



Magilligan Nature Reserve

Work Booklet

MAGILLIGAN NATURE RESERVE - RESOURCE MATERIALS

Introduction

The Magilligan Nature Reserve is situated at the tip of Magilligan Point where Lough Foyle breaks into the Atlantic Ocean, (Grid reference: 660390). Access to the reserve is along a minor road which leads to the ferry terminal. The reserve is administered by the Northern Ireland Environment Agency, (NIEA). Further information on the reserve can be obtained from:

Northern Ireland Environment Agency,
Old Roe Valley Hospital,
Binevenagh Drive,
Limavady, BT49 0AQ
Tel: (028) 7776 3982

or by contacting:

The Educator,
Roe Valley Country Park,
Limavady,
Tel: (028) 7776 7532.

The educator is able to provide guided tours on request.

This material has been prepared mostly with teachers in mind, but should also be of interest to the general visitor. It is probably best that teachers use the services of the NIEA educator, who will be able to provide a guided tour. However, this material should enable teachers to make an independent visit to the reserve. The material has been pitched at the level that pupils at and above KS2 will find useful. The material covers many of the aspects recommended by the National Curriculum. It might be advisable to have made a visit to another habitat such as a woodland before visiting Magilligan. Pupils would then be more conversant with basic concepts such as photosynthesis, biodiversity, food chains etc.

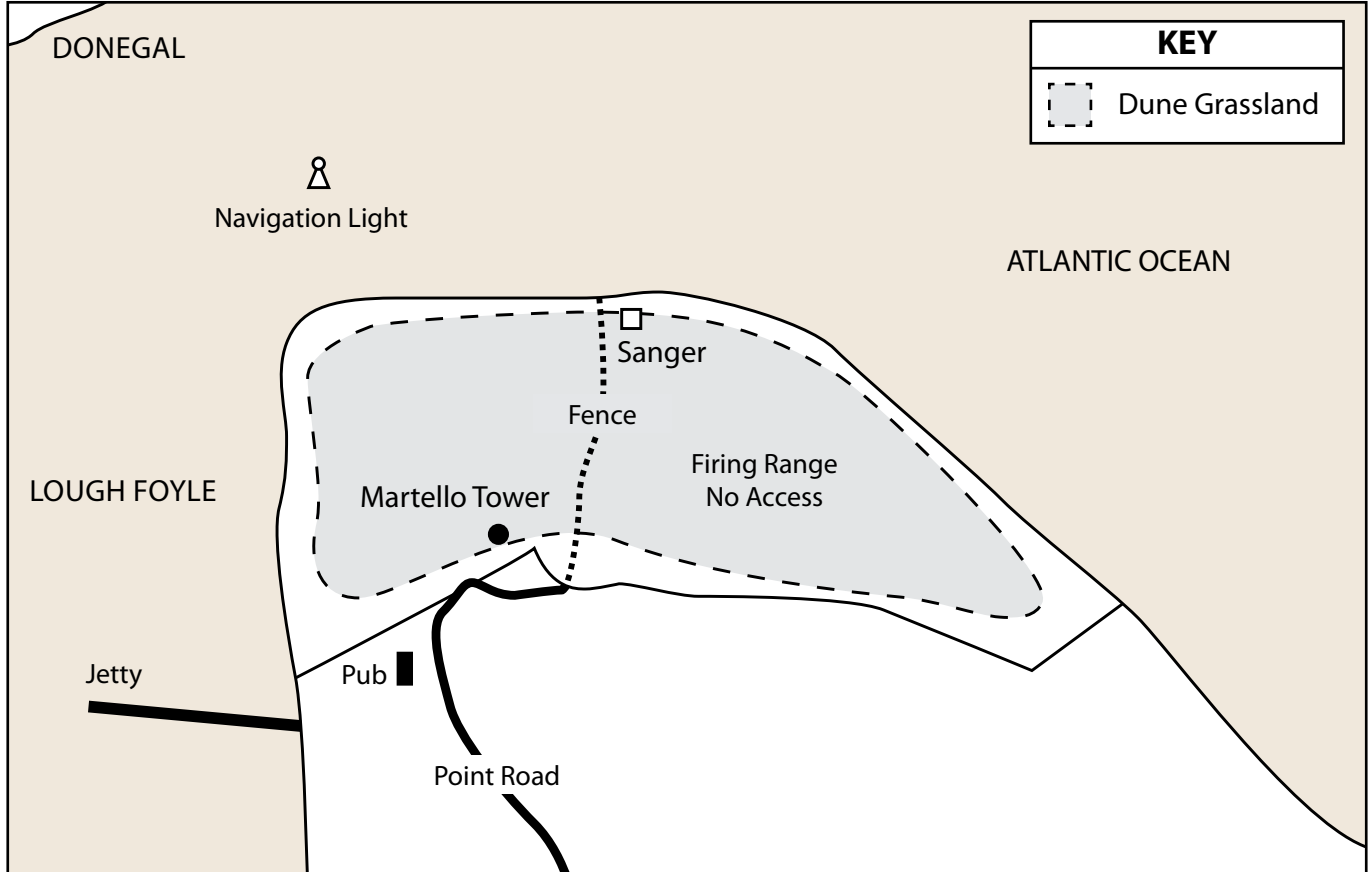
The reserve itself covers 38 hectares. It is triangular in shape. It is bounded to the North and West by the sea. To the south is the road leading from the ferry terminal to the gate of the army firing range. It has been designated as a Nature Reserve because it such a relatively undisturbed sand dune system which contains many important species of wildlife. It also contains a well preserved Martello Tower. There are an almost inexhaustible number of opportunities for study. This booklet is not designed to be comprehensive. It makes just a few suggestions as to what a visit to the reserve might achieve. This booklet concentrates largely on work dealing with the biodiversity, meaning the range of wildlife, on the reserve. Each section consists of suggested activities, fact sheets and follow-up work.

Safety: As with any school visit safety is a major point of concern.

- The reserve is very exposed. It is not suitable for a visit in very cold, wet or windy weather.
- It is important to emphasise that they should not stray too close to the sea.
- Hands should be thoroughly washed after collection activities.

THE MAGILLIGAN AREA – BACKGROUND INFORMATION

You will approach the reserve through the Magilligan area itself. A panoramic view of the area can be seen from the viewing point on the Bishop's Road, (Grid reference: 716 342). Although this viewing point is not on your way to the beach, it is well worth a detour. Magilligan is a large triangle of flat land lying between the cliffs of Binevenagh Mountain and the mouth of the Foyle. This land has only been formed since the ice age. It is the youngest area of land in Ireland



Magilligan Nature Reserve sketch map

BEACH SCAVENGER HUNT

It is very difficult to study the wildlife in the sea. However, you can find out a great deal by simply walking along the beach and collecting the remains of the creatures which once lived in the sea. Avoid anything that looks dangerous or dirty or anything that would be made by people. Just collect natural things. There is no need to go close to the sea. You can use a tray to collect your specimens. It is best to make a base behind the first sand dune nearest the sea. This little camp will protect you from the wind. Walk up and down the beach collecting your specimens. You can use the check list below if you wish. By using the tally method you will be able to find out the more common items along the beach. Return everything to the beach once you have finished.

Beach Scavenger Hunt Check List

Item	Description	Tally
Limpet shell	Mollusc – gastropod	
Whelk shell	Mollusc – gastropod	
Winkle shell	Mollusc – gastropod	
Mussel shell	Mollusc - bivalve	
Scallop shell	Mollusc - bivalve	
Cockle shell	Mollusc - bivalve	
Oyster shell	Mollusc - bivalve	
Razor shell	Mollusc - bivalve	
Starfish	Echinoderm	
Sea urchin	Echinoderm	
Barnacle	Crustacean	
Sea slater	Crustacean - alive	
Crab	Crustacean - alive	
Jellyfish	Coelenterate	
Hornwrack	Bryozoa	
Dead fish	Fish	
Mermaid's purse	Fish	
Whelk egg cases	Mollusc – gastropod	
Seaweed	Algae	
Bird feathers	Bird	
Dead bird	Bird	
Dead sea animal	Mammal	
Tree or branches	Tree	
Seeds	Plants	

SHELLS FACT SHEET

You will be able to find many empty shells along the beach. These are mostly the homes of a variety of soft-bodied animals with shells called molluscs. They are related to land snails and slugs. They are divided into gastropods – with a single shell, and bivalves – with two hinged shells. The chart below will help you identify the more common varieties.



1. LIMPET:

The limpet is a gastropod. It has a conical shell. It spends its adult life firmly stuck to rocks. At low tide it takes in air. When covered by the tide it moves about eating algae and seaweed. They move about to forage but always return to the same spot to rest



2. WHELK:

It is obviously a gastropod. When it was alive, it lived in mud. It takes in clean water to breath through a long siphon but otherwise behaves like a snail. It eats dead things called carrion in the mud. You may also find its odd shaped bunches of egg cases.



3. WINKLE:

It is like a small whelk. This is an obvious gastropod. It spends its life attached to rocks and seaweed eating seaweed, algae and carrion.



4. MUSSEL:

The mussel is a bivalve. Mussels grow in tightly packed bunches attached to rocks. Their eggs float as plankton but once settled hardly move. Mussels eat by siphoning food at high tide. It is obviously tasty as it is eaten by oystercatchers, whelks and starfish and even people. Eating shell fish can be dangerous as their eating habits mean they can absorb toxins from the water.



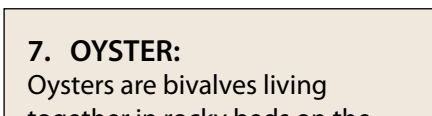
5. SCALLOP:

The distinctive shaped bivalve shells are easy to recognise. It spends most of its time on the sea bottom. It can jump to avoid predators by slamming its shell shut. It swims by blowing out water from its hinge.



6. COCKLE:

This bivalve lives buried in mud. Two siphons stick out of its shell, one drawing in and the other expelling water. The cockle can dig into sand or mud using its foot. They are eaten by gulls, oystercatchers, starfish and flatfish. There are commercial cockle beds in the Roe Estuary.



7. OYSTER:

Oysters are bivalves living together in rocky beds on the sea bottom. Their numbers have been reduced by disease, bad weather and foreign predators. Oysters are considered to be one of the best shell fish to eat.



8. RAZOR:

This distinctive bivalve lives on clean sandy beaches. It uses its 'foot' to dig into sand. At low tide it digs under the sand to hide. When the tide comes in and covers it with water, it leaves its burrow to find food.



Besides shells you may find many more things of interest.



9. STARFISH:

The starfish are part of the group of animals called echinoderms – meaning 'spiny-skinned'. The starfish has five separated arms. It feeds in an odd way. Using its arms it prises open shellfish. It then puts its stomach inside the shell and digests the contents.



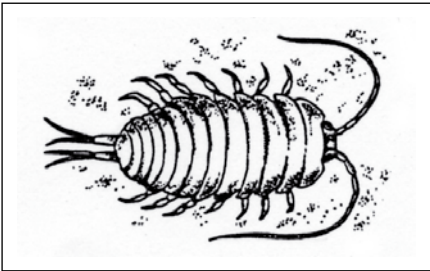
10. SEA URCHIN:

There are several varieties. While alive they have spines but are normally found without spines. They live in rocks or mud eating all sorts of vegetable matter with their strong teeth.



11. BARNACLE:

Surprisingly this is a crustacean related to crabs and woodlice. Barnacles attach themselves permanently to rocks, seaweed, other shells and even ships and whales. When the tide comes in they open out and catch passing food with legs which come out of their shell.



12. SEA SLATER:

It is crustacean much like shore woodlouse. It is not a sea creature. It hides under rocks and rubbish during the day. It comes out at night to scavenge along the tide line.



13. CRAB:

The crab is a crustacean meaning 'has a hard shell and jointed legs'. You may find shore crabs alive or sometimes just their shells. These may belong to dead crabs or may be the shells that crabs must cast off as they grow. Crabs are scavengers. They will eat almost anything.



14. JELLYFISH:

Dead ones are usually found lying on the shore in summer. These creatures are not fish. They are part of the coelentrata group of animals meaning 'hollow stomach'. They have complicated life cycles beginning as swimming larva. They then attach themselves to rocks for a while and finally achieve adulthood by swimming again. There are various species. Most can sting.



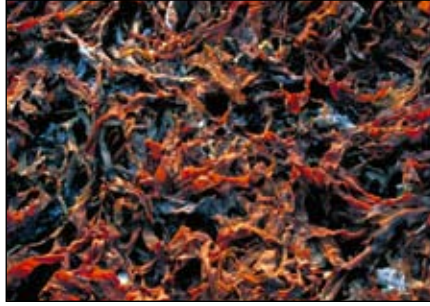
15. HORNWRACK:

This may look like dried seaweed, which are plants, but it is really the remains of an animal. It belongs to the bryozoa or moss animal group. It has separate compartments each of which contains an individual animal called a zooid.



16. MERMAID'S PURSE:

this is a fanciful name for what is something more mundane. It is the empty egg case from which a baby ray or dogfish has emerged. Look for other sorts of egg cases.



17. SEAWEED:

You will find various types of seaweed. They can be divided into green, red and brown types. The green grows best in shallow water where there is more light. The red needs less light. The brown seaweeds live in the deepest water where there is least light. The most common sort is the long strands of wrack. Seaweed is different from all the other finds you will make as it is a plant. This means it can use the strength of the sun in photosynthesis. All the other material you have found belongs to animals. They depend upon plants for survival. Seaweeds belong to the group of plants called algae. All seaweeds need to anchor themselves to rocks. As this is mostly a sandy beach it has little seaweed. The seaweed you find has drifted here from rockier places.

Follow-up Work:

By doing the scavenger hunt you can find out a great deal about what lives in the sea. Discuss the following points:

- Living things or Biodiversity: Did you find examples of the remains of the following things that were once alive: plants, animals, mammals, birds, fish, molluscs, gastropods, bivalves and crustaceans? You can sort your finds out while you are at the beach or back at school.
- Numbers: Even without using the tally chart it will have been obvious that there is a difference between the numbers of shells you found. Can you account for these differences in number, (clue think rocky shore and sandy shore)?
- Food chains: You will already have studied food chains. We will deal with this more thoroughly in a later section. For the moment try and guess what each creature needs to do to survive. Sort out the differences between plants and animals first of all.

You can use your fact sheet to help you draw the different things you found.

BEACH CLEAN UP

This activity consists of a walk along the beach collecting all the man made material you can find, in other words rubbish. You will need bin liners and plastic gloves for this task. Most importantly you will need to wash your hands after the activity. Do not lift anything that would be sharp or really dirty. The rubbish you collect can be stored in the bags. You can dispose of it your self or contact North West Nature Reserves at Telephone: (028) 7776 3982. They will arrange for the rubbish to be collected.

The purpose of this exercise is not only to clean up the beach, but also to increase awareness of the impact of pollution on wildlife and on people.

Fill in the table below. You are asked to make a note of each type of rubbish. The tally section asks you to count the number of times it occurs. The biodegradable section requires you to decide if it will easily rot away – answer with a yes or no. The source section asks you to think how the rubbish got into the sea. The solution means how this pollution could be prevented. You will need to take some time to think about it.

Item	Tally	Biodegradable?	Source	Solution
Wood				
Fibre rope				
Nylon rope				
Nets				
Fishing tackle				
Plastic bag				
Plastic bottle				
Other plastic				
Metal				
Medical waste				
Oil				
Paint tin				
Paper				
Glass				



BROKEN GLASS is very dangerous



PLASTIC & POLYSTYRENE are not biodegradable



NETS & POLYSTYRENE are dangerous for birds, whales and turtles



BEACH CLEAN-UP

Follow-up: Pollution – Some points for discussion

Pollution is one of our most serious modern day problems. Your beach clean up will help you to become more aware of its affects. Most of the material you find on the beach will be swept in by the tide. Other stuff will have been dumped by careless visitors. You may be lucky in one sense and find very little to collect. Unfortunately this is not normally the case and the beach has normally a fair share of items to be collected. This material comes from various sources. It can be dumped overboard from ships. A lot of it will come from dumps on the land and may have floated there from very far away. Other pollutants continue to be pumped into the sea. You are asked to look at each item and consider what affects it would have on wildlife and in humans.

As far as people are concerned, an obvious example would be a broken bottle. Imagine standing on this in your bare feet. All this rubbish is very unsightly. It has a bad affect on tourism. Wildlife can also be very badly affected by this stuff. Diving sea birds such as gannets and cormorants can be caught up in old fishing nets. Plastic bags have been found in the stomachs of whales and turtles which mistook them for the floating jelly fish that they normally eat. Polystyrene, the material used for packaging, is also lethal. It breaks up and floats in the sea. To many sea creatures such as large whales it resembles plankton. They eat it eventually choking their gut with this indigestible material.

Another consideration is the length of time some of this material lasts. Wood, paper, and even metal will eventually disappear as they are degraded by the salt in the sea. Other material, mostly plastic, is virtually indestructible and may take thousands of years to disappear. In other words some things are biodegradable and others are not.

The material you have collected is very obvious. However, there is a type of pollution that is more difficult to recognise. People continue to pump waste into the sea. Sometimes this happens by accident as is the case with oil spillages. Other waste is poured into the sea deliberately. Sewage is just one example. Excess fertilizers used by farmers make their way to the sea down rivers. There are also the waste products of industry chemicals, heavy metals and nuclear waste. These are all poisons of one sort or another. They are all the more dangerous as unlike the rubbish lying along the beach they are invisible.

Their affects can be very severe. One example of a food chain in the sea would be: plankton – small fish – big fish – seal – killer whale, (see below for more on food chains in the sea). Plankton absorb these poisons. These poisons cannot escape. They become more and more concentrated in the bodies of each animal as it passes up the food chain. This problem is so severe in certain parts of the world that some whales could be classified as toxic waste. It is important to remember that we also fit into the food chain of the sea when we eat fish.

We are lucky in so far as Lough Foyle is not highly polluted. Salmon still make their way upstream. Salmon are bio-indicators. This means that they let us know about the health of our environment. They can only survive in clean water. In other parts of the world rivers and the sea are so polluted as to be highly dangerous.

BIRDS

The reserve is an excellent place to observe birds. As birds can move about so readily you will not be guaranteed to see any of the birds mentioned in the text, but you will be unlucky not to see some of them. Binoculars are always a big help when looking at birds.



MEADOW PIPIT



PIED WAGTAIL



PEREGRINE FALCON



RINGED PLOVER



OYSTER CATCHER



SANDERLING



CURLEW



REDSHANK



EIDER DUCK



CORMORANT



GANNET



BLACKHEADED GULL



COMMON GULL



HERRING GULL



GREAT BLACK BACKED GULL

There is such a variety of birds because they can use different habitats in or near the reserve. In the sand hills you will see meadow pipits and pied wagtails. Along the tide line you may see many varieties of birds. Oystercatchers can nearly always be seen near the sea searching for worms and shellfish with their long beaks. Ringed plovers are also quite common. In winter they are often joined by sanderlings, curlews and redshanks. Out at sea are eider duck, cormorants and gannets. Each has its own way of diving underwater to chase fish. Eider duck and cormorant dive into the water from the surface as they swim along. Gannets take a more spectacular approach. They plunge into the sea from a great height. Gulls you will see anywhere. Try to tell the difference between each gull: black headed, common, herring, black backed and great black backed. You may be lucky to see a peregrine falcon hunting the other birds. The peregrine is a bird of prey specially built for hunting. It nests on the nearby Binevenagh cliffs in the summer time.

Adaptations

If you get a chance to look more closely at the birds, you will see that they are built in different ways. Binoculars are a great help. These differences are called 'adaptations'. You can tell where a bird lives and what it eats by looking at adaptations especially in their feet and beaks. These adaptations suit them for their habitat, the place where they live.

A bird like the meadow pipit is built for life on land. Its feet are for gripping branches or walking along the ground. By contrast the oyster catcher is a wading bird. It has long toes and long legs allowing it to walk across soft sand or into shallow water. Its long thin beak allows it to probe into sand to look for worms and shell fish. The cormorant has large webbed feet allowing it to swim well. It dives under water to chase fish. You will often see the cormorant drying its wings. Unlike most water birds it has no oil on its feathers. This makes it easier to dive and swim, but it must dry out its feathers to enable it to fly more easily. The peregrine falcon is a typical bird of prey. It has sharp claws called talons. It uses these to kill other birds. It then tears them up using its curved beak.

Migration

Probably the best time to watch birds at Magilligan is in autumn and winter. There are more birds at this time because many species of birds: ducks, waders, geese and swans migrate here in winter from in or near the Arctic. It is impossible for the birds to remain there in winter as it is too cold and they can find nothing to eat. Our winters are much milder than those in the Arctic. The birds do well here in the relatively mild weather where they find enough food to survive. These birds return to more northerly parts of the world in summer to their breeding grounds. The whole of the Foyle estuary is recognised internationally as very important for these winter visitors.

LEARNING THROUGH OBSERVATION

Look out for any of the birds on your recognition chart and any others you may see. Make a note of the following features and keep a tally of the number of birds you see. Is the beak long or short? Are the legs long or short and what colour are they? Are the feet gripping feet, wading feet or webbed feet? (Look on the sand for clues) Where do you see the bird? What is it doing? You will not make all these observations but note down as many as you can. By making these observations you will begin to see that each species is different, occupies its own special habitat and has different habits.

Species	Colour	Beak	Legs	Feet	Place	Activity	Tally
Meadow pipit							
Pied wagtail							
Peregrine falcon							
Ringed plover							
Oyster catcher							
Sanderling							
Curlew							
Redshank							
Eider duck							
Cormorant							
Gannet							
Black headed gull							
Common gull							
Herring gull							
Great black backed gull							

Suggested Follow-up

1. Make a bar graph of the birds you saw.

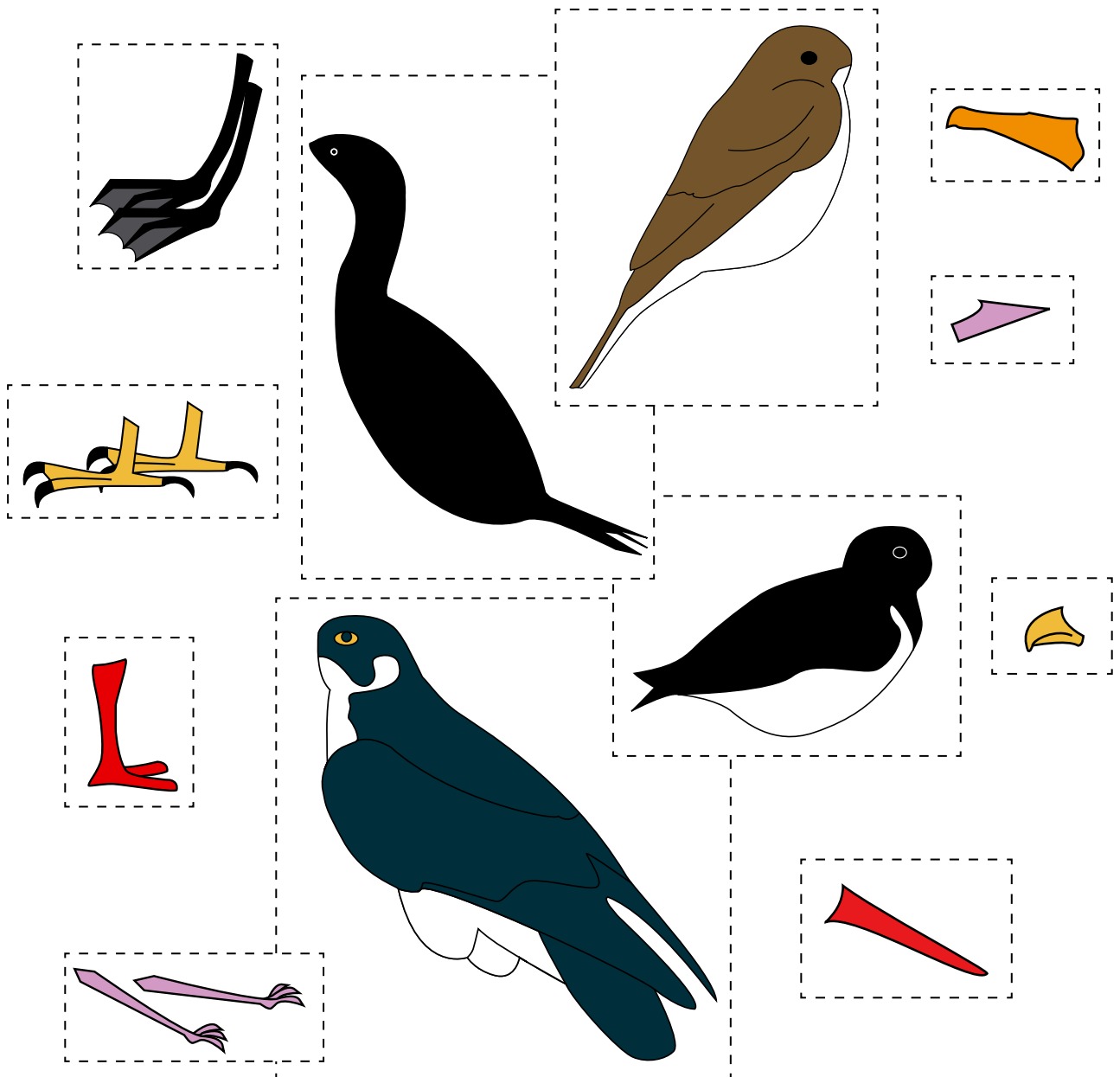
Which was the commonest?

Can you explain the differences in the number of birds? Was it just a matter of chance or was there any reason for it?

2. Migration: Can you explain why many birds would spend the winter in Ireland? On the other hand why do birds come here just for the summer?

3. Chose one bird you saw and draw it. Label it carefully with the particular adaptations it has which allow it to survive.

4. Look at the mixed up drawings of four birds: meadow pipit, oyster catcher, cormorant and peregrine falcon. Draw lines to connect the correct body parts. (They are not to scale)



MARINE MAMMALS FACT SHEET

Mammals are the animals most closely related to ourselves. They are like us in many ways. They breath using lungs. They are warm blooded. They give birth to live young. They feed them on milk. They generally have hair or fur. Just a few kinds of mammals are adapted to life in the sea. Being at the top of the food chain they are all fairly rare as compared to other creatures such as plankton, shellfish or fish. The chances of seeing them from Magilligan Point during your visit are fairly slim. However, if you spend an hour looking out to sea with a pair of binoculars, you might just be lucky. Below is a list of the most common marine mammals living around the Irish coast.



1. COMMON SEAL:

length 1.8m. In spite of their name these seals are less often seen than grey seals on the north coast of Ireland. Common seals spend most of their life around the coast sometimes pulling out on sandbanks to rest or breed. Pups are born in June and July. They are looked after by their mother until mid September. Population crashed by 70% in 1988 due to viruses probably caused by PCB pollution.



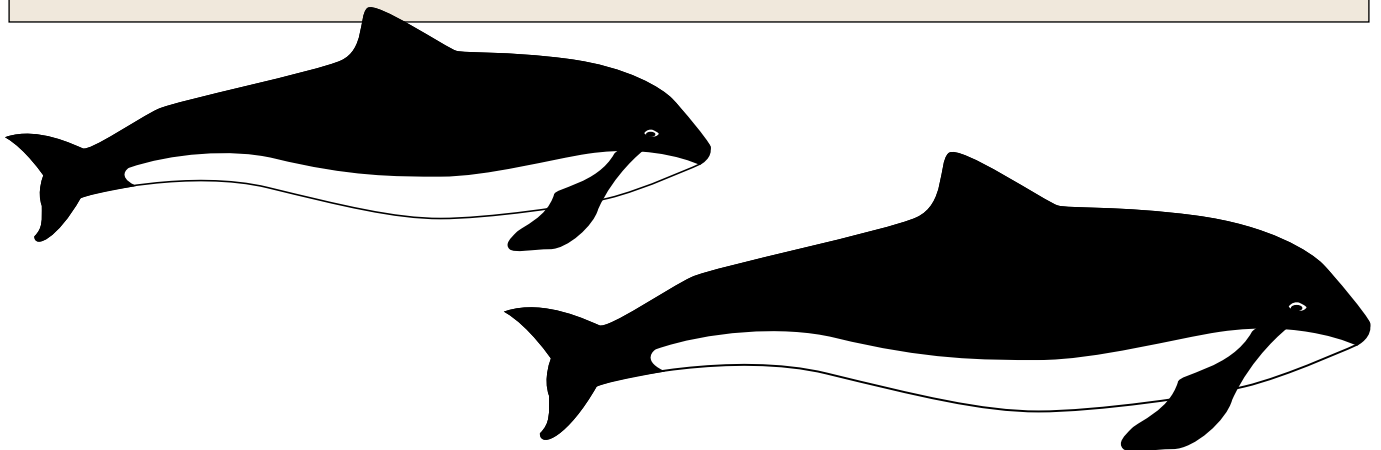
2. GREY SEAL:

length 2.7m. This is the sea mammal you are most likely to see. The male grey seal is easy to distinguish by its 'roman nose'. They will approach quite close to people seeming to be as curious about us as we are about them. Normally they prefer rocky coasts for breeding and hauling out. Pups are suckled for 21 days and then abandoned making their way out to sea when they get hungry.

The whales, dolphins and porpoises belong to the order Cetacea. They are all completely adapted to life in the sea. Until relatively recently it was thought they were some kind of fish not a mammal like us. Unlike the seals they do not even need to come ashore to have their young. We may think that whales only live in more exotic parts of the world. This is not true. There are an estimated 77 species worldwide of which 23 can be seen around the Irish coast. Many species of larger whales have suffered from hunting by man but are now protected by International laws.

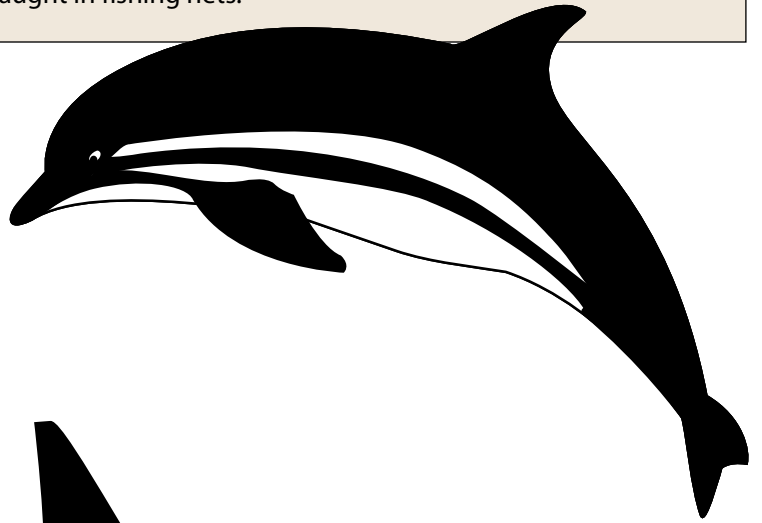
3. COMMON PORPOISE:

length 1.8m. This is the smallest and most common cetacean. Its numbers appear to be falling possibly due to pollution and over-fishing of the fish they eat. They will often chase herring inshore in the evening.

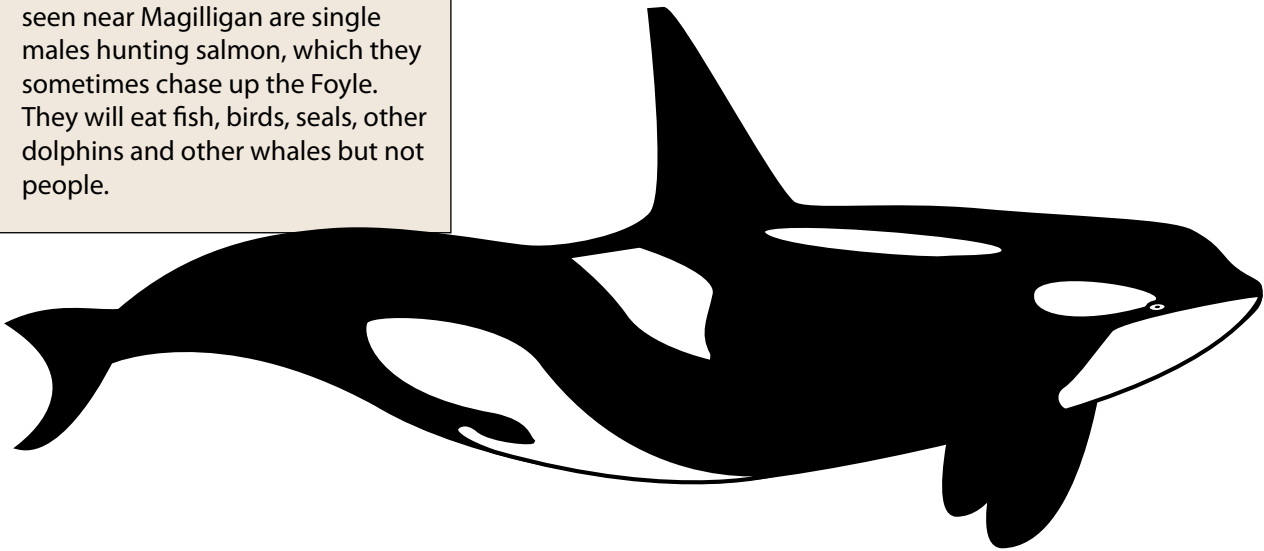


4. COMMON DOLPHIN:

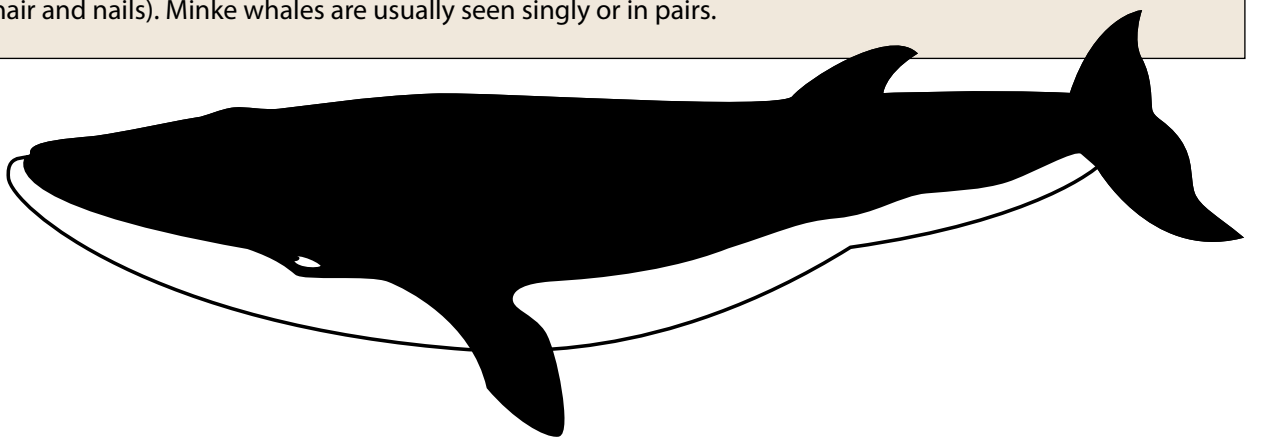
length 2.4m. Along with the bottle-nose dolphin this small cetacean seems to enjoy being close to people, riding on the bow wave in front of boats. In the case of Fungi – the half-tame dolphin in Dingle in Kerry – it is quite happy to let swimmers approach very close. Normally dolphins can be seen in family groups called schools. Very clever, it may be that they are the most intelligent creatures next to people. Their numbers are affected by pollution and they are sometimes caught in fishing nets.

**5. KILLER WHALE:**

length 9.5m. The killer whale or orca is a toothed whale or very large dolphin. They usually hunt in groups called pods of around 40 animals. However the ones seen near Magilligan are single males hunting salmon, which they sometimes chase up the Foyle. They will eat fish, birds, seals, other dolphins and other whales but not people.

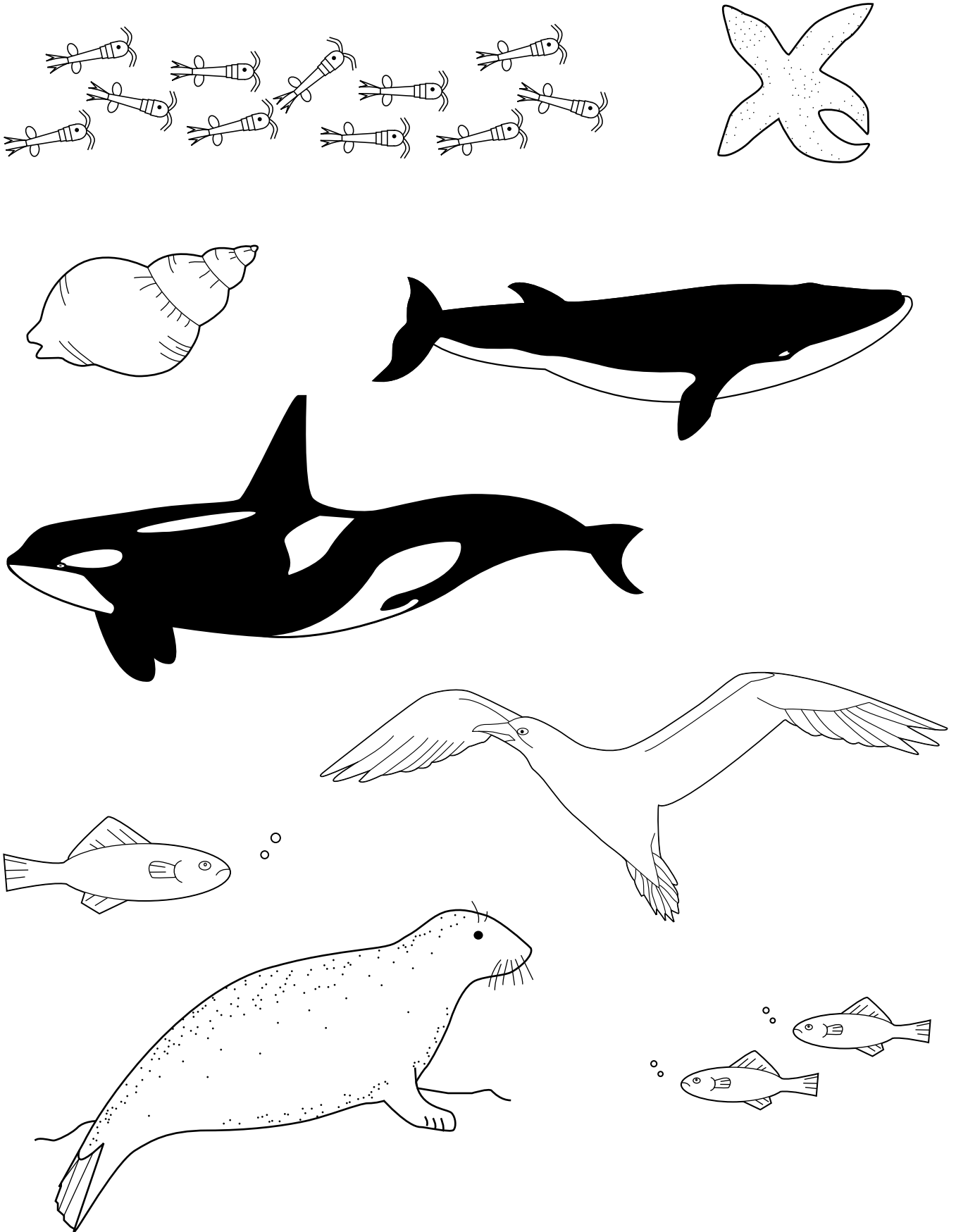
**6. MINKE WHALE:**

length 8.0m. The Minke whale is one of the smallest of the rorquals. Other rorquals such as the blue whale are some of the largest animals that have ever lived on earth. These whales have no teeth but sieve small fish and plankton through comb-like structures called baleen. This is made from keratin (the same material which makes up our hair and nails). Minke whales are usually seen singly or in pairs.



MARINE FOOD CHAINS AND FOOD WEBS

Cut out these pictures to make a food chain or web. The pictures show: plankton, shellfish, starfish, small fish, large fish, seal, bird, killer whale, minke whale. The links may not be as obvious as they first appear.



SAND DUNE DEVELOPMENT AT MAGILLIGAN

The development of the dune system at Magilligan is complex. In very simple terms, the dunes themselves are formed by a combination of factors: sand, currents, tides and wind. After the last ice age the sand was washed down to the sea. This sand was swept along the shoreline by a current that moves along the beach from south to north. This current is called long shore drift. The wind then piled up the sand against small obstacles such as vegetation. Eventually the sand achieved the typical dune formation we see today with alternate humps and hollows. This whole process began some 6,000 years ago. At that time the Foyle would have been a more open estuary but this was gradually filled by a successive series of sand dunes that formed the low lying land known as Magilligan and gradually making the mouth of the Foyle narrower and narrower. The land of the Magilligan area is the most recent in Ireland only forming in the last 6,000 years.

Sand dunes are fluid features advancing and retreating on an almost daily basis. The general trend at Magilligan over time has been to narrow the mouth of the Foyle as the dunes advance. However, on some days the dunes can appear heavily eroded by storms and tide surges. At other times the dunes will begin to grow again.

There is a recognised pattern to this movement of sand. At times the sand can be swept out to a sandbank just off shore. This is known as the Tune's Bank. It is generally quite obvious as waves can be seen breaking over this feature even on the calmest days. At other times large quantities of this sand is returned to the shore. Some idea of the movement of the dunes can be gained from the position of the Martello tower. When it was built 200 years ago, it was actually on the beach. Now it stands 100 metres from the sea.

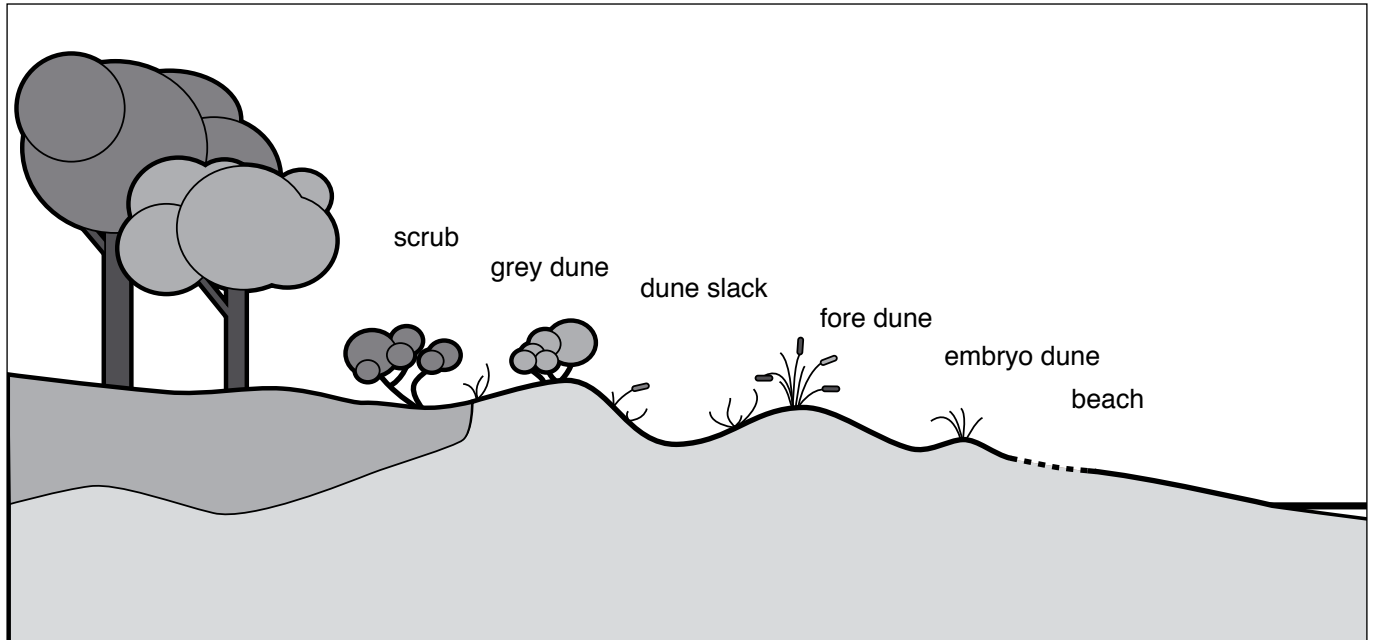


Sand dune erosion 2006

The Dunes

It is possible to study all manner of features of the dunes. This article concentrates on the factors affecting the different living things, biodiversity, of the dunes

The diagram below illustrates the pattern of dune formation moving from the sea inland.



The diagram shows a sequence of dunes beginning at the seaward side. The first dune is known as the embryo dune. This is not always present along the full length of the shore as tides can erode this on a regular basis. The next dune is the foredune. Behind the foredune there is a depression known as the dune slack followed by the grey dune and finally furthest inland the scrub area. The most recently formed dunes are the foredunes. The oldest is the scrub area. The dunes provide an excellent opportunity to study plant succession.

The area nearest the sea is the harshest environment for plants. Plants do not grow on the beach as it is covered by the sea twice a day. In the embryo dune area plants can get a foothold in the harshest conditions. Sometimes the sea will invade stopping all growth. At other times the plants can gain a foothold. However, they have got to exist with problems such as: salt, shifting sand, high winds and lack of moisture as water drains away rapidly and the lack of nutrients in the soil. This is a very harsh environment for most plants. Very few plants are suited to these conditions. As one moves inland these problems gradually decrease allowing much more growth and more species of plants to flourish.

Activity: Plant succession transect.

This theory can be tested by doing a simple transect from the beach gradually moving inland. The transect begins on the beach. A convenient finishing point would be at the road. Readings at roughly every 20 metres would allow the plant succession to become apparent. By using a quadrats, anemometers and thermometers students should be able to test the gradual change in conditions from beach to a more inland location. Teachers can devise their own charts but the one below should be adequate.

Transect recording sheet.

Transect Number: _____

Stop 1
Temperature
Wind Speed
Ground Cover %
Vegetation
Stop 2
Temperature
Wind Speed
Ground Cover %
Vegetation
Stop 3
Temperature
Wind Speed
Ground Cover %
Vegetation
Stop 4
Temperature
Wind Speed
Ground Cover %
Vegetation
Stop 5
Temperature
Wind Speed
Ground Cover %
Vegetation

Hypotheses

Often the best way to study an idea is to set up an hypothesis. One can then test this by the data one finds. In theory the temperature would rise slightly as one moves inland. The wind speed will drop considerably. The ground cover percentage will rise from 0% on the beach to near 100% inland and the number and variety of plants in each quadrat square will also increase. The reason for the increase in vegetation is that the older dunes have had time to develop nutrients in the soil. This is even obvious to the naked eye as the dunes nearer the sea are yellow in colour those further away are greyer because of the humus content in the soil.

Plant variety: There is a wide variety of plants growing at the reserve. Each of them occupies their own niche.

Beach: It is not possible for land plants to grow here as the beach proper is covered by the sea twice a day.

Embryo dune: Very few plants can resist the harsh conditions: rapid drainage, shifting sand, sand blasting, salt content and occasional flooding by the sea at exceptionally high tides. One such plant is the sea couch grass. It thrives because it is able to store water in its leaves. In addition it is able to resist the salt content of the sand and thrives on being buried.

Foredune: The predominant plant here is the marram grass. It is the plant we most associate with sand dunes. It thrives on being buried. It has rolled up leaves which help prevent moisture loss in the dry conditions. These rolled leaves have shiny outsides. The leaves can align themselves to the prevailing wind turning their shiny side to the wind and thus preventing more moisture loss. Its roots or rhizomes store moisture for the plant. In addition they grow both horizontally and vertically in a trellis like pattern. This helps to stabilise the dune and allows other plants to take a hold.

Dune slack: This is the low lying area between the foredune and the grey dune. In wet winters it can even be flooded forming shallow ponds. The vegetation here is not as specialised as that nearer the sea. The ground cover can be almost 100%. There are mosses, buttercups, violets and many other of the wild flowers one can find almost anywhere. In early summer there is also the chance of seeing really beautiful plants called orchids.

Grey dunes: here there is a further increase in variety with larger plants, which are supported by more nutrients in the soil: dandelions, birds foot trefoil and clover. In certain years there is a profusion of large clumps of the yellow ragwort.

Scrub: In an ideal situation over time the vegetation of this part of the dunes would develop into a forest area with willow, birch and oak. This has not happened at the reserve. Some small often prickly bushes can be seen in this area, e.g. blackthorn and gorse. Even these find it difficult to grow because their shoots are eaten by rabbits. EHS staff also clear them away periodically to prevent them dominating the other plants in the dunes.



MARRAM GRASS



BUTTERCUP



BIRD'S FOOT TREFOIL



VIOLET



DANDELION



SEA COUCH GRASS

**CLOVER****YELLOW RAGWORT****COMMON SPOTTED ORCHID****BLACKTHORN**

This study of the plants that occur at Magilligan allows us to begin to understand what plants need to survive and what stops many of them thriving. The succession of plants of what begins as a very harsh environment and then gradually changes also lets us see how plants can colonise an area. It is a useful exercise as it helps us understand how plants survive in a place like a desert. It also helps us understand how plants would have begun return to Ireland after the last ice age 12,000 years ago.

Animal life on the dunes

As to the animal life of the dunes one can always find land snails. They should not to be confused with their gastropod cousins whose remains one finds on the beach. In early summer there is also a profusion of the spectacular six spot burnet moth. The activities of rabbits are always obvious with their burrows and dung. This dung obviously helps with increasing the fertility of the soil. The Magilligan area was once famous for its rabbits. Huge numbers of rabbit skins were exported from there during the eighteenth century. Your knowledge of food chains will let you know that where there are rabbits there will be foxes to eat them.

**BROWN LIPPED SNAIL****RABBIT****SIX SPOT BURNET MOTH****FOX**

Threats to the dunes

The dunes themselves are not stable features. They can be affected by the action of wind and tide. They are also vulnerable to damage by human activity. Collecting sand from the shore or building new features, like the new ferry landing along the shore, can also cause problems. Dunes can also be destroyed by trampling by too many feet or by using them as recreation areas for vehicles such as motor bikes. If the vegetation is worn away the dunes can become more vulnerable to action of high tides and storm surges. In extreme circumstances storms can break through the dunes. Once this happens there is the danger that they will be completely destroyed. This in turn might lead to sea invading areas which are now dry land. To prevent these problems use of the dunes need to be carefully controlled.

Follow-up Work

1. Draw graphs of the results of your survey.
2. Analyse the results. Do they comply with our original hypotheses: temperature will increase slightly, wind speed will drop considerably, ground cover will increase and the species of plants will increase in number?
3. Draw a cross section of the dunes from the sea inland and note the type of vegetation and animal life you discovered associated with each area: beach, embryo dune, foredune, dune slack, grey dune and scrub.
4. The dunes are a harsh environment for plant and animal life yet they have a certain beauty. Explain why such an area has been designated as a nature reserve.
5. Why is it important to control recreation and other human activity on the dunes?

MARTELLO TOWER FACT SHEET

It is possible to make a visit to the Martello tower. It is normally kept locked. For safety reasons it is necessary to be accompanied by an EHS member of staff. You can arrange a visit either by contacting North West Nature Reserves, Tel: 028 777 63982 or the educator at Roe Valley Country Park, Tel: (028) 777 67532.

The Martello Tower stands surrounded by sand hills in the reserve. This strange structure was built to repel an invasion by the French. In 1796 a large fleet of French ships with 14,000 men and Wolfe Tone, the leader of the United Irishmen, on board just failed to land at Bantry in Co. Cork. In August 1798 during the United Irishmen's Rebellion 1,000 French troops led by Humbert landed at Killala in Co. Mayo. They were eventually defeated after some fierce fighting. Later in October Wolfe Tone was captured just outside the Swilly. Tone committed suicide and the United Irish Rebellion ended. Continued fear of invasion required the building of strong and very expensive defences.

In fact by 1803 the French Emperor Napoleon Bonaparte had abandoned any plans to invade England and Ireland. However, it was in the same year that it was decided to build a series of defensive towers capable of firing at any invading French fleet and of withstanding a lengthy siege. In 1784 British forces attacked the ancient 'Mortella Tower' in Corsica. Days of bombardment had failed to destroy it. So impressed were the British forces that they adopted its basic design for all the Martello Towers.

Between 1804 and 1815 around 200 of these towers were built. Of the 74 built in Ireland 40 or so survive. They were placed at strategic points all around the coast. They were designed to be capable of firing on an invading fleet. They were also designed to withstand a lengthy siege, if an invasion force was ever to land. The Martello Tower marks the end of a long tradition in Ireland of defensive buildings stretching back over 3,000 years to Bronze Age forts.

The walls of the tower were built of imported stone. There are three floors. The top floor housed a twenty-four pound gun able to swivel and shoot in any direction. There is a small furnace used to heat the shot in order to set wooden ships on fire. The middle floor was the living quarters for one officer and twelve men. Below is the cellar. This is reached by a spiral staircase. There is a water well and storage rooms for gunpowder and food. The entrance to the tower has been changed. An iron staircase replaces the original wooden ladder.

When you have a look around the tower you will be able to answer the questions on the next page.



Outline section of Martello Tower

Work sheets and Follow-up work.

You can use this work sheet during your visit. You can answer the questions more extensively after your visit.

1. By using the stones estimate the height, circumference and thickness of the tower.
2. How would the shape of the tower help keep it safe against canon shot?
3. The tower used to stand next to the beach. What has happened in the last 200 years to place it 100 meters from the beach?
4. At Greencastle on the far side is another Martello tower. Why do you think it was necessary to have two towers?
5. For what was the furnace used?
6. The officer's room on the middle floor has a larger fire than the men's room. Does this tell us anything about the attitudes of people 200 years ago?
7. The bottom floor had three uses. What were they?
8. This was one of the last fortifications built in Ireland. What made fortifications useless after this date?
9. Imagine you were a soldier in the tower during an attack. Describe your experiences.



Martello Tower at sunset

Northern Ireland Environment Agency
Klondyke Building
Cromac Avenue
Gasworks Business Park
Belfast BT7 2JA
T. 0845 302 0008

www.ni-environment.gov.uk

Our aim is to protect, conserve and promote the natural and built environment for the benefit of present and future generations.



An Agency within the Department of the
Environment
www.doeni.gov.uk



INVESTOR IN PEOPLE