

Evidence of seal impact at Clashnessie Bay farm site (FS0933) & efficacy of ADD use

The following information is provided in support of an application submitted to MD-LOT by Loch Duart Ltd (LDL) for a licence to disturb European Protected Species (EPS) as a result of acoustic deterrent device (ADD) use at the Clashnessie bay fish farm (FS0933). It provides site-specific evidence of the impacts of seal interaction with farm stock at the Clashnessie Bay site, and evidence that the ADD system proposed has proven efficacy in preventing serious damage to livestock.

Evidence to support licensable purpose of ADD use

Direct mortality evidence

As stated in the application, seal interaction is a known occurrence at the Clashnessie Bay site. Figures 1 & 2 below show deceased stock at the site that have been injured during current seal attacks and represents a typical pattern of injury including bite marks to the body and abdomen of multiple individuals. Injuries may lead to rapid death; however fish may also survive for a period leading to a need to cull on welfare grounds. A single seal attack event can cause several hundred fish mortalities in a 24hr period. Impacts on fish and mortality levels as a result of these attacks have been witnessed by Marine Scotland staff in attendance at the site (MS site visit June 2021).



Figure 1 Deceased stock at the Clashnessie Bay site that have been injured during current seal attacks which show a typical pattern of injury including bite marks to the body and abdomen of multiple individuals.



Figure 2 Deceased stock at the Clashnessie Bay site that have been injured during current seal attacks which show a typical pattern of injury including bite marks to the body and abdomen of multiple individuals.

Annual mortality as a result of seal predation at LDL production sites for the period 2020 – 2023 is shown in Figure 3 below. It should be noted that all licensed ADDs were removed from LDL sites after 2021.

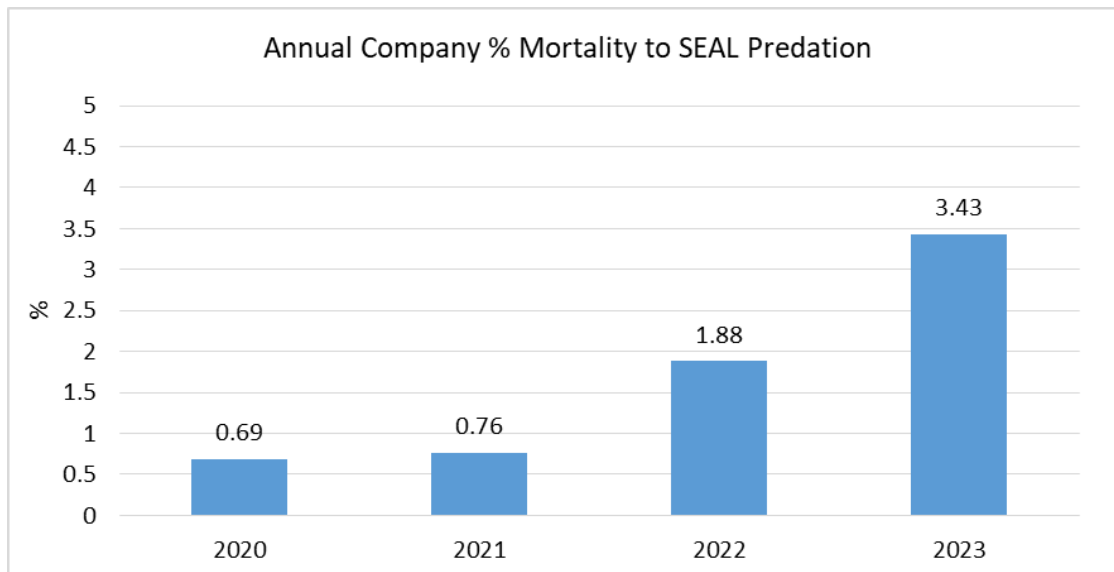


Figure 3 Annual company % mortality to seal predation 2020 – 2023.

The above illustrates a ~300% increase in mortalities experienced since ADDs were removed from our sites. This is unequivocal evidence of the level of damage now being inflicted by seal predation and how the use of ADDs can significantly reduce this. The impact of this new government legislation has come at a significant cost to our business; ~£7 million to date; putting jobs and the business as a whole at risk.

Statistics specific to the application site Clashnessie follow a similar pattern to the Company as a whole, but are much more severe (see Figure 4 below). Figure 4 compares the annual % mortality during the previous production cycle (March 2020 to December 2021) when a licenced ADD was deployed at the site, with the mortalities during the most recent production cycle (March 2022 to December 2023) when no ADDs were present on site.

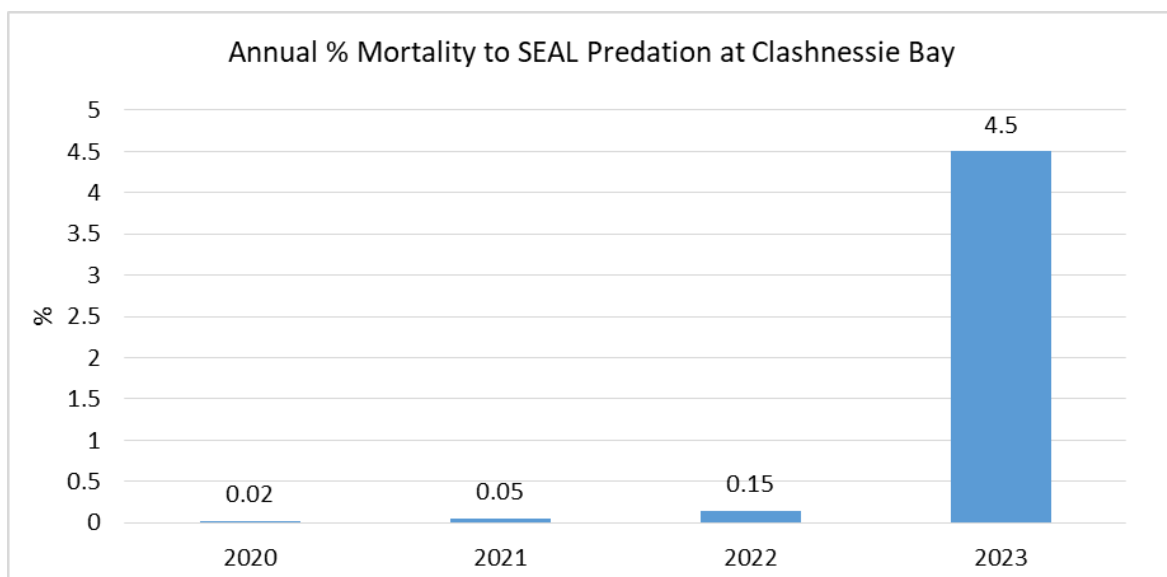


Figure 4 Annual % mortality to seal predation at the Clashnessie Bay application site.

During 2023, when ADDs were not in use due to an EPS licence not being granted, over 17 thousand fish at Clashnessie were killed by direct seal attacks, compared to only 214 fish lost to seals in 2021. This equates to an ~8000% increase. The lost income for this site alone in 2023 reached ~£675K.

ADD efficacy for preventing damage to stock

The impact of seals in terms of direct mortality and the effect of ADDs in reducing this impact can be evidenced by examining the current and previous farming cycles at Clashnessie Bay. Both cycles have involved input of stock at the same time of year and status (spring-input S1 smolt) into the same pen equipment (80m circumference circular pens). An identical suite of baseline predation mitigation measures have also been employed: HDPE pen nets, net tensioning, top nets, reinforcement around mortality sock, low stocking densities and daily removal of moribund/fallen stock. In the current cycle there has been no ADD use, in contrast to the previous cycle where the ADD system subject to the application was in place.

As detailed in the application, activation of the ADD system during the 2020/2021 production cycle was triggered by seal activity being evident at the farm site i.e. seals in the immediately vicinity of the farm, observation of stress-behaviours in the fish and/or fish injury/mortality due to seal attack.

Weekly comparison of the two cycles to date, from smolt input, shows that with ADDs in place the following was evident at the Clashnessie Bay site (Figure 5):

- Delayed onset of mortalities from seal predation occurred during 2020/2021 production cycle when ADDS were in use (81 weeks post smolt input) compared to 24 weeks post smolt input in the 2022/2023 production cycle when ADDs were not in use.
- During 2020/2021 production cycle when ADDS were in use a reduced magnitude in terms of mortality from seal predation both overall and in terms of individual attacks in comparison to the 2022/2023 production cycle when ADDs were not in use.
- Reduced frequency of attacks: 74 weeks in the 2020/2021 production cycle when ADDS were in use versus 38 in the 2022/2023 production cycle when ADDs were not in use.

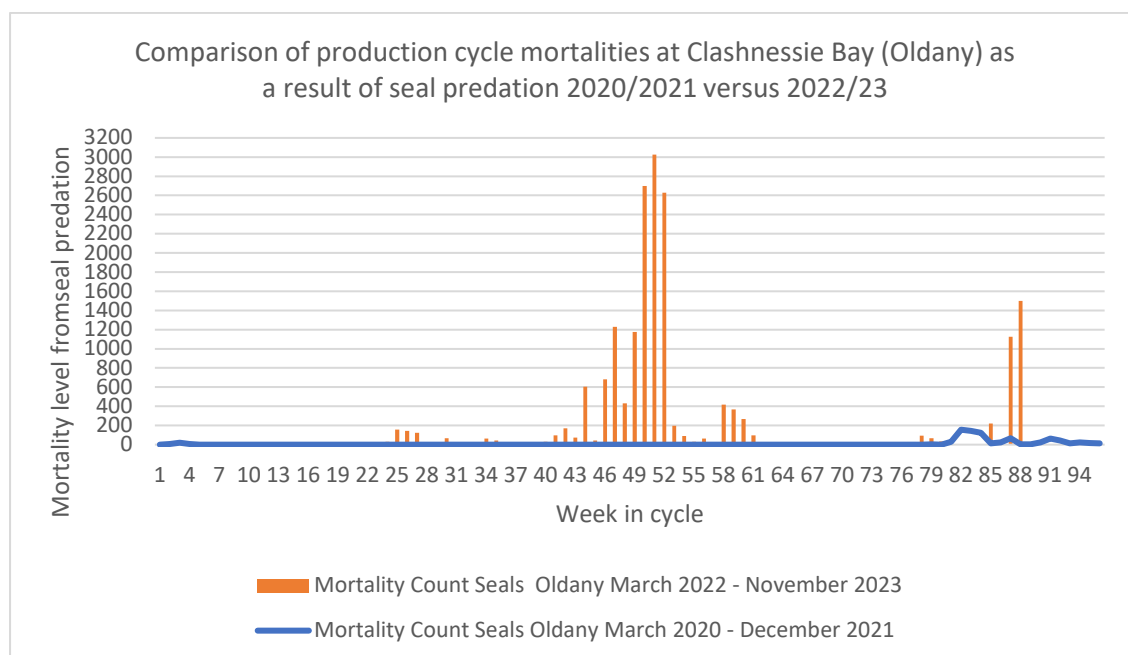


Figure 5. Comparison of production cycle mortalities as a result of seal predation.

Seal interaction and interest in stock is also observed to increase as stock sizes increases. This is due to the attraction of predatory seals to larger fish sizes, with greater food reward offsetting the predation effort as fish grow. Without means of effective interruption, the predation behaviour will become well established and seals, which have learned effective predation behaviours, are highly likely to transmit this to others.

Sub-lethal effects of seal predation to stock

Seal predation also has considerable sub-lethal effects on livestock due to stress and flight behaviour caused by seal presence around a farm. This has significant negative impacts on farm productivity (e.g. reduced feeding, growth and survival), fish health (e.g. physical damage, disease and parasite risk increased), fish welfare and ultimately sustainability through reduced productivity and challenging fish health management.

The above impacts are difficult to illustrate over a complete farming cycle given that many factors interact to contribute to overall growth, survival and health profile. However, we can clearly evidence the impact of seal predation on daily feeding at the Clashnessie Bay site. Figure 6 below illustrates the daily deviation from normal feeding (Specific Feeding Rate, SFR) in a population of fish being targeted by seal attacks. This data is for the month of February 2023, when on multiple occasions, the pen being attacked was feeding at a significantly lower SFR than other pens on the site that were targeted less by seals. Over 80% of the time feeding was negatively affected by seal interaction.

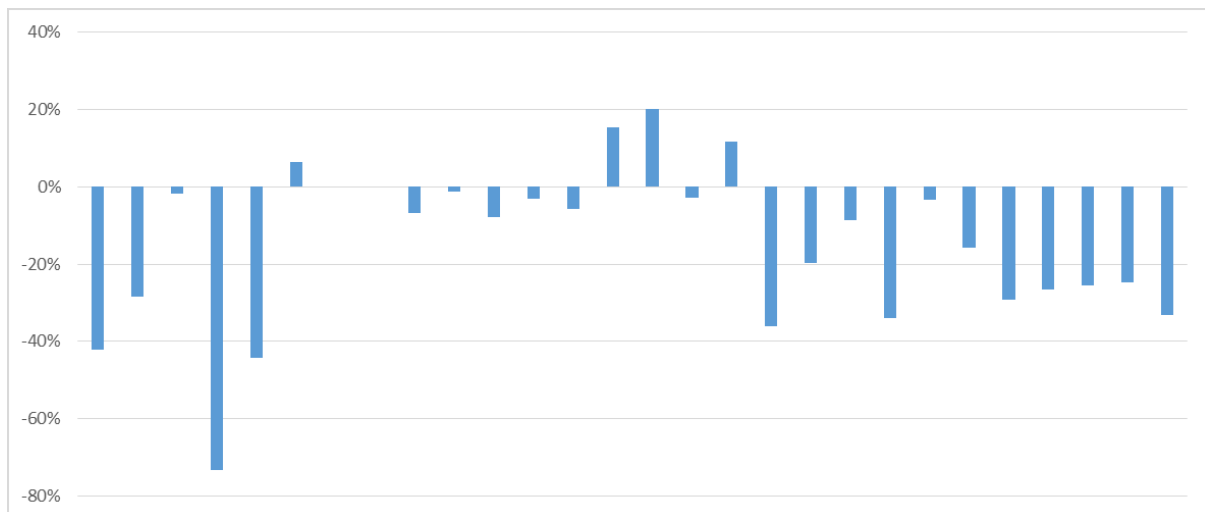


Figure 5. Graph illustrating daily feeding (SFR) for the month of February 2023 in a fish population targeted by seal-predation at the Clashnessie Bay site. The horizontal axis (zero) represents the specific feeding rate in populations less affected by seal predation.

This data ultimately demonstrates that the wellbeing of 500,000 fish at the Clashnessie Bay site alone are at risk due to hounding and predation by seals every day that acoustic systems are not returned to the water. Chronic stress may also evolve in maladaptive coping processes, resulting in an enhanced risk of illness and a compromise to the general wellbeing/health of the animals (see Huntingford et al 2012 and Schreck and Tort, 2016 for further discussion).

Infrastructure damage

As well as direct fish kills and sub-lethal impacts on stock, the persistent and escalating predation pressure also presents a significant containment risk. Without a full suite of anti-predation measures to keep seals away from pen nets - including ADDs which are unique in their acoustic mode of action -

seals will continually attempt to enter pens, placing a site at an increased risk of a fish escape. A benefit of acoustic deterrent systems is that it avoids seals interaction with pens by keeping them at approximately a 50m distance from the cages.

LDL are providing video evidence of seals breaking through the exterior predator net and additionally breaking through into the inner nets at its production sites (Attachment 4). This is a common occurrence at our farms. The videos provided show the methods that seals are currently using to breach both standard and additional predator netting, but it is also widely observed that seals are constantly and innovatively finding new ways to attempt net breaches. Such activity puts unacceptable risk on site equipment that may result in stock escape.

Prior to the removal of ADDs in 2021, LDL experienced no breaches of nets by seals. LDL have since reported the incidence of 2 net breaches in 2023. Since ADDs were requested to be removed by government ministers in 2021, the company has also suffered costs of £187,024.53 to repair damaged netting from seal interactions. Seals are also observed to position themselves on the walkways where farm staff have to carry out farming operations, bringing our staff into close proximity to seals and therefore putting them at unnecessary risk in the workplace.

In summary, given the clear site-specific evidence of impact on livestock and ADD efficacy presented above, it is hoped that the option for ADD use at Clashnessie Bay will be licensed so that seal interaction can be better managed going forwards.

References

Huntingford, F.; Jobling, M. and Kadri, S. (eds) 2012. Aquaculture and Behavior. Blackwell Publishing Ltd.

Schreck, C.B & Tort, L. (2016) The Concept of Stress in Fish. In Fish Physiology (First Edit, Vol 35). Elsevier Inc, <https://doi.org/10.1016/B978-0-12-802728-8.00001-1>.