasion/disturbance below substrate surface	Underwater noise changes	Above water noise changes	Visual disturbance
Activity	X	X	X	✓[1]	✓[2]

X - No impact pathway

1 – Pressure relates to potential change in air-borne noise arising from the light aircraft's engine (where applicable) during activity

2 – Pressure relates to the presence of the aircraft during the activity

Table 2 Biological receptors potentially affected by the pressures arising from light aircraft activity

	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	Impact pathways scoped out	Impact pathways scoped out
Subtidal Habitats					
Fish					
Marine Mammals				✓	✓
Birds				✓	✓

Table 3 Assessment of indicative likelihood of significant impacts from light aircraft 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
Above water noise changes and visual disturbance – cetaceans	**Low** – based on the widespread distribution of the feature (expert judgement)	Some direct evidence of low flying aircraft, causing changes in cetacean behaviour (surface duration, orientation, swimming speed). Level of reaction depending on activity state and species (low)	**Low – Medium**	**Low –** based on low likelihood of overlap between pressure and feature	**Low**
Above water noise changes and visual disturbance – seals (hauled out only)	**Low–High** depending on geographical location of activity (expert judgement)	Some direct evidence of aircraft flying at altitudes between 150-300m caused greater disturbance to hauled out seals than vessels or activities on land (low)	**High** - hauled out seals sensitive to visual disturbance (medium) Evidence suggests common seals more sensitive to pressure than grey seals (high)	**Low–High** based on range of potential for overlap between pressure and receptor. Where overlap occurs, evidence of high feature sensitivity to pressure and impact on feature	**Medium**

Above water noise changes and visual disturbance – Birds	**Medium–High** depending on geographical location of activity (expert judgement)	Evidence of behavioural reaction to light aircraft in some species with greater responses to flying at low altitude or with unpredictable curves (medium)	**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 potential for high level of overlap between pressure and feature and high sensitivity of some species	**Medium**

DELETE PAGE