SHERKIN COMMENT

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INSIDE

A crayfish emerging from a crevice *(see centre pages)*

Photographer: Paul Kay

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Fisheries and Conservation

By Matt Murphy

FISH stocks in Irish waters have been under constant threat for many years. In the main Spanish, French and British flags of convenience trawlers are the main culprits. The EU fisheries commissioner in Brussels annually announces the need for major cuts in catches for the various species. A few days each December "horse-trading" and brinkmanship is the order of the day. The deals are done and fisheries Ministers from each country put a gloss on the results for home consumption. However if one is honest, the day of reckoning for an effective conservation programme has been put off until "tomorrow" because the French and Spaniards get their way.

One must accept that Ireland does not have the same clout at the EU fisheries table as the French or Spaniards. These two countries have failed totally to police their own trawlers when landing fish. They, with the British flags of convenience vessels, have and are still raping what is left of Ireland's fishing stocks of hake, cod, whiting and monkfish, which are nearing extinction. The size of fish being caught is dropping dramatically. In whiting alone there is now a 80% discard in the Irish sea - in simple terms for every 100 fish caught only 20 are brought ashore for sale. In the major hake fishery 45 miles south of Castletownbere the large fish are gone and much of what remains are not suitable for landing - yet the EU has not said stop.

Fish conservation is vital for the marine environment as a whole. When large fish species reach low levels there is little spawning stock biomass. Then small fish species which have no commercial value will take their place and feed on the eggs and larvae of the few remaining large fish that spawn - thus the larger species cannot recover.

There are only four ways to conserve fish stocks and each one is vital:

i) Close spawning grounds
ii) Close nursery areas
iii) Technical conservation measures - particularly increased net mesh sizes and square mesh panels in the net, which allow under-sized fish to escape
iv) Observers on board large fishing vessels. This is equally as important as closing areas. The Canadian and US governments use observers on board so that the type, size and quality of fish caught can be independently recorded.

We must never forget what happened to the cod stocks off Newfoundland, Canada, which failed in 1992. Over 55,000 fishermen and women lost their jobs over the period 1992-95 - eight years on, the cod the stocks have not recovered and many people are still without jobs. It is difficult to understand that in 1962 the cod spawning biomass was 1,600,000 tonnes (Figure 1) - in 1992 they were close to zero. Every year from 1970 to 1992 official reports highlighted the need to conserve and manage Canada's fisheries but common sense was forgotten for short-term political gain. Minister Brian Tobin, Canada's Fisheries Minister in 1995 and now Premier of Newfoundland, on a visit in 2000 to the United Kingdom warned UK fishermen and the authorities that if a fishery collapsed completely it might never return. Signs of collapse could not be ignored - the situation had to be acknowledged and acted upon to prevent massive and costly disruption of communities.

In 1995 Minister Tobin shocked the EU community by arresting the Spanish trawler "Estai" outside Canada's 200 miles limit. The Spaniards had 350 tonnes of juvenile turbot on board. None of the fish were capable of reproduction. Two sets of log books were found on inspection of the vessel. One - the actual - the other contained information to disguise the amount and composition of the catch. The EU condemned the arrest instead of condemning the appalling fishing tactics of EU vessels. Tobin held his nerve and Canada introduced 100% observer control on all foreign vessels fishing in the North Atlantic zone - as Tobin has said prior to and up to 1995 the fishing practices of Spain off Canada were atrocious. Now with the new enforcement programme those practices have been improved.

Ireland must as a nation bombard the EU Commission to accept observers on boats. In April 2000 our present fisheries Minster Mr. Frank Fahey "asked Commissioner Fischler to expedite practical progress on this issue in the EU and secured his agreement that the Commission will convene an early meeting of the Member States concerned to advance a pilot project." A pilot project is rubbish, Ireland's fish stocks need urgent surgery - pilots projects are, in reality, stonewalling.

At the time of his retirement, Joey Murrin, former Chief Executive of the Killybegs Fisherman's Organisation, in an interview with Fishing News, the UK fishing weekly newspaper, stated: "I am sick and tired of listening to fishermen saying: if we have 110mm mesh nets we're going to go out of business; if we hve square mesh panels we're going to go out of business; if we have closed areas we're going to go out of business. I pose the question and nobody can answer it to me: if we keep on going the way we are going are we not going to go out of business anyway? This is a slow death."

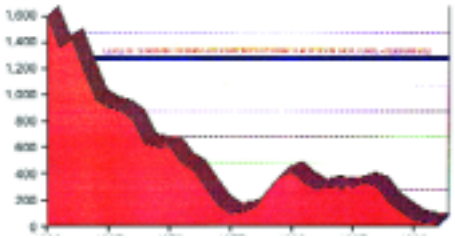

Figure 1: Northern cod spawning Biomass age 7 or over - from 1962-1994

The marine ecosystem must be protected. It is in the interests of everyone that it is, especially for fishermen, and if compensation has to be paid to them to stop fishing in certain areas, then so be it. No one at present knows the real damaged that has and is being done. No doubt in two to three years we will.

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Sherkin Island's Horseshoe Harbour

Photo: © Ian Watts

Horseshoe Harbour, Sherkin Island

By Renata Kowalik

HORSESHOE is a picturesque, natural harbour situated on the south east side of Sherkin Island. It forms a natural amphitheatre surrounding the water below, with the narrow mouth acting as a breakwater calming the often turbulent sea outside. It is a fairly shallow harbour, only ten metres deep near the mouth, covering the area of a small stadium. On entering the harbour from the mouth, it opens out, with a disused quarry lying to the right and a small square cove opposite. The rest of the harbour then curves around smoothly with only a few rocky outcrops breaking the line.

With over a hundred species of seaweed and more than sixty recorded species of animals, the harbour is diverse and rich with life. At low tide where the rocky shoreline meets the water, a dense bed of kelp and thongweed can be seen resting their blades on the surface of the water. Above this, where the water has receded, every square metre has thousands of barnacles and periwinkles covering the rocks. Beadlet anemones flourish in the rock pools and crevices with their tentacles drawn in waiting for the tide to return, interspersed are snakelocks anemones waving their stinging, purple tipped tentacles, unable to retract them completely. This intertidal area is rich with marine plants and animals that take advantage of the protection that the rocky shore offers.

Whether walking at low tide, snorkelling or diving there is more than enough to see along the fringe of the harbour, but to discover a little more, the diver can descend a little further. It may be that only a few metres down a pair of lesser spotted dogfish are swimming between the kelp stipes or resting on the bottom. A white encrustation covers many of the kelp blades, this is the sea mat, it has a distinctive lacy pattern and is a bryozoan. It is not a single animal but a collection of hundreds of small animals living in a colony. Hiding amongst the seaweed cuckoo wrasse can often be seen, the male with his bright blue head and orange and blue stripes along the body. The female is a plain reddish colour in comparison, and hard to see in the shadow of the seaweed. They are usually seen together during spring and early summer when they lay eggs in a nest on the sand and gravel. For those interested in marine plant life the rocks contain enough to keep you interested for hours. Red seaweeds abound here including those that are encrusting, covering the rocks, and the brittle coral weed that has a chalk skeleton.

"With over a hundred species of seaweed and more than sixty recorded species of animals, the harbour is diverse and rich with life."

Moving deeper, the kelp gives way to eel grass, a flowering plant known as seagrass, not a true seaweed. It can grow up to a metre in height and is conspicuously green against the silt bed. The greater pipefish, a close relative of the seahorse, is often found here, with its long slender body and long snout. Sea whips attach themselves to any loose stone or shell. Growing up to four and a half metres in length they have a slimy texture with whip like stems. Beyond the seagrass beds the bright green sea lettuce floats just above the bottom, shifting with the movement of the water giving cover to hermit crabs and small swimming crabs. Animals unafraid, like the slightly aggressive velvet swimming crab, walk boldly across the sediment. Unusually the masked crab can be seen during the day walking on the surface, it would normally bury itself in the sediment during the day, coming out to feed only at night. It has long antennae that are held together and used as a pipe to allow water to reach the gills when it buries itself.

Photo: © Paul Kay

Unlike other anemones, the Snakelocks Anemone cannot draw its tentacles into its body when disturbed or when the tide goes out, so it lives in rockpools and on the lower shore where it can remain covered with water.

Towards the centre of the harbour at six or seven metres below the surface, there is a soft muddy bottom that at first appears barren but on closer inspection contains hidden life. Small and delicate, the long-legged spider crabs hide amongst the maidens hair seaweed, and if you are lucky you might find a smooth, all white, burrowing nudibranch just pushing beneath the surface. Most marine worms are hidden from view, burrowing into the sediment or tube dwelling. Some of the burrowing worms are given away by their elaborate homes such as the sand mason and parchment worm. Burrowing brittlestars reveal themselves by keeping one leg above the sediment, waving it gently to catch food particles. The great scallop nestles in the sediment and if disturbed will snap its shell closed with a puff of the surrounding sand. It is an active swimmer and in some cases when it is disturbed can move rapidly over many metres.

Horseshoe Harbour is a small world, isolated from the Atlantic Ocean outside its mouth. When the sky is cloudless, the sun shines through the kelp and the water is warm, you need a good reason to drag yourself from the depths back to the heavy land-based world. It is a peaceful place that can allow for quiet contemplation, a small haven worthy of a visit from anyone who has a passion for nature with all it has to offer here.

Renata Kowalik - formerly a volunteer biologist at Sherkin Island Marine Station.

Photo: © Paul Kay

The delicate and sticky tentacles of the sandmason worm wave about inthe water, trapping tiny food particles that are present.

Photo: © Terry Farrell

The Edible Periwinkle is one of the most familiar sea snails on the seashore and is the largest of the winkle family.

Non-Indigenous Species Introductions

By Michael Ludwig

IMAGINE an American Cowboy movie where the good guys and the bad guys don't ride into town on horses. Silly? No, it isn't. There were no horses on the North American Continent when Columbus and the Vikings landed. It would take Europeans transporting horses across the ocean and losing a few during their travels in the New World to create the view of horses we all take for granted. Horses were the first non-indigenous species (NIS) introduction we can trace. It certainly hasn't been the last. And, while horse introductions to the Americas worked out pretty well, most of the others have been less appreciated. It is estimated that there are 50,000 NIS in the United States alone and they are causing $138 billion in damage and losses per year. There have been so many NIS introductions around the world that we are now seeing introduced species being displaced by newer introductions. As a result of these NIS introductions, the global ecology is experiencing a remarkable and potentially disastrous shake up.

How did we get in this situation? Simply, no one thought about the consequences of moving things around the world without checking to see exactly what was being moved. In fact, most of the NIS invasions have been facilitated by human activities. Improving transportation is the most frequent villain. Transportation speed continues to improve and, still, there are few controls that might limit where bugs, birds and bacteria that start the day in one locale might end the same day. Fortunately, the receiving location often has an environment that is hostile to the new arrivals. In the days of sailing ships, only the hardiest individuals could survive the weeks it would take to cross an ocean. Species such as the Norway rat found food on ships, survived and even thrived wherever they went ashore. Other species were not as successful, particularly if they had restrictive survival requirements. The new transportation systems deliver goods in days rather than months. Global shipping uses water as ballast as part of their improvements. Ballast is used to maintain the most efficient and safest sailing profile. It used to be rock and many streets are paved with the discarded cobblestones made for ballast. Today, water has replaced other ballast materials. Taken on in one harbour, ballast water is disposed of when no longer needed, regardless of where that might be. Within the ballast water are many of the organisms that swam in the water when it was initially taken on.

The Asiatic shore crab (*Hemigrapsus sanguineus*) is a relatively small crab, with its carapace (or shell) about 2 inches across.

Enter the Asiatic shore crab (*Hemigrapsus sanguineus*). Species use a number of techniques to insure their continued existence. Some rely on production of large numbers of offspring with very rapid maturation characteristics. These species limit predation during their earliest life stages, when they are often unable to flee or hide, by spending only a few hours or days as eggs and weak swimming larvae. Other species produce few young but protect them from predation until they are large enough to fend for themselves. Another technique is to produce large numbers of eggs with a slow growth rate and release them in locations where they will be quickly and widely dispersed. This method limits the likelihood that all the offspring will be eaten. The Asiatic shore crab uses this last technique. It seems ideally suited for ballast water dispersal; its larval stages require about one month to complete. Dispersal and population increases are aided by a reproductive rate which allows production of two broods per season, at least.

Thought to have been a successful traveller in the ballast water of a ship carrying cars or sneakers or other international cargo, the crab was first identified on the US east coast in 1988. First collected around Townsend inlet and Cape May harbour, New Jersey, it appears that in the late 1980s, *Hemigrapsus* were in a ballast water discharge that occurred at the entrance to Delaware Bay. The area possesses the perfect conditions for a successful NIS introduction of a temperate water organism. Vessels leaving sea water and entering less dense, estuarine water in Delaware Bay discharge ballast water to reduce their draft for the trip to the berths along the New Jersey and Pennsylvania coastline. The environment is similar to that found in the crab's homeland of Japan and its preferred habitat is close to the channel. If a pair of organisms can survive to maturity and then find each other, an unintentional introduction will occur. This occurred in at least one instance and a population was established in the rocky intertidal zone of southern New Jersey. Although *Hemigrapsus* has a profligate reproduction rate, the New Jersey introduction may not have been the only one. However, by 1997, the crab was found from Cape Cod Bay in Massachusetts to Oregon Inlet in North Carolina. It is replacing the NIS green crab (*Carcinus maenas*) that invaded our shores in the nineteenth century. We are concerned about the crab because it eats almost anything it finds and excludes other species.

"If a pair of organisms can survive to maturity and then find each other, an unintentional introduction will occur."

Do you know that the potato was brought to Europe by the first explorers of the "New World?" Look around, the ecology of the world is changing thanks to inexpensive (free) transportation. Is this a good idea?

Michael Ludwig, NOAA, NMFS, 212 Rogers Avenue, Milford, CT USA 06460

Competition Winners

The Central Fisheries Board kindly gave "Sherkin Comment" four copies of Peter O'Reilly's book "Flyfishing in Ireland", to give to the first four readers who wrote in giving us the names of 10 freshwater fish found in Irish rivers or lakes. The winners of the books were:

Tony Ellis, Ahascragh, Ballinasloe, Co. Galway.
John T. Murphy, 30 Dundela Haven, Sandycove, Dublin.
Keith Shaughnessy, Loughred, Co. Galway.
Pat Smith, Knockbrack, Lisnagry, Co. Limerick.

Congratulations to all our winners!

Answers to puzzles on page 29

Name the Bird: Puffin
On the Wing: 1-f razorbill; 2-c yellowhammer; 3-d treecreeper; 4-e stonechat 5-b moorhen; 6-a lapwing
Picture That?: a. nest; b. eyes; c. claw; d. neck; e. beak; f. flight

Colours of the Countryside

By M.A. Toole

WINTER is the season in which the countryside slows down and appears to sleep. Then, with the first blink of spring, life seems to move into gear and the world's most prolific chemical factories, the plants, start cranking into production. The first sign of this is the almost imperceptible greening of the brown land and a dusting of buds on trees and bushes. Within a few days, green becomes the dominant hue, overwhelming the drabness of the dead months, to be followed, almost in an instant, by the profligacy of colour brought by the flowers.

The ubiquity of green is due to the presence of chlorophyll in the leaves of plants. This pigment absorbs light radiation from the red end of the sun's spectrum. The energy thus gained is used to break carbon dioxide and water, taken in through the leaves and roots, into fragments from which the plant can build up the sugars and starch which are to be its stores of food, and the cellulose from which its tissues are constructed. The by-product of this process, called photosynthesis is oxygen, which is released into the air.

The early atmosphere of the earth contained no oxygen, so the first living organisms obtained their energy by means of chemical reactions that did not involve the use of this highly reactive gas. It was only with the evolution of the first green plants that free oxygen appeared in the atmosphere. Though oxygen was toxic to many of the early life forms, it opened the door to the emergence of creatures that were able to fulfil their energy needs by the more efficient aerobic burning of foods.

There are, in fact, two forms of chlorophyll to be found in leaves, both based on a similar chemical structure. The basic unit of this structure is a pentagon-shaped molecule, consisting of four carbon atoms joined to a nitrogen atom, which is known as a pyrrole ring. Four of these rings are linked together to form a square molecule with a hole in the centre, called a porphyrin. In chlorophyll, the hole is occupied by an atom of the metal, magnesium.

Porphyrins are quite widespread in nature, hinting at an evolutionary link between plants and animals. Haemoglobin, the red pigment in blood, contains porphyrin molecules in which the central hole is occupied by iron rather than magnesium, while the blood equivalent in certain sea creatures and some insects contains copper. Vitamin B12, essential to the prevention of pernicious anaemia, has a cobalt atom in the centre of the porphyrin molecule.

If a spot of a solution containing the juices of green leaves is placed on some absorbent paper, and a suitable solvent allowed to soak into the paper, in a manner that carries the juices with it, the spot is seen to separate out into a variety of colours. This technique is known as chromatography. It reveals that green leaves contain not only the two chlorophylls, but yellow and orange pigments as well. These are the carotenoids.

The orange pigment, carotene, itself exists in a number of variations and is responsible for the colours of carrots and oranges. One of the variants, beta-carotene, is broken down by mammalian digestive systems into vitamin A, each molecule of carotene forming two molecules of the vitamin. Alpha-carotene, in contrast, produces only half as much. Vitamin A, as such, is not found in plants, but is stored in the fats of creatures that have eaten carotene.

Another variant, lycopene, is responsible for the red colour in such fruits as tomatoes. Similar in structure to the carotenes, but with oxygen atoms attached, are the yellow carotenoid pigments known as the xanthophylls.

Carotene and the carotenoids absorb ultra-violet radiation that might otherwise damage chlorophyll. They give colour to orange and yellow lichens and also to plants that lack chlorophyll, such as fungi.

Insects concentrate carotenoids in their bodies from eating plants and green leaves. Birds, in turn, eat insects, with the result that carotenoids are largely responsible for the colours of their plumage, particularly red, orange and yellow feathers. When pollution reduces insect populations, the plumage of many birds becomes much duller because of a lack of carotenoids in the birds' diets.

As summer comes to an end, and decreasing sunlight means that trees lose water at a faster rate than they can convert it to sugars, production begins to slow down. The carotenoids start to show their colours and the chlorophylls break down to compounds of equally vivid hue, giving rise to the glories of autumn woodlands.

Chemical activity, however, does not cease. Red, blue and violet pigments, called anthocyanins, shade the fruits that have been developing all summer. These can change colour according to acidity. Blackberry and elderberry juice, for example, turn red in acid and yellow in alkali. Beetroot and red cabbage show similar effects, so that these pigments may be used to distinguish between acids and alkalis.

Together with carotenoids, the anthocyanins have coloured the flowers throughout the spring and summer, to attract the insects necessary to pollinate the seeds. They now serve to attract birds and animals to the fruits, so that the ripened seeds can be spread around the countryside. There they lie dormant through the winter months, ready to begin the new greening of the land with the arrival of the next spring.

M.A. Toole, 65, Cheswick Drive, Gosforth, Newcastle upon Tyne, NE3 5DW, U.K.

The Transformation of the Moy

A natural log with "spacers" underneath is put in place in stream bed to provide cover and shade for young fish.

By Vincent Roche

THIS year, the River Moy produced 6,335 salmon to the rod for about 7,500 anglers who came from more than thirty countries. To meet the increased demand for angling, the world famous Moy has been transformed in recent years with the implementation of a major Management and Development Plan by the Regional Fisheries Board.

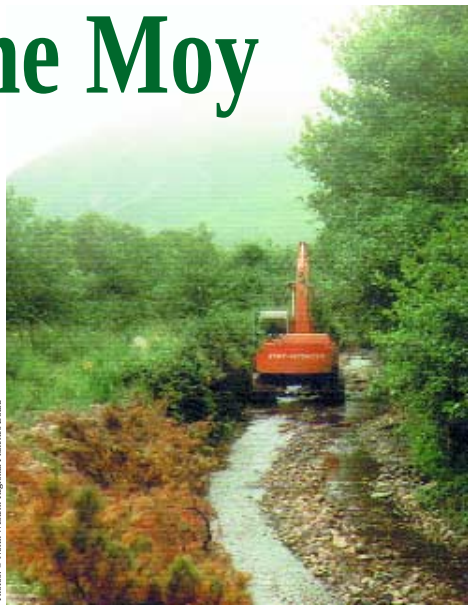
The Moy is 63 miles long and drains an area of 805 square miles in Mayo and Sligo. The system has some 25 tributaries and the catchment includes more than 30 lakes the biggest of which is Lough Conn (12,000 acres).

Salmon have been harvested commercially on the Moy for centuries. The 1960's, however, saw the start of a decline in stocks. The river and its tributaries suffered from a drainage scheme, the onset of drift netting and an outbreak of Ulcerative Dermal Necrosis (UDN) disease. While drift netting at sea expanded, commercial fishing on the Moy estuary also continued with draft nets at six locations and trapping at the infamous "boxes" at Ballina. Dwindling stocks, combined with growing awareness of the tourism potential of salmon angling, resulted in local Fisheries Minister, Paddy O'Toole, buying out the privately owned Moy Fishery, at Ballina, for the State, in 1987. However, the netting and trapping continued, much to the disappointment and frustration of local angling groups and tourism interests. It was clear to all that the huge potential of the mighty Moy was not being realised and that an overall plan was needed. This need was met, in 1992, with the publication by The Western Regional Fisheries Board, of an integrated Management and Development Plan for the Moy System. The objective of the plan was to develop the salmon and trout fisheries of the Moy catchment to their maximum potential and to manage those valuable resources in a way which would yield the maximum benefit for the local economy on an ongoing basis.

"The objective of the plan was to develop the salmon and trout fisheries of the Moy catchment to their maximum potential"

The first step in implementation of the Moy Plan was taken in 1993 with a comprehensive survey of the system. In a huge operation, involving staff from the Central and Regional Fisheries Boards, under the direction of Dr. Martin O'Grady, as many as 246 individual sites were examined in detail. Dr. O'Grady's report found that the rivers and streams held good stocks of salmon and trout fry but survival to the parr stage was generally disappointing. This was attributed to poor quality habitat resulting from 1960's drainage scheme and from various land use practices which had impacted on the riparian zone. Dr. O'Grady became the Regional Board's technical advisor for the Moy Plan and, using a range of internationally tried techniques, he brought forward specific development proposals for habitat improvement.

Funding was provided under the EU-supported Tourism Angling Measure and, in November, 1994, the first steps were taken in a major project that was to transform virtually every river and stream in the Moy catchment. A variety of works were undertaken including the narrowing and deepening of stream channels (to ensure sufficient depth of water during dry spells); the construction of various types of weirs (to provide depth and improve oxygenation); the placing of hundreds of logs in streams (to provide cover and shade for juvenile fish) and extensive bank protection work (to combat erosion and siltation). Fish passes were cut through previously impassable rock faces and pools were excavated on bigger tributaries to provide suitable habitat for adult trout. Extensive monitoring has been carried out to assess the effects of the works and the results have been very encouraging with significant increases in numbers of salmon and trout parr in virtually all developed streams. On the main Moy channel, new angling beats were developed and hundreds of new angling spaces created. A total of £2m. was invested in physical works over the period 1995-1999.



Photos: © North Western Regional Fisheries Board

Work underway on narrowing and deepening a nursery stream in the Moy catchment with Nephin mountain in the background.

While the habitat works were underway, the management changes set out in the plan were also being implemented. Management of the Moy Fishery was devolved to the Central Fisheries Board in 1994. Draft netting ceased with effect from 1995 and trapping ended with effect from 1999 when the fishery was finally transferred to the Regional Board. A new River Moy Manager, Mr Declan Cooke, was appointed. As well as having direct responsibility for management of state-owned fisheries on the Moy, Mr. Cooke also has brief in regard to management of the Moy system generally. A computerised Geographic Information System (GIS) has been put in place and a sophisticated salmon counter has also been installed at Ballina. A comprehensive angling guide has also been published, a new angling centre has been built at the famous Ridge Pool and facilities for disabled anglers have been provided.

The Moy is well positioned, therefore, as we face into the 21st century. While there are concerns in regard to the survival of salmon at sea, everything that can be done has been done to ensure that the system produces maximum numbers of trout and salmon on a sustainable basis. Unfortunately, progress in regard to water quality has not been good. Lough Conn and Lough Cullin are suffering from enrichment resulting from excessive discharges of phosphorous. It is hoped that Mayo County Council will proceed in the near future with proposals to control the use of artificial phosphorous and that the promised new sewage plants, at several locations, will result in a reduction in nutrient inputs to various rivers. The Fisheries Board has discharged its responsibilities and it now hopes that all other relevant agencies will play their part in ensuring the future of a great river.

Vincent Roche, Chief Executive Officer, North Western Regional Fisheries Board, Ardnaree House, Abbey Street, Ballina, Co. Mayo. 096-22788 Fax: 096-70543

A stone weir has been provided in what was formerly a featureless stream. The weir provides depth, cover and natural oxygenation thus greatly improving habitat for juvenile trout and salmon.

Next Door to Nature

By Daphne Pochin Mould

Best fed birds in Europe? Tjorn Lake still partially frozen in this early spring photograph.

IT could so easily have been an urban disaster. Consider the figures. In 1901, Reykjavik, Iceland's capital, had a population of 6,682, 8.5% of the country's total number of people. Most lived on their separate farms or in small coastal fishing townships. Reykjavik was a small cluster of mainly wooden houses, sited between the sea shore and the lake (Tjorn, our word "tarn") - it did not even have a proper harbour. By 1950, it had grown to 56,251, then 39.1% of the country's total. In 1999, it was 109,795, 39.4% of the country's total population of 278,702. Or counting in the "capital area" - development sprawling out round the city limits - a total of 171,514.

But Reykjavik is proud to describe itself as "next door to nature", and Icelanders, busily planting trees -literally by the million - joke about it being the country's biggest forest. Fly over it in summer it is a mosaic of greenery, with the native birch and rowan (mountain ash), various conifers, suburban hedges of willows and thickets of roses *(Rosa rugosa)*. Gone is the thick winter pall of coal smoke that once hung over the town - every building and home is connected to the city's hot water system, fed from the natural hot springs. Forget the long dark winter nights, this city is ablaze with light - electricity generated by the country's great rivers, and to a much lesser extent, turbines driven by natural steam from the country's high temperature areas. It claims to be the only capital with a thriving salmon river through its heart, where the mayor or mayoress must catch the first fish of the season.

Or what other big city has a colony of arctic terns nesting in its midst? Leave some very modern, high tech block of offices, wait for the lights before crossing the stream of gleaming cars, and there's the coastal path. Watch mother eider ducks minding their flotillas of chicks whilst the lazy males sleep in a cluster, ignoring their families. For Reykjavik kept its open spaces and continues to develop them. Every day, crowds of Icelanders go and feed the birds of Tjorn, whooper swans, mallard, tufted duck, eider, a variety of seagulls - they must be the best fed wild birds in Europe! Tjorn and the surrounding expanse of grassy land, has hosted nearly 100 species of bird, including rarities and strays. The new city hall was built over a corner of the lake, so that you can sit in its cafeteria (which serves the best soup I have ever tasted), and look out over the lake and the birds. In winter, the run off from its hot water system keeps a corner of Tjorn unfrozen.

There are big parks and sudden small gardens. A tiny little one, at the back of the parliament house, and for its use, made at the end of the 19th century. One man's creation, Jon's garden - once out in the country but now circled by industrial development - is still carefully maintained. Democracy Garden, in the heart of the old city, from 1974, when Iceland celebrated its 50 years of independence. Here are standing stones, one each from the ancient regional assembly sites of ancient Iceland and from the National Parliament (the world's first), at Thingvellier; each suitably inscribed. And trees and seats. Most of us have wearily tramped city streets; Reykjavik has an abundance of places to rest. And of statutes. Icelanders like art. So Reykjavik's figures range from the very old one of Ingolfur Arnarsson, the first settler of the country in AD 874, through the United States gift of Leif Eriksson, discoverer of America in AD 1000, to all sorts of creations along the coastal path by present day artists. The making of this path along Reykjavik's sea shore was an inspired development, and it is linked to a whole series of walking paths through the city to various other open spaces and parks. It passes the big cemetery of Fossvogur, where Icelanders plant flowers on their graves and trees around it. So leave the path, and the seashore environment, and go through the gate into a woodland one, with the wood thrushes singing from the branches above. We call them redwings when they winter down here in Ireland, and they are shy, but in Iceland they know they will not be harmed, and you can walk up close to them. Beyond Fossvogur, a new pedestrian flyover bridge across a major motorway, takes you to the "Black Forest", part Forest Association trees and part the big garden centre, Blomaval's, with its greenhouses. It too is full of wood thrushes and starlings - birds which have only recently colonised Iceland.

Reykjavik calls itself "spa city", hot spring heated swimming pools are numerous - every Icelandic child must learn to swim before leaving school. The big 50m pool, and the hotspots - choose the temperature you like and sit there gossiping or relaxing as long as you like - is beside the old hotspring spot where Reykjavik women used to wash their clothes. Close by is the Botanic Garden, displaying most Icelandic species and a great many foreign ones. And nearby is the children's zoo, where they can get to know Icelandic animals, domestic and wild; and alongside a play park with among other things, a road-layout, where they can learn the rules of the road in safety. Reykjavik calls itself a child friendly city, and Icelandic children enjoy a freedom to do their own thing, which is now denied to ours in Ireland.

Planting of all these trees only began here c. 1960 and after.

Reykjavik's salmon river.

Reykjavik was one of the nine European cities of culture for the year 2000, and packed the year with all manner of events and developments. One was turning the little sandy beach at Nautholtsvik on the coastal path into a "thermal beach", by building a breakwater and running a hot water pipe into the sea. So you can now bathe in the geothermally heated ocean!

But it was 50 years ago, that the city bought a large area of moorland, Heidmork, as an open space for the people. Now, partly planted with trees by the Forestry Association, it is a beautiful area of forest walks and open trails, for both walkers, and riders on the beautiful Icelandic horses.

So easily, the rapid growth of the city could have been a disaster. But Reykjavik has stayed next door to nature, and is actively planning to stay that way.

Photos © Daphne Mould

Icelanders enjoy the sun on the new thermal beach

Special Areas of Conservation in Ireland

By
Ciaran O'Keeffe
& Peadar Caffrey

IRELAND has a wealth of natural areas and wildlife habitat. But look at the countryside in old photographs, TV programmes or family cinefilm and you will be struck by how much things have changed in a short while. Look at paintings and sketches by the likes of Paul Henry and Percy French from a hundred years ago, and the changes are greater still.

We have changed our lives and our environment for good reason. Paul Henry wrote of life in Achill: "I have yet to see people who worked so hard for so little gain. It meant incessant toil…" We have gained immeasurably in wealth, comfort, health and time and opportunity for leisure.

However, our wildlife has not been able to keep pace with the change and has gone into a steepening decline. We are losing our wildlife especially because we are changing the places where animals and plants have lived – their *habitats*. What was once a hay meadow is now likely to be a well fertilised field of rye grass; what was once a marshland has now been drained and infilled and lies under roads and factories on the edge of a town. New fishing techniques allow extra species to be harvested. And many of our wilder places are under pressure as we spread out in search of new farmland, turfbanks, aquaculture sites or just places to spend our leisure.

"...our wildlife has not been able to keep pace with the change and has gone into a steepening decline."

Hence the need for laws to protect the best of our remaining habitats and we are doing so by implementing the EU Habitats Directive. It requires the establishment of a EU network of ecological sites, known as the Natura 2000 Network. The Network consists of Special Areas of Conservation (SACs) together with Special Protection Areas (SPAs) established under the EU Birds Directive. The Habitats Directive was brought into Irish law as the European Communities (Natural Habitats) Regulations, 1997.

363 sites have been publicly advertised in Ireland and are protected under law. Most of these have been formally transmitted to the EU as candidate SACs. The EU Commission will assess the Irish SACs in September 2001 and indicate whether they are satisfied. Thereafter the sites will be formally designated.

Photos: © Dúchas - The Heritage Service

Photographs from top to bottom: Blanket bog and wet heath, Glenveagh, Co. Donegal; Estuary and sand dunes, Gweebarra, Co. Donegal; Old oak woods with bird cherry; Pink Encrusting Seaweeds - *Lithothamnion* spp. & *Lithophyllum* spp.

The most recently advertised sites were mostly marine in nature. These were selected as a result of Biomar, a 4-year survey of our shores and shallow waters, during which more than 900 site investigations were carried out. The proposed SACs contain 95% of the biodiversity recorded in the survey. (The Biomar survey results are available on CD, £12 inc. p+p, from EcoServe, 17 Rathfarnham Road, Dublin 6; or visit www.ecoserve.ie/biomar.)

The marine SACs include many areas where aquaculture and fishing are important activities. Dúchas will develop conservation plans for these areas, in consultation with all relevant interests. The challenge now is to find the best way forward for both conservation and socio-economic benefit.

We also need to carry out more survey and mapping to improve our knowledge on the distribution and extent of habitats in theses underwater sites.

The arrival of marine SACs has not been entirely welcome among some interests! But there are encouraging examples in Scotland and elsewhere of how the designation can be used as a quality mark for fish producers and tourism operators, among others.

Ciaran O'Keeffe & Peadar Caffrey, Dúchas - The Heritage Service, 7 Ely Place, Dublin 2, Ireland.

Further Details About SACs

Appeals: Those affected by the proposals may object, on scientific grounds, to the inclusion of their lands in these sites. Landowners may also appeal for the inclusion of their lands in a SAC. Initially Dúchas reviews the situation; if the landowner is not then satisfied he may go to the SAC Appeals Advisory Board. This has equal representation from the landowner/user organisations and the non-Governmental conservation organisations, and has an independent chairman.

Compensation: The Government has promised fair compensation of landowners and users who incur a financial loss as a result of restrictions arising from SACs. Landowners are compensated either by participation in the Rural Environment Protection Scheme, which provides an in-built incentive, or by the Department of Arts, Heritage, Gaeltacht and the Islands, which will compensate for actual income losses incurred. Applicants can access independent arbitration if they are unhappy with an offer received.

Planning and Licenses: The Directive requires Member States to maintain or restore the favourable conservation status of the habitats and species listed in its annexes in the SACs. All plans or developments likely to have an adverse impact on these sites must be assessed to determine their likely impact on their conservation interest. If the assessment indicates significant negative impact alternative solutions must be sought.

Developments requiring planning permission remain the responsibility of the Local Authorities and An Bórd Pleanála. These bodies are required to assess the implications, of granting permission, on the conservation interest of the sites. It is important to note that SACs do not automatically prohibit development! Developments not causing significant to the conservation interest of a site may be permitted. All plans, including County Development Plans must be assessed.

All public authorities and Government Ministers that license activities in SACs must assess applications in the light of the conservation interest of the sites. The Minister for Arts, Heritage, Gaeltacht and the Islands is obliged to assess activities not licensed by other Ministers or Authorities.

Farm Plans: Dúchas has agreed farming prescriptions for use in the Rural Environment Protection Scheme, and for use by farmers in SACs who do not wish to participate in the Scheme, for Burren habitats, blanket bogs, heaths, upland grasslands, sand dune habitats and machair areas. Agreement has yet to be reached on a small number of other habitats such as callow type land, turloughs and intensive grasslands and discussions are on going with the relevant farm organisations.

Other bodies with direct responsibility for implementing the Directive: The Department of Agriculture, Food and Rural Development.; The Department of the Environment and Local Government; The Department of Marine and Natural Resources; The Office of Public Works; The Environmental Protection Agency; The Local Authorities, An Bórd Pleanála and the National Roads Authority; Waterways Ireland.

Nursing the Environment in a Desert Land

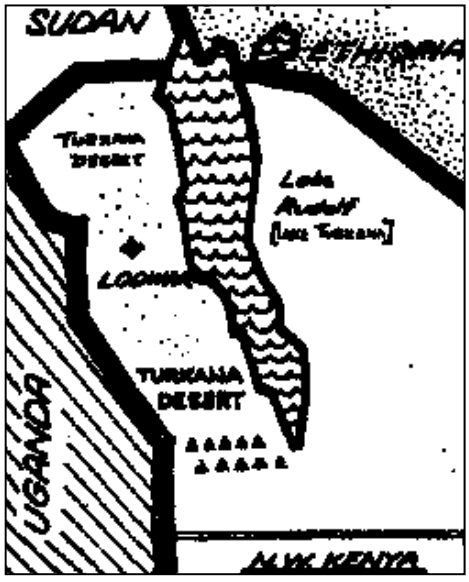
Photos: © Fr. James Good

By
Fr. James Good

Fr. James Good was attached to the Diocese of Lodwar, Turkana, in North West Kenya, from 1975 to 1999, where he was involved in priestly pastoral work. He taught students for the priesthood and administered the diocesan office for the local bishop.
He is now retired and has

THE Turkana Desert, in today's geography, is bounded on the northern side by Sudan and on the west by Uganda. Its eastern wall is formed by Lake Turkana (formerly known as Lake Rudolf) and on the southern side it is blocked off from the rest of Kenya by the high mountains of West Pokot. It is, in effect, a box of some twenty-three thousand square miles of desert and semi-desert land where nothing grows - in the words of the Hebrew psalmist, "a dry, weary land without water".

The Turkana people have a tradition (borne out by historical research) that in the distant past their desert was fertile. It was so fertile, the tradition maintains, that the hooves of the animals were being damaged by the frequent rain. So one day when the menfolk were away hunting, the women got together and pushed the sky up, thus preventing rain. When the men came home, they were naturally very angry with what the women had done. They made a very long spear by tying their individual spears together and tried to drill holes in the sky. All their efforts failed, and so Turkana remains a desert to this day.



This myth is probably a tribal memory of a time when the Turkana area fed the Nile and provided the developing ground for the emergence of the human species. But then volcanic and climatic changes gradually transformed the area into one of the most inhospitable places on earth - as one journalist has aptly described it, "as close as you can get to hell on earth!"

The environmentalist who looks at the Turkana Desert as it is today will no doubt lament its deterioration from fertile valley to barren desert. A "dry weary land without water" does not provide a basis for work for the enthusiast who wishes to protect and foster the gifts of nature. The sad fact is that today there are few gifts of nature left in Turkana.

It seems to be the fate of the Turkana people that in order to survive they must destroy what little remains of the few things that make their desert habitable. Desertification is brought about mainly by the destruction of trees. Trees grow only on the banks of dried-up rivers. The soil is generally hostile to growth of any kind, and the almost complete absence of water (rain, rivers) means that reforestation plans must all ultimately fail - and many have been tried, including the Israeli system of terracing. Fairly regular cycles of total drought (about every ten years) bring with them cycles of death: death of the very sparse vegetation is followed by the death of the herds, to be followed soon after by the death of the herders. However, it is generally agreed that the greatest destruction of the environment is the cutting down of trees for firewood. For many years, trucks returning empty after delivering goods to Southern Sudan filled up with tons of Turkana charcoal, bought in the desert at a nominal price and sold at a huge profit in the charcoal-burning areas to the south. And of course the Turkana people themselves had of necessity to share in this destruction of their environment, since there was no source of fuel available to them - apart from wood or charcoal.

> *"It seems to be the fate of the Turkana people that in order to survive they must destroy what little remains of the few things that make their desert habitable."*

Other resources? The scarcity of food makes Turkana unable to sustain much wildlife. Any wildlife that exists - mainly small numbers of gazelle - is hunted down for food, despite a governmental ban on game hunting. Elephants occasionally wander into the desert (once their home in happier days) but they have little chance against poachers armed with machine guns to kill and chain-saws for chopping up their priceless tusks. Giraffes airlifted into Turkana to form the nucleus of a national gamepark disappeared within a few months. The Turkana love of akiring (flesh meat) proved a bigger attraction than tourists who might come to see the wildlife.

The goat is the great survivor of the Turkana Desert. Blades of grass growing among the rocks, little bits of scrub bush pushing their way up through the sand - virtually anything that grows will sustain the Turkana goat. But if the rains fail, there will be no blades of grass and no scrub bushes. Anyone driving a truck across the desert gets an early warning that the end is near when several members of a flock of goats, running to get out of his way, roll over with the effort and fail to rise again.

After the great famine of 1960-61, European experts identified two possible solutions to the problems of Turkana and its people. The first was to develop the fishing in the 130-mile long Lake Turkana. The experts estimated that 150,000 tonnes of fish could be harvested annually from the lake, and a 250-mile highway was built across the desert to transport the fish to the markets of East Africa. But a local estimate of 15,000 tonnes of fish proved nearer the mark, and the great Fish Road is gradually disappearing into the desert sand.

Irrigation schemes provided another possible solution for the problems of Turkana. However, it was soon discovered that irrigation schemes required such a large injection of capital that they could never be financially viable. It would be almost easier (though less desirable) to give the cash directly to the people of the desert. Irrigation schemes - with one notable exception backed by the Diocese - are but one species of white elephant scattered all over Turkana.

Forty years of development work by the Catholic Diocese of Lodwar would suggest that the only viable investment in Turkana is in its people. Training the local people to be teachers and nurses to their own tribe, and providing massive inputs of food in times of drought, would appear to be the most satisfactory and perhaps the only way of developing the Turkana People.

Perhaps the Creator never really meant human beings to live in an environment as hostile as the Turkana Desert?

Fr. James Good, Parkview, Church Street, Douglas, Cork, Ireland.

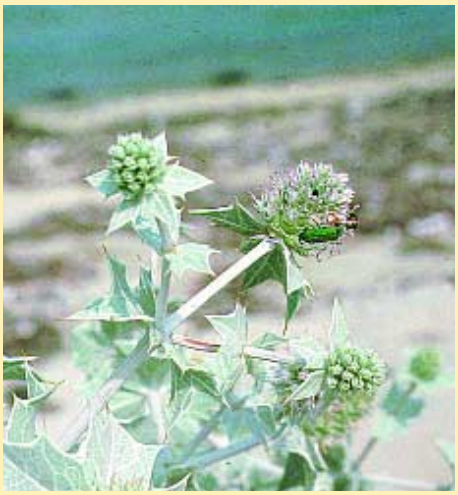


Photo: © John Akeroyd

Sea Holly, a thistle-like member of the carrot family, found only on strands and sand-dunes.

Some Special Flowers of the Seaside

By Dr. John Akeroyd

ONE of the many joys of seaside holidays is a profusion of wild flowers. Not only are coasts places where flower-rich habitats such as heathland, grassland and open, rocky or stony ground survive, but also they are home to special plants found nowhere else. These plants, many especially beautiful, possess a range of ecological adaptations to enable them to survive the frequently difficult habitat conditions found on the coast. Soils are unstable, sandy or rocky and mineral-poor, winds are persistent, strong and salt-laden, and the waves that crash on to the shore can dislodge soil and pummel vegetation.

Strands are one of the best places to look for interesting coastal flowers. Sand is commoner strand material than shingle, although it is less stable and attracts the visitors who may damage the vegetation. A select group of strand plants grows best on open sand or fine shingle where the highest tides have cast up debris such as seaweed and shells. These materials provide compost and plant foods, and the soil can be rich in nitrogen. Rain washes the salt down into lower layers of sand. Most of the plants in this lowest zone are annual, since winter storms will wash them away.

Perhaps the most attractive of them is the lilac- or whitish-flowered Sea Rocket (*Cakile maritima*), a member of the cress family superficially similar to Lady's Smock of wet meadows. The leaves and stems, like those of so many coastal plants, are fleshy to counteract effects of water-loss in a salty and often droughted environment. The pods are characteristically short and stout. This plant, widespread along Atlantic and Mediterranean seashores, flowers in summer but can be found in bloom through the year in the mild Irish climate. Other plants are less conspicuous. Prickly Saltwort (*Salsola kalt*) is a stiffly branched plant with tiny papery flowers and narrow fleshy leaves that each end in a sharp point. Another widespread plant, it is as characteristic of salt-steppes and deserts from Ukraine to Central Asia as it is of sandy strands in Ireland.

A few perennial plants persist in this strand vegetation. Sea Knotgrass (*Polygonum maritimum*) is a rare Irish plant, known only from a single site on the coast of Co Waterford, where it was discovered only in 1973. This largely Mediterranean plant seems to be spreading, for several new sites turned up along the southern coast of England in the 1990s. Its increase perhaps indicates climate change, since it needs hot summers and cannot stand cold winters. It may well spread in Ireland too.

Further up the beach, biennial and perennial plants more easily establish. One of the most characteristic plants here is the handsome Horned Poppy (*Glaucium flavum*). Flimsy, cup-shaped yellow flowers, 5-9 cm across arise from masses of deeply lobed, bristly silvery-grey leaves. The fruits are even more distinctive: slender curved cylinders up to 30 cm long full of small seeds. Rather common in parts of eastern and southern England, it is local in Ireland, although a striking sight where it does occur. An even more conspicuous plant is Sea Kale, a huge grey cabbage with deeply lobed leaves and great clusters of cream flowers. The fruits, like pale brown leathery peas, can float in seawater and are thus transported to new sites. It, is scattered in Ireland from Kerry to Louth, but is perhaps commoner than had been thought, with several new colonies reported in recent years. It is abundant enough on some shingle strands in southern England for local people formerly to have harvested the shoots as an early spring crop.

"These plants, many especially beautiful, possess a range of ecological adaptations to enable them to survive the frequently difficult habitat conditions found on the coast."

Sea Kale is a peculiarly English vegetable. Other, more widely eaten, vegetables too have their origins on the coast. Radish occurs on seashores as a distinct subspecies, Sea Radish. This robust, bristly radish with spreading stems and rosettes of huge lobed leaves - and corky, floating fruits - is common in West Cork, forming small thickets at the top of the strands of Sherkin and many other islands of Roaringwater Bay. Botanists have recorded it there persistently since the Rev. Thomas Allin reported it on Castle Island in 1883.

Wild Cabbage (*Brassica oleracea*) and related plants are native to sea-cliffs in the Mediterranean region, extending north as far as Britain (where they are perhaps not native). From these scruffy tough-leaved plants, plant breeders have selected the kales, heading cabbages, Brussels sprouts, cauliflowers, broccoli, calabrese and kohl-rabi of the market garden. Closely related to the cabbages, Wild Turnip (*Brassica rapa*), occurs both as a weed of waysides and as a plant of semi-natural vegetation on low or earthy cliffs by the sea. This plant is a subspecies of one of the main plants grown for Oilseed Rape crops. Such native pockets of the species will be of considerable significance should the British or Irish government allow the commercial cultivation of Genetically Modified (GM) oilseed rape. Crossing between cultivated and wild plants will allow GM traits to 'escape' - despite the assurances of scientists, many of whom have little knowledge

Photo: © S.L. Jury

Photo: © John Akeroyd

Top: Sea Knotgrass, a largely Mediterranean plant that just extends to Co. Waterford and is apparently spreading.
Above: Kidney Vetch usually has yellow flowers, but on the coast it displays a range of colour-forms.

Photo: John Akeroyd

The coastal subspecies of Curled Dock, with its dense clusters of flowers.

Photo: © John Akeroyd

Sea Bindweed, a beautiful coastal cousin of the twining bindweeds of field and hedgerows.

of wild plants. Wild cabbage relatives are a vital genetic resource for future plant breeding. One unique British example, Lundy Cabbage (*Coincya wrightii*), is entirely restricted to cliffs on one small island off Devon. It is vital that the official agencies continue to protect this plant against habitat damage and contamination from GM crops.

Sea Beet is one of the most conspicuous of seashore vegetable relatives. It is a perennial subspecies of Beta vulgaris, a variable species that has given us the plants we call sugar beet, mangold, spinach beet, beetroot and chard. It has a mass of dark green fleshy leaves and prostrate to sprawling or sometimes erect stems bearing numerous small green flowers and corky fruits that float in seawater. Like those of Sea Kale and Sea Radish, the buoyant fruits disperse in the waves. The yellowish root, which can be massive, contains sugar like that of the related sugar-beet. Again the wild plants comprise a significant genetic resource: all the world's sugar beet descends from plants selected in Silesia (now in Poland) during the Napoleonic Wars! New sources of variation may well be needed in future.

Weeds too have coastal relatives. Indeed weeds may have evolved originally from plants growing naturally on shingle beaches and open ground by the sea. Curled Dock (*Rumex crispus*) is a classic strand plant, with a distinct subspecies found on sand, shingle, the edges of saltmarshes and waste land by the sea. The flowers are massed for protection in a compact dense panicle or cluster: those of plants growing as weeds inland are in much looser panicles. The plants are perennial (with a huge taproot) and can flower over several years, whereas weed plants are annual or biennial, shedding seed before the farmer or gardener can destroy them. Coastal plants flower slightly later, in quiet summer days when salt spray is less of a problem. The seeds of weed plants are much more dormant and hard to germinate than those from seashores, which need to grow and establish as soon as conditions are favourable. Another subspecies, tall, loosely branched and with an even bigger root, grows on muddy river-banks. Here is plant evolution in action!

Sand-dunes are a feature of Irish coasts, especially in the west and north-west. Once stabilised by wild grasses, mosses and other plants, they form areas of plant-rich semi-natural grassland known as machair. In late spring and summer these grasslands are bright with flowers. Towards the front of the dunes the sand is often open and unstable and here grow several characteristic coastal flowers. Sea Bindweed (*Calystegia sepium*) has pretty pink and white-striped funnel-shaped flowers arising from a bed of fleshy, kidney-shaped dark green leaves. Sea Holly (*Eryngium maritimum*) is quite unmistakable, a stiffly branched bluish thistle with holly-like spiny leaves and tight heads of blue flowers framed by spiny ruffs. In the Mediterranean region similar species occur inland and in the mountains. In early summer the yellow or bluish pansy flowers of Heart's-ease (*Viola tricolor*) form colourful patches on blown sand. The coastal plants are distinct from inland populations, especially in being perennial. In Ireland these attractive perennial pansies uniquely occur inland, around the shores of Lough Neagh.

Cliffs provide one of the most spectacular habitats for coastal plants. They are exposed to the full force of high seas, fierce winds and large amounts of salt spray. Soil fertility is often high, especially where numbers of sea birds congregate or nest. Often the vegetation is a dense grassy sward, perhaps with wind-pruned scrub. Where rocks outcrop in quantity, two attractive flowers in particular are abundant, sometimes forming extensive patches. The distinctive Thrift (*Armeria maritima*) has narrow, grass-like fleshy leaves and dense heads of purplish-pink flowers atop long stalks. A few flowers can be found from spring to autumn; in June they show up in great crowds, the heads dancing in the breeze. With it grows Sea Campion (*Silene uniflora*), a dainty flower with 5 white petals emerging from a cylindrical bladder-like calyx. The greyish pointed leaves are in neat opposite pairs.

On a few low cliffs on eastern coasts of Ireland, mats of Western Clover (*Trifolium occidentale*) occur with Thrift and Sea Campion. It is very similar to the common White Clover (*T. repens*), from which it differs by its earlier flowering (April-June), fleshier leaves that are greyish above, and a number of small but consistent flower characters. Botanists first discovered this plant, also known from Wales to northern Spain, in Ireland in 1979. Indeed it was first found, new to science, in Cornwall only in 1961.

A feature of many seashore plants is that they come and go, their numbers fluctuating from year to year. Perhaps the most enigmatic of Ireland's coastal plants is Sea Pea (*Lathyrus japonicus*), found at just a few sites in the west. A magnificent plant, with clusters of purple peaflowers, it has long persisted near Inch in Kerry and two new stations turned up during the Sherkin Marine Station flora survey of Roaringwater Bay. Conversely, it is abundant on some shingle strands and spits in southern and eastern England - so much so that the pealike seeds more than once saved the townsfolk of Aldeburgh in Suffolk from famine! The Irish plants have narrower leaves and tend to grow on sand rather than shingle. Could they have arisen from seeds drifting across the Atlantic from North America? Long before St Brendan made his famous voyage, or people looking out to sea dreamed of Tir na nOg, plants were crossing the oceans to colonise new lands. And seaside plants were always in the vanguard.

Dr John Akeroyd, Editor of 'The Wild plants of Sherkin, Cape Clear and adjacent islands of West Cork', *has researched variation in coastal plants since 1975.*

Monster Conger Eels in Irish Waters

Photo: © Declan Quigley

A Fine Catch: Fishing for Conger Eel off Dungarvan, Co. Waterford

By Declan T. Quigley

THE conger eel (*Conger conger*) is widely distributed throughout the Eastern Atlantic from Norway and Iceland to Senegal (NW Africa) including the Mediterranean and Black Seas and possibly as far south as South Africa. A similar species, the American conger (*C. oceanica*) is found from Cape Cod (Massachusetts) to South America. In Irish waters, the conger eel is found all around our coasts mostly on or near rocky ground, in piers, harbour walls and wrecks, from high water mark down to depths of at least 1,000m. The conger usually spends most of the day hidden in rocky crevices and only ventures out at night to feed on a wide variety of fishes, crustaceans and cephalopods.

Despite its cosmopolitan distribution in Irish waters, relatively little is known about the conger eel's biology, particularly in relation to growth and maturation. Indeed very few mature and/or sexually ripe congers have ever been caught in the wild. In the NE Atlantic, congers are thought to mature when they reach 5-15 years of age. Although several spawning areas are thought to occur, European congers appear to migrate to an area between Gibraltar and the Azores where they spawn (and die) during midsummer over depths of 3,000-4,000m. An individual female can produce vast numbers of eggs. For example, Eoin Fannin *et al*. (FRC, Dublin) estimated the age (21 years) and fecundity (12.4-17.3 million ova) of an exceptionally large (119 lbs, 6 ft) maturing female conger captured by a trawler off the Wexford coast in November 1988 (*J. Fish Biology* 1990, 36: 275-276). After spawning, the *leptocephalus* larvae drift north-eastwards taking one or two years before metamorphosis occurs in European waters.

The growth rate of congers is thought to be rapid. Eels may attain a weight of 2-3 lbs three years after metamorphosis and can weight 90 lbs after a further 5 years in captivity. Although most of the congers found in Irish waters weight between 8 and 20 lbs, there is clear evidence that the species can attain monstrous proportions. Stories of massive eels abound and some authorities on the fish believe that exceptional congers can probably grow to as much as 350 lbs. One of the heaviest authenticated specimens weighed 252 lbs (9 ft long) and was captured by a commercial trawler off the Westman Islands near Iceland. Trawlers have taken specimens weighing up to 160 lbs in UK waters. In October 1985, a trawler 32km SE of Tuskar Rock off the Wexford coast captured a specimen weighing 115 lbs 8 ozs (6 ft 4 inches).

Large conger eels are extremely powerful, and at close quarters, a dangerous century literature describing close encounters with some of these monsters. For example, Couch (1868) remarked how after "A fisherman had safely taken a stout conger into his boat, the fish snapped at and caught his foot within its mouth, and sprang overboard, carrying his shoe with it." The same author also warned how "A man had thrust his foot into the mouth of a conger that showed little sign of life; when suddenly the jaws grasped it, and an active revolving motion began by which he was dashed to the ground with considerable violence." More recently, a vicious attack by a 6 ft long conger eel on a Scottish diver was reported in *The Irish Times* on 2nd September, 1995. The eel apparently dragged the diver away from his companions.

Sea anglers regard the conger eel as one of the strongest and tenacious fish found around our coasts. The late Des Brennan (*The Sea Angler Afloat & Ashore*) described the eel's fighting ability as follows: "The conger fights like no other fish. It twists, writhes, revolves and shakes its head from side to side in its efforts to break the hook hold. It corkscrews its long sinuous body through the water as it backs away, rather like the propeller of a boat in reverse, obtaining a tremendous grip fish. However, they are not normally aggressive unless provoked. There are several anecdotal accounts in 19th and traction in the water which is murderous on tackle and will soon expose any weakness."

A total of 104 specimen conger eel (>40 lbs) have been recorded by the *Irish Specimen Fish Committee (ISFC)* between 1961 and 1999 (Figure 1). The vast majority (88.4%) of these specimens weighted between 40 and 50 lbs; only 12 specimens weighed >50 lbs, while none exceeded the 70 lbs mark (Table 1). Although specimens have been recorded from most maritime counties (excluding Louth, Clare, Sligo and Leitrim), the vast majority (77.8%) were captured off the S and SW coasts of Counties Waterford, Cork and Kerry (Table 2). However, despite this shewed distribution in catch, some of the largest specimens were taken in northern waters (e.g. 64 lbs, Belfast Lough; 60 lbs, Donegal Bay). While all of the specimens were captured between May and November, the vast majority were taken during the summer and autumn: June – September (Figure 2).

Size Group (lbs)	Number	%
40-45	72	69.2
45-50	20	19.2
50-55	8	7.7
55-60	1	1.0
60-65	3	2.9
Totals	104	100

Table 1: Size Frequency Distribution of Specimen Conger Eel

County	No.	%
Louth	0	0
Dublin	3	2.9
Wicklow	1	1.0
Wexford	3	2.9
Waterford	12	11.5
Cork	45	43.3
Kerry	24	23
Clare	0	0
Galway	2	1.9
Mayo	3	2.9
Sligo	0	0
Leitrim	0	0
Donegal	5	4.8
Derry	0	0
Antrim	5	4.8
Down	1	1.0
Totals	104	100

Table 2: Maritime County Distribution of Specimen Conger Eel

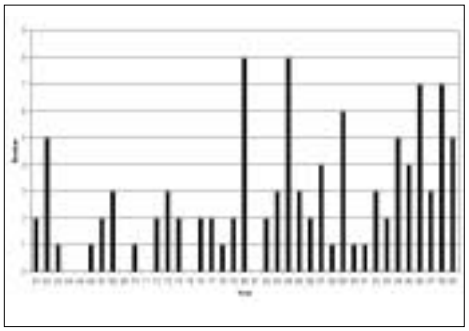


Figure 1: Annual Numbers of Specimen Conger Eel (1961-1999)

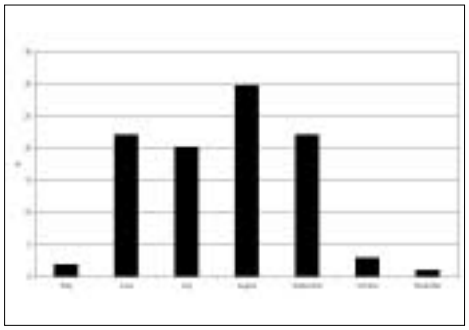


Figure 2: % Monthly Frequency Distribution of Specimen Conger Eel (1961-199)

Although the current Irish rod and line conger eel record (72 lbs, Valentia, 1914) has stood intact for over 86 years, it is clear that there are monster eels weighing at least twice (if not three times) this size lurking out there. The UK rod and line boat caught record, weighing 133 lbs 4 ozs, was captured in 1995 on a wreck SE of Berry Head, Devon, while the shore caught record, weighing 68 lbs 8 ozs was captured in 1992 off Devil's Point, Plymouth. The Irish conger eel record is clearly there for the taking.

Declan T. Quigley, Hibernor Atlantic Salmon Ltd., Derryclare Hatchery, Recess, Co. Galway, Ireland.

ESB Report Highlights Water Quality As Major Problem For Fisheries Management

By Gerry Gough

IN its 1999/2000 *Fisheries Conservation Report* ESB again highlights declining Water Quality as the major problem associated with Fisheries Management.

ESB is statutory owner of fishing rights on the major rivers of Ireland associated with hydro generating stations. Each river is scientifically managed to ensure that stocks of the various fish species are maintained and preserved at acceptable levels. The principal concern is to preserve stocks of migratory species that may be affected by the operation of generating stations.

In particular the report highlights concerns that poor water quality is having on salmonid stocks in the rivers for which ESB is responsible. Salmon stocks internationally are in decline and ESB welcomes the establishment of the National Salmon Commission bringing together all salmon fishing and conservation interests in Ireland. The major concern of the Commission is to achieve consensus on the best means of protecting the resource and to provide advice to the Minister for the Marine and Natural Resources with regard to regulation. ESB is represented on the commission and is fully committed to it's objectives.

ESB Fisheries Conservation operates under guidance of expert scientific groups in all fisheries management programs. The report acknowledges the contribution of agencies which include:

- Department of the Marine and Natural Resources
- Fisheries Research Centre
- Central and Regional Fisheries Boards
- National University of Ireland at Cork and Galway
- Dept of Agriculture Northern Ireland
- An Bord Iascaigh Mhara (BIM)
- Lough Neagh Eel Fishermen's Co-operative.

Queries from the public are welcome and further information is readily available from ESB Fisheries Conservation at Ardnacrusha, Co. Clare.

HIGHLIGHTS FROM THE YEAR

The Shannon Eel Management Programme

During the period 1992-94 ESB initiated and funded a major assessment of the River Shannon eel fishery. Since then the Shannon Eel Management Programme has involved the progressive development of a fyke net/long line fishery, extensions to the eel weir network for capture of silver eels, and the development of a comprehensive stock enhancement programme. During March 2000, a synthesis report on the programme to date was produced on behalf of ESB by the National University of Ireland, Galway, who currently advise on and monitor the programme. An eel fishery conservation model was proposed in this report and will be adopted by ESB. This model is based on an annual mean restocking level of 1.5 tonnes of glass eels/elvers or equivalent. It is envisaged that this level of restocking could provide yields of up to 300 tonnes per annum. All data collated since 1992 will be offered to the National Eel Strategy Group when it is set up.

Parteen Salmon Breeding Programme

The Parteen Salmon Breeding Programme was initiated in 1990 and is carried out under the supervision of NUI, Galway. Its fundamental purpose is to protect the biodiversity and examine the productivity of wild salmon populations on the River Shannon. The programme involves two main lines - Multi Sea Winter (MSW)* line and grilse line. Although the programme is still in its relative infancy, highly significant findings have been made to date. It has been discovered that selective breeding can significantly increase the percentage of fish returning as MSW salmon. There are also indications that selective breeding can increase the weight of a large percentage of the grilse returns. The evidence available to date suggests that average weight of grilse returning to Parteen has been improved by 250g in a single generation. The MSW element of the breeding program is under test to determine if the results can be replicated at locations other than Parteen. A sample group is currently in place at the Burrishoole facility of the Fisheries Research Centre for release in Spring 2001.

Almost 3.5m Salmon fry were planted in the rivers Shannon Erne and Lee and their tributaries during Spring 2000. In addition 300,000 50-70g smolts were also released. This provides a very significant contribution to the national catch around the coast and also contributes very significantly to the recreational fisheries, particularly in the lower Shannon and Lee. Returns to the coast are reckoned to be approx. 2% of the escapement according to the tagging program of the Dept. of the Marine and Natural Resources.

On the R. Liffey an experimental release of almost 10,000 salmon smolts supplied by ESB and co-ordinated by the Dept. of the Marine and Natural Resources is currently being monitored by anglers. The fish were clipped and tagged at Parteen and returns in 2001 will indicate success or otherwise of this initiative.

Installation of State-of-the-art Equipment

During the year ESB installed sophisticated hi-tech fish counters at Ardnacrusha and Ballyshannon. The counter, the Vaki Riverwatcher, enables more reliable identification of fish traversing a fish pass and provides clear data reports with regard to species and sizes. Further installations will take place in 2001 to assist in monitoring some of the tributaries of the main rivers.

* Multi Sea Winter (MSW) salmon are salmon that have spent more than one winter at sea. Grilse are salmon that return after one winter at sea.

Gerry Gough, ESB Fisheries Manager, ESB Fisheries Conversation Section, ESB, Ardnacrusha, Co Clare.

Fish Farming & the Environment

By Eric Twelves

IN the last quarter of the 20th century salmon farming has progressed from producing 100 tonnes per year to over 1 million tonnes. This expansion was predicted, but in the 1970s few in the industry believed that this optimism would become a reality.

As more sea loughs, lochs, fjords and bays became homes to fish farms so concerns for the environmental effects of the industry increased. Salmon farming has become the target of Friends of the Earth and Greenpeace as well as other environmental and conservation movements. Exaggerated claims of gross pollution have regularly been levelled at salmon farming, despite mandatory monitoring of established sites in both Scotland and Ireland and the fact that before new sites can be set up, comprehensive environmental impact studies must be undertaken and approved. Taking a blinkered approach, those who oppose fish farming seem to have forgotten that salmon is an indicator species and that the fish are veritable aquatic canaries. Salmo salar tolerates neither low oxygen saturation nor pollutants and will not thrive or grow in anything less than optimal environmental conditions.

All fish, including both wild and farmed salmon, produce excrement which is released into the sea. The excrement produced by the farmed fish merely replaces that produced by the wild shoals of long ago. It is quickly dispersed, as the photographs of the seabed around salmon pens, which have to be taken regularly as part of environmental monitoring, show.

In the wild salmon are fast swimming pelagic feeders and the increasing use of large offshore pens reflects the salmon farmers' striving to provide optimal conditions for growth for their fish.

Sea lice treatments are highlighted as another sin of salmon farming, but opponents seem to turn a blind eye to the suffering caused to salmon by these parasites which can literally eat the fish alive, starting at the head where there are no scales and working their way along the body. Bath treatments are very carefully controlled otherwise the fish can very easily be killed, as well as the lice. Active ingredients within the bath are measured as a few parts per million and are inactivated by contact with the fish.

Salmon is a global commodity and farmers must grow fish quickly and economically to stay in business in this competitive market. Quality schemes, like Scottish Quality Salmon, have stringent and exacting standards not only for the quality of the final product, the salmon on the fishmongers slab, but also cover all aspects of fish farming including husbandry methods, farm structures and infrastructure and care for the environment. These schemes ensure a consistently excellent product which, from a dietary standpoint, is particularly healthy.

Eric and Jane Twelves on a recent visit to Sherkin Island.

Everyone is aware that global stocks of fish are being overexploited and becoming scarcer. The once huge shoals of salmon are long gone, they had disappeared long before salmon farming was dreamt of. The complaints of the likes of the Glasgow apprentice boys, who were fed salmon so often they were sick of it and asked to eat salmon on 3 days a week only, are just things we read about nowadays, and for a while salmon was a rare and expensive commodity. Farmed salmon is now available as and when people want to eat it and as sales increase it is obvious that more and more people are choosing to eat it as part of a balanced and healthy diet.

Eric & Jane Twelves, Salar, Lochcarnan, South Uist, Outer Hebrides HS8 5PD, SCOTLAND. Tel: 0044+1870+610324 Fax: 0044+1870+610369 Email: sales@salar.co.uk Website: www.salar.co.uk

Eric and Jane Twelves have been living in South Uist since the pioneering days of salmon farming back in the early seventies when Eric was given the task of establishing Booker McConnell's salmon farming activities in the islands.

In 1983 they set up their own salmon farm, Salar Ltd, it began with 2 small pens and 10,000 smolts which they ran together in their 'spare time'. The company has gradually expanded over the 17 years so that it now functions as a fully integrated unit comprising a hatchery, freshwater sites, seawater sites (where 500+ tonnes of salmon and 10 tonnes of sea trout are produced each year) and a smoke house. Specially selected brood fish from stock lines of proven performance are kept to provide the next generations of salmon. Salar Flaky Smoked Salmon was launched 3 years ago and is proving to be a very popular alternative to the traditional cold smoked salmon.

From 2 part-time employees, Salar now employs 15 people full time, 3 part time and extra help is brought in at busy times.

Exploring their Depths

By Paul Kay

MAKE no mistake, the Aran Islands in Galway Bay are stunning below water as well as above. The waters which surround the Islands offer diving sites which should be regarded as world class (given the right conditions), with underwater scenery and marine life which is quite outstanding. The exposed Atlantic coasts may appear inhospitable (especially in bad weather), but are in reality very productive and are home to many creatures and plants.

The limestone from which the islands are made, weathers into fantastic formations above and below water. Above water are the rock strewn and foreboding cliffs. The landscape is both awesome and austerely beautiful. It appears to fit any changes in the weather.

The Worm Hole is perhaps the most unique formation of all those found on the islands. It looks just like someone has quarried a swimming pool from out of the sloping bedrock of the west coast of Inish Mór. At first sight it appears that it has to be man made, but it is completely natural. The passage which connects it to the sea and means that it is full of seawater also allows scuba divers to enter into it - a great, natural rectangle some 10m deep. In superb conditions its entire length can be visible underwater. From below, only the kelp fringes destroy its man made appearance from this angle too!

Undersea cliffs, gullies, fissure and ledges allow the varied marine life to find their niches. Crayfish are still quite easy to see (unlike many place where their numbers have been much diminished), and numerous blue and orange cuckoo wrasse can produce the illusion of near tropical conditions when visibility extends to a staggering 30m or even more.

Beds of dahlia anemones cover the ledges, whilst the vertical cliffs are a mass of brilliantly coloured jewel, plumose and sagartia anemones. Thick kelp forest covers the flatter bedrock and extends many meters below water in the clear light water. In the kelp many rock cook (wrasse) swim in small shoals, inquisitive about the strange air belching visitors, but too afraid to approach too close. Their male relative, the cuckoo wrasse, has no such worries and will nip away at a diver he perceives to be a threat. If he find an area unprotected by tough dive gear, he will draw blood!

Squat lobsters scurry into narrow cracks, tompot blennies peer out of their holes, and large link lie in the back of large fissures. Everywhere there is life, often colourful, sometimes spectacular and never anything less than fascinating.

On the landward side of Inish Mór lies coarse, clean sand. Here too the sea creatures are abundant. Meadows of sea grass grow from the sand, and above the swaying fronds, it is possible to watch large compass jellyfish gracefully pulse along in the relatively still, sheltered water. Flatfish and many sand dwellers live here too including masked crabs and sandstars and that strange creature, the little cuttlefish - as weird as anything dreamed up by any science fiction writer.

On a calm, balmy summer's day, being underwater in this area is an unforgettable experience. But for the cool water, it would be easy to believe that the Aran Islands are situated far to the south, such is the colour and richness of the marine life and the beauty of the spectacular underwater scenery.

Above: The Worm Hole, on the west coast of Inish Mór, appears man made but is in fact a completely natural formation. Top: The Worm Hole seen in stunning conditions - underwater visibility of 30m!

See page 16 and 17 for more photographs.

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CENTRAL AND REGIONAL FISHERIES BOARDS

WILD SALMON AND SEA TROUT TAGGING AND LOGBOOK SCHEME

The Wild Salmon and Sea Trout Tagging Scheme Regulations made by the Minister for the Marine and Natural Resources, following consultation with the National Salmon Commission, provide for a carcass tagging scheme for wild salmon and sea trout commencing on 1 January 2001. The purpose of this scheme is to allow for compilation of accurate salmon catch statistics.

From 1st January 2001 all salmon fishing licence holders (rod and line and commercial) must affix a tag to:

- wild salmon
- any sea trout over 40cm

which they legally catch and retain.

Licence holders must also complete a logbook in respect of salmon and seatrout captured and tagged. Tags and Logbooks will be issued free of charge with the fishing licence. Additional tags will be available free of charge subject to proof compliance with the tagging scheme regulations.

Public Information leaflets for Commerical Fishermen, Anglers, Rod Licence Distributors, Licensed Salmon Dealers, Persons Engaged in Catering and the General Public can be obtained from the Central and Regional Fisheries Boards.

Copies of the "Wild Salmon and Sea Trout Tagging Scheme Regulations, 2000" (S.I. 256 of 2000) can be purchased directly from the Government Publications Sale Office.

ARAN ISLANDS

Exploring their Depths

Photography: © Paul Kay

Dahlia Anemone on wide ledge - 20m deep

Crayfish in shallow crevice

Diver and undersea cliff covered in dead men's fingers

Diver and Compass Jellyfish

Cuckoo Wrasse at a depth of 20m

Burrowing Anemone in maerl *(Ceriathus lloydii)*

Photos: © Geological Survey of Ireland

RSV Bligh, Primary survey vessel, GOTECH Ltd.

IRELAND'S SEABED SURVEY

Revealing the secrets of Ireland's seabed!

By Enda Gallagher

ONE of the most exciting journeys in Irish marine exploration has commenced recently - the survey of the entire Irish seabed, an area that is ten times the size of Ireland's land area. At a cost of £21 million and with a planned seven-year duration this is one of the largest seabed mapping projects undertaken anywhere in the world and will place Ireland firmly to the forefront of world marine expertise. The survey is being managed by the Geological Survey of Ireland (G.S.I.).

Background

In authorising this survey the government has recognised that Ireland must maximise the commercial opportunities presented by its marine resources and plan measures to protect the marine environment in the most effective manner possible. The government was also conscious that a survey of this size would represent an opportunity to build up national marine expertise and to spread this expertise across government agencies, third level institutions and a strengthened private sector. Clearly, a seabed survey would complement the national strategy for marine research, technology, development and innovation as developed by the Marine Institute (M.I.).

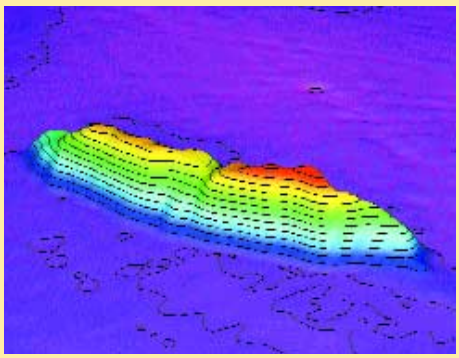
Organisation and partnership

The seabed survey as a major national initiative, involves many organisations and interests, and G.S.I. has attempted to include as many of these as possible in the planning phase. Government departments and agencies as well as third level institutes are involved in the Steering Group and Technical Advisory Committee.

The M.I. will manage a series of ancillary projects on board the survey vessels in topics such as oceanography, marine archaeology, fauna, whales and birds. They will also be involved in data acquisition whilst the surveying contract for deeper waters has been awarded to GOTECH, an Irish company successful in an internationally competitive field.

Consultancy services are provided by the renowned international consultants, the Canadian Centre for Marine Communications, together with the Irish firm C.S.A. Much consideration has been placed on IT requirements since the survey is one which will originate vast amounts of data which will require storage, verification, technical analysis and manipulation into customer-friendly usage formats.

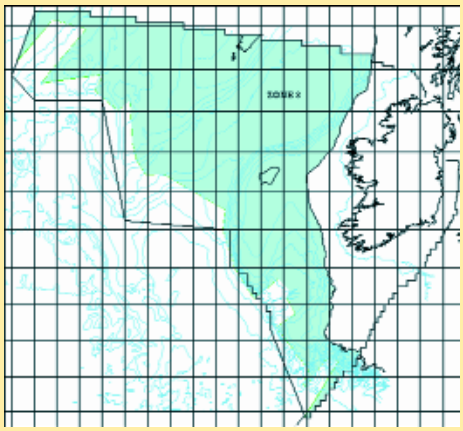
"Outputs from the survey will be a series of topographic and geological maps of the seabed. They will provide an accurate basis for maps customised to the needs of policy-makers, fishermen, engineers, biologists, oceanographers and geologists."



Multibeam sonar image of the SS Lusitania off the Co. Cork.

Survey benefits and customers

Information will be gathered as to the composition of rocks forming the seabed as well as the structure of the earth's crust below. Companies involved in hydrocarbon exploration seek information on the seabed environment in order to identify rock sequences that may contain hydrocarbon resources. Fish habitats are often controlled by the nature of the seabed, and fishery interests seek information which makes fishing more economical while minimising the environmental impacts of trawling. In terms of sand and gravel resources, survey results will outline their distribution in reliable detail. Survey results will also be useful to those with interests in offshore aquaculture, shipping, coastal zone management, coral identification, heritage (including shipwreck identification), renewable energy developments, waste management and identifying natural hazards.



Irish Multibeam Seabed Survey Mapping Area (1:200,000).

The survey

Several vessels are involved in carrying out the seabed survey. These vessels will cruise back and forth measuring the characteristics of the seabed and its underlying rocks. The main technique used will be multibeam echosounding, a variety of the technique used by fisherman to explore for fish. Magnetic, gravity and oceanographic data are also being acquired. A number of the more interesting areas will be investigated in follow-up studies which will include the collection of seabed samples.

Products

Outputs from the survey will be a series of topographic and geological maps of the seabed. They will provide an accurate basis for maps customised to the needs of policy-makers, fishermen, engineers, biologists, oceanographers and geologists. The maps will assist in studying seabed resources, natural hazards, preferred environments for living resources, and the present and future environment of the Irish seabed. Products will be made available in both paper and digital format and in as flexible a manner as possible to various customer groups.

Ancillary projects

An important part of the seabed survey is the building up of a widely spread marine expertise. To this end the M.I. manages an Ancillary Project programme. Ireland's national weather service, Met Eireann, has asked survey crews to compose daily weather reports for them on specially designed reporting formats. B.I.M. is also taking specially formatted daily reports from our vessels. Crews are reporting sightings of cetaceans to the Irish Whale and Dolphin Group and hope to soon have bird and cetacean spotters on board the survey vessels. This year in conjunction with the M.I we implemented a Strategic Research Programme aboard the Irish national research vessel, the Celtic Voyager. The aim of this programme was to build geological expertise in the third level sector, and projects based in Dublin, Cork and Galway institutes took part in it.

Current status

The primary focus of the survey so far has been on Zone 3, the more distant and deeper part of the seabed. By now more than 40,000sq kms of Ireland's waters have been surveyed and the data is currently being analysed in a preliminary manner to ensure accuracy of record and quality. Following on from this preliminary quality control process the formal appraisal and interpretation of the data will commence in earnest. This process will be a lengthy one, but will ultimately lead to the provision of both general and customer-specific maps and products. We hope to be in a position to launch some definitive survey results by Summer 2001. In the meantime let's hope that there are placid waters ahead!

Enda Gallagher, Geological Survey of Ireland, Beggar's Bush, Haddington Road, Dublin 4.

The Power of the Amateur Tradition

Evelyn Mary Booth (1987-1988), author of the Flora of County Carlow, *and an early environmentalist in south-east Ireland: beneath her huntin' and fishin' exterior lay a core of solid science.*

By Maura Scannell

WHEN Evelyn Booth's *Flora of County Carlow* was published in 1979 it was the culmination of over 30 years' work, and the author was described in one review as "one of Ireland's most loved and respected botanists". But Evelyn Booth was interested in every aspect of the physical landscape and the natural world, and her scientific interest in plants and animals was directed towards the conservation of nature as well as care for the environment.

Evelyn Mary Booth was born in Annamoe, Laragh, County Wicklow, on October 30th 1897, the only daughter of Hilda Mary Hall-Dare and James Erskine Booth, an official of the Irish Land Commission. She had two brothers. Through her father she was related to Erskine Childers, a former President of Ireland (1973-74), while Robert Barton, a cousin of Evelyn's on her father's side, was a signatory of the 1921 Anglo-Irish Treaty. Barton (1881-1975) lived well into old age and as his home was only about 20 miles from her Evelyn was a frequent visitor.

During the 1920s and '30s Evelyn resumed country life. Always a gardener, her interests now extend to wild plants. She became acquainted with Edith Rawlins, an enthusiastic member of the Wild Flower Society (Britain), then tutoring families in Carlow, and they botanised together.

Her interest in the flora of the Carlow area developed, her knowledge of the vegetation of the south-east region of Ireland and of the counties along her route to Dublin - where she often came for a few days - soon became well-known. The eminent Irish naturalist Robert Lloyd Praeger (1895-1953) who for many years monitored the distribution of the higher plants throughout Ireland, was always glad to hear from people around the country who knew plants and who could provide records extending the work on species distribution. He in turn named, or confirmed, plants sent to him. Evelyn began communicating with him, a correspondence that was to last for many years.

In 1939 she joined the Wild Flower Society and through its publication, the *Wild Flower Magazine*, added to her knowledge of the Irish flora. Her cousins Daisy and Dulcibella Barton (sisters of Robert) joined her in field work when they came to visit and the young women had great fun exploring the countryside which, because petrol was rationed, they did on foot and by bicycle. During the war, Praeger was particularly pleased to receive information from around the country since, as he observed, the impact of the war had "...almost suspended field-work". The Carlow records sent by Evelyn Booth and Edith Rawlins are reported in Praeger's paper, "Additions to the knowledge of the Irish flora, 1939-1945", published in 1946 in the *Proceedings of the Royal Irish Academy*. It was a sign of Evelyn's emerging authority that her work helped to add to the body of scientific knowledge. Among the species recorded by Booth for this publication were bog myrtle (*Myrica gale*), bird's-foot (*Ornithopus perpusillus*), and pale sedge (*Carex pallescens*). Praeger ends the paper on a personal note: "Now that I have passed my eightieth year, the present paper will probably be my last of a series published under my name." Evelyn, a reflective person, probably pondered on this statement and was encouraged to develop her field-botany skills further.

By now Evelyn was approaching 50, her parents had died, and her brother John was running the family estate. Evelyn herself has settled in Lucy's Wood, Bunclody, a small house which she had extended. Sometime in the 1940s she also laid out the one-acre garden at Lucy's Wood - where the ground rises on the way to Mount Leinster and the Blackstairs Mountains - and built a conservatory for tender plants. At the end of the war, when fuel was more freely available, Evelyn bought a car. Her war-time training in vehicle maintenance, during World War I, and a well-stocked garage at her home meant that she could service her own car. In it she was able to range over several counties and she quartered her terrain like a peregrine. She set about building up a comprehensive and detailed knowledge of the flora of south-east Ireland. In 1953 she became a member of the Botanical Society of the British Isles (BSBI) and subscribed to the *Irish Naturalists' Journal*. Over time she interacted with other members and naturalists, and amassed what would become a fine library. Thus she kept abreast of the latest botanical research. With the literature close to hand, and thanks to her care, she was now well equipped to follow developments in, and contribute to, plant distribution studies in Ireland and Britain. In 1954, the year after Praeger's death, the *Wild Flower Magazine* (issue number 313) reported that E.M. Booth recorded 584 species for County Wexford, 579 for County Carlow and 584 for County Kilkenny - a truly excellent achievement.

In 1954 the BSBI launched a new scheme to record every plant species occurring in each 10km grid unit throughout both Great Britain and Ireland. To be accepted for this work one had to be a skilled field-botanist with the ability to work over complex terrain. Evelyn Booth undertook work in Counties Carlow and Wexford, and in parts of adjacent counties.

In 1962 *The Atlas of the British Flora* was published by the BSBI, the culmination of the programme launched in 1954, and the fruit of many years' work by numerous botanists. This important publication includes Ireland, and even a glance through the volume shows the solid contribution made by "E.M. Booth" (her name is recorded in the index) to the detailed distribution of species in Ireland. In 1963 a branch of the Botanical Society of the British Isles was set up in Ireland. The inaugural meeting was held in University College Dublin's Botany Department, then in Merrion Street, and Evelyn was elected to the committee. For many years she served and provided great support on field meetings, helping to identify grasses and critical genera. Knowing Evelyn's considerable knowledge of the flora and topography of County Carlow, a fellow botanists persuaded her to commit it to print. Although approaching 80 years of age, she rose gallantly to the challenge and embarked on the taxing work involved. She undertook further field work, revisited isolated habitats, and assembled the data according to five natural divisions based on the *Soils of County Carlow* (1967).

Her efforts culminated in the publication of *The Flora of County Carlow* in 1979 by the Royal Dublin Society. The book included a brief outline of plant recording in the county carried out earlier by Robert Lloyd Praeger, R.A. Phillips and others, and short chapters on geology, mosses, lichens and fungi by invited scientists. (Indeed, so sharp was Evelyn, that when she read the pages of one of these expert contributions she immediately spotted a significant omission and sent them back to their author for revision.) It was the first county flora to appear in Ireland since 1950, and the first compiled by a woman.

"She was an environmentalist in the years before institutions were set up to monitor and record natural phenomena."

Evelyn was also interested in the physical landscape and related well to the natural world. She was an environmentalist in the years before institutions were set up to monitor and record natural phenomena. Her scientific interest in plants and animals provided knowledge and skill that helped towards the conservation of nature and to this end she also contributed to surveys of butterflies, dragonflies, birds and certain Crustacea for the Natural History Museum, the National Herbarium and An Foras Forbartha (the national institute for physical planning and construction research (1964-87). All of which work, it must be said, was carried out freely and without remuneration.

From the early 1970s to the mid-1980's Evelyn gathered seeds from naturally-occurring plants in the wild and sent packets of them - labelled with locality and date - to the National Botanic Gardens. These seeds, the result of open pollination, were inserted in the *Index Seminum* catalogue published annually by the National Botanic Gardens and distributed to botanic gardens around the world. Of the 234 numbers in the *Index Seminum* for 1973, no less than 116 were collected by E.M. Booth. It was an important contribution. Though she was approaching 80 during these seed-gathering years, she looked a decade younger and she was wiry, active and very good company to her many friends. Evelyn Booth was well known in County Carlow and especially in the neighbourhood of Bunclody. She rambled everywhere without let or hindrance and she respected the skills and inherent knowledge of rural people.

Evelyn Mary Booth made a valuable contribution to field natural history in Ireland and to plant studies in particular.

This is an abridged version of the story about Evelyn Mary Booth's life and work, which appears in "Stars, Shells & Bluebells - Women Scientists and Pioneers". This excellent and inspiring publication, with biographies of 15 women, was produced by WITS (Women in Technology and Science), P.O. Box 3783, Dublin 4, and costs £4.95. ISBN 0 9531953 0 9.

The "Flora of County Carlow", published by the RDS in 1979, was the first Irish county flora to appear since 1950, and the first compiled by a woman. The cover includes a design embroidered in cross-stitch by Evelyn Booth.

Can Ireland meet its emission targets?

By Nuala McLoughlin

CLIMATE change is now recognised as the most threatening global environmental problem facing the environment today. Potential impacts of climate change include rising sea levels, and increases in temperature and weather disturbances. In Ireland, we are likely to see more rainfall and flooding in the winter time, and less rainfall with more water shortages in the summertime, which could also lead to the loss of valuable bogland. We may also experience increasing storm surges along the coast, in particular the west coast, and overall, this problem has the potential to radically alter the Irish economy. Other parts of the world could experience more life threatening impacts such as increased drought and famine, with severe flooding and rising sea levels which will put tremendous pressure on peoples, societies and resources.

The international community has recognised this problem and at the "Earth Summit" in Rio in 1992 a United Nations Framework Convention on Climate Change (UNFCCC) was agreed. This agreement was followed by the Kyoto Protocol in 1997 which set legally binding targets for industrialised countries to reduce their emissions in a basket of greenhouse gases. Overall, it is estimated that the Kyoto Protocol would achieve an overall reduction of approximately five percent in emissions from 1990 to 2012. Scientists have estimated that cuts of up to seventy percent are needed in the next century in order to stabilise emissions at a safe level, so clearly, the Kyoto Protocol is the first step of many that will need to be taken to combat climate change.

The international community met recently in the Hague for the sixth meeting of the Conference of the Parties (COP 6) to the UNFCCC. The purpose of the meeting was to flesh out a lot of the detail to the provisions of the Kyoto Protocol and the issues discussed included the establishment of a compliance regime and an international emissions trading market. Final agreement was not reached and talks will be resuming in Bonn next May. The outcome of COP6 was reported in detail in the Earth Negotiations Bulletin published by the International Institute for Sustainable Development. This can be accessed on the internet at http://www.iisd.ca. Details on the outcome are also available on the website of the Convention Secretariat at http://www.unfccc.int.

Many of the choices we make on how we travel, what kind of heating we use and how we treat our waste have the potential to help reduce emissions.

Within the Kyoto Protocol, the EU agreed to reduce emissions by eight percent (below 1990 levels) by the year 2012. However, in order to reflect the differing economic positions of many of the countries within the EU, this target has been divided amongst all the member states. Irelands target is to reduce the growth in emissions to 13 percent above 1990 levels by the year 2012. If Ireland does nothing to tackle climate change, it is likely that our emissions will be 35% above 1990 levels by 2012, so this target means that we have to reduce this growth by over twenty percent.

This is a challenging target, in particular, given that our emissions have already passed the thirteen percent target. Meeting our target by 2012 will require all of us to look at what we can do to reduce emissions. Many of the choices we make on how we travel, what kind of heating we use and how we treat our waste have the potential to help reduce emissions.

In order to make sure that Ireland lives up to its global responsibility and meets its Kyoto target, a National Climate Change Strategy was agreed by Government and published last November. This Strategy sets out measures to be taken in all sectors to help reduce emissions. It examines the types of energy we use and promotes using less carbon intensive fuels such as gas or renewable energy, and supports and using this energy more wisely. A range of measures aimed at helping industry reduce greenhouse gas emissions are included. The Strategy also looks at the way we travel, and supports measures to reduce the number of car journeys and improve public transport. New building regulations will tackle energy consumption in new houses, and a range of additional measures have been set out including the introduction of energy efficiency certificates for houses built before 1991. The Strategy recognises the role of forestry, as trees can help to absorb carbon out of the atmosphere and store it. Agriculture also has an important part to play as this sector is a source of emissions as a result of the digestive processes of cattle and the use of fertilisers, and a number of measures have been set out to tackle this.

A copy of this Strategy can be accessed on the web site http://www.environ.ie. Copies of the Strategy can also purchased for £10 from the Government Supplies Agency. A plain guide to the Strategy has also been produced in addition to a separate Executive Summary, and these can be obtained directly from the Department of Environment and Local Government.

Nuala McLoughlin, Department of the Environment and Local Government, Custom House, Dublin 1.

Publications of Interest

The Green Web

A Union for World Conservation

By Martin Holdgate

Earthscan 1999

ISBN: 1-85383-595-1

Price: £17.50stg

The Green Web is the 50 years history of the IUCN (International Union for Conservation of Nature and Natural Resources) known as the World Conservation Union. It looks at the worldwide need for conservation and its development through the IUCN. It follows the early years of the union; the move towards science based information, the beginnings of the environmental movement and the development of strategies for world conservation involving almost a thousand members worldwide.

COLLINS: Butterflies of Britain & Europe

By Michael Chinery

HarperCollins Publishers / 1998

ISBN: 0 00 220059 7

Price: £14.99stg

A well presented COLLINS ID guide, containing hundreds of beautiful photographs. Photos of both upper and underside are shown to help with identification. Detailed descriptions of each species are included, giving information on similar species, habitat, flight, life cycle and range as well as identifying features.

VISION FOR WATER AND NATURE: A World Strategy for Conservation and Sustainable Management of Water Resources in the 21st Century

Prepared by IUCN, The World Conservation Union / 2000-09-01

ISBN: 2-8317-0514-2

Price: £8.50stg

This glossy booklet sets out to describe the strategy needed to create a global water policy, in light of the anthropomorphic stresses facing our limited water resources. A series of goals, targets and actions are presented in order to achieve this 'Vision', along with a number of case studies from around the world detailing how some of these principles have been put into action.

Irish Farming & Wildlife

A Management Handbook

Editor: John Murphy

RSPB, FBD, IWC (Ireland)

ISBN: 1-899204-09-1

Price: IR£10.00

This is an extremely valuable handbook, designed to provide management guidelines to farmers and anybody interested in "wildlife-friendly farming practices". Each chapter covers one of nine recognised farming wildlife habitats, providing details on the habitat and factors influencing it, decision-making on the most suitable choices available and instruction on how to apply them. The information is straightforward and easily accessible with key bullet points highlighted at the beginning of each section.

Fish for Thought

Fisheries, International Trade and Sustainable Development

Natural Resources, International Trade, and Sustainable Development Series No. 1

By Caroline Dommen (drawing on research by Carolyn Deere)

International Centre for Trade and Sustainable Development (ICTSD) and IUCN-The World Conservation Union 1999

ISSN: 1563-0544

Price: £4.50stg

First in a series developed by the ICTSD-IUCN programme on fisheries, international trade and sustainable development. It looks at some of the main questions arising within this area, providing useful information and focusing on the key issues. This is an interesting booklet, useful to both students and professionals alike.

Inland Fisheries

Volumes 1 & 2

By P.K. Talwar & Arun G. Jhingran

A.A. Balkema Uitgevers B.V., Postbus 1675, NL-3000 BR Rotterdam, The Netherlands / 1992

ISBN: Set 90-6191-162-1

ISBN: Vol. 1 90-6191-163-X

ISBN: Vol. 2 90-6191-164-8

Price: £101.50 per set

Set out in two volumes this guide is a comprehensive key to the inland fish wildlife of India and its adjacent countries. It contains information on each species covering geographical distribution, fisheries information, synonyms, common name and a section on distinguishing features. Also included for a number of species are black and white drawings, which are a useful addition. There is a systematic index, index of common names, scientific names and a glossary of scientific terms. This is an invaluable text for those working or just interested in freshwater fish.

Handbook of the Birds of the World

Volume 4: Sandgrouse to Cuckoos

Edited by Josep del Hoyo, Andrew Elliott, Jordi Sargatal

Lynx Edicions / 1997

ISBN: 84-87334-22-9

The Handbook of the Birds of the World (HBW) is the first work ever to illustrate and cover in detail all the species of the world Since its conception it has become a high quality international project.

The work is presented in a series of 10 volumes: The authors of the texts for the various volumes are internationally renowned experts from all over the world. The family texts are lengthy, full of facts and examples, rigorous and at the same time written in a very readable style

The detailed plates are showing for the first time, every bird species in the world as well as all distictive subspecies. Each species has its own individual distribution map and highly condensed text containing all the important and most up to date information. Finally more than 300 colour photographs carefully chosen to illustrate many of the different features referred to in the text and to show numerous rare species.

The six families included in the fourth volume are sandgrouse, pigeons and doves, cockatoos, parrots, turacos and cuckoos. This volume, together with other volumes in the series, is availabe from BirdWatch Ireland, Ruttledge House, 8 Longford Place, Monkstown, Co. Dublin.

Fish Diseases

Volume 1 & 2

Wilhelm Schaperclaus

A.A. Balkema Uitgevers B.V. / 1992

ISBN: Set 90-6191-950-9

ISBN: Vol. 1 90-6191-951-7

ISBN: Vol. 2 90-6191-952-5

Price: £93.75 per set

This is an extensive text set out in two volumes covering the essential topics of fish disease. It includes the causes, study and diagnosis of fish disease. It is set out according to the pathogens and then environmental, nutritional, mechanical-traumatic and genetic or hereditary causes. These two volumes are an essential reference to those teaching fish pathology, pisciculturists, fishermen, aquarists, anglers and anyone interested in fish pathology.

Who has the Legal Right to fish? Constitutional and Common Law in Alaska Fisheries Management.

By H. Bader

Marine Advisory Bulletin, No.49

Sea Grant, University of Alaska Sea Grant College Program, P.O. Box 755040, Fairbanks, Alaska 99775-5040, USA / 1998

ISBN 1-56612-053-5

Price: US$4.00

This booklet is catered towards those who are users of the fish resources and have responsibilities to others because of their use. It focuses on state and federal constitutional law that the reader should be aware of. The author has made use of simple language to make easy reading of the most difficult political concepts. It is well structured and chapters linkup well, using many case studies to provide sound arguments for issues involving fisheries.

Creating a Sea Change: The WWF/IUCN Marine Policy

World Wide Fund for Nature, 1998

ISBN 2-88085-226-9

Price: £10.00stg

This publication is a collaborative contribution by WWF/IUCN to outline a policy that addresses the complexity of oceans and coasts, and challenges the concept of protecting and sustainably managing natural resources. The publication is very insightful and forces the readers awareness to the careless use of the oceans and the consequences of careless use. Interesting additions to the publication are the highlighted quotes from specialist authors such as Rachel Carson and Mark Kurlansky. It caters towards the general public who have an interest in the subject of oceans.

Guidelines for Public Use Measurement and Reporting at Parks and Protected Areas (1st Edition)

By Hornback, K. E. and Eagles, P. F. J.

IUCN / 1999

ISBN 2-8317-0476-6

Price: £15.00stg

This book takes the reader through the initial stages to the advanced stages of developing a Park. It goes on to talk about long-term monitoring of mass tourists, using examples from famous Parks worldwide. The book focuses on the business and economic sides of managing a park. It provides sound advice that could be used as guidelines to those who are specifically involved in the subject of Park development and management.

Ecology of Insects. Concepts and applications.

By Speight, M. R.; Hunter, M. D. & Watt, A. D.

Blackwell Science / 1999

ISBN 0-86542-745-3

Price: £26.50stg

This book is aimed at postgraduate students and readers who have some knowledge of insects, as it contains a lot of detail. There are lots of diagrams and bars charts to illustrate the data. Insecta is one of the most important orders in fauna taxonomy because it represents over half of the total number of animals living on this planet. Insects and their ecology are essential for us, their effects are often crucial or beneficial; they are pests in our crops, they are vectors of diseases, they are an important part of our food webs and some of them are good bioindicators.

Blackwell Science has again edited a very motivating book with a few impressive colourful photographs and up-date information about population dynamics and evolutionary ecology.

Making A Wildlife Garden

WITH a little help anyone can attract a wide variety of wild plants and animals into their garden or patch of land. By making a few simple changes, in no time at all you will be sitting back and enjoying your own "local nature reserve". The wildlife that visits your garden will give you plenty of entertainment and you will have more time to enjoy it too, because with a rich-habitat wildlife garden there is less need for weeding, clipping, mowing and spraying. You will be working with nature. When that happens life is easier for people, animals and plants.

As a wildlife gardener you will be making an important contribution to nature conservation. Wildlife is coming under increasing threat in this country, not alone in urban environments but in the countryside as well. The contribution of modern farming, new non-native forestry plantations and destruction of old, Dutch elm disease, building work and new roads will increasingly put pressure on our native plants, animals and habitats. Wild flowers such as primroses and cowslips are becoming rare in some areas - mainly because this habitat is being destroyed. Wildflower meadows are being built on, ploughed, sprayed with herbicides, or simply fed with fertiliser to encourage more grass to grow. Losing all these wild flowers is bad enough, but of course as the meadows disappear then we are also destroying the habitats for many of our butterflies and moths, our skylarks and all the beautiful creatures which live there. It's time we all started to do something. Starting your own wildlife garden can be your contribution.

As a wildlife gardener you need to take an interest in all the wild green spaces in your neighbourhood. Most of the large animals need more territory than the average garden will supply. For example, hedgehogs will roam over a number of green patches, and although your wildlife garden may be thronged with wild birds from time to time, probably only a few pairs are nesting there. It is important to think of your garden as a "service station" for passing wildlife. If someone sprays the nettle-patch in the churchyard, or chops down the old trees in the park, you will lose some of your wildlife visitors. Your success will be strictly limited if your garden has to operate as a self contained island in a sea of tarmac and concrete.

Grow Some Native Plants

The food chain begins with plants. Many of the grubs, caterpillars and other plant eaters are extremely specialised. They may well be able to eat the leaves of only one particular plant type, and when this is the case the plant will always be native. For example the caterpillars of the Small Tortoiseshell butterfly eat nothing except the young leaves of nettles. All native plants - trees, shrubs and wildflowers will have their own dependent leaf eating creepy-crawlies, so if you grow a range of plants you will attract a wider variety of insects which means a wider variety of birds and animals to feed on them.

Allow Room for Decay

Dead material is important as food for wildlife. In fact, far more types of wild creatures feed on dead and rotting material than on living plants. Try not to clear away all the garden rubbish. If the lawn is covered with fallen leaves, rake them up and throw them under a hedge. Hedgehogs will curl up and hibernate in piles of old leaves.

Cut Down on Chemicals

At the bottom end of the food chain, plant and animal life is very vulnerable. When the first greenfly appear in spring it is always tempting to spray them with a chemical poison. Please don't. (If you have just a little patience, you will see that a well balanced, rich habitat garden has ways of dealing with greenfly, slugs, caterpillars and all other creatures which the modern gardeners call pests). As soon as the greenfly appear you will begin to notice little wriggly grey 'maggots' hunting them. They are Ladybird larvae and can wipe out hundreds and hundreds of greenfly every day. If you spray the greenfly then you will almost certainly kill their natural predators. Then your plants really will be in trouble because the "pests" always recover more quickly than the predators. The other effect of chemicals is even more serious. All the animals you love best depend on plants or plant eating animals for food. For example hedgehogs will eat dozens of slugs; baby blue-tits will keep their parents busy collecting hundreds of caterpillars. If you spray the greenfly or put down slug pellets you will inevitably finish up poisoning the baby blue-tits and hedgehogs as well. A garden free from chemicals rarely suffers from any sort of epidemic as nature has a way of balancing things out if left to its own devices. Try to work with nature and understand it, not to master it. It is somewhat like a pet dog, no matter how much you train it, it will always have its own personality and independence.

Provide Lots of Breeding Sites

Wild creatures need somewhere safe to breed. Native plants and decaying leaf litter will keep many small creatures happy. However bringing some big lumps of timber into the garden and building a log pile will help further. In no time this mini-habitat will be alive with all kinds of wood boring beetles, wood wasps and grubs. In autumn numerous toadstools will appear. If the pile is big enough it may nest spiders or even a pair of wrens or robins. The insects will attract birds and animals, and hedgerows are an important breeding habitat for many of these. Planting a mixture of Hawthorn, Field maple, Wildrose and Wild privet will provide this hedgerow environment. Nesting boxes provide a good substitute for holes in dead trees where many birds would normally make their home in a woodland environment.

The Wildflower Meadow

Informal Lawn: If the grass is left unmown for just a few weeks towards the end of spring you will be surprised at just how many wildflowers will stick their flowerheads up for the first time. There will of course be daisies and dandelions mingling with the blue of speedwell, the yellow catsear and the funny looking flowers of the plantains. After the display has faded you must cut the grass, if you don't the grasses will overshadow the leaves of the rosette plants and the daisies will die out.

Spring Meadow: You could on the other hand leave the grass uncut from early spring right through summer to July and let all the wonderful spring flowers and grasses do their thing. Some of the wild flowers you can expect to find in spring meadow are Cowslips, (still to be found in old pastures), Lady's smock or Cuckoo flower (a food plant for butterflies), Meadow buttercup, Yellow rattle (a semi parasitic plant which feeds off grasses), Oxeye daisy, lots of vetches and trefoils and all the grasses.

Summer Meadow: A summer meadow requires yet another mowing regime. Mow the grass regularly through the spring (not too short) and then leave it uncut from midsummer to autumn. The taller wildflowers such as Field scabious and Greater knapweed will encourage lots of butterflies to drop in and perhaps breed. Cut the hay in the autumn and don't forget to remove it.

Further information on "Making a Wildlife Garden" is on the fact sheet which, along with other fact sheets, is available from ENFO - The Environmental Information Service, 17 St. Andrew Street, Dublin 2. Tel 1890200191 (price of local call) Fax 01-8882946 Email: info@enfo.ie
Fact sheets are also available at their Website: www.enfo.ie

Bray Head Seabirds

By Oscar Merne

JUST half an hour by DART from the centre of the capital city lies the town of Bray. Immediately to the south of the town's seaside promenade Bray Head slopes steeply from sea level to its northern summit at just over 200 m. From there the headland extends southwards some three kilometres towards Greystones, where the rocky cliffs and outcrops give way to gently sloping pastures and low earth cliffs which are constantly eroded by winter storms. The main railway line from Dublin to Rosslare skirts the seaward side of the headland about 50 m above the water, and occasionally disappears into tunnels through the rock outcrops. Parts of the cliff are subject to erosion and the railway has had to be realigned in some places and shored up by buttressing in others. High above the railway runs a cliff walk from which there are good views of the headland. The rocky cliffs below the railway are where most of the breeding seabirds are nesting. There can't be many sites in this part of the world where one can see nesting Fulmars, Shags, Kittiwakes, Razorbills, Guillemots and Black Guillemots from a passing train.

I mentioned in my article on Black Guillemots (*Sherkin Comment* no. 26) that Bray Head, with 127 birds, is the largest colony of this species in Ireland. The colony is known to have existed there since at least 1850. During the spring and summer, when not hidden away in their nesting holes (natural rock crevices in some places, but mainly man-made cavities associated with the railway buttresses), the Black Guillemots can often be seen floating on the sea close to the cliffs, or loafing about on rocks or ledges on the buttresses.

Two other auk species nest on Bray Head - Common Guillemots and Razorbills. Unlike the Black Guillemots these birds nest on open ledges, the former packed shoulder to shoulder, the latter in their own individual nesting places. The numbers of Guillemots and Razorbills have been increasing since they first colonised, the Razorbill about 1950 and the Guillemot about 1985. Now the former numbers 90 individuals and the latter 275 individuals. In Ireland and Britain generally Guillemots are increasing steadily and it will be interesting to see if this trend continues at Bray Head in future. I suspect that shortage of suitable horizontally stratified ledges will be the limiting factor.

Another species which is a relative newcomer to Bray Head is the Kittiwake. These dainty but noisy little gulls had ten nests on the cliffs in 1969/70 and then increased rapidly to 464 pairs ten years later. By 2000 the colony was up to nearly 800-900 pairs.

Fulmars, which first started nesting in Ireland in 1911 (on the north Mayo cliffs), spread rapidly around the coast and were found "prospecting" (taking an interest in suitable nesting sites) at Bray Head by 1947. By 1954 they were breeding there and in 1970 there were 28 pairs present. By the end of the century 60 pairs were breeding, mostly on the cliffs below the railway line, but with some on the cliffs above the path higher up.

"There can't be many sites in this part of the world where one can see nesting Fulmars, Shags, Kittiwakes, Razorbills, Guillemots and Black Guillemots from a passing train."

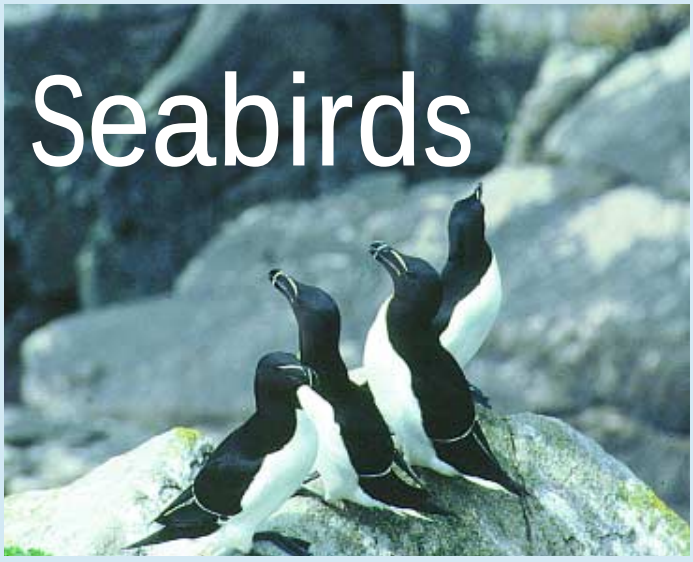
While it is good to see seabird species colonising and increasing at Bray Head, not everything in the garden is rosy. Both Herring and Great Black-backed Gulls colonised in the early to mid-20th century and peaked at 240 and 80 pairs respectively in the 1960s. However, they have both decreased dramatically to near extinction, possibly due to botulism, which became a widespread and continuing problem for the large gull species since the long hot summer of 1976.

There is considerable doubt about the status of Manx Shearwaters at Bray Head. There are a number of reports of these nocturnal seabirds over the last hundred years, with references to "small numbers", "suitable burrows", and so on, but as far as I am aware no-one has actually found adults in burrows with eggs or chicks. In my own youth I made several visits to Bray Head on suitable nights during the nesting season and heard Manx Shearwaters calling. At that time it was assumed that calling birds were a reliable indicator that they were breeding, but now it is known that Manx Shearwaters visit and call at non-breeding sites. So the jury is still out on this matter as far as I am concerned.

In spite of the loss of the gulls and the doubts about the Manx Shearwaters, the colonies of other seabirds are doing very well and Bray Head is well worth a visit during the breeding season. A train ride from Bray to Greystones and a walk back along the cliff path (or *vice versa*) will give a nice perspective on the headland and its breeding birds.

Oscar Merne heads the Bird Research Section of National Parks & Wildlife, Dúchas, The Heritage Service, 7 Ely Place, Dublin 2, Ireland.

Bray Head slopes steeply from sea level to its northern summit at just over 200 m. The rocky cliffs below the railway are where most of the breeding seabirds are nesting.



Razorbills are one of a number of auk species nesting on Bray Head. They build their own individual nesting places on the open ledges.

Kittiwakes are relative newcomers to Bray Head, having had only 10 nests there in 1969/70. This number had increased to 800-900 pairs by the turn of the century.

Monuments to Early Underground Resistance - *The Irish Souterrain*

By Victor Buckley

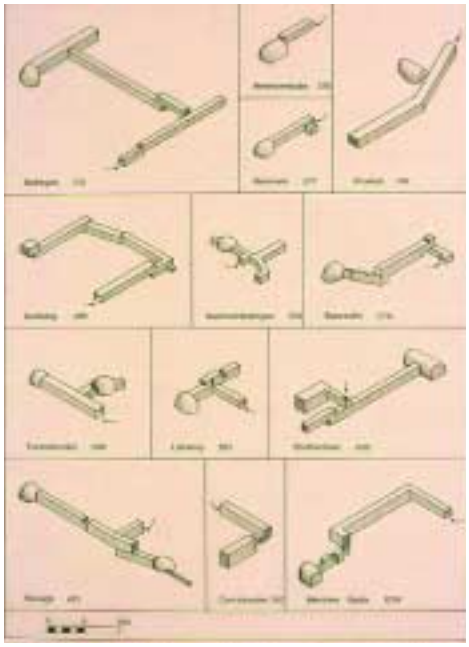
CAVES hold a mysterious fascination for the young and old alike – cold, dark but intriguing – what is down there and how far do they extend underground? Great natural caves such as Dunmore in Co. Kilkenny and the Ailwee cave in Co. Clare have even been turned into visitor attractions, made safe for the public to venture into, giving us a glimpse of the underworld usually only afforded to potholers.

However, there is another type of cave to be found throughout the Irish countryside. These are souterrains, from the French "sous-terrain" – "under the ground". They are archaeological monuments dating back to the second half of the first millennium A.D. These underground man-made tunnels and chambers tell us a story of turbulent times, when people would go to extraordinary lengths to protect their lives.

The souterrain or "Uaimh" – "Cave" in Old Irish was constructed by digging a trench and then building up the side-walls by placing stone upon stone to form drystone walling with a core of earth in between to keep the walls upright. Finally a large lintelstone was slid over the top and everything covered over. Then the earthen core was dug out leaving the lintels to keep the walls apart and the walls supporting the lintelled roof. A system of tunnels and chambers with narrow constrictions known as "creeps" was formed. Creeps were defences that had to be crawled through and once the last of the inhabitants was inside the chamber a large stone could be rolled over and they knew that the next person to try to gain entry was not a friend. Air-vents led off from the chambers in case the attackers tried to smoke the defenders out.

Souterrains are engineering masterpieces and they come in many shapes and forms, depending on how much the landowner was willing to pay for his family's safety. The Early Irish texts tell us that they were built by a professional class of cave – builder "Uaimhearachta" and that in the 9th Century it cost "2 cows for to build a liss (ringfort) 2 cows for a togher (wooden bog track) and also 2 cows for an Uaimh (Souterrain)" At that time there was a barter economy, and things were valued in terms of agricultural produce. Thus in today's prices for a £150,000 bungalow it was the equivalent of another £150,000 to have an underground nuclear bomb shelter. Why was so much

Souterrain found during factory construction, Dundalk, Co. Louth.



Types of souterrain showing complex combinations of tunnels and chambers.

money spent on these dark and hidden places?

In the late first millennium it was a time of great Viking raids and also localised wars and raids by the Irish tribes on each other. As well as snatching cattle and anything of portable value, there was a thriving trade in slaves. People would be rounded up and led off to be sold into captivity, either in one of the Viking cities and towns such as Wexford, Dublin or Limerick or perhaps even as far afield as Spain or North Africa.

With the coming of the Normans the souterrains of Ireland became a thorn in the side of the new feudal lords, for they were convenient places to hide. Many were closed up and filled in by the Normans in the Medieval period. However they have continued to be used up to the present day for many illicit purposes.

There are nearly 6,000 known souterrains throughout Ireland, but many more previously unknown examples are being discovered every year. Usually they are found when a plough accidentally hits the edge of one of the lintels capping a tunnel or chamber. This dislodges the stone which then tumbles into the souterrain – leaving an entry into a structure that may not have been seen by anyone for the last thousand years. They can also be found during house-construction or during gas pipeline and roadway building.

Local traditions often record "hollow sounds" when feet are stamped on the ground in the middle of seemingly flat fields. Stories also abound of tunnels leading from forts or castles to local churches, more probably a faint folk memory of the finding and subsequent closure of a souterrain which even today are seen as dangerous to children or livestock. If you know of any traditions of underground caves which you think may not have been recorded before, even if they are not open today – please write to:

Typical drystone-built passage of Irish souterrain.

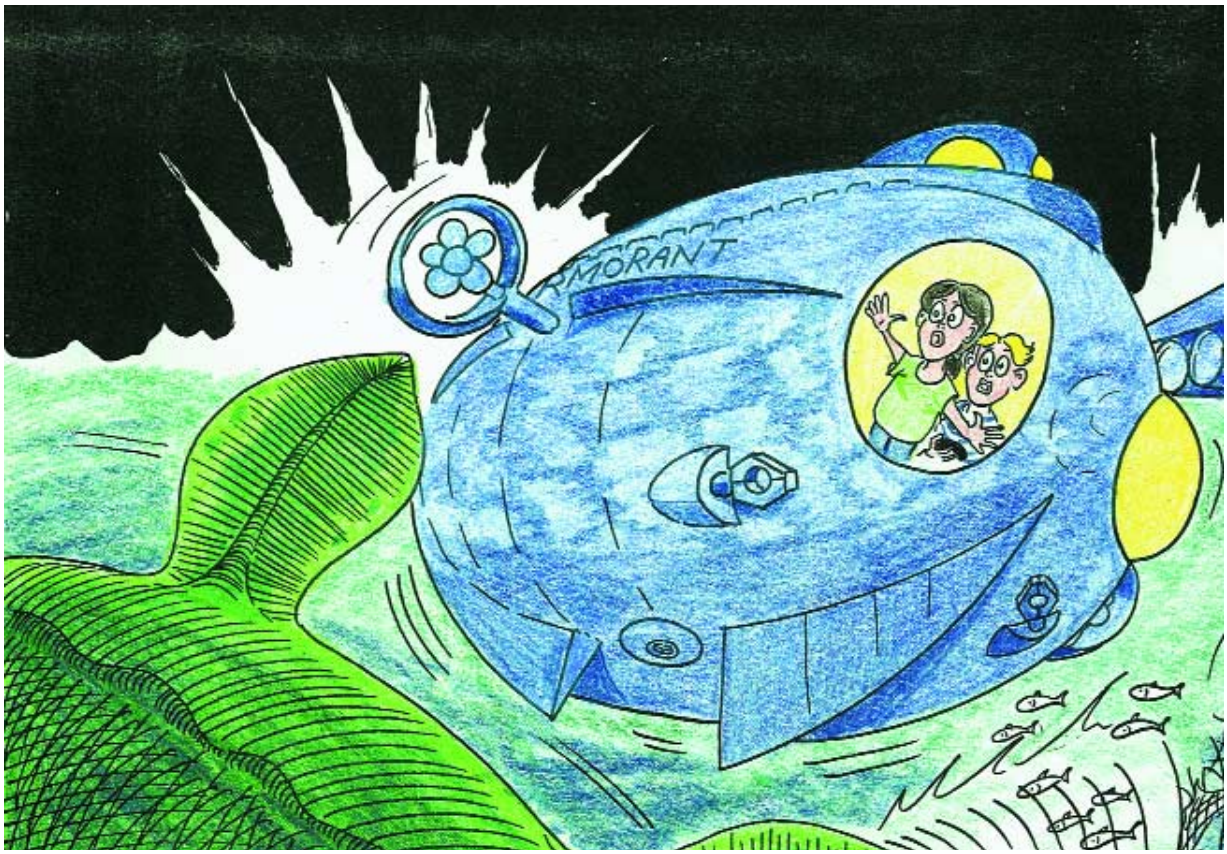
Victor Buckley is Senior Archaeologist with the National Monuments Service of Dúchas: The Heritage Service at 6 Ely Place Upper, Dublin 2. Email: duchas@indigo.ie Website: www.heritageireland.ie We are always glad to record previously unknown archaeological sites.

Junior Pages

Junior Pages

Captain Cockle and the Loch Ness Monster

Abridged in four parts - *Episode One - The Attack!*



By John Joyce

CAPTAIN Cockle, retired submarine captain and inventor of the Cormorant – an amazing submarine that cannot only fly, but also shrink to the size of a sausage at the touch of a button, had flown to Scotland with his wife Dr Catherine Cockle, and their grandchildren Jenny and William to do a favour for an old friend. Alistair McTavish, an old shipmate of the Captain's, had a fish farm in Loch Ness and was worried that someone - or some thing - had been ripping the nets and letting the fish escape. Was it a rogue seal? Was it vandals? Or was it something far more dangerous. McTavish hoped that Captain Cockle and his crew could find out and put a stop to it, before all this fish escaped.

McTavish had his suspicions of course. He thought it must be Professor Bartholomew Potts – a man with a little submarine of his own – who had come to Loch Ness to make a film about the famous Loch Ness monster. But Professor Potts could not find the monster and had decided to make a film about McTavish's fish farm instead, saying how it was polluting the Loch with waste and killing everything in it.

"The trouble with fish farms," said Professor Potts, when Jenny and William met him on the loch that afternoon, "is that they are against nature. They cram fish up in tiny tanks and fish cages. Then fish waste and uneaten food fall out of the cages and pollute the environment. Fish farms are not natural. Oh dear me, no! But then again I wouldn't expect little children like you to understand anything as complicated as that."

"But don't fish squeeze together into huge shoals in the wild," said Jenny, who knew she could easily understand anything complicated that Professor Potts might have to say about the environment.

Back at the fish farm, Alistair McTavish just called Professor Potts "a dangerous looney!"

"But what if he's right and you are polluting the loch?" asked Jenny, who thought that she had seen some dead fish on a beach near the fish farm earlier that day. They looked as if they had come from deep in the loch, and some of them even had bite marks – as if something had been eating them.

"Fish cannot live in dirty water," snapped McTavish. "If I was polluting the loch, all my fish would be dead and, as you can see, they are not. So I don't think your Professor has much of a case. Do you?"

"I suppose not," said Jenny. But she did think it was strange that neither Professor Potts or Mr McTavish seemed to want to listen to each other's point of view and just repeating the same old things over and over again.

That night, Professor Potts called a public meeting to discuss the fish farm and pollution in general. Nessie McGregor, the local hotel owner, was there – as were the local dairy farmer and the secretary of the local angling club. And they all had a big argument over McTavish's fish farm, along with McTavish himself, his two sons and Captain Cockle. In fact, it might have even ended in a fight, had not Dr Cockle, in her loudest school-mistress voice, told them all to be quiet and to settle the matter once and for all by actually testing the water of the loch to get the facts on where the pollution was coming from.

Back at McTavish's fish farm, Jenny and William were keeping watch on the fish from the control room of the submarine Cormorant. To help them, they were using ROVER – a miniature robot with lights and a camera, specially invented by Captain Cockle to see into places the Cormorant could not reach, even when it was shrunk to the size of a sausage. Round and round the farm, and in and out among the fish pens went the tiny robot, but there was nothing at all out there in the dark water.

Then all at once there was a strange noise – a faint clicking noise like someone running a piece of cardboard in the spokes of a bicycle wheel.

"Ticka, ticka, ticka, tick, tick, tick," it went.

"It's getting louder!" said Jenny.

"It's probably something blowing in the wind up on the fish farm," said William. "Or perhaps it's a boat?"

Then all at once, a huge black shape was moving outside the porthole in the water of Loch Ness. It burst out of the darkness, smashed into the Cormorant, and knocked ROVER against the nets of the fish cages and ripped them, letting all the fish out into the loch.

"It's the monster!" cried William.

Will McTavish and Professor Potts come to blows? Will Jenny and William end up as fish food? Find out in the next episode – The Monster - only in *Sherkin Comment.*

Abridged by the author from "Captain Cockle and the Loch Ness Monster " - published in Ireland by Poolbeg Press and available in all good book shops, price Ir£2.99

Visit Captain Cockle and friends online at www.cockle.com


Your World .... Your Choice
FINISH
Congratulations!
You've made a difference.
REUSE
REUSE
REUSE
You fail to use recycled paper.
Go back 6 steps.
The hot water tank is losing heat because of a badly fitting lagging jacket. Go back 7 steps.
You fail to use re-useable nappies or those that have a reduced effect on the environment. Go back 6 steps.
You help cut down on noise pollution by using a lawnmower with a quiet engine. Go on 3 steps.
You use disposable plates, cups and cutlery instead of reuseable ones. Miss a turn.
Your whole family is involved in making your home an environmentally-friendly one.
Go on 5 steps.
You recycle glass and aluminium cans.
Go on 6 steps.
PLAY THE GAME
The world's environment needs your help. Playing this game will give you and your family some idea of what you could do. Its easy to make a difference!
Take it in turn to throw a dice, moving the required number of steps and obeying any commands.
ENFO
You make your own garden compost.
Go forward 6 steps.
You fail to use washing powder and other cleaners that are friendly to the environment. Go back 5 steps.
You use oil-based paint on your walls which are not as friendly to the environment.
Go back 3 steps.
You buy goods which are wrapped in too much packaging.
Go back to start.
START
This game is based on the booklet "A Shopping and Investment Guide for Sustainable Living" which was produced by ENFO and is available from them at 17 St. Andrew Street, Dublin 2.
Tel. 1890 200191 (Lo-call) or 01 888 2001
Email info@enfo.ie

Monkfish

~ set on ~

Risotto & Wilted Baby Spinach

Ingredients

700g/1½ lbs monkfish tails - trimmed

Marinade

55ml/2 fl oz honey
55ml/2 fl oz vinegar - balsamic or white wine
55ml/2 fl oz olive oil
55ml/2 fl oz soy sauce
15g/½ ox fresh chilli - finely chopped

Method

- Place marinade ingredients in glass bowl. Add monkfish and marinate for 30 minutes.
- Remove and roast in hot oven 220oC/425oF/Gas 7, until golden brown for 8-12 minutes.
- Allow to set for a few minutes. Slice into medallions (not too thin) and serve on some hot buttered spinach and risotto.

Risotto

55g/2 oz risotto rice e.g. arborio or short grained rice
25g/1 oz shallots/onion (finely chopped)
25g/1 oz butter or oil
200ml/7 fl oz fish stock
Salt and freshly milled pepper

Method

- Fry shallots/onion in butter without colouring.
- Add rice, mix and gradually add the fish stock and season.
- Simmer for about 15 minutes, stirring occasionally until at the stock has been absorbed and the rice is cooked.

Serves 4.

Fish alternatives:
rock salmon, pollock, hake.

WATCH THE WIND

WIND is air that is moving around the world's atmosphere. When it moves slowly its a gentle breeze but when it moves quickly it creates gales and hurricanes. The Beaufort Scale (see below) is a scale used to measure the speed of the wind. The wind affects all of us but especially the lifeboat crews who have to brave rough seas to answer a mayday call.

It is hard to imagine setting off in a lifeboat when the breaking seas are over 12m high and winds are reach gale force, but all lifeboat crews have experience of coping with the very worst of weather conditions. However, most yachts and sailors do not expect to be out in such conditions, but everyone who takes part in yacht racing knows that bad weather is always a possibility during a race.

When competitors set off on the 1979 Fastnet Race from Cowes, Isle of Wight, to the tip of Ireland and back, little did they know that tragedy was not far away. On Saturday 11 August 1979, the boats set off in a Force 4 wind and, even on the morning of Sunday 12 August, the forecast for Sunday and Monday made no mention of gales and storms. However, on Monday 13 August, two days into the race, the yachts received the following shipping forecast:

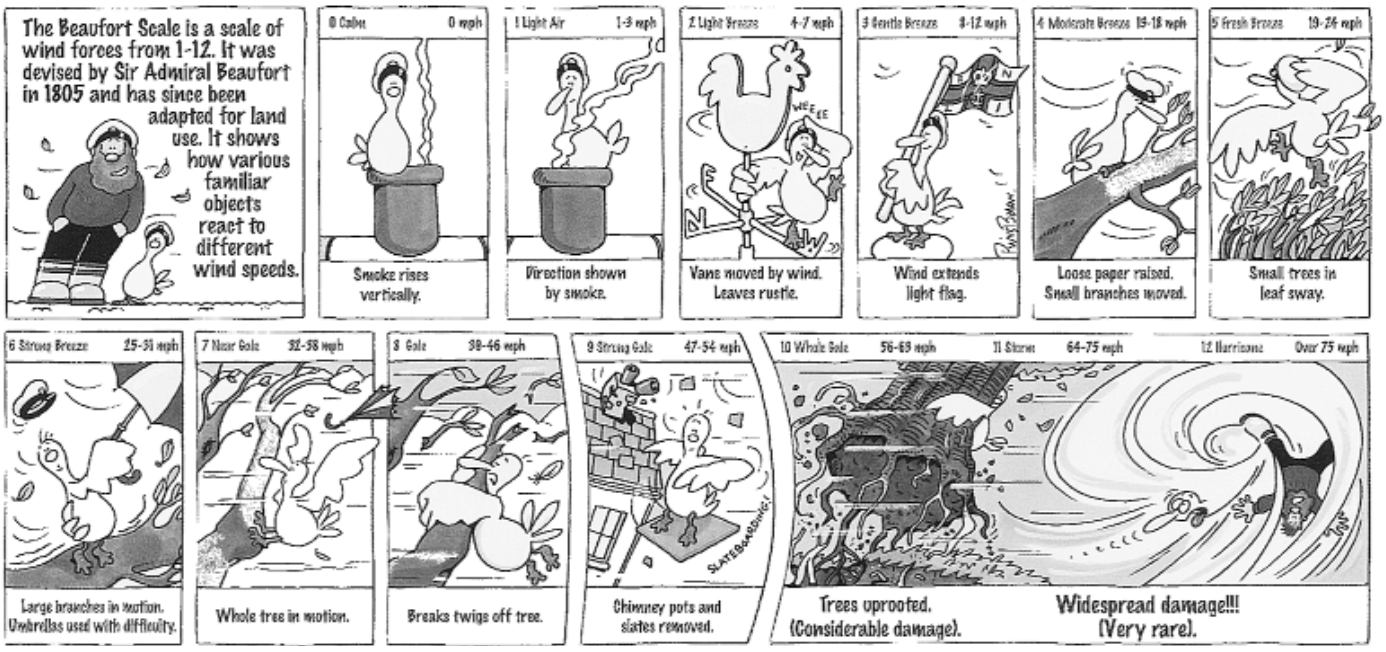
1.55pm: SW Gale Force 8 imminent (within the next 6 hours).
6.05pm: SW Gale Force 8 increasing.
10.45pm: SW Severe Gale Force 9 increasing Storm Force 10 imminent.

The suddenness of the storm caught almost all of the yachtsmen unprepared. Over 10,000 messages were passed between the Coastguards and yachts, ships and other maritime organisations over 2½ days.

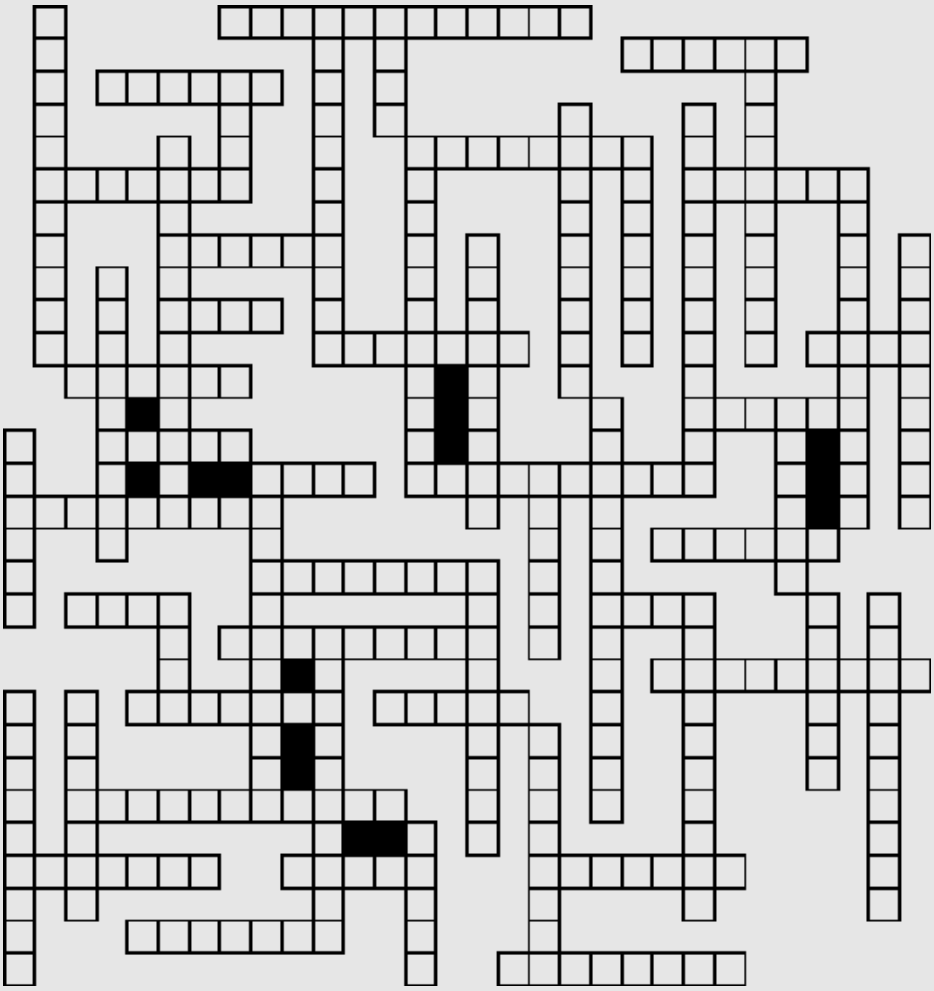
Thirteen lifeboats from Ireland, England and Wales, together with helicopters, naval and merchant ships and fishing boats, went out to help the yachts. During that three day period from August 13-16, lifeboats gave 335 hours service at sea and 96 lives were saved. Twenty one racing boats were sunk or abandoned, and 15 lives lost before the storm had calmed. With winds at Force 10 and waves up to 18m high, the 1979 storm caused the worst disaster in the history of ocean racing.

It is always important to check the weather forecast before you go to the coast or to sea. Even the most prepared people can be caught out sometimes, but make sure that you are not one of them.

Join "Storm Force", the RNLI's club for young people, and you will be sent an exciting members' pack filled with lots of goodies. Four times a year you will receive the action packed *Storm Force News* magazine full of exciting stories, paintings, ideas or jokes to Storm Force headquarters. To join just send your name and address, with a cheque/P.O. for £5.00 to Storm Force HQ, RNLI, 15 Windsor Terrace, Dun Laoghaire, Co. Dublin. *(The cartoon below has been reproduced from "Storm Force News".)*



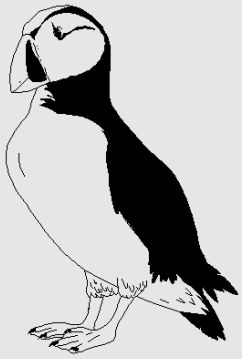
Birdspotting with a Difference!



Thousands of birds grace the skies of Ireland. Listed below are a selection of these birds. Can you help fit their names into the gird on the left?

Answers below.

Can you name the bird on the right? Answer on page 4



4
crow
dove
knot
rook
shag
swan
teal
wren

5
heron
raven
robin
snipe

6
chough
cuckoo
curlew
dunlin
fulmar
gannet
linnet
magpie
merlin
puffin
thrush

7
barn owl
blue tit
kestrel
lapwing
mallard
moorhen
swallow
waxwing

8
dabchick
pheasant
shelduck
starling

9
bullfinch
cormorant
corncrake
guillemot
kittiwake
peregrine
razorbill
stonechat
turnstone

10
greenfinch
kingfisher
little tern
sand martin
woodpigeon

11
little grebe
meadow pipit
reed bunting
sparrowhawk
storm petrel
treecreeper

12
housesparrow
ringed plover
yellowhammer

13
oystercatcher

Picture That?

a. ★ + m -  +  - ke = - - - -

b.  - al +  - k = - - - -

c.  - l +  - at = - - - -

d.  - clo + / - p = - - - -

e.  - e +  - ce = - - - -

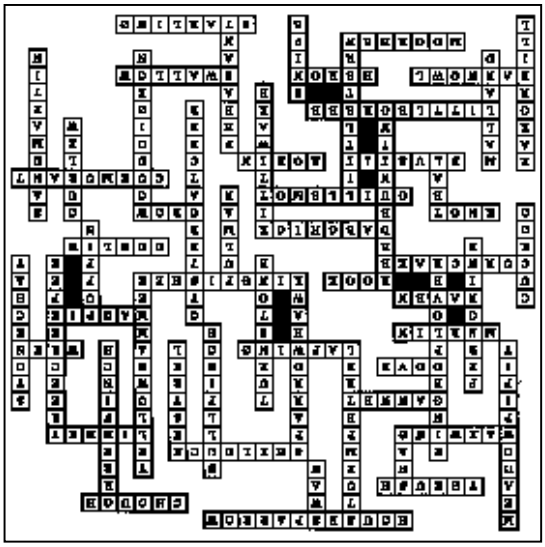
f.  - oa +  - ar +  - ag = - - - - - -

On your left are picture puzzles. Can you work out what the answers are by using the picture and letter clues? Once you have figured out the letters in each puzzle you must unscramble them to reveal a word. All the words have something to do with a bird.
Answers on page 4

ON THE WING

Can you match up these words to make birds' names? *Answers on page 4*

1. razor	a. wing
2. yellow	b. hen
3. tree	c. hammer
4. stone	d. creeper
5. moor	e. chat
6. lap	f. bill



Expedition to Mongolia

By Julie Hannon

FOR my adventure project for my Gold President's Award I was chosen to take part in a Raleigh International Expedition to Mongolia. Raleigh International aims to develop young people through community and environmental work on projects around the world.

I received a scholarship from Gaisce, the President's Award to cover half the cost of the trip and I had to raise the remainder myself. The expedition cost £3000 sterling and I had to raise the remaining £1500 sterling. I did this through appearing in two local newspapers and I gave an interview on local radio. I also wrote to local businesses looking for sponsorship and held a coffee morning. The main fundraiser that took place was a tennis tournament and raffle in the County Wicklow Lawn Tennis Club.

I spent 10 weeks in Mongolia, which is bordered by China to the south and the Russian Federation to the north. On expedition I was involved in three different phases — environmental, community and adventure.

On arrival there was a few days induction to give us a taste of expedition life. The expedition was made up of about 100 people, including staff. They were mostly British and Mongolian, with the exception of myself, a girl from Singapore and an Ozzie.

My first phase was **environmental**. I was working in the Khan Khentii Reserve in the north of the country. Every year forest fires in northern Mongolia have a massive impact resulting in loss of forested land and damage to a precious resource. We were gathering information on areas of terrain that had been destroyed by forest fire. This information would be used to develop a fire management plan. We went out on horses everyday up into the forests where we carried out 'transects' of the vegetation and environmental conditions within the park.

My next phase was **community**. I was helping to build a medical centre in small town called Tunkel. Tunkel was a small timber town about 3 hours by train outside the capital city, Ulaanbaatar. The medical centre was constructed from straw bales. This is a relatively new technique in Mongolia but is far more energy efficient, saving 75% on current heating bills. We worked very long hours in hot weather, starting at 6:30am and lasting till 8 or 9 in the evening some days. We also got to teach English in the local school.

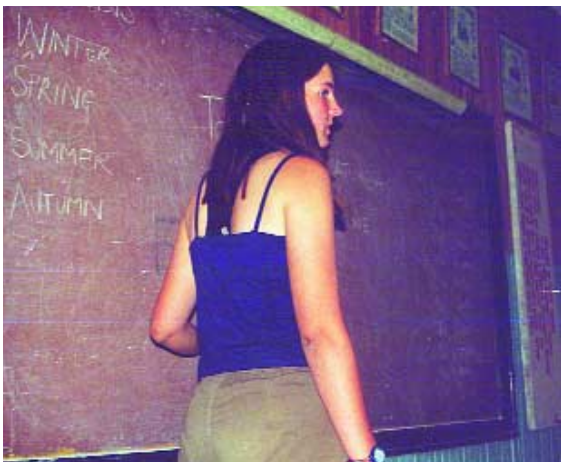
My final phase was **adventure**. This involved trekking 230km through the Gobi desert in southern Mongolia. We started at a town called Bulgan and walked across gravel and rubble plains, rocky slopes and gorges, sand dunes, salt wetlands, dry valleys and oases. I saw the most dramatic and stunning scenery in a remote and mysterious desert. We started our day at 3am, had breakfast at sunrise and finished walking before lunch. We slept during the day and continued walking in the evening. Sometimes we walked at night to avoid the heat of the clay. Temperatures were variable, soaring into the forties on some days and plummeting to zero on others. It was the toughest of the three phases but also the most rewarding.

Top: During the "community" phase of the expedition, Julie, with a co-worker, compressed straw bales which were used to build a medical centre in a small town called Tunkel.

Above: Julie on the horse she used to get to the fire-damaged forests on the Khan Khentii Reserve, where they carried out transects.

For further information about the awards contact:

John Murphy, Chief Executive, The President's Award - Gaisce, The State Apartments, Dublin Castle, Dublin 2. Tel: 01 4758746 Fax: 01 4758749 Web site: www.p-award.net E-mail: mail@p-award.net



Photos: © Julie Hannon

As part of the "community" phase, Julie also got to teach English in the local

Environmental Competition for Primary School Children in Munster 2000

Above: Rath N.S., Baltimore, Co. Cork, being presented with their prizes by Mr. Dan Wallace, T.D., Minister of State at the Dept. of the Environment & Local Government. Also present are Mr. Eddie O'Sullivan, Pfizer Ireland Pharmaceuticals, Ms. Niamh Hunt, Janssen Pharmaceutical Ltd., Mr. John O'Connor, Central Fisheries Board and Mr. Matt Murphy, Sherkin Island Marine Station.

Below: St. Kiernan's Boys N.S., Galvone, Limerick, being presented with their prizes by Mr. Dan Wallace, T.D., Minister of State at the Dept. of the Environment & Local Government. Also present are Mr. Joe O'Mahony, BIM, Mr. Brendan Roycroft, Pfizer Ireland Pharmaceuticals, Mr. Vincent Smith, Janssen Pharmaceutical Ltd. and Mr. Matt Murphy, Sherkin Island Marine Station.

Photos: © Sherkin Island Marine Station

THE response to Sherkin Island Marine Station's Environmental Competition to Primary School Children in Munster for 2000, was excellent. At the prizegiving ceremony during our exhibition at Connolly Hall, Cork, we were delighted to again have presenting the prizes, Mr. Dan Wallace, T.D., Minister of State at the Dept. of the Environment and Local Government, and Cllr. Liam Burke, T.D., Deputy Lord Mayor of Cork, at Connolly Hall, Cork. Here is a very small selection of some of the 405 prize-winners.

The competition this year was sponsored by BIM (Irish Sea Fisheries Board), Central Fisheries Board, Cork Corporation, Cork County Council, Denis McSweeny Photoshop, Cork, Dept. of the Environment & Local Government, Janssen Pharmaceutical Ltd. and Pfizer Ireland Pharmaceuticals.

Above: Berrings N.S., Co. Cork, being presented with their prizes by the Deputy Lord Mayor of Cork, Cllr. Liam Burke, T.C. Also present are Mr. Pat Quinlan, Pfizer Ireland Pharmaceuticals, Mr. Jim Murphy, Janssen Pharmaceutical Ltd., and Mr. Matt Murphy, Sherkin Island Marine Station.

Above: Ballymacarbery N.S., Co. Waterford, showing off their class entry to Audrey Murphy, Sherkin Island Marine Station; ***Below:*** Fenor N.S, Co. Waterford, being presented with their prizes by Mr. Dan Wallace, T.D., Minister of State at the Dept. of the Environment & Local Government. Also present are Mr. Joe O'Mahony, BIM, Mr. Brendan Roycroft, Pfizer Ireland Pharmaceuticals, Mr. John O'Connor, Central Fisheries Board, Mr. Vincent Smith, Janssen Pharmaceutical Ltd. and Mr. Matt Murphy, Sherkin Island Marine Station.

Sherkin Island Marine Station 1975-2000

Clockwise from top: **Matt and Eileen Murphy in 1975, with Mark and Robbie; One of the many plants in the station's herbarium; Jenny Baker with Gillian Bishop, our first volunteer biologist, in 1975; Sunshine records have been taken since 1974; The official opening of our first laboratory in 1976.**

Clockwise from top left: **Audrey Murphy talking to primary school children about marine life; A seashore transect site; Phytoplankton samples are counted back at the lab; Our annual environmental conference in Cork; At our exhibition at Connolly Hall, Cork; A boat trip to the Fastnet Rock.**

WE celebrated the 25th anniversary of the founding of Sherkin Island Marine Station on 8th September 2000. It was wonderful to see so many faces from the past, friends that had helped us survived over the years and former biologists that had spent time with us on the various research projects since 1975, came from far and near.

The family watched or listened to every weather forecast the week before the big day. Fortunately the met office got it wrong and we got a day of days, instead of the rain; a beautiful blue sky from early morn, with the sun shining as never before.

Our aim in that first year was simple, "to establish baseline data on the marine life of the coastline and to record the natural changes in these plant and animal communities". We believe we have fulfilled that statement.

Clockwise from top: **Past and present volunteers celebrating the day with us; Séan O Sé performing at the plaque dedicated to the late Eileen Murphy, the station's co-founder; Lunch in the marquee; A view of the Station.**