



A Thousand
Eye-Witnesses

Today you must be Naturalist, Detective, Judge and Jury!

"Superb exhibition, something quite
different" Sir Ranulph Fiennes
O.B.E. - Explorer

"An exciting educational resource"
Director of Highland
Education.

1000 Eye-witnesses



Myth



The
Vigil

Illusion

Hoax

Loch Ness 2000

Loch Ness Exhibition Centre

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Section 1



Sonar
Patrol



Menu
for a
Monster

More than a Monster!

Animation, Laser, Original
Expedition Equipment.

A large multi-media presentation uses AV cues to lead your group through 35 minutes of themed sets, covering the whole subject of Loch Ness from the pre-history of Scotland, through the cultural roots of the 70 year controversy, with all the phases and aspects of investigation and exploration. Atmosphere and excitement are generated by theme music, special lighting effects, textured surfaces and floors, with a clear narration firing imagination and logic.

Our interpretation of the Loch Ness Enigma and the environment has a high information rate, but the narration, atmosphere, graphics and artefacts are used to focus attention on key area's. Genuine underwater footage, photographs and digital animation is mixed and projected using state of the art technology. Monsters and submarines, food pyramids and seiches, big-game hunters and hoaxers, time-capsules and Chernobyl geography, biology, physics and cultural history are brought to life.

The exhibition is based upon a genuine resource with underwater film taken from expedition or research footage and similarly the equipment displayed is real - including the world's largest inflatable craft, the world's smallest submarine and the deep water ROSETTA coring device.

Loch Ness 2000 was designed and narrated by Adrian Shine of the Loch Ness Project, who has over 20 years experience of working on Scottish lochs, leading expeditions, researching and lecturing on the natural history and enigma of Loch Ness.

This free pre-visit work pack is intended to give teachers a guide to the breadth of content and to introduce students to some of the keywords, concepts and tasks that can be completed prior to arrival. Below is a very brief description of the content. If you would like an expanded room description please contact :info@loch-ness-scotland.com

1. Scotland's Journey

Set in a darkened void.

- Deep in the rock strata of the past, we begin Scotland's 500 million year journey from south of the equator.
- Continents collide. Catastrophe and climate change, forces evolution.
- Today's hills are the eroded stumps of mountains; the glen a fault torn over 300million years ago.
- Life since leaving the water. Humid swamps, the great desert, fragmentation and the ice ages.
- But is Loch Ness a Jurassic park?
- Is it likely that tropical sea reptiles entered the icy loch 12,000 years ago?
- A digital fly-through Loch Ness. A trench profile, scoured by glaciers.
- Two hundred and thirty metres deep, the loch could immerse every human being on earth, three times over.
- Room enough for a few mysteries?



Continental Drift

2. Fire, Water & Witnesses

FOCUS

Into the shadowy world of folklore.

- Fire-light tales of Viking longships with sea-dragon prows.
- The Kelpie that lurked in the watery depths.
- St Columba, in 565AD, encounters a water beast in the River Ness.
- Sir John Murray maps the loch using state of the art technology!
- In 1933, road improvements along the northern shore of the loch.
- The Spicers, in 1933 have the first “long neck” sighting.
- Big game hunter Marmaduke Weatherall is called in.
- Experiments show that perception over water can mislead.
- Famous chance photographs lead to organised research in the 1960’s.



Myths... Mystery ...History

3. The Surface Vigil - Hoaxes and Illusion

Keeping watch.....summer fades to autumn.

- On a hillside giant telephoto cameras try to repeat classic monster photos on film..
- The Loch Ness Investigation Bureau.
- Ten years on, the films bear little resemblance to the classic photos.
- The classic photographs are re-examined.
- Research shows many ways to fake pictures
- The camera can certainly be made to lie - the famous “Surgeon’s photo” is exposed.
- The loch is full of illusions, so convincing that experienced observers can be mistaken.
- Interest turns back to the local accounts of “something powerful in the loch”.
- In the 1970’s, the cameras move underwater.



Investigations

4. Into the Abyss *Beneath the waves, steep cliffs, stillness, darkness, icy cold and crushing pressure.*

- An observation craft peers down at us while the tiny submersible Machan waits silently below.
- The Academy of Applied Science tries time-lapse flash photography.
- A new philosophy. The Loch Ness and Morar Project begins active study of the whole environment.
- A mystery forced into context.
- The loch is a dynamic environment with specialised communities.
- Habitats through the lenses of underwater cameras and the microscope.
- The littoral - a wave-washed zone, prone to sudden flood and drought.
- The pelagic zone - home of tiny drifting microscopic plants and animals.
- The profundal zone - is still, cold, and dark, a refuge for some ice-age relict species.
- Any resident monsters must be predators but the fish stocks are very low.



Habitats

FOCUS

Section 1

5. Sonar Patrol

A moonlit patrol aboard the “John Murray”.

- The Loch Ness Project turns to sonar, a sort of underwater radar using ultra-sound.
- Huge underwater processes are made visible.
- The fish stocks are measured and their distribution and behaviour traced.
- Sometimes, strong winds trigger an underwater seiche or wave.
- Gigantic underwater waves over 40m high, bend and distort sonar beams.
- Communities are displaced miles along the loch.
- Objects on the surface can move into the wind.
- Day and night “The John Murray” sonar patrol vessel ranges over the depths.
- In 1982 there are 40 contacts of exceptional strength and depth. Some seem to move.
- The underwater world has its own illusions and mirages.
- In 1987, Operation Deepscan makes the decisive sonar sweep.

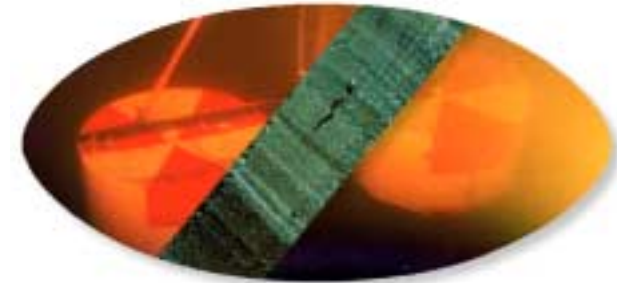


Sonar Sweep

6. Wider Significance

Summing the Data

- The 1990's; the decade of the great general scientific expeditions.
- The animal candidates are reviewed; Reptile, Amphibian, Mammal or Fish?
- The Loch Ness food pyramid challenges belief in large resident animals.
- But there is still room for a possible underlying truth. What do you think?
- Searching Loch Ness reveals a wider significance.
- Deep in the stillness of the abyss, fine silts drift gently into an undisturbed time capsule.
- In 1994, the Project takes the record-breaking ROSETTA sediment cores 200m down.
- Ten thousand years of history. Loch Ness cores are some of the best in Europe.
- Grey ice-age glacial clay changes to banded organic matter 6m high and 10,000 years old!
- Diatoms, pollens, volcanic shards and carbon; tiny clues to large events. Human impact.
- Pollution is now falling; measures to protect our environment are truly worthwhile.
- Time for reflection.



Loch Ness Time Capsule

Glossary Glossary Glossary Glossary Glossary Glossary Glossary Glossary Glossary Glossary

Abyss.

A great depth - like Loch Ness.

Algae

Very simple plants. In freshwater, most are microscopic. Some are attached to stones in long strands while others drift in the open water

Amphibian

Animals that evolved from fish in the later Devonian about 300 million years ago. They flourished during the carboniferous period between 345 and 280 million years ago. They now include newts, salamanders and frogs. They have a larval stage (tadpoles) and have to lay their eggs in freshwater.

Bathymetric Survey.

A study of the Scottish lochs in the early years of the last century to make underwater maps of their depths

Calibration Sphere

A ball used by the Loch Ness Project to measure the strength of sonar echoes. The ball had a known strength so we could tell whether other echoes were stronger or weaker. The ball had the strength of a fish 1m long.

Carbon particles

These are tiny microscopic specks of carbon particles produced from burning coal and oil. They are carried long distances in the atmosphere and we find them in the mud on the loch bed. When we find them in sediment cores, they indicate the amount of industrial pollution at different times.

Catchment

The area of land that drains into a lake. At Loch Ness this is 1,775 square kilometres.

Charr

The Arctic Charr, as its name suggests is a cold water fish of the salmon family. Echo sounding tells us that there are more charr in the loch than any other fish but they are seldom caught because they live so deep.

Clay

The finest particles of mud that are inorganic, that is without material that has been living, like plant debris

Continental Drift

The movement of the continents over time, as they are moved by "plates" of rock floating on the earth's molten "mantle".

Diatom

A class of single celled plant, mostly microscopic and found on the loch bed in shallow water and out in the open water. They have a silica "case" which can sink to the bottom and remain intact for thousands of years. There are thousands of different kinds and we know the conditions that many prefer; warm or cold water, or more or less nutrients, for example. Therefore, we can see how the water conditions have changed over time by looking at the diatoms in sediment core samples.

Enhancement

A process, now normally carried out on a computer to change the contrast or increase the definition of images such as photographs. The method is useful in itself, but can be open to abuse.

Enigma

A mystery or question.

Erosion

The wearing down of the landscape by nature's forces such as water, ice and wind.

Evolution

The way in which living things change from generation to generation. This often happens faster when living conditions change.

Faultline

A line of weakness or crack in the earth's crust. The Great Glen is a faultline torn across the mountains over 300 million years ago

Food Pyramid

The amounts, in steps; of numbers, weight or energy of one species that can support another. So a thousand kilos of plants may support a hundred kilos of water-fleas, which may feed only ten kilos of little fish. That leaves room for just one big 1kilo fish to feed on the little ones.

Glacier

A "river" of ice flowing slowly downhill. Glaciers cause very powerful erosion.

Illusion

Where our senses (usually sight) give us a misleading impression of a situation.

Kelpie

The sinister "Water Horse" of Highland folklore. It would carry travellers into the water and drown them.

"Machan"

A submersible hide used in 1974-5 in an attempt to photograph large unusual creatures.

Mammal

Animals which evolved from reptiles in the early Triassic about 220 million years ago. They were destined to hide from the reptiles for 155 million years, during the reign of the dinosaurs. They are warm blooded and suckle their young.

Glossary Glossary Glossary Glossary Glossary Glossary Glossary Glossary Glossary

Mirage

An illusion which distorts the way we see things. It is usually caused by the air close to the ground or water surface heating up and bending the light by refraction. Sometimes, this is called a **heat haze**. It can make objects appear and disappear and usually makes them look taller than they really are.

Murray (Sir John)

Led expeditions to survey the Scottish lochs at the beginning of the last century. These were called “The Bathymetric Survey of the Scottish Lochs”.

Neolithic

“The new stone age” when mankind was still using stone tools but had begun to practise agriculture.

Nutrients

The chemical “fertilisers” like nitrates and phosphates, which allow algal plants to grow in the open water. Loch Ness is very “nutrient poor” because of the very old an insoluble rock that surrounds it.

Perception

The way we interpret the things we see. Sometimes our perceptions are affected by what we think, as well as what we see.

Photosynthesis

The process by which plants convert carbon dioxide to living tissue, using light. Photosynthesis is difficult in Loch Ness because the light does not penetrate far, because of the peat stained water.

Plankton

Animals or plants that drift in the open water. In Loch Ness the largest plankton animals are about 1cm long but most are microscopic.

Pollen

A very fine powder discharged from flowers. It is the male part of the sexual process in plants and is usually blown by the wind to fertilise other plants over a wide area. The pollen of different sorts of plants can be distinguished, so when we look in sediment cores we can tell what sort of vegetation grew around the loch at any time in the past.

Prevailing Wind

The most frequent wind direction. At Loch Ness, the prevailing wind direction is from the **south-west**. It blows along the Great Glen like a wind tunnel and can blow the warmer surface to the north-eastern end. When the water flows back, it can make huge underwater waves.

Productivity

This is a measure of the rate at which new living organisms are produced within the loch.

Radioactive Isotopes

These are the “fallout” from nuclear events. In 1963 came the peak of atmospheric nuclear bomb testing. Then in 1986 came the Chernobyl nuclear reactor accident. This accident deposited a layer of isotopes in the Loch Ness sediments, making a “marker layer” at a known date, helping with dating cores retrieved from the loch bed.

Refraction

This happens when light or other energy, like sonar is bent as it enters a denser or less dense medium. It can happen both above the surface; between layers of air at different temperature and underwater, where different temperature layers can bend sonar beams making an underwater “mirage”.

Reptile

Reptiles evolved from amphibians about 330 million years ago in late carboniferous times. They had no need to lay eggs in water and so were able to complete the conquest of the land. Reptiles were to dominate the world until the death of the dinosaurs 65 million years ago. Today’s reptiles are cold blooded and could not be active in the loch’s low temperatures.

ROSETTA Project

The Loch Ness Project’s deep sediment coring programme. In 1994 two 6m cores penetrated 10,000 years back to the clays left by the Ice Age. The cores contain very small clues to large events in the history of the loch.

Sonar contacts

“SONAR” stands for SOund Navigation And Ranging, using beams of “ultrasound”, that is, normally above the range of human hearing. Sonar or Echo sounding can detect the loch bed giving depth, fish and other organisms, even layers of water made denser by temperature differences.

Sulphurous rain

This is the “acid rain” laden with sulphur from industrial processes or from volcanic eruptions.

Thermocline

This is the boundary between the warmer surface waters floating on the colder denser water beneath. The two layers remain distinct for the summer, until the loch cools. As the surface water moves from one end of the loch to the other, huge waves form in the thermocline.

Wire Sounding Machine

A simple but accurate machine used to measure the depth of lakes used before echo-sounders were invented.

Section 1

CLICK TO SEE
NEXT SECTION

www.lochnessproject.com