Teachers Notes: Secondary Assembly or Class session

Have you ever met a Sea Dragon? Anglian Water has...

Purpose of session:

- To understand what an Ichthyosaur is
- Learn how the remains were excavated and how complex the process is
- To understand the passage of time through geological phases
- To learn about the importance of Mary Anning

Length of session: 15 –20 minutes

Curriculum links:

- Biology - Inheritance, variation and evolution
- Geography - Physical geography: processes and change
- Geography - Geomorphic processes and landscape

Before you start the session, please make sure you can access and play the video clips with sound.

Overview:

- The slide pack will show you the location of the 'Sea Dragon at Rutland.'
- Why the find at Rutland is so rare and important.
- How it was found, excavated and the process to preserve it on site.
- How we know how old it is and what is happening to it now.
- Information about Mary Anning and why the Ichthyosaurs was named the Sea Dragon.

Slide pack notes:

Slide 1:

The fossilised remains of Britain's largest ichthyosaur, colloquially known as a 'Sea Dragon', have been discovered at the Anglian Water Rutland Nature Reserve in the landlocked county of Rutland.

Ichthyosaur pronunciation is 'Ick-thee-oh-sore'.

It is the biggest and most complete skeleton of its kind found to date in the UK.

The Rutland Sea Dragon (RSD) has been initially identified as ***Temnodontosaurus trigonodon****, which is very rare for the UK. So rare, it's the first one found outside of Germany.*

Slide 2:

Rutland is the smallest county in the UK, but it is the location of the second largest reservoir in the UK.

The initial construction of the reservoir in the 1970s created the man-made lake to ensure sufficient water to supply the growing populations nearby, like Peterborough.

Rutland Water is a successful habitat for many species of animals and birds.

It is a globally important area for breeding and migratory birds, including the osprey. Wintering waterbirds regularly exceed 20,000 individuals and the nature reserve is designated as a RAMSAR Special Protection Area of international importance for its populations of gadwall and shoveller birds. Managed by the Leicestershire and Rutland Wildlife Trust, it is also home to the Anglian Water Bird Watching Centre and Rutland Osprey Project.

The RSD was found in one of nine lagoons, inlets from the main reservoir some of which were added in 2010/11. The nature reserve occupies the shoreline and shallow water lagoons along 9 miles of the western end of Rutland Water, covering a total area of 1000 acres.

The lagoon where the RSD was found is one of nine lagoons. When the reservoir was originally constructed two partial ichthyosaur skeletons were found, and another in a farmer's field nearby in Rutland.

In the past, Rutland Water was home to many ichthyosaurs. Bones from about 16 different animals have been discovered so far.

Slide 3:

The RSD was discovered by Joe Davis, during the routine draining of a lagoon island for re-landscaping at Rutland Water in February 2020.

Joe is the Conservation Team Leader at Leicestershire and Rutland Wildlife Trust (nature reserve partner with Anglian Water).

Joe said: “The find has been absolutely fascinating and a real career highlight, it’s great to learn so much from the discovery and to think that this amazing creature was once swimming in seas above us!”

CEO for Anglian Water, Peter Simpson said: “Rutland Water has a long list of previous, fascinating archaeological and palaeontological discoveries, but none more exciting than this.”

Slide 4:

The fragile remains of the huge skeleton were excavated in August and September 2021 by a team of expert palaeontologists from around the UK.

The main partners were Anglian Water, Rutland County Council and the Leicestershire and Rutland Wildlife Trust.

Watch the video to find out more. Discover the #RutlandSeaDragon

You may wish to talk about some roles of the people involved in the excavation:

- *World ichthyosaur expert Dr Dean Lomax*
- *Specialist palaeontological conservator Nigel Larkin*
- *Marine reptile specialist Dr Mark Evans*
- *Dr Emma Nicholls from the Horniman Museum*
- *Volunteers with experience of excavating fossilised marine reptiles.*

Slide 5:

The RSD is approximately **180 million years old**, living in the Jurassic period, with a skeleton measuring around **10.5 metres in length** and a skull weighing approximately **one tonne.**

So, we know that this landlocked area was once the sea. Think about the landscape changes that have occurred across the millennium and are still occurring due to geology, climate and human activity, which have and are continuing to influence the landscapes.

Ichthyosaur Facts:

- Ichthyosaurs lived in the sea, so they are not classed as dinosaurs but as marine reptiles, because dinosaurs are all terrestrial and lived on land.
- Ichthyosaurs first appeared around **250 million years ago** and went extinct **90 million years ago**. That is so long ago it is hard to understand.
- They were an extraordinary group of marine reptiles that varied in size from 1 to more than 25 metres in length, and resembled dolphins in general body shape.
- It is not known for certain why they became extinct; the most popular theory is due to a combination of climate change and competition. So too hot or too cold and other sea creatures eating all the food.
- They have the largest eyes of any animal species found. One species has an eye roughly the size of a football.
- They could swim up to 22mph.
- They were the top of the food chain, apex predators.
- Fossilised remains of an Ichthyosaur found in China evidenced they gave birth to live young.

Ichthyosaurus with skin trace - Buy Royalty Free 3D model by ThinkSee3D (@thinksee3d) [35857fd] (sketchfab.com)

Slide 6:

How do you excavate a sea dragon?

Play video the process of uncovering the #RutlandSeaDragon

Slide 7:

Now it has been dug up by the palaeontologists, the fossil will be carefully conserved and examined by a conservation team. This will help grow the knowledge of these animals.

"As the skeleton was more fully exposed during the excavation in August and September, we were looking for particular diagnostic features such as notches in certain paddle bones along the leading edge of the fin." Dr Emma Nicholls

This image shows Dr Emma Nicholls applying consolidant to the hind fin to protect the specimen.

"This is one of the best-preserved parts of the skeleton and was exposed by Nigel Larkin. It appears to have been scavenged." Dr Dean Lomax

If you want to know more about this exciting find and what animal scavenged it, have look at Digging for Britain on BBC iPlayer. Series 9 Episode 4 (first shown 11th January 2021) RSD starts at 16.30 and continues at 42.16.

Slide 8:

The palaeontologist, Dean Lomax, wanted to try to pinpoint more closely when the ichthyosaur was alive and one way of doing that is to use **index fossils**: fossils that extensive research has shown to be easily identifiable by palaeontologists and reliably occurring within a narrow time zone (geologically speaking!).

The index fossils found at Rutland Water were ammonites and belemnites. Dr Ian Boomer from the University of Birmingham analysed microfossils found in the sediment from around the specimen.

This gave us an even more accurate age of between 182 and 181.5 million years old.

Slide 9:

Geological timeline

The Earth is 4.6 billion years old. There have been lots of changes over the billions of years. The Mesozoic era is when ichthyosaurs were on the planet. At this time the tectonic plates which make up the Earth's crust were moving, causing volcanic eruptions, earthquakes and landscape changes. Some of these caused mass extinction events to the animals living on the planet at the time.

This also helps explain why a marine animal was found in a landlocked county in England. The Rutland Sea dragon lived 180 million years ago in the ocean which covers what is now the UK, in the Jurassic period. The area is made of sedimentary rock, the right conditions to fossilise animals.

Water has been on the planet for 4.6 billion years and is still as precious a resource, essential to life. A resource we all need to look after.

This video shows the plate movement -

Plate Movement: 200 Million Years Ago to Present Day | California Academy of Sciences

Slide 10:

The very first ichthyosaur was found in 1811 by a 12-year-old, Mary Anning, and her brother Joseph in Lyme Regis. Lyme Regis in Dorset is often called the Jurassic coast due to its richness in fossil finds.

Mary made many discoveries about fossils and dinosaurs and was a leading palaeontologist, at the birth of palaeontology.

Mary was not recognised for her amazing work when she was alive. It took until 2010 for the Royal Society to recognized Mary Anning as one of the ten British women who have most influenced the development of science, 163 years after she died!

Today the Natural History Museum in London showcases several of Mary Anning's spectacular finds, including her ichthyosaur, plesiosaur and pterosaur.

The Sea Dragon is the name that was given to the fossils 12-year-old Mary found. That is why the new fossil has been named the Rutland Sea Dragon, more than 200 years after Mary's discovery.

Slide 11:

Discovering the Rutland Sea Dragon could not have happened without a huge team of people across many organisations.

The primary partnership for the Sea Dragon is between Anglian Water, Rutland County Council and the Leicestershire and Rutland Wildlife Trust.

With scientific support from:

- Dr Dean Lomax, specialist consultant and affiliated scientist at the University of Manchester
- Dr Mark Evans from the British Antarctic Survey, Visiting Fellow at the University of Leicester
- Nigel Larkin, Natural History Conservation.

The dig was also supported by several volunteers, including

- Dr Emma Nicholls from the Horniman Museum
- Emily Swaby from the Open University
- Paul de la Salle from the Etches Collection Museum
- The Peterborough Geological & Paleontological Group.

And the list is growing as we look to ensure the Rutland Sea Dragon's future...

Slide 12:

It will take about 18 months for the Rutland Sea Dragon to be conserved and preserved.

We look forward to the Sea Dragon returning to Rutland Water. The plans for its new home are underway at the moment.

It is tricky to make sure that it is big enough and the right conditions to conserve the prehistoric fossil.

Maybe you will visit the Rutland Sea Dragon in the future.

Further resources and activities to follow, so keep an eye out for more 'Rutland Sea Dragon updates.

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