

ENGAGING THE FISHING INDUSTRY IN MARINE ENVIRONMENTAL SURVEY & MONITORING

FUNDED BY THE EUROPEAN MARITIME AND FISHERIES FUND

As part of this EMFF project two juvenile fish surveys were completed in Loch Ewe, Wester Ross Marine Protected Area (MPA) during the summer of 2019, building on similar work carried out in 2017 and 2018. Monitoring of flapper skate also continued within the Loch Sunart to the Sound of Jura MPA. The skate, which are fitted with acoustic tags, have been transmitting their location to acoustic moorings on the seabed. The moorings were retrieved and re-deployed twice during 2019 to download the data on skate movement within the MPA. The data from these two separate projects will be analysed throughout 2020.

(Figure 1): Flapper skate attracted to baited underwater camera, Loch Ewe.

SURVEYS OF JUVENILE FISH ABUNDANCE – LOCH EWE, WESTER ROSS MPA 2019

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

Ever wondered where young fish live? We know that many juvenile fish use Scotland's sea lochs as 'nursery areas' to shelter from predators and find food while they grow into adults. But now researchers are trying to identify if there are any specific seabed habitats that the young fish prefer. Over the last three years scientists from Marine Scotland Science and the University of Glasgow have placed baited fish 'traps' over different types of seabed on the west coast of Scotland to capture juvenile fish. They also used baited underwater systems fitted with stereo cameras (Stereo Baited Underwater Video - SBRUV) to film the fish on the seabed and record their size and abundance. The main species they are interested in are juvenile 'whitefish' such as cod, haddock, whiting and saithe, which are all commercially important for Scotland's fisheries. This year a local vessel (Walrus) was chartered to carry-out two juvenile fish surveys in Loch Ewe, within the Wester Ross MPA (during July and September). This work builds on previous surveys that were carried out in the South Arran MPA (2017 and 2018), the Small Isles MPA (2017) and within Loch Ewe in 2018.



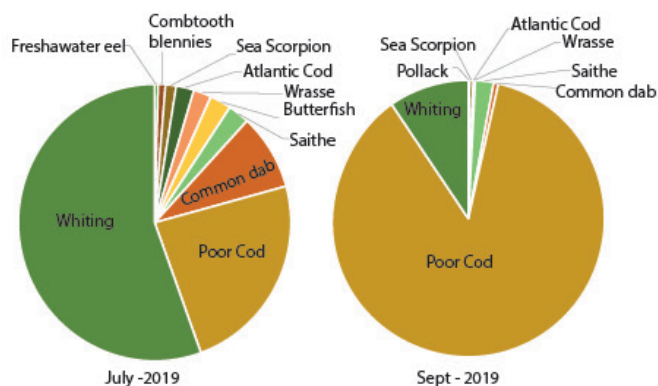
(Figure 2): Juvenile poor cod. Graham Saunders © Marine Scotland.

During both surveys in 2019 baited fish traps were set on the seabed at 30 locations within Loch Ewe during the daytime (see Map 1), and were left for about six hours to attract fish before they were collected and emptied. All juvenile fish were then identified back at the laboratory. A drop-down camera was lowered to the seabed next to the fish traps to record the habitat type where the fish were captured. In addition, SBRUVs were deployed in 30 different locations within Loch Ewe, and a minimum of 1.5 hours of high definition video footage was recorded per site. The team also went rod-and-line fishing within the kelp beds of Slaggan Bay (just outside Loch Ewe) to capture live adult fish for behaviour studies. This was successful, and several medium to large-sized pollack and saithe were kept alive and taken back to the laboratory aquarium for the SMARTFISH H2020 project (<http://smartfishh2020.eu/about-smartfishh2020/>).



FISH TRAP SURVEY RESULTS:

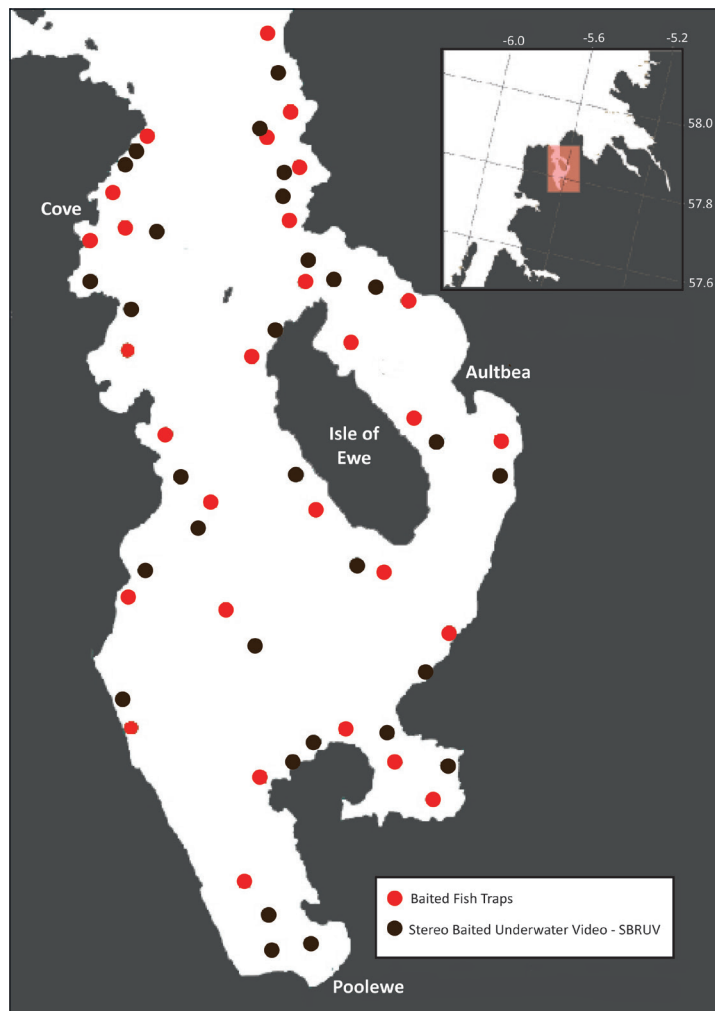
In total 12 species of fish were recorded during both surveys, and whiting and poor cod were by far the most numerous (see figure 3). In July 2019, 236 fish were caught in the baited traps over the course of a week, about half of which were whiting (56%), and a quarter were poor cod (24%). During the second survey in September a total of 1239 individual fish were caught; this surge in numbers was driven by a 20-fold increase in poor cod which accounted for 87% of the catch (Table 1). Saithe and Atlantic cod made up less than 3% of the fish caught during both surveys, and no juvenile haddock were found in the traps. Other juvenile fish captured in the traps in small numbers (<3% catch) included pollack, bull rout (sea scorpion), butterfish, blennies, common dab, turbot, a freshwater eel, and goldsinny wrasse. Two dogfish were also recorded. A large number of crabs also found their way into the traps (mainly shore crabs and harbour crabs).



(Figure 3): Percentage composition of fish species caught in baited traps within Loch Ewe in July (top) and September (bottom) 2019.

Table 1: Total fish caught in baited traps in Loch Ewe during July and Sept 2019 (60 traps set each survey)

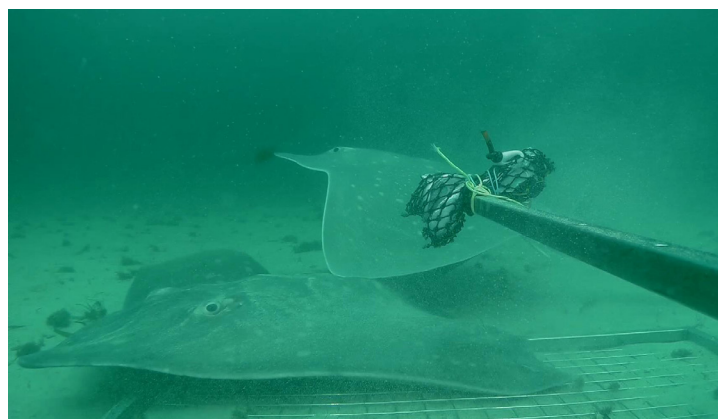
Species	Abundance July	Abundance Sept
Poor cod	56	1077
Whiting	131	118
Saithe	6	27
Common dab	21	7
Sea scorpion	3	5
Atlantic cod	5	2
Turbot	0	1
Pollack	0	1
Goldsinny wrasse	5	1
Freshwater eel	1	0
Combtooth blennies	2	0
Butterfish	6	0
Total	236	1239



(Map 1): 2019 fish trap and SBRUV survey locations within Loch Ewe.

SBRUV SURVEY RESULTS:

The Stereo Baited Underwater Video (SBRUV) filmed a total of 54 hours 55 minutes & 50 hours 28 minutes of high-definition footage in July and September respectively. The team were pleased to see two flapper skate visiting the baited cameras (figures 1 and 4). These skate were once common on the west coast of Scotland but populations have declined dramatically during the second half of the 20th century (see information box on page 3). The underwater video footage is currently being analysed.



(Figure 4): Two Flapper skate, *Dipturus intermedius*, visiting baited underwater camera in Loch Ewe.

SKATE TAGGING PROJECT – LOCH SUNART TO SOUND OF JURA MPA

RESEARCH LED BY POST-DOCTORAL FELLOW AT THE UNIVERSITY OF ST. ANDREWS (JAMES THORBURN), WITH FUNDING FROM SCOTTISH NATURAL HERITAGE AND MARINE SCOTLAND.



The main aim of this project is to determine how long individual skate remain within the Loch Sunart to the Sound of Jura MPA over a period of time. Individual flapper skate were tagged with acoustic transmitters and a network of acoustic receiver-units were deployed in ten locations within the MPA at depths ranging from 80m to 200m (see Map 2). The tags each transmit a unique identification, which are logged by the receivers if the fish swim within 500m of the units.

The acoustic receivers form an array which will be in place for several years. They were retrieved and redeployed twice during 2019 (in February and September) in order to download data. In order to retrieve the units from the seabed the charter vessel (Lady Nicola) remotely triggered the acoustic receivers to float to the surface by pinging an 'acoustic release' signal to the units. Once the units surfaced, they were hauled aboard the vessel and serviced (battery changed and data downloaded) before being re-deployed to the seabed (Figure 5).

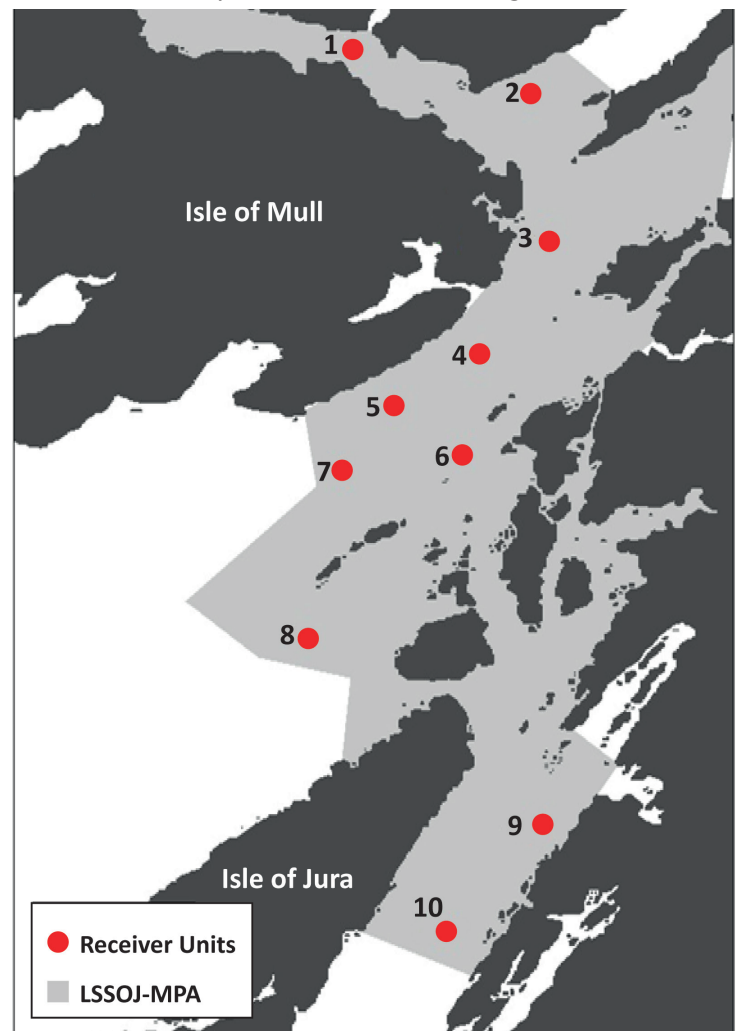
This setup of acoustic transmitters and receivers is capable of gathering data on skate locations within the MPA for up to ten years, and will contribute to long-term monitoring of the species. This work is happening alongside other research that uses photo-identification to document the distribution and abundance of individual flapper skate around the Scottish coastline (see <https://skatespotter.sams.ac.uk/>).

Information Box: *Flapper skate, *Dipturus intermedius* (also known as common skate), are the largest species of skate in Europe. Often growing to more than 100kg, these once-common giants have been reported as 'locally extinct' in many areas where they previously occurred. However, the Loch Sunart to the Sound of Jura MPA is one of the few locations in Scottish waters that still supports healthy populations of this skate. This MPA was designated in 2015 to protect the resident flapper skate population, and researchers have since been investigating how long the skate stay in the MPA and why they aggregate in this particular area.*

In Scotland, flapper skate are a Priority Marine Feature (PMF), which means they receive special protection in Scottish waters. In addition, it is illegal for fishing vessels and anglers to land the species.



(Figure 5): Downloading data from the acoustic receiver. Photo credit: Andy Holbrow, Atlantic Diving Services Ltd.



(Map 2): Location of acoustic receiver units in the Loch Sunart to the Sound of Jura MPA.