An Bord Achomharc Um Cheadúnais Dobharshaothraithe
Aquaculture Licences Appeals Board

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assessing potential impact on

Seals

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Aquaculture Licences Appeals Board

Appeal Ref No. AP2/2015

Technical Advisor's Report: Supplementary Briefing Note

Common seal (*Phoca vitulina vitulina*) impact assessment

1st February, 2018

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Introduction

An application for a salmon fish farm at Shot Head, Bantry Bay, Co. Cork, was granted by the Minister (Ref: T5/555A). Subsequently, fourteen appeals were submitted under Section 40(1) of the Fisheries (Amendment) Act 1997. Following consideration of the appeals and the production of an Interim Technical Advisor's Report, the Aquaculture Licences Appeals Board decided to hold an Oral Hearing in order to benefit from the participation of the key stakeholders and from having the relevant technical submissions presented and examined.

On completion of the Oral Hearing the Chair's Report concluded that several issues remained incompletely addressed, one such issue being the potential impact on common seals, in particular in respect of its status as a species of interest in the nearby Glengarriff Harbour and Woodland Special Area of Conservation (SAC). The Oral Hearing Chair Report recommended a desk-top study be undertaken into *"The potential impacts upon common seal populations in the Glengarriff Harbour and Woodland SAC"*.

This Supplementary Briefing Note has drawn on available scientific literature to further evaluate impacts on common seals and to determine the level of threat to the conservation status of the Glengarriff Harbour and Woodland SAC. It is also intended to establish whether any further supplementary material is required to determine whether the proposed fish farm will have an unacceptable impact on harbour seal conservation status.

Legal Protection

The harbour seal is protected in the Republic of Ireland under the Irish Wildlife (Amendment) Act (1976/2005), as well as under the EU Habitats Directive (Council Directive 92/43 on the Conservation of natural habitats and of wild fauna and flora - Annex II & V), which was transposed into Irish law by the 1997/2011 European Communities (Birds and Natural Habitats) Regulations (SI 94 of 1997, 477 of 2011). As such, the designation of Special Areas of Conservation (SACs) is required in order to protect harbour seals and their habitat.

Harbour seals are listed as qualifying species at 13 SACs in Ireland, including a variety of marine and estuarine habitat types, providing sheltered intertidal habitat suitable for harbour seal breeding, moulting and resting behaviour.

It is an offence to hunt or injure a seal, or to wilfully interfere with or destroy their breeding sites (except under derogation or ministerial permit under section 23 (7)(iv) of the Wildlife (Amendment) Act (1976/2005)). Such permits/licences may be issued to fish farms by application to the Wildlife Licencing Unit of the NPWS.

Population Status

There are five recognised subspecies of harbour seal. The Eastern Atlantic subspecies (*Phoca vitulina vitulina* Linnaeus, 1758) is listed by the IUCN as 'least concern', meaning that its population size and geographical range do not qualify as being endangered, vulnerable or near threatened. In Ireland the population status is considered favourable (NPWS, 2008).

Despite a steady or increasing total population in Europe and the UK, significant declines have been observed in certain regions with local populations being reduced by 85% between 1997 and 2016 in the Orkney Islands, and 25% in Northern Ireland between 2002 and 2011 (SCOS, 2017). The cause of these local declines is not yet known, but evidence suggests that adult survival is the most likely proximate cause (Hanson *et al.*, 2013). A regional population decline was also recorded in Sable

Island, Canada, through the 1990s, but here evidence pointed toward reduced recruitment to the breeding population (Bowen *et al.*, 2003).

The harbour seal population of Ireland has been assessed in different ways since 1964 (summarised by Cronin (2010)), including a minimum estimate of 1,248 in 1978 (Summers *et al.*, 1980). However, a reliable minimum estimate using comparable methods was not made until 2003, when thermal imaging was used to conduct an aerial survey during the August moult period (Cronin *et al.*, 2007). This estimated the minimum population at 2,955 (including 50 initially mis-assigned), though this figure is not directly comparable to previous estimates. This represents the number of seals counted during the survey, and when the likely proportion of seals that were not hauled out is included, the overall population estimate in 2003 was 6950 (Cosgrove *et al.*, 2016). This baseline has since been further refined by land/boat-based surveys undertaken in 2009, 2010 and 2011, which reported a generally stable population, with only slight regional increases and decreases (NPWS, 2012). A further aerial survey was then conducted in 2012, which counted 3,489 harbour seals in Ireland, an 18.1% increase since 2003 (Duck and Morris, 2013).

Population assessments have been made semi-regularly on a local level in Bantry Bay since 1985, and between 1985 and 2005, a steady linear increase in numbers was seen from 135 to around 400 (Heardman, Donnell, and Mcmahon, 2006). These agree generally with results from the 2003 aerial survey, when the minimum population of harbour seals in County Cork was estimated at 489 (33.6% of Irish total minimum population), 341 of which were in Bantry Bay (Cronin *et al.*, 2007). Results from the NPWS surveys suggest this number remained steady at around 320 animals between 2009 and 2013 (Rakka and Minto, 2015). The subsequent aerial survey in 2012 counted 453 harbour seals in County Cork, of which 353 were in Bantry Bay (Duck and Morris, 2013).

Evidence therefore suggests that the Bantry Bay population has been increasing since the end of culling, toward pre-exploitation size. Given the stable population estimate since around 2005, it is possible that a stable population size has been reached. The South-West of Ireland appears to be a significant stronghold for harbour seals in Ireland, with 33.6% of the total population. Within the SW, County Cork and particularly Bantry Bay stand out as the most significant local populations.

Pressures and Threats

Since the cessation of bounty hunting of seals in 1976, large-scale human culling has been replaced as the most significant threat to Irish harbour seals. Threats and pressures facing harbour seals in Ireland have been assessed by the NPWS (2008), along with their importance:

- Marine and Freshwater Aquaculture - low importance (L)
- Fishing and harvesting aquatic resources - medium importance (M)
- Illegal taking/ removal of marine fauna - low importance (L)
- Outdoor sports and leisure activities, recreational activities - low importance (L)
- Marine water pollution - low importance (L)
- Noise nuisance, noise pollution - low importance (L)
- Seismic exploration, explosions - medium importance (M)
- Changes in abiotic conditions - low importance (L)

Fishing was highlighted as having 'medium importance', as a consequence of occasional bycatch in fishing nets. The risk of seal bycatch in tangle net fisheries for crawfish off the west and south-west coasts has been found to be high, although most bycatch was grey seals. In large mesh tangle-nets (320 mm mesh), harbour seal bycatch has been measured at 0.09 seals per km of net (SD 0.32)

(Cosgrove *et al.*, 2016). No harbour seals were observed bycaught in gill net with 120 mm mesh size over 210 hauls and 882 net km (Cosgrove *et al.*, 2016), suggesting that only the large-mesh nets pose a threat.

Seismic exploration is considered a threat to individual animals which may suffer acute injury if exposed to high amplitude underwater noise. A regulatory framework exists to avoid significant impacts on marine mammals, and spatial coverage is generally low (NPWS, 2008).

Phocine distemper is a viral epidemic which reduced the European harbour seal populations by around 58% in 1988 and 2002, with around 15,000 deaths in colonies surrounding the North Sea (Harding, Härkönen, and Caswell, 2002). In both cases, epidemics began at the Danish Island of Anholt and spread through nearby colonies (Härkönen *et al.*, 2006) and there appeared to be no significant immune response among the surviving population after the 1988 outbreak, suggesting that European harbour seals would be equally at risk to a future epidemic. In both cases, however, Ireland seems to have been almost unaffected, with only one seal carcass testing positive in 2002 (Lyons, 2004).

The recent discovery of predation by grey seals upon harbour seals in Scotland (Brownlow *et al.*, 2016) and Germany (Van Neer, Jensen, and Siebert, 2015), has been posited as a potentially significant threat. In these places, particular male grey seal individuals have been found to kill large numbers of grey and harbour seals, inflicting unusual helical lacerations to the carcass. Forty-three such fatalities of harbour seals were found in Scotland between 2008 and 2010 and adult females were the most frequently reported victims (Bexton *et al.*, 2012). Many of these females were pregnant, and therefore represent a disproportionately high cost to the population.

Predation by killer whales is also thought to occur in small numbers around the Irish coast, but not significant enough to threaten a population status.

As apex predators, harbour seals are known to bioaccumulate certain persistent organic chemicals which are associated with endocrine-disruptive and developmental effects, e.g. PCBs (Ross *et al.*, 2004) and PBDEs (Shaw *et al.*, 2008). In areas of particularly high pollution stress, this may constitute an increased pressure on the harbour seal population, but POC emissions in Ireland have dropped dramatically since 1990 and continue to decrease (European Environment Agency, 2015).

Range and Territory

Harbour seals haulout to rest in sheltered intertidal habitat, utilising rocky outcrops and skerries exposed around low tide. They spend an increased amount of time hauled out during the pupping, nursing and moulting seasons from April to October (Thompson *et al.*, 1989; Cronin *et al.*, 2010), especially during warm, dry weather (Grellier, Thompson, and Corpe, 1996). While nursing, females have been shown to have a high degree of site fidelity (Godsell, 1988).

The known breeding and moulting sites within the Glengarriff Harbour and Woodland SAC are shown in the conservation objectives supporting document (NPWS, 2015). A number of haulout sites outside of the SAC boundary were also identified by Cronin *et al.*, (2014a), the nearest of which (on Orthans Island - 51°40'53.00"N, 9°43'18.95"W) is approximately 4 km from the Shot Head site. These sites were also identified in aerial surveys in 2003 and 2012 (Duck and Morris, 2013).

Harbour seals' aquatic range is generally coastal, but they may be found throughout Irish continental shelf waters up to 200 m depth (NPWS, 2008). During winter, they spend more time in offshore waters (Thompson *et al.*, 1989). Foraging trips out to sea may extend 60 km from haulout sites, but

most trips are less than 24 hours and 5 km (Thompson *et al.*, 1996; Cronin, Kavanagh, and Rogan, 2008). Larger seals make longer trips, both in time and distance (Thompson *et al.*, 1998).

The tracks of seventeen harbour seals, tagged in 2006 and 2007 in SW Ireland, are available online from the SealTrack project (sealtrack.ucc.ie). Two seals have been tracked within Bantry Bay, one of which travelling from Orthans Island/Adrigole Harbour to a foraging hotspot approximately 10 km offshore from Dursey Island, the other moved between the Glengarriff Harbour and Woodland SAC and Castletownbere. The latter made regular passages through the area of the proposed Shot Head site, and both seals made extensive use of the existing Roancarrig (2) farm site (Figure 1). This marked association with the existing fish farm is similar to telemetry data that has been observed in Scotland, and is probably due to foraging opportunities at the site (Northridge *et al.*, 2010). These opportunities may be aggregations of wild fish found around farms (Carss, 1990), or may be direct predation on the farmed stock (Northridge, Coram, and Gordon, 2012).

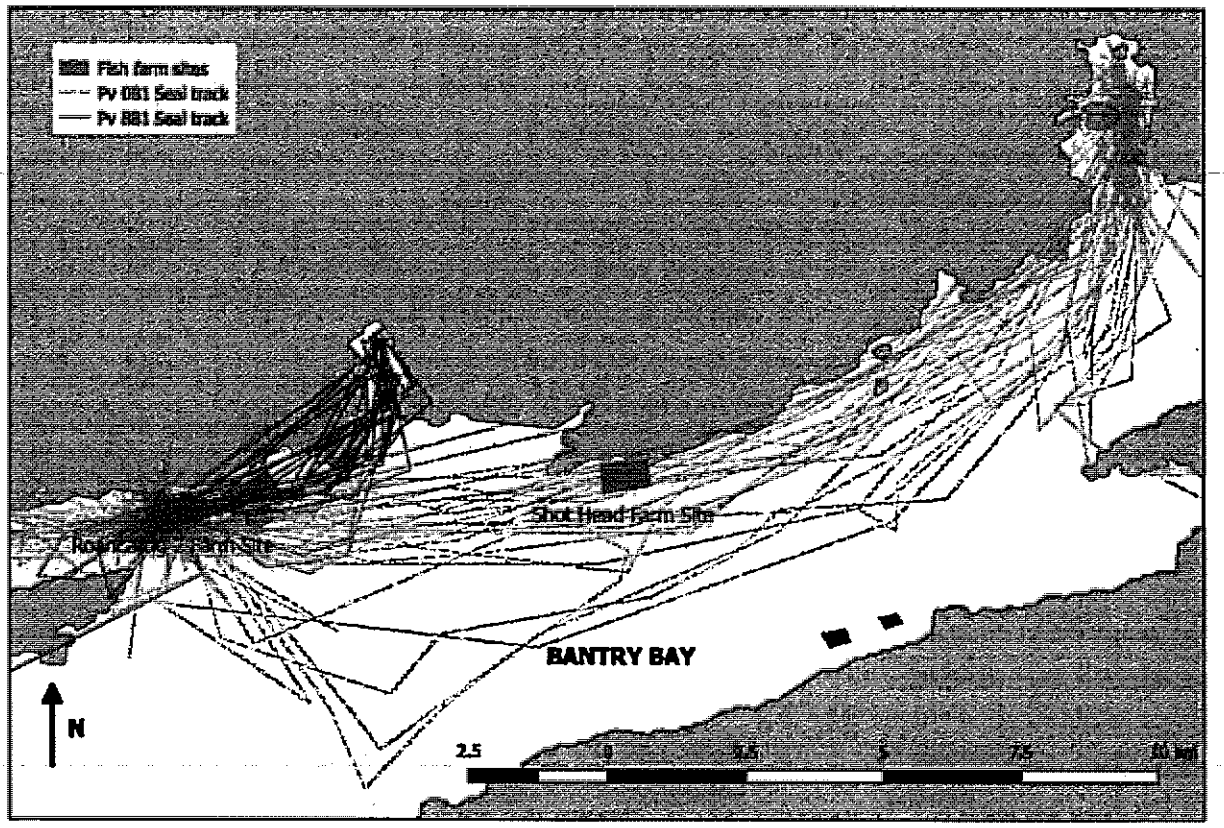

Figure 1. Satellite tracks of two harbour seals tagged in 2006 and 2007 (source: sealtrack.ucc.ie)

Evidence shows that the home range of seals from the Glengarriff Harbour and Woodland SAC, as well as nearer haulouts, is likely to include the area of proposed site. The small sample of two seals tagged within Bantry Bay do not appear to utilise the Shot Head site for foraging, but do closely associate with a nearby site, possibly suggesting predatory behaviour.

Feeding Preferences

The metabolic rate of harbour seals varies significantly between the breeding and moulting periods, with highest energy use between April and August and lowest from June to November (Rosen and Renouf, 1995). An adult harbour seal may eat 4 – 5.5 kg of fish per day, and the total daily fish intake of harbour seals in SW Ireland has been estimated at 6 tonnes (Cronin *et al.*, 2014b).

Analysis of seal scat in Ireland has shown that gadoid fish (whiting, pollack and haddock) are the principle prey of harbour seals (Wilson *et al.*, 2002) but that a wide variety of prey species are also consumed (Cronin *et al.*, 2014b). In the south-west region, analysis of scat identified eighteen different prey species, with sandeels the most numerous prey remains. After correction for estimated prey size, gadoid species including *Trisopterus* spp. (Norway Pout/Pouting) came out as the most significant prey species, comprising 45% of the diet by weight (Kavanagh *et al.*, 2010). Salmonid species were found in 3.3% of samples, making up 0.3% of the fish remains identified (this study included identification of fish bones so as to avoid overlooking fish species which may not be entirely consumed). Of the 22 scat samples analysed from the Glengarriff Harbour and Woodland SAC, nine species were identified of which dragonet was the most important, followed by *Trisopterus* spp., herring then scad (Kavanagh *et al.*, 2010).

Visual observations of seal predation at nets suggests that cod, angler fish, hake, herring, and Atlantic salmon are also consumed by harbour seals in Ireland, although they have not been detected on a species level in diet studies (Cronin *et al.*, 2014b).

Evidence suggests that seals are generalist feeders, probably consuming prey in proportion to its availability. Salmonids have been infrequently detected in seal diet in SW Ireland, but in low proportion compared to more important prey species.

Disturbance

When harbour seals are hauled out, they are sensitive to human disturbance and will quickly re-enter the water when disturbed. Alerting distance (at which an animal becomes alert to a disturbance) and flight initiation distance (at which an animal enters the water) were found to be practically the same at a Danish Island. Seals detected a boat from up to 850 m away, and began to flee once the boat was up to 830 m away (Andersen *et al.*, 2012). They were alerted to pedestrians only at shorter ranges (200 – 425 m), and were more reluctant to flee during the breeding season (Andersen *et al.*, 2012) (when metabolic rates are highest and females may be nursing).

Harbour seals have been known to sensitise to, and habituate to anthropogenic disturbance. In some areas, seals tolerate a relatively high degree of human presence, but in others they reduce overall site use, switch to nocturnal use of a site, or abandon a site altogether (Grigg *et al.*, 2012). It could be that in areas with suboptimal resource availability, seals have more incentive to habituate to human presence wherever foraging opportunities are available. Alternatively, when resource availability is high in the wider area, seals may be more likely to move to a less disturbed location.

A study of the effects of environmental and observational variables on harbour seals found that disturbance (aircraft, boat, or pedestrian) was associated with lower numbers of animals on haulouts in Ireland (Rakka and Minto, 2015). Disturbance by kayaks during surveys was noted by the EIA document, which points out that the local population is probably regularly disturbed by leisure activities. The nearest haulout, Orthans Island, is situated immediately adjacent to the West Cork Sailing and Powerboating Centre, so it seems unlikely that vessel traffic to and from the proposed site will add significantly to levels of disturbance.

Phocid seals use underwater sound for communication (Van Parijs, Hastie, and Thompson, 2000), navigation (Stansbury *et al.*, 2015) and possibly predator/prey detection. The cumulative impacts of increased ambient noise, e.g. from vessels or from acoustic deterrent devices, has been theoretically linked to hearing damage (Götz and Janik, 2013; Coram *et al.*, 2014; Jones *et al.*, 2017). The lack of empirical data on seals' behavioural response to elevated noise levels makes it impossible to quantify the risk of hearing damage, but stable or increasing populations of harbour seal do exist within areas of relatively high marine traffic (e.g. Grigg *et al.*, 2012).

Activities at the proposed site are too distant to cause disturbance at the Glengarriff Harbour and Woodland SAC, or at the other nearby haulout sites. Movements to and from the proposed Shot Head site are not expected to add significantly to levels of disturbance. The cumulative impacts of disturbance from the wider aquaculture industry are not expected to be significant. Temporary hearing damage caused by cumulative noise from vessel traffic or more especially acoustic deterrent devices cannot be dismissed, but it is noted that such devices are in widespread usage.

Interaction with Aquaculture

Scientific literature on the fine-scale interactions between seals and aquaculture is relatively scarce.

Shellfish aquaculture within Bantry Bay was not found to have a significant impact on seals (Roycroft, Kelly, and Lewis, 2004), but the large differences in industrial practices mean this does not necessarily apply to finfish aquaculture. Wild fish are known to associate with marine fish farms (Carss, 1990), and seals may be drawn to farms as a source of prey.

In Scotland between 72 and 86% (Northridge *et al.*, 2010; Northridge, Coram, and Gordon, 2012) of salmon farm sites experience some level of seal depredation. Cronin *et al.* (2014b) suggest that all Irish salmon farms experience some degree of seal depredation, especially in the south-west; although they note that the problem is unquantified. Farms on the west coast were estimated to have lost 5 tonnes of salmon each to seal depredation (presumably per growth cycle) (Cronin *et al.*, 2014b).

Negative direct impacts by aquaculture on harbour seals are limited to the lethal removal of problem individuals by shooting, and potential entanglement in large-mesh netting (anti-predator nets). Figures supplied by the Wildlife Licencing Unit show that licences were granted for the removal of up to 30 harbour seals in Ireland between 2007 and 2017, and that ten seals were reported as shot, two of which were in County Cork. Instances of illegal culling of seals have also been reported since the cessation of the cull.

Where necessary, Irish aquaculture sites are encouraged to use anti-predator nets under the CoGP to prevent damage to stock (Irish Sea Fisheries Board, 2003) but in Scotland, these have also been linked to accidental entanglement and drowning of seals (Northridge, Coram, and Gordon, 2013). No figures are available for seals entangled in aquaculture nets in Ireland but numbers are likely to be low.

Conclusion with Respect to Proposed Shot Head Fish Farm

The population of harbour seals within Bantry Bay appears to be stable, as does the wider European and Irish population. The SW of Ireland (and in particular Glengarriff Harbour and Woodland SAC) appears to be an important site for harbour seals.

Current pressures on the harbour seal population are low, with occasional bycatch in tangle nets, and potential acute injury by seismic exploration highlighted as the most significant threats. The possibility of a population level threat from an outbreak of phocine distemper is not impacted by the proposed site.

Harbour seals may range up to 60 km from their haulout. The existing EIS document states that there is a likelihood that seals will visit the site, and telemetry data from tagged seals in fact show that the proposed Shot Head site is within the foraging range of seals from the SAC.

Harbour seals diet is highly varied and opportunistic. They are thought to consume prey species in relation to their relative availability, and could therefore easily adapt to a reduction in any of the species of lesser importance (e.g. salmonids).

It is noted from the EIA that the need for the use of anti-predator nets or seal scarers will be assessed, if the licence is granted. The improper use of anti-predator nets has been linked to entangling seals in Scotland, but this has not been shown to be the case in Ireland.

The conservation targets for harbour seals in the Glengarriff Harbour and Woodland SAC are (NPWS, 2013):

1. Species range within the SAC should not be restricted by artificial barriers to site use
2. Conserve the breeding sites in a natural condition
3. Conserve the moult haul- out sites in a natural condition
4. Conserve the resting haul- out sites in a natural condition
5. Human activities should occur at levels that do not adversely affect the harbour seal population at the SAC

The proposed site, when considered alongside potential cumulative impacts from the wider aquaculture industry in Bantry Bay, presents no risk to targets 1 – 4.

In respect to target 5, the conservation objectives for Glengarriff Harbour and Woodland SAC note that *"Proposed activities or operations should not introduce man-made energy (e.g. aerial or underwater noise, light or thermal energy) at levels that could result in a significant negative impact on individuals and/or the population of harbour seal within the site"* (NPWS, 2015). The use of seal scarers may constitute introduction of man-made energy at significant levels, but these levels would be well outside the boundary of the SAC. The possibility of acoustic deterrents causing hearing damage to individuals from the Glengarriff Harbour and Woodland SAC cannot, however, be excluded.

Conservation objectives go on to state that *"Proposed activities or operations should not cause death or injury to individuals to an extent that may ultimately affect the harbour seal population at the site"* (NPWS, 2015). Existing sites in County Cork have been granted permission to shoot four seals since 2007, and have reportedly shot two. This level of removal is not significant enough to affect the local seal population.

On the basis of scientific evidence it is concluded that the operation of a fish farm at Shot Head is unlikely to negatively impact the conservation status of the population of harbour seals within the Glengarriff Harbour and Woodland SAC.

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