



The use of acoustic deterrent devices to deter seals in-river: initial results of a user survey for deployments carried out in 2024

1. Introduction

In 2023 Fisheries Management Scotland was awarded funding from Marine Fund Scotland to purchase 19 Acoustic Deterrent Devices (ADDs).

The OTAQ Sealfence Portable is a mobile acoustic system designed to deter seals and sea lions in a wide range of underwater situations. The device uses a robust, underwater projector (fitted with 25m of Kevlar reinforced cable) to emit an omnidirectional sound which seals and sea lions will find uncomfortable at anything inside the system's 40m effective range.

The purpose of this project is to support efforts by salmon fisheries managers to protect salmon from seal predation by continuing to investigate, develop and test non-lethal methods of control, thereby improving our understanding of the effectiveness of these measures.

Predation on wild Atlantic salmon by seals, particularly when small numbers of 'specialist' seals enter rivers to feed, is a concern in a number of rivers across Scotland. Research by Sea Mammal Research Unit (SMRU) has demonstrated that only a small proportion of seals develop this behaviour, and therefore a small proportion of seals can have a disproportionate impact on Atlantic salmon within Scottish rivers. Scottish Government and fisheries managers are focussed on non-lethal methods of preventing impacts from seal predation.

The use of mobile ADDs, mounted on suitable watercraft, can have a particularly important role in deterring seals within rivers. Importantly, the use of ADDs within rivers will ensure that interactions with cetaceans, which are particularly sensitive to this technology, will be eliminated. The project aims to reduce predation pressure on wild salmon and sea trout, by increasing the capacity for river managers to deter seals from entering Scottish rivers.

2. Feedback sought

Following the first full year of use of ADDs, Fisheries Management Scotland undertook a survey to determine their efficacy across a range of different rivers. The survey posed a number of questions as follows:

- *How far upriver are you encountering seals?*
- *An assessment of the scale of the problem associated with sea presence in-river: highly disruptive, disruptive, moderately disruptive, slightly disruptive or not disruptive.*
- *Days the device was deployed in the current year;*
- *Number of operators for deployment and hours required for deployment;*
- *Mode of deployment?*
- *Assessment of the efficacy of the device: Highly effective, effective, moderately effective, less effective or not effective and supporting evidence;*
- *Is the effectiveness of the device variable depending on different factors? For example, river topography, water depth, time of day, water height, number of operators, mode of deployment;*
- *Was further guidance sought on any issues identified above from the device manufacturer;*
- *To what extent do you consider the seals you encounter become habituated to the device you have deployed;*
- *If there were signs of habituation, what measures were tried to overcome this;*
- *Do you have any general observations on the operation of the device that have not been covered above?*

3. Results

Responses were received from eight organisations who have deployed these devices. There was a wide range of experiences encountered with deployment. Six out of the eight respondents felt that the incursions of seals into the riverine environment were either highly disruptive or disruptive, with two respondents saying they were moderately disruptive.

In terms of the effectiveness of the devices, three respondents felt they were not effective, two felt they were effective, one moderately effective and one less effective. One of the survey respondents below has not yet had the opportunity to trial the device. In addition to this another recipient of the device observed one seal in the river but it left and there was insufficient time to deploy the ADD. The assessment of efficacy was variable in some locations, depending on the nature of the terrain and mode of deployment. In particular, two of the sites at hydro dams seemed to have greater efficacy, and this was felt to be due to the hard surfaces of the dam structure at these sites (Awe and Beaully)

A summary of the experiences from each of the nine organisations who responded is provided below:

- **River Awe**

Seals were encountered up to 4 km upstream on the River Awe (from the tide) and the device was deployed on 12 days during 2024. The device was operated by one person and from the riverbank. It worked well in most situations on different seals, particularly where there were hard surfaces close by (rock revetment and concrete at the Awe barrage pool), but appeared less so where there were soft banks. It was mostly used in high flow conditions when seals appeared to use the higher flow to swim upstream to the barrage. There was no habituation experienced, although it was used on several different seals at different times.

- **River Spey**

Seals were encountered at times 15 miles plus upriver from the tide and were felt to be highly disruptive. The device was deployed 12 times during 2024 by one operator from both canoe and the riverbank, although two operators would make operation easier. Duration of use on each deployment depended on location, but was up to four hours per session. The device was felt not to be effective, and this was evidenced on video with seals swimming past the ADDs on multiple occasions. We do not believe that efficacy was variable as a result of different factors, it was deployed in shallow and fairly fast water to deeper slower pools, at different times of day with the same result. For seals to become habituated, the device would have to have worked even slightly, but it made no difference.

- **River Tay**

Seals were encountered from the top of the tide on the main stem River Tay to a point approximately 15 miles upstream, and occasionally 20 miles upstream, at points on the River Isla at Tay junction upstream to junction with river Erich. The device was deployed on 5 days, either from boat or canoe. During use, the seal appeared to leave the area but there is no evidence to support this. Water depth and width of river appears to have an effect on efficacy. There was no evidence to suggest habituation.

- **River Lochy (Lochaber)**

Seals were encountered up to 8 miles from the tide, with the device being deployed on two days from the bank. The device was only trialled in gentle running water where it was found to be ineffective.

- **River Beaulieu**

Seals were encountered approximately 5km above tidal limit, at which point there is a large hydro dam. The device was deployed on 14 days both from the riverbank and on boat. When used at the hydro dam with close proximity to the dam walls, it caused the seal to obviously swim away from the device, (presumably due to the sound reflecting off the walls and making it more effective – this effect was also noted by the Awe DSFB at a similar site on the River Awe).

- **River Findhorn**

Seals were encountered approximately 5km above tidal limit. The device was deployed on two days both from the riverbank and on boat. Deployment from boat: very narrow river channel 25m, slow flow, good weather conditions. Deployed in mid channel, three seals within range of ADD. Two were moved downstream, third seal moved into shallower water where it remained. ADD worked well in these low flow conditions, narrow river channel, seals moved away effectively.

Bankside deployment 2: Elven point, Binsness, channel width 20m, good weather conditions. One seal observed and ADD deployed and had no effect on the seal which stayed in the area. Most effective in narrow channels, slow smooth flow. Good clear calm weather also likely to be important. Two operators ok for most deployments, third operator required for boat. Installation and operation fairly straight forward. One plug jammed and we received helpful advice from manufacturers to fix the issue on site. With only three attempts it's too early to say if seals are becoming attuned to the ADD. Generally found the equipment easy to use, charge and install.

- **River Ness**

We have not had the opportunity to test the scarer yet. Seals have been seen in the River Oich (frequently) but they are mainly transiting and are never present in any one place for any length of time. It has not been used in the loch as the seals are highly mobile there and the range of the scarer is limited. We intend to deploy the scarer in the lower River Ness during the spawning season. In recent years seals have been observed predated spawning salmon on a daily basis. This will provide our best opportunity to trial the equipment properly.

- **River Tweed**

Seals were encountered approximately 5 to 15 miles above tidal limit with at least one seal observed in excess of 30 miles upriver. The device was deployed on 15 days, for up to eight hours at a time. Apart from one seal slightly changing direction we have been unable to prevent seals continuing upstream. The device was

operated within a manual detect and deter framework (i.e. the device was manually activated only when a seal was observed by a riverbank observer to be within the range likely to elicit the startle reflex in seals). The device was deployed from watercraft, permanent structures, and by foot from the bank. Deployment of the device was extremely resource heavy, requiring the attendance of the entire five-man RTC enforcement team. On no occasion when the device was deployed were we able to prevent a seal (Common or Grey) from traveling upstream. The majority of resource and time was spent trying to relocate the seal to then re-deploy the device. It quickly became apparent to us that seals are too agile in the river environment, allowing them to rapidly maneuver past the deterrent devices effective range. This was extremely unsuccessful and labour intensive. 15 x 8 x 5 (staff) 600 man-hours.

During periods of higher flows, it is impossible to keep up with a seal that is intent on travelling upstream. In most situations high flows are unsafe to deploy watercraft, which in turn makes deployment harder. The available staff resource is predominantly wasted trying to locate the seal. The seals do not appear to be affected by the device so habituation doesn't look like an issue. During 2024, there were 53 reported sightings submitted to the Tweed Foundation reporting App. This is more than double the number reported in 2023 and the most significant in recent memory and included Common and Grey seals up-river of the Junction pool, Kelso at OS Grid Reference NT724338, and numerous sightings at Rutherford NT672314 and Mertoun NT618316, over 30 miles from the sea at Berwick Upon Tweed.

In addition to the experiences with deployment above, as part of the National Adult Salmon Sampling research programme (funded by the Marine Directorate), 98 salmon were netted for research purposes at the Paxton Net Fishery on the lower River Tweed during 2024. Of these, 32 displayed damage which could have been attributed to seals.

- A total of 62 seatrout were also sampled at the Paxton Net Fishery during 2024. Of these, 16 displayed damage which could have been attributed to seals.
- A further 73 salmon caught on rod and line were also sampled during the programme. Of these, 16 displayed damage which could have been attributed to seals.
- Damage on the salmon varied from a single slash wound to 5 or less distinctive scratch marks.
- Seals were observed in the river predominantly between March and June and September to November.

Of the 53 reported sightings, 25 were confirmed as Grey seals, 2 confirmed as Common seals and 26 unidentified. It would however be fair to presume the majority of the unidentified seals being Greys. In river seal activity between the 01/02/24 and 30/11/24 directly impacted on the fishing of 112 Tweed salmon anglers.

- **River Dee**

A grey seal was encountered 45km upstream of the tide in March this year however we typically encounter common seals as far in land as 30km upstream of the tide. Since its acquisition in Spring 2024 the device has been deployed on 8 days in an attempt to displace common seals in the Dee. A single operator is required to deploy the ADD from the bankside. Additional staff and or volunteers do make the process easier allowing for identification and deployment of the ADD within range of the seal(s). When deploying from a canoe we require two operators to man the canoe and a third to assist with the collection and transport of the canoe. For the Jet ski we require three staff although it can be operated with a minimum of two. We need one jet ski pilot, one mobile staff member on the bankside to track and keep in range of the jet ski pilot for safety and a third to assist with spotting and recording seal behaviours. We typically use the ADD in blocks of 4 hours from locating and identifying a seal to attempting to displace it with the ADD. We have found that the devices efficacy is determined by the individual seal upon which it is deployed, the location and method.

In the Dee we have several 'specialist' common seals which have been foraging in the Dee for several years now. These seals are less likely to respond having been habituated to a range of non-lethal deterrents over the years (10+) working with SMRU. In our experience only a handful of seals, typically new individuals have responded positively by not trying to pass a deployed ADD (this is not a recent experience this years' deployments have resulted in limited to no displacement effects observed).

Whilst using the ADD can on occasion be effective at displacing these habituated seals, this effect is limited to the range of the device with many seals just moving downstream and out of range, but not leaving the river entirely. With seal incursions in the Dee typically being up to 30km inland, this presents a significant challenge when trying to displace a seal downstream and out of the river using the ADD and one which we cannot manage with our current resources.

Our experience shows that these specialist seals when it is possible to displace them (most likely they have already made the decision to leave the river and we are chasing them out) is that they return to the river within a few hours or the following day, making any displacement temporary at best. The river characteristics do affect efficacy. The Dee is a gravel bed river which absorbs a lot of the sound emitted from

the device, reducing its efficacy and range. The Dee is also quite wide in many parts well beyond the effective range of the ADD which allows the seals to manoeuvre around the ADD and continue to forage.

We can only displace seals during daylight hours, its simply not safe and we cannot see seals in the dark. Seals observed in the Dee will be heading downstream at first light having spent the evening foraging in the river before heading back out to a coastal haul out, or location further downstream. Many seals will come into the river under the cover of darkness, and we are not able to attempt to displace these individuals with the ADD.

The water height/flow will also impact its efficacy. On the Dee we experience an increase in seal activity under high flow conditions. Deploying the ADD from the bank in these conditions is a risk for staff safety and that of the device. Getting within range in these conditions can be difficult as is spotting a seal and establishing if the device is effective.

The jet ski requires certain water conditions to operate. Too low a flow and moving through the river is a problem due to the shingle beds and shallows and too high and coloured (typically when we have seals present) also presents a risk to the operator for fear of striking something on the bed or some debris washed downstream. There is a sweet spot in the middle which allows for operation however it is not always possible to operate at this time as this is dependent upon trained staff resources. Work planning cannot always predict high flow events so we have to be responsive to some extent which can limit opportunities for deploying the jet ski.

Having used ADDs for several years the most effective approach when deploying a portable device is by using the jet ski, keeping the ADD within its effective range of the seal. The canoe offers this effect to some extent but doesn't have the ability to turn around and head upstream if a seal decides to double back. Deploying from the bankside offers the least effective approach as its limited to the range of the device and its mobility thereafter. Where you hope that the seal continues to move in the direction you want it to, and you are able to leapfrog downstream and continue applying pressure with the ADD as it moves.

We are aware currently of at least three common seals which have become habituated to ADDs. Any effects from the device are either negligible or temporary at best on each of these individuals. New seals soon learn that these non-lethal attempts to displace them are not a risk particularly when there are several other seals already upstream. On the Dee we have used a range of different techniques to deploy ADD's having gone through the full range of static and portable devices of

varying different brands over the 10+ years of working with SMRU to test their efficacy.

For portable ADD's we have varied the method of deployment, from the riverbank, canoe and jet ski. We have varied the locations deployed from changing the points at which we deploy the ADD and attempt to displace. We have changed the timings at which we attempt to displace, early morning, late afternoon, evenings. We have also tried varying the length of the period of displacement as well. We have coupled these ADDs with other non-lethal means of displacement such as the use of a paintball gun to help displace. Whilst this has helped it is not always practical to deploy both devices at the same time. These responses relate to the use in the Dee. Use of the ADD in the Don has been limited to date, due to resource implications and ability to displace seals safely downstream in a challenging and historically industrial river environment. Furthermore, the Donmouth LNR also has an island upon which seals haul out just upstream of the estuary. Whilst this is not a 'designated' haul out the risk posed by any disturbance at this very visible location and public perception of the Don Boards activities here have prevented us from taking direct action at this location.