Scottish Salmon Watch, 17 June 2020

Salmon Farms Caught Between the Devil & the Deep Blue Sea

- FOI disclosure by SNH (Nature Scotland) raises alarm bells on ADDs
- Scottish Greens call for a ban on all ADDs including lower frequency Genuswave
- Genuswave claim re. US MMPA compliance "incorrect" says NOAA
- GenusWave's claim that it is endorsed by SNH branded as "inaccurate & misleading"
- £100,000 Scottish Government project report on ADDs due this month (June 2020)
- SNH establish 3km indicative disturbance distance for ADD impacts on cetaceans
- Salmon farm noise pollution still not captured by JNCC's 'Marine Noise Registry'
- Tourist operator David Ainsley questions legality of ADDs
- ADDs banned for use on salmon farms in British Columbia back in 2000
- Install anti-predator nets instead of killing seals & harming cetaceans say campaigners

Documents disclosed via Freedom of Information reveal that Scottish Natural Heritage (re-renamed Nature Scotland just last month) has been pushing salmon farms to turn down the volume on noisy Acoustic Deterrent Devices (ADDs) on salmon farms across Scotland.

Amendments seeking to include ADDs under the definition of 'injury' (in effect outlawing their use by salmon farms) have been lodged by the Scottish Greens at Stage 3 of the Animals and Wildlife Bill which will be debated in the Scottish Parliament later today (17th June) **[1]**.

The Ferret reported today (17 June 2020):

Seal scarers 'should be banned'

The Scottish Greens welcomed SNH's moves. "This is clear confirmation from Scottish Natural Heritage that these devices cause considerable harm to marine life," said the party's environment spokesperson, Mark Ruskell MSP.

He pointed out that there were "far more humane alternatives" such as stronger nets designed to prevent seals from eating caged salmon. "I hope this revelation will convince MSPs to back my amendment to extend the seal culling ban to include these torture devices," he told The Ferret.

"Otherwise it will be clear that market forces have driven the legislation, not real concerns over animal welfare."

The SNH documents were obtained by the anti-fish farming campaigner, Don Staniford, from Scottish Salmon Watch. "Salmon farmers are caught between the devil of killing seals and the deep blue sea of noisy acoustic deterrent devices which harm cetaceans," he said.

"Noisy ADDs need to be turned off completely not just turned down. Instead of protecting seals and cetaceans, Marine Scotland has been desperately trying to shield the salmon farming industry from the added costs of anti-predator nets."

He added: "To comply with EU and US legislation, there must be an immediate and unconditional ban on the use of ADDs on salmon farms. If salmon farms cannot avoid harming marine life then they should move out of the way."

David Ainsley, a marine biologist who runs wildlife watching boat trips near Oban, has started a petition to ban ADDs. To date it has been signed by over 25,000 people.

He said: "Just now seals, dolphins and porpoises are having babies, but they are being driven out of safe inshore nursery areas by acoustic deterrent devices, which are unnecessary because double nets stop seal predation without harming marine mammals."

He described the noise from ADDs as "staggeringly high" and also criticised Marine Scotland. "Scottish law prohibits disturbance or injury to any porpoise, dolphin or whale but Marine Scotland, the regulators, are not enforcing the law," he said.

Marine Scotland has been pushing back against a ban on ADDs even though their use in Special Areas of Conservation such as the Inner Hebrides & the Minches contravenes EU law and looks likely to trigger a U.S. ban on Scottish salmon. A Scottish Government report - issued as a £100,000 public tender in January 2019 via "Improve understanding of use, impact and efficacy of ADDs in aquaculture" - is scheduled to report in June 2020 **[2]**.

Faced with the prospect of an export ban to the United States - the largest export market valued at £180 million per year - "multiple farms" in Scotland have reportedly been installing 'GenusWave' technology over the last few months. GenusWave claims to be "environmentally friendly" and is approved by the Aquaculture Stewardship Council **[3]**.

GenusWave claims their 'Targeted Acoustic Startling Technology' is in compliance with the Marine Mammal Protection Act. However, NOAA told Scottish Salmon Watch earlier this month that this is incorrect and SNH's alleged support for GenusWave was branded in 2018 by SNH as "inaccurate and misleading" **[4]**.

A report - "Influences of lower-frequency Acoustic Deterrent Devices (ADDs) on cetaceans in Scottish coastal waters" - published in June 2018 by the Scottish Aquaculture Research Forum (SARF) provided "no strong evidence" that so-called 'lower-frequency' ADDs would significantly reduce risk of acoustic impacts on harbour porpoises. "The present experiment has shown that use of continuous operation Lower-Frequency ADD signals cannot be assumed to entirely reduce collateral impacts of noise on non-target species such as porpoises" **[5]**.

A scientific paper - "Mapping widespread and increasing underwater noise pollution from acoustic deterrent devices" - published in Marine Pollution in October 2018 concluded that: "ADDs are a significant and chronic source of underwater noise on the Scottish west coast with potential adverse impacts on target (pinniped) and non-target (e.g. cetaceans) species, which requires further study and improved monitoring and regulatory strategies" **[6]**.

The move towards lower frequency ADDs and ADDs using 'Patrol Mode' (i.e. not on continuously) follows a complaint filed with the European Commission by tourist operator David Ainsley in March 2018 **[7]**.

A previous FOI disclosure by SNH in 2018 revealed that the majority of salmon farms employed ADDs and ca. two thirds (68%) had ADDs switched on all the time **[8]**.

In March 2018, the Scottish Parliament's salmon farming inquiry raised concerns about the continuous use of ADDs on salmon farms **[9]**.

Earlier this month the Scottish Greens voiced concerns on ADD use on salmon farms calling for a ban.

Mark Ruskell told Shetland News (7 June 2020): "While I welcome the long-awaited action on seal killing, the timing suggests it may be more about making sure Scottish Salmon stays on American plates than any real consideration for animal protection. But there is a real danger that when the licensed killing of seals is removed, the industry falls back on acoustic deterrent devices which torture and injure not just seals, but whales, dolphins and porpoises too. That's why it's absolutely vital that this step doesn't cause as much damage as its preventing. These devices must be included in the ban, and if ministers won't commit I will introduce an amendment to stop this cruel practice".

Scottish Salmon Watch's call in September 2018 for salmon farms to be included in JNCC's 'Marine Noise Registry' has thus far fallen on deaf ears. In January 2020, JNCC conceded in a FOI reply that noise from ADDs used by salmon farms "is currently one of the largest gaps in data collection" **[10]**.

In 2000, the use of ADDs was banned on salmon farms in British Columbia **[11]**.

In 2017 (in reply to a Parliamentary inquiry from Peter Chapman MSP), SNH's Dr. Caroline Carter and Cathy Tilbrook wrote: "An outright ban on the use of acoustic deterrent devices would be likely to lead to increased demand for seal shooting licences".

As the salmon farming industry is dragged kicking and screaming away from ADD use, new figures published this month by Marine Scotland reveal that salmon farmers are going on a seal-killing spree with the number of seals killed in the first quarter of 2020 double that of the first quarter of 2019 (read more via: "Seal shooting at fish farms doubles before ban").

"Salmon farmers are caught between the devil of killing seals and the deep blue sea of noisy Acoustic Deterrent Devices which harm cetaceans," said Don Staniford, Director of Scottish Salmon Watch who today wrote to Scottish Ministers and the U.S. Government voicing concerns. "Noisy ADDs need to be turned off completely not just turned down. SNH is caught in the crossfire between the U.S. regulations which prohibit the killing and harming of marine mammals and the foreign-owned salmon farming industry which resorts to the cheapest option. Instead of protecting seals and cetaceans, Marine Scotland has been desperately trying to shield the salmon farming industry from the added costs of anti-predator nets. The latest killing spree of seals by salmon farming companies illustrates how this morally repugnant industry is ethically and environmentally bankrupt."

"Grieg Seafood has invested in 'eco-nets' and completely eliminated the killing of seals whereas Mowi, Scottish Sea Farms and The Scottish Salmon Company are still slaughtering seals and harming cetaceans via noisy ADDs," continued Staniford. "Turning down the volume on ADDs via targeted solutions such as GenusWave is simply not good enough. To

comply with EU and US legislation, there must surely be an immediate and unconditional ban on the use of ADDs on salmon farms. If salmon farms cannot avoid harming marine life then they should move out of the way - and that means moving off migration routes for cetaceans and salmonids as well as relocating away from nursery areas for seals and other protected species. The lethal nature of factory fish farming is why consumers are turning away from cheap and nasty Scottish salmon."

The FOI disclosure by SNH in April 2020 - "FOI Backgrounder: ADDs, Seals, Cetaceans & Salmon Farms" - included:

Scottish Sea Farms committed in their 'Sound of Mull ADD Deployment Plan' (January 2019) to "completely phase out the use of ADDs in the Sound of Mull" beyond 2021 "once all farm have been upgraded to polyethylene nets with improved net tensioning".

ADD use beyond 2021

SSF acknowledge that the Sound of Mull lies within the Inner Hebrides and Minches SAC designated for its harbour porpoise population and that it is considered a sensitive location in terms of potential indirect and unintentional disturbance of porpoise and other cetaceans from underwater sound generated by ADDs. Once all farms have upgraded to polyethylene nets with improved net tensioning and we can demonstrate that these improvements can limit seal predation to an acceptable level, it is our intention to completely phase out the use of ADDs in the Sound of Mull.

Scottish Sea Farms pledged in relation to their Fishnish salmon farm in the Sound of Mull (where a humpback whale was killed in 2014) an "intention to remove ADDs from all farms in 2021 once cage nets are fully upgraded":

The Sound of Mull and the Fishnish area in particular, have supported significant records of harbour porpoise activity in recent years, despite existing ADD use in this area. SSF do however accept that the Sound of Mull is a sensitive location in terms of potential indirect and unintentional disturbance of porpoise and other cetaceans. We have therefore identified significant changes in ADD use at all Sound of Mull sites which will reduce the risk of significant disturbance. These include:

- Investment in stronger cage nets and associated net tensioning which should reduce the need to use ADDs;
- Replacing continuous ADD use at sites with limited ADD use where tensioned netting has not been fully effective against seal predation and seal related fish mortality is demonstrated;
- Limiting the amount of time ADDs can remain on;
- Limiting simultaneous use of ADDs to a maximum of two sites;
- Intention to remove ADDs from all farms in 2021 once cage nets are fully upgraded.

The measures proposed will significantly reduce the level of ADD use within the Sound of Mull compared to existing use and will reduce the risk of significant cumulative impacts on harbour porpoise and other cetacean species in the Sound of Mull. We therefore consider that these measures provide appropriate mitigation that will avoid an adverse effect on site integrity of the Inner Hebrides and Minches SAC.

Documents disclosed by SNH via FOI in April 2020 reveal that The Scottish Salmon Company claims to shoot seals "as a last resort" even though the installation of anti-predator nets is not common practice.

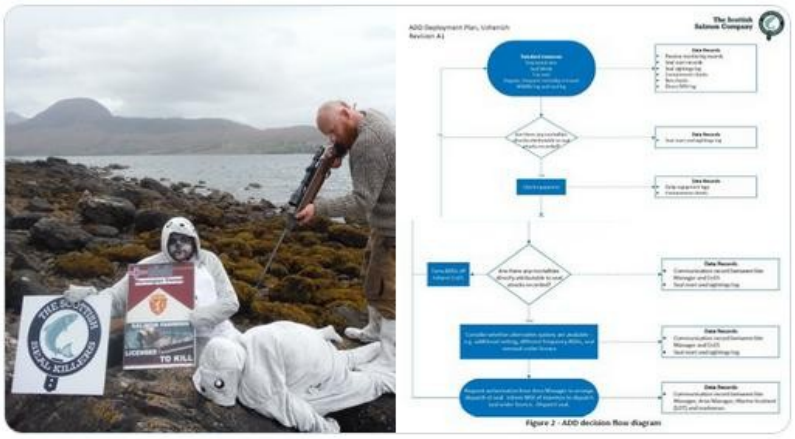
Don Staniford
@TheGAAIA

How can seals be truly shot as a "last resort" when common practice for salmon farming companies is to NOT use anti-predator nets? @salmon_scottish @marinescotland @nature_scot @NOAA @SealScotland @SealifeA @ConcernMarine @MairiGougeon @FergusEwingMSP @onekindtweet @markruskell

11:38 AM · Jun 15, 2020 · Twitter Web App

Don Staniford
@TheGAAIA

Please dispatch Scottish salmon to the dustbin! Here's how @salmon_scottish dispatches (i.e. kills) seals: "Request authorisation from Area Manager to arrange dispatch of seal. Inform @marinescotland of intention to dispatch seal under licence. Dispatch seal" @nature_scot



NOAA and 9 others

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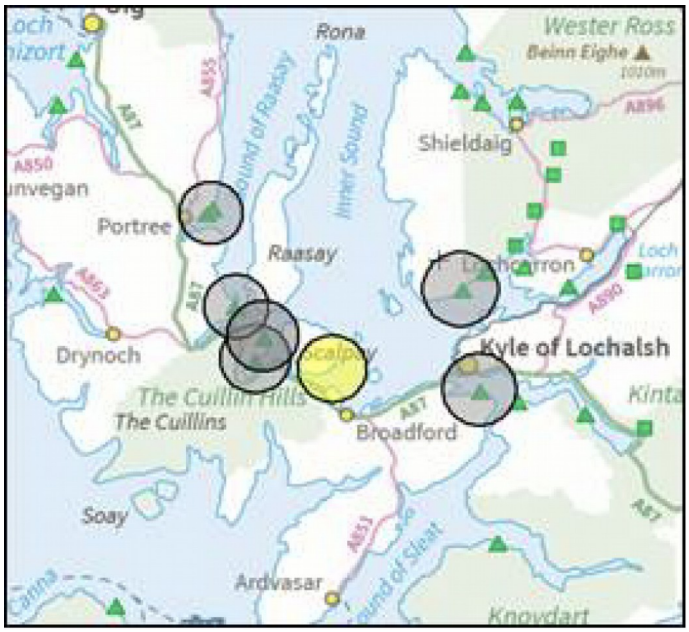
Whilst some salmon farming companies continue to kill seals and rely on ADDs instead of anti-predator nets, others such as Grieg Seafood has not shot a seal since December 2017 and have reported zero use of ADDs.

In September 2019, SNH admitted that a salmon farm proposal by Grieg Seafood for Loch Dunvegan on the Isle of Skye would not have any significant effects. "They [Grieg Seafood] have committed not to use ADDs," wrote SNH in a letter to Highland Council dated 6 September 2019. "They state that this equipment has been successfully used in Shetland with no predation by seals, no need for ADDs and no seals shot".

In February 2019, SNH questioned "inconsistency" in Mowi's application for a new salmon farm at the Isle of Scalpay. "Some farms are able to operate without ADDs with the newer stronger nets," wrote SNH's Dr. Caroline Carter in an email dated 12 February 2019 in reply to Mowi's claim that "removing the option to use ADDs puts potential pressure on the welfare of farmed fish and the protection of seals".

"Conclusive evidence is not what is required," wrote SNH's Caroline Carter in an email dated 12 February 2019 in reply to Mowi's claim that there was "little scientific evidence which provides conclusive data on the impact of ADDs". "There is enough scientific evidence in existence to highlight the potential, and as far as I'm aware under Natura that's sufficient," continued SNH's Dr. Caroline Carter in an internal email to SNH's Kirsty North.



Map: Noise pollution at salmon farms around the Isle of Skye (source: SNH)

In January 2019, SNH criticised Mowi's policy of using ADDs rather than predator nets. "The company's policy is to use ADDs rather than predator nets, and they cite potential entanglement as the reason for not deploying predator nets," wrote SNH's Dr. Caroline Carter to SNH colleagues in an email dated 29 January 2019 in relation to Mowi's new Isle of Scalpay salmon farm. "Thus is a new farm application, and therefore we should ask them to first consider operating the site without using ADDs at all (as per our draft guidance). There are nets available now that are thought to prevent seal predation without needing other measures. For example Seal Pro netting https://www.garwarefibres.com/product/sapphire-

sealpro/ this has/is being proposed by other companies. If they are procuring new kit for this site, then that's the perfect time to look at other options".

Read more via:
Protective nets reduce Scottish Sea Farms seal cull
Predator nets reduce seal cull by a third
All Cooke Scotland sites to be seal-proof by end of 2019
Strong Nets Save Seals – So Why Isn't Everyone Using Them?
Seal killing slips through the net
Drive to end seal shooting in Shetland

"Appendix 5.5a details the company's commitment to achieving ASC certification, and within this, there is a limit to the number of days the ADD system is in operation to less than or equal to 40% of the time the site is stocked," continued SNH's Dr. Caroline Carter in January 2019 . "This could be a significant amount of time, and so my feeling is that we should be aiming for a lower proportion than this".

Mowi's reliance on ADDs and the killing of seals - rather and installing anti-predator nets - is laid bare in their 'Acoustic Deterrent Device Deployment Guidance'.

Here's one example dated September 2019 for their RSPCA Assured salmon farm at Carradale in Kilbrannan Sound (scene of a mass mortality of 300,000 farmed salmon which were skinned alive in 2018):

CARRADALE SALMON FARM
ACOUSTIC DETERRENT DEVICE DEPLOYMENT GUIDANCE

Under the Regulation 39(2) of the Conservation (Natural Habitats, &c.) Regulations 1994 (as amended), it is an offence to deliberately or recklessly disturb any dolphin, porpoise or whale (cetacean). Furthermore, the farm is located within the Inner Hebrides and Minches Special Area of Conservation (SAC) for the protection of harbour porpoise. Scottish Natural Heritage advise that the use of ADDs has the potential to lead to disturbance/habitat exclusion of harbour porpoise. The following deployment plan has been developed as a requirement of Scottish Natural Heritage to guide the efficient use of ADDs with due regard to the responsible management of fish welfare and protection given to seal species.

INITIAL PREDATOR CONTROL MEASURES

- Top Nets
- Seal Blinds
- Tension Nets
- Daily Stock Mortality Retrieval

Mowi Scotland Ltd and its site managers have a responsibility to maintain the welfare of its stock. The RSPCA welfare standard is based on 5 core freedoms covering the freedom from pain, injury, fear and distress. Sites are independently assessed by Freedom Foods and RSPA Officers prior certification to this standard

Increased risk to stock identified (stock mortalities attributed to seals)

Check initial control equipment & if appropriate carry out maintenance	Ensure daily mortalities are retrieved. Consider increasing frequency at which stock mortalities are retrieved	Review mortality data & cause of mortalities

Key considerations:

Is there a licence condition or other mechanism which prevent the use of ADDs?

Are any external notifications required before or after use?

If yes, notification sent to, or permission sought from, relevant external party. If in doubt, please consult the Mowi Scotland Ltd Environmental Team

Continued increase in stock mortalities attributed to seals

Checks in boxes 1 & 2 have failed to reduce risk
ADD's switched on – Patrol Mode 170 dB
Notify Area Manager & in consultation consider additional control measure. Notify any relevant external party.
Review period: Daily
Max. duration: 2 weeks

No further stock mortalities attributed to seals

Continued risk to stock

Continued increase in stock mortalities attributed to seals

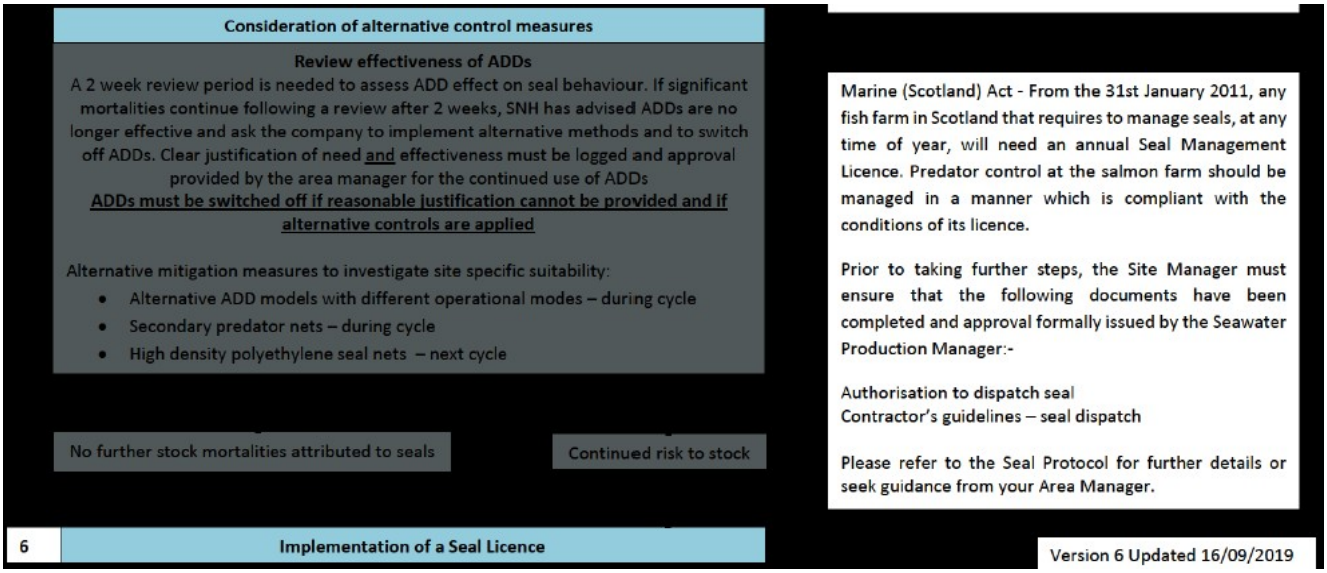
Patrol Mode 170 dB (box 3) has failed to reduce risk
Review other ADD operational modes - Standard Mode 189 dB
Notify Area Manager & in consultation consider additional control measure. Notify any relevant external party.
Review period: Daily
Max. duration: 2 weeks

No further stock mortalities attributed to seals

Continued risk to stock

The **Site Manager** is responsible for:-

- maintaining a record of the deployment date, make & model of device, dates of use, settings used, the position of the transducers
- a daily review as to whether an increased risk is still present and whether the ADDs can be switched back to Patrol Mode 170 dB or if additional measures are required. Any changes to ADD use should be recorded, and
- a fortnightly review in conjunction with **Area Manager** as to whether the risk is still present and whether additional measures are required; actions and justification to be recorded in a log by the **Site Manager**.
- **Site and Area Manager** to review ADD use at the end of each cycle.



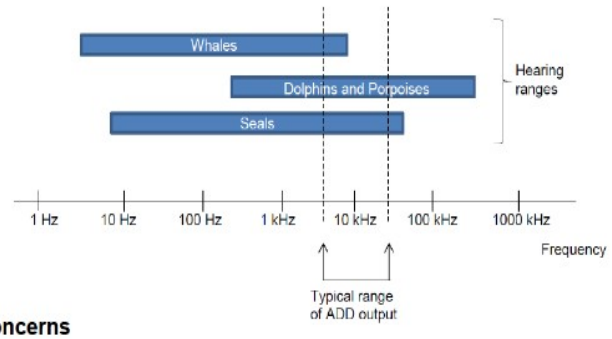
In July 2019, the team at St. Andrews University behind GenusWave admitted that "a range of manufacturers with devices on fish farms have made unsubstantiated claims with regard to being 'cetacean/dolphin/porpoise friendly' or posing 'no risk to hearing damage'". "To our knowledge, none of these claims are actually backed up by any publication in the scientific literature, even though the University of St. Andrews is sometimes falsely quoted to back up these claims," stated the email dated 15 July 2019.

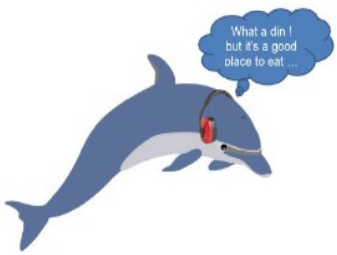
In July 2017, SNH wrote to Marine Scotland stating that "there is sufficient evidence, both empirical and modelled, to show that ADDs can cause disturbance and displacement of cetaceans".

In summary, ADDs used in aquaculture are of the frequency range and level that has been shown to disturb and displace cetacean species in various scientific studies. SNH advises that the potential for these impacts is real and therefore the requirements for protection conferred upon these species through the Habitats Regulations need to be considered.

5. Marine mammals' hearing and ADD overlap

- Different marine mammals have different hearing ranges. For example humans can hear from about 20 Hz to 20 kHz (if we are not a bit deaf). Marine mammals have a much wider hearing range than us. The acoustic output of typical ADDs falls well within the hearing ranges of seals, whales and dolphins





6. Concerns

- We know that ADD signals can be detected against background noise at distances potentially further than 10 km from source
- We know that some ADDs in some circumstances can disturb whales and dolphins between 2 and 7 km from source
- There is a growing concern about the impact of man-made noise in general on marine animals and therefore the ultimate aim is to minimise this impact by reducing unnecessary noise emissions into the marine environment

Read more background via:
Seal scarers used by fish farms branded ‘sonic torture’
Greens want ban on seal scarers
Seals in the Cross-Hairs of the Scottish Parliament
Seal shooting at fish farms doubles before ban
Ban on seal shooting must be watertight
Scottish Salmon's Slaughter of Seals Has Not Stopped!
Seal shooting by fish farms to be banned to save exports to US
Scottish salmon exports face US ban for ‘cruelty’ to seals
The Cruel Sea - why salmon farming law must change
BBC Countryfile on ADDs impacting on cetaceans
Sounding Off On Salmon Farms - Acoustic Deterrent Devices evade Marine Noise Registry
SARF report 112: "Influences of lower-frequency Acoustic Deterrent Devices (ADDs) on cetaceans in Scottish coastal waters"
The Times: "Noisy fish farms ‘harm other marine life’"
Mapping widespread and increasing underwater noise pollution from acoustic deterrent devices
Noise pollution from a salmon farm
Sounding Off About Scotland's Noisy Salmon Farms - Turn Off Acoustic Deterrent Devices to Protect Cetaceans
Deafening Impact of Salmon Farms on Cetaceans- "Deliberate & Reckless Disturbance" by Acoustic Deterrent Devices Makes Waves?
The National: "Warning salmon farm devices could hit wildlife tourism"
Sunday Herald: "Health of whales, dolphins and porpoises put at risk by underwater alarms"
Fish farm noise pollution threatens whales and dolphins
Cetaceans Sound Alarm On Salmon Farms - new research sparks EC complaint & call to ban Acoustic Deterrent Devices
ADDs and flapper skate, Scotland
Mowi’s Noise Pollution - Turn Off All Your Acoustic Deterrent Devices!
Noisy Salmon Farms - Switch Off Acoustic Deterrent Devices Now!

Contact:

Don Staniford: 07771 541826 (salmonfarmingkills@gmail.com)

Notes to Editors:

[1] Here's a list of Amendment selected for Stage 3 of the Animal and Wildlife (Penalties, Protection and Powers) (Scotland) Bill which is debated in the Scottish Parliament on Wednesday 17 June 2020:

Animals and Wildlife (Penalties, Protection and Powers) (Scotland) Bill

Marshalled List of Amendments selected for Stage 3

The Bill will be considered in the following order—

Sections 1 to 15 Long Title

Amendments marked * are new (including manuscript amendments) or have been altered.

Mark Ruskell

29A As an amendment to amendment 29, line 4, at end insert—

<( ) In section 107 (offence: killing, injuring or taking seals)—

(a) the existing text becomes subsection (1), and

(b) after that subsection so formed, insert—

"(2) In subsection (1), "injuring" includes exposing to an acoustic deterrent device.".>

Mark Ruskell

55 After section 10A, insert—

<*Acoustic deterrent devices: requirement to report*

Acoustic deterrent devices: requirement to report

(1) The Scottish Ministers must as soon as practicable, and no later than 1 March 2021, lay a report before the Scottish Parliament on whether existing provision in relation to animals and wildlife is sufficient to manage the use of acoustic deterrent devices on land constituting a fish farm.

(2) A report under subsection (1) must include—

(a) information on the use made of acoustic deterrent devices on Scottish fish farms,

(b) any known impacts that the use of acoustic deterrent devices has on marine mammals,

(c) consideration of whether the use of acoustic deterrent devices on Scottish fish farms is sufficiently monitored,

(d) consideration of the circumstances in which Scottish fish farm operators using acoustic deterrent devices may commit an offence under regulation 39 of the Conservation (Natural Habitats, &c.) Regulations 1994 (SI 1994/2716), and

(e) any future plans for regulation of the use of acoustic deterrent devices.>

On 3 June 2020, [the Scottish Parliament's Environment, Climate Change & Land Reform Committee discussed the issue of ADDs and seals killed by salmon farms](#).

Watch the discussions via Scottish Parliament TV [online here](#)

The written transcript via [the Official Report (3 June 2020)] includes:

Mark Ruskell: I will move us on, because we are where we are. The Government has known about the need to prevent the damage to marine mammals since 2017 and it has taken a long time for this licensing proposal to be introduced. I am glad that it is being introduced, but there are potentially consequences that could impact on other marine mammals.

As I see it, if we rightfully remove the licensed killing of seals, the industry could respond in two ways: it could use tensioned nets and seal blinds to prevent the access of seals to aquaculture cages, but it could also continue to use acoustic deterrent devices. There is scientific literature on ADDs and their impact on marine mammals—not only on seals, but also whales, dolphins and porpoises. According to a 2010 study by Northridge and others, ADDs can be detected at more than 14km from the sound source.

11:30

Another paper, which was written in 2014 by Lepper and others found that commercially available ADDs can cause injury, stress, hearing damage and behavioural disturbance. The same study went on to state that there is a credible risk of exceeding injury criteria for both seals and porpoises.

This year, a study by Götz reported concerns about the new wave of acoustic deterrent devices, which are called "GenusWave". Will the witnesses acknowledge that there is an impact on marine mammals from acoustic deterrent devices?

Mike Palmer: We are absolutely aware of the concerns about ADDs. The issue came up in the inquiry that this committee undertook, and it prompted us to undertake a programme of work to look into ADDs and their impacts. We are undertaking government-funded research, so that we can have proper evidence-based development of policy on ADDs and how they should be addressed as a non-lethal deterrent in future.

I will hand over to my colleague Elaine, who can give a bit more detail on our work.

Elaine Tait: At the moment, a range of non-lethal measures are used by fish farms and the river fishery sector to deal with seal predation. That range of methods includes seal blinds, tensioned nets and also ADDs. As Mike said, we appreciate that there are some concerns regarding disturbance and the potential impact of those devices on cetaceans.

When the committee reviewed the impacts of fish farming, there was talk about various unknowns and uncertainties. We have commissioned research on that, which aims to start to fill some of the key gaps on the extent of ADD use across the sector—including how and where they are used, duty cycles and places in which ADDs are not used—to get a full picture. That means that when we start to move forward we will have a strong evidence base and knowledge about how ADDs are being used.

The effectiveness of ADDs is also part of the project. We will work with the industry to get a feel of their effectiveness. That project will also look at developing science-based industry guidance about how ADDs should be used in order to reduce any potential environmental impact. All that work is on-going and it is due to be completed this year.

As well as funding that research, we are undertaking a review of the current management and regulation of ADDs. That is also on-going and once the review is completed we will set out further details.

Those are the two workstreams that we have at the moment, and we are conscious of the concerns.

Annie Wells: I have two further quick questions. Can you tell us when the research started, given that there was a committee inquiry in 2018? Can you foresee any potential unintended consequences that might need more investigation?

Elaine Tait: The research commenced last summer. It is on-going and will complete later this year. As I said, we are interested in finding out exactly what is going on, so we are not looking at the impact of ADDs in particular. Really, we are looking at efficacy and usage. It is clear that we do not know how these devices are used and, in order to move forward, we need a solid evidence base.

The Convener: Before we wind up this session, Mark Ruskell will ask a supplementary question.

Mark Ruskell: The US Marine Mammal Protection Act is clear. It prohibits the taking of marine mammals, and it says:

"The term 'take' means to harass, hunt, capture, or kill, or attempt to harass, hunt, capture, or kill any marine mammal."

The act defines harassment as

"any act of pursuit, torment, or annoyance which—

(i) has the potential to injure a marine mammal ... in the wild; or

(ii) has the potential to disturb a marine mammal ... by causing disruption of behavioral patterns, including, but not limited to, migration, breathing, nursing, breeding, feeding, or sheltering."

With due respect to the witnesses, the issue is not about whether ADDs are lethal; it is about their ability to disrupt, annoy and harass marine mammals, whether they are seals, whales,

dolphins or porpoises. There appears to be a major issue with compliance with an act that—let us face it—was drafted in 1972. Surely, the compliance issue is not about the extent of the use of ADDs; it is about the nature of that use and their impact on marine mammals. I would like to push our witnesses for a response on that point.

Michael McLeod: You are absolutely right about the MMPA. We have to achieve comparability with how the US uses its regulations, and it has a process that enables the use of acoustic devices. We will be working towards having something that is comparable in that regard. However, to get to that position we need the evidence base that Elaine Tait outlined, because it is the use that creates the noise in the marine environment, and that is what will determine the level of effect that that noise will have.

Read more via: Seals in the Cross-Hairs of the Scottish Parliament

[2] In January 2019, the Scottish Government invited a public tender to a £100,000 research project - "Improve understanding of use, impact and efficacy of ADDs in aquaculture" (CR/2018/08) - to be completed by June 2020.

Scottish Government
Riaghaltas na h-Alba
gov.scot

INVITATION TO TENDER FOR:

Improve understanding of the use, impact and efficacy of Acoustic Deterrent Devices (ADDs) in aquaculture

TENDER REFERENCE – CR/2018/08

A 'Specification of Requirements' included:

SPECIFICATION OF REQUIREMENTS

Improve understanding of the use, impact and efficacy of Acoustic Deterrent Devices (ADDs) in aquaculture

Introduction

1. This specification sets out the terms of reference for the research project "Improve understanding of the use, impact and efficacy of Acoustic Deterrent Devices (ADDs) in aquaculture". The project will assist in gathering evidence on the effectiveness of ADDs in reducing seal depredation and the extent of their use at fish farms in Scotland.

2. Acoustic Deterrent Devices (ADDs) are one of a number of management measures used by the aquaculture industry to reduce seal depredation at fish farms, but in recent years there has been increasing concern about the potential for impacts on cetaceans. Despite the long-term use of ADDs in aquaculture there is 1) a poor understanding of the practical effectiveness of current and new ADDs in terms of deterring seals and reducing predation events at Scottish aquaculture sites, and 2) limited empirical data on the disturbance and displacement of cetaceans as a result of ADD use at Scottish aquaculture sites. These were raised as significant knowledge gaps in a Scottish Government review of ADDs in Scotland[1], therefore the aim of this project is to address some of the recommendations made by Coram et al (2014) in an effort to further develop our understanding of the issue.

3. To address some of these issues requires a greater understanding of the extent of ADD use at aquaculture sites in Scotland. Currently there is limited information on their use (for example, the number, type of device(s) used and mode of operation) which may vary considerably between aquaculture sites. Increasing our understanding of where and how ADDs are used at fish farms will not only enable better mapping of devices, but will also help to inform investigations into the effectiveness of ADDs in reducing seal depredation and the potential for impacts on cetaceans.

4. Assessing the potential for impacts on cetaceans from ADDs, and their effectiveness in reducing seal depredation, can be difficult. They will vary widely based on a number of factors, including sound characteristics of the devices, how they are used (e.g., duration, source level, frequency, duty cycle), the environment in which they are used, as well as species behaviour. Our understanding of the effectiveness of ADDs on seal depredation events in the long-term and the variables that may influence this effectiveness is still limited. Similarly, while a number of studies have been undertaken over the years which have demonstrated that certain devices have the potential to affect some cetacean species (particularly harbour porpoise), there is still a poor understanding of the occurrence of behavioural responses around ADDs *in situ* at fish farms in Scotland and the consequences of any disturbance or displacement of cetaceans.

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[1] http://www.gov.scot/Publications/2014/10/8271/0

5. Consequently, there is a need to improve our understanding of the use, impact and efficacy of ADDs in aquaculture in order to balance the sustainability of our growing aquaculture industry whilst protecting biodiversity and the environment.

The Study

Aims

6. The aim of this research project is to improve our understanding of the use, impact and efficacy of ADDs in aquaculture. Specifically the study will aim to:

- Undertake a comprehensive assessment of the status and use of ADDs at Scottish aquaculture sites.
- Using an analysis of existing data sources and information gathering techniques, assess the relative effectiveness of ADDs in reducing seal depredation.
- Consider and explore the feasibility of alternative non-lethal approaches for reducing seal depredation.
- Deliver a set of recommendations for future *in situ* field studies to fill key data gaps.

Objectives

7. The research objectives for this project are as follows:

- Undertake a comprehensive assessment of ADD use at fish farms around the Scottish coast. This should include an assessment of the types of devices used by each fish farm (where applicable), their location and the extent of their usage. This information should be presented in a live database that can be updated with new data.
- Using existing information sources and dialogue with industry, undertake an assessment of the effectiveness of ADDs as a tool in reducing seal depredation. This should take account of signal characteristics and/or modes of operation and variables that may contribute to seal depredation events and apparent ADD effectiveness, as well as a consideration of the geographical variability in the use of ADDs and associated results.
- Develop science-based industry guidance on the use of ADDs in aquaculture (to minimise the risks of disturbance to cetaceans) building on Scottish Natural Heritages (SNH) guidance (available on request from SNH[2]) and in close co-operation with the aquaculture industry.

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[2] E-mail: caroline.carter@nature.scot

- Drawing on recommendations from Coram et al (2014) and advice from the Special Committee on Seals (SCOS) (in draft) review the feasibility of alternative non-lethal approaches for reducing seal depredation at fish farms in Scotland.

- Deliver a set of recommendations for future *in situ* field studies to 1) investigate the occurrence of behavioural responses of cetaceans in response to ADDs, and 2) the efficacy of ADDs in reducing seal depredation.

Methods

8. The successful contractor should develop the proposal in line with the aims and objectives of the project and wider policy requirements. However, as a minimum it is anticipated that the approach would consist of the following research tasks:

- Working in close cooperation with the aquaculture industry (and other relevant organisations), undertake a comprehensive assessment of the extent of ADD use in Scotland. This should involve the collection of data on ADD usage at aquaculture sites in Scotland (for example, covering types and numbers of devices, modes of operation, location, etc.) to help quantify and map the scale and range of use, which will be collated into an appropriate database. To ensure that the data is up to date and reflects current ADD usage, there will be a requirement for the contractor to develop protocols for its continuous use that can be easily followed beyond the life of this contract.

- Using existing data sources (held by Government, academia and industry), and working in close partnership with the aquaculture industry, gain a greater understanding of the effectiveness of ADDs in reducing seal depredation at fish farm sites. We anticipate this involving 1) analysis of existing data sets and 2) structured dialogue with aquaculture bodies to understand drivers and ADD effectiveness in different locations and circumstances. Particular consideration should be given to the signal characteristics and/or modes of operation of ADDs and potential role of other variables (e.g. time of year, weather, operation of fish farms) that may influence seal depredation events and apparent ADD effectiveness. Contact with the Seal and Salmon Working Group (SASWG) which represents industry, academia and Government is essential.

- Explore opportunities to engage with the industry and other relevant organisations in relation to the aims of the project. To facilitate this, the contractor will be expected to have a project plan in place to ensure continuous dialogue and engagement with the industry.

- Building on SNH guidance "*Proposed use of acoustic deterrent deterrents (ADDs) at fish farms affecting the Inner Hebrides and the Minches cSAC*," drawing on the findings from the above outcomes and working closely with Marine Scotland, SNH and the aquaculture industry, develop science-based industry guidance on the most effective use of ADDs to reduce seal depredation while minimising potential disturbance/displacement of cetaceans. Developing a framework for the assessment of cumulative impacts of ADD will be important.

- Drawing on recommendations and findings of the report "*Evaluating and Assessing the Relative Effectiveness of Acoustic Deterrent Devices and other Non-Lethal Measures on Marine Mammals" (Coram et al, 2014)* and advice from the Special Committee On Seals (SCOS) *(in preparation),* review and consider the feasibility of alternative approaches for reducing seal depredation at fish farms and provide details on where these approaches are being used, how effective they are, financial and logistical feasibility, and any potential constraints associated with their use. Particular focus on nets and associated configurations is encouraged. The outcome of this review should be a set of recommendations on effective solutions with particular consideration of their deployment at Scottish aquaculture sites.

- Deliver a set of detailed recommendations for future *in situ* field studies to 1) investigate the occurrence of behavioural responses of cetaceans in response to ADDs, and 2) the efficacy of ADDs in reducing seal depredation. These recommendations should have regard for current research ongoing, and provide a clear justification, regarding what work, if any, should be commissioned, and provide costings for these elements. As part of this, the contractor should explore the feasibility of field studies and consider a selection of sites for any proposed field trials, including consultations with relevant organisations.

- Close liaison with experts in this research area and the aquaculture industry to ensure that the aims of the project are being met.

The contractor is encouraged to expand and develop their ideas based on the information presented here to fulfil the project requirements in the optimum manner.

Research Outputs

9. Within the first week of the contract the successful contractor will provide a 50 word abstract describing the project for publishing on the Scottish Government website.

10. The successful contractor will provide the Scottish Government with the following outputs:

- Progress reports to be sent to Marine Scotland and Scottish Natural Heritage at a frequency to be agreed. This report should contain information on progress, outputs and deliverables.

- An open access database that includes information on current ADD used (numbers and devices) within the Scottish aquaculture sector. This should be considered a live database and one that can be updated on a regular basis to reflect current ADD use.

- Findings on the efficacy of ADD use with respect to seal depredation.

- Science-based industry guidance on the use of ADDs in aquaculture to minimise the risks of disturbance to cetaceans which will build on the internal SNH guidance on ADD use at fish farms.

- A draft final report for the period of the contract. The content of the report should be agreed with the Scottish Government but it is anticipated that it will include the policy and scientific background, methodologies employed, results, conclusions and recommendations in relation to the aims and objectives of the project. This draft report should be submitted no less than six weeks before the end of the contract and should contain an Executive Summary (no more than two sides) in a format compatible with Microsoft Word. Potential contractors should indicate in their tender who will have the main responsibility for writing the report.

- A research summary which will be published by Scottish Ministers. This should be a 2-4 page summary of the main findings of the research and should be produced separately from the final report. This summary should not be simply a bulleted version of the points in the main report, but should be a wider look at what the findings mean in a wider policy context and may be edited by the Scottish Government.

- An oral presentation of their research findings to the Scottish Government and a range of stakeholders.

Timing and Cost

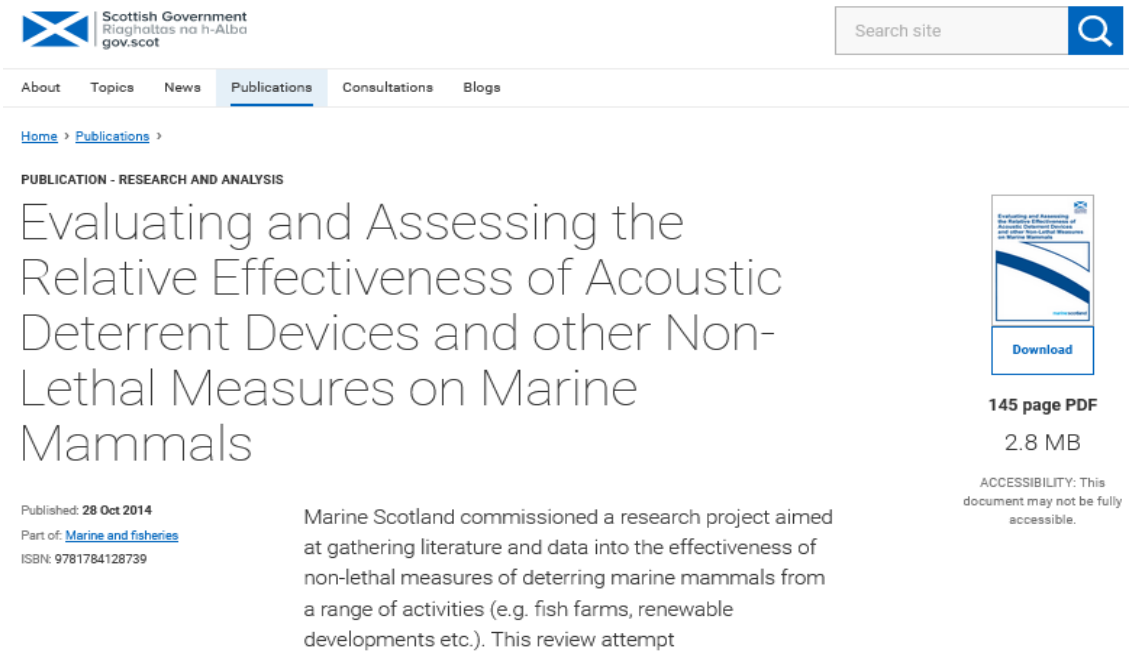
11. It is envisaged that the study will begin in February 2019 and will be completed by June 2020.

12. The estimated budget for this work is £80k to £100k.

Project Management

13. A steering group will be established to manage the project. The steering group will meet with the contractor after the contract has been let, and at six monthly intervals until the project is successfully completed. The contractor should therefore allow for four meetings in total.

The 2014 report referenced in Note 1 is available online here



In July 2017, SNH wrote to Marine Scotland on the issue of ADDs:

Scottish Natural Heritage
Dualchas Nàdair na h-Alba
All of nature for all of Scotland
Nàdar air fad airson Alba air fad

[redacted]
Marine Scotland – Marine Planning and Policy
Scottish Government
Area 1A South
Victoria Quay
Edinburgh
EH6 6QQ

Date: 28 July 2017

Dear [redacted]

IMPACT OF ACOUSTIC DETERRENT DEVICE (ADD) USE ON CETACEANS

In an email to SNH, dated 8 March 2017, you asked that, "*SNH submit formal statutory advice to Scottish Ministers on the impact of ADD use on cetaceans. This advice should be based on sound scientific evidence concerning the actual impacts of different ADDs on cetaceans.*" In more recent correspondence (1 June 2017), you clarified that this advice should "*focus on the scientific evidence regarding potential impacts of ADDs on cetaceans*" rather than discussing possible subsequent regulatory or management approaches.

Our advice is provided as requested and summarised below. In our view:

1. There is sufficient evidence, both empirical and modelled, to show that ADDs can cause disturbance and displacement of cetaceans.

2. There is sound, scientific evidence to expect that hearing damage, stress and masking may also occur but these are difficult to demonstrate empirically and would require further assessment.

Accordingly, we believe there to be a strong case for managing ADD deployment and use, and we would welcome further discussions with you on potential approaches to take this forward.

Further information was enclosed by SNH via an Annex - including:

Conclusions

The balance of scientific evidence indicates that ADDs emit frequencies within the hearing range of cetaceans; can cause disturbance and displacement; and have the potential to cause injury, masking and stress (though these latter aspects are difficult to demonstrate empirically).

The consensus in academic opinion is that ADDs can deter animals from an area[9] which implies a risk of habitat exclusion arising from persistent ADD use. This is particularly relevant in restricted environments (e.g. straits or narrows), where cumulative ADD use could present a barrier to passage by cetaceans. The extent of any habitat exclusion may well be site and context specific, and any resulting impacts on individual foraging success or population level consequences are not yet well understood. However current legislative protection requires a precautionary approach where a risk cannot be discounted beyond scientific doubt.

There is currently little formal regulation or monitoring of ADD use in aquaculture and as such it is difficult to understand the actual level of anthropogenic noise being contributed to the environment from this source. Given the increase in the marine area ensonified by ADD use and growing attention to the potential impacts of underwater noise (e.g. MSFD- Indicator 11) we consider that management of persistent noise sources such as ADD use by aquaculture is necessary.

In summary, ADDs used in aquaculture are of the frequency range and level that has been shown to disturb and displace cetacean species in various scientific studies. SNH advises that the potential for these impacts is real and therefore the requirements for protection conferred upon these species through the Habitats Regulations need to be considered.

[3] Fish Farmer reported (8 April 2020):

GenusWave said that the ASC approval has led to a backlog of orders from certified farms in Norway.

'There are also multiple farms in Scotland that are scheduled for delivery and installation of systems in April, May and June, even though the coronavirus situation has added a level of uncertainty to these plans.'

GenusWave is currently in the process of consolidating design and increasing production capacity to meet future demand by the industry. It is busy ramping up production lines with the next systems available in June/July.

Fish Farmer [reported (25 March 2020)]:

Fish Farmer
For all the latest industry news, markets and jobs in aquaculture

News

ASC approved seal scarer could beat US salmon ban

By Jenny Hjul - 25th March 2020

NEW anti-predation technology that could help salmon farmers avoid an export ban in the US has been approved for use on Aquaculture Stewardship Council (ASC) certified farms.

The Targeted Acoustic Startle Technology (TAST), developed at St Andrews University, deters seals from salmon farms without affecting other marine life, according to the company selling it.

GenusWave said the system, which had been tested on farm sites, was the only acoustic deterrent approved by the ASC.

The ASC has determined that Targeted Acoustic Startle Technology is not the same as an ADD (acoustic deterrent device), said GenusWave.

The ASC Salmon Standard prohibits the use of acoustic deterrence devices by certified farms, but allows exceptions if 'there is clear scientific evidence that future acoustic technology presents significantly reduced risk to marine mammals'.

Under the US Marine Mammal Protection Act (MMPA), companies that do not comply with strict welfare measures will soon be banned from exporting salmon to the States.

The legislation, due to affect imports from January 1, 2022, prohibits the shooting of seals on salmon farms.

The MMPA also stipulates that any country using deterrent devices that cause injury will be banned from exporting salmon to the US.

The Scottish Salmon Producers Organisation said last autumn it was not clear whether acoustic seal scarers would come under the provisions of the MMPA.

The US market for Scottish salmon in 2019 was worth £179 million, the largest export market outside the EU.

The St Andrews team behind TAST, Dr Thomas Goetz and Professor Vincent Janik, said acoustic startle devices differ from ADDs in that they emit lower noise doses.

Goetz said: 'This method has been shown to be successful in deterring seals from a fish farm while not adversely affecting the behaviour and distribution of harbour porpoise.

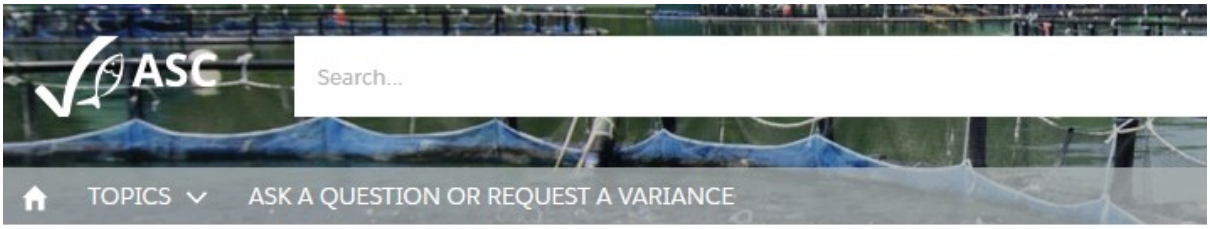
'In a consecutive study, a startle-reflex based system reduced seal predation by ~91-97per cent on a fish farm over the course of one year while operating at a duty cycle of less than one per cent using a noise dose that is more than one order of magnitude lower than in ADDs.'

GenusWave claims that the benefits of the startle response technology extend beyond the efficient dispersal of predators, by reducing stress on farmed salmon.

'Reduced stress means stronger immunity to disease, better appetites, faster growth, better yields and higher revenues,' said GenusWave. 'Less stress actually produces better tasting salmon, too.'

TAST has been implemented in an industrial prototype and is available for use on fish farms as SalmonSafe.

The Aquaculture Stewardship Council [reported in March 2020]():



SALMON

VR334_Salmon_v.1.2_ 2.5.1

16-Mar-2020 · Knowledge

ARTICLE RECORD TYPE Variance Request - Standards	**PUBLICATION STATUS** Published
TITLE VR334_Salmon_v.1.2_ 2.5.1	**DATE OF SUBMISSION** 19/08/2019
NAME OF CAB DNVNO	**SITE NAME**
PROSPECT / CERTIFICATE HOLDER	**ASC DOCUMENT INDICATOR/ CLAUSE** 2.5.1
COUNTRY Norway	**ASC DOCUMENT INDICATOR/ CLAUSE 2**

BACKGROUND

Variance request to allow for the use of targeted acoustic startle technology (TAST) on ASC certified farms.

We have applied previously for another VR (VR 259) regarding criteria 2.5.1 at one of our farms, Rensøya N, which is ASC certified. This VR is still under assessment, but in support of it and in an attempt to find a solution to the animal welfare and salmon health issues related to the presence of seals around our farms, we have been investigating various alternative, non-lethal means to deter seals.

We appreciate the ASC's goals of environmental protection and healthy fish. ASC specifically prohibits the use of acoustic deterrence devices by certified farms under Standard 2.5.1. The newly available targeted acoustic startle technology (TAST) promotes both environmental protection and healthy fish; and we seek a variance to use TAST as a predator deterrent on ASC certified farms.

TAST was initially developed by researchers at the University of St. Andrews, and subsequently in conjunction with GenusWave. We have studied compelling research regarding the use of TAST which show that it offers a significant advance over traditional ADDs/AHDs.

TAST harnesses the acoustic startle reflex, which has been shown to induce avoidance behavior without a decrease in responsiveness over time in the majority of tested seals (Götz and Janik 2011). This approach only requires low noise doses by using:

brief, isolated sound pulses that are
emitted at significantly lower duty cycles and
lower source levels compared to ADDs.
Target-specificity is achieved by choosing a frequency band where hearing sensitivity in the target-species (seals) is higher than in non-target species (porpoise & dolphins).

This method has been shown to be successful in deterring seals from a fish farm while not adversely affecting the behavior and distribution of harbor porpoise (Götz and Janik 2015). The effect on seals was limited to a confined area around the fish farm of less than 250m.

Equally important is the long-term success of the deterrence. Target mammals do not habituate to TAST. Instead, repeated exposure increases animal responsiveness.

In a consecutive study, a startle-reflex based system reduced seal predation by ~91-97% on a fish farm over the course of one year while operating at a duty cycle of only 1% (Janik & Götz 2016). The device tested in this study emitted a noise dose that was more than one order of magnitude (more than factor 10) lower than any ADD. The 2nd study also replicated the previous result, i.e. that harbor porpoise distribution around the fish farm remained the same during control and test periods.

There is therefore no risk of hearing damage associated with this method when considering realistic exposure scenarios (see discussion and supplementary material)

As we previously mentioned in VR 259, Nordland County (where all our farms are located) has the highest estimated population of harbor seals (Phoca vitulina) in the whole of Norway. A study from the Norwegian Institute of Marine Research (Havforskningsinstituttet) found that 1.5 times more seals are estimated to live here than in the county with the second highest estimated population (Nilsen and Bjørge 2015). We have previously documented and informed the ASC of numerous instances of seals in close proximity to our farms, in some cases leading to panic swimming and other stress induced reactions from the salmon.

Using the TAST device will keep the seals away from our salmon which will provide our salmon with a more tranquil, less stressful and healthier environment.

TAST is more aptly described as an ASD (acoustic startle device), not an ADD, due its different approach and acoustic emission pattern. The TAST approach allows the:

noise dose to be lowered dramatically,
effects on non-target species (harbor porpoise) to be mitigated,
avoidance of harm to the target mammal.
As a result, TAST achieves fish and mammal health as well as environmental compliance.

Therefore, instead of requesting permission to use an ADD, we are requesting the inclusion of this ASD in the allowed predator control measures. The justification is based on the fact that the TAST ASD is the only acoustic predator control solution available on the market whose efficacy and environmental compliance has been documented in peer-reviewed papers in the scientific literature.

TAST has been implemented in an industrial prototype and is available for use on fish farms as 'SalmonSafe' marketed through GenusWave ltd. (www.Genuswave.com).

It is also important to note that TAST will enable us to comply with Norwegian law. Norwegian law requires us to reduce stress on our salmon from predators (akvakulturdriftsforskriften, §30).

We believe that TAST is the only viable solution that provides improved welfare and health for our salmon. TAST avoids unnecessary stress (as required by Norwegian law (akvakulturdriftsforskriften, §30)) and avoids impact on other wildlife.

We therefore request the ASC's approval for the use of targeted acoustic startle technology on ASC certified farms.

References

Nilssen, Kjell T. og Arne Bjørge. (2015) “Status for Kystsel.” Havforskningsinstituttet.

https://lovdata.no/dokument/SF/forskrift/2008-06-17-822“Forskrift om drift av akvakulturanlegg (akvakulturdriftsforskriften).” Nærings- og fiskeridepartementet, 2008.

Götz, T., & Janik, V. (2016). Non-lethal management of carnivore predation: long-term tests with a startle reflex-based deterrence system on a fish farm. Animal Conservation, 19(3), 212-221.

Götz, T., & Janik, V. (2015). Target-specific acoustic predator deterrence in the marine environment. Animal Conservation, 18(1), 102-111.

Götz, T. & Janik, V. (2013). Acoustic Deterrent Devices to Prevent Pinniped Depredation Efficiency, Conservation Concerns and Possible Solutions. Marine Ecology Progress Series. 492, 285–302.

Götz, T., & Janik, V. (2011). Repeated elicitation of the acoustic startle reflex leads to sensitisation in subsequent avoidance behaviour and induces fear conditioning. BMC Neuroscience, 12(1). doi: 10.1186/1471-2202-12-30.

Götz, T. & Janik, V. M. (2010). Aversiveness of Sounds in Phocid Seals: Psycho-Physiological Factors, Learning Processes and Motivation. Journal of Experimental Biology. 213, 1536-48.

Johnston, D. W. 2002. The effect of acoustic harassment devices on harbour porpoises (Phocoena phocoena) in the Bay of Fundy, Canada. Pages 113-118 Biological Conservation.

Morton, A. B., and H. K. Symonds. 2002. Displacement of Orcinus orca (L.) by high amplitude sound in British Columbia, Canada. ICES Journal of Marine Science 59:71-80.

Link to Norwegian aquaculture management regulation: https://lovdata.no/dokument/SF/forskrift/2008-06-17-822

REQUEST/ RECOMMENDATION

DNV GL recommends that a Variance Request is granted to use targeted acoustic startle technology (TAST) on Nova Sea AS ASC certified farms considering the special circumstances in this area. Use of TAST to be recorded and evaluated per season. Nova Sea – VR letter 070819Variance Request NovaSeaAS 140819Variance Request NovaSeaAS 140819Nova Sea – VR letter 070819

VR/QA STATUS

Closed

SCOPE OF APPROVED VR

ASC DECISION

Variation

CABS ARE ALLOWED TO REUSE THIS VR

☐

ASC DETERMINATION OF THE VR REQUEST

Variation is approved

TECHNICAL/SCIENTIFIC ADVICE WAS NEEDED?

☐

DETERMINATION VALID UNTIL

NAMES OF ADVISORS

EFFECTIVE DATE

16/03/2020

SCIENTIFIC ADVICE WAS NEEDED?

☐

[4] GenusWave [claims it is in compliance with the US MMPA]():

GENUSWAVE

APPLICATIONS BENEFITS SCIENCE TECHNOLOGY ABOUT U.S. IMPORTS

Targeted Acoustic Startle Technology is in compliance with The Marine Mammals Protection Act

Deterrence of seals by lethal means or with acoustic deterrent devices violates anti-harassment laws in both the U.S. and the EU. The U.S. is moving to ban the import of fish from farms that use Acoustic Deterrent Devices.

The U.S. enforcement of the prohibition against importing fish grown or caught in violation of the Marine Mammal Protection Act is slated to begin on Jan 1, 2022. In the EU, action is still pending.

Conventional acoustic deterrent devices which operate on the premise that causing pain will deter animals violate the Marine Mammal Protection Act. Moreover, ADD's that use these methods have been proven ineffective over the long term with seals. Published research has established that:

- Seals habituate to the deterrent sound of the acoustic deterrent devices
- Acoustic deterrent devices have great potential for causing hearing damage
- Acoustic deterrent devices harm non-target species

Until now, farmers often have had no choice but to resort to lethal means to protect their fish. Seals frequently disregard the acoustic deterrent devices because the drive for food can override the pain in their ears from ADD's. Repeated exposure causes permanent hearing impairment, making the ADD's ineffective. As a result, where acoustic deterrent devices are in use, seal shooting is still common. If acoustic deterrent devices actually worked as promised, there would be no need to shoot seals and media reports would applaud rather than vilify the technology.

Conversely, Targeted Acoustic Startle Technology causes no harm or harassment to marine mammals and is in compliance with The Marine Mammals Protection Act, 101(a)4(b).

NOAA appears to disagree:

Genuswave in compliance with US MMPA? Inbox ×

Don Staniford <salmonfarmingkills@gmail.com> Thu, Jun 4, 10:14 PM
to Nina

Is this correct?

http://www.genuswave.com/us-imports.html

Nina Young - NOAA Federal Thu, Jun 4, 10:59 PM
to me

Nothing that you sent is correct. I am sorry but I have to finalize the 2020 LOFF and need to focus on that.

The Law Society of Scotland reported in August 2019:

The cruel sea: why Scottish salmon farming law must change

A US attorney warns that Scotland has 18 months to legislate new marine mammal protection standards or find the largest export market for Scottish salmon closed for business

19th August 2019 | Allen P Sragow

Including:

II. A threat to the Scottish economic engine

Scottish aquaculture provides over £1.8 billion to the Scottish economy, and supports more than 10,000 jobs. These figures are predicted to double by 2030, making Scotland a current and future key player in the global aquaculture industry.(15) Scottish salmon accounts for most of Scottish aquaculture, and is not only Scotland's largest food export, it is the largest food export of the UK.(16)

Seal predation (predatory attacks on salmon by seals) is as old as the salmon industry itself. Preventative measures have included physical boundaries such as nets, detonating underwater explosives, and shooting seals. For aquaculture facilities, the most used method is acoustic scaring, also referred to as acoustic harassment devices or acoustic deterrent devices ("ADDs").(17)

Unfortunately conventional ADDs are not a reliable solution, and create new problems. Where ADDs are in use, seal shooting is still common. Alarmingly, a first-time study shows the increasing ensonification of the Scottish west coast: ADDs are overwhelming the coast with harmful noise, injuring marine life, and disrupting marine habitats.(18)

Killing seals is obviously prohibited under the MMPA. What is less obvious is that underwater detonations and ADDs, being harmful to seals, harbour porpoises and dolphins, are prohibited as well. The resulting US ban against Scottish salmon would have a serious adverse effect on Scotland's salmon industry and the Scottish economy as a whole.

What can Scotland do? Improved regulations will bring certainty to the market and restore Scotland's image as friendly to animals and the environment.

III. It's not just about shooting: ADDs harm marine mammals and their use will end salmon exports

Historically Scotland has issued licences to shoot seals around aquaculture facilities. In March of 2018, the United States confirmed that this would not be tolerated any more.(19) This restriction is just the beginning.

It comes as no surprise that underwater noise can injure marine mammals. More than 20 years ago the US National Oceanic and Atmospheric Administration (NOAA), an early advocate, examined the use of ADDs and noted that:

- ADDs have great potential for causing hearing damage;
- seals tend to quickly habituate to noise, rendering ADDs ineffective;
- ADDs have great potential for harming non-target species.(20)

NOAA also noted that ADDs can have a "dinner-bell effect" – seals learn that the ADDs signal the presence of salmon, and appear in even greater numbers.(21) At that time NOAA put out a call for greater regulation:

"Some form of licensing or prior authorization should be required for operational (as opposed to experimental) use of high-output devices that reasonably might be expected to harm target or other species – e.g., cause temporary or permanent hearing damage."(22)

Under the Marine Mammal Protection Act, the United States set the goal of zero mammal injury and mortality by 2008.(23) Seal deterrent methods are now squarely under the US microscope. The United States' policy is to prohibit methods of deterrence that "have a significant adverse effect on marine mammals".(24)

The MMPA also prohibits import of salmon by nations that fail to address mammal injury and mortality. These injuries now explicitly include auditory concerns. In 2018, NOAA published its Technical Guidance for Assessing the Effects of Anthropogenic Sound on Marine Mammal Hearing, complete with specific parameters for assessing the effect of manmade sounds on marine mammals. These auditory injuries are recognized to trigger prohibitions under the MMPA.(25)

V. Currently available ADDs fail to protect salmon, compromise the environment, and are not compliant with animal protection laws

By the end of 2021 Scotland will need legislation and enforcement that eliminate injury to mammals while protecting the salmon industry. Unfortunately, currently available acoustic deterrent devices ("ADDs") do not appear to comply, and, some evidence shows, do not even work.

ADDs that are currently in use employ loud, shrill, aversive noises, even including over and underwater explosions intended to scare seals. The evidence of their threat is irrefutable:

"Anthropogenic underwater noise has been demonstrated to cause... damaged auditory systems... alteration in natural behavior, reduction in communication ranges, reduction in foraging ability, prevention of predator avoidance, and in extreme cases complete habitat avoidance or death of individuals."(32)

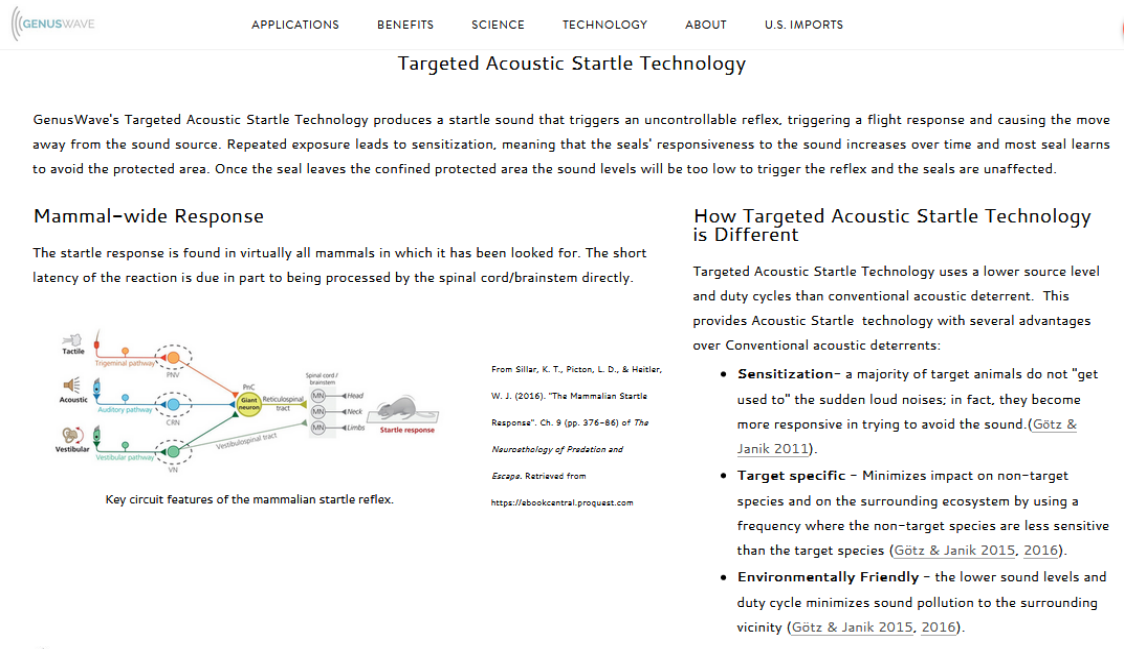
"Commercially available ADDs can cause stress, hearing damage and deter non-target species such as dolphins and porpoises from their natural habitat."(33)

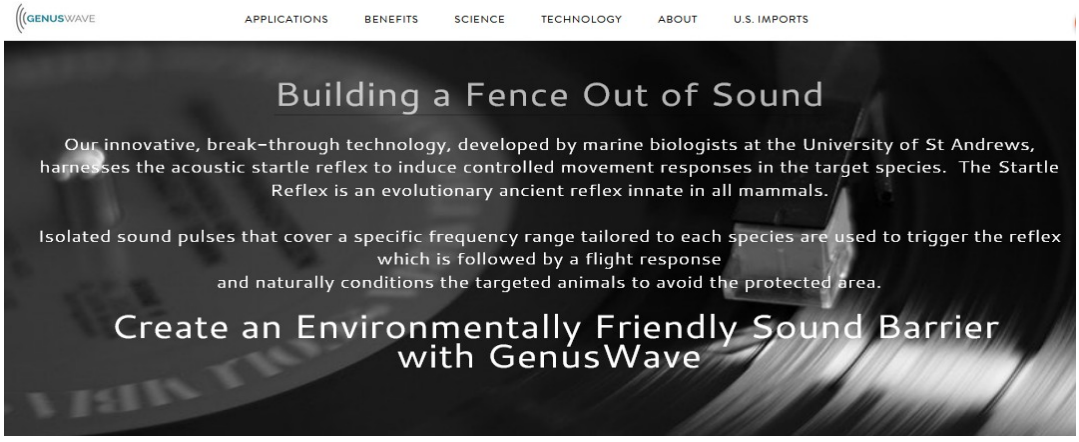
GenusWave's claim in 2018 that it was endorsed and supported by SNH was branded as "inaccurate and misleading". A FOI request by Scottish Salmon Watch in May 2018 asked: "If GenusWave is guilty of making false representation regarding SNH support, please provide details". A FOI reply by SNH in July 2018 (SIR150721/A2655569) admitted:

> We can confirm that the statement referring to SNH was inaccurate and misleading and have asked that it be removed from the GenusWave website. The statement was posted in error while the site was in development and has now been deleted.

Here's GenusWave's web-page on U.S. Imports as it appeared in May 2018 (before the reference to SNH endorsement was deleted):

More information on GenusWave which the company claims is 'eco-friendly', 'environmentally friendly', 'SalmonSafe' and 'WhaleSafe' online here





GENUSWAVE APPLICATIONS BENEFITS SCIENCE TECHNOLOGY ABOUT U.S. IMPORTS

The startle reflex is an autonomous reflex arc that can be triggered at sound pressure levels that are not painful to the animal, nor harmful to them in any way. SalmonSafe technology triggers an uncontrollable reflex which causes the seal predator to stop foraging and flee away from the sound source. Repeated exposure can lead to sensitization, meaning that the seal's responsiveness to the sound increases over time and the seal learns to avoid the protected area. Once the seal leaves the protected area, the sound levels are too low to trigger the reflex and the animals are not affected.

The Targeted Acoustic Startle Technology system emits isolated sound pulses which create much less noise than current devices on the market. Duty cycles, i.e. the amount of time sound is emitted are one order of magnitude lower than in many conventional acoustic deterrent systems (Götz & Janik 2013).

The conventional acoustic deterrent device ("ADD") operates on the premise that causing pain and using loud, shrill sounds will deter animals. The problem, however, is that this is not quite true. Conventional ADDs have been shown to have limited effectiveness as the animals either habituate to the noise or become unable to hear the deterrent sound as a result of hearing impairment caused by exposure to the ADD[1][2]. Götz & Janik 2010, Götz & Janik 2013

GENUSWAVE APPLICATIONS BENEFITS SCIENCE TECHNOLOGY ABOUT U.S. IMPORTS

Executive SoundBite:

Targeted Acoustic Startle Technology offers many new critical advances to the industry that were discovered as a result of the science and innovation conducted at the University of St Andrews and initially funded by Marine Scotland.

Targeted Acoustic Startle Technology is vastly different from existing Acoustic Deterrent Devices (ADD's). It is not an acoustic deterrent device, rather, it is an entirely new technology that works by activating a natural reflex arc that will not cause the animal pain. Devices with Targeted Acoustic Startle Technology operate at specific operational frequencies, with lower operational decibel level, lower duty cycles, and have a smaller effective radius. Targeted Acoustic Startle Technology fills a key need as the market moves beyond Acoustic Deterrent Devices (ADD's).

Overview: Conventional Acoustic Deterrent Devices and Predation Issues

Acoustic Deterrent Devices (ADD's) may amplify predation issues. Acoustic Deterrent Devices cause pain to deter animals, and have proven to be ineffective over the long term to avert pinnipeds. Seals habituate to the deterrent sound of the Acoustic Deterrent Devices. Acoustic Deterrent Devices have great potential for causing hearing damage and cause habitat exclusion to non-target species.

A correlation between Conventional Acoustic Deterrent Devices and seal depredation is apparent, as seals appear to associate the sound from the acoustic deterrent device with food and are lured to the farm – this is known as the 'Dinner Bell Effect'. At the farm, seals disregard the Acoustic Deterrent Device's sound because hunger drives them to ignore the auditory pain or their hearing has become impaired from prior exposure to Acoustic Deterrent Devices.

Where Acoustic Deterrent Devices are in use, seal shooting is still common.

The Sound Way to Keep Animals at Bay.

GENUSWAVE APPLICATIONS BENEFITS SCIENCE TECHNOLOGY ABOUT U.S. IMPORTS

Predator-Free Farms

The SalmonSafe™ System protects salmon and other farm raised fish from predatory seals, and other mammalian predators, without harming the environment, or the predators. By working with the environment, SalmonSafe™ leverages Mother Nature to provide a predator-friendly sound barrier that surrounds and safeguards farm raised fish.

Our acoustic barrier drastically reduces the costs associated with:

- Predator reduction programs, such as shooting seals.
- Equipment repair and replacement, including installing and maintaining anti-predation netting and cages.

The same innovative GenusWave targeted acoustic startle technology that protects salmon from predatory seals is used to power the WhaleSafe™ animal-friendly safety solution. Just as in SalmonSafe™, WhaleSafe works with the hard-wired mammalian acoustic startle reflex to protect whales from harm (without disturbing other species). Like other mammals exposed to these targeted sounds, the whales do not habituate to the reflex; repeated exposure only leads to increased responsiveness.

Research is ongoing at the University of St Andrews to properly calibrate the system for optimal use with cetaceans.

GENUSWAVE APPLICATIONS BENEFITS SCIENCE TECHNOLOGY ABOUT U.S. IMPORTS

Research on the problems associated with conventional ADDs:

Adverse effects on non-target species, noise pollution and lack of efficacy (habituation)

Findlay,C.R., et al. (2018): Mapping widespread and increasing underwater noise pollution from acoustic deterrent devices,Marine Pollution Bulletin.135, 1042-1050

Finneran, J.J. & Branstetter, B.K. Effects of noise on sound perception in marine mammals. In: Animal Communication and Noise (ed. Brumm, H.), 273–308 (Springer Berlin Heidelberg, 2013)

Götz, T. & Janik, V. Acoustic Deterrent Devices to Prevent Pinniped Depredation (2013). Efficiency, Conservation Concerns and Possible Solutions. Marine Ecology Progress Series. 492, 285–302

Götz, T. & Janik, V. M. (2010). Aversiveness of Sounds in Phocid Seals: Psycho-Physiological Factors, Learning Processes and Motivation. Journal of Experimental Biology. 213, 1536-48.

Jacobs, S.R. & Terhune, J.M. (2002). The effectiveness of acoustic harassment devices in the Bay of Fundy, Canada: seal reactions and a noise exposure model. Aquatic Mammals 28, 147–158.

Janik, V. M. Underwater Acoustic Communication Networks in Marine Mammals. in Animal Communication Networks (ed. McGregor, P. K.) 390–415 (Cambridge University Press, 2005).

Johnston, D.W. (2002). The effect of acoustic harassment devices on harbour porpoises (Phocoena phocoena) in the Bay of Fundy, Canada. Biological Conservation. 108, 113–118.

Mikkelsen, L., et al. (2017) Simulated Seal Scarer Sounds Scare Porpoises, but Not Seals: Species-Specific Responses to 12 kHz Deterrence Sounds. Royal Society Open Science 4 (7): 170286.

Morton, A. B. & Symonds, H. K. (2002). Displacement of Orcinus orca (L.) by high amplitude sound in British Columbia, Canada. ICES Journal of Marine Science 59, 71–80.

Lepper, P.A., Gordon, J., Booth, C., Theobald, P., Robinson, S. P., Northridge, S. & Wang, L. 2014. Establishing the sensitivity of cetaceans and seals to acoustic deterrent devices in Scotland. Scottish Natural Heritage Commissioned Report No. 517.

Olesiuk, P.F., Nicol, L.M., Sowden, M.J. & Ford, J.B. (2002). Effects of the sound generated by an acoustic harassment device on the relative abundance and distribution of harbour porpoises (Phocoena phocoena) in Retreat Passage, British Columbia. Marine Mammal Science. 18, 843– 862.

Tyack, P. L. & Janik, V. M. Effects of Noise on Acoustic Signal Production in Marine Mammals. in Animal Communication and Noise (ed. Brumm, H.) 2, 251–271 (Springer Berlin Heidelberg, 2013).

Research on the science behind the targeted acoustic startle technology

Götz, T., & Janik, V. (2016). Non-lethal management of carnivore predation: long-term tests with a startle reflex-based deterrence system on a fish farm. Animal Conservation, 19(3), 212-221. doi: 10.1111/acv.12248

Götz, T., & Janik, V. (2016). The startle reflex in acoustic deterrence: an approach with universal applicability?. Animal Conservation, 19(3), 225-226. doi: 10.1111/acv.12295

Götz, T., & Janik, V. (2015). Target-specific acoustic predator deterrence in the marine environment. Animal Conservation, 18(1), 102-111. doi: 10.1111/acv.12141

Götz, T., & Janik, V. (2011). Repeated elicitation of the acoustic startle reflex leads to sensitisation in subsequent avoidance behaviour and induces fear conditioning. BMC Neuroscience, 12(1). doi: 10.1186/1471-2202-12-30

Schakner, Z., Götz, T., Janik, V., & Blumstein, D. (2017). Can fear conditioning repel California sea lions from fishing activities?. Animal Conservation, 20(5), 425-432. doi: 10.1111/acv.12329

[5] SARF report 112: "Influences of lower-frequency Acoustic Deterrent Devices (ADDs) on cetaceans in Scottish coastal waters"

SARF112 – Influences of lower-frequency Acoustic Deterrent Devices (ADDs) on cetaceans in Scottish coastal waters

Suggested Citation:
Benjamins, S., Risch, D., Lepper, P., Wilson, B. 2018. SARF112 – Influences of lower-frequency Acoustic Deterrent Devices (ADDs) on cetaceans in Scottish coastal waters. A study commissioned by the Scottish Aquaculture Research Forum (SARF). http://www.sarf.org.uk/

Title: SARF112 – Influences of lower-frequency Acoustic Deterrent Devices (ADDs) on cetaceans in Scottish coastal waters

ISBN: 978-1-907266-80-5

First published: June 2018

Includes:

EXECUTIVE SUMMARY

- Acoustic Deterrent Devices (ADDs) are widely used in the Scottish finfish aquaculture sector as a non-lethal means to deter depredation of Atlantic salmon (*Salmo salar*) by harbour and grey seals (*Phoca vitulina* and *Halichoerus grypus*) by emitting loud, aversive sounds into the surrounding marine environment. In so doing, large areas are inevitably exposed to ADD signals, potentially impacting non-target species of conservation concern such as harbour porpoise (*Phocoena phocoena*) and other cetaceans. Impacts of particular concern include physical auditory injury (both temporary and permanent) and behavioural disturbance, potentially resulting in changes in behaviour and/or distribution with long-term deleterious effects.

- Increased awareness of these wider impacts of ADDs has led to the development of different mitigation approaches. One of these attempts to exploit differences in auditory sensitivity between seals and odontocete cetaceans, by lowering the ADD signal frequency from the commonly used range of 10-20 kHz down to <2 kHz, where porpoises' hearing sensitivity is reduced compared to seals.

- The present experiment aimed to compare the effectiveness of this approach by comparing the acoustic and behavioural responses of wild harbour porpoises to two artificial signals: a high-frequency signal ('HF'; 8-18 kHz), and a low-Frequency signal ('LF'; 1-2 kHz). To comply with the funder's original project brief, no actual ADDs of any particular brand were tested as part of this research, or form part of any results of this research, in order to maintain impartiality towards all suppliers. The chosen field site was Bloody Bay (northern Sound of Mull, western Scotland), an area known to be frequented by porpoises, which contained a fish farm that did not use ADDs. Harbour porpoise presence within the ensonified area during repeat exposures was evaluated using visual and passive acoustic monitoring methods.

- Based on the experimental results, the present study provides no strong evidence that widespread application of commercially available lower-frequency ADDs with signal characteristics similar to those tested would, by themselves, result in significantly reduced risk of acoustic impacts on harbour porpoises in Scottish waters, when compared to existing ADD signals.

- Given the results presented here, a number of recommendations can be made about use of LF-ADD signals, and ADDs more broadly, in Scottish finfish aquaculture:

  Recommendation 1: The present experiment has shown that use of continuous operation LF-ADD signals, with signal characteristics similar to the ones used in this experiment, cannot be assumed to entirely reduce collateral impacts of noise on non-target species such as porpoises. Further development and investigation of use of all non-lethal methods to address seal depredation is recommended.

  Recommendation 2: To improve understanding of ADD usage in Scottish aquaculture, it is recommended that a formal monitoring programme be developed to collect accurate information on ADD distribution and usage patterns. This will make it easier to document ADD-associated noise emissions and their potential impacts in the context of wider conservation activities such as the establishment of Marine Protected Areas. This improved understanding is also relevant in the light of other regulatory requirements to report marine noise pollution (e.g., under the EC Marine Strategy Framework Directive; EC 2008).

Recommendation #3: Given the results from this study and the current extent of ADD presence in Scottish coastal waters (Findlay et al. 2018), it is recommended that efforts be undertaken to 1) clearly establish the efficacy of ADDs in terms of long-term, successful deterrence of seals from impacting fish farms; 2) clarify which signal characteristics and/or modes of operation (e.g., loudness, frequency composition, duty cycle, signal repetitiveness) contribute to the effectiveness or otherwise of different ADD models, and 3) identify which other variables (e.g., time of year, weather, presence of fish farm staff) might affect the probability of seal depredation events and apparent ADD effectiveness.

Read in full online here

SARF112: Low-Frequency ADDs and Porpoises (LEAP)

Influences of lower-frequency Acoustic Deterrent Devices (ADDs) on cetaceans in Scottish coastal waters

Benjamins, S.[1], Risch, D.[1], Lepper, P.[2], & Wilson, B.[1]

[1]Scottish Association for Marine Science, Dunstaffnage, Oban, Argyll, Scotland, UK, PA37 1QA
[2]Dept. of Mechanical, Electrical and Manufacturing Engineering, Loughborough University, Loughborough, Leicestershire, England, UK, LE11 3TU

SAMS Loughborough University

A FOI disclosure by SNH in April 2019 revealed that the SARF report was criticised by a referee in May 2018:

> However, the primary goal of comparing the effects of low frequency versus high frequency ADDs on cetaceans in the vicinity of fish farms has proven elusive. The authors have discussed potential reasons for this and have suggested further work aimed at reducing confounding factors.
>
> It is not clear that investing further funds to evaluate low frequency ADDs in the field would produce clearer results than in the current project, owing to the complexities involved.

Another referee commented in April 2018:

> The results were rather inconclusive insofar as the contention that low frequency (LF), as opposed to high frequency (HF), ADD's would have a much less measurable impact on cetaceans behaviour. In short it was expected that the LF ADD's would not deter cetaceans as much as the HF ADD's. This was not the outcome – the harbour porpoises observed appear to be impacted by both LF and HF ADD's.
>
> Although not the result that was expected the result is very significant for SARF in that the impact of LF and HF ADD's on cetacean behaviour is more complex than had been thought.

It is clear that the impact of ADD's on marine mammals is neither simple nor yet fully understood. Given the public perception of the impacts of fish farming on the seal and cetacean populations, the stringent conditions in this respect contained within the ASC certifications and the recent ban on importing Scottish salmon into the USA if there is an associated mortality of marine mammals this is a live issue to say the least.

And a third referee commented in May 2018:

This study used a signal that is lower in volume than most commercially available ADDs; it is possible that the localised deterrence may be over a greater distance when the volume is increased.

SNH's FOI disclosure in April 2019 also revealed that the authors of the SARF report rectified a mistake:

From: Steven Benjamins <Steven.Benjamins@sams.ac.uk>
Sent: 02 July 2018 14:43
To: Richard Slaski <r.slaski@sarf.org.uk>
Cc: 'Sandra Gray' <s.gray@sarf.org.uk>
Subject: RE: SARF 112

Hello Richard,
Thank you again for your message earlier. I have discussed the matter with my co-authors and we agree that a mistake was made which we intend to rectify. Specifically, we have amended the Table 1 & associated text as follows:

- We have removed OTAQ from the 'AirMar' row at the top of the table so that this cell now reads "AirMar (Gael Force Marine Technology)", in line with the fact that Gael Force still makes use of the AirMar dB Plus II unit. This should hopefully address the concern stated by OTAQ that their device was unfairly lumped together with their competitors.

- The "Commercially Available" column has been removed entirely. This was originally intended to only refer to 'cetacean-friendly' systems but this was evidently unclear to the reader. This change should hopefully address OTAQ's comment concerning their device's commercial availability.

- The table caption used to read: "Table 1. Acoustic signal characteristics of different ADD types currently used, or proposed in Scottish finfish aquaculture. Adapted from Götz & Janik (2013). Values from particular references are indicated using *, ** and *** symbols."

  This caption now more accurately reads (new text highlighted in yellow): "Table 1. Acoustic signal characteristics of different ADD types historically and currently used, or proposed for use, in Scottish finfish aquaculture. Table adapted from Götz & Janik (2013). Values from particular references are indicated using *, ** and *** symbols. †The term 'Cetacean-friendly' here refers to devices where changes in signal structure and/or duty cycle have been made to reduce acoustic impact on cetaceans. Other approaches, including 'Soft start' approaches, to reduce overall acoustic impacts were not considered in this report."

  This latter aspect is important as the report focuses on a specific approach to achieving 'cetacean-friendliness', namely one that changes the acoustic signal structure (in our case, frequency) to achieve reduced impact on cetaceans. To highlight the fact that other approaches such as soft starts exist, we have now also added a single sentence in Section 2.5, p.20, which reads "Other systems make use of 'soft starts' to slowly increase sound outputs.". Section 3.2 (page 20) then specifies that in the present report we are solely focusing on the potential effects of changing the frequency output.

- Concerning OTAQ's request that *"a clarificatory statement is included in the report that OTAQ products, whilst commercially available, were not tested as part of this research, and do not form part of any results of this research"*, we feel this is already covered under the text in Section 3.2 (page 22), where we explain that no actual, existing ADD devices of any kind were used in the experiment, as per SARF's original stipulations. We are concerned that OTAQ may have inadvertently misinterpreted the first section of the report (notably Table 1) which was merely intended to provide a general overview of ADD types that have been, are being or may be used in the near future in Scottish aquaculture, and which makes no statement concerning their relevance to the study.

- Given the issues pointed out by OTAQ, we strongly feel that it would be beneficial for everyone involved if we contacted OTAQ directly to apologise for the mistake and explain the changes made. We have had personal conversations with the company in the past and we feel this issue can be readily resolved through a direct conversation.

I would like to discuss these changes with you, if possible, over the phone this afternoon, to confirm that these are acceptable.

SNH's FOI disclosure in April 2019 detailed a complaint by ADD manufacturer OTAQ including the threat of legal action:

From: Chris Hyde <Chris.Hyde@otaq.com>
Sent: 02 July 2018 09:29
To: Richard Slaski <r.slaski@sarf.org.uk>
Cc: 'Sandra Gray' <s.gray@sarf.org.uk>; Phil Newby <Phil.Newby@otaq.com>
Subject: SARF 112

Richard,

Further to our conversation on Thursday, we have significant concerns with some of the content within your latest published report SARF 112 . I have copied in our MD who is closely monitoring the response from SARF and the outcome.

Misleading / Incorrect Technical Information
As I said on the phone my primary concern here is with the misleading and incorrect technical information regarding our system. The report states...

"A review of commercially available ADD systems was carried out, with a summary provided in Table 1 of acoustic signal characteristics of the most commonly used ADDs in the Scottish finfish aquaculture sector. The different models differ in terms of their acoustic characteristics (e.g. signal type, duty cycle, frequency range) as well as in terms of power supply and cost."

- Our system (which is actually called OTAQ Sealfence) has been incorrectly bundled with several other devices on the same line under "Airmar" and all technical specifications quoted here for our system are incorrect.
- Please demonstrate how you arrived at RMS values for source level and why are you stating a 50% duty cycle.
- The column for "cetacean friendly" is extremely misleading and is without explanation.
- And despite being grouped with one of our only active competitors (Gael Force) we are not indicated as being "commercially available". As we now have over 500 systems deployed on around 40 sites in Scotland, it cannot be argued that the researchers have carried out a review that could be considered diligent on any level.

Action Required from you

We have consulted with our legal advisers, and request that you confirm to us by Friday 13 July 2018 that the following steps have been taken:-

1. OTAQ has been removed from the table on page 11; and

2. a clarificatory statement is included in the report that OTAQ products, whilst commercially available, were not tested as part of this research, and do not form part of any results of this research.

If you fail to provide such confirmation by the date requested, we will consult our lawyers further, and we fully reserve our position.

ADD manufacturer Ace Aquatec also criticised the SARF report:

ACE AQUATEC
COMMENTS | WWW.ACEAQUATEC.COM

CONTACT

Nathan Pyne-Carter
Managing Director
[redacted]
Ace Aquatec Ltd.
16B City Quay, Camperdown Street,
Dundee. DD1 3JA

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PURPOSE OF DOCUMENT

The recent SARF report112 has been conducted to ascertain whether low frequency deterrents have an impact on cetaceans. The study uses a bespoke low frequency noise generator rather than a commercial system. In using this system, and failing to report sounds recorded up to 200khz, it is suspected that the equipment generates noise above 2khz which could be heard by cetaceans. If correct, the conclusions reached by this study are flawed.

Overview of the company

Ace Aquatec is a leading provider of innovative aquaculture equipment worldwide. We have developed an award winning range of triggered acoustic deterrents and electric nets to prevent seal, sea lion and shark attacks from farm cages (Scottish Aquaculture Innovation Centre's 2016 technology award 2016, Queen's Award 2018).

CRITIQUE OF THE FOUR RECOMMENDATIONS OF SARF112:

The focus of the study does not provide grounds for the breadth of the recommendations in the summary and conclusion:

1. Recommendations for non acoustic deterrents:

Why should predator nets that kills seals and birds be promoted over triggered acoustic deterrents for example? The study has not demonstrated that a low frequency system operating at 1-2khz impacts cetaceans – only that their device has potentially impacted a few cetaceans, possibly due to broadband noise at higher levels, and with the possibility of other local deterrents impacting the bahaviour of the cetaceans detected.

2. "There is a need for improved understanding of ADD use and distribution in Scottish Waters".

We would welcome this – but central to such a study should be what manufacturers are already implementing to reduce noise – Ace Aquatec is rolling out sonar triggers and has a connected platform to bring all deterrents into duty cycle harmony to reduce overall sound on any one site. It has also developed electric fish and nets to allow the playing of low volume noise to act as a conditioned sound when paired with an electric shock. OTAQ has developed a PAM de-activation system to switch devices off when porpoises are detected. The studies do not seem to reflect the work and energy put in by manufacturers to use academic research to build upon and improve deterrent systems – nor are the current authors as balanced as other academics like Dr Simon Northridge on the benefits of deterrent systems. The current authors seem to want to push Scotland towards a BC Canadian model – without sharing the other side of the argument – for example farms in BC are trapping and moving animals – a model which is expensive, stressful and temporary in its effect.

3. Low frequency devices deter porpoises:

We dispute this finding – we believe had the study been conducted with our commercial system which has harmonics above 2khz removed, that the finding would not have been the same. This is reflected in the current results being obtained from our system which is being analyzed by St Andrew's university in Wyre.

4. A study on acoustic systems is required:

We would agree with point 4 – but whatever study is conducted needs to look at all mitigation measures being implemented. This should included sonar triggers, IOT (internet of things) devices co ordinating sound outputs, low frequency sound, electric fish and nets; PAM (Passive Acoustic Monitoring) deactivation etc.

SPECIFIC COMMENTS:

P11. While the low frequency system is derived from the US3, it has is own name: RT1.

P11. The systems referred to in the Northridge study in 2013 were only US3s in name. In 2014 out deterrent build was handed over to Neptune Sonar, and they created a completely different method of sound generation in the system, and at different volume levels. No systems in Scotland retain the physical properties described here. There are currently 290 US3s in Scotland – they share a central intelligent core which is monitored via a portal in Dundee. The systems can co ordinate their sound generation to reduce duty cycle across the site as a whole. Similarly, they are all built to be sonar activated; this triggering system has been tested at Loch Duart and is being rolled out to all our rental deterrents this year. This will dramatically reduce duty cycle to below 1%.

P12. Ferranti Thomson deterrents only exist in scientific labs – so I've no real idea why these are mentioned here. We stopped developing these back in 2004.

P20. Very little reference to why manufacturers have spent time and money investing in low frequency systems seems to be provided. It was in response to the last Marine Scotland report by Vincent Janik that we have sought government funding alongside our own funds to develop a low frequency system. That study used the research of Kasteline and the available knowledge at the time to suggest that deterrents should be pushed below 2khz as cetaceans hearing is not sensitive below these levels. The soundness of this research can be seen in the development of other cetacean friendly systems such as the Fauna Guard produced by Ron Kasteline who has extensively tested the most productive deterrent sounds for different marine mammal groups.

P20. Silent scrammer – Ace Aquatec has not produced the 'silent scrammer' triggers in 10 years. We have since developed a sonar trigger which is currently being used at Loch Duart and will be rolled out to all US3 devices over this year.

P20. It seems very strange that the authors support a cetacean friendly device designed by academics Vincent Janik and Thomas Goetz) over various cetacean friendly devices developed elsewhere. Sonar triggers should reduce duty cycle, limit chances of habituation avoid non target species being impacted – but no attempt has been made to explore what measures Ace Aquatec or OTAQ are currently using. Similarly, electric nets receive a cursory mention when substantial work has been carried out by Dr David Thompson and his team to bring to bear a conditioned avoidance response in seals which is the holy grail of deterrent technology. I think the authors either need to focus on the remit of this study which is to look at 1-2khz noise or to conduct a complete study looking at all mitigation measures to avoid cetacean impact. A smattering of opinions on the subject does no justice to the time and effort of all companies working in this space.

P20. It states there is little scientific backing for producing a deterrent system operating at 1-2khz. The Marine Scotland report in 2012, plus Thomas Goetz's thesis 2008 recommended that deterrents should focus below 5khz and should preferentially make noise below 2khz to avoid cetaceans. Ron Kasteline has produced his own deterrent systems focused on this range in response to his own work in this area, and Dr Leppar has been in contact with Alex Coram of St Andrews's University - so he will know that another study is currently ongoing looking at the impact of our RT1 device on porpoises and that the results, while not yet published show the opposite results to this study. While of course he cannot reference the results, he can acknowledge that another academic study is currently being undertaken and therefore some conclusions from this study should be left on hold until corroborated or contradicted by that study.

p.21 suggests the startle response has been patented. It has not been patented. It is patent pending and all examination reports suggest the patent will be rejected on the basis that you cannot patent a reflex, that the argument for novelty is invalid given that 10ms rise time startle reflex is already described in papers from the 1960s in rats and upon the existence of air gun technology in seal deterrents which have utilized the effect of the 10ms rise time in this context before.

P22. Says no commercial ADD was used in order to retain impartiality. We would argue that this approach has invalidated the whole study.

When Ace Aquatec first built the RT1 device it was deployed at a site in Wyre with SNH approval and the sound production was assessed by Alex Coram of St Andrews University. Alex found that the electronics driving the system produced a noise above 2khz which was likely having an impact on cetaceans who are highly sensitive to novel sounds in higher frequencies. Ace Aquatec commissioned Neptune Sonar to

develop a filter at great expense to remove this component. It seems improbable that engineers at Neptune Sonar have built a system costing over £100k to remove the system noise above 2khz whereas the academic system developed on this project has managed to achieve what we set out to do on a shoestring budget. To ascertain if this is the case, we would like access to all records from this device so that a full analysis of the sounds generated in the water can be conducted. It should be noted as well from the previous Janik studies that Airmar tried to build a deterrent below 2khz but failed to create a noise in the water that did not contain sounds above this level.

P26. If we compare the provided plot of the LF output used in the study we see sounds produced above 2khz all the way up to 12khz – well in the sensitive hearing range of porpoises. The authors mention the harmonics but point out they are probably too low an amplitude to bother porpoises. I would argue that Ron Kasteline's work on porpoise deterrent systems shows very good deterrent effects at low volume – so much so that they have been able to create a porpoise deterrent operating at volume levels not normally associated with deterrent systems. Similarly battery operated pinger devices rely on the highly sensitive nature of porpoise hearing and the flightiness of their response to new sounds.

The plot also does not show sounds produced above this level, and we would argue that the electronics themselves will be generating a sound around 70khz – again – in prime cetacean hearing ranges. Providing the original sound files to our engineers would be appreciated to confirm or discount this.

SUMMARY:

This study's recommendations go well beyond the remit to advise on whether low frequency sound impacts cetaceans. By providing limited records of sound production up to 200khz it cannot be ascertained for sure that the system used to generate sounds is as clean above 2khz as our commercial RT1. Furthermore the test site is confounded by the presence of large quantities of mid frequency deterrent devices, and a more sensible approach would be to deploy an existing low frequency device into a protected area where there are no confounding mid frequency deterrents.

nathan@aceaquatec.com www.aceaquatec.com [redacted] https://www.linkedin.com/company/ace-aquatec-ltd

SARF addressed the concerns raised by both OTAQ and Ace Aquatec - here's the response to OTAQ in October 2018:

Response to OTAQ comments to the previously published version of the SARF 112/LEAP final project report (now superseded):

The below comments illustrate how the various points raised by OTAQ have been addressed in the present version of the report:

1. Concerns had been raised that further clarity was needed about precisely which ADD systems had been used in the experiments described in this report. The use of a bespoke sound transmission system, rather than testing existing ADD systems, was identified by SARF as an important requirement within the scope of the project as well as being strongly supported by the project's Steering Group, and we have adhered to this requirement throughout. To make this point explicitly, the third bullet point in the Executive Summary now reads as follows:

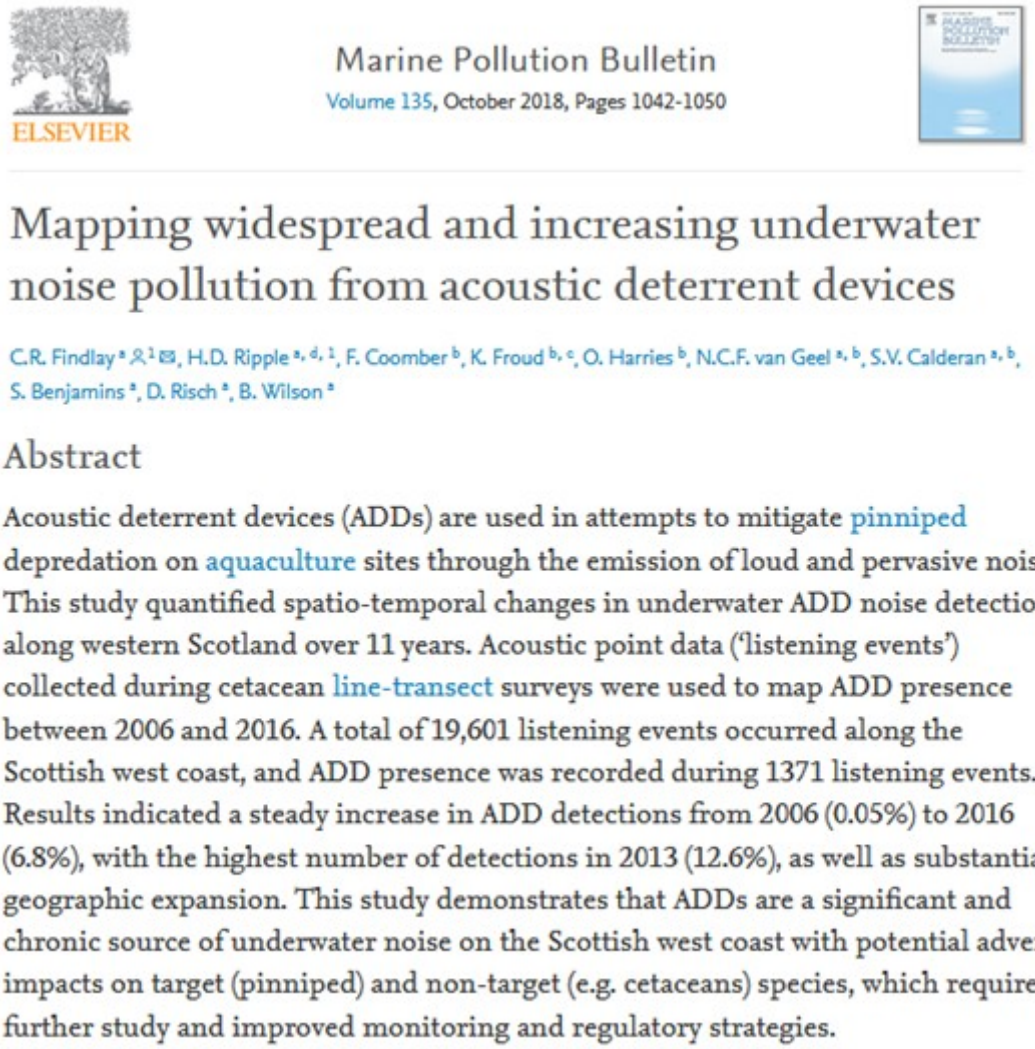
   "The present experiment aimed to compare the effectiveness of this approach by comparing the acoustic and behavioural responses of wild harbour porpoises to two artificial signals: a high-frequency signal ('HF'; 8-18 kHz), and a low-Frequency signal ('LF'; 1-2 kHz). To comply with the funder's original project brief, no actual ADDs of any particular brand were tested as part of this research, or form part of any results of this research, in order to maintain impartiality towards all suppliers. The chosen field site was Bloody Bay (northern Sound of Mull, western Scotland), an area known to be frequented by porpoises, which contained a fish farm that did not use ADDs. Harbour porpoise presence within the ensonified area during repeat exposures was evaluated using visual and passive acoustic monitoring methods." [N.B.: text underlined for illustrative purposes].

   The underlined text above is based on wording proposed by OTAQ in previous communications and will hopefully allay any remaining concerns that any manufacturers of existing ADDs, including OTAQ, were in any way directly affiliated with the present report. The point is subsequently repeated in Section 3.3 (Acoustic Playback Signal Design, p.14), and in Section 6 (Recommendations, p.52).

2. Concerns had been raised about the accuracy of the information contained in Table 1 in the previous version of the report. This table attempted to aggregate signal characteristics of current, past and future ADD types to provide background context. This table was based on available information in the published and grey literature. It has since become apparent that a significant number of new developments re: ADD design have occurred that are not available in the public domain, potentially for reasons of commercial sensitivity. As a result, and to avoid inadvertent misrepresentation of any ADD product currently available, we have elected to remove Table 1 entirely from the report. We have also generally sought to reduce the number of times that actual ADD systems are referred to, apart from where such a reference is directly relevant (e.g., when describing the design of the generic signals in Section 3.3). Referring to the same concerns described above under Pt.1, a thorough review of the report text has been carried out and OTAQ is now not mentioned anywhere in the report.

We hope that these edits will serve to allay any residual concerns of inadvertent association of OTAQ and its products with the findings of the present SARF112/LEAP report.

[6] Marine Pollution reported in October 2018:



Marine Pollution Bulletin
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Mapping widespread and increasing underwater noise pollution from acoustic deterrent devices

C.R. Findlay [a] [1] ✉, H.D. Ripple [a, d, 1], F. Coomber [b], K. Froud [b, c], O. Harries [b], N.C.F. van Geel [a, b], S.V. Calderan [a, b], S. Benjamins [a], D. Risch [a], B. Wilson [a]

Abstract

Acoustic deterrent devices (ADDs) are used in attempts to mitigate pinniped depredation on aquaculture sites through the emission of loud and pervasive noise. This study quantified spatio-temporal changes in underwater ADD noise detections along western Scotland over 11 years. Acoustic point data ('listening events') collected during cetacean line-transect surveys were used to map ADD presence between 2006 and 2016. A total of 19,601 listening events occurred along the Scottish west coast, and ADD presence was recorded during 1371 listening events. Results indicated a steady increase in ADD detections from 2006 (0.05%) to 2016 (6.8%), with the highest number of detections in 2013 (12.6%), as well as substantial geographic expansion. This study demonstrates that ADDs are a significant and chronic source of underwater noise on the Scottish west coast with potential adverse impacts on target (pinniped) and non-target (e.g. cetaceans) species, which requires further study and improved monitoring and regulatory strategies.

Read more via:
Cetaceans Sound Alarm On Salmon Farms - new research sparks EC complaint & call to ban Acoustic Deterrent Devices
Sunday Herald: "Health of whales, dolphins and porpoises put at risk by underwater alarms"
Fish farm noise pollution threatens whales and dolphins

More details via:

Charlotte Findlay

PhD student

I am a marine ecologist interested in understanding the impacts of man-made noise in the marine environment, and how this affects marine species at both individual and population levels.

My work focuses on the risks posed by Acoustic Deterrent Device noise to marine mammals on the west coast of Scotland.

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PROJECT | PUBLICATIONS | CAREER | OTHER INFO

Modelling underwater noise from acoustic deterrent devices to determine the extent of exposure and implications for the conservation of marine mammals

Acoustic Deterrent Devices (ADDs) or 'seal-scarers' produce intense and aversive noise within the hearing range of seals to deter them from approaching and damaging cages or finfish at aquaculture farms. The use of ADDs in Scotland is largely undocumented, however recent evidence suggests that the noise from these devices has become widespread across the west coast of Scotland, and represents a regionally important but overlooked source of underwater noise pollution.

This PhD aims to model the extent of underwater noise from acoustic deterrent devices (ADD) on the west coast of Scotland and assess risks for marine mammal populations. Specifically, the PhD will explore the risk for injury and potential of habitat displacement for harbour porpoise (Phocoena phocoena) and seal species (Phocidae spp.).

Results will be used to consider management options for the use of ADDs in Scotland and better inform legislation addressing underwater noise and species protection.

Supervisors

Professor Ben Wilson, SAMS

Dr Denise Risch, SAMS

Dr Nathan Merchant, Centre for Environment, Fisheries and Aquaculture Science (Cefas)

SAMS
Scottish Association for Marine Science

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Texa Sim

PhD student

I am a cetacean scientist, specialising in the ecology, ethology and socio-biology of these incredible marine mammals. In my PhD I am studying the occurrence of harbour porpoises around Scottish sea farms, with a focus on acoustic techniques to answer questions about their behaviour.

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PROJECT | PUBLICATIONS | OTHER INFO | CAREER

The Scottish salmon farming industry is an important source of income for many communities on the west coast of Scotland, and the numbers of these facilities are set to increase as the Scottish Government strives to support 'sustainable growth targets' in both marine finfish and farmed shellfish production.

The west coast of Scotland is also set to become Scotland's only Special Area of Conservation (SAC) for the harbour porpoise (Phocoena phocoena), and the proposed 13,539km² region has significant overlap with existing salmon farm sites.

My PhD will address knowledge gaps associated with the potential interactions between porpoises and aquaculture, with an aim to understand occurrence and behaviour around salmon farms on the Scottish west coast. I will use Passive Acoustic Monitoring (PAM) to identify whether harbour porpoise occur near farms, and if so, establish temporal variation in usage patterns and evidence of specific behaviours from acoustic information. I intend to assess potential attractants, such as aggregations of possible fish prey species, and investigate the effects of Acoustic Deterrent Devices (ADDs) where they are used.

Supervisors

Professor Ben Wilson, SAMS UHI

Dr Steven Benjamins, SAMS

Dr Caroline Carter, SNH

Funder

Marine Alliance for Science and Technology for Scotland (MASTS)

[7] Read in full via: David Ainsley's EC COMPLAINT on ADDs March 2018

In June 2020, David & Jean Ainsley published a legal and scientific update on ADDs including:

Disturbance:

Aquaculture ADDs output 179-196dB. Disturbance (the legal driver) to captive porpoises has been demonstrated at 100dB[3], 96% exclusion of porpoises at 113dB at stations at 7km from an active ADD[4], and temporary hearing damage (which becomes permanent at further exposure) recorded by Schaffeld et al. (2019)[5] at 142decibels:

"A harbour porpoise in human care was exposed to an artificial ADD signal with a peak frequency of 14 kHz. A significant TTS was found, measured by auditory evoked potentials, with an onset of 142dB re 1lPa^{2}s at 20kHz and 147dB re 1lPa^{2}s at 28 kHz."

It has been proposed that low frequency ADDs do not disturb porpoises, however recent work on ADDs found that high and low frequency ADDs are equally disturbing to porpoises[6]. The low frequency GenusWave, which is still in at the experimental stage outputs 180dB, so it is a source of significant underwater noise.
There is a Planning Application in Shetland to use the newly developed Genuswave ADD (also known as an Acoustic Startle Device ASD).
Each device outputs 180-182 decibels, louder than currently used 179 dB Terecos ADD. The proposed sound duration of a single device is lower than other ADDs. But, if this device does become ineffective as has happened with other ADDs will the sound duration be increased?
Genuswave is unlikely to comply with Scottish Law protecting dolphins from disturbance & injury as a simulated signal (well below the maximum output of this device) caused startle reflex (a type of disturbance) in a bottlenose dolphin (Gotz 2020). The developers claim that the low frequency ASD does not "adversely impact" porpoises, however Benjamins et al (2018) found that that both high and low frequency signals disturb porpoise. If porpoises do remain near farms, can it be proven that they will not suffer hearing injury on long term exposure as do people working in noisy environments?
The claim that Genuswave can deter one species without affecting another requires scientific scrutiny, as highlighted by Trites and Spitz (2016).
There is a need for testing of the device by scientists independent of commercial interests.
The Planning Application does not mention that operating the ASDs may be an offence, it does not mention that the use of the devices would require a European Protected Species Licence where they could disturb cetaceans nor does it quote the scientific papers which cast doubt on the developers claims.

In May 2020, tourist operator David Ainsley (who organised a 24,000 strong petition against the use of ADDs on salmon farms) raised concerns about the use of the Genuswave ADD with SNH:

Subject: Re: Salmon farm Genuswave application
Date: Friday, 15 May 2020 at 16:40:13 British Summer Time
From: Sealife Adventures
To: marine.planning@shetland.gov.uk, juan.brown@nature.scot
CC: Cathy Tilbrook, David Donnan, Liam Wright
BCC: John Aitchison, Tom Appleby, Jo Coumbe, Kerri Whiteside, Guy Linley-Adams

Dear Juan and Iain,

I sent the email below to Cathy Tilbrook who understandably is unable to deal with it before 12th June because of Covid-19 work. I am concerned that a consent might be granted which would not meet the requirements of Habitats Regulation 39(2).

It is important that the advice SNH gives to planners is correct and in this case the advice is based on incomplete science. There are peer reviewed papers as explained which give rise to reasonable scientific doubt that the Genuswave ADD will not disturb cetaceans, therefore if consent was given the planners would be acting ultra vires and consenting to an illegal activity. The correct course of action would be for SNH to advise the operators and the planners that an EPS license would be required to operate these devices.

Under these unusual circumstances, will you agree to delay any grant of planning permission until it has been established beyond reasonable scientific doubt that the ADDs applied for cannot disturb any porpoise, dolphin or whale?

David Ainsley,

+44 (0)1852 300 203

From: Sealife Adventures <info@sealife-adventures.com>
Sent: 14 May 2020 15:18
To: Cathy Tilbrook <Cathy.Tilbrook@nature.scot>
Cc: David Donnan <David.Donnan@nature.scot>
Subject: Salmon farm Genuswave application

Dear Cathy,

Application to vary a condition at a farm in Shetland, stipulating that ADDs may not be used.

I hope that you are well.

The law in Scotland, Habitats Regulation 39(2), states it is an offence to deliberately or recklessly disturb any porpoise, dolphin or whale, however the SNH response to this Planning Application does not mention this. The science on which the application has been based is incomplete and does not include studies which strongly suggest that TAST ADDs could disturb cetaceans.

The farm proposes to use 12 TAST ADDs, each outputting 180 to 183 dB. This is louder than currently used Terecos ADDs. The duty cycle is reported at up to 2% and although this is lower than commercial ADDs, the duty cycle is also stated to be adjustable. The farm proposes to use 12 of these devices with obvious cumulative impacts.

It is stated that the devices will only be used in response to seal attack, however there is no monitoring of their use. Hydrophones surveys showed that BDNC farm near Shuna, where the ADDs are also supposed to be used only in response to seal attack apparently used them continuously

The TAST ADD is new technology and is purported to be different to other ADDs in that the startle reflex combined with low frequency output can selectively disturb seals but not porpoises. The two studies on this device have been carried out by the developers based on their own observations rather than C-POD data.

There is a commercial company partly funded by St. Andrews University and one of the developers is a director of this company.

There is a clear need for independent scientific study to ascertain whether the findings of the developers are replicated long-term on a range of sites and if this technology will fulfill the requirement of Habitats Regulation 39(2). A study by Gotz (one of the developers) found that a bottlenose dolphin did exhibit a startle reflex at received sound pressure level below that of the output of the Genuswave, indicating that Genuswave is likely to disturb cetaceans.

The Genuswave is a low frequency ADD, claimed to exploit differences in species hearing to disturb seals but not cetaceans. In theory this might be expected to work on porpoises but not lower frequency cetaceans such as dolphins. One independent piece of work, the SARF 112 study by researchers at SAMS found that porpoises are disturbed by both high and low frequency ADDs, indicating the need for further work independent of commercial interests to prove that no cetaceans can be disturbed by multiple arrays of TAST ADDs in a range of situations.

The first draft of the SARF 112 paper obtained under FOI from SNH included in its recommendations that:

> *"Recommendation # 1 (TOP PRIORITY): The effectiveness of alternative non-acoustic mitigation methods (e.g. appropriate fish husbandry, good net maintenance, improved net tensioning, and stronger net materials) should be investigated. These methods potentially harbour unrealised opportunities for successful mitigation of seal depredation but have not benefited from equivalent attention compared to ADDs. Preferably, and assuming that these methods are at least equally successful in mitigating depredation by seals, the use of one or more of these methods should be promoted over the use of ADDs."*

This is a clear and logical recommendation from the findings of the study that low and high frequency ADDs disturb cetaceans, it is concerning that it was watered down but still retained its meaning in the published version.

Trites and Spitz 2016 deconstruct and criticize the research used by the developers of the Genuswave and state that :

"Unfortunately, all technologically based deterrence methods are likely to fail in the long term as animals adapt to prolonged stimulus and find the rewards they receive to be greater than the price they pay to obtain them (Schakner & Blumstein, **2013**). New technologies often also equate to new problems and conflicts, it is just that no one knows yet what they are until the technology has been fully implemented. Thus, simple (but perhaps initially expensive) options that prevent predators from seeing or accessing the fish intended for human consumption are likely to be the most successful, while the technologically based solutions are likely to be most successful when used sparingly."

This planning application is not for a scientific study into TAST ADDs, but for commercial use of 12 devices. It is based on the incorrect assumption that it has been scientifically proven that they cannot disturb or injure cetaceans. **We ask that SNH amend their advice to planners that these devices cannot be used in areas where there are cetaceans without an EPS license until the science is demonstrably robust to prove that they cannot disturb cetaceans**. If SNH is not minded to change their advice to planners, please explain with full scientific references why you believe it has been proven beyond scientific doubt that these TAST ADDs cannot disturb cetaceans.

For an EPS license to be issued the 3 EPS licensing conditions would have to be met, one of which is that there must be no satisfactory alternatives. Farms in Shetland are currently fitted with double nets which as suggested by both the SARF 112 paper and Trites and Spitz 2016 are a satisfactory solution which does not disturb cetaceans and does prevent the need to shoot seals. It would be a negative move for farms to move away from double netting and allow unnecessary noise pollution in the seas.

Best wishes,

David Ainsley,

+44 (0)1852 300 203

SNH replied to David Ainsley in May 2020:

Scottish Natural Heritage
Dualchas Nàdair na h-Alba
All of nature for all of Scotland
Nàdar air fad airson Alba air fad

Mr David Ainsley
Sealife Adventures.

28 May 2020

By email to: info@sealife-adventures.com

Dear David,

Application to vary a condition at a farm in Shetland, stipulating that ADDs may not be used.

Thanks for your email on this from the 14th of May. I have now sought input from colleagues and we respond below to the points you have raised.

The application referred to in your email is for a variation in planning permission to allow a trial deployment of the TAST system at an existing fish farm site at Swinning Voe by Grieg Seafood, Shetland.

We have reviewed our advice to Shetland Island Council and can confirm that this still stands. We disagree that the evidence available is not robust enough to enable this trial of the full TAST system in this location. As the application is pending consideration, the conditions to be applied to this variation are not yet confirmed; but we anticipate that monitoring, reporting and assessment will be conditioned in line with our advice, the results of which will inform future advice. The intended duration of the trial is 19 months, i.e. one complete production cycle.

We highlight that the use of the TAST system is in addition to the predator control measures already in place, and will be operated in line with the TAST deployment plan. This states that the system will only be switched on in the event that existing measures are not working, and that the system will be switched off after five consecutive days of no seal morts. Reporting is included in the plan.

Based on the evidence to date, our view is that this system is likely to be significantly less harmful/disturbing to marine species, and is one of the only ADD systems available that has evidenced a reduction in seal predation (Gotz & Janik, 2016[1]). A further trial in a different location is the next step in this assessment.

We have formed our response to your query as follows:

1. EPS Licensing.
2. The TAST system and its Development.
3. SARF.

[1] GötzT,JanikVM (2016) Non-lethal management of carnivore predation: long-term tests with a startle reflex-based deterrence system on a fish farm. *Animal Conservation* 19: 212-221. doi: 10.1111/acv.12248

1. EPS licensing

We highlighted in our response to your FOI request of June 2019 our process with regards to Regulation 39(2) and EPS requirement (copied below):

Q4. Please supply any information as to why SNH has not informed the other farms of the requirement to hold an EPS licence before ADDs can be used.

A4. For commercial activities in the marine environment, EPS licences are regulated and issued by Marine Scotland Licensing Operations Team (MS-LOT). SNH are formally consulted by MS-LOT as part of the licencing process, but it is not a statutory requirement for us to provide advice on whether or not a marine EPS licence is required. As marine EPS licencing is regulated separately by MS-LOT it is not directly relevant to the planning process and we do not routinely seek to provide the Planning Authority with advice in relation to the requirement for marine EPS licences.

Our advice to Scottish Government in 2017 still stands. We highlighted then our view that there is enough evidence in the literature to suggest a real risk of disturbance to cetaceans from certain types of ADD brands. This advice was based on available literature regarding specific ADD systems; we therefore called for management of ADD systems used in aquaculture to be put in place. Our advice does not call for a ban on any/all ADDs but seeks to control the type and use of ADD systems going forward.

We understand that Marine Scotland are responding to you on a related matter and will update you on progress in their work on ADD policy.

2. The TAST system and its Development

Science is rarely definitive; however, in this case we are satisfied that there is sufficient evidence to enable this trial to go ahead. We do not agree that the findings of Trites and Spitz (2016) 'strongly suggest' that TAST could disturb cetaceans.

Whilst the commercial development of the TAST system is relatively new, this system has been under development for over a decade; the system designed for seal deterrence is called 'Salmonsafe' which sits under the overarching 'Genuswave' brand, a Targeted Acoustic Startle Technology (TAST). Thomas Gotz first started looking at ADD systems for his PhD[2]. The idea arose from the concern regarding typical ADD systems, and the need to try to find a system that was effective for seals without negative impacts on non-target species. The PhD was completed in 2008, and was the basis for all work that has followed in the intervening years.

The commercial component has been developed from the academic. It is not true to infer commercial pressure and observational bias has influenced device testing and development. You also allude to the fact that 'one of the developers is a director of the company'. Whilst this is true, we do not agree that this means there is any untoward bias in the science. Professor Vincent Janik is an established and respected scientist, and currently is the Director of the Scottish Oceans Institute (SOI) at St Andrews. Both authors are transparent about the connection between the scientific studies and the commercial application. The scientific process is one of peer review and challenge. There is very little scientific research that does not include caveats and further unknowns. We therefore need to consider the evidence in a risk-based manner.

This Farm proposes to use 12 TAST transducers, spread across its site. The reason for this is that the startle response only works in the near field and therefore to protect the farm from all angles, devices are needed all around it. Only one transducer will fire at any one time (unlike other systems that potentially could overlap). The mention of 'random' relates to the pattern, or order of firing. There will not be occasions where two or more fire simultaneously

[2] Gotz. 2008 PhD thesis "Aversiveness of sound in marine mammals: psycho-physiological basis, behavioural correlates and potential applications. St Andrews

as this would negate the effect of a startle sound source. The duty cycle is representative of the pattern of firing, and can be altered so that the gaps between firing are reduced if required. This application cites up to 2% duty cycle. This is very low when compared to other ADD systems.

With regard to the noise level of this system (at ~180 dB re 1 µPa; centre frequency 1 kHz)), it might be useful to compare this to other man-made noise. For example, small boats' and ships' vessel noise is in the order of 160-180 dB re µPa rms at frequencies of 20Hz to 10kHz, with larger vessels emitting noise increasing in volume to ~190 dB re µPa rms[3]. Although vessel noise is continuous in nature rather than intermittent, it is useful for context. Also, fish finders or echosounders can operate at a range of frequencies dependent on the type. However, some are within marine mammal hearing and operate at levels around 200 dB re 1 µPa[4].

Gotz and Janik (2010)[5] looked in detail at different types of sound, i.e. white noise, sine wave, psychophysical sounds (sound roughness, dissonance) and typical ADD noise profiles. The signal for the Genuswave transducer builds on this and uses the roughness characteristic together with a short rise time to elicit a startle response. This is a different signal type to other brands of ADD system.

Götz & Janik (2015)[6] detailed work conducted in the west coast of Scotland, at Bloody Bay on the Isle of Mull. This was an assessment of the system over a two-month period on a fish farm (the same location as subsequently used in the SARF project). Observations were made over three distance categories, by vantage point methodology using binoculars and a theodolite. Seal presence decreased within 250m during active sessions, but was unaffected further away. There was no statistical difference in harbour porpoise presence in any of the distance categories. The differences in responses between the two species can be explained by the differences in hearing abilities at 1kHz.

Götz & Janik (2016)[7] presented a trial of the system, focusing on seal predation, and wider marine mammal responses to the system deployed at Shuna. As with the previous study, visual observations were undertaken using both vantage point methodology and theodolite, over a survey period of about a month. Here they found a slight reduction of seals within 100m, but no effect on porpoise presence. Analysis of fish farm morts, suggested seal predation was significantly reduced.

Both of these studies are published in peer-reviewed journals.

Götz & Janik (2016b)[8] responded to Trites and Spitz (2016) commentary in agreement with many of the issues raised, in particular that any one system should not be considered a panacea. This is worth a read, as it counters much of the criticism levelled at this work, i.e. absolute numbers were provided, statistical models were used to look at effect, and the work was conducted in areas of high porpoise presence. In our view, Trites and Spitz (2016) make reasonable points, but their critique of the Genuswave is not warranted in places.

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[3] OSPAR Commission (2009). Assessment of environmental impact of underwater noise. Biodiversity Series.
[4] Ocean Noise and Marine Mammals (2003). Committee on potential impacts of ambient noise in the ocean on marine mammals. National Research Council ISBN: 0-309-50694-8, 204pg
[5] GötzT, Janik VM (2010). Aversivness of sounds in phocid seals: psycho-physiological factors, learning processes and motivation. The Journal of Experimental Biology, 213, 1536-1548
[6] GötzT, Janik VM (2015). Target-specific acoustic predator deterrence in the marine environment. *Animal Conservation*, 18: 102-111. doi: 10.1111/acv.1214
[7] GötzT, Janik VM (2016). Non-lethal management of carnivore predation: long-term tests with a startle reflex-based deterrence system on a fish farm. *Animal Conservation* 19: 212-221. doi: 10.1111/acv.12248
[8] GötzT, Janik VM (2016b). RESPONSE. The startle reflex in acoustic deterrence: an approach with universal applicability *Animal Conservation* 19: 225-226. doi: 10.1111/acv.12295

In our view, Gotz *et al* (2020)[9] does not constitute evidence that the Genuswave will result in disturbance to bottlenose dolphins. Odontocetes can self-mitigate noise and can down-regulate their hearing when emitting echolocation clicks, so this work was looking at whether they have a flinch reaction to startle sounds. The 1kHz signal elicited a weak startle in bottlenose dolphin at 146-150 dB re 1 µPa. There was no avoidance reaction, but a brief and weak flinch. This study acknowledges that there is more work to do to find out where the sensitization level is in bottlenose dolphin, however, any behavioural response if it occurs would be at higher levels than required for a flinch. There is little concern that Genuswave would elicit a behavioral response from bottlenose dolphins.

3. SARF

The SARF project you mention did find reactions to both the high frequency and low frequency signal used. This study used an artificial signal at 8-18 kHz and at 1-2 kHz. The project did not use any commercially available ADD system signal, the artificial one was designed to replicate typical signal patterns such as for the Airmar and AceAquatec brands. These were pulsed sinusoidal waves, which are therefore different to the signal type used in Genuswave, also with a much higher duty cycle (at 50%) than Genuswave. The SARF project is a useful and interesting look at the different signal characteristics, however, there were issues (noted in the report). One was that when they conducted the study there were few porpoise sightings, although we think the general avoidance to both of these signals was reliable. One relevant criticism levelled at the low frequency signal was that, when the signal was activated, there was a broadband click (which included higher frequencies) on switch on, and switch off, which may have affected the results.

The SARF study to us suggests caution, that a low frequency *per se* may not have the target specificity as seen in Gotz and Janik's work, and this in turn suggests that it is not only frequency and level that is important, but signal type as well.

The draft version of the SARF report cited was just that, a draft which required review and editing before publication, and it is to be expected that the final wording might differ. Appropriate fish husbandry, good net tensioning, and stronger net materials are typically included in the predator control hierarchy to be used at finfish farms, with ADDs being used if predation events still occur. This draft recommendation did not therefore need to be highlighted.

We share many of your concerns regarding indiscriminant ADD use, and we are working towards improving the situation with Industry, Local Authorities and Government. There are existing knowledge gaps and as a result there is work ongoing to inform this issue. For example, the following research projects are now in progress, though the findings are not yet available.

- Scottish Government funded – Improving understanding of the use, efficacy and impact of ADD use in Aquaculture
- Crown Estate Scotland/ Marine Scotland funded – Investigation and testing of non-lethal measures to address seal predation at fish farms and river fisheries
- SNH funded (just let) Risk of auditory damage from simultaneous use of ADD systems in Aquaculture.

You highlight another concern we share with regard to compliance, and you give BDNC as an example. Their change in ADD use was observed; Argyll & Bute Council have notified MOWI of this breach in consent conditions and work is ongoing to rectify the situation.

Lastly, we highlight that although all acoustic deterrent systems come under the same umbrella term of "ADD", different systems have different acoustic characteristics. We

[9] GötzT, Pacini A.F, Nachtigall P.E, JanikVM (2020) The startle reflex in echolocating odontocetes: basic physiology and practical implications. *Journal of Experimental Biology*

therefore assess these, in our casework advice, on a case-by-case basis, and may vary our advice accordingly.

I hope this provides you with some clarity on the basis for our advice, as well as our role in relation to EPS licensing for ADD use. Should you have any further queries regarding this case please don't hesitate to get in touch.

Yours sincerely,

Cathy Tilbrook
Head of Sustainable Coasts and Seas
cathy.tilbrook@nature.scot

[8] Scottish Salmon Watch reported in April 2018:

Data obtained from the Scottish Government via FOI reveals that 164 salmon farms use ADDs with 112 salmon farms where ADDs are listed as "Always On". The data reports an 'ADD Count' of 1,189 with the most popular ADD models listed as Airmar/Mohn Aqua (72), Terecos (60) and Ace Aquatec (33) . Of the 164 salmon farms using ADDs, Marine Harvest accounted for 65 followed by The Scottish Salmon Company (41), Scottish Sea Farms (35), Loch Duart (10), Kames Fish Farming (5), Cooke Aquaculture (5) and Wester Ross Fisheries (4). Hjaltland Seafarms (Grieg Seafood) reported no use of ADDs **[2]**.

The latest Scottish Government fish farm production survey 2016 - published in September 2017 - reported 253 salmon farm sites but only 136 reported production during 2016 (i.e. 117 reported zero production). Hence it seems that the majority of Scottish salmon farms use ADDs despite the known impacts on cetaceans and breach of European law via the Habitats Directive.

Download data compiled by Marine Scotland and obtained by GAAIA from SNH via FOI in April 2017

Read more via:
Deafening Impact of Salmon Farms on Cetaceans- "Deliberate & Reckless Disturbance" by Acoustic Deterrent Devices Makes Waves?
Cetaceans Sound Alarm On Salmon Farms - new research sparks EC complaint & call to ban Acoustic Deterrent Devices

[9] In March 2018, the Scottish Parliament's Environment, Climate Change & Land Reform Committee report on the environmental impacts of salmon farming stated:

234. The Committee understands the regulations that allow the killing of seals in Scotland fall foul of the United States Marine Mammal Protection Act, which "Prohibits the intentional killing or serious injury of marine mammals in all fisheries." As a result, we could face an export ban on all our fisheries products in four years. The Committee questioned what Marine Scotland is doing to address that including considering withdrawing the regulations that allow the intentional killing of seals. Marine Scotland confirmed that they, and part of the wider Scottish Government, is looking to understand exactly what it means, what is required and what the expectations are. The Committee asked Marine Scotland to confirm what action it is taking to ensure Scotland does not face an export ban on fisheries products to the US and the timescale for that action. In a written reponse Marine Scotland indicated that while the regulation does not come into force until 2022, countries are required to demonstrate compliance or working toward compliance by 2019. Marine Scotland referenced various ongoing discussions but did not outline any specific action, either underway or planned, to ensure Scotland is compliant.

Use of Acoustic Deterrent Devices (ADDs) - evidence of effectiveness

235. Acoustic Deterrent Devices (ADDs) are used on Scottish fish farms as a non-lethal method to reduce the risk of seal depredation by producing loud, aversive underwater sounds. However, the report states that "Despite their widespread use in Scottish aquaculture, the long-term effectiveness of ADDs as a seal deterrent remains unproven."

Current use of ADDs

236. The Committee is aware of reports of large numbers of fish farms operating ADDs continuously. The Committee asked the SSPO how many farms are operating ADDs on a continuous basis. In a further written response the SSPO said no system continuously emits a noise. All have different cycles of sound propagation, with periods where no noise is produced. The SSPO did not provide detail on numbers but said they understood 50-60% of ADDs/farms that currently use ADDs use them in a manner where they are turned on continuously. They said industry is keen to support continuous improvement in design and adaptation of anti-predator systems, including research to better quantify if our use of ADDs is having any actual effect on non-target species. They stated "Our current experiences of interaction with wildlife around fish farming areas points to this not being a problem." The Committee understands there is no consistency of approach in the use of ADDs with fish farms relying on differing manufacturers guidelines.

Impact of ADDs on marine wildlife

237. The report says "...the absence of a consistent ADD monitoring scheme and/or licensing process currently poses a significant challenge to the assessment of the scale of ADD-related noise pollution and consequently its impact on marine species. ..... ADDs are currently not being recorded consistently in any national marine noise register." SNH confirmed the report reflects their concerns about the potential impacts of ADD use on marine wildlife (especially European Protected Species),

including disturbance/displacement; auditory injury and long-term impacts such as increased stress levels. They state there is evidence of an increase in the extent of marine acoustic pollution in areas of Scottish waters that are important to cetaceans. These concerns are reflected across evidence including the submission from the Hebridean Whale and Dolphin Trust who raised concerns about the siting of fish farms in critical areas of habitat for cetaceans.

238. SE LINK referred to a growing body of evidence on the impact of ADDs on harbour porpoises saying the devices induce stress, cause hearing damage and cause displacement—they change the behaviour of harbour porpoises by preventing them from going to certain areas. SE LINK stated although ADDs are not proven to be effective on seals, they have a significant impact on cetaceans. The Scottish Salmon think tank suggested there should be a moratorium on deployment of ADDs while research on the deleterious impacts on seals and cetaceans is investigated.

Regulation, monitoring and management of ADDs

239. Argyll and Bute Council discussed the regulatory process for ADDs: "ADD use is considered by planning authorities when determining a planning application for a new or expanded farm. ADDs are normally proposed as part of a number of anti-predator control measures and used only if other measures such as tensioned netting are not effective. The acceptability of ADD use is assessed based on the sensitivity of the location, the type and frequency of the ADD and how it will be operated. SNH provide advice as a statutory consultee and normally if planning permission is approved for a development, it is subject to a planning condition that ensures that ADD use cannot take place unless the details of ADD use have been agreed by the Planning Authority in consultation with SNH and thereafter the development maintained as such unless any variation is agreed in advance by the Planning Authority. While ADD use is considered in individual applications there is currently no formal monitoring requirement directly linked to existing regulatory consents."

240. Highland Council confirmed they look to control ADD use at the planning application stage and subsequently through the compliance with the condition placed on planning consents to require the operator to retain a log of ADD use. They are also looking retrospectively at the existing use of ADDs on farms and the need to take action by requiring adjustments to the way in which they are used including adjusting frequencies to affect seals but not harbour porpoise and other cetaceans.

241. SNH raised concerns about the lack of a consistent approach to the monitoring and management of ADD usage. SNH suggest that a more formal ADD registration system would provide data required to better understand this issue and manage it effectively.

242. On ADD noise-related pollution Marine Scotland Licencing confirmed there is a case for better monitoring and licensing and they confirmed their intention to lead on this and to work collaboratively with Scottish Natural Heritage.

Other approaches

243. The SRSL report and evidence to the Committee suggested there are other options for seal management including: tension nets and extending the use of double

View of the Committee

246. The Committee is extremely concerned to ensure seal welfare is maintained and promoted and it has not been convinced that seals in the vicinity of fish farms are being shot only as a last resort. Seals are a European marine mammal protected species and there is a requirement to ensure their protection.

247. The Committee considers Scotland needs to act now to ensure it does not fall foul of the US Marine Mammal Protection Act, which prohibits the intentional killing or serious injury of marine mammals in all fisheries. The Committee considers all fish farms in Scotland should be required, via legislative or any other appropriate means, to follow the position of the Aquaculture Stewardship Council in relation to marine mammals. This ensures farms cannot kill marine mammals.

248. The Committee heard ADD's are not effective as a seal deterrent and has seen little evidence of their efficacy. The Committee understands most ADDs are left to operate continuously and is particularly concerned about this as it heard impacts from ADDs are cumulative and unintended and widespread underwater noise pollution may be affecting cetaceans. The Committee is also concerned there appears to be no assessment by government and regulators of the scale of ADD-related noise pollution and its impact on marine species since 2014 and no related action. The Committee has significant concerns about the use and operation of ADDs and their cumulative impact and considers all fish farms in Scotland should be required, via legislative or any other appropriate means, to follow the position of the Aquaculture Stewardship Council in relation to ADDs. This ensures fish farms cannot use ADDs.

249. The Committee considers the industry should manage the risk of predation through extension of the use of double skinned predator nets.

JNCC Report
No: 615

Evidence base for application of Acoustic Deterrent Devices (ADDs) for marine mammal mitigation in coastal and offshore industries

McGarry, T., De Silva, R., Canning, S., Mendes, S., Prior, A., Stephenson, S. & Wilson, J.

Version 2, August 2019

For further information please contact:

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The report included:

6.21 GenusWave Ltd: SalmonSafe

Note: The Salmonsafe ADD will be the successor to this device, but from the literature there has been no testing of this device published and there no accessible data from the manufacturers.

Parameter	Manufacturers specification	Notes
Source level	None specified.	Measured sound pressure level output = 180 - 182dB re 1µPa at 1m (RMS) for signals centred at 10kHz (Gotz & Janik 2015).
Frequency (frequency range and swept band or single frequency)	500Hz – 22kHz.	A noise pulse centred at ~1kHz is used for deterrence of seals only (this noise pulse was within 10dB of its maximum output between 700Hz and 1500Hz), while a similar pulse centred at ~10kHz would be recommended for deterrence of both seals and odontocetes (odontocetes) (Gotz & Janik 2015).
Continuous/ intermittent	None specified.	-
Duty cycle	None specified.	-
Range	None specified.	60 – 250m (Gotz & Janik 2011, 2015).
Battery	None specified.	-
Training requirements	None specified.	-
Device testing	None specified.	-
Deployment	None specified.	-
Functionality	None specified.	-

Here's a JNCC email to SNH in January 2017:

From: [redacted]@jncc.gov.uk [redacted]@jncc.gov.uk]
Sent: 12 January 2017 13:30
To: Caroline Carter
Cc: [redacted]@jncc.gov.uk
Subject: ADD use in Scotland (MSFD UK Marine Noise Registry)

Hi Caroline,

I hope you are well. I'm not sure if you will recognise me via this email, but it' [redacted] I have taken over the role of MSFD Noise Registry Adviser at JNCC while [redacted] which I believe you may have been informed about by my line manager [redacted]

I am emailing as I was recently informed by [redacted] that SNH and Marine Scotland are in talks about licensing/regulating the use of ADD at fish farms in Scottish waters. As part of the UK Marine Noise Registry (MNR) we are attempting to collect the time and source location of all anthropogenic impulsive noises, between 10 Hz and 10 kHz, produced in UK seas for each calendar year, but as of yet we have been unable to collect data associated with ADD use at fish farms [redacted].

I wondered therefore if it would be possible for me to be included in any future meetings between SNH and Marine Scotland regarding ADD use at fish farms, and to work with both organisations to try and find a feasible method of collecting future ADD noise data for the Marine Noise Registry?

Could you let me know if you think this would be possible, as we would really like to start the process of recording ADD data in the MNR to ensure our data is inclusive of all impulsive noise sources.

Best wishes,

[redacted]

[redacted]
JNCC, Inverdee House, Baxter Street, Aberdeen, AB11 9QA
Tel: 01224 266550, Direct Dial: [redacted] Mobile: [redacted]
Email: [redacted]@jncc.gov.uk

And a reply from SNH to JNCC in January 2017:

From: Caroline Carter
Sent: 18 January 2017 16:24
To: [redacted]@jncc.gov.uk
Cc: [redacted]@jncc.gov.uk
Subject: RE: ADD use in Scotland (MSFD UK Marine Noise Registry)

Hi [redacted]

[redacted]

I've spoken to a few key folk about your request to join in on any future meetings, and our feeling is that our meetings have not been a formal forum and are (still) at quite an early stage of discussion so they probably won't help you in trying to collect ADD usage data. We actually do not have another meeting timetabled at the moment.

I'm not surprised you have had trouble collecting this information - because it doesn't really exist. Fish farms include ADDs in their planning application as potential mitigation, and there are instances where this doesn't necessarily mean that they will be used; often the industry just want to keep their options open. Having said that, we think that most are using ADDs continuously as a 'just in case', and we are in discussion with Industry to try and improve our understanding of how fish farms use ADDs.

How ADDs are used at each fish farm is decided by the manager on site, and often the details of this use is not known beyond the site itself. We have had discussions with Industry environmental managers and they do not have a handle on exactly how the devices are used on their farms. Managers can supply the make and number of ADDs that they have, they can log whether they are used continuously – or triggered – but it's not necessarily clear what this means. For example continuous can mean 24/7 – or when the cages are stocked – or switched on when the workers are on site, and then switched off when they leave! Or switched on when the manager 'feels' that there may be a problem.

When fish farms apply for a licence to shoot seals, they have to disclose any ADD use. However, the application is via an on-line form and there's not a lot of detail requested on ADDs. Essentially it's only to establish that all mitigation methods have been tried and the fish farm still has a problem which requires permission to shoot the seal. Marine Scotland are responsible for managing seal licensing, and the person to contact at Marine Scotland is [redacted]@gov.scot). You could talk to MS and see if this data would be of any use. It won't be the whole story as there will be farms that do not apply for a shooting licence, but it may give you an indication.

One thing occurs to me in relation to the inclusion of Aquaculture ADDs on the noise register, is that although they are pulsed noise sources – can they be characterised as impulsive? I have seen them referred to as continuous noise sources, especially where there are more than one ADD installed on the cages and therefore there are essentially no quiet gaps in the sound. I guess this will depend on how you are defining impulsive??

I'm not entirely sure on what the output of the MNR will look like, or how we will be able to use it, but if you are detailing the location of these noise sources used within a calendar year, you could use the locations of the fish farms and assume that ADDs of some description was used during that year – it's a bit blunt I know. But my understanding is that it's just registering the block location of an impulsive sound? So there's no reference to how loud it is, nor how far the sound is likely to propagate?? (it would be good for us to understand this a bit better).

Read more via: Sounding Off On Salmon Farms - Acoustic Deterrent Devices evade Marine Noise Registry

A FOI reply by JNCC to Scottish Salmon Watch dated 25 March 2020 included:

Please note: emails are presented in date order.

From: Sonia Mendes
Sent: 11 September 2018 09:58
To: Elaine Tait; Caroline Carter

Hi Elaine/Caroline

You will have seen the press release and media articles on the ADD issue today. Unfortunately JNCC has made no progress in getting hold of data on ADD use for the Noise Registry. We have been so busy that we haven't been able to pick this up. One thing I did do was to transcribe some questions and answers from the inquiry below. What David Sandison said sounds promising in terms of getting the industry to collaborate. I'd welcome a quick call sometime next week or the next to find out what you guys have been doing and if you have any ideas on how to go about getting the data.

Thanks

Sonia

Environment, Climate Change and Land Reform Committee - Inquiry into the environmental impacts of salmon farming - February 06

David Sandison, General Manager, Scottish Salmon Producers' Organisation

DS: In relation to ADDs and whether they are appropriate, in some cases they are. The idea they are left on continuously and have a massive effect on other marine mammals I would refute because they are used selectively, they are not switched on willy nilly, they are used when there is a problem

MSP: an FOI request in 2016, 60% of the farms using ADDs listed as saying they're always on.

DS: Doesn't concur with my knowledge of the situation but I'd have to go and have a look at the FOI and see if I can shed any light. I recognise that ADDs have an impact on marine cetaceans around the fish farms so ADDs need to be used appropriately

MSP: How do you propose better monitoring of ADDs?(…)

DS: I will come back to you and I'm sorry if I'm not aware of that information. However, we are the best people to tell you what's happening on farms and we have absolutely no reason not to; So, whichever agency needs to know that information I think that industry would quite happily freely give that information and then we can make decisions on whether that's appropriate use of ADDs.

Dr Sónia Mendes
Senior Marine Mammal Advisor - Offshore Industries

From: Cathy Tilbrook
Sent: 31 January 2019 10:07
To: Karen Hall (JNCC)
Cc: Caroline Carter
Subject: ADD research specification

Hi Karen

As discussed in our catch-up call yesterday, I attach a copy of the MS tender spec for the ADD research project I mentioned. Caroline is our main contact for this, if you need any further info (or Elaine Tait in MS). Hopefully this work will provide a more comprehensive dataset for MSFD noise registry purposes.

Let me know if you want a further catch up sometime on the HP conservation objectives issue that we discussed last week. It would be useful to hear feedback from your discussions with colleagues.

Cheers, Cathy

Cathy Tilbrook | Sustainable Coasts & Seas Activity Manager

From: Alex Coram
Sent: 18 October 2019 10:32
To: Sonia Mendes
Subject: Re: shapefiles derived with JCP code

Hi Sonia

Attached should be what you need. You can take explanatory text from previous versions of the report.

The two columns 'sc-WntTot' and 'sc-SmrTot' are scaled from the density surface layer to agree with population totals from SCANS III. I notice they are saved as strings, rather than real or doubles, which must have been a consequence of how they were transformed. That shouldn't be a problem but just wanted to point it out in case you have any issues.

On an unrelated topic... I am working on a project for Marine Scotland, collecting info on the use of acoustic deterrents in aquaculture. Caroline from SNH suggested talking to you so that we can collect and store data in a way that would be useful for the MSFD marine noise register. Maybe easiest to discuss on the phone?

Best,

Alex

From: Kate Brookes
Sent: 16 January 2020 17:37
To: Sonia Mendes
Cc: Elaine Tait
Subject: ADDs

Hi Sonia,

Marine Scotland currently have several areas of work around ADDs. One of the issues that we're facing is whether ADDs are impulsive noise or not. In several of the areas, it's clear that they are not considered to be impulsive noise. This means that we have some contradictions in terms of how ADDs are treated in relation to the noise registry.

We'd like to understand more about why ADDs are included in the noise registry and seem to be considered as impulsive noise in this context.

Are you available in the near future to have a discussion about this?

Thank you,
Kate

Dr Kate Brookes
Marine Mammals Specialist

From: Sonia Mendes
Sent: 20 January 2020 13:00
To: Kate Brookes; Elaine Tait

Hi Kate/Elaine, hope you are well,

do the following text extractions help at all? Also bearing in mind we only collect data for sources between 10Hz and 10kHz (with the exception of MBES sonar which we collect up to 12kHz). Let me know if you still wish to chat! We are of course interested in keeping abreast of the outcomes of the Marine Scotland project and also seeing how the MNR can collect any future data on ADD use as this is currently one of the largest gaps in data collection.
Cheers, Sonia

[11] ADDs were banned for use on salmon farms in British Columbia in 2000.

marine mammals

concern:

the methods used to protect farm salmon are hurting other species

We've heard your concerns that the actions taken by salmon farmers to keep predators away from the fish pens can be harmful to wildlife.

growing pains:

early techniques were modeled on land-based agriculture and were harmful

When farmers first began farming salmon, predators were dealt with the same way they were in land-based agriculture – with a gun. Firearms were kept on site and used when a seal or sea lion became too aggressive or acclimatized to the farm site as a source for food. Later, in order to reduce the number of marine mammals killed at farm sites, other methods were explored including Acoustic Deterrent Devices. These devices create an underwater noise that deters predators, but also impact echo-locating marine species, especially dolphins and whales.

our response:

All of our farm companies have voluntarily banned the use of firearms on their farms. Also, salmon farmers stopped using Acoustic Deterrent Devices before they were eventually banned in 2000.

To deter seals and sea lions, we commonly use predator nets. These large, robust, weighted nets surround the farm site and provide an additional barrier between the predator and the fish. These nets also provide an additional barrier to prevent fish escapes. Some farms also use non-lethal electric fencing that can be turned on at night when predators are most likely to visit.

For smaller predators such as birds, otters and mink, securely sewing top nets to side nets is a very effective deterrent. For persistent animals, live-traps are used to capture and relocate. In the very rare occurrence that no other solution can be found, farm companies can have the problem animal euthanized in a humane manner. This requires special permitting from the Department of Fisheries and Oceans for a specific animal, ensuring that this decision is not made lightly.