

Marine Mammal Scientific Support Research Programme MMSS2

SSI 2: Annual Report Seals and Salmon Interactions

Sea Mammal Research Unit
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Executive Summary

This annual report documents progress made under the Seals and Salmon Interactions (SSI) theme of the Marine Mammal Scientific Support Research Programme. It provides an update on the ongoing scientific and management advice activities between April 2017 and March 2018. The overall aim of the SSI theme over the past 12 months has been to help reduce conflict between river fisheries and seals.

The scientific activities reported include completion of the processing of the 50,000 photo-identification images from the 2016-2017 field effort, the capture and tagging of four harbour seals at the Donmouth haulout and the subsequent mapping of tracks to date, and additional scat and skin sampling to better understand diet and association with breeding areas through genotyping.

The management activities reported include the development and trialling of methods to catch river-using seals, and the support provided to District Salmon Fishery Boards (DSFBs) and river fisheries. In particular, details of catching methods that have been deployed in the River Dee and at the Donmouth haulout in late 2017 and early 2018 are described.

Other activities completed this year include delivery of an interim report documenting findings from the study of seals in rivers, including a preliminary investigation of seal sightings, predation rates and the spatial distribution of seals in Aberdeen Harbour ([available for download](#)), and a briefing paper, “Review of options (including non-lethal measures) to limit seal access to salmon rivers”, was also delivered.

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1 Introduction

The Seals and Salmon Interactions (SSI) programme, funded by the Scottish Government through the Marine Mammal Scientific Support (MMSS) Research Programme, is currently focused on seal interactions with river fisheries. The main objectives have been driven by considerable changes in both predator (seals) and prey (salmonid) populations. Seals may reduce salmonid stocks and fishery catches potentially impacting on the value of these fisheries. Conservation Orders in many areas of Scotland now prevent the killing of both salmon and harbour seals, and the changing perspective on the lethal control of seals has led to an increasing need to develop non-lethal options for mitigating the effects of seals on fisheries.

The policy objective of SSI is to undertake studies of seal interactions with river fisheries with a view to understanding potential impacts and to establish the potential value of different non-lethal measures in deterring seals from impacting on these wild salmonid fisheries. The project also provides an advisory function to assist fisheries in identifying potential impacts, as well as offering advice on the various non-lethal measures currently available.

The project can be divided into two main areas: scientific activities to understand the behaviour and ecology of seals in relation to salmonids and the river environment, and management activities that include the implementation of working agreements with District Salmon Fishery Boards (DSFBs). The overall aim is to minimise conflicts between river fisheries and seals.

The River Dee hosts important salmonid stocks and fisheries. The Dee DSFB has raised concerns about seal and dolphin predation on salmon near the mouth of the River Dee and also about seals interfering with fisheries further upriver. These concerns led to the establishment of the Dee Seal Forum in 2015. The Forum was formed by the River Dee DSFB, fishery stakeholders, the Sea Mammal Research Unit (SMRU) and Scottish Government. Through the Forum the fishery board and other stakeholders were able to present information to explain their concerns and to develop a strategy to address those concerns. In part to fulfil SSI requirements, and guided by outcomes from the Dee Seal Forum, SMRU began a scientific study in April 2016 to collect 12 months of seal photo-identification data to investigate the behaviour and ecology of those seals using the river and estuary. Specific questions of interest were:

- How many seals are using the River Dee system?
- How is this usage distributed in time and space?
- How much salmonid prey is likely being consumed?
- How and when are river specialist seals making use of the river?

From a management perspective, the current aim is to work with the Dee DSFB, to develop a work programme in response to seal activity, with the principle aim of developing strategies that can be applied to other river fisheries experiencing seal/fisheries conflicts.

Management activities include:

- assisting the Dee DSFB in identifying individuals that are habitually using the river, to enable management that is targeted towards individual seals;
- developing methods to catch river specialist seals and, where possible, translocating individuals identified for relocation to other coastal areas to test the utility of this method to limit conflict with river fisheries;
- monitoring haulout sites to determine where and when known river-users haul out. This information may be used to inform catching efforts to target those individuals identified for relocation for capture on the haulout.

Objectives over the last year included

(i) the processing of the photo-identification images collected during the twelve months of field effort from April 2016 to March 2017,

- (ii) individual identification of seals venturing high up the River Dee,
- (iii) collection of information to assist with the capture of seals specialising in river use, and
- (iv) development of measures to capture seals that use rivers.

In this report the achievements in relation to these objectives under the headings of scientific activities and management activities is described.

2 Scientific Activities (study of seals in rivers)

A study was set up in 2016 to help address the questions raised by the Dee Seal Forum. A land-based position overlooking Aberdeen harbour (Figure 1) was used to collect seal sightings information and photo-identification images over a twelve-month period. Regular visits were also made to a local harbour seal haulout in the Donmouth Local Nature Reserve. When resources allowed, three other observation positions were used within the tidal reaches of the River Dee (Figure 1). Incidental sightings and occasional dedicated observation periods for seals made at other sites in the lower 35 km of the river provided further information on seals using these reaches. Details of field methods and maps used for the work described are detailed in Harris and Northridge (2017). Figure 1 provides a map of the local area showing the relationship between the Donmouth and River Dee and four observation positions in the tidal reaches of the River Dee used in the 2016 and 2017 fieldwork.

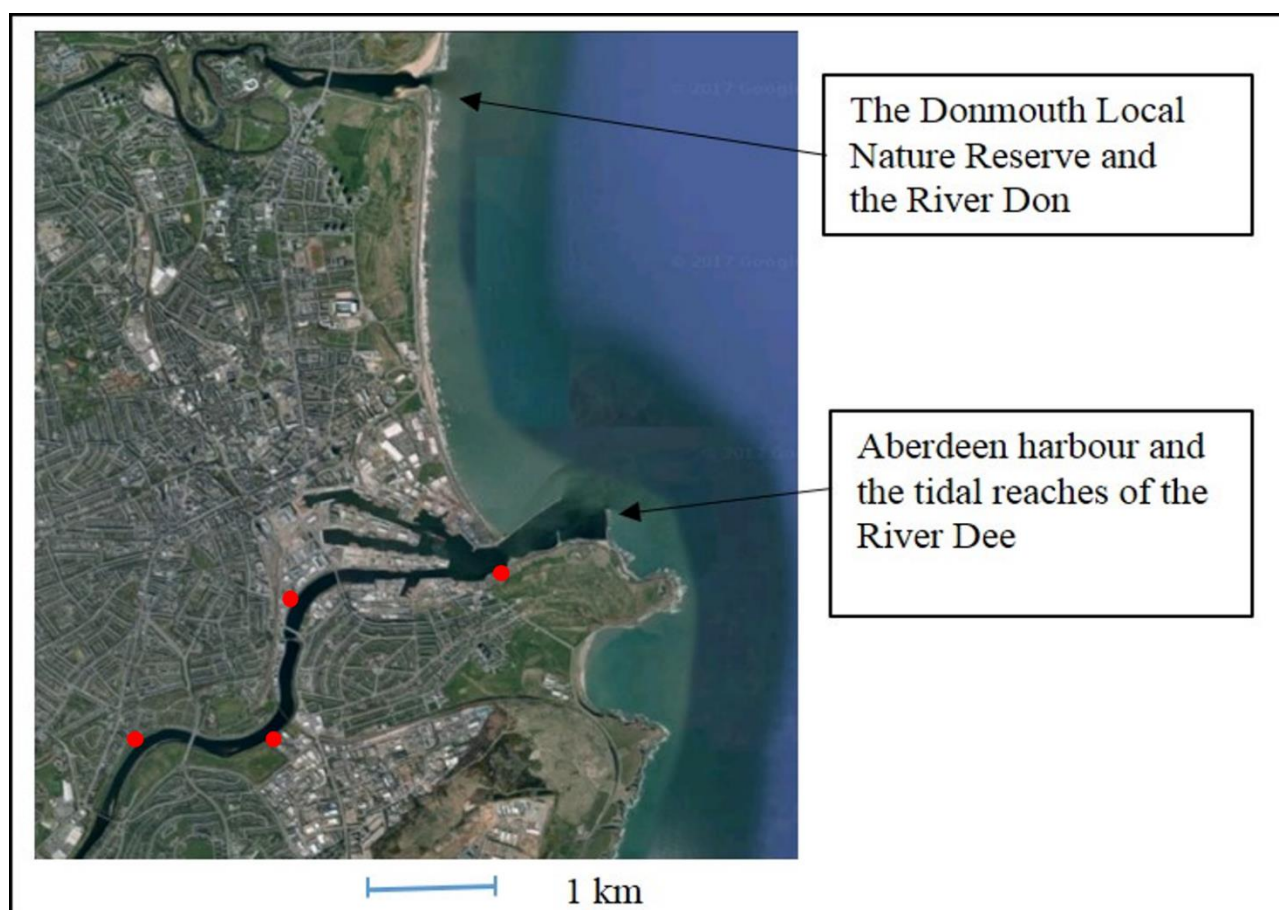


Figure 1. Map showing the location of the Donmouth, River Dee and four observation positions (red circles) within the tidal reaches of the River Dee.

Processing of images involved the creation of a photographic identification file for each known (identifiable) seal; these files were then used to identify seals from the remaining images. Approximately 50,000 images from the Donmouth haulout, Aberdeen Harbour, and River Dee sites upriver from Aberdeen Harbour have

been processed. Seal sightings information has been entered into spreadsheets, along with sightings of dolphins and otters, and observations of piscivorous bird feeding events. An analysis of the collated data will be presented in the next annual report.

2.1 Harbour seal tracking

During attempts to capture a known river specialist seal (Pv018D) (see Section 3), four adult male harbour seals were captured and tagged at the Donmouth haulout. All four seals were known individuals from the Donmouth photo-identification histories (Harris and Northridge, 2017). Furthermore one individual was a known user of Aberdeen Harbour where it had been observed predated on salmonid. Tag data from these individuals will contribute to the harbour seal usage maps (available on the [Marine Scotland webpages](#)) and help with understanding of local harbour seal movements, complementing information from land-based observations. For the individual seal known to use Aberdeen harbour the tag data will allow harbour usage versus at sea usage to be quantified. Tag data from the other seals will contribute to knowledge from ongoing land-based observations, helping to establish whether or not they are using the River Dee outside of observation periods, for example at night. Overall the aim is to distinguish salmonid and river specialists from occasional river users with perhaps more varied diets. Diet information for known individuals is being obtained from scat analysis (see Section 2.1.2) and direct observations from photo-identification fieldwork (Harris and Northridge, 2017).

The harbour seal known to use Aberdeen Harbour (Pv030D) was fitted with a GSM tag (SMRU Instrumentation) on 27 September 2017, while the three other harbour seals tagged at the Donmouth haulout on 29 September 2017 were fitted with UHF tags (tag numbers 65501, 65509 and 65510; PathTrack Ltd.). The fine scale spatial distribution of GPS locations from the three harbour seals fitted with UHF tags has shown the animals spent their time between Aberdeen and the Ythan Estuary and generally remained very close inshore (Figure 2).

Figure 3 shows the spatial distribution of GPS locations for the one harbour seal (Pv030D) fitted with a GSM tag (Tag ID. 14205). The use of the Aberdeen Harbour area by this harbour seal is of interest to the SSI study and therefore we provide, by month, a close up of those GPS locations within the vicinity of Aberdeen Harbour and the River Dee (Figure 4). Although these data, along with dive profiles are yet to be fully explored, GPS positions show that this seal uses the coastal environment, as well as Aberdeen Harbour. During November, December, 2017, and January 2018 the seal made some use of the River Dee channel with GPS locations recorded approximately 2 km above the harbour, the noticeable absence of any GPS locations in this area of the harbour and river during October is of interest and analysis of these data are ongoing.

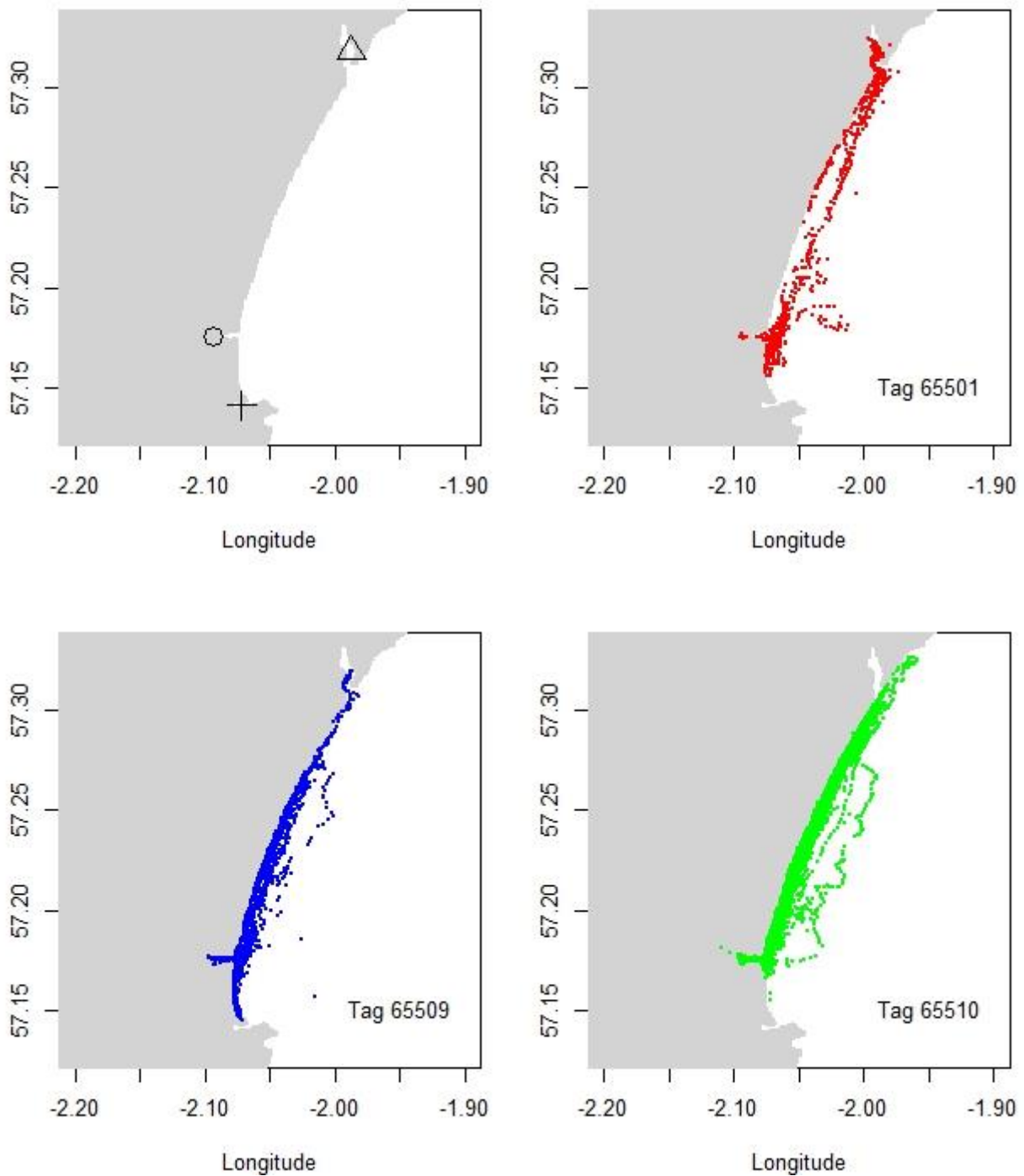


Figure 2. Unfiltered GPS locations for three harbour seals fitted with UHF tags from the Donmouth haulout. The top left panel shows the locations of Aberdeen Harbour (cross), the Donmouth haulout (circle) and the Ythan Estuary (triangle). The other three panels show data for each individual tag. All three tags were deployed on the 29th September 2017 and the last position shown for tag 65501 was on the 22nd December and for tags 65509 and 65510 the last positions shown were on the 30th December. All three tags are still active. The time lag between the collection and processing of UHF data, as well as the deployment spanning two reporting windows means that UHF tracks only to December 2017 are available during this current reporting window.

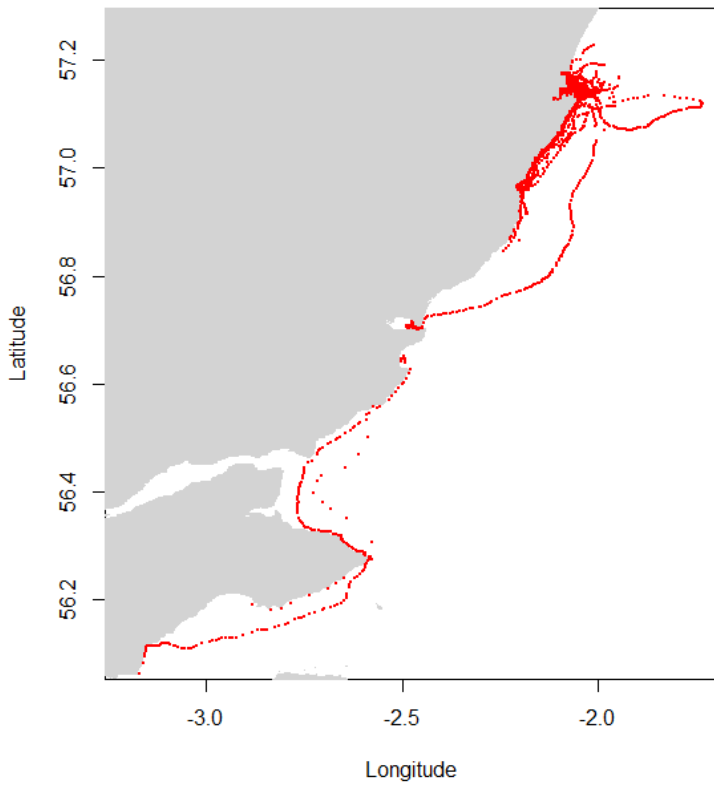


Figure 3. The spatial distribution of GPS locations for SMRU's GSM tag (tag ID 14205) fitted to the seal known to use Aberdeen harbour (Pv030D). The tag was deployed on 27 September 2017 and the final location was received on 25 January 2018.

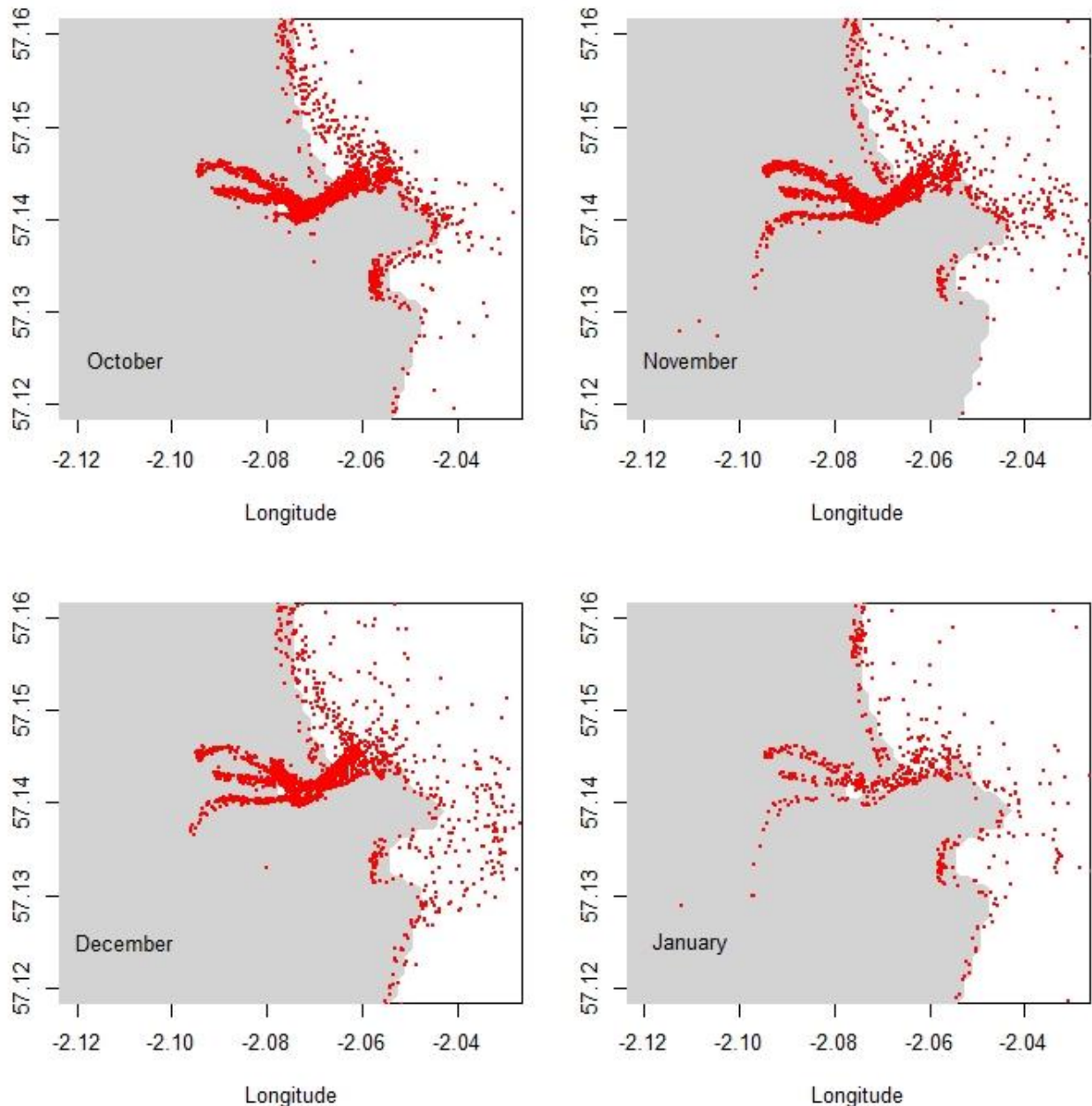


Figure 4. These four panels show all the GPS locations from GSM tag (tag ID 14205) within Aberdeen Harbour and the adjacent area for each month from October to January.

2.2 Additional sampling

A total of sixteen scat samples (twelve were collected from the Donmouth haulout and four collected directly from each of the four tagged seals) have been collected. These will be subjected to hard-part analysis and tested for the presence of salmon and trout DNA.

Skin samples taken from the four tagged seals will be genotyped to assess from which geographical area these seals may have originated. Adult seals typically leave the Donmouth during the breeding season and no pups have been observed there in June, suggesting that seals are breeding in other areas.

3 Management Activities

A component of the SSI theme is to develop and evaluate management activities with DSFBs and to provide advice about seals in relation to river fisheries. It is important to be able to react to changing events with the

overall aim of minimising conflict between river fisheries and seals. SMRU has provided Scottish Government with regular updates of SMRU's provision of advice and progress with management activities.

3.1 Development of methods to catch river-using seals

The capture of seals in the wild is important for a range of scientific and management goals. While SMRU has developed several successful techniques for capturing seals at a variety of coastal haulout locations, methods for catching seals in the more challenging environment of a river are less well developed.

In collaboration with the Dee DSFB, attempts were made to capture a specific harbour seal (Pv018D) that is known to regularly travel up the River Dee, interacting with salmon fisheries on the lower river. If captured, this individual would be tagged and translocated to another area to investigate the utility of the translocation approach to keep seals out of rivers, whilst exploring new approaches to capturing seals in larger rivers. SMRU has successfully developed methods to capture seals in rivers where flow rates are typically low or when and where seals are known to actively hunt close to river banks. However, the River Dee represents a more challenging environment with high flow rates for which new methods need to be developed.

3.1.1 River wide net

The initial river net trial (river wide net) deployed an existing net across the entire width of the River Dee, maintaining the lead line on the river bed and float line at the surface, subsequently creating a barrier to seals. However, it was found that the strength of the river flow combined with the mesh size of the net led to a substantial risk of seals becoming enmeshed and drowning. This meant that a new net with smaller meshes was needed to eliminate this possibility. The primary reason for continuing to pursue this approach is to develop a method for catching seals through the introduction of an escape route in the net barrier where seals can be captured as they attempt to pass through.

3.1.2 River sweep net

The second river net trial (a sweep net approach) was instigated in part due to the knowledge gathered from photo-identification and behavioural observations that indicated that Pv018D travelled up the River Dee before dawn and descended the river during the mornings. The method utilised the skills developed during the river wide net trial to position a large net in a swift flowing river. The sweep net approach was developed to target Pv018D as she returned down the river. In brief, the approach required a large downstream pocket of net to be created (Figures 5 and 6) in a relatively shallow, swift flowing section of river. Once the seal entered the pocket, the net would be drawn quickly (~15 seconds) back across the river by the pull vehicle encircling the seal (Figure 7), and the swift flow was necessary to collapse the pocket of net quickly onto the river bank. A relatively shallow stretch of river was required so that a seal swimming underwater could be easily tracked by an observer on the river bank and the sweep of the net initiated at the correct moment. The shallow water also substantially reduces the possibility that a seal could become entangled unseen. During netting operations a boat was positioned to help divert seals into the sweep, a seal scarer (OTAQ Ltd.) was also deployed from the bank close to the boat to encourage the seal down the opposite bank.

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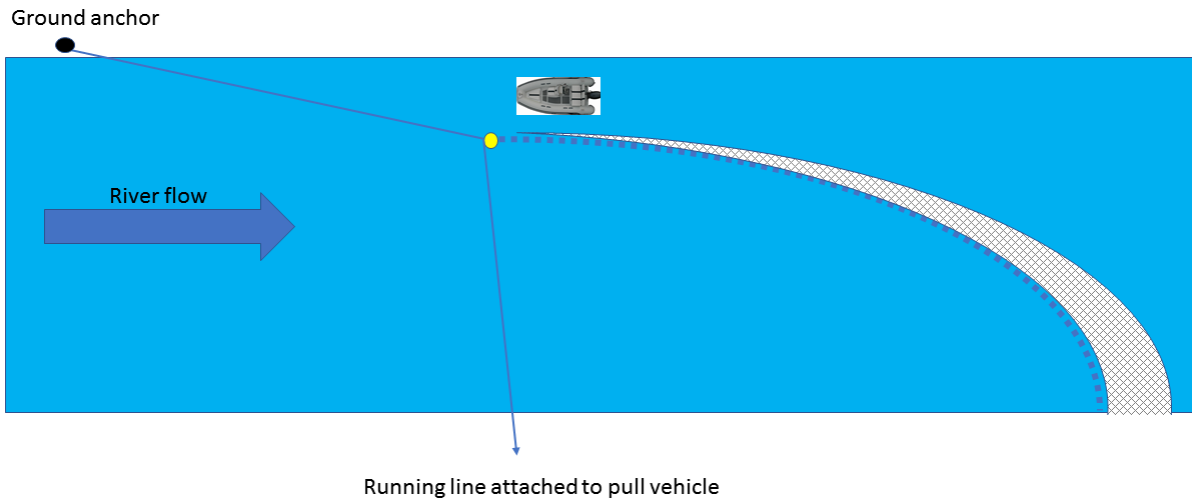


Figure 5. Plan view of river sweep netting operation for seals after the net has been introduced to the river and before the net is simultaneously released from the ground anchor and hauled back across the river by the pull vehicle.



Figure 6. A photograph of sweep net operation at the stage depicted in Figure 5, viewed from the pull vehicle.



Figure 7. Sweep net being hauled back across river, viewed from the ground anchor (opposite bank to pull vehicle).

In October 2017, the netting method was tested on five days with one sweep each day, which allowed the method to be refined and tested in a range of different river levels. During this time, Pv018D was observed traveling down river in the morning before the setup had been completed. Once the setup procedure had been established and staff familiarised with the process another sweep netting trip took place in December. Pv018D was identified and the net introduced to the water on two mornings. Unfortunately, on each occasion the net broke with the force of water and, with river levels rising, further attempts were abandoned. A reinforcing line was added to the net and a third field trip took place in January 2018 when one capture attempt was made. Pv018D was not identified and, furthermore, the river level was too low and slow flowing for this net design to be effective. The heavy lead line requires strong flow to ensure that the net is swept onto the river bank and the seal does not have the opportunity to escape from the net. The following day river levels rose to spate levels and the trip was abandoned. Difficulties associated with changing river levels, predictability of seal presence,

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logistics of net deployment and limited personnel resources resulted in a decision to refocus catching efforts at the Donmouth haulout.

3.1.3 Baited trap

A floating seal trap was developed in 2016, but difficulties associated with finding a suitable site in the River Dee for deployment and with sourcing suitable bait (due to perceived biosecurity issues), have hindered the development of this approach. However, in February 2018 the fishery board were able to secure a number of dead salmon kelts from the river which have been permitted for use as bait and have been stored frozen.

3.1.4 Catching at haulout

Two seal catching trips have been organised to the Donmouth haulout specifically aimed at capturing Pv018D using a popup net to encircle the haulout. The net was triggered on two occasions during the first trip and was not triggered at any point during the second trip as Pv018D hauled out too late in the tidal cycle for the net to be effective. On the two occasions when the popup net was triggered, Pv018D was not captured but other harbour seals were. These seals were tagged and samples including faeces (for prey DNA analysis) and a small skin sample (for genotyping) taken. Furthermore, thirteen scat samples were recovered from the haulout. The data arising from tagged seals and collected samples will contribute understanding of the feeding behaviour and natal origins of harbour seals in this area of Scotland. Further information is included in the section 'Scientific Activities'.

3.2 DSFB and salmon fishery support

During this project year support and advice in relation to seal matters has been provided to a number of DSFBs and river fisheries, including the Spey DSFB, Dee DSFB and salmonid fisheries on the River Forth, River Ythan and the North Esk. References

4 References

Harris R.N. and Northridge S.P. (2017) Seals and Wild Salmon Fisheries. *Interim report to the Scottish Government – SSI.*