



Home Office

NON-TECHNICAL SUMMARY

Fish tracking in the Bristol channel

Project duration

5 years 0 months

Project purpose

- (a) Basic research
- (d) Protection of the natural environment in the interests of the health or welfare of man or animals
- (e) Research aimed at preserving the species of animal subjected to regulated procedures as part of the programme of work

Key words

Rays, spurdog, herring, Bass, Acoustic tags, Marine distribution, Marine development, Marine Protected Area

Animal types

Life stages

Atlantic herring

Adult

Spurdog

Adult

European Seabass

Adult

Rays

Adult

Retrospective assessment

The Secretary of State has determined that a retrospective assessment of this licence is not required.

Objectives and benefits

Description of the projects objectives, for example the scientific unknowns or clinical or scientific needs it's addressing.

What's the aim of this project?

The overall aim of this work is to collect data on data poor and commercially exploited species (4 species of ray, Spurdog, European bass and Atlantic herring), to assess migration patterns, survival, and seasonal residence in the Bristol Channel area. To do this we propose to tag the fish with acoustic pinger tags and follow their movements for one or more years with a tracking network of approximately 100 passive acoustic receivers distributed throughout the Bristol Channel. The project will build on our existing Bristol channel passive acoustic receiver array which has already been used to successfully track multiple species, including sea trout, Atlantic salmon and twaite shad.

Potential benefits likely to derive from the project, for example how science might be advanced or how humans, animals or the environment might benefit - these could be short-term benefits within the duration of the project or long-term benefits that accrue after the project has finished.

Why is it important to undertake this work?

The project aims to provide data for a number of data poor species (elasmobranchs, Atlantic herring, European bass) which will contribute to future management plans and associated management measures, understanding of stock identity and migration patterns, and inform regulatory assessment of major marine developments. Target species comprise both recreationally and commercially exploited species including elasmobranchs (Spurdog, Thornback ray, Spotted Ray, Blonde ray and Small eyed ray), European Bass and Atlantic herring. The lack of data on marine migration and distribution of these species and hence potential impact of policy measures and developments, has impaired the ability of policy makers and developers to assess impacts and propose suitable mitigation, compromising marine licence applications and potentially putting the fish populations at risk.

The work will provide evidence to support policy developments including identification of key areas for protection measures and quota setting. It will also provide evidence for impact assessments; the abstraction being built for Hinkley point C, and proposed tidal lagoons in Swansea Bay and elsewhere in the Bristol Channel are major developments where this work has significant current application.

The project will also collect and supply data to other researchers tagging fish in the Bristol channel and surrounding area.

What outputs do you think you will see at the end of this project?

1. Quantitative data on distribution and residence times of tagged species in key 'hotspot areas'
2. Qualitative data on coastal distribution and migration paths in the wider Bristol Channel area.
3. Marine survival rates.
4. Comparison of similarities and differences in migration patterns between species; predator prey associations.
5. Project report(s) and publications on all species

Who or what will benefit from these outputs, and how?

The project will provide evidence which will have long term benefits to policy makers and regulators by identifying marine areas / habitat of particular importance to commercially and recreationally exploited species. This is important in the development of both marine protected areas and quota setting. Additionally support for Marine Renewable Energy (MRE) development is an important element of Welsh Government policy. However lack of data on key marine species is recognised as a strategic information gap for Marine Renewable energy (see for example ref 1 below), and other developments such as major abstractions for power generation, by both regulators and industry .

Developers, regulators and policy makers will be provided with valuable data as the study progresses. Information specific to the area will benefit local regulation (Natural Resources Wales, Natural England, Environment Agency) and inform evaluation of current and future development proposals as well as aiding understanding of the effectiveness of the MPA. The information will therefore provide both short and long term value. Results describing migration and behaviour patterns in inshore areas will have wider utility and will benefit assessments by regulators elsewhere in the UK (Environment agency, Marine Management Organisation, Natural England and Marine Scotland). The value regulators place on this data is reflected in financial commitments (tag and receiver purchase) to help support the work.

1. Marine Energy Wales. Tidal range: Critical Evidence gaps and how to address them. Workshop report, March 2022.
<http://www.orjip.org.uk/sites/default/files/u53/ORJIP%20OE%20MEW%20Tidal%20Range%20Workshop%202022%20V1.pdf>

How will you look to maximise the outputs of this work?

The project is collaborative with regulators, charter vessels and local fishermen. We are already working closely and collaborating with Natural Resources Wales, Natural England, Environment Agency, and the Devon and Severn IFCA, as well as local fishery interests.

Information will be shared with all the partners through regular update meetings with data presentations (at least 2 per year), and the production of interim project reports (which partners will be consulted upon and which will be published on one or more partner websites). A final project report will be published and made publicly available (see above). The more important results will be published in peer reviewed journals. We would also expect to provide information regularly during the course of the

project to the wider scientific and development community through conference papers and peer reviewed publications.

Species and numbers of animals expected to be used

- Other fish:
 - Rays: 300
 - Atlantic herring: 300
 - Spurdog: 150
 - European Seabass: 200

Predicted harms

Typical procedures done to animals, for example injections or surgical procedures, including duration of the experiment and number of procedures.

Explain why you are using these types of animals and your choice of life stages.

All the species selected are data poor / commercially exploited species, which are important to both commercial and charter fishers in the Bristol channel. Very little is known about their distribution / migration paths within the Bristol Channel, limiting the ability of policy makers and regulators to formulate appropriate fishery management measures, or to assess impacts of major developments.

We are looking at adults because they are the commercially exploited stage and because they are the most valuable life stage for future reproduction and spawning.

Typically, what will be done to an animal used in your project?

Fish will be captured using rod and line or netting / research trawling techniques. Methods used will minimise the risk of damage during capture.

They will be anaesthetised and tagged with an acoustic tag through an incision approximately 1cm long (or less). The incision will be closed with a dissolvable suture and covered with a suitable covering to provide a waterproofing barrier to protect the wound during the initial stages of healing. They may also be tagged with an external marker (floy) tag. Analgesia will be applied as appropriate.

After recovery from anaesthesia they will then be released to continue normal lives.

What are the expected impacts and/or adverse effects for the animals during your project?

Experience has shown that fish rapidly recover from anaesthesia and surgery and are not expected to suffer any lasting long term harm as a result of the procedures under this protocol being carried out.

The procedures carried out in these protocols will be done under general anaesthetic (with the exception of the ray species) and therefore fish will be subjected to no more than mild stress as a

result of capture and handling. There may be some mild post-operative discomfort, but experience of staff carrying out the work will ensure that fish are only released when they are recovered and able to swim actively.

Expected severity categories and the proportion of animals in each category, per species.

What are the expected severities and the proportion of animals in each category (per animal type)?

We expect the severity to be moderate for Spurdog, herring and European Bass which will undergo anaesthesia and surgical procedures for coleomic insertion. For ray species we expect the effect to be mild. The tag will be externally attached to a Petersen disc. These are attached by passing a stainless steel wire through the wing which will be a rapid and relatively minor process, without the need for anaesthesia and any associated effects. The tagging approach is intended to minimise discomfort or damage to the fish.

What will happen to animals used in this project?

- Set free

Replacement

State what non-animal alternatives are available in this field, which alternatives you have considered and why they cannot be used for this purpose.

Why do you need to use animals to achieve the aim of your project?

The project aims to look at the behaviour and distribution of elasmobranchs (Spurdog, Thornback ray, Spotted Ray, Blonde ray and Small eyed ray), Atlantic herring and European sea bass, in the wild, alongside anadromous species (salmon sea trout and twaite shad (ongoing work, already licenced)) in order to gain information to inform our understanding of multi species habitat use and seasonal distribution in the Bristol channel area. This will inform the development of fishery management policy and management measures, as well as informing impact assessments of specific development areas. There are no practical alternatives to generate this data.

Which non-animal alternatives did you consider for use in this project?

Movement and behavioural modelling has already been used for some of this work. However all such work has to be grounded in real observed data to demonstrate that the assumptions underlying the models are realistic.

Why were they not suitable?

The use of models to predict impacts requires real data to demonstrate that the assumptions underpinning the model and the predictions are realistic. Our work to date has already demonstrated

that for existing assessments (eg twaite shad presence), without validation by real data, such models may be grossly flawed. This can have important ecological implications for the species as well as significant economic implications for fishers and developers.

Reduction

Explain how the numbers of animals for this project were determined. Describe steps that have been taken to reduce animal numbers, and principles used to design studies. Describe practices that are used throughout the project to minimise numbers consistent with scientific objectives, if any. These may include e.g. pilot studies, computer modelling, sharing of tissue and reuse.

How have you estimated the numbers of animals you will use?

We need to use sufficient fish to provide robust estimates of marine distribution to inform models which can then be used to predict impacts without the requirement for further experiments using live fish. We have drawn on a combination of movement data from our existing studies of twaite shad and sea trout, as well as literature studies on similar species, to inform our sample sizes.

What steps did you take during the experimental design phase to reduce the number of animals being used in this project?

We have used information from studies of similar species to set initial samples sizes. We are planning to use an adaptive experimental design which will be updated on an annual basis to determine numbers deployed in each year enabling the number actually tagged to be the minimum necessary to achieve the objectives of the study. In year 1 up to 200 ray (from 4 species), 100 spurdog, 100 European sea bass and 100 herring will be tagged. We expect to get multi year data from many of the fish.

What measures, apart from good experimental design, will you use to optimise the number of animals you plan to use in your project?

Ongoing review of data, developing computer models which can be used in subsequent studies to reduce requirements for similar work.

Refinement

Give examples of the specific measures (e.g., increased monitoring, post-operative care, pain management, training of animals) to be taken, in relation to the procedures, to minimise welfare costs (harms) to the animals. Describe the mechanisms in place to take up emerging refinement techniques during the lifetime of the project.

Which animal models and methods will you use during this project? Explain why these models and methods cause the least pain, suffering, distress, or lasting harm to the animals.

The capture and tagging methods we are using with acoustic tags are well established, and are designed to allow the fish to return as rapidly as possible to normal behaviour with minimal long term effects.

Why can't you use animals that are less sentient?

Our objective is to observe and understand the behaviour and distribution of the fish under natural conditions at sea. This cannot be achieved by other means.

How will you refine the procedures you're using to minimise the welfare costs (harms) for the animals?

Choice of tags

We are using the smallest tags available consistent with the objectives of the project, including tag life and tracking in the marine environment. The tags we are using are specifically designed by suppliers (Innovasea or Thelma biotek) for work with the species and life stages we are using. They are tough and smooth to minimise any issues if ingested by a predator.

Tagging and recovery procedures

The anaesthesia techniques we are using are well established. Aseptic surgery techniques and single use scalpel blades and suture needles will minimise risk of infections.

Each incision will be covered with a suitable gel to provide a waterproofing barrier to protect the wound during the initial stages of healing. Sutures will be checked prior to transfer into recovery and holding tanks. Analgesia will be applied as appropriate.

Fish will be recovered and will not be released until they are capable of holding station and swimming against the current.

All procedures will only be performed by suitable trained and qualified individuals (ie PIL holder; training and competency records will be kept by the NTCO).

For the ray species we have considered the options of internal tagging and external tagging. Both approaches will require fitting a Petersen disc in the wing (for internal tagging an external mark will still be needed to ensure commercially caught fish do not enter the human food chain during the anaesthetic withdrawal period. The external mark will also enable reporting of commercial captures). As a Petersen disc will be required in both circumstances, and can provide an effective external attachment point for the tags, we have opted for external tagging of these species.

Humane end-points and limits of severity

If internal damage to organs were to occur during surgery, the fish would not be allowed to recover and would be euthanized by a schedule 1 method.

If fish fail to recover from anaesthesia they will be euthanized by a schedule 1 method

What published best practice guidance will you follow to ensure experiments are conducted in the most refined way?

There are a number of published studies using these tags and techniques. However methods evolve continuously and we continue to share experience with others to develop best practice through conferences and direct conversations with other groups, including NRW, Hull International Fisheries Institute, Plymouth University, the Atlantic Salmon Trust, and the Game Conservancy Trust. All the above are undertaking current licenced work with these species and our approach and protocols seek to take the best from each, consistent with our objectives.

How will you stay informed about advances in the 3Rs, and implement these advances effectively, during the project?

We will continually review the literature. We will attend conferences, and continue to network with others to share and learn from further developments, both as research understanding of the field develops and to improve our tagging methods to minimise any potential adverse effects. Where appropriate we will update our protocols and methods.