SHERKIN COMMENT

Issue No. 42 Environmental Quarterly of Sherkin Island Marine Station *2006*

New Zealand's Cool Waters

Paul Kay
Wildlife Photography

Lucy Kay behind a Red Coral within the Gut (Te Awaatu Channel) Marine Reserve, New Zealand.
Photograph by Paul Kay

Contents

Editorial

A Water Meter for Every House?

By Matt Murphy

DUBLIN City Council, on behalf of the four Dublin local authorities, has recently announced that they are considering, as a possible option, piping water over 100 kilometres from Lough Ree on the River Shannon. It seems the Dublin area will have a shortfall in water supplies in a few years due to the huge growth in both residential and commercial development. Before this option is taken it is essential that major studies be undertaken so that a proper assessment can be made on what effect such a scheme would have on the ecology of Lough Ree and Lough Derg. Taking water from Lough Ree may seem reasonable when the river levels are high but summer water levels can drop severely. It cannot be forgotten that climate change is now with us and that we will have much drier summers.

In March 2000 the National Water Study was published. It found that unaccounted for water losses varied significantly between regions but were generally in the range of 40% to 50%. Of course, not all this water was wasted - a good proportion was just not being properly metered and recorded. The report was quite emphatic that water conservation strategies should assume a high priority. These should include:

- All supplies to each scheme should be metered;
- All connections to each scheme and number of properties connected should be identified;
- All non-domestic properties should be identified and metered;
- Schemes should be divided into district meter areas, and permanent district flow metering installed;
- Meters should be re-calibrated regularly.

Local authorities with major Department of the Environment funding were advised that all non-domestic water consumers are to be metered by end 2006 and a programme for active leakage control should be put in place. Since this report was published, those local authorities that carried out active leakage control works have reduced significantly Unaccounted For Water rates. For example, in Dublin they reduced from 42.5% to 28.7%; in Donegal it was from 59% to 39%; in Meath it was from 47% to 34%; and in Kilkenny it was from 45% to 29%.

However, we must go further. Huge savings in water use would result if a meter was installed for every residence in the State. Many people believe that water is an endless resource and it costs them nothing. Therefore they see no reason to be prudent with its use. A householder could be allocated x litres monthly and thereafter pay for the extra volume used. Very quickly running taps and damaged pipes would be taken care of and many other saving would be made. Collecting rainwater for gardening and other uses would be of immense help. A hugely important issue not being emphasised is the excessive water use by the commercial world. A major educational programme would reap major savings of water, which in itself would be of economic benefit to businesses.

Photo: Courtesy FOphoto.org

"Huge savings in water use would result if a meter was installed for every residence in the State."

Before transporting water from Lough Ree, indepth studies must look at the effects on:

- Tourism
- Farming
- Fish stocks
- Possibility of more frequent algae blooms
- Cost of pumping the water up the east coast.
- Treatment costs (the Shannon waters are peaty)
- The knock on effects to the ecology of Lough Derg.

It needs to be remembered that once a pipeline becomes a reality supplies can and will be taken from along its length by other local authorities that may have water supply problems in the future. Thus what may only be a small percentage of extraction at the beginning could be a "flood" in a number of years. Then which will have precedence, the River Shannon's ecology or people using its waters on the east coast?

The issue of extracting water from Lough Ree needs to be examined by the EPA, our environmental watchdog. They already have much water data on our rivers and will now need to introduce further monitoring programmes, such as river flow and flora and fauna. We cannot afford to mess about with nature. We must be certain that this great river will not suffer ecological damage. If the east coast does in time need extra water supplies then maybe they should be extracted below the Ardnacrusha Dam where the ecological damage would be vastly less.

Maybe the time has come to encourage residence and commercial development in counties where there is sufficient water supplies. I pose the question, should local authorities have water supply as a condition in gaining planning permission? Worldwide lack of water is now a major issue for many countries. Because of increased demand from development and agriculture, many aquifers in the US are falling so fast they are not being replenished. Are we in Ireland heading in the same direction and is this the beginning of possible conflict between the east of the country and the rest? Urgent action is needed to get people to realise water supplies are not never-ending.

Matt Murphy, Director, Sherkin Island Marine Station, Sherkin Island, Co. Cork, Ireland.

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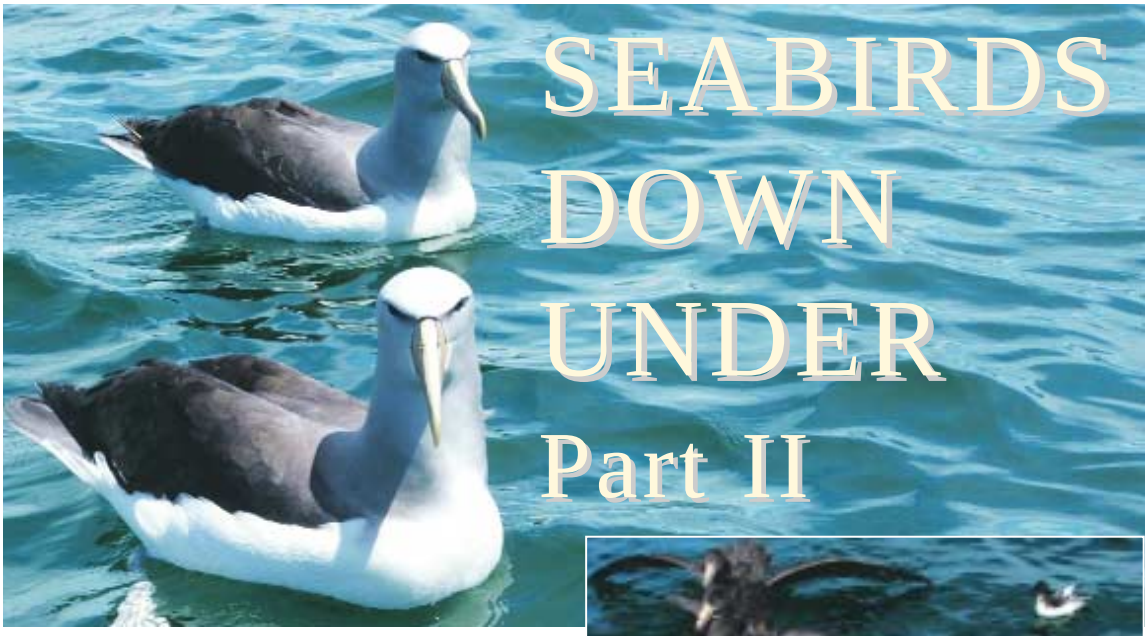

SEABIRDS DOWN UNDER Part II

Photos: © Oscar Merne

Above: A pair of Salvin's Albatrosses sitting on the sea.
Right: A Wandering Albatross, with three Giant Petrels and a Cape Pigeon.

By Oscar Merne

IN the last issue of *Sherkin Comment* (No. 41) I reported on our experiences with New Zealand's three species of penguins, as the first part of a short series on the wonderful seabirds on the far side of the world. In this article I continue the theme, this time concentrating on the pelagic seabirds which wander the southern oceans and come to land in New Zealand and its islands only to breed. This group comprises mainly the albatrosses, petrels, gadfly petrels, storm-petrels, diving petrels, prions and shearwaters – all belonging to the Order Procellariiformes. About forty species breed in the New Zealand area and occur regularly in the seas around the main islands. Their nearest relatives in Ireland are the breeding Manx Shearwaters, European and Leach's Storm-Petrels, and the non-breeding Balearic, Great, Sooty and Cory's Shearwaters, which sometimes occur in large numbers off our west coast. The last two species are migrants from their breeding colonies in the South Atlantic and South Pacific.

Our breeding shearwaters and storm-petrels are nocturnal at their colonies on remote and inaccessible islands, but these and the non-breeding species can often be seen by "sea-watching" from prominent headlands, especially on the south-west coast. In certain weather conditions (e.g. strong on-shore winds) many thousands can be seen passing. While travelling around the South and North Islands of New Zealand in November 2005 I tried some "sea-watching" whenever we found ourselves on suitable headlands, but with limited success as far as the pelagic species were concerned. The main exception was at Shag Point (north of Dunedin) where I saw over 1,000 Sooty Shearwaters – the same species which occurs each (northern) autumn off our shores – wheeling about off the headland, apparently fishing in a convergence zone. But we were more successful in three other situations.

At Taiaroa Head, at the tip of the Otago Peninsula, about twenty kilometres from the city of Dunedin on South Island, is the only mainland breeding colony of the magnificent Royal Albatross – one of the great albatrosses, rather similar to the Wandering Albatross, and endemic to New Zealand. The colony is very carefully protected from human disturbance and is fenced off from access. However, there is a fine visitor centre with impressive audio-visual material and a CCTV camera focussed on an occupied nest during the breeding season. The colony is on the "blind" seaward side of the headland so we couldn't get a view of the real live birds. However, while we were watching a group of attractive Spotted Shags on their nests at a nearby cliff, a Royal Albatross came gliding into view. It was huge, and we realised just how big it was when it passed close to a Black-backed Gull (about the size of our Great Black-backed Gull) and dwarfed it by what seemed a factor of three. The wingspan of the albatross was over three metres! We then moved to another headland about a kilometre back the road and set up a telescope on a tripod, focussed on Taiaroa Head. For a while we enjoyed watching three, four or five albatrosses wheeling about on the updraughting wind at the cliff.

Another good experience of pelagic seabirds was when we crossed the Cook Strait which separates South Island from North Island. The first half of the ferry journey from Picton to Wellington was in the sheltered waters of the 30 km long Queen Charlotte Sound, where small rafts and feeding flocks of Fluttering Shearwaters (very similar to our Manx Shearwaters) were common. Then we came out into the Cook Strait and a full gale and enormous seas. The strait was alive with pelagic seabirds, with small grey, white and black Fairy Prions dominant. With the rolling and pitching of the ship, the fierce winds and sea-spray everywhere it was difficult to watch the birds with binoculars, so I'm sure I missed many birds, but I had good views of many White-chinned Petrels and Salvin's Albatrosses, a distinct sub-species of the White-capped Albatross.

But the best experience of all was at Kaikoura, at the north-east side of South Island. This is a world-renowned site for seeing large numbers of pelagic seabirds, usually of twenty to twenty-five species. Weather permitting, dedicated boats sail out two or three times a day from Kaikoura for whale-watching and seabirds. On a beautiful, bright and calm morning I put my wife on a whale-watching boat, while I went on a seabird trip. Apparently a very deep underwater canyon comes very close to the shore just south of Kaikoura, and this brings plankton-rich cold waters to the surface. In turn, this concentrates fish, fur seals, whales, dolphins and seabirds in the area. Within minutes of leaving the port we were in the midst of Wandering, Royal, Black-browed and Salvin's Albatrosses, Northern and Southern Giant Petrels, Cape Petrels (aka Pintado Petrels, Cape Pigeons), large Westland and White-chinned Petrels, five species of shearwaters (including Short-tailed and the endemic Hutton's Shearwater, which breeds in the snow-covered mountains behind Kaikoura), Fairy Prions and several other seabird species. The birds are used to coming to fishing boats to forage on the discards, so to attract them to our boat the skipper released a net bag of frozen tasty bits from the stern, attached to a rope. This resulted in a feeding frenzy within a couple of metres. It was a truly fantastic experience almost to be able to reach out and touch Wandering Albatrosses and Giant Petrels right beside the boat.

My wife had close encounters with three magnificent Sperm Whales and about 200 Striped Dolphins.

In the next issue I hope to conclude with an article on the other wonderful seabirds of New Zealand.

Oscar Merne retired from Ireland's National Parks & Wildlife Service in January 2004.

PHOSPHORUS

The Bringer of Light

By Anthony Toole

IN the late 17th century, the German alchemist, Hennig Brandt heated the solid residue formed by the evaporation of urine. The vapour that distilled glowed in the dark, leading Brandt to name his new discovery phosphorus, meaning 'bringer of light'. Subsequent discoveries showed phosphorus to belong to the same family of elements as nitrogen, arsenic and antimony, and like the last two, it is extremely poisonous, a fatal dose being as little as 0.1 gram. It is also spontaneously inflammable, and has been responsible for suffering and death on a huge scale. In complete contrast, it shares with the other family member, nitrogen, the property of being indispensable to all living organisms.

The pure element is too unstable to exist as such in nature, but is widely distributed in phosphate minerals such as apatite from which it can be extracted. In the past, in addition to urine, it has been obtained from bones and the droppings of sea birds, known as guano.

Phosphorus exists in three distinct forms, or allotropes, depending on how the molecules are arranged in the solid structure. Most dangerous is white phosphorus, a pale yellow, waxy substance that is always stored in water. If exposed to air, even in an enclosed space, white phosphorus smoulders until the oxygen is depleted. If warmed, it bursts into flames, producing a thick, acidic smoke. Red, or violet phosphorus, while still highly inflammable, is more stable and does not need to be kept in water. Black phosphorus is unusual as a non-metal in that it shares with graphite the ability to conduct electricity.

The ready inflammability of phosphorus led to its use as the main constituent in the heads of matches, the manufacture of which exposed one of the toxic effects of the element. In the 19th and early 20th centuries, workers in match factories suffered from a painful and disfiguring disintegration of the jawbone, known as 'phossy jaw', as a result of inhaling phosphorus vapour.

During World War II, phosphorus was used to devastating effect when thousands of tons of it were dropped in incendiary bombs onto German cities. It is estimated that the resulting firestorms killed more people than did the atomic bombs in Hiroshima and Nagasaki.

Ironically, one of the cities destroyed in this way was Hamburg, where the element was first discovered.

In the naturally occurring state, phosphorus is nearly always combined with oxygen to form a phosphate, and as such, it not only loses its toxicity, but becomes widespread in living things.

A molecule of fat or oil is formed by a combination of the alcohol, glycerol, with three fatty acid molecules. If a phosphate group replaces one of these fatty acids, then a phospholipid is formed. These compounds make up the outer membranes of all living cells. Within the cells, the breakdown of foods such as sugars and fats, and the transfer of their energy to the cells is mediated by adenosine triphosphate, ATP. About five grams of ATP are present in the body as a whole, but during the cycle of energy production, each molecule is recycled between two and three thousand times each day. This amounts to a turnover of about one kilogram per day. ATP also stores energy during photosynthesis in plants. Its versatility is such that it also plays a part in the transmission of signals along nerves and in the synthesis of nucleic acids. Research is at present being undertaken into the possible use of ATP as an energy source for heart pacemakers, thus eliminating the need for batteries.

The double helical structure of the DNA molecules that carry the genetic code is now familiar. The code itself depends on the sequence of linked bases, which are supported on both sides by backbones consisting of sugar units and phosphate groups.

By far the largest concentration of phosphate in animals' bodies is as hydroxyapatite, a form of calcium phosphate, in bones and teeth. As this material is continually being built up and broken down, phosphate is needed in the human diet to the extent of around 0.8 gram per day. A balanced diet normally contains between one and two grams per day, so deficiency is unlikely, the richest sources being fish, lean meat, eggs and cheese. Though the phosphate concentration in nuts and flour is quite high, it is in a form designed to help seeds germinate, and is largely indigestible, and so unavailable to animals.

The prevalence of phosphates in the body means that it is generally safe as a food additive. The calcium salt is present in self-raising flours, while phosphoric acid itself is used as flavouring in some soft drinks.

Much of the phosphate in soil is insoluble and therefore difficult for plants to absorb. When removed, it is not easily replaced. Unlike elements such as carbon, nitrogen and sulphur, it is not re-cycled through the air. While other minerals are also necessary, the availability of phosphorus is often the factor that limits the growth of plants. Phosphates are therefore an important component of most fertilisers. When conifer forests grow on phosphorus-poor soils, these nominally evergreen trees readily drop their leaves to replenish this essential element.

Other commercial products that contain phosphorus compounds include rust inhibitors for coating steel and reducing corrosion in engines, insecticides, weed killers, toothpaste and, surprisingly, flame retardants.

Of course too much phosphorus can have a damaging effect. Phosphates are used in detergents, both to soften hard water and to suspend dirt. The waste water often finds its way into rivers and lakes, along with sewage and the fertiliser run-off from fields. The result is excessive growth of plants, particularly algae, in the rivers. When the plants die, the process of their decomposition by bacteria removes oxygen from the water and thus kills other aquatic life.

In contrast, phosphorus is very sparse in the oceans. When fish die, their remains sink to the sea floor. As the phosphates do not dissolve, they can stay locked into sediments for centuries.

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Bat Fauna of Sherkin Island

By Daniel Buckley

DUE to the presence of the sea, islands are extremely difficult places for terrestrial mammals to colonise. If the island is close enough to the mainland then some can swim across, such as the case of foxes on Sherkin and badgers on Coney Island. Of course semi aquatic mammals such as the otter can colonise islands much farther out and because of this were probably one of the earliest mammalian colonists to reach Ireland at the end of the last ice age. Most mammals rely on human aided transportation to get there, either intentionally in the case of rabbits or accidentally in the case of the wood mouse. But due to their ability to fly, bats are one mammal group for which colonisation of islands shouldn't be a problem. Bats are the only mammals that can truly fly. Their wings are actually modified arms with elongated finger and wrist bones making up the basic structure and support for a double membrane of skin which envelopes them. Aerodynamically, bat wings act like sails on a boat, catching the wind and, because of the presence of fingers, are much more maneuverable in flight than bird wings. This ability to fly has allowed bats to colonise every continent in the world except the Antarctic.

Bats belong to the order Chiroptera, which means hand wing. This order is extremely rich and diverse, containing approximately 1,100 species. There are 47 known bat species in Europe, 17 in Britain and 10 in Ireland, making up a third of Ireland's mammal fauna. Worldwide, these animals can be divided into three groups based on what they eat; fruit eaters, insectivores and carnivores. All bat species in Ireland and Europe eat insects and spiders. In temperate regions of the world where there is a winter and insects are unavailable, bats can go into hibernation during cold periods to avoid starvation and the harsh weather.

Irish islands can be very difficult for bats to live on because they are generally small in size with a limited number of habitats. One of the most important habitats for most bats in Ireland is deciduous woodland. This habitat provides foraging habitat for woodland edge and woodland interior species and roosting sites for both woodland bats and bats that forage in other habitats. Very few of our islands have any substantial tree cover, either due to the harsh winds coming off the Atlantic Ocean that burns the leaves of trees or because of human clearance of the original native woodlands there for the creation of agricultural land or building material and fuel. The pollen records from Lough Ordree tell us that Sherkin was once covered in mixed woodland of oak, pine and hazel and it is likely that the island would have provided suitable habitat for a number of species.

All Irish bat species have adapted to roosting in human dwellings and this may allow some species to live on islands where woodland cover is scarce or absent. The bat fauna of Irish offshore islands is not very well known. Bats are known to occur on Cape Clear (1 resident species and 2 vagrants), Clare Island (3 species) and Rathlin Island (1 species). Sherkin Island's bat fauna was unknown until quite recently when a survey was conducted in August 2006 by the Cork County Bat Group when four species were found to occur on the island; the common pipistrelle, soprano pipistrelle, brown long-eared and Leisler's bats. Given the size of the island, this is quite a diverse number of species.

So what is so great about Sherkin Island for bats compared to other offshore islands? Firstly, Sherkin is quite close to the mainland and so is much easier to colonise than say Cape Clear. Secondly, because it lies in the shelter of Roaring Water Bay, trees find it much easier to grow here than Cape Clear, which is much more exposed. Sherkin Island also has some good pockets of elm woodland that provide excellent foraging habitat for the brown long-eared bats that are a woodland interior species that feeds mainly on moths, catching them in flight or by gleaning them off foliage. Sherkin also possesses some freshwater bodies that provide foraging habitat for the pipistrelle species and Leisler's bat. Leisler's are likely to be non-resident visitors here due to the small size of the Island, which would probably not be big enough to maintain a resident population.

Bats are threatened both globally and locally from habitat destruction, roost destruction, pollution and human persecution. So what can be done to protect the bat populations on Sherkin? Currently, roosts are at risk due to the renovation of houses, whereby access is prevented due to filling in of entry points during building work. Bat roosts need to be identified and the house owners educated about the beneficial nature of bats so roosts are tolerated and retained during repairs. It should be pointed out that bats are protected under the Wildlife Act 1976 (amended 2000) and it is illegal to disturb bats in their roosts.

If Landowners on the island wished to enhance their lands for bats they could plant trees around their farm buildings and hedgerows and treelines along their field boundaries to link up important foraging sites. The creation and expansion of broadleaf woodland would also increase the amount of foraging habitat for bats especially the brown long-eared and potentially provide suitable roosting sites in the future. The protection of existing freshwater bodies from pollution would ensure that their value as bat foraging habitat would be ensured. Again, landowners could dig new waterbodies which would increase this habitat for bats and other aquatic life such as dragonflies and frogs. The small amount of elm woodland on the island needs to be protected and expanded if possible.

The bats of Sherkin are part of the island's heritage, just as much as the abbey and other archeological sites. They need to be protected and appreciated. So the next time you are wandering through the elm tree lined road on the way to the Jolly Roger pub keep an eye out for those "flying goblins of the night" and take some time to observe their skillful flight and precarious existence on a small but diverse island on the edge of the Atlantic.

Daniel Buckley, Cork County Bat Group.

Photos: © Conor Kelleher

Above: Brown long-eared bat.

Right: Soprano pipistrelle bat.

Far Right: Common pipistrelle bat.

Below: Leisler's bat.

CHANNELS & CHALLENGES

The enhancement of salmonid rivers

Photos: © "Channels & Challenges"

Rejuvenation of a river bank over 5 years. The original bank line was rebuilt with rocks, backfilled, planted with willow slips and fenced off.

By Matt Murphy

HOW timely the book "Channels & Challenges - The enhancement of salmonid rivers" is with the ending of the drift net salmon fisheries at sea. The non-angler may be forgiven for thinking that with the ban now in effect, salmon stocks will return to their former numbers, that the anglers will be in the clover and that thousands of salmon and trout anglers will revisit Ireland to fish our rivers. This is so far from the truth. The ban is but the beginning. Much work and research will have to be undertaken both in Ireland and on the high seas to understand the many other problems, which are causing the decline of the Atlantic salmon.

This book addresses one of the most important issues in the decline of salmon and trout stock, that is the enhancement of the major salmonid river catchments in Ireland. Under the Irish fisheries enhancement programme (1994-1999) led by Dr. O'Grady, natural techniques were used to restore riverine habitats across Ireland, resulting in over 250 miles of river and streams being recovered, with fish stock up to 30 times greater than the pre-works conditions. This manual by Dr. O'Grady describes these techniques, heretofore not employed in Ireland, for example the use of natural wood and timbers, and rocks and boulder materials.

The author divides his manual into eleven chapters: The Value of Baseline Surveys, The Critical Importance of Water Quality, The Natural Physical Form of Irish Channels, How to Recognise Healthy Channels from a Salmonid Perspective, When is a Channel Seriously Damaged from a Fishery Perspective?, Addressing Habitat Problems, Fencing, Reconstructing Pools in Rivers, Two-stage Channels, Other Instream Programme, and Benefit of Enhancement Programmes.

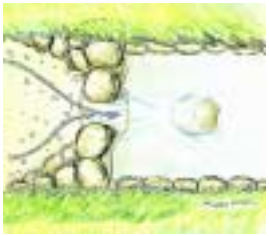
The manual is thoroughly unique. It is filled with over 300 photographs and diagrams, showing the conditions before and after work has been undertaken, and thus what can be achieved. It is primarily for fisheries biologists, workers and engineers but it is an invaluable resource for anyone involved in the restoration of water quality for all animals and plants in a river or stream.

It is also a vital resource for salmon and trout anglers who must realise how essential it is to manage our salmonid rivers and what solutions are necessary to achieve that goal. I make no apology for saying again that drift netting has been but part of the salmon problem. The groups that won the battle on drift netting have yet to win the war.. This cannot be achieved unless the many reasons for the decline can be established and solved, which is a mammoth task. It is hoped they will continue with their campaign to save the salmon.

With this manual, Martin O'Grady, of the Central Fisheries Board, has shown true commitment and dedication to the sustainability of Irish salmonid fisheries. The staff of the Fisheries Boards carried out the works undertaken during this programme. Their work is crucial if progress is to be made in expanding this programme.

"Channels & Challenges - The enhancement of salmonid rivers" by Dr. Martin O'Grady. 2006
Price: €30.00 (plus postage)
Available from The Central Fisheries Board, Swords Business Campus, Swords , Co. Dublin. Tel: 01 8842600 Fax: 01 8360060 Email: sandra.doyle@cfb.ie Web: www.cfb.ie

Changes to a rocky stream over a seven-year period, following stabilisation of the bank using logs and bushy tree tops.



A simple single notched weir is the most suitable stone weir structure for small channels (< 3.5m basewidth). Monitoring data indicate that they have greatly increased the salmonid carrying capacity of small channels for 0+ to 1+ year-old fish.

GOING FOR GOLD
at Nature's Expense

By John Akeroyd & Andrew Jones

ROMANIA has many wonderful traditionally farmed landscapes, especially in and around the Carpathian Mountains. Rich in plants, wildlife and human culture, these special places are now threatened as Romania joins the EU, and political and social pressures demand profound change in the countryside. One of the best such landscapes lies around the historic village of Rosia Montana in the Apuseni, low but scenic mountains in western Transylvania, an outlier of the Carpathians. Here the threat is more drastic and immediate – a huge open-cast gold mine that will erase the village and three adjacent mountains. Gold and other rare metals have been mined here for more than 4000 years, but as an integral element of the rural economy alongside agriculture and forestry rather than on a massive and destructive scale.

Proposing the new mine is Gabriel Resources, a Canadian-Romanian company which has some government support and has conducted a vigorous publicity campaign in the Romanian media. The company, which claims the support of many local people, emphasises job creation and eventual restoration of the landscape once the mine has ceased production after some 20 years. It admits that the extraction of the gold (present at low concentrations, an ounce per ton of rock) will be potentially hazardous, involving use of cyanide leaching and a settling lake for residues confined by a massive dam. Yet it is confident that there is no major threat to the environment. Unsurprisingly, the mine has run into considerable opposition from environmentalists – locally, nationally and in nearby Hungary (where the Ministry of the Environment has made its opposition clear), victim of massive pollution in 2000 when a similar dam failed in Romania, spilling toxic material into the Danube river system.

We visited Rosia Montana in July this year, at the invitation of local environmental group Alburnus Maior. In minutes and within easy walking distance of the village – a perfect base for visitors interested in natural history – we found ourselves in a mosaic of pristine wildflower-rich meadow and pasture, grass-heath with dwarf brooms, bilberry and ling, cotton-grass mire, and sphagnum bog with sedges and

Photos: © Andrew Jones

Round-leaved Sundew (*Drosera rotundifolia*), a 'priority habitat' under the EU Habitats Directive. Rare plants in the 'High Nature Value' hay-meadows, a magnificent mix of flowers, included the medicinal herb Arnica (*Arnica montana*, listed in the EU Habitats Directive) and Purple Viper's-grass (*Scorzonera purpurea* subsp. *rosea*) and Globeflower (*Trollius europaeus*), both Red-listed in Romania. We spotted eight grassland orchids, six on the Romanian Red List, including Bug Orchid (*Orchis coriophora*), Burnt-tip Orchid (*Orchis ustulata*) and Lesser Butterfly-orchid (*Platanthera bifolia*) – and all this in attractive mountain scenery.

The woodlands were mostly semi-natural plantations of spruce or Scots pine, but still plant-rich. But we did see Grey Alder (*Alnus incana*) in a gully growing with the big Balkan endemic yellow daisy *Telekia speciosa*, a damp woodland type that is an EU Habitats Directive priority habitat. Some of the most exciting plant communities were on cliffs, rocks, screes and old mine debris containing heavy metals, with species such as stonecrops and the fern *Asplenium septentrionale*. A characteristic plant of this habitat – probably a unique Romanian plant community as yet undescribed by botanists – is a white-flowered catchfly, *Silene nutans* subsp. *dubia*, Red-listed and endemic to Transylvanian mountains. Similar 'Calaminarian' habitats are protected in the EU (e.g. in North Wales and Derbyshire), for their rare and unusual plants.

Thus we were distinctly puzzled by an Environmental Impact Assessment commissioned by Gabriel Resources which concluded: "this is one of the most impacted areas of Romania, with severely affected biodiversity" and is "of no major interest for biodiversity". True, the district has witnessed millennia of human activity but any impact has undoubtedly enhanced rather than destroyed this ecological and cultural landscape. Indeed, in July this year UNESCO added the tin and copper mining landscape of SW England to its prestigious list of World Heritage Sites! We would argue strongly that Rosia Montana is a Romanian national treasure, a site of international importance that elsewhere in Europe would be a prime candidate for conservation.

Certainly, species-rich grasslands, perhaps because they are still widespread in Romania, haven't always gained the recognition there that they deserve as habitats of major ecological and cultural significance (not least attracting tourists and enhancing the country's image abroad). But the area also holds populations of animals of international importance, including wolves, birds such as Red-backed Shrike and Black Woodpecker, and scarce butterflies. Another feature is the presence of rare metals and other minerals. And Rosia Montana retains important archaeological and historical remains from ancient Dacian and Roman gold mines to architectural gems such as steeply pitched thatched barns and 18th century classical-style buildings. The district demonstrates historic links between mining, farming and forestry, and associated land use and biodiversity. Apart from the cultural loss if the mine project were to be realised, it would be impossible to restore, for example, acid bogs and associated mires or even the wetter hay-meadows, evolved over thousands of years. Short-term economic gain resulting in environmental destruction can surely be no substitute for the long-term economic potential of sustainable tourism and other rural development.

Clockwise, from the top:

The landscape, around the historic village of Rosia Montana in the low but scenic mountains in western Transylvania, is under threat from mining on a massive and destructive scale.

Within easy walking distance of the village is a mosaic of pristine wildflower-rich meadow and pasture, a 'priority habitat' under the EU Habitats Directive.Right:

Round-leaved Sundew (*Drosera rotundifolia*)

Bug Orchid (*Orchis coriophora*)

Dr John Akeroyd, Editor of 'The Wild plants of Sherkin, Cape Clear and adjacent islands of West Cork' (1996), has been visiting Romania since 2000. He and European grassland expert Dr Andrew Jones have collaborated since 2003 on studying the wildflower-rich meadows of Transylvania.

Environmental Enforcement in Practice

Photos: © EPA

The number of activities licensed by the EPA currently stands at 715.

By John Feehan

THE Office of Environmental Enforcement (OEE) was established in October 2003, as a dedicated and distinct office within the Environmental Protection Agency (EPA). The establishment of the Office, which followed 10 years of licensing activity by the EPA, coincided with the completion of a strategic review of the work of the Agency. The strategic review identified a need to ensure better enforcement of environmental legislation against a background of concern about illegal dumping of waste in the greater Dublin area and the discovery of waste from the Republic of Ireland in illegal sites in Northern Ireland.

A number of enforcement priorities were identified by the OEE and this article provides summary information on progress towards achieving these priorities for 2004 and 2005.

The priorities are as follows.

- Unauthorised waste activities.
- Compliance with licences granted by the EPA to industrial and waste activities.
- Local authority environmental protection performance.
- Enforcement of environmental protection legislation.
- Complaints about environmental pollution.
- Prosecution of environmental offences.

Unauthorised waste activities

In 2005 the OEE published the first factually based account of the nature and extent of unauthorised waste activity in Ireland. It set out an action plan that is now being implemented by the relevant agencies through the Environmental Enforcement Network (EEN), which is co-ordinated by the EPA. The report highlighted the following findings:

- Large-scale illegal dumping of the type that occurred in Co. Wicklow in 1997-2002 was no longer taking place, and illegal cross-border movement of waste had reduced significantly as a result of increased vigilance and cross-border co-operation.
- Unauthorised collection of waste is a significant problem, with over 50% of local authorities reporting problems in this area. Unregulated, small-scale 'man in the van' operators account for some of the reported increase in illegal fly-tipping.
- 80% of local authorities identified backyard burning as a significant issue. This activity contributes over 50% of all dioxin emissions in Ireland and is more prevalent in rural areas.

Compliance with licences granted by the EPA to industrial and waste activities

Industrial activities

An integrated pollution prevention control licence (IPPC) is the vehicle through which many of the European Directives are implemented in Ireland. European law requires enforcement of these Directives. The licences granted by the EPA provide for the enforcement of multiple pieces of legislation across all environmental media in one document. The enforcement work of the OEE is targeted at facilities that have continually shown significant non-compliance with relevant legislation or that present a potential risk to the environment. The number of activities licensed by the EPA currently stands at 715. The number of closed sites currently stands at 145, approximately two-thirds of which are activities ceased and the remainder of which are at various stages of closure. The licences granted by the EPA have required industry to review the way they conduct their business, to innovate where necessary and to decouple production from environmental pollution. Studies have shown that licensing of industry has been an effective method to control emissions and to reduce pollution load from pre-licensing levels. However, the licences granted to industry are very stringent and a number of compliance issues are evident across the range of industry licensed. These issues include:

- Poor management of waste, particularly hazardous waste, on and off site (identified as an issue in 8 out of 12 classes of industrial activity).
- Poor containment of polluting materials (identified as an issue in 7 out of 12 classes of industrial activity).
- Inadequate air emission control and monitoring (identified as an issue in 6 out of 12 classes of industrial activity).

Waste activities

While the EPA licenses 81 landfill facilities, only 36 are active. EPA licensed facilities in Ireland are being operated to a much higher standard than previously, with improved management, design, monitoring and resources. The introduction of the licensing regime has led to the installation of gas collection infrastructure at most landfill facilities. As a result there has been a 33% reduction in the volume of landfill gas emitted to the atmosphere. However, compliance by the waste industry needs to improve in the following areas:

- Landfill gas and leachate treatment at older landfills.
- Accuracy of waste records.
- Odour abatement at transfer stations and composting facilities.

Local authority environmental protection performance

The EPA exercises a supervisory role in respect of the environmental protection activities of local authorities. The OEE audits and reports on local authority performance in the areas of drinking water, waste water treatment and water quality.

Drinking water

The most recent drinking water report concluded that the quality of drinking water provided to 84% of the population by the sanitary authorities in public water supplies and public group schemes (which get their water from public supplies) was satisfactory while the quality of water provided to less than 7% of the population by private group schemes was unsatisfactory. The remainder of the population gets its drinking water from small private supplies such as private wells. The quality of water supplied by private group schemes is, however, improving, with the compliance rate for *E. Coli*, the most important indicator of drinking water quality, improving from 74.9% in 2003 to 78.1% in 2004. A key concern highlighted in the most recent report is the potential risk to water supplies and public health arising from the parasite *Cryptosporidium*.

Landfill gas monitoring

Cryptosporidiosis is a notifiable disease that can cause fever, stomach upsets, weight loss and diarrhea and can be fatal in the young and old and those with weak immune systems.

The OEE has recommended that all local authorities assess the vulnerability of public water supplies to *Cryptosporidium*, commencing with the larger treatment plants. So far 363 risk assessments for *Cryptosporidium* have been carried out. The supplies assessed provide water to about 59% of consumers served by public water supplies. What is required now is that risk assessments be carried out on the remaining public water supplies and that steps be taken to protect water supplies where risks are identified. The OEE welcomes the pro-active approach being taken by local authorities in relation to this issue.

Waste water treatment

Almost all of Ireland's urban waste water, irrespective of the level of treatment, is discharged to estuaries and freshwaters. The most recent report by the OEE concluded that 18% of waste water arisings received no treatment, 13% received preliminary treatment, 2% received primary treatment, 58% received secondary treatment, and 9% received nutrient reduction in addition to secondary treatment. It was evident that the frequency and method of emissions sampling was, in many cases, not to the standard required by law and was not sufficient to establish compliance with the relevant regulations.

Auditing of local authorities and urban waste water treatment plants highlighted examples of good practice as well as deficiencies that require correction. However, poor performance of any waste water treatment plant is a cause for concern as even smaller plants can have a significant impact on water quality in the waters to which their effluents discharge. All local authorities should review the operation, maintenance and management of urban waste water treatment plants in their functional areas and prepare corrective action programmes for plants that are in breach of the standards. Priority should be given to implementing corrective action programmes at plants that are having a demonstrably negative impact on the waters to which they discharge.

In 2003, discharges from municipal waste water treatment plants were suspected to be the source of pollution in the case of 354 of 1,222 polluted sites, including 22 cases of serious pollution. The OEE has prioritised the seriously polluted sites where a waste water discharge was the main suspected cause of serious pollution. All relevant local authorities have now been contacted and instructed by the OEE to prepare action plans to improve plant management.

Water quality

Surface water quality (lakes and rivers) has improved slightly in recent years when assessed against the requirements of the Phosphorus Regulations. However, a worrying trend is the continuing decline in the number of river stations recording the highest biological water quality. Efforts need to be stepped up if Ireland is to meet water quality targets set out in the Phosphorus Regulations and indeed the more stringent targets of the EU Water Framework Directive. Tackling pollution from sewage treatment and agricultural sources remains the greatest challenge. New powers under the European Communities (Good Agricultural Practices for the Protection of Waters) Regulations enhance the enforcement tools available to

local authorities to deal with agricultural pollution and the OEE recommends that local authorities fully enforce these Regulations. The success of the implementation of water pollution measures will be ultimately judged over the coming years by keeping track of changes in water quality. The EPA is continuing its water monitoring programmes to assess whether the necessary improvements in water quality actually happen.

There is a wide array of information already available to local authorities about pollution blackspots and action needs to be taken against suspected causes of pollution to ensure compliance with the water quality standards. In many cases the causes of poor water quality are known and need to be targeted by co-ordinated actions including investment, advice, education and enforcement.

Enforcement of environmental protection legislation

To effectively enforce the wide range of environmental legislation the Office of Environmental Enforcement established the Environmental Enforcement Network (EEN) in 2004. The network aims to harness the collective resources, expertise and investigative capacity of all public sector agencies and government departments that can contribute to enforcing environmental law and stamping out illegal waste activity and other environmental crime in Ireland. Over 900 staff from about 50 agencies are now involved in the network. The *modus operandi* is that working groups of experienced practitioners from relevant agencies are established to deal with a specific issue, such as illegal dumping of waste.

The working group analyses the problem and agrees the best way to tackle it. Depending on the problem, this may result in direct enforcement action, such as co-ordinated roadside and facility inspections involving several agencies, or the building of capacity in enforcement agencies through the preparation of guidance or the delivery of training. The success of this approach is exemplified by the dramatic turnaround in compliance with waste export regulations at recent port inspections in Dublin, with a shift from 100% non-compliance in 2004 to 100% compliance in 2005.

Complaints about environmental pollution

Complaints from the public can be an important indicator of the environmental performance of licensed facilities. The EPA received 1,077 complaints regarding licensed facilities in 2004 and 1,123 complaints in 2005. The number of complaints received by the EPA with regard to IPPC facilities decreased from 711 in 2004 to 466 in 2005. However, complaints about waste facilities increased from 366 in 2004 to 657 in 2005. The most common cause of complaint was odour. The enforcement response has been to focus inspections on the facilities that gave rise to most complaints in 2004 and 2005. As a result of increased enforcement and new technology there has been a significant improvement at these facilities. Nine of the ten facilities with the most complaints in 2004 do not feature in the 2005 list, or showed a substantial reduction in complaints.

Since the establishment of the OEE, 575 complaints about matters that are the responsibility of local authorities have been investigated, using the powers granted under the Protection of the Environment Act, 2003.

Prosecution of environmental offences

In 2005, 20 cases were brought against licensees before the District Courts. Convictions were handed down in 16 of these cases, three were referred to higher courts and one was dismissed on a court technicality. Most of the charges related to persistent breaches of emission limit values, failure to install infrastructure and failure to submit information to the EPA as required under licence conditions. The Director of Public Prosecutions directed that Books of Evidence be served in the three cases that were referred to higher courts. As of the end of December 2005, the EPA had 11 District Court cases on hand; a further case is with the Director of Public Prosecutions for consideration. Legal action by the EPA led to investment by licensees of approximately €19 million in improvements to site infrastructure and management.

Further Information

Further information on the work of the Environmental Protection Agency and the Office of Environmental Enforcement is available on the EPA website www.epa.ie.

John Feehan, Environmental Protection Agency, Office of Environmental Enforcement, Regional Inspectorate, John Moore Road, Castlebar, Co. Mayo.

Drifting Back

By Dave Kearns

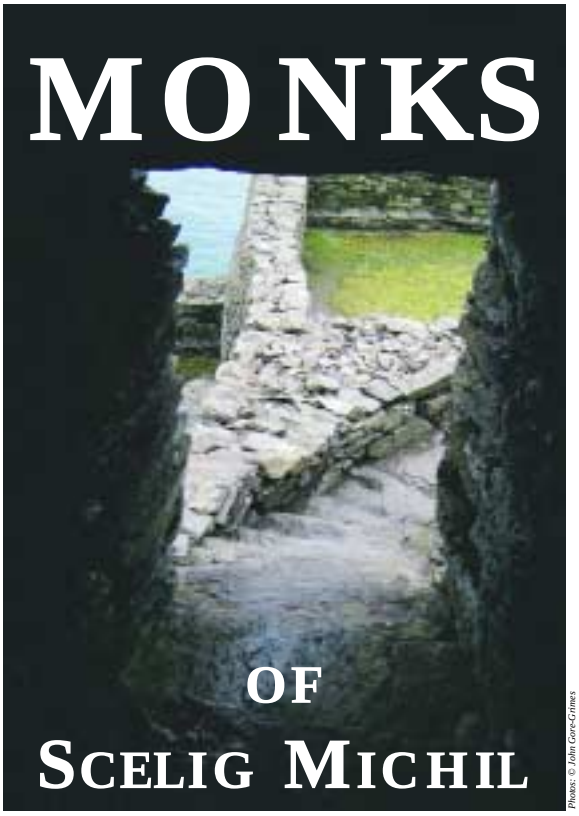
Red and blackened berries
Opulently declare summer's
Departing love
Golden hair grass nods farewell
Thistle tops wither
Upon declining green
Grateful to have
Lived vibrantly
In the elusive
Window of light
Dead leaves float by
In homage to the how
In response to the why

Berries, grass, thistles, leaves
Teach
Acceptance's truth
In response to
The wind's calling
In harmony with the
Mistress of light
No questions
Just rhythm
With the circle
Of her loving sun

The simple glittering prize
Ignored by my
Distracted magpied mind
Vegetating in worry's clasp.

Dave lives in Clonsilla, Dublin 15. Many of his poems are inspired by nature especially the animals, birds and fauna on the Royal Canal near where he lives.

MONKS OF SCELIG MICHIL



Photos: © John Gore-Grimes

By John Gore-Grimes

MUCH of what is written about the Skelligs is legendary and many of the accounts of the activities of the Christian monks and anchorites on Sceilig Michil are based upon brief reports in the Book of Inishfalllen, the Annals of the Four Masters and other volumes. Some of the history of the occupation and building of the monastery is taken from folklore and in that sense it is fanciful.

Fionan was a young man when he joined the community at Clonmacnois. He studied the writings in the monastery's scriptorium and was especially impressed by the account of the life of St. Anthony who had advocated total solitude as a means of getting closer to God. Fionan spoke of this with Abbot Brendan who had himself been a great ocean wanderer. Brendan encouraged Fionan to follow in the footsteps of the hermit Anthony but he cautioned Fionan that he should not go alone. He should take with him twelve brothers, in the way of Christ.

It took time for Fionan to choose his twelve companions and it took time to build a skin covered boat, large enough to accommodate this small community and their meagre supplies. Eventually they drifted down the Shannon and when they reached the ocean Fionan told the brothers that they should rest their oars and see which way the boat would drift. This was the 'peregrinatio pro Dei amore' meaning, 'wandering for the love of God'. It was just how Brendan the Navigator had found his way from the shores of Kerry to the eastern shores of North America.

The 'peregrinatio' guided Fionan and the twelve brothers to the steep rocky pinnacles which rise so dramatically from the Atlantic and which are known as the Scellic Rocks. They landed on the larger of Scellic Rocks in the year 588 and at once set about building a cashel and cells within the walls.

Although it is sometimes recorded that the monastery on Sceilig Michil with its terraces and majestic staircases, were built by Fionan and the twelve brothers, it is unlikely that they could have accomplished so much in such a short time. In 588 Fionan was already an old man, allowing that fifty years was a venerable age at that time. Building the seven cells or clochain (stone houses), the two oratories with three attendant leachta (altars/shrines), together with the terraces to support them and the walls to enclose them, was clearly a task which lasted for several hundred years. The monastery is at an elevation of 550ft above sea level. It is built on the south-east side of the Northeast peak 108ft above the valley which separates the Northeast peak from the South peak (geographically the west peak). This dramatic and elevated valley is known as Christ's Saddle. The South peak is where the true hermits of Sceilig Michil lived from time to time in total isolation on small ledges or terraces. That peak is 714ft high.

Five cells stand in a row with their backs to the prevailing wind beneath the ridge of the Northeast peak. Behind them is a nineteenth century stone wall which is sometimes referred to as the Lighthouse wall. Behind the Lighthouse wall is a large sloping, flat area. Looking from there across to the South peak and seeing its sharp pointed summit, it is easy to imagine that much of the stone which is now contained in the cashel, the terraces and the monastery, was quarried from what was once a higher and more pointed second peak on Sceilig Michil. The sixth cell stands separate from the other five at the eastern boundary wall of the enclosure. The seventh cell which was built outside the original entrance gate, was buried for years under rubble and stone. This cell may have been used as a guest cell for penitents or other visitors.

The old monastic order probably lived and prayed on Sceilig Michil from the time of Fionan's arrival until Abbot Eoghan decided to abandon the monastery in the early part of the thirteenth century. The Book of Inishfalllen describes a terrible storm in the year 1222 – "A great wind throughout Ireland, and it wrecked houses, churches and great woods and sank many ships and it was known as 'the Great Wind'".

Storms, which were common-place on these Atlantic rock pinnacles, would hardly have persuaded the monks to abandon their Monastery. There were dramatic climatic changes during the twelfth and thirteenth centuries. It became much colder and the river Thames froze over each winter. It was then that the Norse inhabitants of Greenland disappeared without a trace leaving that barren and frigid land to its original inhabitants. Ireland too became colder.

A social transformation was taking place in Ireland. The Vikings had been defeated at Clontarf. They were soon followed by the descendants of an earlier Norse invasion which had settled and intermarried in the province of France called Normandy. The Norman colonisation was very different from the marauding invasion of the Norsemen. The Normans were systematic. They did not plunder, pillage and rape but rather they settled in their lofty, fortified strongholds. They took and developed the most fertile and productive land.

The old monastic order with its absolute abbatial authority was replaced by the system which remains today. Territorial dioceses were established and overseen by Bishops appointed from Rome. A second more subtle and, perhaps, more sinister invasion ran parallel with the Norman invasion, as Rome extended its influence and its strong disapproval of the abbatial autonomy which had been at the core of the old Irish monastic system.

A new order of monastic life emerged to mark the end of the traditional Irish monastic system. The rule of St. Benedict spread throughout Europe although it was about seven century's later when a Benedictine monastery was first established here. The Cistercians and Augustinians, whose orders had already submitted to diocesan authority and consequently to Rome rule, settled in Ireland.

Abbot Eoghan, who had learned of the rules of St. Benedict, could not understand how a community could worship God when its fathers and brothers could sleep, eat three meals a day and drink wine. Two of the greatest temptations which were to be avoided in the old Irish monastic tradition were sloth and gluttony. Abbot Eoghan could not help feeling that these new Orders had, at once, succumbed to both.

Although the storm of 1222 had damaged the cashel and the terraces and although it had blown the timber off what they called "the new church", it may not have been the deciding factor which prompted Abbot Eoghan to abandon the monastery. There were just eight monks left before the storm. Three of those were so old that they had already carved the crosses of stone which would soon adorn their graves. When the storm broke, three of the youngest monks had run down the North steps, taking them two at a time, in an attempt to retrieve the net which was tied across the mouth of the cove which is variously known as Fishing Cove, Blue Cove or North Cove. The wind howled in from the north-west and the Atlantic swell heaved as it struck the rock wall of the cove. The monks were still about thirty feet above the water when a huge wall of sea came crashing in. It rose up to a height of fifty feet and when it retreated, the monks had disappeared in the ocean. They were never seen again.

Abbot Eoghan knew that the diminished community could not survive. He knew also that the temptation to join one of the new Orders would decimate the numbers of aspirant monks who might otherwise have wished to continue the old monastic ways. In 1222 Abbot Eoghan sailed to Ballinskelligs Bay with his community of just three elderly monks.

There is no fuel on the Sceilig Michil. Apart from the fact that cooking would have been contrary to the austere philosophy behind the anchorite way of life, there is not a single bush nor tree and there never was any turf. The monks, probably, did not cook. They grew peas, beans and radishes in their gardens. At that time the mighty potato had not found its way to Ireland.

The monks lived in their cells which were sheltered from fierce Atlantic storms. They lived there without light or heat throughout the darkened part of the year but they must have looked forward to the lightened part when the gloom of winter lifted and the sea birds returned in plenty to nest on the ledges. In summer, salmon would have drifted into their nets in Blue Cove. Once skinned and cleaned, the salmon were wind dried in preparation for eating.

There are no springs on either of the Scellics and when Fionan arrived in 588 he had to think long and hard as to how he would provide water for the community. There is of course

Photo (and inset): © Kate Byrne

Above: The Scelig Michil enclosure. Inset photograph of the Author. Top right: The East steps tumble down from the Monastery.

ample rain fall so, at once, Fionan chiselled out two cisterns in the ridge above the monastery site. These cisterns were linked by channelled groves, which were cut into the rock slabs. The water was guided from the cisterns through those channels which, eventually ran beneath the clochain and filled two cut-out holding tanks located, literally at street level, in what might fairly be described as "main street Sceilig Michil". These cut-out basins are there today and the rainwater is still channelled in to fill them. The channelled groves also served to prevent an accumulation of water collecting under the monastery and carrying the buildings off the site and down into the sea below it.

Lent was a time of double devotion and double fasting. During Lent the monk's normal labours of maintenance and preparation, were suspended as they spent more time praying around the leachta. Apart from occasional summer visits from mainlanders calling to do penance or to be married in a period when marriage was prescribed on the mainland, the monks remained in solitude.

When the Vikings came to Ireland in 795, they showed no interest in the two barren rocks which stand alone in the ocean. They pursued monastic treasure on the mainland but only rarely bothered about isolated offshore islands. From time to time the community at Sceilig Michil had seen Viking vessels pass close by.

Sceilig Michil was raided in 824. The monks had observed a high-prowed vessel with many men standing on deck looking up at the clochain's on the Northeast peak. The sun caught their shining metal helmets and sent a dazzling flash to the eyes of the watching monks.

Abbot Etgal was a kindly monk who, since birth, had one leg shorter than the other. One arm was missing from the elbow and his nose and ears had all but rotted away. Etgal never complained of the wretchedness of his condition.

On hearing of the ships of the Finngaill in the ocean below the monastery, Abbot Etgal directed his small community to gather up the small bronze crosses, the silver chalices and the chrismal, with the Sacrament inside. He spoke to his community;

"Run now and take these items with you. Descend to the Saddle and proceed quickly to the Eye of the Needle on the South peak. Prepare the boulders when you have passed trough the Eye and conceal yourself on the hermit's ledges which are up there".

The monk Enda spoke: "But what of you Abba, you must come with us"

Abbot Etgal replied: "Brother, these Finngaill seek two things. Treasure and blood."

Photos: © John Gore-Grimes

Above: The Abbots cell in the foreground and three other cells looking eastwards to the little Scelig.

Right: The Necessarium built conveniently close to the Monks garden

Etgal produced the silver bell from beneath his robe. The monks understood what the Abbot had said to them and they scattered reluctantly, but obediently, down the stone steps to the Saddle. Abbot Etgal followed them slowly.

The monks crossed the Saddle and ran up the pathway leading to the South peak. Enda paused at the top of the path. He heard an ugly cry from the edge of the saddle and seconds later wild men with horns on their head, shields on their back and with drawn swords in front of them, stepped up from the top step onto the grass of the Saddle.

"Hey der du da munke".

They surrounded Etgal and beat him savagely to the ground. They snatched the bell and rang it loudly and then they saw Enda and some of them ran up the hill after him.

The climb from the top of the path above the Saddle, through the Eye of the Needle, is hazardous enough and only one man at a time can pass on the narrow ledges which, in places, are just one foot wide. Enda stopped on this narrow path before climbing through the Eye. He had been followed. He heard incomprehensible shouts and chatter. He thought he heard the words: "De den derre munke", but he was not sure.

Then he saw the fist of a hand gripping the steep cliff rock at the corner of the ledge path just beyond the top of the Saddle path. Enda picked up a rock and, as the tall, broad shouldered Viking with dirty tangled blond curls and cold blue eyes came around the corner and continued the pursuit with broad sword and axe at the ready, Enda blessed himself and hurled the rock at the Viking. The Viking ducked and Enda's rock flew passed the invader's helmet. This Norseman straightened up quickly but, as he did so he lost his balance and fell to his death, screaming all the way down into Seal Cove some 600ft below.

A second Viking came around the corner and Enda threw another rock. This one struck the Viking in the face. The Viking, thinking the better of it, retreated. Enda heard the strange foreign tongues of these Norwegian Vikings bickering incomprehensibly. Enda climbed up through the Eye of the Needle and as he emerged from it he saw that a pile of boulders had been collected which would be used to repel any unwanted visitors.

From the upper ledges of the South peak, the monks could see the invaders retreating down the steps. They had captured Etgal and it appeared from the Abbot's slow and painful progress, that they had treated him badly. The monks could see that their garden on the Northeast peak had been ruined by the Norsemen but they had not spotted the nets set in the Fishing Cove. Damage had been done to the clochain and stones had been removed and thrown wantonly into the waters below.

As the sun touched the Atlantic horizon, helmeted figures were seen to return to their langskip. Enda and the brothers climbed down to the Saddle and, from there, they could see that Abbot Etgal had been placed on the Leaning Rock below. The Leaning Rock is close to the South landing but it is just separated from the Scellic. Etgal stood on the sloping summit of the Leaning Rock with his arms outstretched, preparing for his death.

Etgal spent nine days on the Leaning Rock and, from time to time, some of the brothers went to visit him. The Norsemen spotted the monks on the rock and jeered them from their langskip. They rang the captured silver bell in mockery as they ate their food and drank their likor. They did not launch their boats from the langskip. They were confident that it would only be a matter of time before the monks surrendered themselves in exchange for food.

The Norsemen had underestimated how long it takes to starve a man to death when he has spent a life-time of fasting and of depredation. On the ninth day Abbot Etgal was no longer standing on the Leaning Rock. He lay sprawled across the flat black stone in the position of a crucifix. Some black-backs had pecked the skin off the back of the Abbot's meagre neck. On that day, the Norsemen launched their boats from the langskip and landed again on the Leaning Rock. They picked up Etgal's lifeless body and dropped it in a heap.

The Norsemen returned to their langskip. They had exhausted their supplies of food and likor. They pulled up the heavy stone that had served as their anchor and sailed east.

There are many more stories of monastic life on Sceilig Michil between 588 and 1222. It is a spiritual place. It is a place of enchantment and magnificence. Richard Foran of Valencia, is the attendant at the Lighthouse and when we spoke he said:

"I have been coming out here for nineteen years and before that I served as a supernumery at the Skellig Lighthouse. I think I know every inch of Sceilig Michil but, in spite of that, I see and learn something new each time I come here".

George Bernard Shaw visited Sceilig Michil on the 17th August 1910 and after his visit he wrote:

"But for the magic that takes you out, far out of this time and this world, there is Skellig Michael ten miles off the Kerry coast, shooting straight up seven hundred feet sheer out of the Atlantic. Whoever has not stood in the graveyard and the beehive oratory does not know Ireland through and through".

And so you must go there!

John Gore-Grimes, Cavendish House, Smithfield, Dublin 7.

The Black Death in Ballincollig

Photos: © Daphne Pochin Mould

The mills stretch for about a mile and a half along the River Lee. Here, from the air, is part of the complex, with the old buildings cleaned and accessible.

By Daphne Pochin Mould

THE late George Kelleher was a man with a passion. He wanted to save the Powder Mills and make the people of Ballincollig appreciate the treasure that lay in the tangled wood by the river Lee - its history and its importance. I think for most of us "Powder Mills" mean nothing. What powder? Face powder, flea powder, dust blown on the wind? But the powder that Ballincollig in the county of Cork produced was the black powder of death - gunpowder. This powder let guns spit death, demolished castle walls, wrecked cities, and allowed a few men so armed take possession of vast lands whose inhabitants had only swords and spears and the bow and arrow. True it had peaceful uses too, to blast rock in quarries, mines, railway tunnels, but again mishandle it and it would kill. And Ballincollig made the stuff for about a hundred years and had an excellent safety record.

So George Kelleher explored the local ruins and other gunpowder mill sites. He hunted in libraries and archives, and ended up with a vast knowledge of the subject. Better still, he got people interested and Cork County Council ended up buying the land from the Department of Defence, with the result that the growing town of Ballincollig got a Regional Park. This great amenity includes all the mills' remains, as well as playing fields and woodland and riverside walks. Here you can walk the dog or pick your way from one ruin to the next, tracing every stage of the making of this deadly powder.

And now Jenny Webb and Anne Donaldson have given us a well produced little book giving the history of the Royal Gunpowder Mills. Charles Leslie and John Travers started the business in 1794, evidently with an eye to the hostilities with France. Here the authors sadly exhibit that "sea blindness", so common today, saying the need was for the Army and making no mention of the Navy, which was the great user. Every navy ship carried as many guns as it could, and it was the fire powder and the superb seamanship of the fleet that kept Napolean in check and unable to invade Britain, just as the Navy and Air Force halted Hilter. And at the same place, mention is made of the slave trade, how gunpowder was one export to Africa to buy slaves and ship them to America. But the returning ships brought sugar, no "tea and cotton" as the authors state. Tea came from China and Murphy's of Cork (and Midleton distillery) had a little brig, which went to fetch it, when she arrived in Cork. There was an auction widely advertised in the Cork papers listing all the different teas.

FIRE! The Connaught Rangers fire a volley with their muskets. Uniforms in those days were very colourful but muskets were not very accurate.

Gunpowder is a mix of charcoal, made on the spot, and imported sulphur and saltpetre (potassium nitrate). There is a long process of refining, mixing, pressing, glazing with graphite - giving the black colour. All these stages can be followed in the separate ruins in the park and are detailed in this book.

As a WMD (weapon of mass destruction) security was always vital. Workers were searched going in for matches, metal items, and stolen powder going out. A barracks was built at Ballincollig to guard it with a regiment of artillery (not cavalry, as stated in the book - that came later. The troops had over a mile gallop on site).

The site was ideal for the purpose. The river Lee provided power - a weir, just below Inniscarra bridge, directed water into a canal system. This powered water wheels and provided sparkless transport from one unit to the next by horsedrawn little barges. Some coal was used to create steam to dry the powder grains, and in charcoal production. There was a large coal store at the site known as the culm yard. But here the authors err in saying culm is a type of coal dust. It is actually a type of low-grade coal, mined in north Cork and used in lime kilns and such works as mills, where very great heat is not needed.

Packed in wooden barrels, ranging from 100lb down to two or even less, the gunpowder was loaded into horse drawn wagons to travel the few miles to Cork and waiting ships. In August 1803, the wagon leaked powder and left a trail down the street, which ignited by a spark from a horse's hoof. It caused alarm but no damage, and request came from the city authorities to find another route.

The mills kept up to date: in 1856 a turbine (more efficient than a water wheel), made by Perrotts of Cork and one of the first in Ireland, was installed to work the saw mill (timber for the casks). It is still to be seen on site. At that time, some 500 men, women and children worked in the mills, and a family might earn £3.15 a week.

The new book provides very full information about the whole story. Illustrated with both black and white colour photographs in plenty, it has as well a section on the flora and fauna of the Park, such as how bat boxes have been fixed to some of the trees. For those who know the Park, it will add to their understanding of it, and introduce others to this huge and important piece of industrial archaeology.

Jenny Webb & Anne Donaldson. "Ballincollig Royal Gunpowder Mills - A Hidden History" 1845885406 Nonsuch Ireland, Dublin 125pp €21.99.

Iron, muzzle loading, cannons came in all sizes from small to very large. They fired round cannon balls. These are some example on display at Charles Fort, Co. Cork.

The Demise of the Irish Field Naturalist

By Prof. Michael Guiry

IRELAND, from a position in Victorian and Edwardian times of being a world leader in the quantity and quality of its field naturalists, is in danger of losing any independent capability in this important area.

You may wonder why I use the term "naturalist" rather than "biologist" or "ecologist". The reason is simply that a naturalist is a very much broader person than either of the others. A naturalist takes pride in knowing a very large range of animals and plants, and many such naturalists are often knowledgeable biologists or ecologists or both. A naturalist is a person with whom you would, or should, be delighted to spend a day with as you would return home enriched with an astonishing range of knowledge.

The Irish naturalist par excellence was the polymath Robert Lloyd Praeger. He was trained in Belfast as an engineer, took part in archaeological excavations, worked as a librarian, was probably Ireland's most eminent botanist, and, above all, was the prime driver of the Clare Island Survey of 1910-11.

The Survey is justly regarded as the outstanding achievement of Irish natural history during which the island and the "adjoining mainland" was scoured for every single plant and animal species that could be found by Irish and international experts. Now being resurveyed by the Royal Irish Academy, the island is truly one of the best-known areas of western Europe, and also one of the most untouched, at least in relation to the rest of continent.

With such an eminent past, one would think that official Ireland would take pride in its heritage and encourage a new generation of naturalists. Not so.

Most universities, museums and botanic gardens, where such people found refuge in the past from the glaciers of public penny-pinching, are under pressure to employ everything but biologists and ecologists, not to mind naturalists. With our so-called Science Foundation Ireland funding only "applied projects" (a phrase which induces in me a frissance of fear) in biotechnology and information technology, what do you expect?

The Marine Institute and the Environmental Protection Agency have as part of their legislation-driven missions important roles in the assessment and protection of Ireland's natural resources. However, their mission, like that of SFI, is driven by a two-faced national policy of lip-service to European regulatory regimes and the perceived necessity for "near-market" research to fuel the "information society". The necessity for holistic development seems to have been lost.

Third-level research is also now driven by a similar necessity to show increasing research funding each year, and the nearer market it is, the happier are the funding agencies. "Academic freedom" may soon become one of the richest oxymoronic jokes in any language. Irish academics have scarcely any freedoms left despite it being enshrined in the Universities' Act (1997). I see myself and many of my colleagues as the last of the academic Mohicans that will shortly be wrung completely out from the system by overcrowded and underfunded universities being driven by economic political correctness. Should the universities continue to be forced along this track, we will have no independent academic voices left in this country to call a halt to the worst excesses of public policy.

What to do? Well, I am greatly encouraged each year by the numbers of students that want to do Marine Science in Galway and who want to do it for its own sake. Bringing such students to the seashore is such a pleasure. They want to know about their environment; they want to know the correct names for things that they see alive; they want to preserve their surroundings; they want to be naturalist, biologists and ecologists. For them, the pressures of the "information society" are vague; oddly, they never seem to get any older!

There are many more people like these and it is our duty to find a way to encourage them. Éamonn de Butléir, Gerrit Van Geldren, Michael Viney, Tim Robinson and the Murphys of Sherkin all found ways to popularise natural history, but the forces ranged against them are huge: greed, selfishness, destructiveness, strange EU regulations worthy of a place in 'Lord of the Rings', and, in particular, a horrible kind of Irish clientism in which the client is as much in thrall as our forbearers were to the absentee landlords. Even RTÉ and other broadcasters are now having difficulty in doing what they did in the past and what public service television in other countries can do so well, and newspapers are under even worse pressures.

Something else that has virtually disappeared in Ireland is the gifted non-professional. (I avoid the somewhat pejorative use of "amateur" as many of these supposed amateurs are very gifted people.) These include stars in the areas of ornithology, botany, entomology, and zoology. And they manage to shine whilst holding down daytime jobs that are completely unrelated to their so-called hobbies. It is these people who will now carry the flag for Irish natural history, and I have no hesitation in doffing my academic mortarboard to them. Hopefully they will always be with us, and much more could be done by the third-level sector to facilitate them.

There are other encouraging signs. Recently, I put on a night class one wet, dark and windy winter. Twenty-five hardy souls attended every Tuesday for 10 weeks to my academic rantings about seaweeds, their beauty and uses; and when we went to the shore, they could only be pried off it with difficulty, drank pints with studently gusto, and sang some inappropriate songs on the way home in the bus. It would be the very hard of heart that could not be gladdened by this. I was put in mind of Praeger "dragooning" his Victorian gentlefolk naturalists with a whistle, and I went back to my supposed ivory tower in hope and peace.

Prof. Michael Guiry, Director, Martin Ryan Institute, NUI, Galway, Ireland.

STINGRAYS

(Order: Myliobatiformes)

in Irish Waters

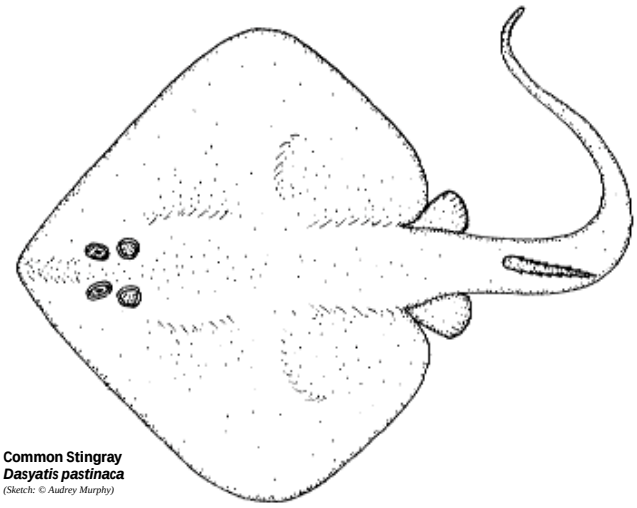
By Declan T. Quigley

STINGRAYS belong to a relatively large group of rays (Order: Myliobatiformes) which is currently represented by 183 known species. The majority of stingrays are benthic, found on mud and sand in shallow tropical and warm temperate waters but occasionally down to depths of 200m. Although they are mostly marine, they often enter estuaries and some tropical species are restricted to freshwater (South America, Africa & South-east Asia). Eleven species have been recorded from the Mediterranean Sea, eight of these from the North-east Atlantic and four of these from Irish waters (Table 1).

Relatively inactive fishes, stingrays are usually found partially concealed in sand or mud or slowly swimming over the bottom by undulating their large rounded pectoral fins. Food generally consists of a variety of bottom-living organisms, including crustaceans, molluscs, worms and small fishes. Stingrays are ovoviparous (embryos develop within the oviduct), producing a small number (2-9) of live young after a gestation period ranging from 4 to 12 months. The stingray's low fecundity makes them extremely vulnerable to overexploitation.

A number of morphological features distinguish stingrays from other rays. Apart from having relatively large brains (stingrays are regarded as quite intelligent fishes), all stingrays have one or more serrated caudal spines situated close to the base of their whip-like tails. These formidable spines, which can be up to 35cm long, are only used in self defence. Glandular tissue on the underside of the spine secretes excruciatingly painful venom. Although normally placid, injuries caused by threatened stingrays are relatively common in some parts of the world, albeit fatalities are considered to be relatively rare.

Following the recent highly publicised fatal injury of the wildlife conservationist Steve Irwin while filming stingrays on the Great Barrier Reef, it was reported that only 17 fatalities had been recorded worldwide and only twice previously in Australia. Although the majority of stingray injuries result from people accidentally stepping on them in shallow water, it is likely that many stingray injuries and fatalities go unrecorded, especially in remote regions of the world. Columbian health authorities register more than 2000 cases of freshwater stingray (Family: Potamotrygonidae) injuries annually. Indeed, over a 5-year period in one small local hospital there were 8 deaths, 23 amputations of lower limbs, and 114 other cases where victims were unable to work for up to 8 months. In the US, about 1500 stingray injuries are reported annually. Although fatalities have not been recorded in European waters, it is likely that stingray injuries do occur but data appears to be lacking.



Common Stingray
Dasyatis pastinaca
(Sketch: © Audrey Murphy)

Common Stingray
(Dasyatis pastinaca)

The common stingray (*D. pastinaca*) is a wide ranging species throughout the Eastern Atlantic, occurring from southern Norway southwards to the Mediterranean and Black Seas, and onwards via the Canaries to South Africa.

Although the species has been recorded from all around the Irish coast, it seems to be more common, at least locally, in the south and south-west. Almost 84% of all the rod & line caught specimen common stingray (weighing ≥ 13.6kg) recorded by the Irish Specimen Fish Committee (ISFC) since 1960 were captured in Tralee Bay. Although the species is regarded as unpalatable and is usually discarded by commercial fishermen, concerns have been expressed about the potential commercial overexploitation of the species in Irish waters. This hypothesis is not well supported by the fact that only 43 rod & line specimens have been recorded rather infrequently since 1960, including 56% of these over the last decade (Figure 1). Although anglers now generally return their catch "alive", perhaps localised rod & line pressure may constitute a significant threat to the species too?

In northern European waters it has been observed that the stingray becomes noticeably more common during the summer and autumn months and that this may indicate a northward migration of the species. Although all of the ISFC specimens were taken between April and September, the species has been taken by commercial trawlers during the winter months when angling effort is significantly lower. Perhaps the species migrates further offshore during the winter months returning inshore during the summer?

The common stingray is one of the largest representatives of its group. It is reported to attain a maximum total length (TL) of 250cm. The world record rod & line caught specimen, weighing 201.4kg, was captured off the Azores in September 1999; the largest specimen caught on rod & line in Irish (and UK) waters, weighing only 33.2kg, was taken in Tralee Bay during May 1999. There is no evidence that the species breeds in Northern European waters.

Eagle Ray
(Myliobatis aquila)

The eagle ray (*M. aquila*) has a distribution similar to the common stingray. While it has been recorded fairly frequently in UK waters, there are only 4 confirmed occurrences from Irish waters (Ardfry, Co Galway, 1800s; Timoleague, Co Cork, July 1888; Magilligan Bay, Co Derry, July 1958; and off Fastnet Rock, Co Cork, September 1965). It grows to a moderately large size; the UK rod & line record weighing 27.9kg was taken during 1989.

Violet Stingray
(Pteroplatytrygon violacea)

The violet stingray (*P. violacea*) is the only member of the group that is exclusively pelagic. It is considered to be probably cosmopolitan in tropical and subtropical seas worldwide. Only two specimens have been recorded from Irish waters, both taken in albacore (*Thunnus alalunga*) surface drift-nets off the south-west coast (50° N, 14° W) prior to their banning during the late 1990s. The recognised world rod & line caught record, weighing only 6.2kg, was captured off Corsica during June 2001.

Devil Ray
(Mobula mobular)

The devil ray (*M. mobular*) belongs to a small sub-family of stingrays that includes the gigantic zooplantophagous manta ray (*Manta birostris*) which can measure 8m in width and weigh 3 tonnes. In the Eastern Atlantic the devil ray is found southwards from northern Spain and Portugal, throughout the Mediterranean (but not the Black Sea), and onwards via the Canaries and Azores to Senegal and possibly strays into the North-Western Atlantic from New Jersey to Cuba. There is only one Irish (and Northern European) record; a single specimen was reported from the south coast of Ireland c1830. The latter specimen is on display in the Natural History Museum in Dublin.

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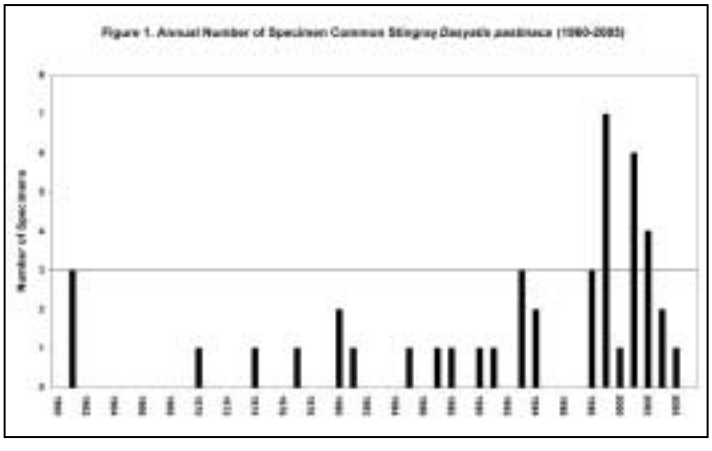
Table 1. Stingray species (Order: Myliobatiformes) recorded in the North-east Atlantic & Mediterranean Sea

Common Name	Species Name	North-east Atlantic					
		Ireland	UK	France	Portugal	Spain	Mediterranean
Common Stingray	Dasyatis pastinaca	√	√	√	√	√	√
Eagle Ray	Myliobatis aquila	√	√	√	√	√	√
Violet Stingray	Pteroplatytrygon violacea	√		√	√	√	√
Devil Ray	Mobula mobular	√		√	√	√	√
Roughtail Stingray	Dasyatis centroura			√	√	√	√
Spiny Butterfly Ray	Gymnura altavela				√	√	√
Bull Ray	Pteromylaeus bovinus				√	√	√
Lusitanian Cownose Ray	Rhinoptera marginata					√	√
Forskal's Stingray	Himantura uarnak						√
Round Stingray	Taeniura grabata						√
Fortunesia's Stingray	Dasyatis fortunesia						√



New Zealand's Cool Waters

Fur seals are inquisitive creatures in the water (Fiordland)

Photos: © Paul Kay

By Paul Kay

NEW ZEALAND'S waters are temperate – marginally warmer than those found around Ireland. They do vary though from North to South and the marine life found there shows this.

Off North Island are world famous areas such as the Poor Knights Island – now a totally protected marine area. Here moray eels can be found together with actinothöe anemones – this equates to a mix of Mediterranean and Irish waters (although to be fair there are some (very rare) records of Morays being found off Ireland). Small brightly coloured triplefins sit amidst vivid patches of sponge, whilst more familiar looking scorpionfish patiently await an unwary meal to swim past. Dead men's fingers (a near relation anyway) are familiar but in a blue water context which gives them a slightly strange look.

North of The Poor Knights, in the Bay of Islands, lie the remains of the Greenpeace vessel "Rainbow Warrior", now re-sunk in a marine reserve. Nature has had the final say on this ship as her bows are now home to beautiful, brilliantly coloured jewel anemones – as if nature is having the last laugh at a government's neurosis and stupid actions!

A leatherjacket (triggerfish) makes an elusive subject as it darts around in a mixture of curiosity and trepidation (Fiordland)

Whilst North Island has a decidedly warmer, less temperate feel to its undersea, South Island does not. We set off from the southernmost harbour towards Fiordland and visited Ulva Island on route. Here we found flightless wekas – a bird about the size of a small chicken with an assumption that footwear is edible! And dived on a shallow but fascinating sandy seabed. Here we saw the curious, waddling and quite unmistakable pigfish and encountered a young, rather enthusiastic sea lion who became just a little too boisterous under water.

Fiordland, which is a huge area on the south-west coast of South Island, is cool and harbours some of the most amazing marine life to be found in temperate waters. For a start it has an estimated 60,000 black coral colonies, many of them in water so shallow that they can be seen by looking over the side of a boat!

The black corals are actually white and are themselves hosts to other animals, most noticeably the serpent stars which coil around branches and enjoy a mutualistic relationship with the coral. In return for a perch, they clean the coral.

Whilst not a true coral, the 'red coral found in Fiordland certainly looks the part. Its vivid crimson sprays jut out from reefs injecting splashes of yet more colour into what is often already a rather gaudy scene. Massed zoanthid anemones provide carpets of yellow, encrusting pink algae covers parts of the reef and many large, brachiopods, and red, orange and even green sponges add their impact too.

Rock lobster abound in the totally protected marine areas, unafraid they sit on ledges waving their long antennae at the passing, visiting divers. For the most part the undersea inhabitants are unafraid and merely curious, especially the blue cod which clearly consider divers as curiosities. These docile fish will congregate around a diver, sitting on the seabed and watching to see what is going on. At times they are so nosey that they have to be gently pushed away or they might stare into a diver's mask seemingly transfixed by the diver's face, or perhaps their own reflection.

Jock Stewarts too, sit on the seabed. These fish have a distinctive jagged crest of a dorsal fin, large slightly sad eyes and a large down-turned mouth. They are common in Fiordland. A rather more tropical looking fish is the leatherjacket, a triggerfish without scales and having a leathery skin. These too could be curious and alternated between being camera shy and wanting to see what the camera was!

Down on the sand, we found large sea pens and what are locally referred to as horse mussels but which we would call fan shells.

New Zealand fur seals are found in Fiordland and like many seals they are playful. We dived near the rocks on which they were basking and sure enough, they joined us, wary at first but soon with growing confidence. They dived, swam in twirls and shot past us in an display of their fast, powerful, graceful, complete mastery of their environment.

Fiordland is itself spectacular. As its name implies it is a fiordic system of deep water, steep mountainous sides and it rains – a lot. It is a land of mist, ever-changing light and landward has some stunningly remote and beautiful country. We travelled in a small boat up one of the rivers to the east and the only way I can describe it is to liken the journey to that described by Conan-Doyle when his characters canoe through the undergrowth – dense vegetation, fallen trees, slow moving water and a feeling of being tightly enclosed. Stepping onshore did little to alter this view, streams, waterfalls and luxuriant growth.

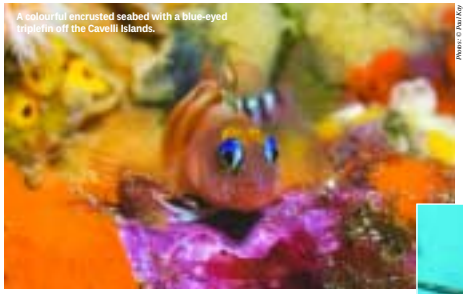
On our last day in Fiordland it rained – hard. Water cascaded from the mountains with waterfalls forming everywhere. Cloud seemed to drop to sea level parting occasionally to reveal thickly forested mountains, before closing in again. Fiordland's greatest asset is probably its inaccessibility. It is truly an area of outstanding natural beauty both above and below water.

Paul Kay BSc FRPS is a professional photographer, specialising in marine wildlife photography and the sale of underwater photographic equipment. Stock Underwater Photography www.marinewildlife.co.uk. Suppliers of Seacam Silver Underwater Photo Equipment www.underseacameras.co. Tel. 0044 1248 681361 or 07702 411614 - Skype

(See overleaf)

New Zealand's Cool Waters

ABOVE: Snorkelling with fur seals is an excellent way to meet them on their own terms. They cannot resist getting into the water to see what is going on (Fiordland).



A colourful encrusted seabed with a blue-eyed triplefin off the Cavelli Islands.

Photo: © Paul Kay

Photography by Paul Kay

(Read his article on the previous page)

A rock lobster on the rock walls of Fiordland.

Dead men's fingers (*Alcyonium aurantiacum*) in the Poor Knights Marine Reserve.

An oblique swimming triplefin sits on top of a serpentstar which is coiled around black coral in the Gut (Fiordland)

ABOVE: Blue cod are very approachable and show no signs of fear at being approached with an underwater camera (Stewart Island).

LEFT: This fish is known as a Jock Stewart and is resting on part of the wall in Acheron Sound, Fiordland.

Large sea pens (*Sarcophyllum* sp.) ~30cm high are found in the sand within Fiordland - this one was in the Gut.

Zoathids anemones are stunningly colourful and surprisingly abundant in some parts of Fiordland such as the Gut.

A Spotlight on World Environmental Matters

by Alex Kirby

Climate change may be harming midwife toads

Researchers who studied midwife toads in Spain's Penalara Natural Park between 1976 and 2002 say climate change may be worsening a disease that threatens many amphibians worldwide. Details are published in the journal *Proceedings of the Royal Society B*. More than 100 amphibian species are affected by the disease, chytrid fungus: some die quickly, but more resistant individuals can still carry the pathogen. The fungus infects the skins of amphibians (frogs, toads, salamanders and newts) and impairs their ability to absorb water. The researchers fear warming temperatures could be harming the creatures' immune system or increasing the ability of the fungus to grow faster.

Humans make too many demands on the planet

WWF says humans are degrading the natural world "at a rate unprecedented in human history". The group's *Living Planet Report* said vertebrate species populations had declined by about a third in the 33 years from 1970. By 2050, it said, with human depredations continuing at their present rate, humanity would need two planets to satisfy its demands - if the resources were still there. But if everyone in the world lived at the same level as the UK, it would take three Earths to supply them. Another WWF report, the Ecological Footprint, said humanity's demand on the biosphere more than tripled between 1961 and 2003. The carbon dioxide footprint rose more than ninefold in the same period. The overall footprint exceeded biocapacity by 25% in 2003, up from 21% in 2001.

Temporary ban on wild bird trade a success

The UK's Royal Society for the Protection of Birds says hundreds of thousands of rare and exotic birds have been saved from death or captivity by a temporary ban on the wild bird trade. The Europe-wide ban, which the Society says should be made permanent, came into effect on 27 October 2005. The RSPB says Toco toucans, made famous by Guinness adverts, are amongst birds still alive in the wild because of the ban. Without it, many toucans, parrots, owls and other birds would now be caged pets, and many more would have died on the way. The RSPB says the pet trade is threatening 60% of the world's 350 parrot species and 10% of the 1,200 bird species now at risk of extinction. Up to 60% of birds caught for the pet trade are thought to die before they reach their destination.

Volunteer needed in UK for nuclear dump

The UK has decided to bury its radioactive waste, but any site will have to be "in a geologically suitable area", with no community forced to accept one. Some experts say it could take 40 years to build a repository. A report in July from the Committee on Radioactive Waste Management said waste would need to be buried at least 500m below the surface. Local councils will be invited to volunteer to have a nuclear dump in their area, with those chosen receiving multi-million pound investment. Finland is building an underground repository and looks likely to become the first country in the world to dispose of nuclear waste in such a way.

Save the planet and save money

Sir Nicholas Stern, a former World Bank chief economist, says governments must cut greenhouse emissions or face economic ruin. Sir Nicholas, who chaired a UK Government review set up to analyse the financial implications of climate change, concluded that doing nothing could tip the global economy into the worst recession in recent history. His report challenges conventional economic thinking, by arguing that tackling climate change, far from being unaffordable, will actually save industrial nations money. The US refused to join the Kyoto protocol, the international agreement on greenhouse gas emissions, partly because President Bush said it would harm the economy.

Amazon deforestation has slowed

Brazil says international criticism that it is using the Amazon rain forest to produce soya and beef is mistaken. It says only 0.27% of the country's soya crop is grown in the Amazon region, and less than 1.5% of its beef. Brazil is the world's biggest beef exporter and the largest soya exporter after the US. In September, preliminary official figures showed that the rate of Amazon deforestation had slowed by 11% this year.

16,000 plants & animals heading for extinction

A group of leading scientists has called for the establishment of a global organisation committed to slowing the loss of plant and animal species. Writing in the journal Nature, the 19 signatories have urged the setting-up of an Intergovernmental Panel on Biodiversity, a counterpart to the Intergovernmental Panel on Climate Change. The group includes the former IPCC head, Robert Watson from the World Bank, and Peter Raven, director of the Missouri Botanical Garden. The 2006 Red List of Threatened Species showed more than 16,000 plants and animals heading for extinction, including a third of amphibians and a quarter of mammals. Hippos and polar bears have recently been placed on the list. Human activities, notably the destruction and damaging of habitats, threaten 99% of Red List species, and climate change is recognised as a growing threat. Other problems include alien species, over-exploitation and pollution.

Iceland resume commercial whaling

Iceland has announced that it is resuming commercial whaling, despite the international ban in force since 1986. It said it would catch nine fin whales and 30 minkes in 2006/7, as well as maintaining its scientific whaling programme. By late October it had caught three fin whales. The International Whaling Commission allows any member state to catch whales of any species so long as it is done in the name of research. Commercial whaling still remains banned, to try to allow endangered species to recover and because of revulsion at the way the mammals are killed. Fin whales are the second largest animals on Earth, almost as long as blue whales, and are known to grow to more than 80 feet in length. They are listed as endangered by IUCN-The World Conservation Union. The European Commission called on Iceland to reconsider its decision to resume commercial whaling.

Australian rabbits cause trouble near Antarctica

Australian rabbits are accused by WWF of destroying the habitat of threatened seabirds on remote Macquarie Island, near Antarctica. The group said the rabbits were stripping Macquarie of its grasses and causing landslides which destroyed the nesting sites of penguins and albatrosses. It wants an immediate cull.

Alex Kirby is a former BBC environment correspondent.

Can Environmental Assessments & Environmental Impact Statements be effective tools for managing our environment?

Photos © Robbie Murphy

By Mike Ludwig

I LIKE to read a good Environmental Assessment (EA) or the expanded version, an Environmental Impact Statement (EIS) and so should you! Just as the stories in *Earth in the Balance Ecology* and the *Human Spirit* and *The Da Vinci Code* can capture a reader's imagination so too should the "story" presented in an EA or EIS. Where else can one learn why a project is designed as it is, the nature of its environmental impacts, how they might occur, and ways to avoid, minimise or mitigate them? Whether you are a neighbour, community leader or a member of a regulatory agency, reading the documents explains a project and helps decide its fate. The guiding law for producing my reading is the National Environmental Policy Act. The Act requires that project proponents seek the help of everyone who might be impacted by the project. This "scoping" effort seeks to identify potential impacts, sources of data, data gaps and evaluation procedures needed in an EA. A good EA provides an overview of a proposed activity and the environment in it which it will be placed. Then the document identifies and discusses the potential for the occurrence of significant adverse environmental impacts should the proposed activities be undertaken. The identified significant adverse environmental impacts are discussed in terms of their threat to natural resources and whether the impacts are significant or insignificant and whether they can be avoided, minimised or offset. The reader is introduced to the workings of the proposed activity and the habitats and species at and around the site where the activity might cause impacts.

If the EA finds only minor impacts a "finding of no significant impact" (FONSI) report is drafted and the evaluation is complete. Often, the EA effort reveals that impacts are likely and they will be significant. Such a finding means the EA must be supplemented with information about how the identified impacts can be avoided, minimised or mitigated and that is an EIS. One need read only those portions of the document that contain the subjects of interest but because the creatures of the land are tied to the creatures of the air and water and all are dependent on functions and values of their varied habitats, a full read of the EA/EIS is needed to appreciate the implications of authorising, funding or undertaking the proposed action. Unfortunately, a full read of the more complex EA/EISs can require weeks as the documents can be thousands of pages long. While brevity is encouraged it is seldom provided.

"For me, a good EIS tells the story of what a new project might do to or for the environment and I rely on the documents to perform their principal function; helping decision makers make informed choices that lead to implementation or denial of projects."

For me, a good EIS tells the story of what a new project might do to or for the environment and I rely on the documents to perform their principal function; helping decision makers make informed choices that lead to implementation or denial of projects. However, just as in making sausage, lots of things go into the creation of an EIS. During the "manufacture" process resource managers help develop a draft edition. When we get the draft, my responsibilities shift to protector of aquatic resources and I along with the other stakeholders, review and comment on the draft assessing its completeness and accuracy in characterising items of importance to us. All substantive comments are supplied to the authors and must be addressed in subsequent versions of the document. The procedure may seem complicated but the product is, usually, a useful tool.

Over the course of my career I have read some very strange statements in otherwise normal EA/EIS documents. For instance did you know that dredging of harbours is good because people like to watch the dredges work? In another EIS, a PCB spill problem would be solved by placing large numbers of fish in the polluted waterway and every year, collecting and treating the catch as if they were sponges that selectively collected the PCBs. As a way to protect floating nuclear power stations from accidental collisions with ships, the owners wanted to place mines around their facility. How about planting poison ivy on sand dunes to keep people from trampling down the more important and sensitive, dune grass? More recently, I read that explosions on liquid natural gas vessels wouldn't harm fish because the gas wouldn't sink, it evaporates quickly and any flames would rise into the air.

But, usually, as an Aquatic Resources Manager I sit down and read how a proposed activity will be undertaken and consider how the negative, neutral or even positive impacts along with the possible alternative designs, construction practices and operating parameters will impact the Public Trust Resources that I manage. That these documents are capable of presenting an unbiased assessment of a proposed activity is assured by the involvement and review process employed in their creation and the presence of the "no action" and, when the action involves impacts in the water, the Least Environmentally Damaging Practicable Alternatives in the EIS. The first requires a discussion of the consequences of not undertaking the proposal. The second must present the least impacting design! The proponents of the project must describe those alternatives and present an argument supporting their project in comparison to not moving ahead and why they may not be using the most environmental friendly design.

Not all places have the same EA/EIS process. I described the US technique because I think it works so well. AND, not all development is bad, many are beneficial to our environment (a sewage treatment plant lessens the pollution into a local waterway). Demand good documentation and subsequent monitoring to prove the claims of compatibility are true. Happy reading!

Mike Ludwig has recently left government service and now works for Ocean & Coastal Consultants, Trumbull, CT 06611, USA

Moonrise over Kakadu

Moonrise over Yellow Water.

Photos: © Anthony Toole

Water lily.

By Anthony Toole

EVERYTHING here is big: the birds, the trees, the red rocks. From high viewpoints, the wilderness of eucalypt forest reaches into a distance limited only by the abrupt wall of the 400-kilometre Arnhem Escarpment. Even the span of a spider matches that of my hand.

Yellow Water Billabong was no different, though at a first glance, it appeared nothing more than a broad river. The boat meandered through half-submerged trees, freshwater mangroves (Darlingtonia) and a huge acreage of water lilies. Further expanses of water opened out around each bend, and as the first crocodile drifted silently across the bow, we realised we were in the middle of a vast wetland, and that the nearest dry shore was a long way off.

Big as it is, Kakadu is not a place to see at a gallop, and we had taken two days to get this far. Stretching for 100 kilometres east to west and double that north to south, it is Australia's largest National Park, a Ramsar wetland and a UNESCO World Heritage Site.

To qualify for World Heritage status, a site must fulfil at least one of ten criteria, which cover either its significance in human cultural development or its importance in the natural environment. Of more than 800 sites worldwide, over three-quarters are listed for purely cultural reasons. Kakadu satisfies no fewer than five of the criteria, and is one of only 24 sites to be listed as of both cultural and natural significance.

Kakadu has been inhabited by humans for probably 50,000 years, and was almost certainly one of the first areas in Australia to be settled by the Aboriginal peoples. It plays an important role in their creation myths, those wonderful, richly textured stories that incorporate the physical landforms, the birds, animals, fishes and their relationships with the settlers. At places such as Ubirr and Nourlangie, these myths are exquisitely illustrated in rock paintings, which give a unique insight into Aboriginal culture and history.

The traditional owners manage the National Park jointly with the Australian Government Department of the Environment and Heritage. It is a wilderness, cut by only two surfaced roads, the Arnhem Highway from Darwin to Jabiru, and the Kakadu Highway from Jabiru to Pine Creek. A short road north to Ubirr and the border with Arnhem Land is impassable in the wet seasons, as are the unsurfaced roads that are generally navigable only by 4WD vehicles.

Six seasons divide the year in the Aboriginal calendar, though half this time is dominated by the storms that precede and follow the monsoons of December to March. This year, the rains lasted longer than usual, and Cyclone Larry, which in March had battered North Queensland, had prolonged their effects. The result was that we were unable to get through to Ubirr, while the roads to several outlying billabongs and the spectacular Jim Jim Falls were still submerged. After several hours being amazed by the rock art of Nourlangie, we booked our campervan onto the Cooinda site and awaited the boat for the late afternoon trip on Yellow Water.

Kakadu is the only National Park in the world that contains the entire catchment of a major river system, that of the South Alligator. It also encompasses the smaller West Alligator and much of the Wildman rivers, and is divided from Arnhem Land by the East Alligator. In the monsoon season, the floodplains cover several hundred square kilometres. Even our campsite had been inundated less than two weeks earlier. As the dry season advances, and the waters shrink, the wildlife, including 2.5 million birds, become concentrated into the resulting billabongs.

Jabirus, pied herons and egrets, with crocodile just visible in foreground.

The Yellow Water region is home to around 50 kinds of fish, as well as two types of crocodile, freshwater and the larger and more dangerous saltwater.

As our boat left its moorings, a flock of magpie geese crossed the skyline. To either side of us, an enormous carpet of water lilies stretched toward the distant trees. Egrets and tall jabirus tiptoed through the vegetation. Darters decorated half-submerged logs, wings outstretched, as immobile as statues. Pied herons gazed into the water, searching for a meal among the roots of the Darlingtonia.

At this point in the season, there were 30 or 40 bird species in the Yellow Water region. Over the next few months, this would rise to around 75. During a year, more than 280 species of bird have been recorded in Kakadu as a whole. This represents one-third of all Australia's birds. In addition, around 50 kinds of fish swim here as well as two crocodiles, freshwater and the larger and more dangerous saltwater. No species have been introduced, and the river is completely unpolluted, making this a pristine environment.

We spotted our first 'saltie', a 3.5-to-4-metre giant, after about ten minutes. Over the next hour-or-so we came across another six, some gliding through the water, others resting on patches of mud among the trees. Three weeks earlier, when the water was 2.5 metres deeper, only two crocodiles had been seen. Now, the depth had fallen to one metre, and shrinkage of their habitat had brought 15 or 20 into Yellow Water. In another month, the area over which we now sailed would be completely dry, and the crocodiles would have retreated to the muddy remnants of scattered billabongs.

We passed beneath a white-bellied sea eagle, perched magisterially on a high branch, unperturbed by our proximity. A whistling kite flew over us, carrying nest material, and settled on a tree. Its relative, the black kite, though not in evidence here, was overall the most abundant bird we saw throughout Kakadu. At one time, we witnessed as many as two dozen circling

Photos: © Anthony Toole

Egrets (above) are one of the birds that tiptoe through the vegetation in Kakadu National Park.

over the smoke and flames of a bush fire.

We sailed away from the water lilies and into a flooded jungle. Large trees, tinted pink by the light of the sinking sun, stood proud of the water. A rare and secretive sacred kingfisher landed on a stick, but flew away as we approached.

The boat passed out into open water once more. The sun had now sunk behind the trees to the west, which became black shadows against a background of an increasingly Götterdämmerung fire. The reds and oranges of the sky reflected onto the water to give it an eerie luminosity.

Then something magic happened.

The sky to the east grew dark, yet the raft of

The Golden orb weaver spider.

lilies, the trees and the gaunt, leafless skeletons shone with something resembling an alpenglow. The boat slowed and began to drift in silence. A silver glimmer, the topmost curve of the moon, peered tentatively through a dip in the tree line, before disappearing behind taller greenery. It re-appeared, and though it seemed not to move, in little more than a minute, it was above the trees and opening a gap, which increased noticeably while we watched. The conversation receded to a whisper, consisting mostly of gasps of astonishment, just audible against the staccato click of cameras and the soft lap, lap against the sides of the boat. As the moon rose, its reflection drifted clear of the lily field, and acquired its own independence, flickering, fragmenting and changing shape with the line at the edge of the lilies and the ripples on the surface.

Over a period of several minutes, the sky darkened and the sharp boundary between vegetation and water faded and vanished. The moon rose higher and the first stars appeared. Almost imperceptibly, the magic quietly subsided to nothing more than that of a beautiful tropical night. Yet the effect on us lingered.

We returned to the mooring half-an-hour later than scheduled. As we stood in the pitch dark and sticky heat, awaiting the shuttle bus for the short trip back to the campsite, nobody complained. The talk was muffled. An owl hooted in the trees nearby. The Milky Way glowed like a vivid white streak across the profound blackness of Space.

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

Moths of Sherkin Island

Brimstone Moth

Dark-barred Twin-spot Carpet

Photos: © Sherkin Island Marine Station

By Christopher Barry

MOTHS have a long standing and undeserved reputation as unattractive, grey flapping bugs of the night which can reduce cupboards of clothing to tatters. Hopefully this article will help to dispel some of the negative publicity which currently exists and continues to persist.

Firstly, not all moths eat cloths, in fact only a very small number of very small moths from one family actually do; so if a moth you see is any bigger than half a matchstick be assured it will not be interested in last season's fashions. Dull, grey-brown bugs they are not either; on closer examination the variety of colours, patterns and lifestyles far exceeds that of the butterflies, who for too long have enjoyed undeserved, yet useful, publicity.

What is the difference between moths and butterflies? Unfortunately there is no clear answer to this question as the division is a popular one made for convenience rather than a scientific one. The most straightforward general rule that can easily be observed, is that butterflies have clubbed antennae whereas moths do not. A more rigorous but difficult to see character are structures that help to couple the fore and hind-wings in moths which butterflies lack. Exceptions of course exist, for example members of the colourful and vivid day-flying Burnet and Forester moths also possess antennae with a club-like appearance. Having bold colours like these is probably poor camouflage but these particular paint jobs advertise toxic qualities to non-insect predators. The well known and instantly recognisable Cinnabar moth, *Tyria jacobaeae* also has similar colouration and again is distasteful to non-insect predators owing to its larval diet of the toxic plant Ragwort, *Senecio jacobaeae*.

Moths are sometimes unpopular, like loudly dressed adolescents, for their involuntary attraction to bright lights at night. There is no universally accepted scientific reason for this behaviour however the most common explanation goes like this: moths navigate by maintaining a constant angular relationship with a celestial light (amongst other means), on encountering an artificial light the moths spiral towards it due to their more rapidly changing position relative to it. Another explanation is that lights cause a visual distortion (the Mach band) which is amplified by the compound eyes of moths. It has been postulated that moths, as nocturnal creatures, should aim, for reasons of personal safety, to travel by the darkest routes possible. The visual distortion places an artificial dark area adjacent to the light source; when moths approach lights they are actually aiming for the darkest place visible to them. As the moths move towards the light the imaginary darkest area changes position resulting in them spiralling in towards it.

Moths are important to overall diversity for several reasons. As primary consumers they are a significant link between plants and animals further up food chains which currently include a number of threatened species. Rare species of Bat like Bechstein's, Grey Long-eared and Horseshoe all rely upon adult moths for a substantial proportion of their food. Both caterpillars and adult moths are common sources of food for a number of birds including species that have shown recent declines such as Bullfinches, Spotted Flycatchers and Corn Buntings. Some plants also rely on moths for the pollination of their flowers; in the case of night blooming flowers light pollution can affect their reproductive ability as well as that of the moths themselves.

As a species rich group of primary consumers with high overall biomass and often species specific associations with larval foodplants moths are influential components of ecosystem dynamics. For this reason they are good indicators of the impacts of changes in land use and can provide a sound means of examining habitat integrity over time.

Workers at the Sherkin Island marine Station have been studying moths since the late 1970's. During this time they have recorded a number of the larger or 'macro' moths, as they are commonly known, that exceeds more than one quarter of the British Isles species list (800+ species). This is impressive species richness on an island that, by land area comparison, is only one ten thousandth the size.

Sherkin Island encompasses a great variety of different habitats which in turn boast a famously vast array of wild plants, plants which moths rely upon for food as well as shelter. This variety of habitats is the single most important reason for the wide diversity of moths on the island. Species typical of coastal, marsh, heath and garden habitats as well as deciduous and coniferous woodland can all be found in relatively close proximity to each other.

The island's climate is another factor that is conductive to moth numbers. Warmed by the Gulf Stream species are able to grow, mature and reproduce rapidly. For example the Brimstone and Dark-barred twin-spot Carpet can exhibit two or three generations a year whereas in colder, greater latitudes only one generation is possible.

Sherkin is also placed in a very favourable location as regards migrant moths which typically arrive from warmer climes in southern Europe and north Africa. Several infrequent and spectacular visitors such as the Convolvulus Hawk-moth and the Crimson Speckled have been recorded as well as more common visitors like the Scarce Bordered Straw, Angle Shades and the Vestal. In general most migrants cannot survive the winter, however as the world's climate continues to warm it is reasonable to expect that some may become established on Sherkin given that acceptable food plants exist for the larvae.

Even without the spectacular visitors mentioned above Sherkin Island and many places in Ireland have numerous beautiful and fascinating species. The Garden Tiger is an instantly recognisable species both as an adult and as a busy, black hairy caterpillar or 'woolly bear' as they are sometimes known. Unfortunately the Garden Tiger is a species (along with the Cinnabar) that has shown dramatic declines in numbers in the British Isles recently (though not on Sherkin) indicating significant changes to their habitats.

Today widespread changes in land use coupled with population increases threaten the integrity of our natural spaces; without careful planning we may cause irreversible damage. The abundance and diversity of groups of animals such as moths can be very useful in helping to judge our success in integrating our human requirements with those of the natural world. To avoid compromising our natural environment and thus a range of natural resources that we take for granted, such as the air we breathe and the water we drink, we must pay closer attention to the impacts of our lifestyles.

Find out more:

Eyre, D. (2004) Moth Records from Sherkin Island, Co Cork, 1977-1997: Macros. Irish Naturalists Journal, Vol. 27 No.12: 468-480.

Ford E. B. (1972). Moths 3rd Edition. Collins Clear-Type Press, London & Glasgow

Majerus, M. (2002) Moths. British Wildlife Publishing.

Young M. (1997) The Natural History of Moths. T & A D Poyser Ltd

http://www.habitas.org.uk/moths/

http://www.butterfly-conservation.org/index.php

http://ukmoths.org.uk/

Christopher Barry was formerly a volunteer biologist at Sherkin Island Marine Station.

RESTORING THE NY/NJ HARBOR ESTUARY

Scientific measures of the environmental health of New York Harbor have improved as much as ten-fold in the past 30 years.

By Dennis Suszkowski

WITHIN the last two years, it has been possible to reflect on the current health of the NY/NJ Harbor Estuary in light of the avalanche of environmental laws, regulations and programs promulgated in the U.S. since the early 1970s. The Hudson River Foundation for Science and Environmental Research, Inc. published a report in 2004 showing that scientific measures of the environmental health of New York Harbor have improved as much as ten-fold in the past 30 years. The "State of the Estuary" Report – the first comprehensive look at the environmental conditions of the estuary – examined trends by tracking key environmental indicators over time and across the harbor. The report is available online at www.hudsonriver.org.

The NY/NJ Harbor Estuary comprises the estuarine portion of the Hudson River, New York Harbor and the tidal sections of several other rivers which empty into the harbor. Its watershed contains the largest city in the U.S. (New York City) and the fourth largest urban area in the world, housing nearly 20 million people.

The natural features of the NY/NJ Harbor Estuary, including its bottom topography, shorelines and adjacent wetlands, have been dramatically altered to accommodate the demands and changing needs of the region. More than 80% of the harbour's tidal wetlands have been filled, shorelines have been stretched seaward (Manhattan is over 20% larger than it was in the 1600's because of encroachments into the Hudson and East Rivers), a vast network of channels (over 250 miles of federal channels) and berthing areas has been excavated to enhance navigation, and countless tons of industrial waste and human sewage have been discharged into the estuary over the years, with large amounts of toxic chemicals becoming lodged in bottom sediments and posing continuing threats to public health and the environment. While many plant and animal species have adapted and even flourished within this changing environment, others have suffered declines and near obliteration, like the oyster.

Despite these abuses, the overall condition of the estuary has improved dramatically: Contaminants in sediments have decreased to levels one-tenth of those observed 30 years ago; levels of contaminants in fish have dropped significantly; losses of wetlands and near-shore habitats have slowed considerably; dissolved oxygen levels in the harbor have greatly improved; and sewage-related pathogenic contamination has been notably reduced. Much of this improvement can be directly traced to one major piece of federal legislation — the Clean Water Act, enacted in 1972 – which provided massive funding for sewage treatment plants and instituted a strict permit program to curb the flow of toxic chemicals into the estuary.

Even with these improvements, significant environmental challenges remain. Combined sewer overflows still contribute raw sewage to waterways when it rains; some species of fish are in decline; advisories against eating fish and shellfish from the estuary remain in effect because of contaminants in their flesh; sediments in navigation channels are too contaminated to dredge and dispose of economically; and some shellfish beds have remained closed for decades. Now the challenge is to address the legacy of pollution, and restore bottom and wetland habitats that have been altered or lost. But comprehensive restoration will require the emergence of new kinds of collaborations and partnerships. While the environmental programs developed over the past thirty years have been very effective, they were able to narrowly focus on specific issues within traditional administrative and political controls. Generally, single government agencies at the state or federal level took control of a particular problem. Future restoration, however, will have to cut across several areas of government responsibility. And to further complicate the situation, habitat restoration and sediment remediation do not fall within any single agency's mandate. New authorisations, creative partnerships among agencies and organisations, and new funding sources will be necessary to tackle these tricky problems. In addition, restoration efforts must be developed with credible science and be strongly supported by public interest groups if they have any chance for success.

Several efforts are now underway which provide hope for this to happen. The NY/NJ Harbor Estuary Program (an effort sponsored by the federal government) and the Hudson River Estuary Management Program (a New York state effort) are two key planning initiatives. In addition, the U.S. Army Corps of Engineers has recently been authorised to develop a comprehensive ecosystem restoration plan for New York Harbor. In addition, a major scientific initiative, the Contamination Assessment and Reduction Project (CARP), is nearing completion.

The CARP's purpose is to develop scientific tools to evaluate the relative significance of sources of problematic contaminants to New York Harbor, thereby providing a technical framework from which actions can be taken. In particular, it is identifying the most important sources of pollutants that are contaminating sediments in shipping channels and constraining dredging operations. And it is also addressing the management question of what fraction of those chemical loads would have to be reduced in order to render future dredged sediments "clean" by regulatory standards. To address these questions, a large data collection program was undertaken and a state-of-the-science mathematical model was developed, perhaps the most ambitious contaminant assessment effort undertaken in the U.S.

The modelling efforts to date are showing that the legacy of contaminants in bottom sediments is a primary control on the fate and distributions of problematic pollutants like PCBs and dioxins. Therefore future restoration efforts will have to focus on remediating harbor sediments to restore the ecological and public health values of the harbor. Because the model tracks the flow of contaminants and sediments throughout the system, it will be an invaluable tool for planning benthic habitat restoration. It can provide answers to questions thought to be impossible to address in the past, such as: What sediments are acting as contaminant sources to other areas of the estuary? What happens if you dredge out contaminated sediments? Will the clean areas become re-contaminated? Cleaning up what sections of the harbor will produce the most benefits?

The progress made to date in restoring the NY/NJ Harbor Estuary has been remarkable. Given the monumental physical and chemical changes that have occurred, particularly over the past 150 years, full restoration is impossible. However, the vision of a vibrant estuary with a flourishing ecosystem, free of public health concerns and one which enhances the economic vitality of the region is challenging, but achievable. The next year will likely be a critical time for getting restoration planning on the right track.

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www.hudsonriver.org

Publications of Interest

A Guide to the Identification of the Whales & Dolphins of Ireland

Jim Wilson with Simon Berrow

Irish Whale and Dolphin Group

www.iwdg.ie

ISBN: 10: 0-9540552-2-5

ISBN: 13: 978-0-9540552-2-6

Price €12.99 / 2006

This is a no nonsense guide for those interested in whales and dolphin watching around Ireland's coastline. It is beautifully laid out and is very much for the beginner. It begins with information on when and where to look for whales and dolphins, mentioning some 44 locations around Ireland. It stresses the importance of being prepared with the right clothes for all weathers before setting off. Many people so often venture out to sea or along the coast without proper protection. The identification section, with over 20 species of whales and dolphins, is well-presented and beautifully illustrated with drawings and photos. The Irish distribution of each mammal is given, as well as their behaviour in the sea. The final section is a glossary, which is extremely helpful for the beginner. The book is wire bound and excellent for bringing out into the field. The author is to be commended for his wonderful contribution to this increasingly popular pastime.

Extinction - How life on Earth nearly ended 250 million years ago

By Douglas H. Erwin

Princeton University Press

http: / / press.princeton.edu

ISBN 0 691 00524 9

Price: £15.95 / 2006

The most catastrophic event in the history of life on Earth, in which 95% of species became extinct, ended the Permian era, 251.6 million years ago. What caused this, and why did the recovery take tens of millions of years? Douglas Erwin, Senior Scientist at the Smithsonian National Museum addresses these questions, drawing on research carried out largely during the past decade.

Possible causes include plate tectonics, global warming, ocean chemistry, volcanic eruptions and asteroid impact, as well as combinations of these. Erwin looks at each hypothesis in turn, examining the evidence from places as far flung as Utah, the Guadalupe mountains of Texas, China and South Africa's Great Karoo. Some aspects of the data are conflicting and incomplete and geologists argue over the conclusions. Nevertheless, a picture is slowly emerging.

While the non-scientist can readily understand the book, some parts would be better appreciated by a reader with some knowledge of geology and biology. A report of work in progress rather than a definitive account, it is a fascinating exploration of how scientists weigh the evidence and gradually zero in on the culprit.

Anthony Toole

The Selendang Ayu Oil Spill: Lessons Learned

Reid Brewer, Editor

Alaska Sea Grant College Program

www.alaskaseagrant.org

AK-SG-06-02

ISBN: 1-56612-106-x

$15.00 / 2006

It is not often one can say a book on environmental issues "hits the nail on the head". Well, this is such a book. Every county council around Ireland's coast should have it as a bible on the lessons to be learned from this oil spill. Indeed one can go further and say for any major environmental disaster. When an oil spill occurs the immediate worry is the potential damage to nature from the oil but what the book also points out is that there are other problems when a ship goes aground. One of these problems is an invasion of rats from the vessel. Rats have invaded 80% of the world's islands, primarily by way of ships, and are responsible for 40-60% of all bird and reptile extinctions. The final chapter "Lessons learned and final thoughts" is a masterpiece of simple and essential recommendations. This book is a must for local authorities, consultants and environmentalists.

Managing Fisheries *Empowering Communities*

Workshop Proceedings April 21023, 2005, Anchorage, Alaska

Alaska Sea Grant College Program

AK-SG-05-05

www.alaskaseagrant.org

ISBN: 156612-100-0

$10.00 / 2005

This book is the outcome of a conference called to understand and consider impacts to coastal communities of Fishery management. 150 Alaska coastal residents, fishermen and managers, regulators and economists attended. Among the questions being addressed:

* Are there ways to develop effective policies and programmes that do not foreclose opportunities to coastal communities?
* What aspects of "coastal communities" are we trying to protect?
* How can communities be considered under the federal and state fishery management systems?
* What do we need to know in order to assess community impacts?
* Are there better ways for communities to participate in the development of fishery management programmes and plans?
* How can community members take advantage of the provisions of existing programmes?

Papers included: The Importance of community to fisheries management, Local area management plans, fishery social impact assessment, sustaining fisheries - sustaining communities. The discussion and recommendations can so easily apply to Ireland's coastal communities but will we ever see such important issues being discussed here? Possibly not until it is too late. This needs wide circulation in Ireland. The four Fish Producers Organisations should purchase copies of this book for their members.

The Journey to Pices *Scientific Cooperation in the North Pacific*

Sara Tjossem

Alaska Sea Grant College Program

AK-SG-05-04

www.alaskaseagrant.org

ISBN: 156612-099-3

$20.00 / 2005

This book is the story of the formation of the North Pacific Marine Science Organisation (PICES) an intergovernmental body which would lead to a better understanding between countries on marine science - oceanography and fish production distribution and production. From the time the idea was first born it was nearly 20 years before agreement was reached to hold the first PICES convention in March 1992. Chapter 1 presents a chronological account of early strategies and discussion. Chapter 2: The challenges of bridging fisheries and marine science. Chapter 3: the accomplishments and challenges of the first 10 years and Chapter 4: assessment of those years and the future. This book is an excellent study of the problems that arose between countries on the use and development of the North Pacific seas. A similar organisation to oversee Ireland's 16% of EU waters would be most welcome. The EU does not seem to be able or willing to undertake proper management of our massive resource.

Ecosystems and Biodiversity in Deep Waters and High Seas

Kristina M. Gjerde

UNEP / IUCN The World Conservation Union

ISBN: 92-807-2734-6

www.unep.org

Price: Free *(plus postage)* / 2006

"What was regarded as featureless, unchanging and inexhaustible is now known to be complex, dynamic and finite." This 58-page book expands this promise to provide a succinct analysis of the huge potential of the oceans for human activity, provided that it is sustainable. Recent studies have revealed an astonishing range of ecosystems and biodiversity at great depth - not a lifeless dark abyss but a powerhouse of life and evolutionary processes. The book is full of interesting information on a realm that covers over 70% of Earth's surface and yet where, for example, just some 200 of an estimated 100,000 seamounts have been fully explored. Submarine volcanic vents, discovered only since 1977, are centres of endemism and give clues to the very origin of life processes. Exploration and depletion of these precious resources, both by surface fishing and deep-sea trawling, has already made inroads into this hidden world that buffers our climate, recycles carbon and feeds us. And that is even before we have catalogued the diversity. The book includes both a section on existing legislation, with suggestions for future progress, and a list of "Fingertip Facts". Both should be essential reading for all governments.

John Akeroyd

The Status and Distribution of Freshwater Fish Endemic to the Mediterranean Basin

Edited by Kevin G. Smith and William R.T. Darwall.

IUCN The World Conservation Union

www.iucn.org / bookstore

ISBN: 2-8317-0908-3 (book)

2-8317-0916-1 (CD)

Price: £10.00stg / 2006

The Mediterranean region is one of Earth's great centres of biodiversity. Its botanical richness has been greatly emphasised, but less attention has been paid to the animal life, much of it endemic or threatened. Wetlands especially are in danger, from dams, drainage, pollution, drought and alien species. The book, with accompanying CD of data and maps for individual species, collates information on freshwater fish on a regional basis. It identifies centres of fish diversity - notably the southern Iberian peninsula, N. Italy and the Adriatic, W. Turkey and the Levant - and past, present and future threats. Just over half the 249 endemic species are threatened, and it is to be hoped that governments and policy makers take heed of these fascinating detailed regional data on freshwater fish.

John Akeroyd.

Explanatory Guide to the International Treaty on Plant Genetic Resources for Food and Agriculture

Gerald Moore & Witold Tymowski

IUCN The World Conservation Union

www.iucn.org / bookstore

ISBN: 2-8317-0819-2

Price:£13.50stg / 2005

This guide produced by IUCN's Environmental Law Centre and the International Plant Genetic Resources Institute (IPGRI), analyses and explains a significant treaty on the conservation and sustainable use of plant germplasm in world agriculture. The Treaty aims to ensure that plant breeders and farmers enjoy ready access to these vital resources and that the benefits of such man-made biodiversity, which has evolved over millenia, are shared fairly. The book covers each of the 35 Articles of the Treaty, explaining the text and examining scientific, technical and legal aspects of the legislation. The Treaty, which entered into force in June 2004, is an important complement to the 1992 Convention on Biological Diversity.

John Akeroyd

Tales of Water *A Child's View*

Umbrage Editions Book / IUCN The World Conservation Union

www.umbragebooks.com

www.iucn.org / bookstore

ISBN: 1-884167-58-6

Price: £24.50 stg / 2006

Water is the essence for every form of life. Yet millions of people around the globe still do not have ready access to this precious resource. In many countries, young boys and girls walk for hours every day to fetch water, unwittingly sacrificing their own education and future. Millions of children die annually of diseases caused by polluted water. In certain regions, they are increasingly suffering from desertification while elsewhere they are hit by floods and other natural disasters.

To address the world's water crisis, the international water community needs to come up with more than just statistics and warnings. Hard facts and figures are important, but they only tell part of the water story on this planet. Children's presence and voices are lacking and this prevents us from appreciating their stories and views on water. Children have a very honest and direct way of telling how they relate to water at present, and how they would like to do so in the future.

This book of photographs, which are superb, tell the children's own stories. They show the immorality in having children working in such appalling circumstance. What is wrong with mankind to allow this to happen? Why can we not begin with the most basic of all rights and give them clean water? So many of the disease problems worldwide would be eliminated. This book is a gift for a family and especially children to remind them of what we in the western world would take for granted - the gift of water.

Achieving Environmental Objectives *The role and value of Communication, Education, Participation and Awareness (CEPA) in Conventions and Agreements in Europe*

Editors: G. Martin-Mehers, S. Calvo, E. Auchincloss & W. Goldstein

IUCN The World Conservation Union

www.iucn.org / bookstore

ISBN: 2-8317-0843-5

Price £16.00 stg / 2004

This publication makes interesting reading. The case histories from various countries in Europe is a reminder how environmental issues should be handled. The chapter "From conflict to cooperation: Thanet Coast (UK) and Natura 2000" is most interesting. The Local Authority and the Port Authority were in conflict with English Nature, the government environment "watchdog", over development. English Nature eventually decided to appoint an officer, despite having won a court case, to help solve the issues and to promote discussions with the various bodies. This brought about a positive working relationship and problems were solved with a give and take from everyone. The conclusions in this excellent book, if adopted in Ireland, could save many local authorities, developers and conservationists much time and money, as well as being good for the environment. There is a very interesting short section on humility and open-mindedness - rare gifts.

Achieving Sustainable Fisheries - Implementing the New International Legal Regime

Charlotte de Fontaubert and Indrani Lutchman with David Downes and Carolyn Deere

www.iucn.org / bookstore

ISBN: 2-8317-0697-1

Price: £16.00stg / 2003

All indicators point to a worsening state of global fisheries. According to the latest figures of the UN Food and Agriculture Organisation (FAO), fishing pressure is increasing, as is the

IMAGES OF IRISH NATURE

THE noted photographer Mike Brown, has just published a companion to his already acclaimed "Ireland's Wildlife - A Photographic Essay" (photographs from the book were features in Sherkin Comment No. 41). In this new book "Images of Irish Nature" Mike Brown has produced another stunning collection of beautiful and unusual photographs on some of Ireland's flora and fauna. His introduction to the book gives us an insight into why he undertook such a publication:

Photographing wildlife in Ireland, or anywhere in the world for that matter can be a difficult business. It is without doubt a succession of highs and lows and it can be both immensely rewarding and incredibly frustrating. Firstly, there just never seems to be enough time. Seasons come and go in the blink of an eye. The uncertainty of our weather doesn't help and the fact that animals don't always perform as you wish. These things can all make it even more infuriating. It seems that I often find myself chasing my own tail rather than that of my quarry. However, the joy of the highs - when an image turns out well, or even better than expected - always wins over the lows of perhaps spending eight hours in a hide and still not getting a picture.

After I had published my first book, "Ireland's Wildlife - A Photographic Essay" in 2002, I took a break from my wildlife photography. The project had been demanding and although I was thrilled with the reception it received from the public, I needed time to evaluate where I was going to go next with my wildlife photography. For about two years I stayed away from the wildlife work to concentrate on my commercial work and to pursue some other interests. During this time I decided to go ahead and work on a follow up to the first book. I set myself a target of two years to shoot a whole new set of images and this book is the result."

One of my aims was to include a lot of new subjects in this book. Whales and bats for instance were not included in "Ireland's Wildlife" and there is a vast number of birds, plants and insects in Ireland which also hadn't featured. So there was no shortage of subject matter. However, I also had other ambitions for this book. I wanted to experiment with movement and in particular, flight. Birds and bats fly as easily as we walk and when they take to the air they take on a whole new look. I wanted to show this great talent in the most beautiful way I could."

Some creatures do feature again in this book. We don't have a particularly large list of land mammals in Ireland so it was inevitable that some would appear again. Where this has happened I have tried to photograph them in very different ways than before. The emphasis this time, as I hope you will see, is more on the total image than on simply showing the perfect portrait. I also wanted to show some more abstract and simple views of nature such as dried seaweed on a shingle beach, snow in the Kerry mountains or the stunning granite pavements of the Burren at sunset. All these represent our nature perfectly in my mind. Finally, I wanted to ask some other people who are involved in Ireland's natural history, to become involved. Six writers have given us their thoughts, hopes, dreams and advice in essays, which are spread throughout this book. To me these essays conjure up further images of Irish nature and I hope you enjoy them as much as I did when I first read them.

While there may be a few lows in my work, there is nothing so wonderful as spending precious time in the Irish countryside. It is a great pleasure to enjoy its sights, sounds and smells. Or to spend time watching a wild creature as it goes about its business, unaware of your presence. I hope these new images bring those pleasures alive for you.

"Images of Irish Nature"
ISBN: 0954286316 Price: €39.95
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Photos: © Mike Brown

number of overexploited and depleted stocks. The FAO also predicts that sustained high catches will only be possible if remedial action is taken to reduce or revert overfishing conditions. Overfishing has long been explained by the legal uncertainty that prevails over the rights and obligations of fishing states.

This publication aims to examine the mosaic of new international fisheries instruments and measures, and to interpret them in a set of clear rights and obligations, which, if properly implemented will help address this conservation problem. It reviews all the new instruments that have been negotiated, highlights their relevance and scope of application, and suggests means to facilitate their implementation. In that respect, it is a resource for those working on international law and policy, including managers in government. The publication also provides a useful tool by including the text of the international instruments that can be used to enhance sustainable fisheries.

Values and Rewards: Counting and Capturing Ecosystems Water Services for Sustainable Development

Edited by Lucy Emerton

IUCN Water, Nature and Economics Technical Paper No. 1

IUCN The World Conservation Union

www.iucn.org/bookstore

ISBN: 955-8177-43-1

Price: £10.00stg/2005

The case studies of the countries in this book are from Asia and Africa but that does not mean we in Ireland can ignore the recommendations and importance of ecosystems when making water decisions. Water ecosystems have long been perceived by decision-makers as having little value. There are seen to be few economic benefits associated with the conservation of habitats such as wetlands. In particular, housing developments and industrial activities have had a serious impact on these environments. If discussions had taken place in the planning stages, there could be many positive gains for the environment. Unfortunately the reality is that there is an ignorance as to the importance of the ecosystem. It is pointed out that economic valuation can provide a powerful tool for placing water ecosystems on the agenda of conservation and development decisionmakers. It is hoped we in Ireland can learn from issues raised in this book.

International Ocean Governance

Using International Law and organisations to Manage Marine Resources Sustainably

Lee A. Kimball

IUCN The World Conservation Union

www.iucn.org/bookstore

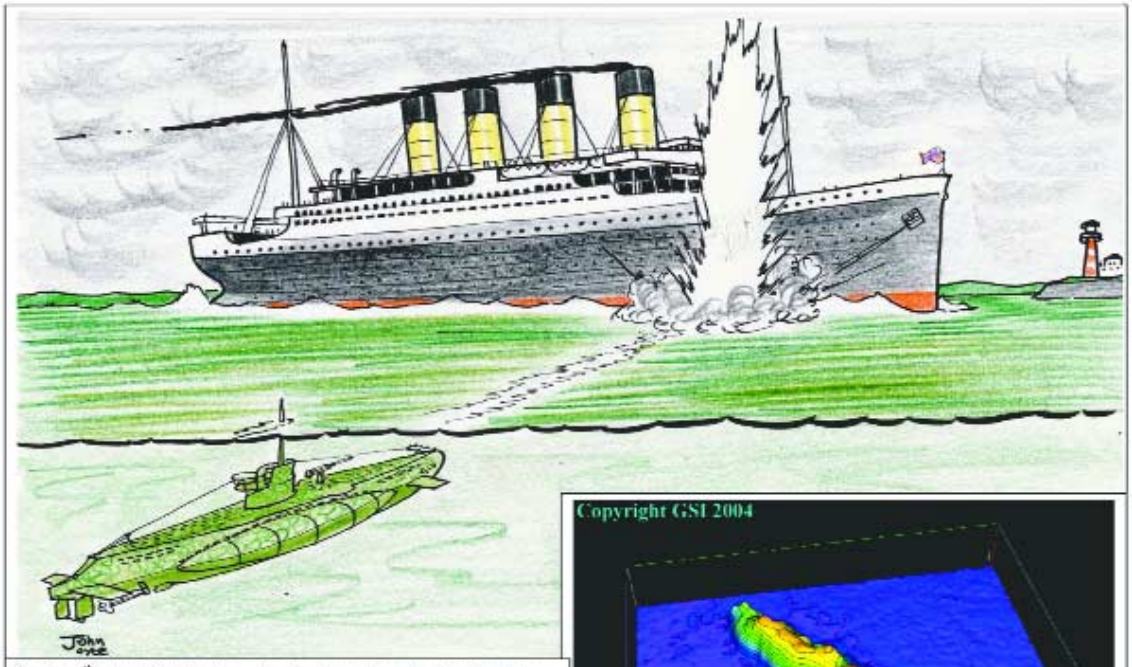
ISBN: 2-8317-0617-3

Price: £20.00/2003

International Ocean Governance has three purposes. First, it may be used as a guide and a resource for identifying which international conventions and organisations play a role in addressing various sources of marine pollution, unsustainable fishing practices, invasive species, or other threats to marine biodiversity. It provides general guidance on how to use and develop international legal instruments. Second, it identifies strengths and weaknesses in international management arrangements for each problem. The report's suggestions for further international legal developments and improvements in the resources and functioning of international arrangements are intended to stimulate debate, new research and fresh ideas. A third goal is to promote discussion of how to advance ocean governance at the regional level based on the importance of maintaining ecosystem goods and services for the people who depend on them.

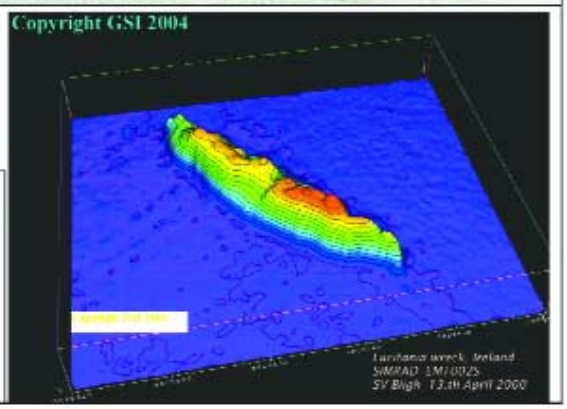
International Ocean Governance should be useful for government officials and for international and non-governmental organisations working in the international arena, but it will also be a valuable resource to help managers and civil society address the coastal/oceans problems they face at home. It is hoped it will make a significant contribution to the growing number of national and international deliberations on ocean governance and regional approaches. A must for government officials and managers.

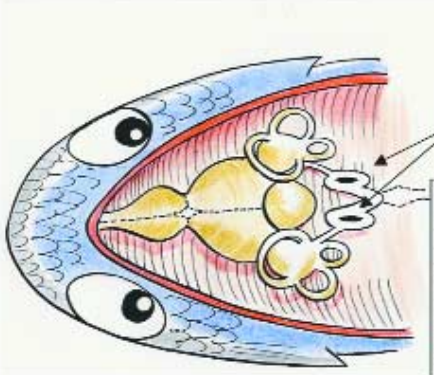
Junior Pages Junior Pages



On the 7th May, 1915 the liner *Lusitania* was torpedoed and sunk by the German submarine U-20 off the Old Head of Kinsale in Co. Cork with the loss of 1,195 civilian lives.

Today, three-dimensional sound pictures of the wreck are available thanks to technology used in the Irish National Seabed Survey and INFORMAR surveys performed by the Geological Survey of Ireland, the Marine Institute and other partners in Ireland's 220 million acres of marine territory.





How Old is that Fish?

Fish have a pair of tiny stones called "Otoliths" inside cavities in their heads. These stones rest on sensitive hairs that send back signals to the fish's brain to tell them which way is up or down.

Fisheries scientists (left) need to know how old fish are so that they can tell how fast the fish are growing and how many it is safe for fishermen to take from the sea.

The otoliths grow in "rings" that can be read under a microscope like the rings of a tree to tell how old the fish is.

Captain Cockle's Log

Welcome aboard shipmates!
Together, we'll be taking a look at the world's greatest natural resource - the sea!
Words & pictures by John Joyce
(unless otherwise stated)
www.cockle.com © John Joyce 2006

Flying Fish

Flying fish can escape from predators attacking them from below by bursting through the surface of the sea, thrashing the water with their strong tails and gliding above the waves using their extended pectoral fins.

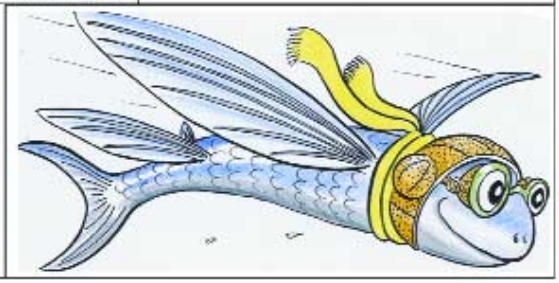
Flying fish have been seen to glide up to 50 meters (164 feet) before dropping back into the water.

Check out these websites for more information:

http://www.marine.ie/home/services/surveys/fisheries.htm

http://www.gsiseabed.ie/imagery.htm

http://en.wikipedia.org/wiki/Flying_fish



WREN

(Dreoilín)

Troglodytes troglodytes

Photo: © Clive Timmons

Above: *Wren*

By Niall Hatch & Declan Murphy

AT just 10 cm long, the second-smallest bird in Ireland (the smallest is the minute Goldcrest, coming in a centimetre shorter), and, based on the results of BirdWatch Ireland's Countryside Bird Survey, our most widely distributed, found in the widest range of habitats and present in 95% of all locations surveyed. A very common visitor to gardens, it can be very inconspicuous as it creeps around in and under bushes, trees and other vegetation looking for food, so its presence often goes unnoticed. Almost never tempted to bird tables, its main food consists of small insects and other invertebrates. Due to their tiny size, Wrens are often badly hit during cold winters, with mortality sometimes as high as 80% in particularly bad years; population levels soon return to normal after just a couple of years, however.

The head, back, wings and tail are a finely barred chestnut brown colour, while the breast and belly are paler and more buff in colour. The combination of tiny size, dumpy shape, mouse-like behaviour and its habit of always holding its tail in a cocked position generally makes the Wren unmistakable, though the best clue to its presence is often its distinctive song: an incredibly loud and powerful cascade of rapid notes, frequently coming from the centre of a dense bush.

DUNNOCK

(Donnóg)

Prunella modularis

ONE of Ireland's most common and widespread birds, the Dunnock remains unknown to many, despite the fact that most well-planted gardens will have one or more in residence. This is because, unlike more colourful and showy garden birds such as the Robin and the Blue Tit, the Dunnock is a shy, skulking bird that prefers not to venture out into the open. It is much more at home creeping around mouse-like beneath bushes than on bird tables, but if seed and left-over food scraps are left around the edges of the lawn it may reveal its presence.

The English name of this species has Gaelic origins, and like the similar Irish name means "little brown thing", a very apt description. It used to be more commonly known as the Hedge Sparrow, but this name has fallen out of favour as the Dunnock is not related to the sparrows at all but instead is the only Irish member of a family of birds called the accentors. It is, however, around the same size as a sparrow, at 14cm in length.

Predominantly streaky brown on the back, wings and top of the head, good views reveal that the breast and face are bluish-grey in colour. It has a slender, pointed bill, and pinkish legs which it uses to scuttle around on the ground and to clamber around bushes. In addition to gardens, Dunnocks are also commonly found in parks, hedgerows, scrub and gorse habitats and woodlands. One of the best ways to discover their presence in an area is to listen for their distinctive song: a rapid, scratchy warble that many people liken to the sound of an un-oiled shopping trolley wheel!

The Dunnock is amongst the most sedentary of Ireland's birds, with most individuals moving no more that 1 km or so from the area where they were fledged. Surveys show that there may be as many as 1 million Dunnocks in Ireland, though they are a difficult species to census accurately.

Photo: © Jerry Cassidy

Right: *Dunnock*

Learn about birds with BirdWatch Ireland

Feeding Wild Birds Leaflet
Download this leaflet from the Learn about Birds section on BirdWatch Ireland's website at www.birdwatchireland.ie

Learn how to identify the birds in your garden with our **Free Garden Bird Charts**. Send a SAE to: *BirdWatch Ireland, Rockingham House, Newcastle, Co. Wicklow.*

BirdWatch Ireland has over 10,000 members and has branches throughout the country which organise events and outings in your area. Why not get your school to join? Write to us or visit our website for details: www.birdwatchireland.ie

BirdWatch Ireland has two educational web sites, catering for learning about birds in schools.

- Visit the Migration web site to learn about the fascination of bird migration
- Visit the Working with Birds web site to learn about watching and feeding birds

Simply go to **www.birdwatchireland.ie** and go to the 'learn about birds' section

BirdWatch Ireland, Rockingham House, Newcastle, Co. Wicklow.
Tel: 01-2819878 Fax: 01-2819763
Email: info@birdwatchireland.org

Website: www.birdwatchireland.ie

FEED THE BIRDS

Not only will you have the pleasure of observing birds and their entertaining behaviour at close quarters, you will also have the satisfaction of knowing you've helped at least some to survive the cold, lean months.

Common Insects

THERE is no such thing as the typical insect. They come in all shapes and sizes, albeit mostly quite small. Many are so small that they cannot be seen without the aid of a microscope. Insects can be found everywhere – from the highest mountain to salt marshes, from the snow-capped poles to the driest deserts. There are more different insects than all other plant and animal species put together.

Insects provide us with honey, beeswax, dyes and silk. They are crucial in the making of healthy farm soil and in the pollination of most fruits, flowers and vegetables. Yet despite all their beneficial uses to man and other living organisms, we are carelessly destroying thousands of non-pest species through the use of pesticides and insecticides and through the destruction of their natural habitat, forests.

Insects are incredible creatures and the variety of them is endless. For example, a grasshopper's ear is on the base of its abdomen, whereas the cricket's ears are just below the knees, and these are two quite closely related insect species. Some insects are quite like us in that they live in very complex social communities, such as bees, wasps and ants. Would you believe, bees actually perform a dance for the other bees in their community to let them know where a good source of nectar is to be found.

The carefully performed 'dance' is like a map and lets the others know how far away and in what precise direction (relative to the sun) they should look.

But, before going any further, what exactly is an insect? Well, creepy-crawlies such as beetles, flies, butterflies, bees, crickets and ants are all insects. Spiders, centipedes, slugs, snails and worms however are not. All insects have several common characteristics. To start with, their bodies are divided into three sections; the head, thorax and abdomen.

The head, like ours, has (at least) two eyes and a mouth, but also a pair of antennae, or 'feelers'. The thorax is the powerhouse of the insect. It has three pairs of walking legs and often two pairs of wings. Did you know that insects have taste buds on the soles of their feet? They can figure out what is good to eat before they put it in their mouth! The last body section is the abdomen, similar to ours. It contains the digestive and reproductive systems of the insect. The insect has no lungs as such. Instead it has tiny tubes called trachea, which run throughout its body. The openings, to the trachea are small holes called spiracles along either side of the abdomen and the air just circulates freely in and out.

It is estimated at the moment that there are as many as 950,000 different types (species) of insects in the world. But as new species are being discovered all the time (several hundred identified and named each year) it would be impossible to know the exact number. The insects we currently know of are divided into 28 groups (orders). The largest group is the one containing all the beetles (Coleoptera). However, the most diverse and advanced group is the one made up of the bees, wasps and ants (Hymenoptera). Other large groups are the butterflies and moths (Leipidoptera) and the two winged flies (Diptera).

A hypothetical typical insect

Insects are well known for helping flowering plants to disperse their pollen, allowing them to reproduce. This arrangement is mutually beneficial; the inset gathers nectar from the flower and in doing so unknowingly allows some pollen to rub off on its body. When the insect then feeds off another flower, it transfers the pollen across, pollinating the flower.

It is because of insects that flowering plants have been able to diversify, giving us the amazing range of flowers we could choose to grow in our gardens. In fact, insects are so important to so many flowering plants that they would be unable to exist without them, at least not to the vast extent that they do.

Flowers tend to be quite picky about which insects they'll allow feed on their nectar. This is why there is such a variety of flower shapes. Each flower is designed to be visited by a particular type of insect. Flowers with tubular necks where the pollen is deep inside are designed for insects with long tongues that can reach into the nectar, such as butterflies and moths.

The reason the flowers have different scents is not for our enjoyment but so as to attract certain insects to feed on them. Not all flowers are sweetly scented though, just as not all insects like sweet smells. There are some flies that feed on rotting meat and are not remotely interested in plants. However, some ingenious plants have evolved to exploit these flies and produce the smell of rotting meat.

Sure enough, the flies fall for it and help pollinate the trickster plant. Some orchids have evolved to look like a female bee. The male is fooled, and in his attempt to mate with the mimic flower, and subsequent similar flowers, pollinates them

What do insects eat?

Most insects will feed on a variety of foodstuffs during their lifecycle, but many will feed directly on plant material at some stage. In turn, insects are preyed upon by other insects and at some point in their development, both predator and prey become bird food.

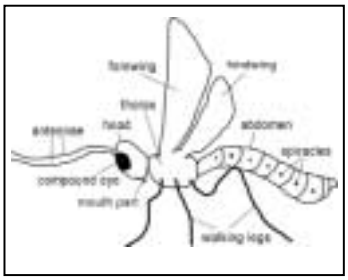
The majority of insects need one or more food plants as larvae, and nectar from plants as adults. The wider the range of plants available, the wider the range will be of insects that inhabit your garden. A wider range of insects in your garden will attract a greater range of visiting birds to feed on them. Flowers are present at most times of year in gardens, providing food over longer periods than natural habitats, making them a haven for insects. Gardens, with a higher proportion of native plants, such as wild flowers, are likely to attract more insects, as they are more easily recognisable and accessible than exotic species unfamiliar to our native insects.

Some insects eat dead or decaying plant matter, detritus. For this reason it is advisable not to clear away all dead garden material and seed heads as many insects depend on it for food or a place to hibernate during the winter months. A good idea is to leave piles of dead leafs in a heap under a bush instead of throwing them out. This will provide perfect shelter and food for wide variety of different insects.

Likewise a couple of logs piled up together will attract wood boring insects into your garden. A wildflower garden is the ideal way to encourage insects, and with them birds, hedgehogs and perhaps frogs or toads into your garden.

What eats insects?

The main predators of insects are other



A hypothetical typical insect

larger insects, spiders and birds. As foodstuff, insects are a very nutritious and valuable source of protein, especially to young birds. Both web spinning and hunting spiders feed on insects, commonly earwigs, beetles, woodlice and flies, but anything they can catch will do for dinner. In turn, spiders are also eaten by birds.

Many of the larger insects will eat smaller insects. Mantids, earwigs, some grasshoppers and crickets, bugs, beetles, and many other insects are carnivores, some more predacious than others. Ladybirds are well known predators of greenflies and other aphids. Earwigs also eat aphids as well as scale insects and small flies.

Some insects are pests

A few insects are somewhat of a nuisance in the garden due to their large numbers and endless appetite for our beloved plants. The insects really aren't to blame though. As far as they are concerned, we have very generously provided them with an all-you-can-eat gourmet buffet. It's no wonder they munch away happily and raise large families. Why shouldn't they? On warm summer days we attract wasps into our gardens with the false promise of sweet smelling foods and drinks.

It's their fault for being there. Slug numbers (not actually insects, but common garden visitors al the same) are regulated in the wild naturally by food availability. There is only enough food to support a moderate size slug population. However, in our gardens, with so much slug food available, slug numbers increase well past their natural levels in the woodland. Unbeknown to them these unfortunate creatures are deemed as pests and every effort is often made to destroy them.

As it happens, many of these pests do deserve their name, as they seem to do nothing but harm plants. However, not all of our invited guests (it is us who lure them in with appetising meals) are truly pests. Earwigs, for example, have no interest whatsoever in our ears. They prefer to annoy us by munching on our Dahlia and Chrysanthemum petals. But, when not attacking their preferred flowers they also enjoy eating scale insects, small flies and aphids. So if scale insects or aphids (the genuine pests) are your problem, is it that much to sacrifice a few petals to enlist the help of the earwig?

Those insects that do occur in pest proportions in our gardens can seriously damage or weaken a plant. It is usually necessary to control their numbers in some way to limit the damage that they can do. Many chemicals are available to do the job. Unfortunately, these widely used chemicals (insecticides and pesticides) do much more harm than good. A better solution is the natural one.

Insecticides

There is a wide range of insecticides and pesticides available commercially. They all vary somewhat in what they claim to do and what chemicals they contain, but also have some key similarities. The chemicals in these preparations are very strong poisons and very damaging to wildlife. That's how they work. Few if any are targeted at one pest specifically. In fact, most boast of being capable of killing a wide range of garden pests. What the packets fail to mention is that they harm a lot more than just the intended pest.

When the targeted pest ingests the poison and dies, the poison still remains in its victim. A dead slug or woodlouse is easy prey and will soon become part of the food chain, and with it the poison that killed it. This dose of poison alone won't be lethal to an unsuspecting robin – but robins don't just eat one meal a day. As a result of your killing spree many more easy (poisoned) meals will await unsuspecting birds. So don't complain about the scarcity of thrushes or blue tits in your garden if every other meal they find there is poisoned.

Natural / Biological Controls

Before trying to eliminate a pest from your garden, start first by thinking why it might be there. Just like humans, plants suffering from stress are more susceptible to illness. There are many factors that can cause a plant to suffer from stress. If the soil is not well enough drained, too dry, or not containing enough organic matter the plants will suffer. Equally, if the plant is getting too much or too little sunlight it can become stressed and more vulnerable to attack by pests.

In nature most plants and animals have predators. Just as the greenfly is a predator to the silverbirch tree, the ladybird, adult and larvae are predators of the greenfly. When greenflies become pests it is because there are not enough ladybirds around, possibly because there are not enough sheltered sited for the adults to over-winter in. It is possible though to buy ladybirds to introduce into your garden. Many organic garden centres can order them in for you. Companion planting also works. This means planting certain plants to either attract the pest's predator or deter the pest directly. Here are some other natural pest control solutions:

Ants: plant mint beside the kitchen door to deter them

Blackfly: attract their predator, the hoverfly, by planting aromatic herbs near the problem area. Also ladybirds.

Cabbage White butterfly: aromatic herbs attract ichneumon flies, a predator.

Carrot fly: sprinkle garlic powder while and after sowing.

Greenfly/aphids: ladybirds and companion planting of chives, parsley and garlic.

Scale insects: ladybirds and Anthocorus nemorum are predators. Rub off with soapy water and a cloth.

Thrips: strong blast of water on trees. Fork over a pea bed to allow birds to eat off larvae.

From the ENFO leaflet "Common Insects" written by Justine Cavanagh. ENFO – The Environmental Information Service,17 St Andrew Street, Dublin 2, Ireland. Tel: (01) 8883911 (01) 8883933Fax: (01) 888 3946 e-mail: info@enfo.ie web site: http://www.enfo.ie. ENFO is a service of the Department of the Environment, Heritage and Local Government.

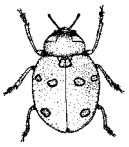
Puzzle Page

INSECTS

a

A tiny insect that lives in a huge colony.

– – –



b

This insect is usually bright red in colour, with black spots.

– – – – – – – –

c

Often found hovering over water, this insect has large wings and a very long slender body.

– – – – – – – – –

d

This insect has powerful back legs, which it uses for hopping.

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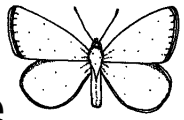
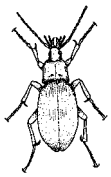


e

The delicate wings of this insect are often beautifully coloured.

– – – – – – – – –



f

Often black in colour, this insect has horny wing covers that lie over the rear wings when at rest.

– – – – – –

g

This insect has a large black and yellow striped body and, like the honey bee, collects pollen to make honey.

– – – – – – – – –

h

This insect does not go into people's ears, as its name suggest. It has a pincer on the end of its body.

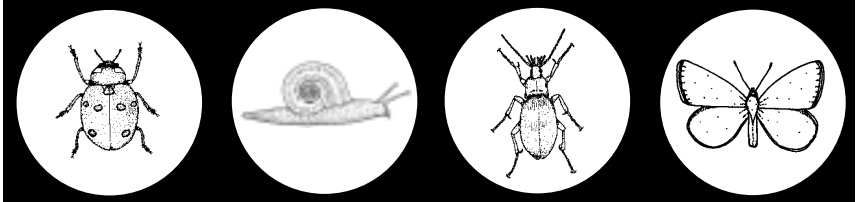
– – – – – –

The pictures of insects on the left are nameless. Can you select a name from the list on the right? Each has a description alongside to help you. *Answers* below.

1. butterfly
2. grasshopper
3. bumblebee
4. ant
5. beetle
6. ladybird
7. earwig
8. damselfly

Odd One Out!

Can you pick the odd creepy crawlie out? Three of them are insects and one is not? The colour the circle of those that are insects green and the one that is not red? *Answer below.*

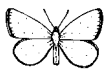


Ladybird Snail Beetle Butterfly

Connections

Below are the names of six insects, however they have been split up and you have to try and put them back together again. Can you work out which words go together to make an insect? *Answers below.*

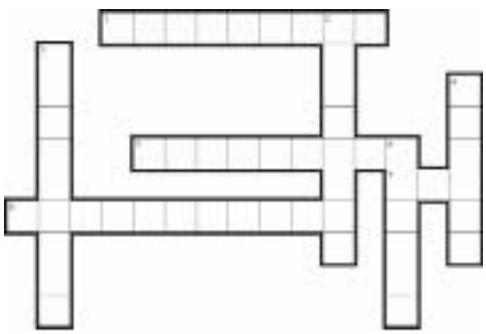
1. damsel	bird
2. bumble	fly
3. grass	wig
4. lady	fly
5. ear	bee
6. butter	hopper



Make Us Fit!

Can you fit all of the following insects into the grid on the right? *Answers below.*

ant
beetle
butterfly
bumblebee
damselfly
earwig
grasshopper
ladybird



ANSWERS TO PUZZLES

Sketches: © Sherkin Island Marine Station

Insect Pictures:
a. ant; b. ladybird; c. damselfly; d. grasshopper; e. butterfly; f. beetle; g. bumble bee; h. earwig.

Odd One Out!:
The snail is the out one out. It is not an insect.

Connections:
1. damselfly; 2. bumble bee; 3. grasshopper; 4. ladybird; 5. earwig; 6. butterfly.

Make Us Fit!:
1. damselfly; 2. ladybird; 3. butterfly; 4. beetle; 5. bumble bee; 6. earwig; 7. ant; 8. grasshopper.

One Man's Belief in the Young People of Ireland

By John T. Murphy

JOHN (Sean) Murphy who has been the Chief Executive of Gaisce – The President's Award since its foundation in International Youth Year 1985, has just retired from his position. A recent retirement dinner in Dublin Castle provided the opportunity for friends to pay tribute to him for his many years of dedicated service.

John is originally from Ballydehob in Skibbereen, West Cork and he has always been an outdoor man. In his youth he was an excellent boxer, he was an active member of the FCA and always involved in community activities. Before long he found his niche by achieving an Agricultural Science Degree and joining Macra na Feirme as Training Officer. In this position he could put his many skills into mobilising young farmers, organising parochial meetings and conferences and training the members in communication skills and leadership. John quickly moved up the ranks to become Chief Executive of Macra and a regular contributor to The Farmers Journal and other publications on community, youth and farming matters.

It was in 1985, when the Government recruited John as first Chief Executive of Gaisce – The President's Award and Secretary to the Founding Committee which comprised of Tony O'Reilly, the late John Meagher, Alex Spain, Ray McLoughlin, Niall Green and Dr Fergus O'Ferrall. The Award was initially supported by Mr. George Bermingham the then Minister for Youth Affairs.

Whilst developing the Award Programme, initially on a pilot scheme in five pilot areas: Monaghan, Kilkenny, Galway, Cork City and Dublin North, John contributed greatly to the National Youth Council of Ireland, he was also a Director of the Youth Employment Agency and very involved in Enterprise and Community Development Programmes. To this day he remains a judge on the Bank of Ireland Leadership Awards. Retiring so young John will continue to use his energies in the community with young people in particular.

Photos: © Gaisce - The President's Award

John with Award participants at the 4-day Army Survival Training with The Defence Forces.

Throughout the progress of Gaisce John was innovative in attracting positive publicity for the Award Programme. He invited the World's Strongest Man at the time, John Paul Sigmorson from Iceland to be the front man in a sporting and strength promotion of the Award. He had Gaisce participants on expeditions with Robert Swan to the North and South Poles. He encouraged young adults to push out the boundaries and excel in ways which they never thought possible. This could be from cycling from Malin Head to Mizen Head – a total of 446 miles in six days; to climbing Kilimanjaro or Mount Blanc to winter expedition on Snowdon or the Mourne Mountains. There will be many former participants (many now not so young!) who will recall vividly these great challenges, however tough, and the enormous amount they learned about themselves, others and the world through their participation in Gaisce.

Over all those years John invested heavily in the recruitment, training and support of President's Award Leaders nationwide with an ambitious and thorough training programme. "These PALS" John has always said "are the backbone of what the Award is about". Such PALS give dedicated and voluntary commitment to the young people of Ireland and deserve the thanks and respect of all of us.

Throughout the past twenty one years over 140,000 young people have participated in the Award Programme and have raised over €30 million for national and local charities. Many millions of voluntary hours of community involvement have been given by them - from helping in charity shops to visiting the elderly to learning Sign Language to assisting the less fortunate. These achievements bear testimony to the man who John Murphy is and his great belief in the young people of Ireland not alone in what they are but what they can become.

John has already "immersed himself" in sailing and is looking forward to many, many years of enjoyment of the sport. He is still trying to convince his wife, Mary and his three adult sons, Niall, Kevin and Brendan to crew with him. Keep an eye out for him on the shores around the coast.

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John with his wife Mary and two of his sons, Brendan and Kevin, at his retirement party in Dublin Castle on Saturday 21st October 2006.

Gaisce – The President's Award is the highest personal challenge award for young adults in Ireland and having President McAleese as its Patron it is the most prestigious. Gaisce is a full member of the International Award Association, the body for similar awards world wide. For more information please check out: www.p-award.net

Sherkin Island Marine Station Environmental Competition

for Primary School Children in Munster 2006

Photos: © Sherkin Island Marine Station

Above: **Poulacapple NS, Poulacapple, Mullinahone, Thurles, Co. Tipperary.** Cllr. John O'Shea, Mayor of Cork County presenting the prizes at the Carrigaline Court Hotel, Carrigaline, Co. Cork. Also present were: Vincent Smith, Janssen Pharmaceutical Ltd; Mary Kelly, Pfizer Ireland Pharmaceuticals; Bob Cooke, Bord Iascaigh Mhara; Dr. Mary Stack, Cork County Council; Paul Bourke, Central Fisheries Board, Matt Murphy, Sherkin Island Marine Station.

A BIG THANK YOU to all who entered Sherkin Island Marine Station's *Environmental Competition for Primary School Children in Munster 2006.* We had a marvellous response to the competition and a wonderful day at the prize-giving ceremony at the Carrigaline Court Hotel, Carrigaline, Co. Cork, where Cllr. John O'Shea, Mayor of Cork County, presented the prizes.

We would like to take this opportunity to again thank our sponsors for this year. They were: BIM (Irish Sea Fisheries Board), Central Fisheries Board, City Print Cork, Cork City Council, Cork County Council, Denis McSweeny Photoshop, Cork, Dept. of the Environment, Heritage & Local Government, Evening Echo Newspaper Cork, Janssen Pharmaceutical Ltd. and Pfizer Ireland Pharmaceuticals.

Here is a very small selection of some of the 405 prize-winners.

Above: **Ballygiblin NS, Ballygiblin, Mitchelstown, Co. Cork.**

Above: **Bealad NS, Bealad, Rossmore, Clonakilty, Co Cork.**

Above: **Presentation Primary School, Tralee, Co. Kerry.**

Above: **St. Joseph's NS (Girls), Macroom, Co. Cork.**

Above: **The Model School, Dunmanway, Co. Cork.**

Above: **Maultrahane NS, Leap, Co. Cork.**

Sherkin Island Marine Station Environmental Award 2005

By Matt Murphy

AS tonight's recipient of our Environmental Award has sown the seed of nature in the minds of hundreds of children over many years, I want to talk for a couple of minutes of how, 66 years ago, the seed of nature was planted in my mind by my mother, when just five years old. She would talk of her childhood and the canoe her father built her and in which she canoed in Tralee Bay. From then on any photographs or articles about canoes fascinated me. My secret was to own a canoe. It took 14 years to achieve my dream. At the age of 19, I brought my first canoe in Cobh, the hometown of tonight's recipient. A year later I built my first canoe, as my other fell apart - a story in itself. My first real canoeing trip was on the River Blackwater. I was hooked. I fell in love with camping and the nature of the river. Within a couple of years I was building a number of canoes and I started canoe-camping adventure holidays, mostly for children. The seed blossomed and Eileen, my late wife, and I catered for thousands of children on the river and then moved to Sherkin, where we ran an adventure centre. Another seed was sown which lead to our Marine Station. Eileen and I used always say from the beginning on the Blackwater that if we just sowed the seed of nature in the children coming on our adventure holidays we would have achieved the true purpose of our holidays.

The sowing of the seed of nature is so important in today's world. Today much is talked about drink and obesity in young people. There is away out for many if they embrace nature and the outdoors. The Celtic Tiger has brought much prosperity to our country but it has also brought downsides. The community spirit is disappearing, huge housing estates are appearing, with little or no thought to realistic green spaces for children. Wetlands, which are full of wildlife, are being gobbled up. Many of you here this evening can influence the creation of the green spaces vital for this generation of children and the many to come. Equally you can see that wetlands are protected. So that is the seed I want to sow tonight.

I am thrilled that our Environmental Award recipient is a person who for many years has been sowing the seeds of nature in the minds of hundreds of children he teaches at Scoil Iosef Naofa in Cobh. Since 1990 he, with last year's Award winner, Jim Wilson, brought children to Cuskinny Nature Reserve outside Cobh to give the pupils at the school a better chance to experience nature first hand.

These visits take place outside school time, in the evenings and on Saturday mornings. The children have constructed and maintained nesting boxes at the reserve since 1991. On their visits they record when nesting begins, eggs are laid, young are born and how many survive. And of course the type of bird using the boxes. The children report all their information to the school, where the results are filed under "Cuskinny File" and are annually forwarded to BirdWatch Ireland and the British Ornithological Trust. The school is one of the few schools, if not the only one, who has done this survey for so long in Ireland and England. And the trips to the reserve are not just about the birds. The children also study the trees, plants, insects and other wildlife of the areas. It is an ongoing learning process for everyone, giving the children an overall experience of Cuskinny.

Under William's guidance, the children also carry out a Winter Garden Bird survey each winter in their home gardens. In all 35 species have been seen in the gardens of Cobh in the winter of 2005 and 2006, with the blackbird at number one.

Another project is daily weather recording. The school began recording rainfall in 1991, followed by the recording of temperatures and wind speed. The pupils record it everyday from September to the end of June and the results form part of the everyday lessons of the class. At the end of the month the pupils write a report of the month's weather. They can now compare months with past years. In fact some can now check the graph for the month they were born and see the type of day it was!

The result of all the surveys are published in the local town newsletter "The Great Island Community News" and finally the class are involved in the "Dawn Chorus" organised by "Mooney Goes Wild".

This wonderful initiative for the children is the brainchild of William McSweeney, who gives so much of his time both inside and outside school time to guiding the children of his class to nature's ways.

Photo: © Robbie Murphy

Matt Murphy presenting the Sherkin Island Marine Station Award 2005 to William McSweeney.

In a time where volunteers are becoming more and more scarce, it is wonderful to see the commitment that William has to teaching children about their natural surrounds. I am convinced that the children William has taught will have been instilled with a wonderful appreciation of nature and that they will carry this with them through their lives. Who know where it might lead?

He is as, I said, the sower of the seed and an example to us all. Now I ask him to accept this award for the wonderful work he is doing for the children and for nature itself.

Matt Murphy, Director, Sherkin Island Marine Station, Sherkin Island, Co. Cork.