The **Helford** River
geology

400 million years in the making...

HELFORD
VOLUNTARY MARINE
CONSERVATION AREA

Portscatho beds

The Helford River area has a history extending back almost 400 million years. Its geology records events associated with the movement of past geological plates, the subsequent formation of the river, and its modification by dramatic rises and falls of sea level particularly during the climate changes of the Ice Age, creating a drowned river valley known as a ria.

Today the river is some 9.2km long, widening seawards and has many creeks running into it, most of which dry to mud at low tide. The actual shoreline of the Helford (44.3 km) is five times longer than its length. The tidal area is 568 ha, of which one third (186 ha) is intertidal.

Geology

The river lies in a low lying zone, dominated by slate and sandwiched between the higher Carnmenellis granite to the north around Constantine and the Lizard Plateau to the south. The granite and Lizard Ophiolite Complex, the latter having formed in an ancient ocean, are separated by bands of Devonian strata (418-362 million years), that were bulldosed northwards, like the Lizard Complex itself, as a series of sheets over south-dipping thrust faults. These movements converted the original muddy rocks into slates. From north to south we see first the Mylor Slates, locally baked as molten granite rose from below to form the Carnmenellis Granite ~ 100 million years after the muds were originally deposited. They are best seen in Polpenwith and Polwheveral Creeks around Scott's Quay.

The main river lies in a belt of sandstone and slates, known as the Portscatho Formation and bounded by the Carrick and Veryan thrusts. The sandstones were deposited by turbidity currents flowing down-slope into deeper water. The Carrick thrust deserves to be marked by a golden spike as some geologists believe this thrust controls the occurrence of gold in the area, but such a spike would probably use up all the gold to be found! In many ways the rocks farther south, between the Veryan thrust at Dennis Head and the Lizard Boundary fault at Porthallow, are more spectacular with conglomerates and

Nare Point

quartzite block

The river is unusual in that, lying on the eastern side of the Lizard Peninsula, it is protected from the dominant southwesterly winds and swell and is only exposed to easterlies.

Helford River during the Ice Ages.

Both the warm and cold phases of the Pleistocene Ice Ages, which lasted almost 2 million years and only ceased 11,000 years ago, have left their strong imprint on the Helford River. Like the Fal, the Helford had a deep water channel, but all that remains now is the deep water mooring pool between Helford and Helford Passage. Whether these deep river channels were incised during the Ice Ages or earlier is not known.

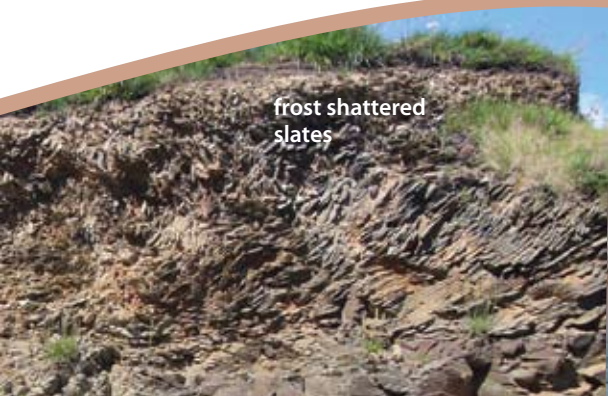
During the warm interglacial periods higher sea-levels eroded and widened the mouth of the river, creating a funnel shaped entrance and forming raised beaches within the outer Helford between Durgan and Trebah, Padgagarrack Cove, the Gew, Dennis Head and between Nare and Men-aver Points, as well as along the coast from Porthallow to Rosemullion Head.

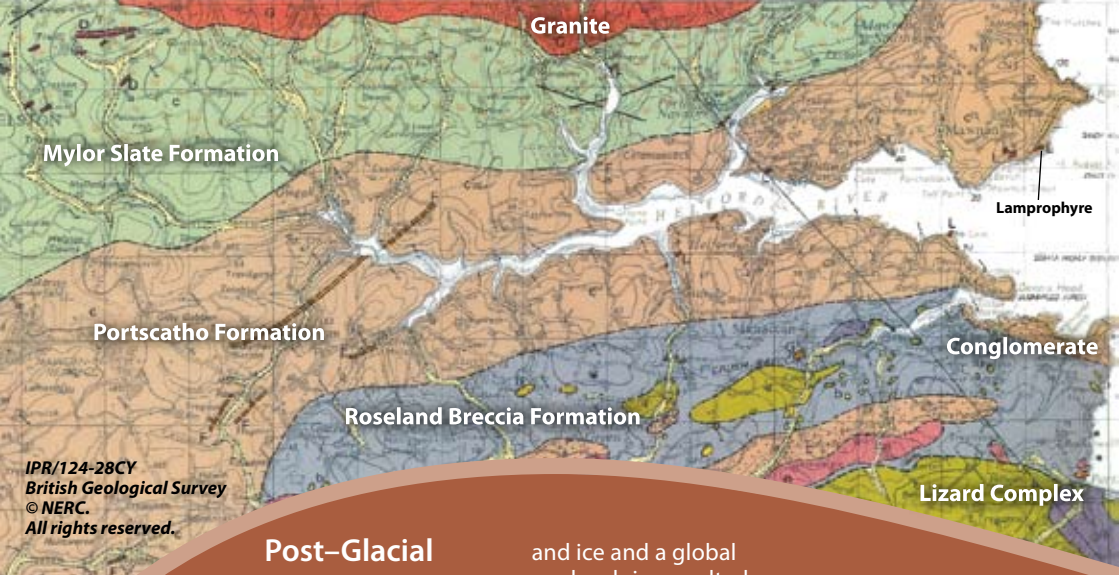
During the colder periods of the Ice Ages, Cornwall lay south of the main ice sheets and was characterised by a tundra landscape like Alaska, northern Canada and Siberia today. The climate was very cold as can be seen by abundant evidence of intense frost action around the sides of the estuary. Frost shattering of the slates at the Herra at Gillan Cove is a classic example.

During the glacial summers, the tundra surface melted and slid downslope to form deposits known as 'head', a term derived from Sir Henry De la Beche's 1839 description of the coastal deposits on either side of the Helford and still commonly used by geologists. He noted that the raised beaches of the district were overlain by a head of angular fragments, derived from the coastal slopes above. At the height of the last glacial period the climate became very dry with wind blown dust (loess) settling on top of the 'head'.

blocks of exotic rocks that formed in ancient submarine canyons and from huge underwater land slides.

Equally striking are the series of dykes, known as lamprophyres, which are particularly well-displayed in the outer Helford (The Gew, Menaver beach and Parson's Nose). Lamprophyre is a relatively unusual geological rock type, recognised by its characteristic shiny appearance caused by flakes of mica, and reddish brown colour. It formed within the earth's mantle and preceded melting which generated granite in the earth's crust above.





Post–Glacial History

At the end of the last Ice Age, 11000 years ago, the Helford would have looked very different from today, with gently sloping 'head' terraces like that still preserved at Nare Point extending out into the estuary. The river would have been confined to the deep water channel in the centre.

As the glaciers in the northern hemisphere started to melt, rivers became more active with melting snow and ice and a global sea level rise resulted, flooding the Helford and its tributaries. The 'head' terraces were eroded, and the resulting debris was pushed into the creeks, burying the deep water channel and creating the double spits at St Anthony that separate the harbour from the main creek. In higher reaches of the Helford, rising sea level caused the river to silt up. Mining activities, largely confined to the granite-dominated north side of the river, contributed to this process and led to a large amount of mine waste settling out in the northern tributaries particularly during the 17th -19th centuries.

Today the estuary with its extensive intertidal area is a natural field centre for displaying the effect of wave and tidal processes – even the humble seaweed is recruited by the waves and tidal flows to help move larger pebbles and move the finer material preferentially.

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For further information about the HVMCA and how you can become involved, look on the Helford Voluntary Marine Conservation Area website www.helfordmarineconservation.co.uk