



Discovery through dissection - an opportunity for sharks, skates & rays in the Celtic Sea Ecoregion

Strandings of elasmobranchs (sharks, skates and rays) occur around the UK and Irish coastline. Very little is known about the causes of these strandings, so if the individual dies after stranding or washes up on the coast dead, it's really important to take each opportunity to investigate the potential causes of death and better understand biology and ecology.

The [Cetacean Stranding Investigation Programme \(CSIP\)](#) has coordinated the investigation of cetacean strandings around the UK coast since 1990, with huge advances made in understanding the cause of these phenomena, as [outlined here](#). Large-bodied elasmobranchs were added to the CSIP remit in 2017, following the inclusion of basking sharks in 2007, to replicate the work done with cetaceans to provide valuable information about these mysterious and in some cases, rare elasmobranchs. It is unfortunate that strandings occur, but by following the CSIP approach, we can ensure the best scientific data is gathered from these events, to better understand and safeguard the future of these species.

What information can be gathered?

Stranded animals can provide an accurate picture of which species are found living in UK and Irish waters and can show local and seasonal distribution. Data gathered through post-mortem examinations and the further analysis of collected samples allow us to determine the possible causes of death and general health of the individual, including information on disease and contaminants. This provides us with valuable data, and in some cases can help detect outbreaks of disease or unusual increases in mortality, giving us an idea of the general health of the wider populations living around our coasts. They can also give us insight into the lives of these marine animals, such as their diet, reproductive patterns, population structure and connectivity to other populations.



Angelshark (*Squatina squatina*) dissected at Aberystwyth University School of Veterinary Science (ASVS).

Why is collaboration important?

[Project SIARC](#) (Sharks Inspiring Action and Research with Communities) and [Angel Shark Project: Wales](#) are community-led projects that work with fishers, citizen scientists, researchers, local communities and government to better understand and safeguard sharks, skates and rays in Wales. To date, most of this work has focused on the Critically Endangered [Angelshark \(*Squatina squatina*\)](#), which is found only in limited locations around the UK and Ireland, with hotspots identified around the coast of Wales and in Tralee Bay in Ireland. Very little is known about Angelshark biology and ecology – a flat shark that spends the majority of its time buried under sediment on the seabed. We only have a few data points to estimate how long they live for, how many pups they give birth to and how far they are likely to move.

Through the relationships built by Project SIARC and Angel Shark Project: Wales, the team were notified of five dead Angelsharks between November 2020 and June 2022. Three of the Angelsharks were found dead on the Welsh Coastline by beach walkers from the local community – luckily those who came across the individuals were able to correctly identify the species and contacted the team about their rare findings. The animals were then collected, with the help of local fishers, Natural Resources Wales (NRW) and the CSIP team based in Wales, before being stored in freezers to enable dissections to occur once Covid-19 restrictions had eased.



Angelshark (*Squatina squatina*) dissected at University College Dublin Veterinary Hospital (UCDVH).

Angelsharks are a protected species, which means it's illegal to target, retain, injure, kill or land Angelsharks around UK and EU waters. This can make it difficult for fishers if one is accidentally caught as bycatch during their fishing activity. Fishers are actively supporting the project by following [best practice guidance to safely release Angelsharks if accidentally caught](#). However, there are some extremely rare cases where the Angelshark is dead when it arrives to the boat. This happened to a fisher operating in the Irish Sea, who quickly contacted colleagues at the Irish Elasmobranch Group (IEG) and Inland Fisheries Ireland (IFI) to ask what to do, as they knew it was a rare species in the region. These groups contacted the Sea Fisheries Protection Authority (SFPA), who issued a special dispensation to land the individuals for scientific purposes.

It is only in rare cases that Angelsharks are accidentally caught around our coasts, but by working closely with recreational, commercial and charter boats in the region we are able to gather vital data to better understand one of the rarest species of shark in Europe. A [recent paper](#) highlights the importance of this collaboration, and uses fisher-data to investigate the distribution, ecology, and habitat use of Angelsharks in coastal waters of Wales and the central Irish Sea. Information like this will help towards the conservation of this enigmatic species.

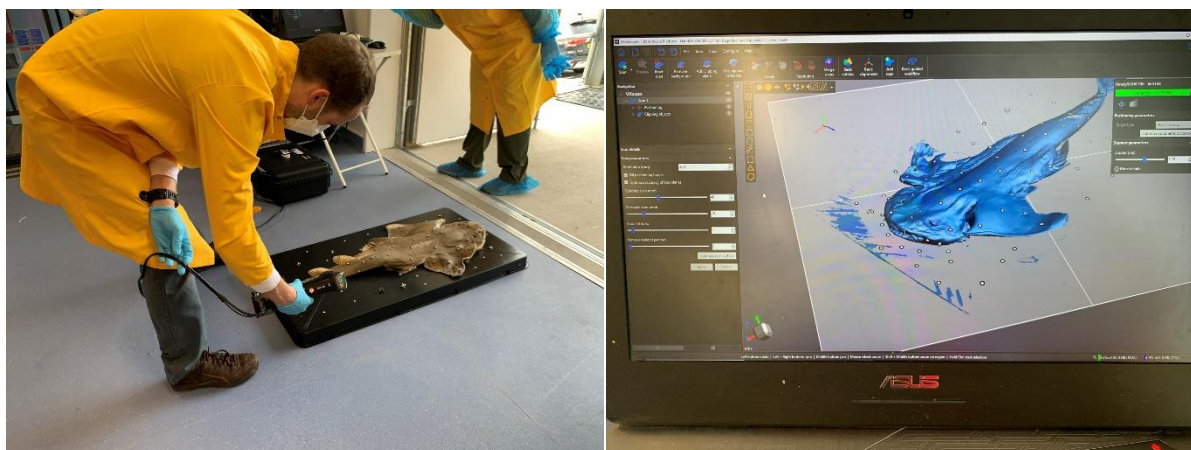
How are the dissections conducted?

In collaboration with CSIP, Aberystwyth School of Veterinary Science (ASVS) and University College Dublin Veterinary Hospital (UCDVH), Project SIARC were able to conduct two sets of #CSlofTheSea examinations of these five Angelsharks, one set in Wales and one in Ireland. The dissections followed a scientific protocol developed by the Angel Shark Project, using advice from Cefas and taken from literature review of papers published on Angelshark morphology. Ensuring that data is collected in a standardised way is hugely important to allow further comparison of samples from across the Angelsharks' range.



#CSlofTheSea Angelshark examination being conducted at Aberystwyth University School of Veterinary Science and University College Dublin Veterinary Hospital (UCDVH).

The first set of #CSlofTheSea examinations were conducted on the two sharks that washed up on the Welsh coast. Unfortunately, one of the sharks was heavily degraded, so a thorough examination was not possible. The other shark, found in Cardigan Bay, North Wales, was identified as an adult female. Before starting the examination, Swansea University carried out 3D scanning on the shark, something that has never before been tested on this species. The team managed to get a perfect render of the shark, which has been used by schools across Carmarthenshire to 3D print Angelsharks and other elasmobranchs as part of the Project SIARC school engagement initiative.



3D scanning of an Angelshark being conducted at Aberystwyth University School of Veterinary Science by Swansea University.

The second set of #CSlofTheSea examinations were conducted on the two sharks from the Irish Sea. One of these sharks was identified to be male, and the other female. These two specimens were nearly half the size of those dissected in Wales, and were thought to be sub-adults, a rarely seen life history stage for Angelsharks. UCDVH was also able to complete an X-ray and CT scan of the sharks, which helped provide important additional information on the internal anatomy of this species.

A final dissection of an Angelshark washed up in Tywyn, North Cardigan Bay, was completed at CSIP's base at the Zoological Society of London – so that the samples from this shark could be analysed alongside those taken from the #CSloftheSea examinations. This shark was a large adult male, the first mature male Angelshark dissected by the team.

What have we found so far?

An examination report for the Welsh female shark brought up some interesting initial insights. The stomach contained semi-digested fish bones and fish lenses as well as mud, grit, and plant matter. Four very long tapeworms were also found, though these were thought to be unlikely to cause significant disease. It was also thought that the individual was in the early stages of pregnancy, as potential ovulation sites were found on her ovaries and yolk material was also present. Further testing will be carried out to confirm this.

Overall, it was determined that the female was otherwise healthy, and had most likely become trapped and isolated in a shallow estuarine pool at low tide. CSIP will

continue to test the samples to get a better understanding of the health of the animal and cause of death.

An initial examination report will also be pulled together for the other dissected Angelsharks in the near future.

From all the individuals, a range of biological samples were taken, which will be used to better understand Angelshark biology and ecology. These included:

- Skin samples have been sent to Field Museum's Pritzker Laboratory for genetic analysis, this will allow us to better understand whether the Angelshark populations using the seas around Wales and Ireland are genetically different from those in the other parts of the Angelshark range.
- The stomachs have been sent to Cefas for stomach content analysis, to give us a better idea of Angelshark diet.
- Various samples, including muscle, liver and skin have been sent to Queen Mary University of London for stable isotope analysis, which can be used to understand what environmental conditions the Angelsharks have grown up in, trophic ecology and potential food sources.
- Liver samples have been sent to Cefas for heavy metal and contaminant analysis to investigate the effects of pollutants on these species.

What next?

The dissection events provided an incredible opportunity to both strengthen and expand current collaborations in Wales and Ireland following the Covid-19 pandemic. Project SIARC consists of a wide range of delivery and collaborative partners, who were able to meet in person for the first time for the dissection event in Wales, as well as giving an opportunity to share research techniques through the 3D scanning. In Ireland, the dissection provided the perfect opportunity to bring together those working on Angelsharks in the region, to discuss next steps and scope out possibilities for collaboration.

These events highlighted the vast number of organisations working towards the conservation of Angelsharks and other shark species across the Celtic Seas Ecoregion. Following the events, a cross-country research group has been developed to facilitate information sharing and further collaboration. Together, we hope to build the capacity for collaborative elasmobranch conservation across the region.



Attendees of the two #CSlofTheSea Angelshark examinations at Aberystwyth University School of Veterinary Science and University College Dublin Veterinary Hospital (UCDVH).

Following these dissections, the Angel Shark Project has received further funding from Shark Conservation Fund, to formalise Angel Shark Project: Ireland. The project, led by the IEG, will build on the approaches and learnings from Angel Shark Project: Wales, with the aim to safeguard Angelsharks in Ireland using fisher-generated data and stakeholder engagement. Check out our [video](#) for more information and if you have any Angelshark records in Ireland please email angelsharksireland@gmail.com.

If you come across a stranding, you can report it through CSIP by calling 0800 6520333. Additional information is also available at www.ukstrandings.org/how-to-report-a-stranding/

[Click here for more information about the dissection events.](#)

Partners involved:

Project SIARC Lead Partners:

Zoological Society of London, Natural Resources Wales

Project SIARC Steering Group:

The Project SIARC Steering Group includes the following organisations: Bangor University, North Wales Wildlife Trust, Shark Trust, Swansea University, Blue Abacus, Cefas, Cetacean Standings Investigation Programme (“CSIP”), National Waterfront Museum, On the Edge, People’s Collection Wales, Welsh Government, Welsh Federation of Sea Anglers, Welsh Fisherman’s Association, Universidad de Las Palmas de Gran Canaria and Leibniz Institute for the Analysis of Biodiversity Change

Angel Shark Project: Ireland Partners:

Irish Elasmobranch Group, Natural Resources Wales, Zoological Society of London, Leibniz Institute for the Analysis of Biodiversity Change and Universidad de Las Palmas de Gran Canaria

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