

The European Eel (*Anguilla anguilla*)

Eels have a long and mysterious life cycle, which has only really been understood for the last century but there are still many unanswered questions. As a result of there being so many different stages to their life cycle (with many looking nothing like an adult eel) in the past, people didn't realise that all the stages were in fact the same animal and they came up with all sorts of weird and wonderful stories to explain the sudden appearance of eels in their rivers. The Egyptians thought they came from the sun warming the River Nile, while the ancient Greeks thought they emerged spontaneously from mud and rainwater or that new eels developed when old eels rubbed away parts of their bodies on rocks! In the UK there were other theories such as the Scottish belief that eels started off as beetles and the English story that eels were created when hairs from horse's tails fell into the water!

www.dreamstime.com © Mikelan45

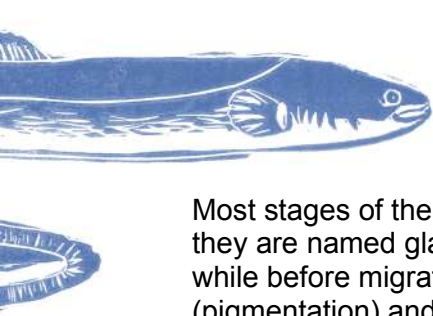


We now know a little more... Many people are familiar with the journey of the adult salmon from the sea up to rivers to spawn (this is known as **anadromous** migration) but eels do it the opposite way round – from the rivers to the sea (**catadromous** migration). This is unique among migratory fish species! They start life in the Sargasso Sea in the North Atlantic Ocean, where scientists have found recently hatched eels spread across a 2000 km wide area! On hatching, they emerge as a cylinder-like shaped larva which then develops into a leaf-shaped larva called a **leptocephalus** (about 5cm long). The leptocephalus stage can last for up to three years. During this time, they drift on ocean currents such as the Gulf Stream, travelling 5,000–7,000 km from their spawning grounds to Europe and northern Africa. As the **leptocephali** approach the coast of Europe they change (**metamorphose**) into glass eels.



Glass eel

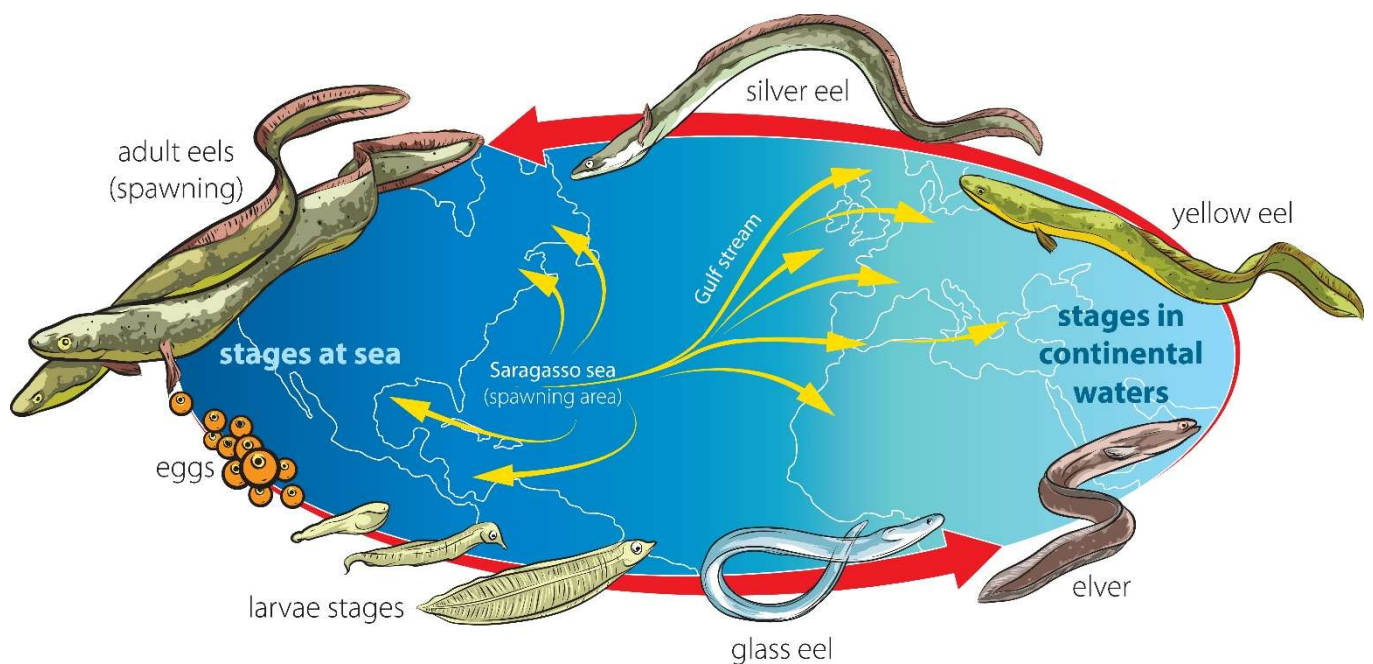
Photo Credit: Laura Weldon WWT



Most stages of the eel life cycle are named after their colour at that time, so at this stage they are named glass eels because they are transparent. They may stay at the coast for a while before migrating upriver, but once they reach freshwater, they develop colour (pigmentation) and turn into young eels called elvers. They can stay up to 14 years feeding in rivers and wetlands, where they become known as yellow eels due to the golden colour of their bellies. Eventually, the eels mature and on damp autumn nights start their return journey all the way to the Sargasso Sea to spawn. Little is known about this epic journey home because, although scientists have tracked returning eels in the oceans for more than six months, they've still not managed to follow the eels all the way to the Sargasso Sea yet.

To get ready for the journey, the eels make one last set of changes known as 'silvering' and they become known as Silver eels. These changes (or **adaptations**) prepare them for a life in the deep oceans. Amongst other changes, their eyes become larger and better suited to seeing in deep water and their sides turn silvery, which is believed to make them harder to be seen by predators. This is the last we will see of them, because once they eventually reach the Sargasso Sea, they mate, spawn and die. However, they leave behind their eggs which when they hatch will begin the incredible life cycle all over again.

The Life Cycle of the European Eel



www.dreamstime.com © Lukaves

Why are eels becoming rarer?

In the past, European eels were found in large numbers all across Europe, including the Mediterranean, Baltic and Black Seas. However, today, they are an endangered species and are on the brink of extinction. Their population has decreased 90-95 percent in the past 45 years! This fall in numbers has been linked to three main reasons –

Over fishing/illegal trade

The European eel is in great demand in Asia, where it is considered a delicacy and just a kilogram can be worth up to £1,000. Although it has been illegal to import and export European Eels to and from the EU since 2010, the illegal trade and poaching has continued until it is now Europe's largest wildlife crime. The eels are usually smuggled as glass eels and when they reach Asia they are farmed until they are fully grown. They are then sent all over the world as food. They are particularly popular in Japan where they are used in two main eel dishes: unagi kabayaki and sushi. Wherever people eat food containing eel, it is important that they check where it's from, as if it is from China it is likely that it is smuggled, endangered European eel. It's thought that up to 350 million live eels are being smuggled from Europe to Asia every year.



Eel Sushi

Habitat loss

As a migratory fish, eels need all the habitats where they spend any stage of their life cycle to be in a good condition. However, because they spend the majority of their lives in European wetlands, it is essential that these habitats are of a high standard. As of 2015, only 13% of European wetland habitats were described as being of a 'Favourable Conservation Status' which means that they were in a good condition across their natural range, were supporting all the species that they should, and were likely to stay that way. One of the major causes of habitat loss is due to how we manage our water. If we take too much water from rivers and drain wetlands to build houses, then the eels have nowhere to live and feed.

Barriers to migration

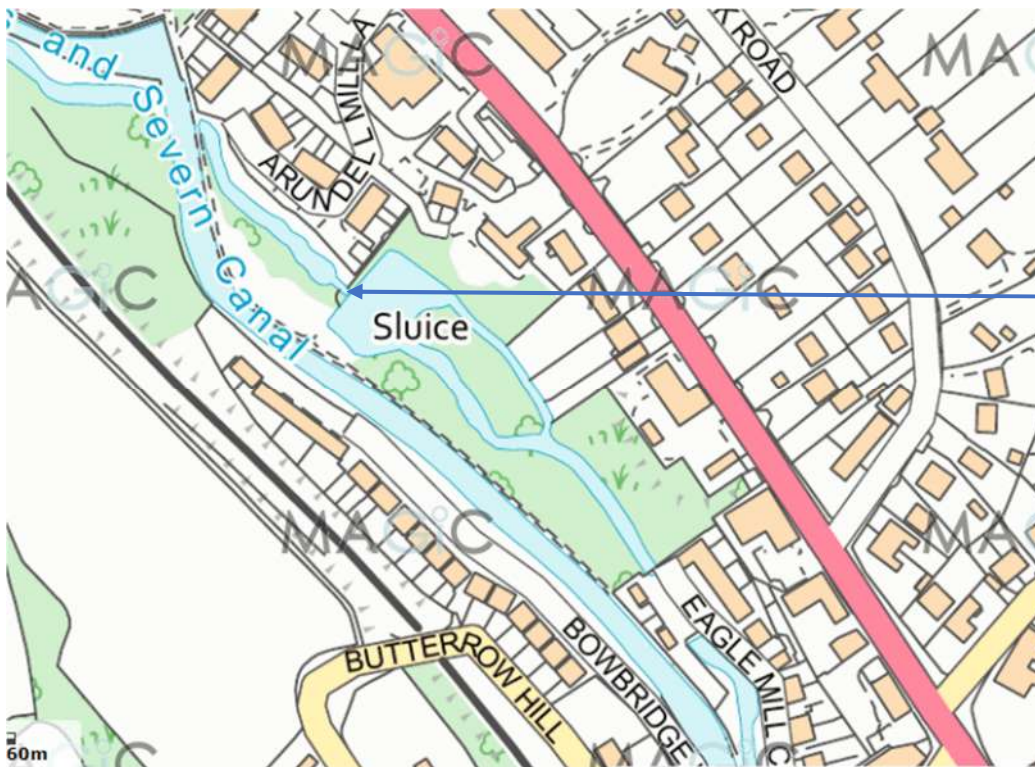
Man-made objects can block the migration of young eels up and adult eels down rivers. These blockages can be as large as a hydroelectric power station or water pumping station or be as small as little weir or dam on a stream. Project Amber, an EU project to map all the river barriers across Europe, has already identified over a million obstructions across European Rivers and according to the Environment Agency there are around 26,000 obstructions in England and Wales that could prevent eels and elvers travelling freely upstream! One such barrier is found on the river Frome at Arundel Millpond.



Caban Coch Dam in the Elan Valley, Wales – A massive obstacle for any migratory fish

Sluice gate and Spillway at Arundel Millpond

At Arundel Mill pond, on the river Frome between Capel's Mill and Bowbridge, (see map below) there is a sluice gate and spillway which blocks fish moving upstream.



Arundel Mill Pond Sluice Gate and spillway

(c) Crown Copyright and database rights 2021. Ordnance Survey 100022861.

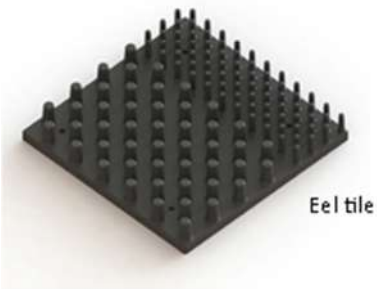
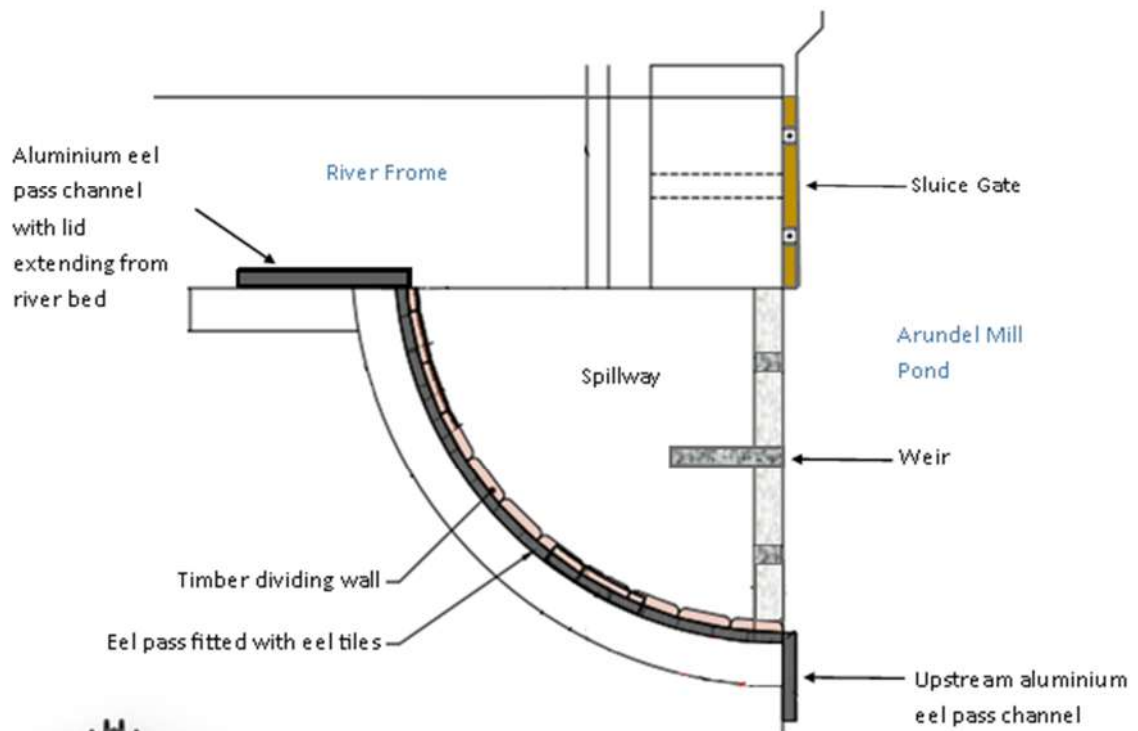
Why are the barriers there?

Arundel Mill Pond was once a thriving mill with up to three different mills being on the site (see history section). Initially the mills would have been powered by water and the mill pond was created from the River Frome to deliver water to them. To create a pond from a river, the river needs to be blocked at one end and at Arundel Mill Pond this is by means of a sluice gate. By having a gate rather than a permanent dam it would have allowed people to control the amount of water in the pond according to how much power they needed and how much rain had fallen. Arundel Mill Pond also has a spillway for water to escape if the pond gets too full after heavy rainfall. Normally when eels come across barriers like these, they will try and get around them, for instance via wet grass or other vegetation, but at Arundel this isn't possible. These barriers also stop other fish such as salmon reaching the upper stretches of rivers. Eels have been found in the area before and records show them all the way up to Chalford and while salmon can't reach Arundel Mill Pond yet (they are in the lower river) hopefully with changes they will be back.

How can we help eels get around barriers?

To keep a pond at Arundel Mill, the sluice gates can't be removed and as the eels can't get over or around the sluice, they need a helping hand. This is achieved by creating an eel pass. An eel pass acts like a watery staircase which allows the eels or elvers to swim up the aluminium eel pass channels then they wriggle through the eel tiles and leave via the eel channel at the other end and then carry on with their journey (see diagram on next page).

Diagram of Eel pass at Arundel Mill Pond



The Eel Pass in place at Arundel Mill Pond

The upstream aluminium eel pass channel with eel tiles