

## ENGAGING THE FISHING INDUSTRY IN MARINE ENVIRONMENTAL SURVEY & MONITORING - A EUROPEAN MARITIME AND FISHERIES FUND (EMFF) PROJECT

*This three year project, ending in 2020, is commissioning fishing vessels where possible to help survey seabed habitats and species in and around Scottish Marine Protected Areas (MPAs). Data collected will be used to monitor the condition of these habitats and species, and to find out if fisheries management measures are proving effective.*



(Above) Snapshot of drop-down video camera footage in South Arran MPA showing an octopus and scallop on maerl.

### DROP-DOWN VIDEO SURVEYS TO MONITOR THE SEABED:

Video surveys of the seabed have been carried out from fishing vessels in Loch Alsh MPA and the Inner Sound, Wester Ross MPA, Small Isles MPA and South Arran MPA and surrounding waters. Refer to Pages 2 to 4.

### JUVENILE FISH ABUNDANCE:

Four surveys of juvenile fish have been completed this year using fish traps and baited cameras, with the aim of investigating habitat preferences of cod, haddock and whiting. Two surveys were in Loch Ewe (Wester Ross MPA) and two in South Arran MPA. Refer to Pages 5 and 6.

### SKATE TAGGING PROJECT:

During June and July 2018 anglers and fishers helped scientist fit acoustic tags to common skate in Loch Sunart to the Sound of Jura MPA. Acoustic moorings were also positioned in this area to receive data from the tags and track skate movement. Refer to Page 7.



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### FUTURE WORK PLANNED (IN 2019):

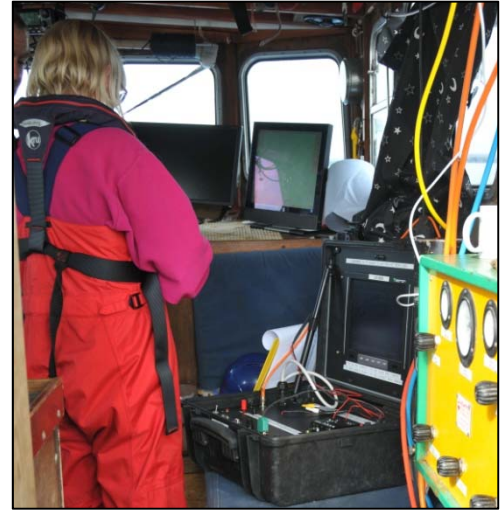
The Drop-Down Video (DDV) surveys are now complete for 2018, with more surveys planned throughout 2019. Marine Scotland will once again be inviting fishing vessels to assist with the work, and new invitations to tender will be released early in 2019. The skate tagging project will collect acoustic data from their moorings, and aim to carry out some research on the life cycle of skate by exploring possible nursery grounds. Additional juvenile fish surveys may be planned for 2019 depending on the initial findings from the 2018 surveys.

PROJECT CONTACT DETAILS: Project Management (Seascope Fisheries Research Ltd): [grant@seascopefisheries.co.uk](mailto:grant@seascopefisheries.co.uk); Marine Scotland: [lily.burke@gov.scot](mailto:lily.burke@gov.scot); Scottish Natural Heritage: [Ben.James@nature.scot](mailto:Ben.James@nature.scot); Project engagement: [marineconsulting@kylaorr.com](mailto:marineconsulting@kylaorr.com); For vessels to register an interest in the project: [Bob.McLeod@gov.scot](mailto:Bob.McLeod@gov.scot).

## DROP-DOWN VIDEO (DDV) CAMERA SURVEYS - OVERVIEW

A COLLABORATION BETWEEN MARINE SCOTLAND, SCOTTISH NATURAL HERITAGE (SNH), THE FISHING INDUSTRY, SEASCOPE FISHERIES RESEARCH LTD AND CRANGON LTD

As part of this EMFF project a new robust, drop-down video camera has been developed and commissioned, which can be deployed from a fishing vessel and is capable of filming down to 300 m. At each survey station the skipper holds vessel position while the crew lower the camera frame over the side of the vessel until it is just above the seabed. A live video stream is then transmitted up to a computer in the wheelhouse (via an 'umbilical cord'), and the skipper and winch operator can watch the screen to help them position the camera and vessel correctly (and avoid obstacles!). The vessel then drifts for about five minutes with the prevailing wind or current (<1.2 knots) while filming. The camera frame can also be 'landed' momentarily to photograph the seabed. The majority of the seabed footage is filmed using the new DDV camera, but a second smaller GoPro™ camera mounted to a sledge (owned by SNH) is also available as a back-up if there are any equipment failures. The smaller GoPro™ camera is also more suitable in very shallow water. All DDV survey footage is downloaded and saved for later analysis in 2019.



(Above) Watching the live video stream in the wheelhouse. Lisa Kamphausen © SNH



(Above) EMFF Drop down video camera being deployed.

### HOW ARE SURVEY LOCATIONS SELECTED?

Survey locations are selected by SNH considering how much information they have on a seabed habitats in each MPA, how recent that information is, and also if management of activities (such as fishing restrictions) have been introduced. Sample locations might be selected to confirm the presence of a particular habitat where existing data are sparse; to more accurately map the extent of a known habitat; or to identify new locations of habitats or Priority Marine Features (PMFs) of interest.

### WHAT HAPPENS TO THE DATA?

Once the video footage has been analysed, the data will be used for a variety of purposes depending on need. For example it might be used to monitor the condition of habitats in MPAs, to assess the effects of management measures, or to identify the distribution and extent of areas of sensitive PMFs in need of protection. All the data will be archived to national data storage systems and available for other uses.

## SUMMARY OF 2018 DROP-DOWN VIDEO SURVEYS

### LOCH ALSH MPA & INNER SOUND (16-20<sup>TH</sup> JULY)

*Survey focus: to gather footage on the location and condition of flame shell beds, burrowed mud, maerl and 'biogenic' reefs, which are created by animals such as horse mussels.*

This was the first survey of the year to test the new EMFF DDV camera, and the Lady Nicola was chartered to carry out the work along with a survey team from Seascope Fisheries Research Ltd., Crangon Ltd. and Scottish Natural Heritage. In total 76 sites were surveyed within the Loch Alsh MPA, the Inner Sound (see map below). The crew of the charter vessel had good local knowledge of the seabed and tides, which proved very helpful to the survey.

A few technical glitches were experienced with the EMFF camera (which can be expected for a first trial), so the smaller SNH GoPro<sup>™</sup> was used for the majority of the work while the other camera underwent repairs. This meant that only sites shallower than 70 m could be visited (due to the shorter length of the SNH camera 'umbilical cord').



(Above) Drop-down video stations surveyed in 2018 in Inner Sound and Loch Alsh shown by green dots.

### WESTER ROSS MPA (30<sup>TH</sup> JULY - 4<sup>TH</sup> AUGUST)

*Survey focus: to gather footage of maerl beds and northern feather stars (as well as other protected features within the MPA), and determine if there has been any change in their extent and condition since fisheries management measures were introduced. This included surveying areas previously exposed to fishing gear that is towed on the seabed.*

Footage of the seabed was collected from 130 locations (see map below) using the EMFF DDV camera deployed from a chartered fishing vessel. Strong westerly and south westerly winds (force 3-5) meant that the vessel was restricted to working in the more sheltered areas to the east of land masses and islands. At some of these sites footage was also gathered for other seabed habitats to improve knowledge of their distribution in the area. The team had originally hoped to survey some more wave exposed sites outside the MPA too as part of a 'gap filling exercise' to identify other areas with maerl beds (shallower than 35 m), but the poor weather prevented access to these areas.



(Above) Drop-down video stations surveyed in 2018 Wester Ross shown by green dots.



Three flame shells. Graham Saunders  
© SNH.



Northern feather star. Christine  
Howson © SNH.

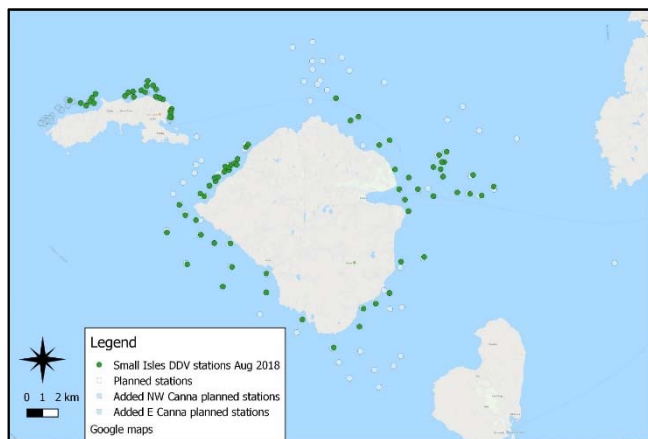


Seapen on burrowed mud. Ben James  
© SNH.

## SMALL ISLES MPA (13-17<sup>TH</sup> AUGUST)

*Survey focus: to improve our understanding of the distribution of protected features within the MPA such as northern sea fans, northern feather stars and burrowed mud habitats. The survey also included sites around Rum and Canna where there is currently little information on seabed habitats and species, and builds upon work in previous years to refine the habitat maps for the area.*

A total of 87 sites were surveyed from the chartered fishing vessel. Several sites north-east of Rum were visited to find out if northern sea fan and sponge communities were present, and some sites east of Rum were surveyed to look for fan mussel habitats. In addition, several nearshore sites were explored for maerl and flame shell beds. The monitoring team planned and selected their survey sites by combining seabed mapping data (e.g. from multibeam sonar) with existing records of habitats and species in the area (including anecdotal accounts). The video surveys were then used to confirm the presence or absence of species, as well as the area they covered. The team had planned to visit some deep water sites to test the new DDV camera at depth and to explore historical records of cold-water corals (e.g. off SE Rum), however, poor weather prevented this.



(Above) Drop down video stations surveyed in 2018 around the Small Isles (Rum and Canna) shown with green dots.



Northern sea fan. Ben James © SNH.



Maerl at Pladda-Kildonan, South Arran.  
Lisa Kamphausen © SNH.

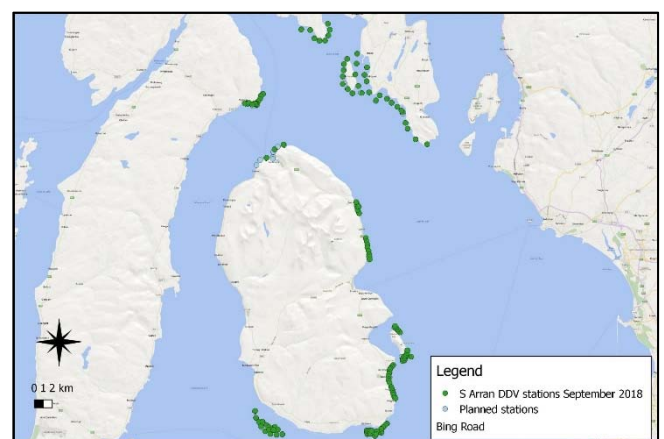


Small crab on seagrass in South Arran.  
Francis Bunker © SNH.

## SOUTH ARRAN MPA & ADJACENT WATERS (2-7<sup>TH</sup> SEPTEMBER)

*Survey focus: to monitor the condition of seabed habitats in areas formerly exposed to towed fishing gears to find out how well fisheries management measures are working. Video footage will also be used to measure the extent and status of seagrass and maerl beds, and develop an inventory of the different habitats found within and outside the South Arran MPA.*

Video footage and photographs were recorded of seabed habitats and PMFs at 134 stations in South Arran MPA and surrounding waters by a chartered fishing vessel. The week started off with fairly strong south-westerly winds and moderate swell, forcing the team to focus on sheltered sites to the east of Arran. However, the weather calmed through the week allowing the vessel to work in shallower water and more exposed areas, including around Pladda, Holy Isle, off the Iron Rock Ledges and the Inchmarnock area to the north-east of Arran. Toward the end of the week surveys were done off Skipness (Mull of Kintyre) and in Loch Ranza, but deteriorating weather and the north-westerly winds meant that the vessel could not visit all sites in this area, so the team returned south to survey the sheltered waters of Whiting Bay.



(Above) Drop down video stations surveyed in 2018 around Arran and adjacent areas shown with green dots.

## SURVEYS OF JUVENILE FISH ABUNDANCE - OVERVIEW

A COLLABORATIVE PROJECT BETWEEN MARINE SCOTLAND SCIENCE AND THE UNIVERSITY OF GLASGOW

*'Nursery areas' are habitats where young fish can find food and shelter from predators while they are growing, and are important because they influence the health of future populations of adult fish. As part of the EMFF project scientists are investigating the types of seabed habitats that are preferred by juvenile cod, haddock, whiting and other demersal fish within several MPAs.*

To carry out this research scientists have been setting fish traps and baited underwater video cameras over various habitat types within MPAs on the west coast of Scotland, and chartering fishing vessels to assist with the work, when possible.

**Fish traps:** At the start of each survey day the research team set 12 fish traps on the seabed (generally 6 fleets of 2 traps), after which they lowered a small drop-down camera to identify the type(s) of seabed that the traps were lying on. The fish traps were then left for around six hours each day before they were collected and emptied. All the gadoid fish such as cod, haddock and whiting that were younger than 1 year old were recorded and preserved, and all other fish were identified and measured before they were returned to the sea. Any invertebrates caught in the traps were also counted. Staff from the Marine Scotland Science Laboratory in Aberdeen, in conjunction with a University of Glasgow PhD student, will use the otoliths (ear bones) from the sampled juvenile fish to determine their age by counting the daily growth increments. These data will be used to infer growth rates and survivability of juvenile fish caught over different habitat types sampled within and outside the MPA.

**Baited underwater cameras:** "Stereo Baited Remote Underwater Video Camera (SBRUV)" frames were used during each survey to measure fish abundance and length frequency over different habitat types. Bait was attached and the frames were lowered to the seabed, where high definition video footage was recorded for about 1.5 hours per site.

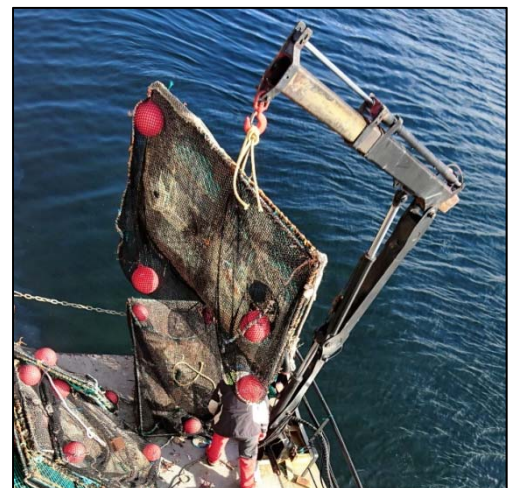


(Above) Snapshot of footage from baited camera. © John Clarke / Marine Scotland.



Juvenile *Pollachius pollachius* (Pollack) swimming over maerl. Graham Saunders © SNH.

*Demersal fish such as cod, haddock and whiting spend the early stages of their life-cycle in the water column, but as the larvae grow they start to settle on the seabed, where they develop into adults. This transition to seabed habitats is critical, and the growth and survival of young fish in their inshore 'nursery areas' helps build and sustain healthy populations of adult fish.*



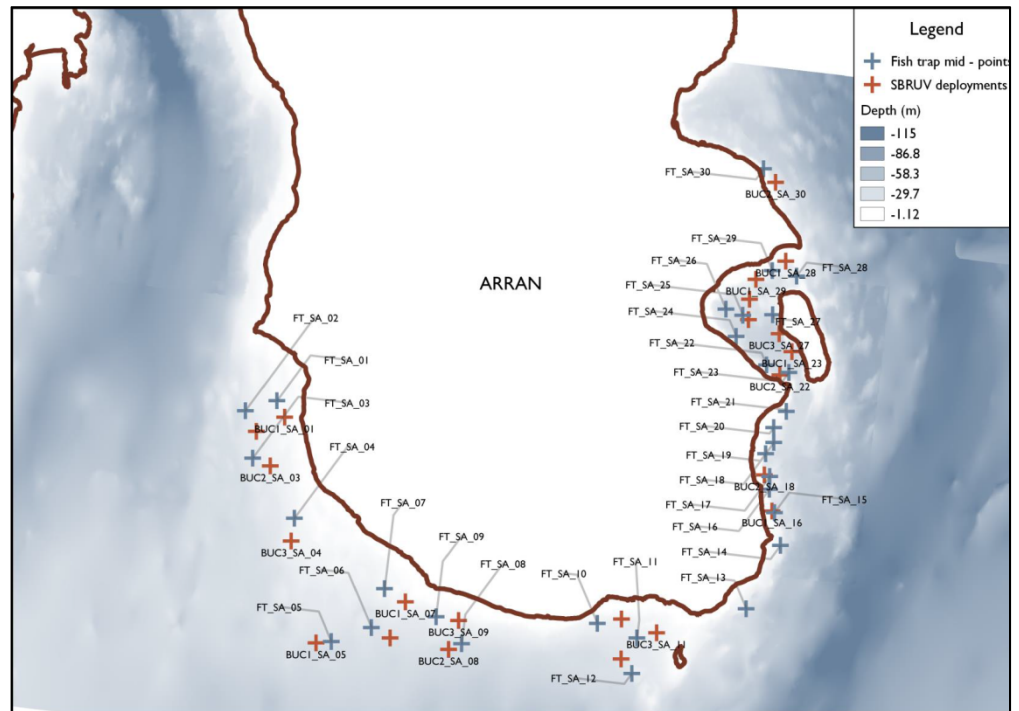
(Above) Fish traps being offloaded from vessel. © John Clarke / Marine Scotland.

## 2018 JUVENILE FISH SURVEYS

Four surveys took place in 2018, two around the South Arran MPA and two in the Wester Ross MPA (Loch Ewe). The fish samples from these surveys and the video footage are still being analysed, and an update on the results will be provided at a later date. These surveys build on similar work carried out within and around the South Arran and Small Isles MPAs in 2017.

### SOUTH ARRAN:

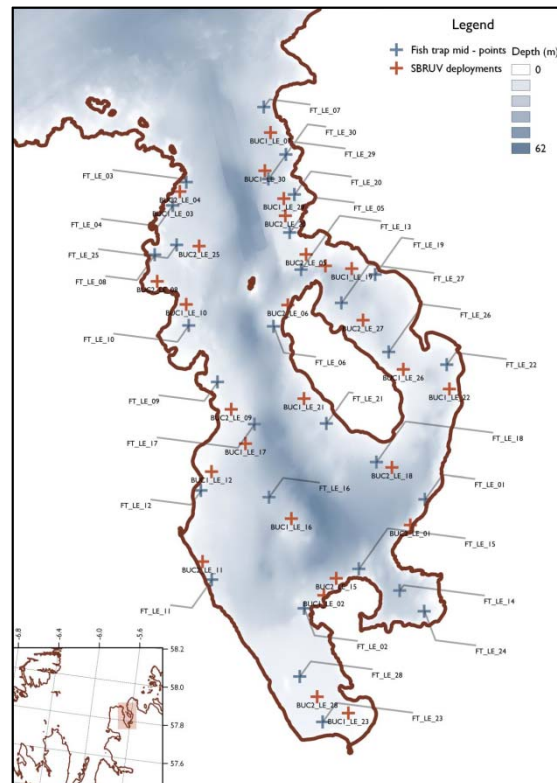
Sites surveyed for juvenile fish around South Arran are shown in the map (right). The two surveys took place from 15 - 20th July, and 2nd - 7th September 2018 using a charter vessel. Fish traps were set and recovered each day, sampling a total of 30 locations. The underwater baited cameras recorded 23 hours 19 minutes of video footage across 15 sites (approximately 1.5 hours per site).



(Above) Map showing position of fish traps and baited underwater cameras around South Arran © Marine Scotland.

### LOCH EWE, WESTER ROSS:

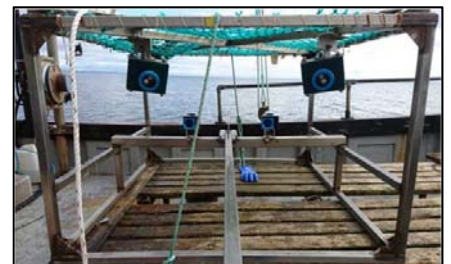
Loch Ewe was surveyed for juvenile fish twice this year (22<sup>nd</sup> - 27<sup>th</sup> July with a repeat visit from 17-23<sup>rd</sup> Sept). Sites surveyed for juvenile fish during both trips are shown in the map (right). The traps and baited cameras were deployed from a chartered vessel working out of Aultbea. The fish traps were set and recovered at different sites each day (total 28 sites), and the baited underwater cameras recorded a total of 60 hours 36 minutes of video across 27 sites (approximately 1.5 - 2.5 hours per site).



(Left) Position of fish traps and baited underwater cameras in Loch Ewe © Marine Scotland.



(Above) Fish traps ready to deploy © John Clarke / Marine Scotland.



(Above) Frame of Stereo Baited Remote Underwater Video Camera (SBRUV), showing the 2 cameras.

## SKATE TAGGING - LOCH SUNART TO SOUND OF JURA MPA

RESEARCH LEAD BY POST DOCTORAL FELLOW AT THE UNIVERSITY OF ST. ANDREWS (JAMES THORBURN), IN COLLABORATION WITH SCOTTISH NATURAL HERITAGE AND MARINE SCOTLAND

*Flapper skate (a sub species of common skate) were once found around the coast of Britain but their population has reduced greatly and they were the first marine species to be declared locally extinct in some parts of the UK. However, the area from Loch Sunart to the Sound of Jura is still home to a good number of flapper skate, and was designated as an MPA in 2014 for their protection. This study is tracking skate movement (with acoustic tags) to learn how they use different habitats in the MPA, and whether the area is an important skate breeding ground.*

**Skate tagging:** In order to monitor the long term movement of skate in the MPA individuals are tagged with acoustic transmitters, which report the location of the skate (every 3 minutes) for up to 10 years. The data is then logged by acoustic 'receivers' that have been moored on the seabed, and can be retrieved by scientists periodically. This acoustic data will allow scientists to track the behaviour of skate in relation to different habitats within the MPA over a long time period.

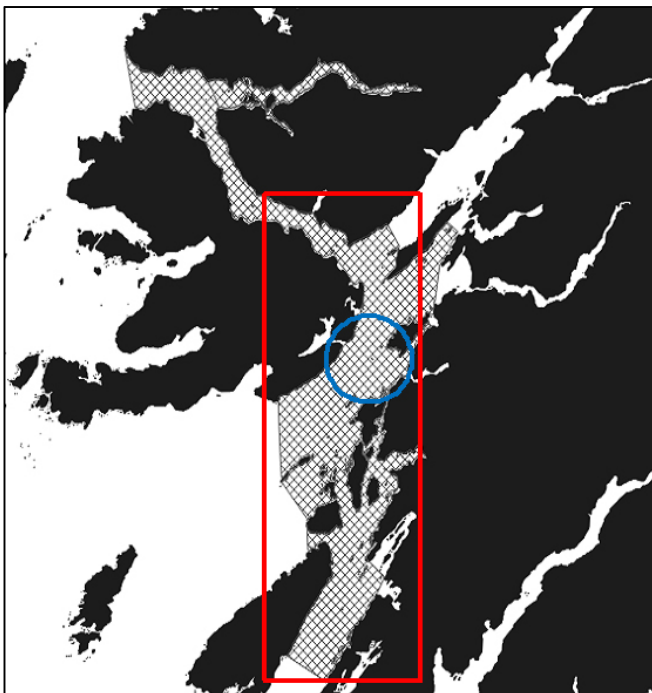


(Above) Skate being measured ©James Thorburn

In July a charter vessel helped scientists catch and tag ten skate within the MPA using single lines with barbless hooks. Once on deck the skate were measured and had their weight estimated. The heaviest skate was an impressive 95kg and the smallest was about 31kg. Each animal was then given a local anaesthetic before the tags were fitted, after which they were released.

Most of the tagged skate were males, however, the ratio of males and females in the area changes over the course of a year due to events in their life cycle, such as mating and laying eggs. In an effort to tag more females other trips are planned throughout next year.

The first set of acoustic receivers were successfully moored to the seabed by a survey vessel (9-11<sup>th</sup> July). The moorings are not visible from the surface, but the survey vessel can trigger the units to float to the surface by remotely activating the 'acoustic release'. The moorings will be lifted this way every six months to download the data for analysis.



(Above) Map of the study site. Black hashed area shows the current extent of the Loch Sunart to the Sound of Jura MPA, the red box shows the area covered by acoustic receivers and the blue circle shows where the tagging has already occurred.

*Flapper skate are the largest species of Skate in the world. They grow and mature very slowly, and can measure over 3 m long and weigh upwards of 100kg. The long time it takes for the skate to reach maturity makes them very vulnerable, and commercial fishing and landing of flapper skate was made illegal in Scotland in 2009 to protect them from further decline.*

