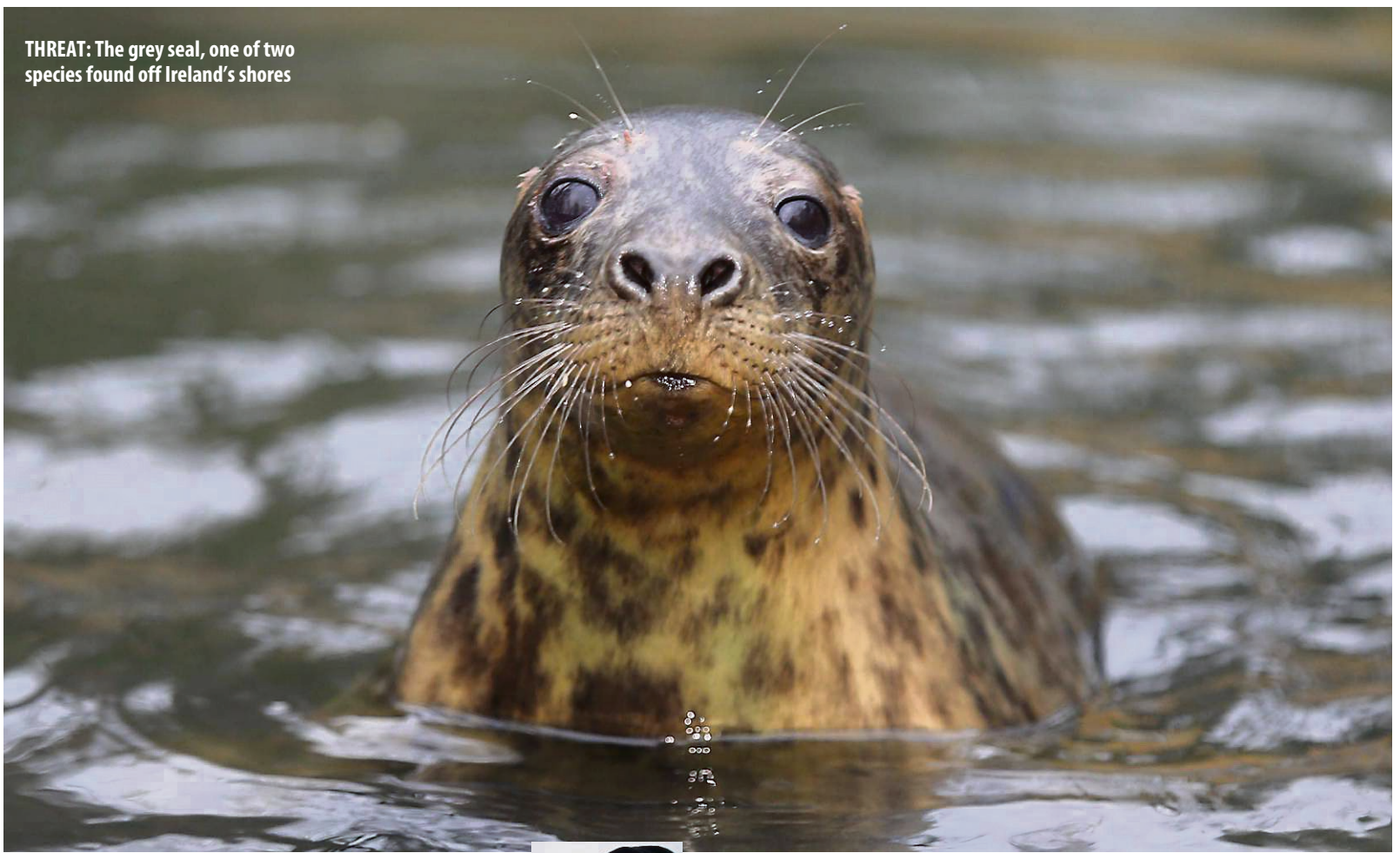
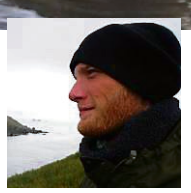
We live in a world of incredibly fast-moving science, where information and knowledge are constantly pushing back the boundaries. And you don't have to go far to see this science in action — hundreds of UCC students are carrying out vital work on a daily basis. In this new series, A Closer Look At Science, every Tuesday we will highlight the work of the finalists in the UCC Science For All competition held earlier this year, which aims to explain often complex work in a manner that can be easily understood. This week, work that could help save seals from getting caught up in fishing nets

A CLOSER LOOK AT SCIENCE

Research that will aid fishing industry and save seals too



THREAT: The grey seal, one of two species found off Ireland's shores



By Cian Luck, School of Biological, Earth and Environmental Sciences and Centre for Marine and Renewable Energy Ireland (MaREI), UCC

AS an island nation on the edge of Europe, fishing has long played an important role in our national identity.

Today the fishing industry is as important as ever. The Irish fishing fleet of around 2,000 vessels land more than €300 million worth of fish per year, and the industry as a whole employs thousands of people around the beautiful coast of Ireland.

The waters off Ireland contain a diverse and complex marine ecosystem, ranging from microscopic phytoplankton to titanic humpback whales.

Seal populations, as top marine predators, which rely on the entirety of the food web beneath them, can provide us with a snapshot of the ecosystem health.

Ireland is home to two species of seals, the grey seals and the harbour seals, which are protected by the EU Habitats Directive and attract large numbers of tourists each year.

Unfortunately, seals and fisheries don't always make for happy neighbours. Seals aren't above a free meal and have been known to help themselves to fish caught in commercial nets.

This can amount to considerable losses for the fishers, as significant numbers of fish can be removed from a net or damaged beyond a level at which they can be sold.

One need only imagine hauling in a net full of fish heads to understand the frustration of fishers.

While this is obviously bad news for the fishers, what is even worse news for the seals is that they can become caught in the nets themselves and drown.

This accidental catch (known as bycatch) of seals is a global issue which leads to thousands of seals becoming caught in nets around the world.

This issue pops up most often in 'static' nets which are typically left in the water for a day, a week, or longer.

Scientists have previously tried to tackle this problem by using underwater loudspeakers to deter seals from nets and fish farms or by modifying nets with escape hatches for the seals, but these 'fixes' are usually specific to a particular fishery or part of the world, and are unlikely to work everywhere.

In order to discover new methods of reducing seal bycatch, we must first understand why seals become caught in the first place. My research aims to answer this question.

To do this, I first went fishing. I spent a number of days at sea, on board a small fishing vessel in south-west Ireland, collecting data on when and where seals were being caught.

This was no small task as I love being at sea but have terrible sea legs, so I lost my breakfast, lunch, and dinner most days.

Then I combined my research with data collected from other observers and fishers around the country.

When I first started going through this data, something jumped out immediately. Even though most of the fishing was happening in the summer months, almost all of the seals were becoming caught in winter.

I was racking my brain, trying to think what could be behind this pattern, when I mentioned it to a local fisher who seemed entirely unsurprised. "I never catch seals when the water is clear," he told me.

Maybe the answer was as simple as that. Maybe, when the water was murky, seals couldn't see the nets, and were more likely to swim into them accidentally.

Certainly, this might explain the winter peak in bycatch, as any scuba diver can tell you, the underwater visibility typically worsens dramatically in winter. However, the next challenge was how to prove it.

Satellite imagery has come a long way in the last few years and by studying satellite images of the earth's surface (generally referred to as earth observation data) we can tell a lot about what's going on in the local environment. By comparing my fishing data to satellite images of ocean colour, I found that seals were most likely to be caught when the water was murkiest, and least likely to be caught when the water was clear.

Now, seals are pretty good at what they do. They don't just rely on eyesight underwater but can actually find food by using their whiskers to follow the turbulence generated by a swimming fish.

They are so good at this, in fact, that there have been records of blind seals living and feeding quite happily.

That being said, the disturbance in the water generated by an actively swimming fish is much greater than that made by a static net. So our theory of seals not being able to detect the net in murky water holds up.

Now, you might rightly be thinking, "So what?" Well, this is actually quite encouraging.

Researchers in the US have had success at reducing sea turtle bycatch by making nets more visible. This could be done by adding LED lights or high contrast black and white panels to the nets.

In my analysis, I found no link between water clarity and the amount of damage done to the catch by seals or the total number of fish caught.

This is especially encouraging as making nets more visible might allow us to reduce the number of seals being drowned while not exacerbating the problem of seals stealing fish and not reducing fishing success, although this must first be tested at sea.

I believe this study is a shining example of the progress scientists can make by working with fishers and tapping into their expert knowledge.

Ultimately, I hope that this research will allow us to take a more pro-active than reactive approach to fisheries management, and ensure that fisheries and seals co-exist sustainably and long into the future.