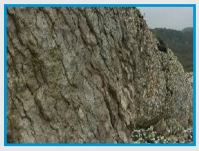
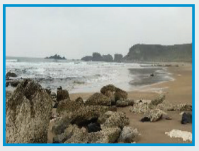
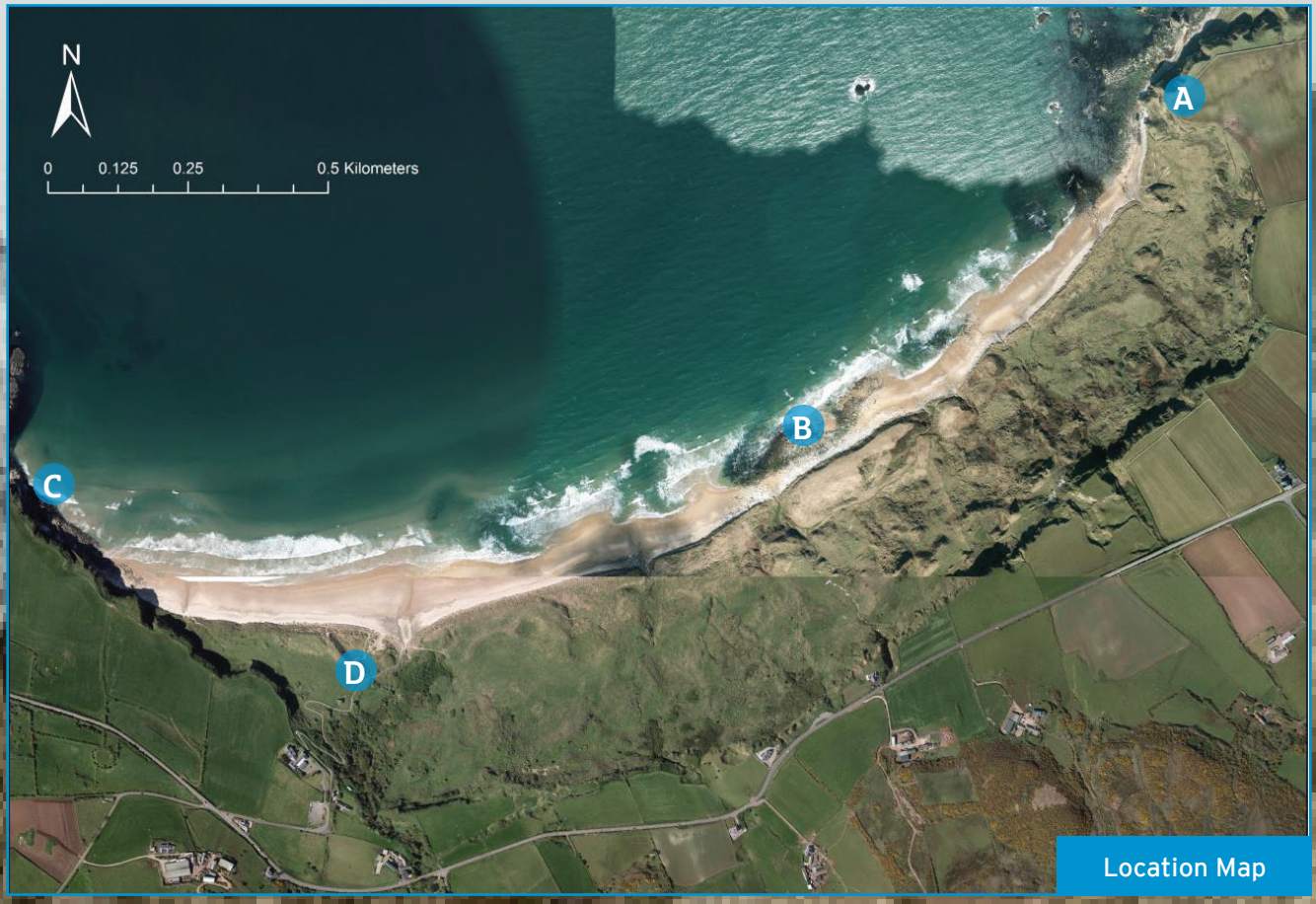
Whitepark Bay





Teacher's Sheet

This is a safe location to learn about the Jurassic, Cretaceous and Palaeogene geology of Northern Ireland. The site is located just off the A2 Coast Road with a bus/coach stop and parking for smaller vehicles in the National Trust car park above the beach. Access to the beach is by a steep coastal path. Most features can be observed from the beach and shoreline. The dune land is routinely grazed by cattle for conservation purposes. Always check for cattle before entering the dunes.



Location Map

Teacher's Notes

SUGGESTED STOPS	POINTS TO NOTE
Access:	Parking is available in the National Trust car park (minibuses and smaller vehicles only), located off the main A2 Coast Road. Visitors are advised to contact the National Trust before undertaking a group visit to the site. Alternatively, there is a bus/coach stop located on the main A2 Coast road above Whitepark Bay. Access to this site is by a relatively steep coastal path which may not be suitable for those with limited mobility. There are no toilet facilities available at this site; however, there are public toilets in Ballintoy Village and Ballintoy Harbour. Care should be taken whilst on the beach at high tide.
1	Upon arrival at Whitepark Bay it is best to walk towards the eastern end of the bay (point a on map) where a coastal path (the Causeway Coast Way) extends towards Ballintoy Harbour. Here, at low tide, it is possible to see the upper surface of Lias Clays which represent the oldest layer of rock found at this location (see information sheet for photographic example). These Lias Clays formed during the Jurassic Period, 200 million years ago. At this time Ireland was located adjacent to a warm shallow sea created by the breaking up of a supercontinent known as Pangaea. The climate resembled that of present day humid countries, with monsoon-type summers. This led to erosion of the adjacent land and deposition of fine material (clay) in shallow marine waters. Over millions of years, and following deep burial, this clay has been compacted to form mudstone. The layer of Lias Clay found at Whitepark Bay extends under much of the County Antrim coastline. Because it is a relatively soft rock which underlies younger and heavier limestones and basalts, expansion and contraction of the clay minerals following heavy rain frequently results in rockfalls and landslides along the A2 Antrim Coast Road. It is recommended that students have an opportunity to visit either Portrush National Nature Reserve or Waterloo Beds in Larne. At Portrush the Lias Clay has been metamorphosed by intrusion of an igneous rock (dolerite) into a more resistant rock, Hornfels. At Waterloo Beds in Larne it is possible to see Lias Clay which contains abundant fossils along the foreshore. Within the Lias Clay here the fossilised bones of an Ichthyosaur were found in 1999. These bones are now displayed at the Ulster Museum in Belfast. **Did you know?** During the Jurassic Period as Pangaea broke up, a rift in the Earth's crust developed between North America and northwest Africa. This rift marked the beginning of what is now the Atlantic Ocean. As the crust stretched and thinned, cracks appeared, through which magma intruded forming dykes. Whilst there is no evidence of these dykes at Whitepark Bay, they are recorded on the other side of the Atlantic Ocean in Stonehammer Geopark, Canada.
2	After looking at the Lias Clays, walk back along the beach to the white rock which is exposed at sea level (point b on map). This rock, which is known as Ulster White Limestone is Cretaceous in age (80 - 120 million years old) and topographically sits on top of the Jurassic Lias Clay seen at point a. Because the Ulster White Limestone sits on top of the Lias Clay, we know that it is younger, and because the rocks are very different in composition and appearance we can tell that there was a dramatic change in the climate and depositional environment of this area at the beginning of the Cretaceous Period around 140 million years ago. During the Cretaceous global sea levels rose dramatically, covering much of Europe from Ireland to the Caucasus Mountains in Russia under a warm, shallow sea in which thick deposits of limestone formed. Ulster White Limestone is formed almost entirely of the remains of microscopic shells known as coccoliths; however, if you look closely you might find fossils such as the cigar shaped belemnite (see image on information sheet). The limestone in this area also contains abundant flint nodules. These flint nodules formed from the remains of siliceous sponges which would have lived on the sea floor. **Did you know?** During the Cretaceous Period (between 145 and 65 million years ago) Europe and North America continued to drift apart. The climate was much warmer that at present with no ice at either of the Earth's Poles. This resulted in much higher global sea levels and very productive oceans.

3	After examining the limestone, walk back towards the western edge of the beach where a small unmarked coastal path continues along the rocks to Portbradden. This path is located across basalt rock which is exposed at sea-level at this location (point c on map). The basalt rock was deposited during the Palaeogene Period (beginning 65 million years ago), when this part of Ireland was located at the centre of intense volcanic activity generated by rifting between the North American and European plates. As these two plates drifted apart the Earth's crust thinned, generating huge amounts of basalt magma which rose through the existing rock (limestone and mudstone at this location) and produced extensive lava flows on the surface which buried the older rocks. In this part of Ireland lava flows extended over much of County Antrim, capping the older rocks and forming the impressive Antrim Plateau. Where magma cooled at depth it formed a series of dykes and sills. The intense heat and pressure generated at these features has on occasion metamorphosed the surrounding rock e.g. limestone has been baked to form marble (see Ballintoy trip) or mudstone has been baked to form hornfels (see Portrush trip). **Did you know?** There is extensive evidence of volcanic Palaeogene activity across NW Europe, particularly in Northern Ireland and Scotland e.g. the Giant's Causeway and Causeway Coast World Heritage Site (see trip), the Kingscourt dyke swarm and Garrison sill in Marble Arch Caves Global Geopark (see Virtual Tour), and the Ardamurchan ring complex, Mull flood basalts and Isle of Rum layered intrusion in Lochaber Geopark, Scotland.
4	As you walk back to the car park, stop and look across the extensive dune system which extends from the beach to the foot of the cliffs (point d on map). During the Quaternary (last 2.5 million years), a series of glaciations (ice ages), saw ice sheets expand southwards across Ireland. As the ice advanced it acted much like sandpaper, scraping and scouring the surface of the land. Upon retreat the material collected by the ice was deposited, forming large deposits of glacial material, with sediment ranging in size from fine clays, through to sands, gravels and boulders. Over time this material has been worked and re-worked by coastal processes (wind and wave action) to form the dune system in Whitepark Bay. The last ice sheets retreated from this coastline approximately 13,500 years ago, as the Earth's climate warmed. This resulted in large volumes of fresh water entering the oceans and resulted in higher sea levels. Eventually as the weight of ice was removed from the surface of the land, it began to rise relative to sea level in a process known as isostatic rebound. The extensive dune system at Whitepark Bay provides evidence that sea levels were once higher, as some of the oldest dunes, below the cliff, are now located quite a distance from the sea. The process of isostatic rebound continues in this part of Ireland today; however, the amount of movement is now minute. **Did you know?** That whilst volcanic activity has now ceased in this part of the world, the Atlantic Ocean is still opening with Greenland and Europe moving away from North America. Volcanic activity along the mid ocean ridge continues to produce new crust, pushing the plates further and further apart. Located directly on the Mid-Atlantic Ridge is Iceland, most which is formed of volcanic material that spewed out from the mid ocean ridge.