



SHERKIN COMMENT

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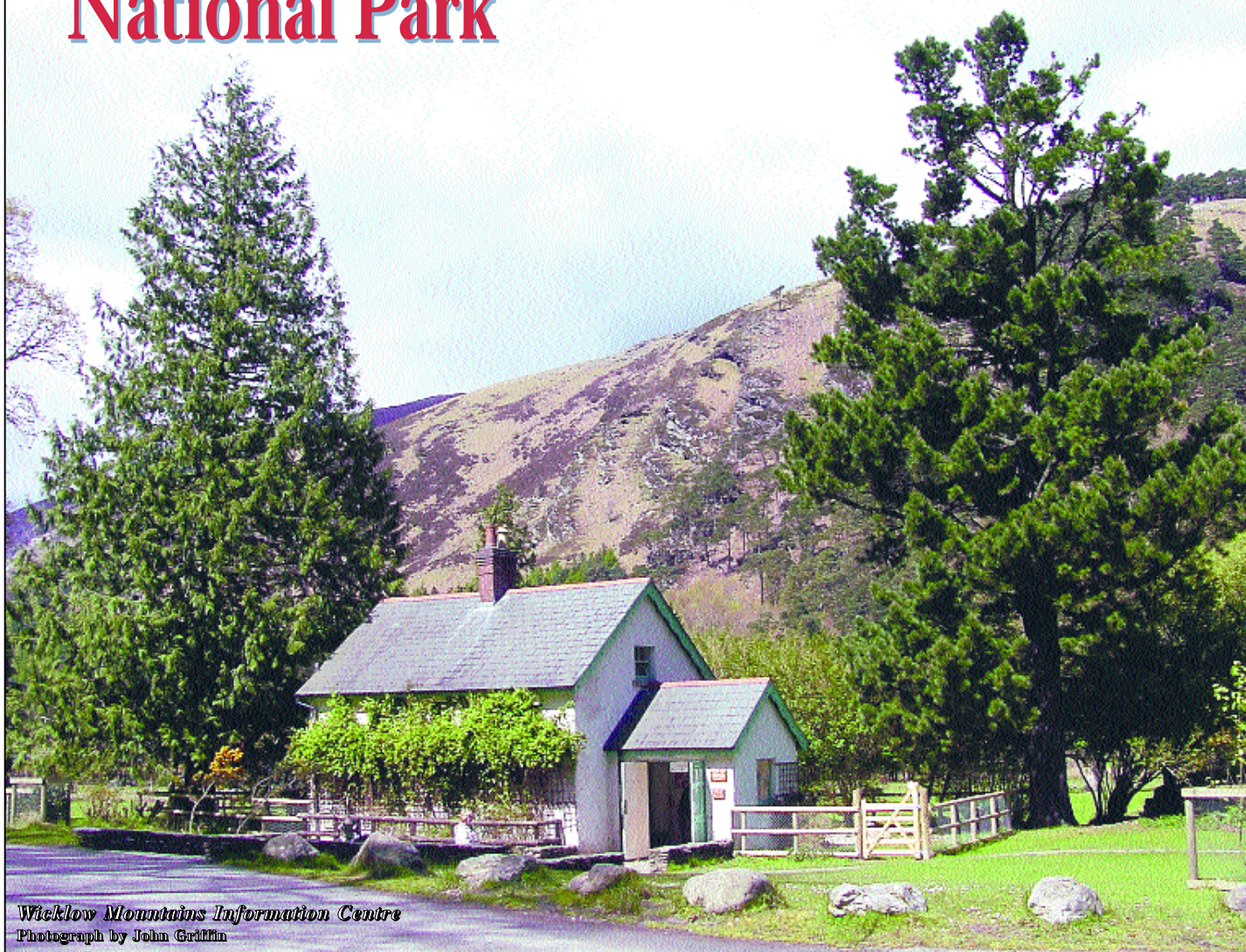
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INSIDE

The Wicklow Mountains National Park



Wicklow Mountains Information Centre
Photograph by John Griffin

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Editorial

60 YEARS OF POLLUTION

The Ispat Steel Plant in Cork Harbour - Is it an Ecological Time Bomb?

By Matt Murphy

IS it any wonder that the steel plant on Haulbowline Island in Cork harbour is no longer in operation? Quite apart from any commercial considerations, the horrifying legacy of environmental pollution revealed by the investigations of the Environmental Protection Agency in preparing to issue an IPC (Integrated Pollution Control) Licence must have scared off Irish Ispat, who purchased the site in 1996 from Irish Steel for £1. The big issue now is who will take responsibility for and fund the massive clean-up that is required?

The first warning of the extent of the environmental problems came in a memorandum of 28th February 2001 by Mr. Kieran O'Brien, of the Cork EPA office, to each EPA board member on Irish Ispat's IPC licence application. It makes sobering reading, to say the least. To quote from it:

"The site investigation in 1995 involved trial pitting and the installation of boreholes distributed throughout the landfill. Trial pits, of four meters depth indicated a completely heterogeneous material including silver slag material, brown gravel material containing metal and brick fragments, plastic bags and bricks and brown compact "clayey" material. Soil samples from the trial pits were analysed. These samples show high concentrations of copper, chromium (>6xDIV), cadmium (>2xDIV), lead (>8xDIV) and zinc (>17xDIV) in excess of the Dutch Intervention Values (DIV).

"Isolated high levels of lead contamination in excess of eight times the DIV have also been found. This indicated the presence of furnace dust deposits within the landfill. The PD [Proposed Determination] requires that all furnace dust deposited on the surface of the landfill is removed within three months and that all furnace dust in bags stored on the landfill is removed within six for off-site disposal."

"During the site investigations in 1995 the harbour sediments adjacent to the landfill were found to have elevated levels of metals. A requirement for the assessment of the biological impact of these sediments has been included in the PD."

"There is no treatment of surface water discharge from the site. Contamination of surface water is evident, from on-site inspection, from open storage of scrap and the handling and movement of slag and dust in the area of the EAF [electric arc furnace]."

Not surprisingly, the IPC Licence issued by the EPA on 22nd June 2001 imposed very significant obligations on the new owners. EPA was trying to right all the environmental problems, which have occurred since the steel plant opened in 1942. Their effort was the first, thorough, environmental evaluation of the site.

Condition seven of the Waste Management section in the document makes unpleasant reading. It required Irish Ispat to prepare a plan for EPA agreement, the elements to include:

- Waste analysis
- Waste Handling
- Dust control
- Surface water management and protection
- Groundwater management and protection
- Leachate management and disposal
- Restoration
- Environmental monitoring.

It also required a strategy to include identification of

- Historical disposal practices
- Depth and extent of waste on site.

Did Ispat know what faced them when they took on a lease in 1996 containing a number of environmental safeguards? The most important of these were:

- To accept responsibility for the damage caused to the property arising out of any dumping operation carried by Ispat (or the former owner).
- Construction of a sea wall on the landfill section of the island.

That Ispat agreed to such terms seems incredibly generous as much of the environmental damage had already been done or "set in place" through landfill dumping and other degrading practices over the previous 55 years, when the plant operation was in State control.

There is very definite evidence showing that hazardous waste has been disposed for many years on both the South and East tips of the site. This waste included furnace dust, PCBs and organic solvents. Also, there is leaching of contaminants

into Cork Harbour from those tips. Questions that need answering:

- How significant is the contamination of soils on the full site, including the portion under the main plant structure.
- In the early years, the plant carried out pickling and galvanising activities - where were the process wastes and treatment sludges disposed?
- A coal gasification plant was on site pre 1959. What happened to the Polynuclear Aromatic Hydrocarbon (PAH) residues from that operation? Adjacent to Haulbowline Island is the small Rocky Island, also a part of the plant facilities. *Sherkin Comment* understands that the island has been used, for many years, as a store, with a spectrum of materials, including radioactive materials and steel dust.

What has happened since Irish Ispat went into liquidation? Cork County Council have had to pay for disposal of waste to Britain. There are a number of containers of furnace steel dust on the Irish mainland, waiting disposal. Substantial tonnage of hazardous waste is on site at Haulbowline awaiting disposal. With Ispat in liquidation, the State is left with no option but to pay for its disposal.

Sorting out and setting the mess right will be costly. Cleaning up the contamination on the former gas works site in Dublin Docks cost over €23 million. This site is likely to be considerably more expensive.

Sherkin Comment poses a number of critical questions about this debacle.

- When will the comprehensive assessment of the site, as set out by the EPA, be carried out?
- What remedial action is needed?
- To what extent will leachate from this site damage the marine environment of the harbour?
- Will sea walls be sufficient to contain the problems on both Haulbowline Island and Rocky Island?
- Who will fund the very significant efforts of making the site environmentally safe?
- What lessons can be learned from these experiences with a 60-year old plant? Urgent action is needed. Further delay cannot be justified.

SUBSCRIPTION FORM

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TERNs IN DUBLIN PORT

By Oscar Merne

MOST people familiar with terns regard them as graceful and elegant swallow-shaped seabirds with pristine plumage, breeding in colonies on remote and attractive small islands. This is generally the case, but in Ireland there is a major exception to this idyll. Surrounded by the polluted waters of the Liffey, the malodorous smell of the sewage works treating the effluent of Dublin's one million human inhabitants, and the loud noises of a huge power station and a busy port, one of Ireland's largest Common Tern colonies is situated on a semi-derelict man-made platform which used to serve as a mooring dolphin and cooling water intake for the old Pigeon House power station.

It is not known when the terns decided to make this their summer home, but these graceful visitors from West Africa have been breeding, or attempting to do so, in Dublin Port for at least fifty years. Over the decades they have used power station stockpiles of coal, recently claimed lands as yet undeveloped, imported car marshalling yards, and seldom-disturbed jetties as their nesting places – with varying degrees of success. A feature of Dublin Port is continuous change and some of the nesting places used by the terns were only temporarily available, so the birds were constantly having to seek out other suitable areas in which to nest. During the All-Ireland Tern Survey in 1984 eighteen pairs of Common

“One of Ireland's largest Common Tern colonies is situated on a semi-derelict man-made platform which used to serve as a mooring dolphin”

Terns were found nesting for the first time on the dolphin at the Pigeon House. At the time it was considered not to be a very safe place as there was little if any nesting material available to the terns, and nothing to stop eggs rolling over the side or into the gaps between the decking planks. Chicks, too, could fall over the sides. In spite of these problems terns were still nesting on this dolphin ten years later.

By now the alternative options were very limited and terns defending their nests on the oil terminal jetties were causing growing concerns for the health and safety of terminal workers. The port authority and Dúchas – National Parks & Wildlife discussed this problem and it was decided that the terns could be discouraged from nesting on the jetties so long as they had an alternative suitable site where they could nest. The Electricity Supply Board, which owns the derelict dolphin at the

Pigeon House, was approached and kindly agreed to the use of their dolphin, and furthermore was willing to spend a considerable sum making the platform safer for the terns. Works were carried out before the start of the 1995 breeding season. These comprised surrounding the platform with 30cm high wooden retaining walls to prevent eggs and chicks going over the side; covering the platform decking with heavy-duty polythene, chain-link wire and a layer of gravel, to cover the gaps between the planks and to provide a more suitable nesting substrate for the terns; and covering over two wells in the platform which were a hazard to wandering chicks.

When the terns returned from Africa in April 1995 they were not in the least bit deterred by the changes to the dolphin – quite the contrary indeed, and numbers increased from the 34 pairs of the previous year to 48 pairs. And instead of losing lots of eggs and chicks the birds managed to fledge successfully 58 chicks. In subsequent years the colony continued to increase steadily and in 2001 just over 200 pairs of Common Terns nested on the dolphin, making it one of the largest colonies in Ireland for this species, and one of the most productive, with each pair of terns successfully fledging



The Common Tern, from West Africa, has been breeding or attempting to do so, in Dublin Port for at least fifty years.

up to 1.8 chicks.

A modern concrete mooring dolphin just upstream of the Pigeon House dolphin has also been used by nesting terns (both Common and Arctic) in recent years – but only by small numbers (c.15-20 pairs). However, port development plans included the incorporation of this dolphin (and therefore its loss to the terns as a safe nesting “island”) in an extension to the nearby wharf. Again Dublin Port, Dúchas and the ESB had discus-

sions about providing an alternative nesting place, and it was decided that the capacity of the Pigeon House dolphin could be increased greatly by removing stacked metal grilles, spreading gravel on the bare concrete platform underneath, and partitioning the whole area with low timber walls to encourage the terns to nest in higher density. This work was carried out by Dublin Port during the 2000-01 winter and resulted in peak tern numbers and productiv-

ity in the 2001 nesting season.

This conservation success story provides an excellent example of how co-operation between development and conservation interests can come up with a solution that benefits all parties – not least the terns themselves.


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



The timber section of the ESB dolphin, Dublin Port.




Over 200 pairs of Common Terns nested on the platform in 2001.



Water Quality in Ireland 1998 – 2000

For the first time since national surveys commenced, Ireland's river water quality has improved. According to the recent Environmental Protection Agency report on Water Quality, 70 per cent of river channel length monitored in 1998-2000 is now classified as unpolluted, representing a three per cent improvement since 1997. Most of the improvements have occurred in catchments where new anti-pollution measures are in place. The EPA warns however that increased efforts are required to bring water pollution under control.

Water Quality in Ireland 1998 – 2000 is priced at €30 (including water quality maps) and is available from EPA Publications, Richview, Clonskeagh Road, Dublin 14. Telephone: 01 2680100 Fax: 01 2680100



ENVIRONMENTAL PROTECTION AGENCY An Ghníomhaireacht um Chaomhnú Comhshaoil

NITROGEN

the reluctant life saver

By Anthony Toole

To many people, air and oxygen are the same thing. In fact, only about one-fifth of the atmosphere is oxygen. The remaining four-fifths consist almost entirely of nitrogen. Apart from small deposits of potassium nitrate in South America, very little nitrogen is present in the rocks or the soil. Most of the Earth's nitrogen is to be found in the air. If any nitrogen compound were to decompose and release the element into the air, the gas is so stable and unreactive that it is likely to remain there indefinitely.

Yet the removal of nitrogen from the air is essential to the sustaining of any kind of life on Earth.

The extreme stability of nitrogen is attributed to the fact that the gas is made up of molecules in which the atoms are linked together in pairs, with each pair being joined by three chemical bonds. In contrast, molecules of other elements that exist as pairs of atoms, like hydrogen and chlorine, are joined by single bonds, or in the case of oxygen, by a double bond.

Nitrogen's triple bond makes it extremely difficult to separate the atoms once they are joined together. A few simple bacteria, found in the soil, or concentrated in nodules on the roots of plants like clover, contain chemicals that are

able to remove nitrogen from the air. Apart from these nitrogen-fixing bacteria, no other living creature can perform the task.

The only natural process, other than the bacterial route, by which nitrogen can enter the soil in a useful form, occurs during thunderstorms. When electricity passes between the clouds and the Earth, the energy released is sufficient to split nitrogen and oxygen molecules into single atoms. These may combine to form nitrogen oxides, which dissolve in the rain water to make a dilute solution of nitric acid. The acid then reacts with minerals in the soil to produce traces of nitrates, which can be absorbed by plants.

Without this nitrogen, plants would be unable to synthesise the amino acids that are essential for the production of proteins. Animals, in turn, would be unable to survive, as they would lose their primary

source of protein.

The nitrates removed from soil by growing plants are replaced largely by the breakdown of proteins and amino acids following death and decay of plants and animals. This is why compost and manure are spread on fields and gardens.

Increased demand for food means that natural processes are, in themselves, insufficient to provide all the protein necessary for a growing world population.

The main compound from which artificial fertilisers are made is ammonia, which is manufactured by forcing nitrogen from air to react with hydrogen at high temperatures and pressures. The ammonia produced is alkaline, and so will react with acids to form neutral salts like ammonium sulphate and ammonium nitrate that are excellent fertilisers.

A high proportion of manufactured ammonia is reacted with oxygen, in the presence of a platinum catalyst, to form nitrogen oxides. In a process analogous with what happens during a thunderstorm, these are converted into nitric acid.

There are a number of different oxides of nitrogen, and they are, in themselves, interesting compounds.

Molecules of nitrous oxide each contain two nitrogen atoms combined with one atom of oxygen. For many years, this has been used as an anaesthetic to deaden pain during surgery. Its common name, laughing gas, arose from the hysterical behaviour seen among some patients following operations in which it was used.

Nitric oxide molecules contain a single atom each of nitrogen and oxygen, giving it the chemical formula NO. It is a colourless gas, and relatively stable so long as it does not come into contact with air. It is, however, a free radical, having an odd number of electrons shared between its atoms.

Immediately when it is exposed to air, it combines with oxygen to form the brown, strongly acidic and highly toxic gas, nitrogen dioxide. This is also a free radical, and on cooling in ice, its molecules combine in pairs to produce an equally corrosive liquid called dinitrogen tetroxide. Either of these latter oxides will produce nitric acid on dissolving in water.

Much nitric acid is used to make fertilisers, such as nitrates of potassium, sodium and ammonium. Sodium and potassium nitrates do not themselves burn, but on heating, decompose to release oxygen, which will help other sub-

stances to burn. They are sometimes used for this purpose in fireworks.

If solid ammonium nitrate is heated, it decomposes explosively, the small volume of solid expanding rapidly to a large volume of gases. This is believed to be the cause of the explosion that wrecked a fertiliser factory in Toulouse, France, in the summer of 2001.

This illustrates the danger of many nitrogen compounds. Because they are generally less stable than the elemental nitrogen, they decompose, under the right conditions, to cause an explosion. The second most important use of nitric acid, after fertiliser manufacture, is in the making of explosives such as trinitrotoluene (TNT) and nitroglycerine.

All is not destructive, however. Nitric oxide molecules occur naturally inside the body where, safely isolated from air, they remain harmless. In fact, they serve the useful purpose of relaxing muscles that surround blood vessels.

Much heart disease is caused by constrictions in the arteries that help feed the heart muscle. One of the treatments for angina consists of tablets containing small quantities of nitroglycerine. This releases, into the tissues, nitric oxide, which in turn causes the muscles surrounding the constricted arteries to relax, allowing the artery walls to expand so that the blood can flow more freely.

It is the same mechanism, brought about by the production of nitric oxide, naturally in the body, that brings about the male mammalian response to sexual stimulation - yet another example of the ways in which compounds of this otherwise almost inert element are essential to the continuation of life on the planet.

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Dams & Fish - 2002

By Michael Ludwig

WATER is a renewable and inexpensive source of energy. For those reasons, dams are considered, usually, environmentally friendly. Unfortunately they have drawbacks that have not been overcome after three thousand years of designing. Sometimes, dam builders dismiss important ecological functions of waterways when seeking energy and irrigation benefits. Impoundments stop natural flows and impact events such as fish movements, flooding and erosion patterns and the way estuaries function. Dam builders recognize these problems and continue to look for ways to achieve the benefits of unrestricted flows and avoiding the detriments of flooding. Today, there are about 39,000 large dams in the world, altering the flows in almost two-thirds of the world's water courses. As needs change, it is becoming apparent that not all dams are needed.

Dams change the character of a river ecosystem by altering deposition patterns. Altered sediment deposition by control of river flows, decrease fertility and crop production in adjacent flood plains and change aquatic habitats. Adverse impacts from reduced sediment movement can be found far from a dam site. The Assam High Dam in Egypt starves the Nile River delta of new sediment. Without that sediment natural erosion of the delta has destroyed an important Mediterranean fish spawning area. The lack of a good spawning area has doomed the fish species. But, water releases can be used to restore lost functions. For the first time since its construction, a major water release was allowed at the Hoover Dam in 2000. It was an attempt to use flooding to restore natural habitats in Grand Canyon. The effort achieved many of its goals by sweeping away accumulated silt and exposing gravel in the riverbed and along the shorelines.

Sometimes, dams help spread undesirable species. When the dam and lock system of the St. Lawrence Seaway was opened, sea lampreys were able to enter the Great Lakes through the locks and damage fish stocks. Other



consequences of damming include accelerating the rate of the earth's rotation and altering its magnetic fields. These impacts are caused by adding the weight of the impounded water to the land surface.

Some of the problems created by dams also cause their demise. Dams have three main limits to their life span; 1) dam materials deteriorate (concrete lasts 50 to 100 years), 2) sediments fill the impoundment reservoir, and 3) technology and human needs change. In the US, these constraints led to use of 50-year permits for dams. At the end of each 50-year permit, the dam operator must obtain a new permit, based on present day technology. Today, we are using the re-licensing process as well as special laws for fish restoration to assess the very presence of impoundments. When the assessment shows there are more benefits to dam removal than retention, we are requiring that the waterway be returned to natural flow patterns. Dam removal is the most environmentally responsive measure possible, but controlled releases of water, installing fish ladders and bypass systems are worthwhile, less expensive and, more routinely, included in new permits. A surprisingly large sector of society support dam removal when it is indicated. What started as a program to insure dam safety has expanded to re-establishing aquatic movements and habitat for many types of fish, particularly diadromous species. Diadromous fish need both fresh and saline waters. There are two types of diadromous species: anadromous and catadromous.


Anadromous fish live most of their lives at sea, entering rivers only to spawn and occasionally, to die. Salmon, river herring and striped bass are anadromous. Eels live most of their lives in freshwater, only

seeking the open ocean to reproduce and die. Eels are a catadromous species. While dams, pollution and overfishing have removed many of these species from fish markets and menus, they remain important members of foodwebs that sustain other species important to us, now. Striped bass and the family of shad species survived dam building by spawning below dams or in waterways without dams. In recent years, they have been provided special protection because we prize them as food. Most of the other diadromous species are not that "special" or flexible in their environmental needs. The anadromous species termed "river herring" and the Atlantic salmon were hard hit by dam building. Today, we know river herrings (from the alewife to the lowly, blueback herring) are important food sources for oceanic species such as Atlantic cod and haddock. Blocked access to spawning habitat and diminished water quality, brought on by more than 350 years of development in the Americas, has some anadromous species at the edge of survival. Curiously, to restore populations of important oceanic species, we must help those anadromous species as well.

All dams are not equally to blame for resource declines. The use of water impoundments expanded inland as colonisation progressed. It was, typically, the first dam that caused the biggest impacts. Unfortunately, where it took only one dam to stop natural flows, it takes impoundment removal or installation of fish passage systems at a number of structures to restore natural conditions. However, each impoundment modification, inland from the river's mouth, restores habitat opportunities for diadromous species. Dam removal or the installation of fish passage systems are expensive, complicated and successful fishery restoration is uncertain. Regardless of the constraints, they are now considered reasonable resource restoration techniques, so, we are using them. And, although we have completed fewer than one hundred removals, virtually all have been successful!


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The False Men and the Maids of Bute

By Daphne Pochin Mould

THE SCENE: two standing stones on the island of Bute in Scotland's Firth of Clyde. "It's the look of them. If you stand here and shut wan eye, they'll put ye awful in mind o' the two MacFadyen gyurls up in Pennymore". He christened them the Maids of Bute and was angry at passengers on the "Inverary Castle" who said they were not at all like women. "That's the worst of them English towerists, they have no imagination". So the Captain sent off Para Handy to dress the Maids with red and white paint. White faces, red bonnets and frocks: "Wan of them I called Mery after a gyurl I knew, and the other I called Lizabeth, for she chust looked like it. Mery had a waist ye could get your arm roond, but 'Lizabeth was a broad, broad gyurl". [From Neil Munro (+1930), the distinguished Scottish novelist, in his series of Para Handy tales of the Hebridean "puffer" *Vital Spark*, one of the small steam ships that back in the 1900s carried everything about the islands.]



A very fine standing stone on the slopes of the Sugar Loaf near Glengarriff, Co. Cork.

Standing stones, singly, in rows, or circles: what are they for, what do they mean? Folklore, like Para Handy, has long had a field day with them. In *Genesis 19*, Lot, with his wife and two daughters running from the doomed city of Sodom, is told not to look back. But the wife does and becomes a natural pillar of rock salt. Staunchly Methodist Cornwall named a fine stone circle with outlying pillar "The Merry Maidens" – girls who danced on the Sunday, and both they and their piper were turned into stone! Martin Martin, writing about the island of Lewis in the Scottish Hebrides about 1695: "Some of the ignorant vulgar say, they were men by enchantment turned into stones; and others say, they are monuments of persons of note killed in battle". And on North Uist, "There are three stones erected about five feet high, on eminences about a mile from Loch Maddy, to amuse

"Story goes that during the time of fear of French invasion, they were given red coats and sticks to look like muskets!"

invaders; for which reason they are still called false sentinels"

From the Hebrides to Cape Clear, they are "false men". Facing out to the Fastnet on Cape Clear's cliffs, the new "Discovery map" (sheet 88) duly marks the Fimbrea, and story goes that during the time of fear of French invasion, they were given red coats and sticks to look like muskets!

Cape Clear's weather would have quickly disposed of the coats, and in view of the island's

signal tower with officer and men, they were most unnecessary.

In fact, I do not think sharp-eyed invaders were likely to have been "amused" by standing stones, but similarly sharp-eyed navigators may have found some of them very useful landmarks. For thousands of years, people sailed not by written map or instruments, but on the basis of memorised routes, landmarks, times taken to "sink" or raise mountain peaks, and so on. We might do better to see Cape's false men as a prehistoric forerunner of the Fastnet light!

So what is the reality? The stone circles and stone alignments seem to line up on astronomical events. Drombeg circle in West Cork lines up on the mid-winter sunset, nearby Bohonogh on that of the equinox. Given that baseline, you can observe sunset positions at other angles from it and have a rough calendar. A stone alignment can be used in the same way.

It was Admiral Somerville, brother of writer Edith (of *The Irish RM* stories), who had the idea of checking the orientation of the stones. On an Admiralty survey off the Hebrides, bad weather forced his party ashore and he began to explore the great stones and circle of Callenish on the

island of Lewis. Back in West Cork, close to their home in Castletownsend, he and Edith were up before dawn on Midsummer Day, at the Finger's alignment. Edith: "Our archaeological hearts beat, and then precisely at the sunrise hour in the gap, the first gleaming spark of the sun's rim appeared. The Fingers had been correctly aligned".

We may suppose that some religious liturgies took place at circles and alignments, but we cannot know. What was the significance of the pairs of great stones? Male and female - probably not; or the centre of some long-lost surrounding structure? And then there are the multitudes of single standing stones – the lone gallaun. They must have many meanings. Snorri Sturluson, writing a history of the Norwegian kings, tells of how in the earliest



Photo: © Daphne Mould

At 6m 65cm, probably Ireland's tallest gallaun at Gorteenakilla, Co. Cork, on the line of the old road over Lackabaun. The stone fell in 1985 but has now been re-erected.



A fine pair of standing stones in Caherbaroul, Co. Cork. The tallest is just short of 3m high. Their edges have been rubbed smooth by cows, who use them often for scratching.

time the dead were cremated and over their ashes were raised standing stones. Later chiefs were buried in mounds with a multitude of grave goods. (Snorri wrote in Iceland in the early 13th century.)

Both stones and cairns can mark tracks and paths. The pilgrim route across Mull to St. Colmcille's Iona is marked by standing stones. And Robert Louis Stevenson, travelling with a donkey in the Cevennes: "over the summit of the

Goulet there was no marked road - only upright stones posted from space to space to guide the drovers". Our modern way-marked walks use the less permanent wooden posts for the same purpose. A standing stone on the crest of a pass is almost certainly a route marker, as on the Dogs Pass (Barnanmaddra) over the Monavullagh mountains in Co. Waterford, or a small alignment where the old trail (now part of the Kerry Way) climbs out of the

Black Valley and down to the valley of the river Caragh.

Cows find standing stones good scratching posts and some may have been set up for them. Today the standing stone is back in fashion. Modern machines make it easy to set up your own. Road makers like them, often with decorations, along the new highways, and the larger garden can have its own stone circle. The false men and maids of the 21st century!

The *Exxon Valdez* Oil Spill

Why was it special?

By Dr. Jenifer Baker

ON 24th March 1989 the *Exxon Valdez* ran aground on Bligh Reef in Alaska's Prince William Sound. The resulting spill of about 35,000 tonnes of crude oil, followed by intense media interest and public concern, is probably the most famous spill ever. Why? It is by no means the largest spill that has ever happened - there have been at least 30 bigger ones. But it was the largest spill to have occurred in the USA, and Prince William Sound is an area of spectacular beauty and teeming wildlife.

From a retrospective scientific point of view, it was special in many ways. The following account looks behind the pictures of oily shores, which were transmitted to the world's television screens, to some of the work and thinking, which contributed to the spill response.

Shoreline surveys

Different types of shorelines were done for two main reasons - first to provide information for cleanup teams, and second to monitor ecological recovery.

Shoreline Cleanup Assessment Teams (SCAT) carried out much more assessment work than has been done for any other spill, with the following objectives:

- Assess the presence, distribution, and amount of surface and subsurface oil.
- Provide information needed to make environmentally sound decisions on cleanup techniques (bearing in mind previous experience).
- Identify areas in which special actions were needed to minimise disturbance of sensitive resources. The cleanup was remarkable in being the largest such effort in oil history, by a very long way. Over 10,000 workers were involved at the height of the operations in 1989. The primary strategy was removal of bulk oil, to stop it floating off shorelines with subsequent high tides and so oiling greater and greater areas. As time progressed, there was the greatest-ever use of high-pressure hot-water washing (hot water being more effective than cold water for removing weathered oil from rocks). Many other techniques were used as appropriate for specific shores. The human effort was greatly enhanced by natural processes, especially during the winter of 1989/90. Winter storms removed up to 90% of the surface oil from exposed, high-energy shorelines and up to 50% from sheltered shorelines.

Surveys for monitoring shore recovery had to cope with a major disadvantage - lack of pre-spill data. In this situation, the best that can be



Photo: © Jenifer Baker

Shore survey work in Prince William Sound, Alaska, during the summer of 1990

done is to compare oiled shores with unoiled "control" shores of similar rock type, exposure to wave action, etc. Question marks about the adequacy of this approach are one of the reasons why there have been different opinions about recovery rate. One of the problems, given the numbers and distribution of shore organisms fluctuate naturally from year to year, is that there was no prior record of the scale of these natural fluctuations.

How clean is clean?

As cleanup operations continued into 1990 and 1991, it became increasingly important to decide when to stop, hence the importance of the question how clean is clean? In this sense, the *Exxon Valdez* oil spill was a significant catalyst for an ongoing scientific and operational debate, which can be summarised as follows:

Clean in the aftermath of an oil spill cannot mean a complete absence of oil because petroleum hydrocarbons can be found everywhere in the environment (though usually at very low concentrations) because of inputs such as routine shipping operations. It therefore is necessary to refer either to specified concentrations or to other criteria. For example, clean may be defined as petroleum hydrocarbon concentrations that:

- Do not exceed normal background levels for a particular location;
- Do not exceed statutory limits;
- Are not lethal to specific organisms;
- Do not cause tainting of food organisms;
- Have no detectable impact on the function of an ecosystem;
- Do not impair the human use of an area;
- Are not visible to the human eye.

It is unlikely that any single definition will serve all interests. For example, visible residues of weathered oil may be acceptable from an ecological viewpoint because they are not affecting the normal functioning of the ecosystem. This may not be acceptable, however, from a public amenity viewpoint. It follows that the definitions of clean for any particular area following a spill must be determined by the interested parties.

advantages and disadvantages of natural cleanup. It was in Prince William Sound that this concept was first used, and it has continued to develop.

For example, high-pressure hot-water washing (not surprisingly) tends to turn shore organisms such as mussels and barnacles into seafood soup. Such cleaning may add to any damage already done by the oil. But it may be justifiable at some locations because there are other environmental priorities, such as birds, mammals or public amenity. Seal breeding areas in Prince William Sound were cleaned for the sake of the seals and their pups, recognising that there would be increased short-term damage to more lowly organisms but also recognising (from previous experience) that recovery in the long term would be possible.

Dr. Jenifer Baker has worked all around the world as an environmental scientist, specialising in oil spill response, and is currently a theological student.

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Ireland's Cold Water Coral Reefs

New Horizons in Irish Marine Science



Monkfish (*Lophius*)



Lophelia corals



Antipatharian coral and featherstar (crinoid)



The French research vessel "Atalante"

By Geoffrey O'Sullivan

"Full many a gem of purest ray serene the dark unfathom'd caves of ocean bear" (Gray's Elegy)

WHEN one thinks of coral reefs, one thinks of the clear sunlight waters of the Pacific, and in particular the Australian Barrier Reef, not the cold dark waters off the west coast of Ireland. Yet recent research has revealed that not only do coral reefs occur in the Atlantic, but these reefs rival their tropical counterparts in terms of their beauty and diversity.

Our story begins in the early 1990s when exploration scientists first identified and described spectacular underwater mounds up to 300m in height and 2-3 km in diameter – the so called "carbonate" mounds. Further investigation revealed that these mysterious carbonate mounds (another intriguing story) were often, though not always, associated with cold water corals principally of the species *Lophelia pertusa* and *Madrepora oculata*. *Lophelia pertusa* is widely distributed throughout the Atlantic and occurs in a number of forms from small isolated colonies to massive reefs tens of metres high and hundreds of metres long.

These exciting new discoveries paved the way, in the mid-1990s, for European funding for a suite of collaborative research projects focussed on the cold water corals and carbonate mounds of the European Continental Shelf. Indeed in May 1998, a European Commission Press Release announced that "Off south west Ireland, at depths ranging from 600 to 1,000m, Europe may host the world's most impressive cold water coral reefs."

Atlantic coral reefs were first described in 1869 by Charles Wyville Thomson on board a HMS Porcupine cruise sponsored by the Royal Dublin Academy and the Royal Dublin Society. And

while we have been aware of the existence of these coral reefs off the west coast since the last century, the full extent and diversity of these reefs has only become apparent in the last decade with advances in sonar technology and deep sea photography.

In August 2001, a major French Marine Institute (IFREMER) and Irish Marine Institute sponsored coral research cruise, known as the CARACOLE Mission (CARbonate mounds And COLD Coral Exploration) was undertaken off the west coast of Ireland in August 2001.

They deployed a state-of-the-art remotely operated vehicle VICTOR from the French mother ship ATALANTE and rediscovered cold water reefs on the European Continental Shelf at depths up to 1000 metres.

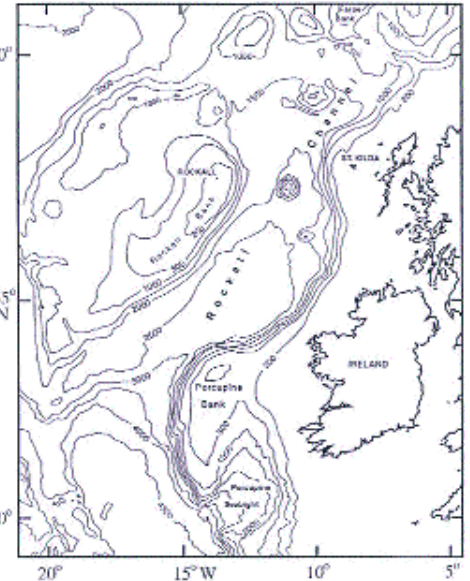
The multidisciplinary and international team of scientists on board ATALANTE included researchers from France, Ireland, Belgium, Germany and The Netherlands.

Using VICTOR's unique navigational and bottom sampling (including photographic) capabilities, truly amazing insights and spectacular photographic and video records have been collected. According to Dr Karine Olu (IFREMER) in an

"Over 62% of known coral reefs described from the North Atlantic are found in Irish

Charles Wyville Thomson
(1830-1882)

CHARLES WYVILLE THOMSON held the Chair of Geology at Queen's College Belfast and also occupied the Chair of Natural History in Belfast and Cork from 1860-1870. During the 1850s Edward Forbes, who held the Chair of Natural History in Edinburgh, had stimulated much of the Victorian work on benthic fauna. As a result of his extensive work he had noted that animal life appeared to decline with depth and made the assumption that 'the zero of animal life would probably be found somewhere below 300 fathoms'. Subsequently, for a while, it seems to have been assumed in popular science that no life would be found below this depth. It fell to Charles Wyville Thomson to disprove this belief through a series of scientific expeditions. The first of these, namely those of HMS *Lightning* in 1868 and of HMS *Porcupine* in 1869 and 1870 were organised and led by Thomson from Belfast. The success of the Porcupine Expedition, which for example dredged animals from 2,435 fathoms when 5 days out from Belfast, was seminal to the *Challenger* Expedition of 1872-1876, which is widely regarded as the foundation of modern oceanography. However, by this time Thomson had moved from Belfast to Edinburgh (where he succeeded to Forbes' chair). Following the *Challenger's* return home, Thomson was able to enjoy his new-found fame and enhanced earning capacity for only a short time. His health soon began to fail and he became seriously ill in 1879, suffering an attack of paralysis possibly brought on partly by the financial and administrative tussles with the Treasury over the publication of the Expedition Reports. He resigned his directorship of the Challenger Commission and his professorship in 1881, and died the following March.



A base map off Ireland's west coast.



Conger eel and crabs



Featherstars (crinoids) attached to coral



VICTOR is a state-of-the-art remotely operated vehicle which was deployed from the French mother ship ATALANTE.

interview with the prestigious Science Magazine (August 2001) - "These surveys have revealed an underwater wonder world of coral gardens teeming with life."

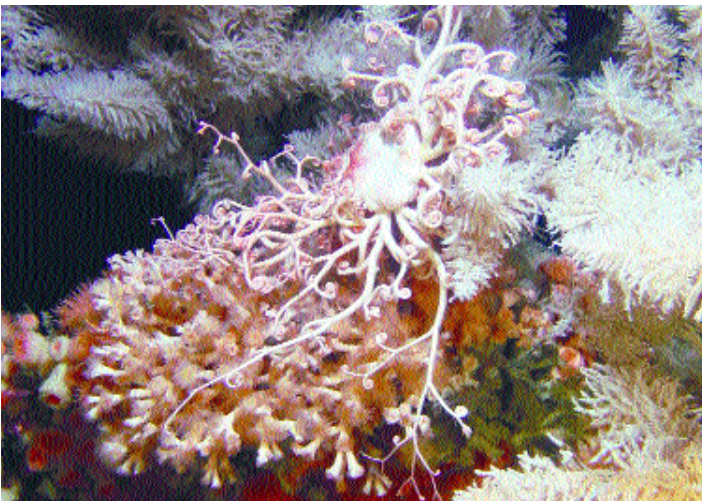
While current activity has focussed on the Porcupine Bank and Rockall Trough, recent work carried out by the

Geological Survey of Ireland National Seabed Survey has revealed extensive coral reef provinces to the west of Rockall. No doubt a focus for future work.

Coral reefs typically support high biodiversity: Over 900 species have been reported with *Lophelia* and

this richness has been compared with that of tropical coral reefs. It is also anticipated that new species to science will be identified from these deepsea reef systems. Bioprospectors are already moving in to establish what new novel compounds (including genes) might be extracted from this unique ecosystem thriving in the cold, dark and deep waters off Europe, for use in industry, nutrition, medicine, and the environment.

Coral reefs are particularly susceptible to damage by trawling. There is growing concern with the expansion of the Irish Whitefish fleet and the targeting of deep water species, some of which are associated with the coral reefs. In Norway, for example, where reefs occur in shallower water (200m), destructive trawling practices have already reduced large tracts of coral reef to rubble. One of the immediate positive results emerging from the CARACOLE mission was that no



Elaborate feather star on *Lophelia* and Antipatharian corals

evidence of extensive damage to reefs was found – though breakage by trawls and ghost fishing by lost or discarded nets was observed.

The principal risks to deep water coral reefs are considered to be trawling and hydrocarbon exploration. The main instrument of conservation in the EU is the Habitats Directive. Following action by Greenpeace in November 1999, The UK High Court ruled that the Habitats Directive was not limited to the territorial sea (12 mile limit) but extended to the UK continental shelf and to super-adjacent waters up to a limit of 200 miles. As a result of this ruling, the UK Government has recently announced (October 2001) that the deep-water coral reefs off NW Scotland would be the first Marine Special Area of Conservation outside the territorial waters of the UK.

An Irish Coral Reef Task Force is currently formulating proposals for the conservation and sustainable management of the deepwater *Lophelia* coral ecosystems in Irish waters.

For further information: Atlantic Coral Ecosystem Study (ACES) Web-sites: <http://www.uni-tuebingen.de/geo/gpi/ag-freiwald/proj/aces/index.htm> <http://www.cool-corals.de/>




Anemone attached to rock

Geoffrey O'Sullivan, Marine Institute, is a Section Manager with responsibility for International Co-operation and the implementation of the Marine RTDI Measure of the National Development Plan (2000-2006). He is based at the Institute's Dublin Office.

The Marine Institute acknowledges IFREMER, the CARACOLE Cruise and Dr Karine Olu for the photographs displayed in this article.



Serpulids, ascidians and crabs plus surface debris (net and plastic cup).



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These Guidelines have been prepared for information purposes only and do not purport to be a legal interpretation. The holder of a rod licence should familiarize himself or herself with Part 3 of the Fisheries (Amendment) Act, 1999 (No. 35 of 1999) and the Wild Salmon and Sea Trout Tagging Scheme Regulations, 2000 (S.I. No.256 of 2000).

For further information please contact the Central or Regional Fisheries Boards. Leaflets are available in English, Irish, French and German from rod licence distributors or Regional Fisheries Boards and the Central Fisheries Board.



In coastal Milford, Connecticut, USA, residents have legitimate concerns about the loss of trees in the City's 23 sq. miles.

By Mary Ludwig

AFTER more than a decade of rapid development in coastal Milford, Connecticut, USA, residents have legitimate concerns about the loss of trees in the City's 14,700 acres (23 sq. miles). Drive 75 miles northeast of New York City or 150 miles southwest of Boston to reach what is known as a "Small City With a Big Heart." Many of the 50,000 residents are very aware of the need to replace the trees that have been cut down during the height of development.

Milford Trees, Inc., a volunteer, non-profit organization, promotes the planting, protection, maintenance and

inventory of the urban forest in Milford, Connecticut. Although most people understand the important role trees play in an urban environment, many folks are not aware of why it is crucial to keep an up-to-date inventory of public trees. As in anything of value, whether it is in a retail store, corporate business, farm or private home, taking stock or inventory of assets is smart management. Assets within a community are no exception and trees are of great value in many ways that some people may take for granted.

Without taking an inventory of the trees that are already planted, how do you know what the diversity of species is throughout the city? What size or diameter are the trees? Where

The Importance Of Taking A Tree Inventory

are they located? What condition are they in? What maintenance needs do they have? Are there any special points of interest about the trees that need to be noted? These are the questions that are answered when you take a tree inventory along public roads, in parks, on school property and on other public property.

Knowing what species you have, and how many of each, can be of utmost importance especially if fungi, bacteria or invasive insects attack your trees. Dutch elm disease destroyed virtually all the mature elm trees in the U.S. and now there are very few elms that reach full growth. The woolly adelgid insect is attacking hemlocks and as we are taking inventory, we can see row upon row of Eastern hemlocks dying or dead. Wouldn't it make more sense to plant a variety of species in a given area? Then, if one species were attacked, the whole area wouldn't lose all of its trees. You can plan diversity of species throughout your community only by having specific knowledge of what species already exists and where they are located.

Measuring and recording the size of a tree tells you its approximate age, depending of course, on other environmental and physical impacts. A healthy community needs different age groups to sustain itself and the same is true for trees. You know the old expression, "The best time to plant a tree is twenty years ago." Knowing the ages of trees in an urban forest gives you an opportunity to sustain a healthy and continuous canopy. An inventory will help you manage the diversity of the ages of trees so that you will have a continuous pattern of growth and regeneration.

Now that you know what species



Photos: Courtesy of Landscape Architect, Stephen Wing

It is crucial to keep an up-to-date inventory of public trees. Knowing what species you have and how many of each within that species can be of utmost importance especially if fungi, bacteria or invasive insects attack your trees.

you have and what their diameter is, where are all the trees located? Some trees are planted in lawn areas where the roots can spread out in a natural manner without any interference from sidewalks, roads or driveways. Overhead telephone wires can cause problems if the wrong tree is planted underneath. Trees that grow over 25 - 30 feet at maturity do not belong under telephone wires because they will grow into the lines. The pruning required ruins the tree's shape and can often kill the tree. Planting a tree in the grass strip area between the road and sidewalk can create many problems. Depending on the soil conditions and the type of tree, often the spreading roots will lift or crack the sidewalks making it a hazardous situation for walking. A wider grass strip can help alleviate this problem but the best location is still planting in a lawn area. An inventory shows the location of each public tree and gives

an indication of potential problems and maintenance needs.

How do you know what condition your public trees are in without taking an inventory? Using specific criteria for judging a tree's condition, in an inventory you record a tree as "good, fair, poor, dead or dying." This information is invaluable for keeping tree maintenance crews well informed. Knowledge about the condition of your community's trees also helps plan future plantings in a tree replacement programme.

Take a day in the life of a tree maintenance crew sent out to do their work. Do they drive around taking notes or wait until a tree falls down? Or maybe a concerned resident notices that there is a cavity the size his dog can climb into that makes him phone the Public Works Department to come out and evaluate the needs of the tree. What about a dead branch that has an eight-inch diameter that is partially split but the leaves cover it up during the summer so the tree crew missed spotting it? These are just some of the maintenance needs that data collecting volunteers will identify. Knowing what trees need service and where they are located saves the city time, money and liability.

Once all the data is collected it is put into a Geographic Information System, which gives a visual picture using overlay maps of every public tree in the city.

A volunteer based tree inventory provides valuable data to the City that will make your tree maintenance, protection and replacement programme more efficient, less time consuming, less costly and will provide residents with an opportunity to work with City officials, make new friends with a common interest and learn more about their own city.

Mary Ludwig, Milford Trees, Inc., Milford, CT, USA



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Changes to Ireland's Wildlife Act

By Patrick Gilheaney

The Wildlife (Amendment) Act, 2000 was enacted in December 2000 to amend The Wildlife Act, 1976 (The Principal Act), which at that point in time was almost a quarter of a century old and was the only major legislation concerned with wildlife that had been passed in the previous 45 years. The Principal Act was the main national legislation providing for the protection of wildlife and the control of some activities that could adversely affect wildlife. Its core aim was to provide for the protection and conservation of wild fauna and flora. For its time, it was a comprehensive and indeed, in some respects, a far-sighted legislative instrument for the conservation of wildlife.

However, while the Principal Act was strong in the context of species protection it was weak in relation to the protection of sites of special wildlife importance. In addition, the Principal Act had been overtaken by a range of EU and international generated legislation and conventions, including ones such as the Habitats and Birds Directives, CITES, the Berne Convention and the Convention on Biological Diversity. Following a total review of the existing legislation, which was accompanied by a large degree of consultation, the Wildlife (Amendment) Bill was published in July 1999. This Bill was the subject of further examination and consultation within the Department of Arts, Heritage, Gaeltacht and the Islands (the sponsor Department), other relevant Government Departments and with the public and interested NGOs. It passed through the Houses of the Oireachtas and was enacted into law in December 2000. It is not possible in an article of this size and nature to adequately outline all the new provisions in a lengthy (76 Sections) and very complex and technical amending Act, but outlined below are a number of the major changes.

Fundamental Changes

While the Principal Act approached wildlife conservation from the perspective and context applying at that time, the Amendment Act caters for a number of key developments which constitute fundamental change in the approach adopted in this country (and further afield) to the conservation of the natural heritage. The following are amongst the most important features of the Bill:

- The provision, for the first time, of a mechanism to give permanent statutory protection to Natural Heritage Areas, including geological and geomorphological sites;
- The broadening of the scope of the Act to include the majority of wild species;
- Introduction of measures to facilitate the ratification of the Convention on International Trade in Endangered Species (CITES);
- Providing statutory recognition of the Minister of Arts, Heritage, Gaeltacht and the Islands' responsibilities in the light of Ireland's commitment to the UN Convention on Biological Diversity;
- Improvement of a number of measures to conserve wildlife species and their habitats;
- Improvement in controls over hunting, including the regulation of commercial shoot operators;
- The significant increase in penalties for con-

"Under the Amendment Act the maximum penalty is now raised to £50,000 (€63,500) and/or a term of imprisonment of up to two years or both."

victions under the Acts, with the possibility, for the first time, of a custodial sentence.

These key features of the Amendment Act are described below in a little further detail.

1) Natural Heritage Areas (NHAs)

The sections which provide the statutory footing for the designation of Natural Heritage Areas are perhaps the most important in the Amendment Act. They provide for the designation, conservation, and permanent protection of NHAs, which will constitute our most important national sites of ecological and also geological importance (including such sites as the recently discovered "Valentia Footprint Site").

Such sites will support elements of our natural heritage that are unique, or of outstanding importance at the national level. If destroyed, such areas can never be adequately replaced. The new provisions will-

- Provide for protection for NHAs, in a fair and open manner.
- Provide a full designation process that will be based on sites proposed for their scientific importance and will include a process to facilitate the appeal of such designations, again based on scientific evidence.
- Provide that all activities that are likely to damage an NHA must be notified to, and receive the permission of the Minister, before they can continue.
- Provide a system of compensation similar to that already in place for Special Areas of Conservation (SACs).

2) The broadening of scope of the Act to include the majority of wild species

This change will bring about a fundamental change in our approach to wildlife conservation – namely, the broadening of the scope of the Act to include the majority of wild species. The original Act excluded from its general scope all fish and aquatic invertebrate species. While this situation may have been understandable in 1976, it would be completely at variance with an appropriate approach for today, when an 'ecosystem' or holistic approach to biodiversity conservation is being pursued. Also, in practical terms, the approach up to now has meant that tens of thousands of species, from both marine and freshwater ecosystems, were strictly speaking off-limits from any conservation consideration.

The Amendment Act brings all wild plant and animal species within the scope of the Act, apart from certain species relevant to fisheries (whether commercial or recreational), which will be excluded by regulations.

This broadening of the basis of wildlife legislation is of fundamental significance as it establishes a new and holistic framework within which wildlife conservation can be addressed and advanced.

3) CITES / International Agreements

The Amendment Act enables Ireland to ratify CITES – the Convention on International Trade in Endangered Species of Wild Fauna and Flora. While Ireland signed the CITES Convention as long ago as 1974, we never brought

in the full legislative provisions which would enable us to formally ratify the Convention. This new Act provides a host of provisions that allow us to ratify and fully implement the Convention. Following Government and Dáil approval the instrument of ratification was deposited in January 2002 with Ireland becoming a party to CITES 90 days thereafter. Ratification of the convention by Ireland signals our support for the Convention at the international level by underpinning and endorsing the continuing and ongoing significance of the Convention as a key element of international environmental law.

The Amendment Act will also enable Ireland to ratify the African-Eurasian Migratory Waterbirds Agreement - an agreement under the Bonn Convention. The Migratory Waterbirds Agreement is of special significance in the Irish context given that this country is of major importance for many groups of wintering waterbirds as well as for breeding populations of some relevant species.

4) Biological Diversity

In considering aspects of the Act which reflect global developments such as CITES above, it is important to signal the new measures which provide that promoting the conservation of biological diversity shall now be part of the Minister for Arts, Heritage, Gaeltacht and the Islands' overall functions and responsibilities. The Convention on Biological Diversity is the defining framework within which the conservation of biological diversity must be pursued whether at the international or national level. It was not reflected previously in either the original Act or other legislation and it is therefore appropriate, and a reflection of this country's commitment to this landmark Convention, that specific reference to biological diversity is included, as a responsibility of the Minister and the Department in the country's primary legislative instrument for wildlife protection.

5) New and Enhanced Protection for Species;

The Amendment Act improves a number of measures, or introduces new ones, to enhance the conservation of wildlife species and their habitats. Examples of such provisions include:

- With respect to plant species, the Act provides that trade or possession without a licence of protected flora is an offence.
- In relation to wild birds, the Amendment Act further strengthens the protection afforded to bird species, and their eggs or nests, by removing exemptions for carrying out certain activities and making them subject to a licence from the Minister.
- Protection is provided for the resting-places of protected animals, thereby ensuring, in particular, that bat roosts are not unlawfully disturbed. Through the deletion of the provision to enable the granting of other hunting licences, the Act copper fastens the strict protection currently afforded to otters.
- The Principal Act allows the capture or killing of wild birds or animals where they

are causing damage to property, crops, etc. The Amendment Act provides that such action is taken only in cases of serious damage.

- Provisions are included to allow the Minister to prohibit the introduction of any species of wild bird, animal or flora, which may be detrimental to native species. It will be an offence to introduce exotic species of flora and fauna into the wild, other than under licence from the Minister. The Act will also enable the Minister to prohibit the export of any wild species, rather than limit it to protected species, as was the case heretofore.
- While the most significant provisions relevant to conserving species habitats are those concerning NHAs, other measures are also included, including provision for the creation of Refuges for Flora to conserve sites of special importance for plant species.

6) Hunting / regulation of commercial shoot operators

The Amendment Act greatly enhances the existing controls under the Principal Act in relation to hunting which are designed to serve the interests of conservation. In that regard of particular importance are the new provisions that will allow for the regulation of the business of commercial shoot operators. Such operators either own, or have access to, shooting rights on lands and use these rights of access to provide hunting on those lands to others (non-resident hunters in particular) on a commercial basis. The core of the new provisions is that commercial shoot operators will only be allowed to carry out their activities if they are in possession of a permit issued by the Minister. In issuing such a permit the Minister will be able to request a wide range of relevant information pertinent to the operator to assist in determining if the permit should be granted.

Among the amendments relevant to hunting practices are new provisions that will allow the Minister to require applicants for a hunting licence to show evidence of competence to hold such a licence, and the introduction of greater controls and restrictions on the use of devices such as traps, snares and nets.

7) Increase in penalties

The Amendment Act will amend, and substantially extend, the penalties applicable in the case of a conviction under either the Principal Act or the Amendment Act. In addition and for the first time, the Amendment Act provides for a term of imprisonment, on conviction of an offence, of up to two years. With regard to the financial penalties it was clear that the previous maximum of £500 (€635) as originally set in 1976 (with no provision for a custodial sentence) needed to be increased significantly. Under the Amendment Act the maximum penalty is now raised to £50,000 (€63,500) and/or a term of imprisonment of up to two years or both. It is envisaged that the possibility of imprisonment, combined with the heavy financial deterrents now being put in place, will serve to enhance greatly the protection and conservation of important habitats and wildlife generally.

Patrick Gilheaney is Assistant Principal Office, Dúchas - The Heritage Service, 7 Ely Place, Dublin 2.

SEA BREAMS IN IRISH WATERS



Black Sea Bream (*Spondyliosoma cantharus*)

Photo: © Declan Quigley

By Declan T. Quigley

SEA BREAMS, also known as Porgies or Snappers in various parts of the tropics, belong to a relatively large family of marine fishes (Sparidae) that includes 29 genera and about 100 species found around the world in tropical and temperate seas. The family, however, is poorly represented in northern European waters: only 10 genera (including 16 species) have been recorded from French waters, 7 genera (including 9 species) from UK waters and 5 genera (including 6 species) from Irish waters (Table 1). Most of the species found in northern European waters occur as seasonal immigrants and with two exceptions (Black Sea Bream *Spondyliosoma cantharus* and Red Sea Bream *Pagellus bogaraveo*), all are rare vagrants north of the English Channel.

BLACK SEA BREAM (*Spondyliosoma cantharus*)

The Black Sea Bream ranges from northern Namibia, Cape Verde Islands, Canary Islands, Madeira, Mediterranean (very rarely in the Black Sea), and north to

the Britain and Ireland and less commonly to Norway.

The Black Sea Bream is one of the few nest-building Sparids; the male digs a depression in the sandy seabed in which the female sheds her eggs 10,000 – 100,000 (during April/May in the English Channel and May to August off Morocco). The eggs (1 mm in diameter) adhere to the substrate and are guarded and aerated by the male until they hatch (after about 9-10 days at 13°C). The young tend to form a loose school around the nest for several weeks after hatching. In common with many Sparids, the Black Sea Bream is a protogynic hermaphro-

dite. The species reaches sexual maturity as a female in its second year (at about 20cm) and later on as a male in its eighth year (at about 35cm).

Black Sea Bream are gregarious, sometimes forming large schools over sea-grass beds down to depths of 15m (particularly juveniles) as well as rocky and sandy bottoms down to depths of about 300m (larger specimens). The species is an adaptable omnivore, feeding on a wide range of items, including seaweeds, small invertebrates and fishes. Growth is rapid during the first few years. In the Bay of Biscay juveniles attain 18cm after one year, 34cm after 5 years, 44cm after 14 years, and 46cm (1.8kg) after 17 years. The species is not sufficiently abundant generally to be an important food fish, albeit about 2-3000 tonnes per annum are landed in France.

Although the Black Sea Bream is regarded as relatively common in northern European waters, it is primarily a summertime migrant north of the English Channel. A pronounced feature of its occurrence in the latter area is its annual appearance in considerable numbers in the East Channel, where it spawns during April or May, and is common over rocky marks during the summer months.

Although the Black Sea Bream appears to be relatively scarce in Irish waters, where only about 25 specimens have been positively identified, it has been suggested that the species could well be present in greater numbers in certain areas in some years. Specimens have been recorded from the NE, E, SE, S and SW coasts, from Carnlough Bay, Co Antrim (1), southwards along the coasts of Cos Down (1), Louth (3), Dublin (1), Wexford (2), Cork (1) and Kerry (16). More than 50% of the specimens have been recorded from Co Kerry. No specimens have been recorded from the W, NW or

N coasts.

Although the species has been recorded during each month of the year (Figure 1), except February and October, it would appear to be more frequent in its occurrence during the spring and summer, particularly during March, May and July.

The largest (and first) specimen recorded in Irish waters weighed 1.362kg (May, 1846: Cultra Point, Belfast Bay), but this specimen was relatively small compared to the largest specimen taken on rod and line in UK waters (3.125kg, September, 1977, Devon). The vast majority of Irish specimens measured <40cm (T.L.); mean 32.8cm; range 20.5-40.0cm and weighed <800gm; mean 603.8gm; range 86-1362gm. The species is thought to reach a

maximum length of about 60cm.

The majority of specimens were recorded by commercial fishermen (trawls 9; salmon drift nets 2; and seine nets 1), from shallow inshore waters (e.g. Castletown River, Co Louth) to relatively deep offshore waters (e.g. W of the Blasket Islands, Co Kerry). However, the species' general preference for rocky habitats probably protects it from most types of commercial exploitation. Although the Black Sea Bream is a popular, albeit seasonal quarry of sea anglers in the English Channel, anglers in Irish waters have recorded only 4 specimens.

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

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GENUS	SPECIES	COMMON NAME	FRENCH WATERS	UK & N EUROPEAN WATERS	IRISH WATERS
Boops	<i>Boops boops</i>	Bogue	X	X	X
Dentex	<i>Dentex dentex</i>	Common Dentex	X	X	X
Diplodus	<i>Diplodus annularis</i>	Annular Sea Bream	X		
	<i>Diplodus cervinus</i>	Zebra Sea Bream	X		
	<i>Diplodus puntazzo</i>	Sharpnose Sea Bream	X		
	<i>Diplodus sargus</i>	White Sea Bream	X		
Diplodus	<i>Diplodus vulgaris</i>	Common Two-banded Sea Bream	X		
	<i>Lithognathus mionectes</i>	Stripped Sea Bream	X		
Lithognathus	<i>Lithognathus mionectes</i>	Stripped Sea Bream	X		
Obolus	<i>Obolus melanura</i>	Saiflof Bream	X		
Pagellus	<i>Pagellus acarne</i>	Auxiliary Sea Bream	X	X	
	<i>Pagellus bogaraveo</i>	Red Sea Bream	X	X	X
	<i>Pagellus erythrinus</i>	Common Pandora	X	X	X
Pagrus	<i>Pagrus pagrus</i>	Couch's Sea Bream	X	X	
Sarpa	<i>Sarpa salpa</i>	Salena (Sauger)	X	X	
Sparus	<i>Sparus aurata</i>	Gill-head Sea Bream	X	X	X
Spondyliosoma	<i>Spondyliosoma cantharus</i>	Black Sea Bream	X	X	X

Table 1. Sea Breams (Sparidae) recorded from northern European Waters

Figure 1. Black

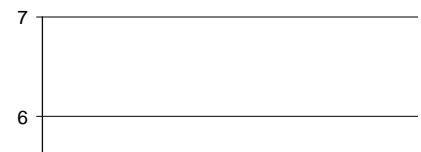


Figure 1. Black Sea Bream: Monthly Frequency Distribution of Irish Records

The Angler on the Bridge

By Matt Nolan

AS far as I know there is very little Viking blood in me but as May comes around every year, the countryside comes alive again and I find myself longing once more for the sound of oars and the rhythm of fresh running water over stones. There is a cure I think, in the sound of running water. Its rolling sounds quieten the mind so that jagged thoughts no longer play about like forked lightning.

I usually head for the west country – East Co Galway to be precise, where the River Shivan meanders its way through rusty farmland above Ballygar. This is great fishing territory and I have some great fishing memories from this place, Trehill Bridge in particular – especially at evening time in May.

The lower stretches of the river below Islandcaskie Bridge otherwise known as Flynn's Bridge, has a nice stock of coarse fish such as roach, bream, tench and of course perch, eels and pike. For me

though, the real treat of a days fishing is to stand on Flynn's bridge with a group of local "experts" who fish from the Bridge on those long summer evenings and on Sunday afternoons in particular.

If I ever take up fishing seriously, it will be the type of fishing that is done from Flynn's bridge, as it is the type of fishing where the catch does not matter. A fly-fisherman in green waders and porridge hat decorated with an assortment of flies, for instance, has little in common with the men who fish from the bridge. He is of a different species altogether, for when he goes to fish he knows what he's about. He does not simply wait for something to happen but rather he plans each fishing trip with the precision of a dental

surgeon striving to know his river as best he can and study the light and wind. He must have the right flies, not any sort of fly but the right one for that day, place and conditions. He wants to catch fish: not any kind of fish, but a particular type of fish. When he fishes for salmon he fishes for



Matt Nolan fishing from near his famous bridge

salmon and when he fishes for trout he fishes for trout. He is, you could say, dedicated and committed. He knows what he wants and nothing else will do.

Likewise our coarse fishing friends who usually fish under great green umbrellas along the river and canal banks are masters of their "product". They are usu-

ally positioned behind a raft of equipment such as fishing rods and gear like wagglers, plumb bobs and fish finders. They know their swims, which are always prebaited.

But the men who fish from Flynn's bridge are in a different category. They are grateful of anything that comes their way – perch, roach or even eel. For them fishing is a lucky dip, and when one of them brings up a cluster of weed or grass, they console each other with the thought of the big catch next time. And they are never too disappointed if they catch nothing at all.

They just gather up their meager tackle when the light goes explaining to each other as they walk home that the fish weren't taking today, in much the same way as a comedian, finding his jokes falling on stony ground, will blame everything but his material.

I notice too that the element of cut throat competition is almost completely absent from my bridge fishermen. There is no envy to speak of; if the man on the other side is doing a bit better it is not a question of greater skill but the luck of the draw. All the bridge anglers use the same bait and much the same tackle so it's a question of once their lines are in the water the rest is up to the fish.

Moreover – for I hope I have not given the opposite impression but the anglers on Flynn's Bridge

do catch fish. I have seen them myself. I have watched them stiffen like a pointer dog, reel in the line and grab a wet slimy pike with bare hands and twist a voblex spoon bait from the pikes teeth before releasing him to the river again. My friends on Flynn's Bridge like catching fish, though you might not think it when you see them in action but they are not pushed one way or another. They are not fishing to live, or for the food, or for the pride and glory, but for the fun of it. And not so much for the fun of fishing as for the fun of being on the bridge over "their" great river and being part of the chat and banter that's always part of the scene.

I don't know what those anglers think about when fishing from the bridge but I know that insurance policies, floating exchange rates, bank overdrafts or extraordinary general meetings do not enter their heads. For the river is the oldest of psychiatrists. It flushes out routine thoughts as it flushes pools among the rocks. It cuts you free from the unending profit-and-loss assessments that are involved in everyday living and gives the mind a chance to stretch and relax.

Fishing is fun no matter where it happens but for me the action on Flynn's Bridge can't be beaten.

Matt Nolan, Shannon Regional Fisheries Board, Thomond Weir, Limerick.



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What's in a Laundry Detergent?

And does it matter to the environment?

By John Solbé

IT is not so many years ago that our mothers and grandmothers washed clothes with soap boiling water. There were no such things as enzymes in washing powders and the whole process of doing the family laundry occupied several days hard work: the popular song " 'Twas on a Monday morning-o....?" says it all!

Nowadays laundry detergents contain several chemicals which each have their own function or interact with other ingredients to give you a satisfactory cleaning performance. The principal components are surfactants and builders, but other things such as bleaches, enzymes and rinse conditioners, perfumes and dye-fixing polymers may be included. This note describes some of these and the general environmental profile of the household task of cleaning cloth.

Soap cleans because it is a surface-active agent or 'surfactant': it improves the wetting ability of water, loosens and removes dirt, emulsifies some forms of dirt like fats and oils so that they can be carried away in the rinsing, and reduces the chance that the dirt will deposit again on the clothes before the wash is over. The problem is that soap, reacting with the hardness of the water, tends to leave a chalky scum, and it takes hot water to make a good job of the washing. Of all the stages in the washing process, of ourselves or our clothes, it is the heating of the water which has the greatest impact on the environment. Far more energy is consumed (and therefore wastes such as carbon dioxide created at the power station) in this stage than in acquiring the raw materials, 'formulating' products with them, packing and transporting them or disposing of them after use (ie 'down the drain').

One thing that soap didn't do well was to cause foaming in rivers – not because it was easily degraded in sewage works but because it isn't that good a surfactant.

In the late 1940s, better surfactants than soap came on the market. They reduced the effort required to wash clothes clean, freed the housewife to some extent from the chains of the wash-tub and allowed lower temperatures to produce a good job. However, these early surfactants (technically 'branched alkyl benzene sulphonates') did not break down well in sewage works, so they could and did cause water to foam, in this case in the rivers! Sometimes this foam reached epic heights and could be seen rolling down high streets located near river weirs! The detergents industry responded in the early 1960s and created a new and better breed of surfactant, which is still with us today - the linear alkyl benzene sulphonates. Later, other members of the family of biodegradable surfactants went on to the market. They break down well in waste water treatment



Sketch: © 1995 Saffrey International Inc., and its licensors

and consequently are not damaging to the environment.

But a washing powder is not just a surfactant. To help keep the chalky salts from forming a scum on the clothes we now use a class of substances called 'builders'. Phosphates were particularly popular and very effective because they not only removed the chalkiness but they enabled the formulator to work other tricks to pack more effectiveness into the product. However, concerns that phosphates contributed (albeit in a very minor way in Ireland) to eutrophication (the enrichment of waters with nutrients leading to excessive growth of water plants including algae) led to a voluntary reduction in the use of phosphate and an increase in alternatives such as zeolites, nitrilo-acetic acid and sodium carbonate.

Some products (but not those for washing coloured cloth), contain bleaching agents so that we no longer need to drape our washed clothes over bushes in the sunlight after washing. Again, modern formulations contain agents which manage to release the active oxygen that does the bleaching without having to heat the washing water above 40 °C. Fabric whitening agents (fluorescers) may be added too, and there are some parts of the world where they are very popular. (Perhaps people like shining brightly in disco lighting!)

The last trick to reduce washing temperatures and thus save energy, helping the environment, is to add appropriate enzymes to the product. These do the same thing that they do in living organisms, act as catalysts, making reactions happen very quickly even at low temperatures. Some enzymes break down fats (they are called

lipases), some break down proteins (proteases) and others break down starchy stains (amylases). A very small percentage of people react to the presence of traces of enzymes on clothes and come out in a rash. Therefore the detergent companies market biological (with enzymes) and non-biological products (no enzymes) so that customers can choose for themselves. To help clothes feel soft (and last longer) detergents may be supplied with substances called fabric conditioners or rinse conditioners. (Conditioners in shampoos have the same softening effect on your hair.)

They work by neutralising the static electrical charge which would otherwise make things stick together, giving a more matted feel. They also allow clothes to dry more easily because they reduce the way the fabric tends to cling on to water. To help clothes smell nice perfumes may be added.

Again there will be alternatives, just as there is in dishwash liquids so that you can decide between no perfume and the fragrance of your choice.

How can we judge whether a washing powder is right for the environment? It mostly depends on how the waste water is treated once the product has gone down the drain. If the drain is connected to a sewage works or a septic tank system there should be no risk of significant harm to the environment. This is because, to the biological processes involved in wastewater treatment, the organic chemicals in washing powders are simply a source of food and thus of energy and the means of growth. There will be some substances which break down slower than others, some which need oxygen to break down and some which are not organic, so have no available energy content for the micro-organisms doing the degradation. These inorganic substances include simple salts, found naturally and are not considered harmful at the concentrations which occur. It is a mistake to judge a chemical on its inherent properties (the properties it has in the packet). Instead we should look at what is left of the substance following treatment or disposal, check what concentrations are still present and compare these with known safe levels, for example to river life, to give us an idea of the degree of any risk which might be found. This check is known as risk assessment and is being applied to all major chemicals in the European Union. If you would like to learn more of the process for household cleaning detergents please look at www.heraproject.org.

John is a biologist with many years experience in the UK water and chemical industries. He is a free-lance environmental consultant, a Visiting Professor in the Centre for Eco-Chemistry at the University of Cranfield and the Department of Civil Engineering at the University of Newcastle upon Tyne. He has given several papers at the Sherkin Island Marine Station Conferences. Any opinions in the above article are his own.



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Wicklow Mountains National Park

An Insight



Morning on the Upper Lake

Photo: © John Griffin

Compiled by
Seán Casey

THE Wicklow Mountains comprise a high mountain tableland of rolling blanket bog, glaciated valleys and granite peaks. They are the largest continuous area of high land in Ireland. Their geological basis, the Leinster granite batholith, is the largest of its kind in Ireland or Britain

There are eight areas of major biological or geological interest in the Wicklow Mountains. Two of these areas are now Nature Reserves – Glendalough Wood and the Glenealo Valley. A third, Liffey Head Bog, is of international importance. All of these sites are owned by Dept of Arts, Heritage, Gaeltacht and the Islands and are contained in the Wicklow Mountains National Park. Five other sites are rated as being of national importance. They are Lough Bray (Upper and Lower), Lugnaquilla and Glenmalur, Lough Ouler, Athdown Moraine and Powerscourt Waterfall. (They form part of the Wicklow Uplands SAC)

The Wicklow Mountains are among the 110 Irish sites (SPAs), which have been accepted by the EU as being internationally important for birds, particularly birds of prey such as the Peregrine, Merlin and Hen harrier. These three species are included in Annex 1 of the EU Directive on birds (19/409/EEC) as being species requiring special conservation measures

because they are under threat or are vulnerable or are endangered in the EU.

In addition to containing exceptional natural resources, the Wicklow Mountains is an area of spectacular scenery, which rivals the mountains of Kerry, Connemara and Donegal. An Foras Forbartha listed the Wicklow Mountains in their entirety as an "area of outstanding landscape". Wicklow County Council as part of



Photo: © John Griffin

Common Lizard to be found throughout the park basking in the sun on rocks.

its County Development Plan has accepted this listing; they have classified the Wicklow Mountains, including its associated valleys as an "Area of Outstanding Natural Beauty". The Wicklow Mountains also contain a number of sites of historical importance. The most famous is the monastic settlement at Glendalough, founded by St Kevin in the 6th century.

The combination of exceptional natural resources, splendid scenery and sites of historical/cultural interest attracts large numbers of visitors to

the Wicklow Mountains for recreational purposes. The most popular recreational activities include walking, cycling, site seeing, photography, picnicking and nature observation. The use of the Wicklow Mountains as a recreational resource will continue to grow as the population of the greater Dublin area expands and as a result of the increasing interest generally in outdoor pursuits. The pressure has in fact been increasing in recent years and it is important to ensure that this increased use is catered for properly to ensure that the area's special qualities and natural resources are not diminished.

It was for these reasons, viz., the importance of conserving effectively the natural and cultural resources and scenic beauty of the area in harmony with recreational use, that it was sought to establish a national park in the Wicklow Mountains.

Wicklow Mountains National Park

The proposal to establish a national park in Co Wicklow was submitted to the government in November 1990. The government decided the following:

- The establishment of a national park in Wicklow in the "core area" at Glendalough. The core area consisted of the areas constituting the Glendalough and Glenealo nature reserves (2115 hectares).
- The expansion of the Park as resources permit within the target area (mainly above the 300 metre contour) of 30,000 hectares approximately; in this context approval was given for the acquisition of Liffey Head Bog and surrounding lands from the Powerscourt Estate, negotiations for which were on-going at the time.
- That certain lands within the central uplands, planted by the Forest and Wildlife Service, and at that time held by Coillte Teoranta, were to be transferred for inclusion in the National Park. Coillte would be permitted to harvest the timber crop when it matured. Unplanted lands (2718 hectares) within the target area to be transferred immediately.
- The provision of a visitor centre for the National Park.

The Minister responsible at the time, Mr Brendan Daly, T.D., announced the establishment of the Wicklow Mountains National Park at Glendalough in April 1990.

Acquisition

Various acquisitions were made in the intervening years, mainly from large estates such as Powerscourt, McGrath and Ballinabrockey. All acquisitions were in response to offers of land by the owners. Compulsory purchase is not an option, available or desirable.

The present National Park comprises lands formerly held by the Forest and Wildlife Service and Coillte Teoranta, together with lands acquired directly by Dept of Arts, Heritage, Gaeltacht and the Islands for inclusion in the Park, now totalling c. 20,000 hectares.

Education

Based in Bolger's Cottage at the Upper Lake in Glendalough, the education programme of the National Park runs throughout the year. The programme facilitates secondary schools with fieldwork in Ecology, Physical and Social Geography and Geology, and primary schools with Nature Awareness programmes. An outreach programme concentrating on habitats and wildlife of the Park is also offered. Special programmes are offered to people outside the mainstream education, special education and adult learning.



Photo: © John Griffin

Education programme: Guide Andrea Webb introduces primary school children to nature

The Education Centre also provides guided walks, lecture series, Art in the Park and In-service Training for primary teachers.

The primary aim of all the work

undertaken is to promote a better understanding of our natural environment.

Deer

All deer in the National Park are hybrids of red and sika. However, there are red-like and sika-like animals with the former, resident in the open mountain areas, and the latter in the latter mainly in the woodlands, mainly. An annual cull is undertaken each year in order to maintain the populations at sustainable levels.



Photo: © Dichas

Sika deer introduced by Lord Powerscourt in 1860, now hybridized with red deer in Wicklow.

Birds

The Wicklow Mountains National Park contains habitats that provide foraging and nesting areas for a wide variety of bird species. Nationally important populations of a number of species are present.

Peregrine Falcon, Merlin, Red grouse, Wood Warbler, Redstart, Raven and Goosander are among the circa 80 bird species which live and breed in the Park.

Visitor Pressure

Living in the Dublin shadow, the Park is under great pressure. A survey in 1999 revealed that in excess of 100,000 thousand people visit Glendalough, annually, a good percentage of who engage in hill walking. This activity has caused serious erosion in a number of areas. Park Staff have undertaken various types of remedial works in the last 5 years. About 10 kilometres of boardwalks have been laid. This has proved very popular, but has exacerbated the problem of erosion, as the mountains are now accessible to people who might otherwise be unable to access them. More boardwalks, more people, more boardwalks and so to infinitum!

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Photo © John Griffin

Heath Dog Violets (*Viola canina*) found in the Oak forests of the National Park in April and May



Photo © John Griffin

Education centre at the foot of Cammerry Mountain overlooking the upperlake of Glendalough.



Photo © John Griffin

Leisler's bat rescued by Ranger Enda Mullen from house renovations and released in spring 2002



Photo © John Griffin

Wheelchair boardwalk around the lower lake in Glendalough, completed in 2001 by Park staff



Photo © John Griffin

Ranger John Griffin with a rescued female Peregrine falcon, shot near Devils Glen 2001, ringed as a chick in Glendalough 1993 by Ranger Wesley Atkinson and now in a captive breeding programme



Photo © John Griffin

Minersroad follows the North shore of the Upperlake to the mining ruins at the top of the valley - a very popular family walk

The Wicklow Mountains National Park

Photographs by
John Griffin & Wesley Atkinson
Conservation Rangers
Wicklow Mountains National Park



Photo © John Griffin

St. Kevin's monastic city in Glendalough is a major tourist attraction within the park



Photo © Wesley Atkinson

Feral Goats rutting - once domestic and in Glendalough since the time of St. Kevin



Photo © John Griffin

Bell heather covers the mountains in bloom in the summer months



Photo © Wesley Atkinson

Barn Owls in St Kevin's Kitchen, Glendalough

Pristine Salmon Rivers of Kamchatka

By Jim Lichatowich

ABOUT five hours after leaving Anchorage, Alaska the jet descended below the clouds and I had my first look at Kamchatka, Russia. Several large cone-shaped mountains immediately caught my attention. They were obviously volcanic and I would learn later that the east coast of the Kamchatka Penin-

sula has 29 active volcanoes. But it wasn't the volcanoes that brought me across the Pacific. The rivers of Kamchatka and their salmon lured me from my home in Oregon. Kamchatka extends south from eastern Siberia like a long bony finger pointed at the northern islands of Japan. The peninsula is about the size of California with a population of about 390,000. Most people, over 300,000, live in

Petropavlovsk. Less than 90,000 Russians are scattered over an area the size of California. Kamchatka is very lightly settled. The trip was arranged by the Wild Salmon Center, a nonprofit organization headquartered in Portland, Oregon. The Center has a unique approach to the protection and conservation of Pacific salmon. It arranges guided fishing trips to Kamchatka's



Kamchatka is a land of many volcanoes.

pristine rivers, then uses the income above what is needed to cover expenses to fund

salmon conservation programs. They carry out their work on both sides of the Pacific.

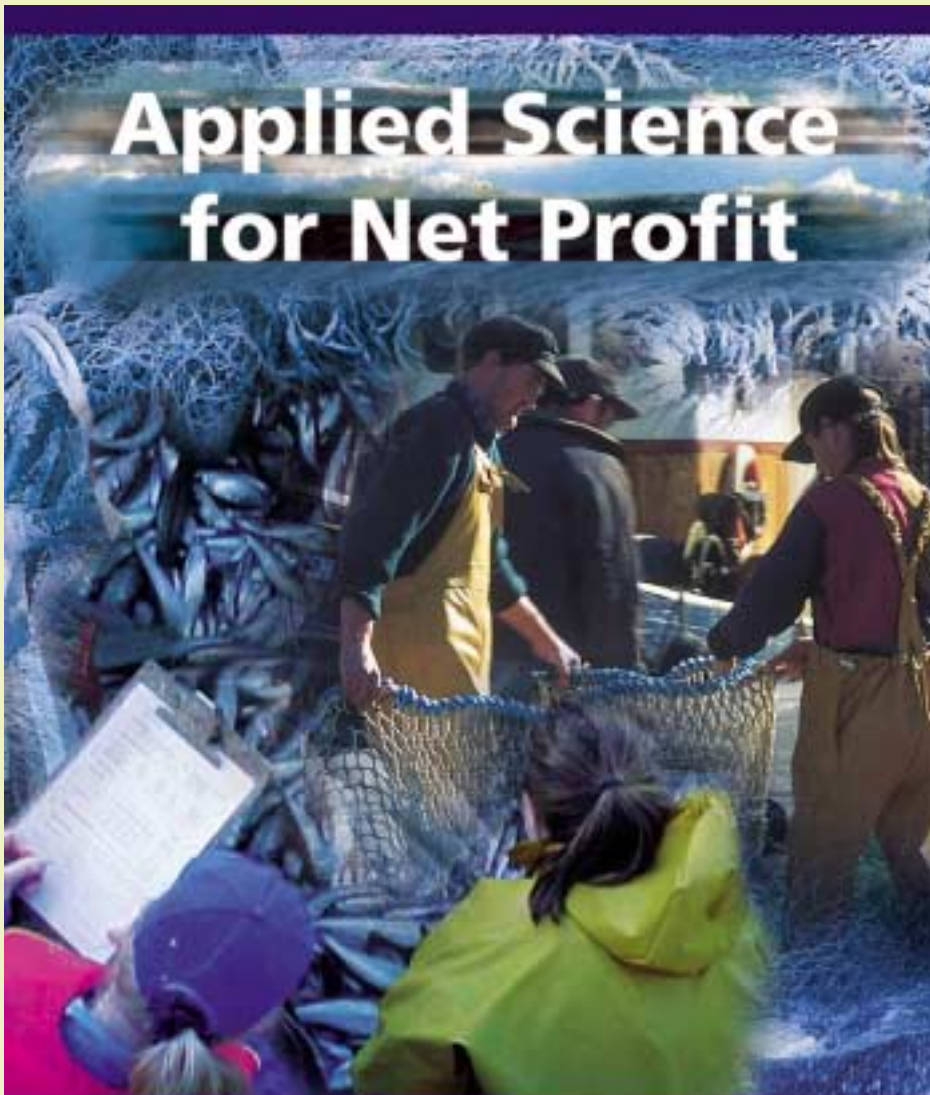
I was on this trip at the request of the Gordon and Betty Moore Foundation, which was interested in funding salmon conservation programs on the peninsula. We were trying to assess the feasibility of establishing salmon sanctuaries and research stations in some of Kamchatka's pristine rivers. During the week we were in Kamchatka, we met with several government officials, television and newspaper reporters and Russian environmentalists. We took a low-level flight by helicopter over the 110 Km length of the Kol River from its head waters in the Serdinny Mountains to its mouth on the Sea of Okhotsk. This was followed by three days of fishing on the Zhupanova River.

Anthony Netboy, the author of many books on the salmon and their plight around the world, once said that the salmon (Atlantic and Pacific)

ability to correct the problems of degraded rivers and depleted salmon populations. He once told a symposium on salmon recovery, that in his experience looking worldwide at salmon and their rivers, once a salmon river has been severely degraded it is almost impossible to bring it back. I share his pessimism about our ability to solve the problems created by the industrial economy, especially when we attempt to use technology to replace natural ecological processes. I am optimistic regarding the healing powers of rivers if they are allowed to mend themselves.

For all 32 years of my career I worked on rivers that had been subjected to degradation for so long that their pristine state was at best a dim memory. That's why what I saw in Kamchatka was such an amazing sight. As our helicopter flew over the Kol River, mile after mile of catchment slipped by with no sign of development or human disturbance to the landscape. Thousands of acres of undis-

"Thousands of acres of undisturbed floodplains and wet lands created ideal low gradient conditions for salmonids."



Gas pipeline crossing the Kol River. Will development follow?

are the world's most harassed fish. Everywhere salmon and their rivers have come into contact with the industrial economy, the salmon have been the losers. Netboy did not have much faith in our

turbed floodplains and wetlands created ideal low gradient conditions for salmonids. There are no undisturbed, low gradient river reaches along any river in Oregon. Even though nearly all the Kol =>



The Marine Institute,
Marine Fisheries Services Division,
Abbotstown, Dublin 15, Ireland.



Email: www.marine.ie



⇒ Basin was untouched, there were ominous signs that the industrial economy was beginning to make inroads into this wilderness. For example, at one site a crossing for a gas pipe line was being constructed.

The Kol empties into the Sea of Okhotsk on the west side of the Kamchatka Peninsula. As we made our way up the coast we saw several fishing villages. Many were abandoned. Fishing vessels hauled up on shore rusting near houses and processing plants that were in various stages of decay — reminders of the failure of the centrally planned economy of the communist era. The fishery had moved further offshore where many

an easy next step to use them to replace river habitat. Kamchatka has resources that can be exploited if rivers are developed and concerns for salmon habitat are relaxed. It seems to me that history is repeating itself. Management decisions made a century ago in the Pacific Northwest, which led to the decline of salmon in that region are being repeated in Kamchatka. Another set of pristine rivers and salmon populations on the verge of being sacrificed for the myth that it's possible to have salmon without healthy rivers.

I came away from Kamchatka with some great memories of the people, the land, the rivers and their



The braided channel and undisturbed flood plain of the Kol River makes excellent rearing areas for juvenile salmon.

foreign fishing vessels harvest the salmon from Kamchatka's pristine rivers like the Kol.

When salmon are captured greater and greater distances from their home river the likelihood increases that the fishery will harvest a mixture of stocks from several rivers. This sets up the possibility that the weaker stocks or the stocks that are temporarily at low levels of abundance due to natural variation will be over harvested. I raised that concern with some of the Russians we talked to and what they told me was disheartening. The effects of over-harvest will be eliminated by constructing and operating fish hatcheries. Some of the hatcheries would be paid for by the Japanese, one of the countries engaged in the offshore salmon fishery.

The use of hatcheries has its Russian critics, but official policy seems to be moving in the direction of increased hatchery production. Here, where the rivers and many of the stocks are still pristine and productive, it appears that the same mistakes made in the Pacific Northwest when the rivers there were still pristine will be repeated. It appears the Russians may be ready to substitute hatcheries for stewardship. Once hatcheries are accepted as a substitute for rational harvest policies, it is

salmon. But I also came away with the realization that despite of the cultural and political differences that separate the eastern and western sides of the Pacific, the salmon people across the Pacific Rim are united by a common resource. Unfortunately, they also seem to share a common story of a disastrous relationship between the salmon and industrial economies. The only difference is that in some regions the story has progressed further than others. In the Pacific Northwest there are many rivers where the story has reached its end. The salmon are extinct in 40 percent of their historical range. Kamchatka is still in the opening chapters of the story and it is a story without a happy ending.

Can the wild Salmon Center make a difference? Can the Center working with the Russians rewrite the story and produce a different ending? The center is trying, but only time will tell if it is successful.

Jim Lichatowich is a fisheries biologist and author of the award-winning book, Salmon without Rivers: A History of the Pacific Salmon Crisis. He lives in Columbia City, Oregon, U.S.A., and can be reached at www.jal@salmonwithoutrivers.com.

The Wilted Greens

Environmental campaigners have been having a bad press recently. Alex Kirby thinks they don't deserve it:

PERHAPS it was Bjorn Lomborg, author of *The Skeptical Environmentalist*, who began the backlash. His admission that he'd moved from being a member of Greenpeace, first to distrust and then to outright rejection of some of the most sacrosanct green shibboleths, sent a frisson through the bunnyhuggers' boardrooms. Then again, perhaps Lomborg really did no more than give a hefty nudge to a process that was already under way. Perhaps a more crucial moment was the admission by Greenpeace itself, back in 1995, that it had done its sums wrong, and that Shell's Brent Spar platform contained far less oil than the campaigners had first claimed. Greenpeace was careful to insist that its basic argument with Shell remained intact - installations like the Spar should be cut up and recycled, not dumped at the bottom of the Atlantic. But for many critics, and quite a few waverers, that honest admission of an error of detail showed Greenpeace had feet of clay, and probably a brain to match. The environmentalists had got it wrong. Ergo, never trust an environmentalist again.

There is a spirit of distrust towards the greens, certainly in the anglophone world (lower-case greens, that is: the various political parties of continental Europe are something else again). One of the ways it shows itself most vehemently is over climate change. Many contrarians are bitterly dismissive of scientific claims that it's happening at all, or that humans are making any detectable contribution towards it, or that there's anything we can or should be doing to reduce any contribution.

The climate contrarians reserve most of their bile for politicians and for the scientists who advise them. The Intergovernmental Panel on Climate Change comes in for the keenest derision. But the green non-governmental organisations (NGOs) get caught in the slipstream, especially when they campaign against George W Bush for his repudiation of Kyoto Protocol, the international agreement on tackling global warming.

Environment journalists certainly aren't immune. I've been upbraided for advocating genocidal policies and for driving young people to suicide, all because I reported that a green NGO thought climate change was a serious problem.

So have the green NGOs had their day? Have the savvy new contrarians consigned them to history, by showing us that there really is nothing to worry about after all? Is it time we sent them packing, unelected and unaccountable elites that they are?

Unelected they clearly are, but that doesn't deprive them of any claim to legitimacy. The recent US and UK experience suggests, at least, that many voters are sceptical about what elections can achieve. And the NGOs are accountable: if they don't respond to the wishes of their supporters, they soon find that they don't have many supporters. You can ask whether the information they produce is always as accurate and well-founded as it should

"Perhaps one of the best things any UK NGOs have done is to run the highly visible Jubilee Campaign to persuade politicians to cancel the unpayable debts of the most indebted poor countries."

be. But I think people in Ireland, Britain and other countries are too worldly-wise to fall for a wholesale con trick by the NGOs, if any of them felt like trying one on.

Have the NGOs anything to their credit, any achievements for which we ought to thank them? Yes, many. If we accept that the green wave gathered strength in the mid-eighties, there have been milestones since then, which they can count in the balance.

In the UK, one of the first was the decision to phase out the use of CFCs (chlorofluorocarbons) in aerosols because of the damage they do to the ozone layer. The scientists found the evidence over Antarctica: the NGOs helped to alert people and to brief journalists. Without their involvement, any ban would certainly have been delayed for some time.

It's a pattern they've repeated subsequently with other concerns. If more of us now believe that climate change is a real worry, again it's the NGOs who've managed to attract our attention. A recurrent challenge to the mass media these days is that we should take responsibility for giving readers, viewers and listeners more information about the environment, and especially about global warming. I don't think the media see their role that way any more, if they ever did. Editors recognise the need for respectable ratings, but not much else. So who should tell us, the questioners ask. The scientists? They do what they can, but few of us are equipped to under-

stand their findings without help. The government? Governments these days face an uphill struggle to overcome distrust and cynicism. Who then does that leave but the NGOs?

Ozone depletion and climate change aren't the only feathers in the NGO's caps. They've done more than most to warn us of the possible risks from genetically-modified crops. Some go in for direct action, uprooting GM plants wherever they find them. Others accept that there may be real benefits from GM technology, but underline that there may well be drawbacks as well.

The future of European agriculture is about much more than GM crops, and the NGOs are deeply involved in the arguments about what sort of common agricultural policy should replace the present ruinously expensive and widely unpopular model. That will have repercussions, in the expanding European Union, from Poland to the Atlantic.

Perhaps one of the best things any UK NGOs have done is to run the highly visible Jubilee Campaign to persuade politicians to cancel the unpayable debts of the most indebted poor countries. The campaign hasn't wiped out debt, and it hasn't engaged all politicians in the argument. But it's gone further towards those goals than anything that preceded it. The UK Prime Minister, returning from a trip to West Africa, said he hoped something like the Jubilee Campaign would spring up to force politicians to take the continent and its problems seriously. The best-known groups in the campaign are probably not environment NGOs. But they know that poverty is one of the worst environmental threats of all, and they've been pulling their weight in making Jubilee work.

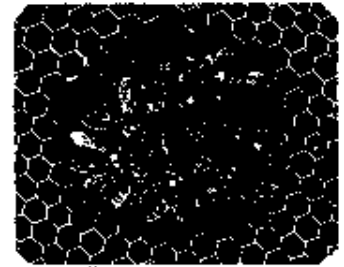
The NGOs are nagging consciences, deeply unfashionable in the post-ironic twenty-first century. But post-11th September many of us have less stomach for irony or for what comes after it, and more concern that if we're going to be tough to terrorism, we have no choice but to be even tougher on the causes of terrorism.

I'd be sorry to see the back of Greenpeace, Friends of the Earth, WWF and their ilk. It would be a duller world without their stunts and protests, their incessant sniping at whatever government is in power. More to the point, I think it would be a less scrutinised world, one where those inclined to cut corners, or to increase profits, or simply to decide what's good for us without fear of contradictions, would sleep easier in their beds. And I don't want them to sleep at all.

Alex Kirby is a British freelance journalist.



HONEY BEES



Honeybees - Interesting Facts

THE Honeybee belongs to the insect order Hymenoptera. This order contains many thousands of species of bees, wasps, ants and many groups of parasitic insects.

The bee has been known to the human race for many thousands of years. There is a very old educational painting in a rock shelter in Spain depicting bees. Stone Age man ate honey which he stole from the nests of wild bees. Bees were first kept by man in hollow logs with sticks to support the honey combs. Later man kept bees in straw baskets called 'skeps' and today, bees are kept in standard hives.

There are about 10,000 species of bees, which are roughly divided into two main groups: Social Bees, living in colonies and Solitary Bees that live alone.

Honeybees are social insects. They live and work together in large groups. They form a colony (group) which consists of:

- A QUEEN (the reproductive female)
- The WORKERS (infertile females) numbering about 10,000 in winter and increasing to about 60,000 in mid summer
- DRONES (male bees) numbering 200 - 1,000 approximately and are present in the colony mainly during the summer months.

The QUEEN honeybee lays the eggs that hatch into thousands of young bees. Laying eggs is the queen's only function - she does not gather food or build honeycomb. Queens can live for 3 - 4 years and may lay up to 2,000 eggs per day at a peak time. The queen has a smooth curved sting which she uses only to kill rival queens.

The WORKERS do all the work in the colony. They live for about 6 weeks in summer and up to 6 months in winter and early spring. All worker bees are females (infertile) and are smaller than the queen. The young worker bees remain in the hive for two weeks where they are involved in cleaning empty cells, caring for the young, building comb and processing the incoming nectar. When the worker is 10 - 14 days old, it flies to the field where it forages, collecting nectar, pollen and water and then returns to the hive.

Some worker bees perform guard duty at the hive entrance defending the hive against strangers; other workers at the entrance fan fresh air into the hive and force out stale air. The movement of the workers' wings help to produce enough heat to keep the colony of bees at an even temperature. The sting of a worker bee is straight, with barbs or hooks on it. Bees depend on their sting as their only means of self defence and will only sting when they feel they are under threat.

DRONES are the male honeybees and are large burly clumsy creatures with hairy bodies and large eyes. They develop from unfertilized eggs and their only function is to mate with young queens. After mating the drones die. They have no sting and are unable to defend themselves against workers who ruthlessly force them out of the hive when there is a scarcity of food and at the start of the winter period.

Bee Larvae

Bees like other insects are produced from eggs. The queen lays one egg in each cell of the comb. The eggs are very small, pearly white, visible to the naked eye. After three days a tiny wormlike larva hatches from each egg. It is fed for three days on food produced from the head glands of the worker bees. When the larva is three days old, it is fed a mixture of honey and pollen. Five days after the larvae hatches, the worker bee builds a wax cap over the cell. In it's sealed cell the larvae changes into a pupa, then the pupa develops into an adult bee. The adult worker bee bites it's way out of the cell 21 days after the egg is laid. The drone takes 24 days and the queen 16 days.

Honey - What is it and how is it made?

From the human point of view, honey is the prime product of the honeybee. Honey is a foodstuff, which is produced by the honeybee from the nectar of blossoms, which bees collect, transform, combine with specific substances of their own, and store in honeycombs. Bees use the honey to feed the larvae during the winter. Flowers have special glands called nectaries that produce nectar. Nectar is the

sweet liquid that plants produce to attract insects for pollination. It consists of sugars dissolved in water. Honeybees suck up nectar from the nectaries of the flower with their long tongues and store it in their honey sacs. When the honeybee has filled it's honey sac with nectar, it returns to the hive. In the hive the bee regurgitates the nectar and passes it to the hive bees who put it in an empty cell in the hive for use as needed. While the nectar is in the bee's honey sac, it combines with enzymes. In the honeycomb the water evaporates and the chemicals from the bee change the nectar into honey. When the honey is ripe the bees seal it into the cells by putting wax caps on the honey filled cells.

Nectar is an essential food for bees and they can use it immediately to feed on. If it is not used at once the bees will store nectar as honey for use later. If the bees have more honey than they need, the beekeeper will remove the surplus honey for his own use.

Plant Pollination

The greatest value of honeybees is in their service as pollinators, which far outweighs their value as honey producers. Pollination is the term used to describe the transfer of pollen from the male element of the flower to the female element of the same flower, or to other flowers of the same species. Many plants are air pollinated and have no need of insects e.g. coniferous trees, grasses and most cereals. Fruit trees and soft fruit require special pollinators i.e. insect pollination. It has been proven that apples, pears, plums and other hard and soft fruits will yield a much heavier crop and a better shaped fruit when pollinated by the honeybee. The bee's food consists of pollen and nectar. In order to obtain these the bee flies from flower to flower collecting them. In doing so, the flowers are pollinated. The bee also plays an important part in the pollination of ornamental plants and flowers. The destruction of many of the old and established hedges which were the natural habitat of wild insects and wild bees, who played an important part in pollination, has increased the need for honeybees.

The External Features of the Adult Bee

Honeybees vary in colour from black to yellow. The honeybee, like many other insects, has a body that is divided into three sections: the head, the thorax and the abdomen.

The head of the bee has five eyes: three small ones in a triangle on top of it's head and a large compound eye on each side of it's head. The three small eyes or ocelli are simple eyes and have very limited vision. They are not capable of forming any image on a retina and it is thought that their function is to determine light from darkness and possibly to see which way is 'up'.

The compound eyes are extremely complicated. Each compound eye consists of a great number of facets, each of which function as a single lens. The number of facets varies from 3,000 to 6,000 in the queen and worker and as many as 13,000 in the drone. Behind each facet is a lens reaching down to the retina. Due to it's

construction, the retina cannot form an image but receives a mosaic of dots of varying intensities. The bee's vision by human standards is poor, but detection of movement is excellent. Bees cannot focus their eyes because the eyes have no pupils. Bees can distinguish colours, their best vision is at the ultra violet end of the spectrum.

The head also has two long feelers or antennae with which the bee can sense, touch, taste and smell. The bees tongue is a flexible tube which it uses to suck water and nectar into its mouth.

The Thorax carries two pairs of wings. The front pair is bigger than the hind pair and the two wings of each side are hooked together. The bee has three pairs of legs. Part of it's hind legs are used for carrying pollen and propolis. This area

is known as the pollen basket. The sting is situated at the tip of the abdomen.

Further information on "The Honey Bee" 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 This leaflet is based on an information leaflet by Mr Michael Gleeson, Federation of Irish Beekeepers Association, with assistance from Dr Martin Speight, National Parks and Wildlife Service.

Looking for information on the Environment?

ENFO may have the answer!

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1. Write to: Enfo, 17, St Andrew Street, Dublin 2.
2. Telephone: 01-8882001 or 1890 200 191 (local).
3. Fax: 01-8883946.
4. E-mail: info@enfo.ie
5. Website: www.enfo.ie
6. Visit: The drop-in centre at 17, St Andrew Street, Dublin 2 (off Dame Street) and see the exhibition, visit the children's corner, see environmental videos and access the library's database and internet facilities.
7. Check out: The Enfo information stands at your Local Authority office or County/City Library.

Forthcoming Exhibitions

1st June - 28th June: Planning for Local Communities
July: A New Way to Look at Wetlands Exhibition
August: ENFO's Environmental Art competition for primary schools

Estuaries and Sea Level Rise

By Ian Townend

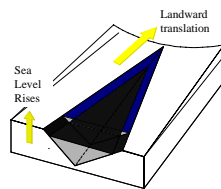
SEA level rise continues apace, with the long-term records suggesting an increase of about 1-2mm/year. This is broadly consistent with the average rate suggested by the geological record for the last few thousand years. However, there are periods when things speed up and others when they slow down or even fall rather than increase. There is evidence for this over the long-term as a result of events such as the Little Ice Age in the Middle ages. Similarly there are changes on a much shorter time-scale, which can also have an effect. For instance the tidal range varies over a period of 18.6 years, known as the lunar nodal cycle. This change can mean that the average level of high and low water are both changing by as much as 10mm/year and the tidal range by 20mm/year. On an even shorter time scale there are spring and neap tides, occurring over a 14 day cycle and again these affect the tidal range.

All of these changes are significant because they affect the

size of the tidal prism going in and out of the estuary and the depth of water. The depth is important because it alters the way in which the tide propagates and the influence of wind-waves on the shoreline. So based on the explanation given in the article in the last issue (*Sherkin Comment No. 30*), these changes will be altering the form of the estuary. Importantly, they may also be altering the distribution of the biology. The various cycles and trends described will tend to alter the amount of time the upper shore is submerged and the lower shore is exposed. Consequently species that have different levels of tolerance to saltwater submergence are likely to respond to these changes. This may in turn affect the morphology of these intertidal areas, as some species, such as diatoms, help to stabilise the sediments, whereas others, such as *Macoma*, have the opposite effect.

Such changes may be small but they can still have far reaching effects. Although there is still much debate about exactly how an estuary responds to changes in sea level and tidal range, some of

the key mechanisms were described in the last issue. It is thought that these combine to give rise to a process referred to as estuary rollover. As the water level goes up so the estuary moves landwards. This means that the estuary is trying to get wider and longer – whether it does so depends on the geology and the shape of the river valley. For the Humber estuary on the East Coast of England, which is about 140 km long, we have



Estuary rollover

estimated that for every 1mm of sea level rise it might be moving landwards by about 5 metres. Whether it is or not remains uncertain because the change is relatively small and difficult to identify from historic charts, even where these do exist. However these charts do suggest that the size

of the Humber has changed, not only in response to the long-term trend in sea level rise but also in response to the lunar nodal cycle (18.6 years). In addition, there is supporting evidence in estuaries such as the Severn, where Professor John Allen has explained the terracing in the saltmarshes there, using the estuary rollover model.

In an unconstrained estuary this landward expansion includes the surrounding flood plain. The areas near to the existing bank are progressively covered with water more and more often at high tide. This causes sediment to be left behind and so raises the level of the saltmarsh, to keep pace with sea level rise, and at the same time assists the marsh to migrate landwards over the flood plain. Clearly this cannot happen where there are flood defences or other structures, such as docks and quays. In such circumstances the migration process can continue at lower water levels but not at high water. This results in the intertidal area of mudflat/saltmarsh progressively reducing in width – a process sometimes referred to as “coastal squeeze”. In addition,



The managed re-alignment site at Orplands in Essex. The original sea walls are to the left and are breached in two places (in the middle and upper left of the picture). New sea walls have been built to the rear and mud flats are beginning to develop on what was farmland between the new and old walls.

such constraints can, in some cases, amplify the tidal wave as it propagates up the estuary so increasing the risk of flooding. This all points to the need for careful land-use planning alongside estuaries. It is not that these areas should be no-go-areas but simply that in the long-term it may be a cheaper option to give the estuary some room to move and thereby accommodate

changes in sea level or rainfall run-off. Current forecasts are for more intense floods during winter months and an acceleration in the rate of sea level rise due to climate change. It may therefore be more prudent to investigate the options of allowing the estuary to do the work, rather than pinning it in place and then having to continuously re-engineer protective measures.

Habitat Creation in Estuaries

IN an estuary free to adjust to changing climate and the resultant changes in sea level, rainfall run-off and sediment supply, the system will continuously evolve to reflect the changing circumstances. Where this is the case it is certainly best to leave things well alone and allow the governing forces of tides, winds, waves and rainfall to fight it out. However most estuaries in the world have been modified to some degree. This may have been due to changes in the catchment altering rainfall run-off, embanking and reclamation, progressive claiming of areas that have accreted in the past, or works to protect settlements from flooding or erosion. In many cases turning the clock back is simply not an option.

Equally there are important habitats to be found in estuaries. These include mudflats, saltmarshes and shallow sandbanks. The nature of the sediments and the transition from fresh to salt water make this a specialised ecosystem for a limited range of species and gives rise to a very high productivity (it has been estimated that estuary mudflats can be five times more productive than the best agricultural land). This in turn means that these habitats are invariably important as nursery areas for fish, and roosting and feeding areas for birds.

In the article above, I describe how an estuary responds to sea level rise, by moving upwards and landwards. Problems arise however when this migration is constrained. This may be due to a change in geology but can equally be due to embankments and defences. In these circumstances the high water line is pinned and cannot move landwards (or at least not until the defences fail!) and

the intertidal area in front of the defences is progressively narrowed. This process may well account for much of the loss of mudflat and saltmarsh currently being observed in estuaries.

So what can be done about such losses? Or, if further development is proposed, what can be done to compensate for new losses? Some of the answers that are currently emerging seem to present a split in opinion. On the one hand there are those who would like to “design” a natural estuary. But what is natural? An estuary forms a mix of habitats depending on the prevailing constraints. In order to “design” a natural estuary, we would have to start setting out societal preferences for particular types of habitat. On the other hand are those who abhor the thought of human intervention as a form of nature gardening. This fails to recognise that the estuary has already been gardened to a greater or lesser degree. For me the prime requirement is to take advantage of any opportunity that will increase the room in which the estuary can move, by removing unnecessary constraints. This can be usefully supported by restoration work, where, for instance, an area has been polluted by historic (or ongoing) activities. Such a way forward is slightly vague about just what habitats will be created, as this will depend on just how the estuary responds to changing circumstances. It does however avoid tinkering with the system, which seems to be the prime characteristic of some habitat creation schemes.

This is exemplified by recent attempts in England, which fall under the heading of “managed realignment”. This is where the primary flood defence is set back along some landward line.

However the original seaward defence is not removed so that the newly unprotected area can become an integral part of the estuary system, which may or may not become mudflat/saltmarsh. Instead the existing wall is breached at one or more locations to create new channels in and out of the set-back site. This in effect creates a new sub-system to the estuary. This may have an impact on the estuary as a whole because it will change the tidal prism. However, because it remains separate (cut-off by the original walls), the scope for co-adjustment of the main channel and the areas in which water is stored at high tide is much more constrained. It is likely to preferentially create saltmarsh, which may be good from a particular administrative point of view (such as the Biodiversity Action Plan or implementation of the Habitats Directive1) but does little to enhance the estuary’s ability to adapt to change. It is also very definitely a form of gardening!

Recent research has shown that if choices have to be made, there may be reaches in the estuary that should be given room to move preferentially over others. This may maximise the ability of the system to adjust and can also give rise to other benefits, such as reduced tidal amplification, or increased capacity as a nitrogen sink. Just where these are will depend on the setting of the estuary and the relative magnitude of the tidal and river flows. It is likely that the current policy drivers, such as the Habitats Directive, will give rise to many new and varied attempts at habitat replacement or creation with varying degrees of success. These should however provide opportunities to improve our understanding not only of the different types of habitat but also how they interact with the wider estuary system and ultimately how an estuary really works!

Jan Townend, ABP Research & Consultancy Ltd., Pathfinder House, Maritime Way, Southampton, SO14 3AE England.

Forty Years on Ice

By Charles Swithinbank

The Book Guild Ltd., 25 High Street, Lewes, Sussex, England 1998

ISBN: 1-85776-261-4

Price £25.00 stg.

Swithinbank writes as one of the most highly respected authorities on polar exploration. The book chronicles four decades of scientific discovery and adventure in one of the world's most hostile environments and visits both the North and South Poles. *Forty Years on Ice* is a fascinating read that manages to capture the extreme sub-zero temperature, toil and hardship, whilst introducing the reader to the majesty and beauty of these frozen tundras and the teamwork and determination needed to survive.

Foothold on Antarctica

By Charles Swithinbank

The Book Guild Ltd (see above) 1999

ISBN: 1-85776-406-4

Price: £10.50stg

Charles Swithinbank recounts his experience of the first Norwegian-British-Swedish Antarctic expedition (1949-1952). The glaciological information gained from the expedition led to new understanding of the importance of ice sheets in sea level, and in global climate regulation. Not only scientifically significant, this book is intriguing in Swithinbank's descriptions of the numerous obstacles the expedition overcame. A number of detailed photographs

Publications of Interest

depicting life in the harsh Antarctic environment complement the text and make for a most enjoyable read.

Drugs from the Sea

Edited by N Fusetani

Karger AG, P.O. Box CH-4009, Basel, Switzerland 2000

ISBN: 3-8055-7098-8

Price: US\$121.00

Drugs from the Sea, a collection of scientific papers and essays, highlights the fascinating possibilities and the problems involved in marine organism derived drugs. Professor Nibuhrio Fusetani, who edited the book, points to the vast unexplored and un-tapped sources, which may be present in the relatively little known marine environment. He also indicates the enormous obstacles that must be overcome in order to make these drugs viable. The papers he has chosen highlight these points and try to explore ways of making these exciting possibilities a reality.

Limnology (Third edition)

By Robert G Wetzel

Academic Press, Harcourt Place, 32 Jamestown Road, London NW1 7BY, UK 2001

ISBN: 0-12-744760-1

Price: £36.95stg

Limnology by Robert G Wetzel provides an extensive text on both lake and river ecosystems. This reference book gives the reader a plethora of information at their fingertips, supplying both in-depth or basic knowledge depending on the reader's needs. The illustrations are well formatted and supply an invaluable source of readily available information. This reference book is well written, but is orientated to those within the scientific field.

Streams: Their ecology and Life

By Colbert E. Cushing & J. David Allan

Academic Press (see above) 2001

ISBN : 0-12-050340-9

Price: \$49.95

"Streams" incorporates an extensive range of comprehensive and fascinating information in an attractive guide to ecological processes. This book is a useful tool for enthusiasts at all levels. A pleasure to read, with quality photographs and attractive diagrams which aid understanding of a wide variety of topics. Cushing and Allan have produced a fine study offering concise information whilst raising awareness of important conservation issues.

City Region 2020

By Joe Ravetz

Earth Scan Publications Ltd., 120 Pentonville Road, London, N1 9JN, UK 2000

ISBN: 1-8538-3606-0

Price £19.95 stg (Pb) £50.00 stg (Hb)

Joe Ravetz tackles the issue of sustainability in cities and uses Greater Manchester, England's second largest conurbation, as a case study. This text is highly recommended to any reader with an interest in sustainability, whilst proving itself to be comprehensive enough to function as a tool for the expert. A fine layout, clear text and abundance of detailed yet easily understandable illustrations make the chapters a joy to read.

ISBN 1-930665-33-4

Price: US\$54.95

The *Ecology of Running Waters* provides a well thought out and easily understood outline of the complex ecosystems found in fluvial systems. The author condenses this vast subject area into a flowing and precise account, taking the reader through the chemical properties of water, associated plants, invertebrates and fresh water fish. This book is a must for biologists and individuals with interests within this field.

Marine and Coastal Protected Areas

By Rodney V. Salm and Joun R. Clark with Erkki Siirila

IUCN 2000

ISBN : 2-8317-0540-1

Price: £20.50stg

A comprehensive guide for all marine conservationists and a practical tool with an applied hands on view, providing modern approaches to planning and managing tropical coasts and seas. This source book introduces the importance of marine protected areas in implicating sustainable use of resources and community involvement whilst considering principles and mechanisms for planning and management of different environments. The combination of technical knowledge and case histories make this an essential companion for any marine protecting practitioner.

The Oceanic Circle

By Elisabeth Mann Borgese

United Nations University Press, 2 UN Plaza, Room DC2-1462-70, New York, NY 10017, USA 1998

ISBN: 92-808-1028-6

Price: £19.95stg

With our Earth's surface covered in two-thirds water it seems we simply overlook the oceans as a world distant from our own. Yet as our oceans become polluted and over fished, supervision and investigation of them is becoming more important. This fascinating publication views the ocean through world wide social and economic perspectives, intertwining the legal aspects with institutional matters producing an interesting book discussing the governance of the world's oceans.

Guidelines and manual for the protection and rehabilitation of contaminated rivers

Water Resources Series No. 78

United Nations, New York (see above) 1998

ISBN: 92-1-119933-6

Price: £25.00stg

This volume provides a wealth of information covering environmental status, management options, statutory provisions and social considerations necessary in the protection and rehabilitation of contaminated rivers. It illustrates and highlights the need for management to ensure a plentiful supply of unpolluted freshwater for this and future generations. The text is well laid out and comprehensive, with detailed diagrams throughout to aid understanding of the issues discussed. An essential tool for understanding the importance of protecting and rehabilitating our water supplies.

The Ecology of Running Waters

By H.B.N Hynes

Blackburn Press, P.O. Box 287, Caldwell, New Jersey 07006, USA 2001

Evaluating effectiveness - Best practice protected area guidelines

Series No. 6

IUCN Publications Services Unit, 219c Huntingdon Road, Cambridge CB3 0DL, UK, 2000

ISBN: 2-8317-0546-0

Price: £16.00stg

A much needed book looking into the status of the increasing number of protected areas worldwide. Effective management and monitoring of these areas is discussed in depth with the book divided into 2 distinct sections. The framework and guidelines supply the reader with a wholly satisfactory background, before the global case studies apply these principles. Clear concise text and a wealth of information make this an ideal tool to assist managers in their task.

Financing Protected Areas

Editor by Adrian Phillips

IUCN 2000

ISBN: 2-8317-0544-4

Price: £15.00stg

Intended for managers of protected areas, Phillips provides a systematic, well laid out framework for developing and implementing financial strategy. Divided into three sections, the book discusses the themes of financial strategy development and financing. The first two chapters are supported by a series of case studies, illustrating a

successful implementation of suggested strategies. The clear structure and detailed contents allow the reader to easily find relevant sections. This book is accessible and informative making it an invaluable starting point for financial planners of protected areas.

2000 IUCN Red List of Threatened Species

Compiled by Craig Hilton-Taylor

IUCN (see above) 2000

ISBN : 2-8317-0564-9

Price: £30.00stg

This is a very interesting book giving an understandable outline on conservation issues concerning threatened species worldwide. Tackling both animals and plants it gives an excellent comprehensible review into distribution trends, location and the major threats. A well set out book with excellent diagrams and figures. It is a must-read for anyone concerned with conservation.

Spatial Processes and Management of Marine Populations

By Gordon H. Kruse et al

Report No. AK-SG-01-02

Univ. of Alaska Sea Grant, P.O. Box 755040, 203 O'Neill Bldg., Fairbanks, Alaska 99775-5040, USA 2001

ISBN: 1-56612-068-3

US\$40.00

Understanding and predicting relationships of the dynamics between fish stocks and important habitats is fundamental for the effective assessment and management of marine fish populations. There is now a recognition of this by commercial fish managers. The explosive growth of human populations in coastal areas worldwide is believed to be detrimental to the sustainability and conservation of coastal fisheries resources. This book of 35 symposium papers covers distributions of populations, patterns in life history, species interactions and other important areas. An excellent book for anyone involved in fishing.

Harmful Algal Blooms on the North American West Coast

Edited by Raymond RaLonde

Report No. AK-SG-01-05

Univ. of Alaska Sea Grant, USA (see above) 2001

ISBN: 1-56612-071-3

Price: US\$10.00

Algal blooms create major problems for fish farmers worldwide. This book comes from a conference in Alaska to discuss means of dealing with PSP (Paralytic Shellfish Poisoning). Paper presented show that algal blooms, and the problems associated with them, have been around for hundreds of years. Monitoring programmes and the economic consequences are discussed. This book should be essential reading for fish farmers and scientists so they can understand fully the need to monitor algal blooms and to show above all that they are not a new phenomenon as some scientists like to portray.

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Answers That Matter

By David Nash

Butterflies in Ireland

IN most years, thirty-one species of butterfly may be seen in Ireland during the season. Twenty-eight of them are resident. The common migrants include the Red Admiral and the Painted Lady. Less reliable is the Clouded Yellow, which arrives in June, when there are favourable warm winds from Northern Africa and Southern Europe.

Other less common and erratic vagrants include the Monarch, which sometimes is carried from North America by storms or in the jet stream during autumn and may be found stranded on the southern coast. The Monarch has colonised the Canary Islands (1880) and southern Spain (1980). There are a small number of rarities such as the Camberwell Beauty, which can be found in much of Europe.

There have been two isolated reports of the Comma during the past two years, from the Raven Co Wexford (2000) and from Gartan Co Donegal (2001). These are the first fully confirmed sightings from Ireland which has given rise to some speculation as to their origins. However, this species is known to be increasing its range in Britain and to have colonised the Isle of Man in recent times. So it is possible that these sightings are a consequence of global warming. However there is no evidence that they are established and reproducing in Ireland. An alternative explanation is that someone may have bred and released them!

In general what is happening to butterflies in Ireland? The answer (as for most of the other insects in Ireland), is that our knowledge of their distribution and abundance is quite limited and patchy. A Provisional Atlas showing the known distributions in Ireland was published in the 1980s. Due to the demise of the Biological Records Centre this work of gathering information



The Small Copper (*Lycaena phlaeas*) is usually seen in ones and twos, but in some years large numbers may be found at good sites.

was discontinued. In 1997 the Dublin Naturalists' Field Club agreed to co-ordinate the collection of information in the Republic of Ireland and this information was incorporated in the Millennium Atlas of Butterflies of Britain and Ireland which was published in 2001. The Atlas contains distribution maps and much information on the ecology and distribution of butterflies in these islands and the most comprehensive information to date for Ireland.

This illustrated atlas presents the findings of the most comprehensive survey of the butterflies ever undertaken in Britain and Ireland. After five years of recording by thousands of volunteers, it provides an up-to-date assessment of our butterflies, the habitats they live in, and the threats they face, and the major changes that have occurred since the publication of the previous such Atlas in 1984. The body of the book is taken up with species by species accounts, each accompanied by a full page distribution map and superb photographs of the butterfly concerned. The book summarises a wealth of new information about butterfly ecology. However, in Ireland especially, there is much more work to be done. This is illustrated by the discovery, since the Atlas was published, that there are in fact two species of Wood White in Ireland and apparently only one in Britain.



The Atlas gives distribution maps for each butterfly.

In Britain, it is clear that many species have declined and some have become extinct due to loss in habitat, changes in agricultural practice and increased use of herbicides and insecticides. In Ireland, although we do not have sufficient information to make definitive statements, it is

clear that we are also suffering from the same problems. While we may not have yet reached the same critical state, we are getting there! There is preliminary evidence that the Holly Blue which has a single brood only in the northern part of the country may now have a second brood in the Greater Dublin Region, and perhaps elsewhere.

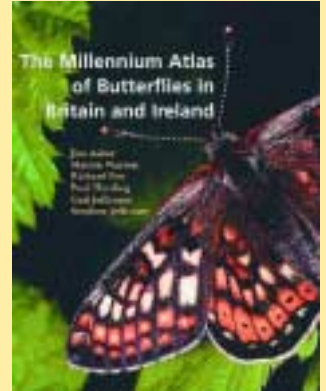
The scarcer species such as Large Heath and Marsh Fritillary, threatened on a European scale, require boggy habitat. Much of our raised and blanket bog has been damaged through drainage, peat extraction and afforestation. The Small Blue has suffered from loss of inland limestone habitat containing Kidney Vetch and much coastal sand dune habitat has been damaged by golf links construction and other 'development'.

A critical factor in the survival of butterflies is the availability of the larval food plant. The adult butterfly lays its egg on food plants specific to its species which provide the necessary nutrients for the caterpillar to feed, moult several times and then undergo pupation before the cycle is eventually completed. Some butterflies e.g. the Brimstone

have only one or two foodplants (in this case the Blackthorn). The Brown Hairstreak which is found almost exclusively in the Burren and part of Galway lays its eggs on the Blackthorn. The eggs are laid in August and remain there until the new leaves appear in April the following year. The trimming of blackthorn hedges with eggs of the Hairstreak will inevitably have a detrimental effect on this species.

Many species rely on species of native grasses for the completion of their life cycle. The replacement of flowery meadows and rough pastures by monocultures of ryegrass has had its inevitable effect on populations.

We can make a small contribution by encouraging butterflies to come to our gardens by having a variety of good nectar plants available and, more importantly, by



"The Millennium Atlas of Butterflies in Britain and Ireland" is published by Oxford University Press (www.oup.co.uk) ISBN: 0 19 850565 5. It is available for £30.00stg.

making available nettles which are essential to the Peacock, Red Admiral and Small Tortoiseshell for egg laying and for caterpillar nutrition. Members of the Cabbage family (Brassicaceae and Cruciferae) are important food plants for the caterpillars of the Whites. But garden horticulture cannot compensate for habitat loss.

If you wish for further information please visit the website www.geocities.com/butterflyireland which contains distribution maps and identification and includes photographs and drawings of butterflies, eggs, caterpillars and pupa. If you wish to contribute to the ongoing collection of data you can forward your records (including your name and address and details of number of species found, accurate location - preferably a grid reference - and date) to 35 Nutley Park, Dublin 4 or to dnfc@eircom.net.

David Nash, 35 Nutley Park, Dublin 4.



The Small Copper is a characteristic butterfly of lowland heathland.

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Women's reluctance to invest in Pensions is cause for concern

MUCH has been documented about the importance of smart financial planning, especially in the area of pensions and retirement.

City Life, one of cork's leading independent brokers, has expressed concern at the relatively slow uptake of personal pensions by women, compared to their male counterparts.

Referring to figures from a Milllion Dollar Round Table survey, Women in Retirement, Lesley Giltinan, of City Life, said: "While some women are worried about their retirement, they are often relying on sources beyond their control to provide for their future".

Million Dollar Round Table (MDRT) is the premier association of

more than 23,000 of the world's best life insurance and financial services professional, from 65 nations.

The survey gathered information from 1,000 American adults, 500 men and 500 women, and found that half of the women did not know how much money they would need for retirement.

Fifty six percent of the women surveyed said they planned to rely on their husbands, inheritance, or stock market windfalls to support them during retirement.

Sixty percent of women did not realise that they needed to save more money than men to finance a retirement; their life expectancy exceeds men's by seven years, while they earn less during their lives.

This is typically due to childbearing, family responsibilities and career breaks, as well as lower average earnings.

"Women can take matters in their own hands by planning their own personal pension fund as early as possible in their career," said Niamh Coakley, of City Life. "Of course, they will gain from all relevant tax advantages, in accordance with their marginal rate of tax, and, at retirement age, 25% of the fund can be taken totally tax free."

City Life has calculated an example to illustrate the premiums required to provide for a pension fund of €507,895 or €400,000, at a retirement age of 60.

The illustrations are based on a tax rate of 42% and an annual growth rate of 6%.

- Female, aged 23 next birthday/€421.34 gross per month, €244.38 net per month.
- Female, aged 35 next birthday/€891.75 gross per month, €517.22 net per month.
- Female, aged 45 next birthday/€1,994.67 gross per month, €1,156.91 per month.

Premiums invested in pensions are tax deductible at the individual's marginal rate of tax.

A female, aged 23 next birthday, on a tax rate of 42%, will receive full tax relief on the gross amount of €421.34, a saving of €176.96 per month.

Pensions are long-term savings towards retirement, and have the following tax incentives:

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For further information, please contact Lesley Giltinan, or Niamh Coakley, at City Life on (021) 4275121, or email: niamh@citylife.ie

“BRANCH” MANAGERS

Finding and Minding Archaeology in Ireland's Forests

By Victor Buckley (Dúchas) & Michael Cox (Coillte)

'If you go down to the woods today, you're sure of a big surprise...' so goes the opening line of the song 'The Teddy Bears' Picnic'. However, ensuring the long-term safety of Ireland's archaeological heritage can sometimes be no picnic. In trying to protect our archaeology Dúchas works very closely with the Forest Service and the people at the cutting edge of the timber business- Coillte, Greenbelt and the other forestry companies.

DANGER-“TIMBER!”

Forestry, like any other development that involves ground disturbance, can be a very destructive process for buried archaeological remains. The ploughing of strips for planting can rip through a monument and at a later stage the root systems of

Sometimes sites have been levelled or buried and no traces of them can be seen, either on the ground or from the air, but archaeological deposits remain intact. This is when the landscape knowledge of the archaeologist comes into action. A classic example of this occurred at Piperstown, near Drogheda, Co. Louth, in December 2001. The forester, Padraig Nolan of Coillte had asked our advice on a large plantation, which was adjacent to a deserted medieval village. There was also a large standing stone in another part of the site. Both these sites were excluded from forestry and access to them was left open. However at the edge of the site an old stream had to be straightened into a field drain - the perfect spot for fulachta fiadh (see *"Breakfast in the Bronze Age"* Sherkin Comment No.

unknown sites and in 2001 alone, some 12 sites were discovered during the felling process.

These have included an impressive megalithic monument constructed of massive slabs within a cairn of smaller stones and earth at Derryriordane, Co. Cork.

Many forestry companies are now having their field staff trained to recognise archaeological and historical monuments in the course of normal forest work. Following a series of courses in the Cork and Kerry regions a number of unlisted tombs were discovered. Those recent discoveries included 2 beautiful wedge tombs, one at Gortnacorrige near Inchageela, (not far from the Derryriordane cairn), and the second at Cloghboola, Co. Cork. Both of those discoveries were made by Pat Mc Nulty, Coillte's Harvesting Manager in Macroom, who also located the Derryriordane tomb, while a beautiful Pair of Standing Stones, was located at Cusloura townland and the site fenced off.

These new sites were recorded by Coillte's archaeologist on the ground and the areas cleared so that no damage took place to the monuments. The records were then passed to Dúchas so that the State could legally protect them and the sites were then excluded from the possibility of future replanting.

26). The machine operators were alerted and though nothing was visible they were on the lookout. Six fulachta fiadh were identified and saved from planting as well as a large cremation pit and a large area of burnt stone. These were excluded from development and will be safe for future generations to study.

Excluding archaeological sites is not a problem for foresters, as 15% of the proposed development has to be left as open space or planted with native tree species under biodiversity regulations.

Reaping A Rich Harvest

Forestry is a commercial enterprise and in the cycle of development the final stage is the felling and harvesting of the trees for commercial purposes. The plantations, which are coming on stream for harvesting now, were planted many decades ago-prior to the laws enacted to protect our heritage and before archaeological survey, was carried out. Hidden among the trees are many previously



An unrecorded wedge tomb at Gortnacorrige, Inchageela Forest Area, Co. Cork



A beautiful pair of standing stones located at Cusloura townland, Co. Cork



An unrecorded wedge tomb at Cloghboola, Co. Cork

the trees can disturb archaeological layers. Finally, many years later, when it comes to harvesting the mature trees, damage can be caused during felling. So how can we prevent this and are we being successful in guarding the past?

Ground-Breaking Protection

Nature renews itself, but if a monument is destroyed it is gone forever! The first step in the process is to make sure that known archaeological sites are avoided. To do this, when an application to plant is sent to the Forest Service, it is referred to Dúchas for comment. The archaeologists check the Sites and Monuments Record for known archaeology and report back on areas to be excluded from planting. These are fenced off before work starts on the land. This protects the upstanding sites such as castles, ringforts, and earthworks, as well as the hidden sites that may not be visible on the ground but have shown up as cropmarks on aerial photographs.

Preserve-Wood If We Could

Sometimes it is difficult to see the wood for the trees and in archaeology it is no different. However, with proactive co-operation between archaeologists and foresters, our woodland environments will soon be rich in areas of archaeological importance, protected by their environs rather than threatened by their development. The remains of past

societies, once so dependent on wood as a resource will return to the protection of woodlands once again.

Victor Buckley, Senior Archaeologist, Dúchas - The Heritage Service, 7 Ely Place, Dublin 2 & Michael Cox, Coillte, Touramakeady Wood, Co. Mayo.



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Why Conserve Wildlife?



Photo: © Paul Kay

Sea pink (or Thrift) and lichen.

MODERN technology has given us the tools to exploit our natural resources as never before. The material benefits have been enormous. But the environmental costs have been high. The countryside is being built on with factories, houses, road and reservoirs. We drain marshes and estuaries. We have enlarged and mechanised our farms and increased their production by the use of pesticides and fertilisers. We are polluting our waters and our air.

It means that we are rapidly reducing the variety and richness of life on earth - our "biodiversity".

Why does this matter?

The plants and animals, which make up our biodiversity, are interrelated in ways which sustain our own existence. They provide, directly or indirectly, many of the essential of life - our oxygen, water, food, clothing, health and relaxation.

Nobody knows the precise number of species of plants and animals on the planet. We have counted and described some 1.7 million but there are many more. Species are being lost at an ever-increasing rate as a result of human activity.



Photo: © Paul Kay

Bluebells and bracken.

In the UK alone we have lost over 100 species in the last century.

Historically, all medical treatments were based on plant and animal extracts, and many of these sources of treatment remain essential today. For example, aspirin is derived from willow. In agriculture, diversity of crops is important to combat pest and diseases. There is also increasing use being made of biological control where selected organisms are used to deal with pests, which cause damage. In just one day a ladybird can eat over 100 aphids which are harmful to crops.

We do not know for certain the effects of losing a particular species or the value of a species yet to be discovered. This is why we should be concerned at the loss of any species.

The natural world can also help us to understand the environment in which we live. Woods provide a record of land use stretching far back into history - sometimes as much as a thousand years. Peat bogs can provide equally fascinating insights into our prehistoric past. By analysing pollen taken from peat we can tell which plants were growing in the surrounding countryside thousands of years ago. As well as our countryside, the green spaces in towns and cities are very important. Parklands and waste ground provide different habitat opportunities for plants and animals. The trees and shrubs help to screen dust and impurities and help to absorb pollutants such as sulphur dioxide.

The natural world, whether in town or country, offers us a source of wonder and refreshment amidst the complexities

of modern life. Contact with it is life enhancing in the most profound sense.

We all have a part to play in safeguarding the Earth's biodiversity. Action at the local level for example by planting shrubs in our gardens to attract birds and insects is every bit as

important at initiatives taken by Governments at national and global levels.

From the leaflet "Why Conserve Wildlife?", produced by the Countryside Council for Wales.



Photo: © Ian Watts

The Peacock butterfly.

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Captain Cockle and The Pond

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



By John Joyce

JENNY lay on her seat in the flying submarine *Cormorant*, trying to remember where she was. They had been flying back from Loch Ness, down across the Scottish border and back towards the south. She remembered the lightning, and the crash, and...

Outside the portholes it was pitch black.

She smelt a burning, rubbery smell - like the time her grandfather, Captain Horatio Nelson Cockle, had put the electric kettle on the gas stove by mistake. She heard the drip, drip, drip of water coming from something leaking.

"Granny! Grandad! Are you all right?"

Dr Catherine Cockle coughed in the smoky air.

"I think I am. Whatever happened?"

"We were hit by lightning and we crashed, Granny," said Jenny's brother William out of the darkness.

Dr Cockle leant forward and shook the figure lying slumped over the controls.

"Horatio! Wake up!"

"What! Where! Man the pumps! Blow the main ballast tanks! Er...who are you?" said Captain Cockle, feeling the growing lump on his forehead. "My goodness, I'm hot! Is everyone else feeling like this too? Are we on fire?"

"Yes," said Jenny. "And all the metal-work is so hot you can hardly touch it!"

"Oh dear!" mumbled Captain Cockle, as if a terrible thought had wandered into his head. He was remembering that the submarine *Cormorant* could shrink to the

size of a sausage, and when it did, all the metal got very hot. William peered into the darkness beyond the porthole.

"I think we're underwater," he said. "We must have come down in that lake I saw on the radar."

In the light of Captain Cockle's torch beam a trickle of water was forcing its way past the seal in the hull wall at the end of the gleaming propeller shaft.

"It's much more serious than I thought," said Captain Cockle, shaking his head. "We can stop some of the water by stuffing these into the gap from inside, but if we don't want to drown we'll have to seal the leak by putting on diving suits and welding it shut from the outside."

"But look at the size of those weeds, Horatio!" said Dr. Cockle, pointing to a dark clump of ghostly waving branches as thick as palm trees. "They're huge!"

"Well, whatever they are, they're caught up in the rotors," said William.

"Yes, I'm afraid you're right!" agreed Captain Cockle. "Let's see if we can cut away those weeds and repair the propeller gasket before the water gets too deep in here. Jenny and William, you get ROVER's control pad and come with me. We'll use his light to show us the way!"

ROVER was another of Captain Cockle's amazing inventions. It was a small Remotely Operated Vehicle steered from a control box like the joypad of a video game. Shaped like an orange sausage and just over three feet long, ROVER had already helped the Cockles rescue the Loch Ness monster, and save William and his grandmother from a giant crab. So Captain Cockle, Jenny and

William climbed down into the diving chamber and, taking ROVER with them, stepped out into the dark water and started to cut the giant weed away from the *Cormorant*. All around them, the strange creepers climbed towards the surface. Jenny thought they were strangely familiar - as if she was looking at something she already knew, but from a different angle.

Suddenly the *Cormorant* rocked as if a huge wave had swept past.

"Now what was that?" shouted Captain Cockle.

Back in the control room, Dr Cockle was flicking through Jenny's book on pond life looking for pictures of freshwater weeds. Her eyes went up and down from the pages to the misty world outside and back again, comparing the drawings and pictures with the huge leafy creepers. But nothing in the book was that big!

"You know Horatio, those weeds look for all the world like something called *Elodea canadensis*"

"What?" asked William over the radio. "Isn't that 'Canadian Pondweed'?" asked Jenny. "The stuff you get in pet shops to put in with your goldfish?"

"But that's impossible!" insisted Dr Cockle. "It says here that this sort of weed only grows a few feet long!"

"Where's ROVER?"

"Over there by the weeds, Grandad," called William from the conning tower. "Press 'return' and bring him inside. It's far too dangerous out here."

"But why? We're only in a lake!"

"Just do it, William. And quickly!"

William pressed the 'return' button on

ROVER's joypad, activating the little submersible's onboard computer memory to return the way it had come. The faint purr of its electric motor reached Captain Cockle as it turned towards the submarine and safety.

"Horatio! Look out!"

A colossal shape, as big as a nuclear submarine, burst out of the gloom. A pair of jaws the size of a garage door yawned open to reveal row upon row of gigantic teeth. Captain Cockle saw a rushing whirlpool of searchlight eyes, giant fins, and an endless wall of flashing scales. The water surged like a tidal wave. The *Cormorant* swayed and groaned in the current. Jenny was thrown back out of the diving hatch into the water. Captain Cockle was picked off his feet and whirled like a bubble in a bathtub drain, up off the bottom and into a clump of weeds. The colossal shape passed, slowed, and began to turn.

"It's swallowed ROVER!" cried William.

"And it's coming back..." breathed Captain Cockle.

Will Captain Cockle and his crew get eaten by the giant fish?

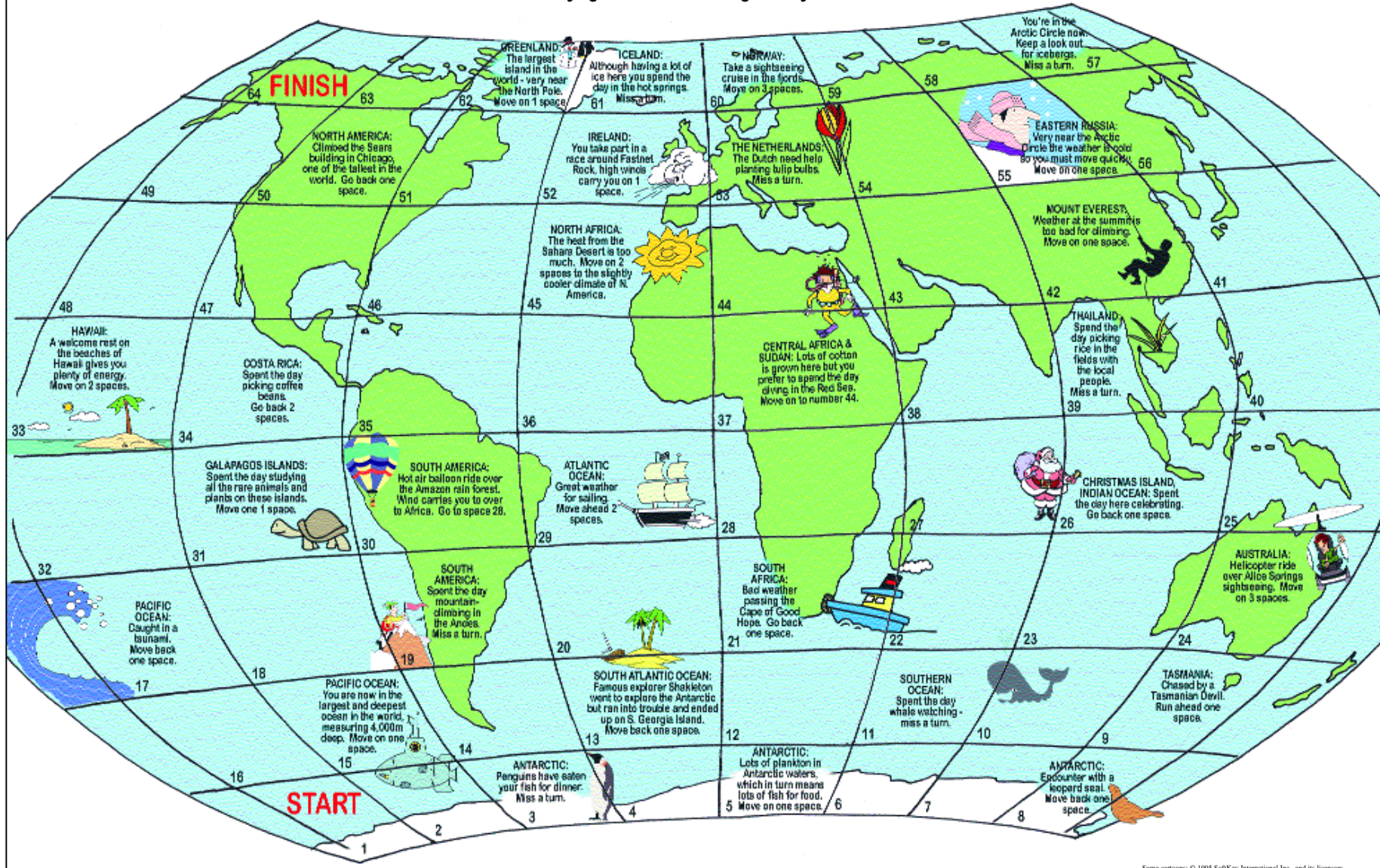
Find out in the next episode - "The Land of the Giants" - only in *Sherkin Comment*.

Abridged by the author from "Captain Cockle and the Pond" published in Ireland by Poolbeg Press and available from all good bookshops.

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

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Launching the Lifeboats

How do lifeboats get in the water, if they don't launch down a slipway or from a harbour? Have you ever wondered about all the other vehicles the RNLI uses as well as lifeboats...?

For many years horses played an important part in the lifeboat service! The lifeboat horse, like the lifeboatman, had other forms of employment but joined the rush for the lifeboat stations when the maroons (rockets) went off!

Where horses could not be used, man, and very often woman, power was. Teams of shore helpers hauled the lifeboat down the beach and back up again, over pieces of wood called "skids". At Dungeness, for instance, the famous Tart and Ollier families not only helped crew the lifeboat, but their women folk helped launch her.

The first trials with tractors were conducted in the 1920's,

but it was after World War II that enough experience was gained in the use of track vehicles, such as tanks. This helped to decide that horses were no longer needed.

For many years lifeboat tractors were commercial designs which were modified, but this became difficult and costly. The RNLI used Fowler and Case tractors for over thirty years, but the time came when there were no spare parts and the new Mersey class lifeboats and Atlantic ridge inflatables required better launching vehicles. A company from Wales, M A Bigland, had already started designing a waterproof "box" for use on tractors. This was used by boatyards to launch yachts and other boats without getting the engine and electrics wet. The RNLI joined forces with them and a new generation of launching vehicle was born.

The biggest and most powerful tractor is the Talus MBH which went on service at Hoylake in Wirral in 1983. This was produced specifically to launch carriage lifeboats.

The tractor has a totally enclosed cab for the driver and is fully waterproof. Two quartz iodine headlights are fitted at each end in glazed waterproof boxes, which also contain all the other lights. Two floodlights are mounted on the roof and there is a flashing blue light. The driving seat can face either way, with dual driving positions. Steering is by a joystick which is pushed in the direction of travel. Power and winch are controlled by the "deadman's pedal" (take the pressure off and the power is cut).

Atlantic rigid inflatables are now launched with one of three vehicles: The Bigland County tractor is used to launch the Atlantics on their DODO (Drive On-Drive Off)

trolley. These lifeboats can also be recovered into a net when they need to land very quickly, for instance, if there is an injured person on board who needs to be taken to hospital, or when the weather is very bad. Otherwise the

agricultural tractor is used. However, because the lifeboat and its trailer are quite light they can be manhandled into the water and the launching vehicle does not need to get wet.

The RNLI has invested in some ATV. Their easy manoeuvrability and handling can tow the lifeboat to launch sites on the beaches, with great ease.



A horse-drawn launch at Watchett, UK



County tractor and lifeboat at Trearddur Bay, UK



Landrover and Clifden lifeboat, Co Galway



Fowler tractor at LIFEBOAT!, the Royal National Lifeboat Collection at Chatham, UK

lifeboat "reverses" back onto the trolley.

A tractor combining the best points of the Bigland County and the Talus tractors, which is completely waterproof, was then designed to launch Atlantic rigid inflatables at lifeboat stations where conditions required a tougher vehicle. This is called a Hydrostatic tractor.

The 1150 Case tracked vehicle is used at some Atlantic lifeboat stations where conditions are more severe.

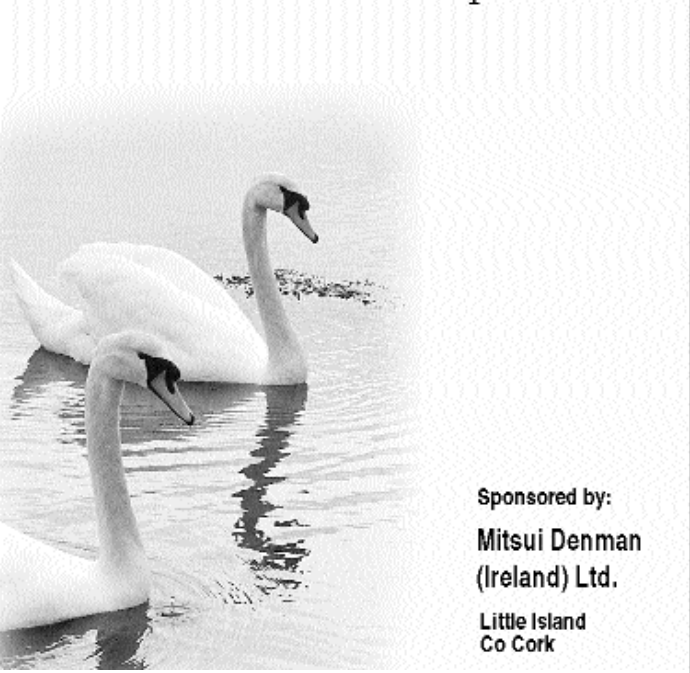
D class (and the few C class) lifeboats are launched in three ways. Where the beach is too rough for either a landrover or All Terrain Vehicles (ATV), an ordinary

At places like Flint where the lifeboat covers a long area of the estuary and has many launching sites, a long wheel-base landrover is used. The lifeboat is towed along the roads to the launch site nearest to the casualty. It's quicker sometimes to go along the road than through the water! People in and around Flint are used to seeing their lifeboat rushing along the dual carriageway!

Landrovers are also used in some places to pick up the lifeboat crew from a central point and take them to the lifeboat station which might be away from the town or village.

"Storm Force News" Issue 47

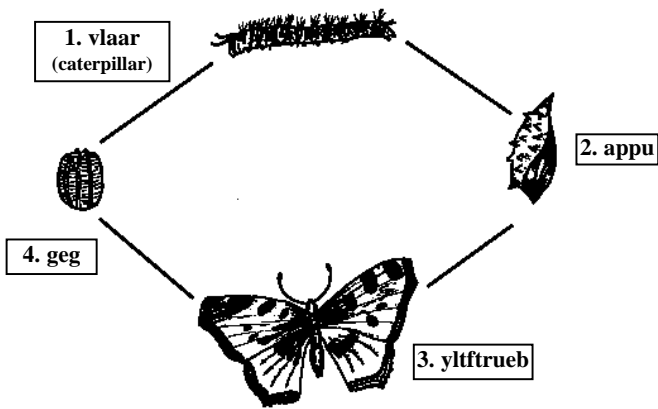
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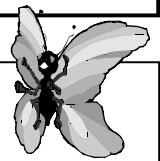
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The Life Cycle of a Butterfly



The butterfly begins life as an egg, hatches into a larva (caterpillar) and then forms a pupa - which looks like a little case wrapped around the caterpillar. After a while the pupa opens and a butterfly flies out. Can you unscramble the words on the right to give the correct name for each stage:
 a. butterfly; b. larva; c. egg; d. pupa. Answers below

Lepidoptera is the study of butterflies. How many words of two or more letters can you make from the word lepidopter a
 We can find 270
 (Listed on page 31)



Butterfly Chase

The butterflies are hiding in the bushes. Use the code above to reveal their identity.

- a. 24 - 13 - 4 - 19 - 16 / 9 - 20 - 21 - 6 - 16
- b. 1 - 4 - 13 - 26 - 19 - 16 / 6 - 21 - 2
- c. 15 - 1 - 25 - 25 - 1 - 26 / 14 - 24 - 7 - 16
- d. 2 - 16 - 13 - 15 - 1 - 15 - 23
- e. 25 - 13 - 4 - 5 - 20 / 18 - 4 - 21 - 6 - 21 - 24 - 24 - 13 - 4 - 1
- f. 25 - 16 - 13 - 17 - 1 - 9 / 14 - 4 - 1 - 9 - 26
- g. 4 - 16 - 17 / 13 - 17 - 25 - 21 - 4 - 13 - 24
- h. 2 - 13 - 21 - 26 - 6 - 16 - 17 / 24 - 13 - 17 - 11
- i. 19 - 4 - 16 - 16 - 26 / 8 - 16 - 21 - 26 - 16 - 17 / 9 - 20 - 21 - 6 - 16
- j. 17 - 13 - 4 - 23 / 19 - 4 - 16 - 16 - 26 / 18 - 4 - 21 - 6 - 21 - 24 - 24 - 13 - 4 - 11
- k. 24 - 13 - 4 - 19 - 16 / 20 - 16 - 13 - 6 - 20
- l. 15 - 24 - 1 - 7 - 17 - 16 - 17 / 11 - 16 - 24 - 24 - 1 - 9



A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z
13	14	15	17	16	18	19	20	21	22	23	24	25	26	1	2	3	4	5	6	7	8	9	10	11	12

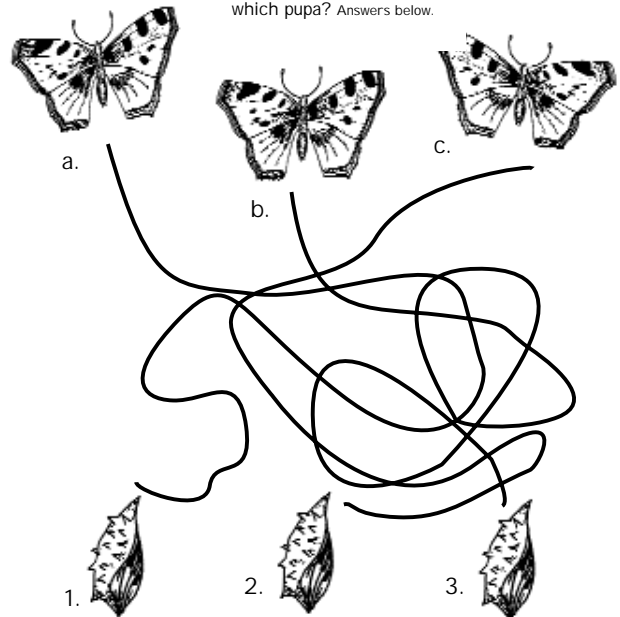
Hidden Identity

Hidden in these sentences are words related to the butterfly. Can you find them? Answers below.

- a. The pup and the kitten are best friends.
- b. There is spectacular value in this year's sale.
- c. All those who win get a special prize.
- d. She addressed the government during a state visit.
- e. The round peg goes in the round hole.

Changes!

Which butterfly belongs to which pupa? Answers below.



Share the wonders of migration with a three-to-six year old. This little book with charming illustrations tells the story of a swallow migrating to South Africa, and the animals and birds he meets on his way. Profits support the British Trust for Ornithology (BTO) migration research.

"Rusty Flies South" by Graham Appleton and Sally Bell, BTO, £5.00stg including postage from BTO Swallows, The Nunnery, Thetford, Norfolk IP24 2PU, U.K. (cheques to "BTO")

ANSWERS:
 THE LIFE CYCLE OF A BUTTERFLY
 1=b; 2=d; 3=a; 4=c.
 BUTTERFLY CHASE
 a. Large White; b. Orange Tip; c. Common Blue; d. Peacock; e. Marsh Fritillary;
 g. Meadow Brown; h. Red Admiral; i. Painted Lady; j. Green-veined White; k. Dark Green Fritillary; l. Large Heath; m. Clouded Yellow.
 HIDDEN IDENTITY
 a. The (pup a)nd the kitten are best friends.
 b. There is spectacular (lar va)ue in this year's sale.
 c. All those who (win g)et a special prize.
 d. She ad(d)ressed the government during a state visit.
 e. The round p(e)g (g)oes in the round hole.
 CHANGES a=1; b=3; c=2

Pathways Through Time

The endeavours of twenty-five year old Kieran McCarthy from Douglas in Cork City



The Road very much less travelled. This is west of Beenlught Bridge, in the Boggeragh Mountains, Co. Cork. Eventually this road completely disappeared - nature had taken it back.



Kieran on his horse Eugene. For his 'sporting' activity he mastered horse-riding, taking lessons and successfully competing at gymkhanas.



The River Blackwater as seen from Fermoyle, Co. Cork.

"I have sought to discover a haven of rest, where the sun sinks by day in the land of the west ...I have roamed through all climates but none can I see like the green hills of Cork and my home by the Lee"

THIS verse, written by John Fitzgerald in 1913, became embedded in the mind of Kieran McCarthy in 1993 during his Transition Year at school. That is when his interest in the history of Cork City began to grow. Since then his fascination for the city's past and his love for his hometown has grown by the day.

Kieran graduated in Archaeology and Geography in the summer of 1999. He then decided to take up the challenge of The President's Award - Gaisce at gold level. He had to agree a challenge in four different areas of activity:

- A community activity
- A personal skill
- A sporting activity
- A venture activity

No marks for guessing that Kieran's obsession with the history of Cork would now resurface in his endeavours to earn the greatest honour from President McAleese.

For the 'community' section of the award, Kieran gave local history lectures to schools and community associations. He just wanted to rekindle in others his own love for the history of his city. In the summers of 2000 and 2001 Kieran organised historical walking tours in Cork City for tourists and locals.

Kieran then published a book last year entitled "Pathways Through Time - Historical Walking Trails of Cork City". Much of the earlier work was spent exploring the streets of and the lanes of Cork and getting to know the people and getting lost in housing estates on a Honda motorcycle.

This sense of adventure is still foremost in Kieran's mind and no matter how many times he walks over familiar ground, he still sees something new - or in a sense something that was, or still is, part of the life of Cork City. "Pathways" attempts to bring this sense of adventure to the general public.

Kieran, of course, had to complete three other activities to earn his gold award. So, for his 'personal skill' he became involved in life saving and in the years 1999 and 2000 he achieved two awards; The Pool Lifeguard and the Award

of Merit, under the Cork Life Saving Club.

For his 'sporting' activity he mastered horse-riding, taking lessons and successfully competing at gymkhanas.

When it came to the 'venture section' of the award, Kieran's love for all that is natural returned and he undertook a four-day 80-kilometre foot expedition in the Nagle and Boggeragh Mountains. At first however, when he entered for the Award he cringed at the thought of an 80-kilometre expedition and he left this activity the last of the four.

He now feels this was the right decision. Two years is a long time in a young persons life, as they say in Cork, a lot of water flowed under "South Gate Bridge". He felt he became more mature and confident not just to fulfil the expeditions section but also to enjoy it.

This is reflected in the log, which all participants have to create of their venture. Kieran's log is full of observation that almost forces the reader to undertake a similar expedition to see those sights.

Here is an example of some of them:

"Starting in Fermoyle, I

admired its nineteenth century bridge and the wide scope of the Blackwater River"

Again

"I arrived at Killavullen at 11:00. The name Killavullen or in Irish Cill An Mhuillean suggests the development of a medieval church in the area. Whether or which, the present day church was built in 1839, along with the village national school in 1907"

Again

"Travelling west from Fermoyle, I arrived at Ballyhooley with its population of 987. It became apparent straight away that the growth of the settlement at this point was due to the domineering castle overlooking the settlement. The history of the castle dates back to 1314 when William V, son of Lord Roche constructed the initial structure"

Again

"The challenge on day four is to climb McLough Mountain (358m) on the Boggeragh range. Beginning the climb it is clear from the ordnance survey map that humans have been prevalent in this area since pre-historic times - ranging from the Bronze Age (2500 BC) to early Christian times (600 to 1000 AD). From the Bronze



Ballyhooley Castle, Co. Cork.

Age, standing stones, stone rows to Fulacht Fiadhs or cooking sites. In the case of the latter, the availability of water would have been a priority. From the early Christian period there are numerous ring forts or enclosed circular settlements"

Kieran's President's Award Leader is Mr Sean Kelly.

Further information on The President's Award - Gaisce can be had from:

John Murphy, President's Award - Gaisce, Dublin Castle, Dublin 2. Tel: 01 4758746. Or look up the web site: www.p-award.net click on "Profiles".

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Vincent Fitzsimons

The Work of a Hydrogeologist

ENDA GALLAGHER, a non-geologist in the GSI (Geological Survey of Ireland), put questions to his GSI colleague Vincent Fitzsimons about his work. Vincent is not just a geologist, but a hydrogeologist. Enda decides to take a light-hearted approach to the interview.....

Enda: Vincent, I presume it takes a special someone to become a hydrogeologist? I mean not everyone has what it takes, surely?

Vincent: Well Enda, I suppose it helps if you've got an optimistic attitude towards drilling samples - you never know when you might strike oil! Or it also helps if you're unfazed by having a shotgun pointed at you by some irate individual as you arrive first on the scene at a proposed new landfill site, or you can smile benignly if manure is dumped on the bonnet of your car! Yes, these things can and do actually happen! But seriously, if you're the kind of person to be inspired by the prospect of contributing in a positive way to our environment then the area of groundwater would be as good a place as any to begin your vocation!

Enda: You look over-worked, frazzled even, every time I bump into you in GSI's esteemed corridors. Just what is it makes you so busy all day?

Vincent: Well the two main components of a hydrogeologist's work are resource work or environmental work. Resource work generally involves the search for new groundwater supplies for towns or villages. Today, the majority of hydro work is concentrated on the environmental side, largely involving the assessment of hazards associated with certain activities, e.g. the location of a landfill site. My own work in GSI is more on the environmental side. As a team we work on the various groundwater protection schemes we have initiated around the country. We advise the government on policy issues such as the recent EU Nitrates and Water Framework Directives. We also undertake

additional background research on various issues concerning groundwater protection. Oh, but why do I look frazzled? Well all this work stuff is obviously important but it's as nothing compared to babies and sleepless nights!

Enda: But Vincent, Ireland is choc-a-bloc with rainfall. Sure we've plenty of water. So, what do we need hydrogeologists for? Is your work of any importance in the real world?

Vincent: Well considering that if you're building a new house in let's say Offaly, and you locate your septic tank in the wrong place you might contaminate the group water source in that area, affecting several hundred people. More than 70% of Offaly's public and group scheme water supplies come from groundwater (there are few mountains around to require the construction of surface water reservoirs). Also, did you realise that property owners in the countryside, who may have gone through a very thorough process with lawyers, architects and builders to ensure the

structural integrity of their new house, will often have no idea about the build quality of their well and the risks to the water they drink? Currently, there are no regulations on proper construction of wells to help prevent contamination. There is a development of a few very substantial new commuter-

belt houses in one county near Co. Dublin; each with their own private well. Though they have ensuite bathrooms and all the mod cons, the water is not drinkable because of the septic systems - each house is polluting the other's well! Don't you think it's important that a householder can be advised on potential issues like these?

Enda: Hydrogeologists can do that?

Vincent: Yes and no! And what about landfills? They represent a very current issue on Ireland's waste management agenda. Isn't it important that someone is able to scientifically

advise on their best relative location in terms of risk to groundwater quality? This hydrogeologists can do because of the kind of land use suitability assessments we carry out.

Enda: So how did it all start for you then? Were

you, as a child, perhaps playing on the beach one day with the waves chopping at your little heels, and you thought, hey this is what I want to do forever....play with water?

Vincent: Hmnn, not exactly! But I had always had an interest in water. When I finished my Earth Sciences Degree in Trinity in 1991 I got work in GSI's groundwater section as a Temporary Field Assistant. I was put to work on a research assessment into the Gort lowlands and why they were flooding so often. This was fascinating work as it allowed me to see first hand the direct relevance of what I

had been studying. Incidentally, we reckoned that it was patterns of rainfall more than any other factor that was causing the regular flooding. I also thoroughly enjoyed making tea from groundwater fresh from our first drilling expedition! There's nothing quite like it Enda - even non-hydrogeologists should try it sometime!!

Note: Further information on GSI's Groundwater Section and its work can be found on GSI's website <http://www.gsi.ie> by choosing "Groundwater" from the "Work of the Survey" section.



Monica Lee & Donal Daly testing the water level at Feacle turlough, as part of Co. Roscommon Groundwater Protection Scheme.

Photos: © Geological Survey of Ireland

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