



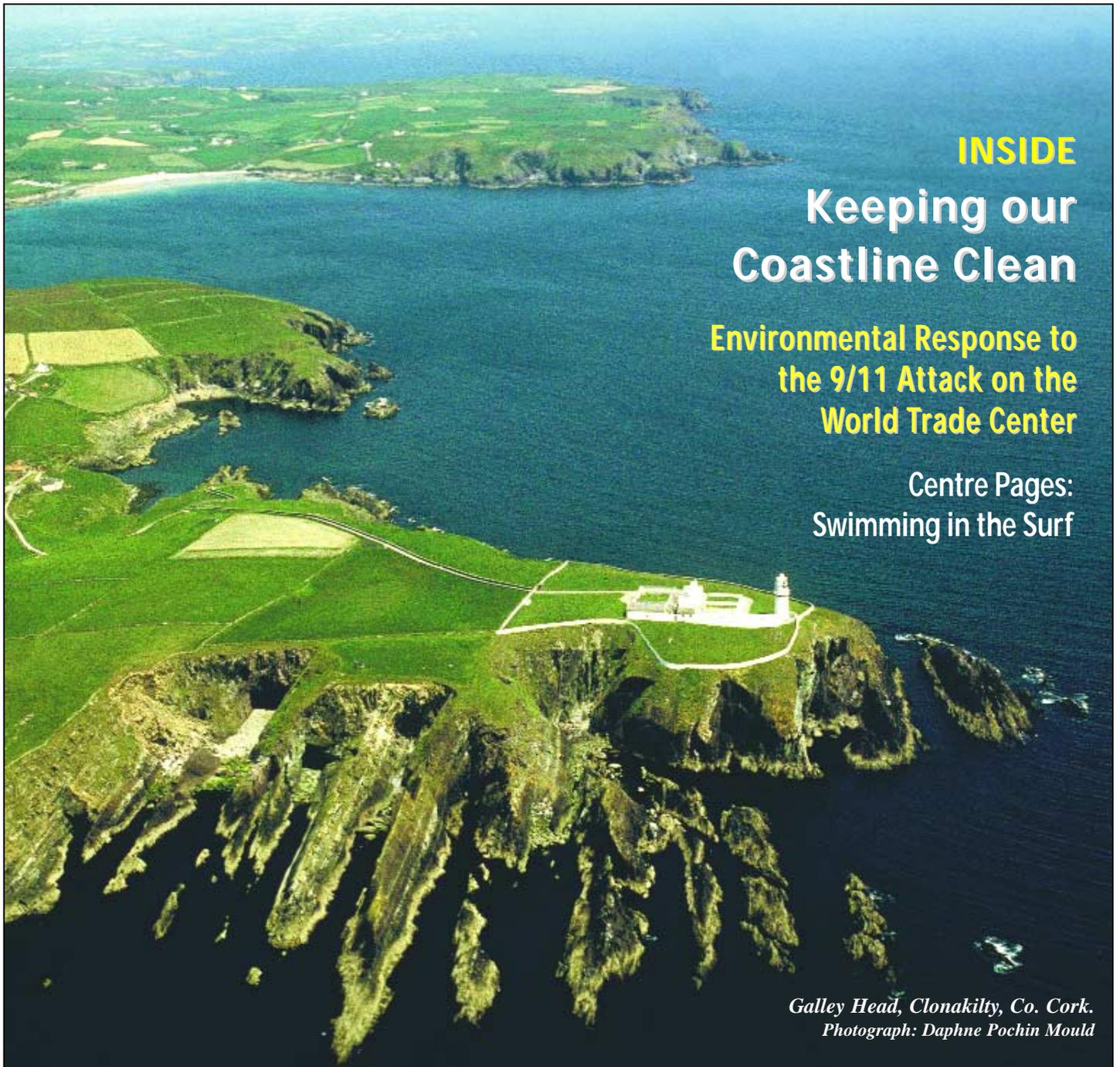
SHERKIN COMMENT

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Coastline Clean**

**Environmental Response to
the 9/11 Attack on the
World Trade Center**

Centre Pages:
Swimming in the Surf

*Galley Head, Clonakilty, Co. Cork.
Photograph: Daphne Pochin Mould*

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Editorial

Reducing Water Wastage

By Matt Murphy

THE recent announcement by the Minister for the Environment and Local Government, Mr. Martin Cullen, T.D., of a €278 million water conservation programme highlights the appalling waste of this natural resource which has been on going for many years.

- The aims of this programme are:
- Improving efficiency in water supplies
 - Elimination of wastage in water supplies
 - Deferment of capital expenditure on new supplies through reduced consumption
 - Improvement in services delivery and water quality

The present estimated cost by the Department of the Environment in respect of population centres over 5,000 inhabitants puts a conservative estimate of €180,000 on the value of unaccounted for water (UFW) each day or €66 million per year. If one is to look back over the past 20 years then hundreds of millions of euro were wasted on UFW. Over the years if this sum was invested in such things as waste management, we would be much nearer to a sensible approach to the disposal of waste. The National Water Study published in 2000 estimated that up to 47% of all water produced by water treatment plants is unaccounted for and that this level is higher in some parts of the country. Prior to this latest investment by government a number of counties were involved in an unaccounted for water (UFW) scheme. Reductions were significant for example.

In Dublin they reduced UFW from 42.5% to 28.7%

In Donegal	59% to 39%
In Meath	47% to 34%
In Kilkenny	45% to 29%

The Minister highlighted the Greater Dublin Area (GDA) with a population of 1.3 million. The GDA includes Dublin City, Fingal, South Dublin, Dun Laoghaire Rathdown and parts of Kildare and Wicklow. The GDA water supply services nearly 500,000 householders and has a total pipeline of 7,200 kilometres.

Daily consumption of water is 500 mega litres (130,000,000 gallons). This would fill the entire pitch area of Croke Park to a level of 5 metres higher than the Cusack Stand. Of the 7,200 km of pipeline 411km is over 100 years old, 754 km is 80 years and 900 km is 60 years old. So one need not be a genius to see the probable waste sources.

While preventing wastage of water through pipe replacement will make major financial savings, there are other major pluses to the consumer. In the

“People must be prepared to pay the very reasonable charges to local authorities rather than pay the massive increases householders now have to pay in Great Britain, with the privatisation of water supplies.”

Phase I scheme Donegal County Council had major benefits:

- Improved quality and pressure of supply to the consumers in the areas included in the project.
- A reliable supply of good quality water is available.
- Improved supply for fire fighting.
- Developments allowed to proceed in areas which previously had been refused due to lack of reliable water supply.
- Improved moral among staff involved in water maintenance due to training, metering, telemetry and leak detection equipment.
- Less disruptions to supplies during times of high demand and less consumer complaints.
- Improved management of the network leads to reduced operating cost.
- Accurate data on water consumption, pipe sizes, consumers, pipe materials.
- All schemes have been divided into District Metering Areas.
- Because of infrastructure put in place

and training the response time in identifying and repairing leaks has reduced significantly.

- Improved efficiency in operational and capital works planning thus maximising the value of economic investment in existing or proposed capital works.
- Improved management of infinite water resources for their beneficial use by all consumers and users.

There is no doubt this water conservation programme by the Minister is a most welcome development. The amount of €278 million will see major changes - all for the good. However water conservation must have the same high profile as recycling of waste. Water conservation is much easier to attain and can and will have major benefits. However, the next issue his Department must address is the water being wasted from households in the State. At present householders connected to mains water have free water supplies while those connected to group water schemes (GWS) pay an annual fee, which in some cases would be based on metered consumption. A conservative estimate would be that there is a 30% wastage (cost €15 million) from leakage, faulty tapes, malfunctioning toilet cisterns, excessive use of water when carrying out such simple duties as cleaning our teeth or watering our gardens. Major education programmes are needed to alleviate such wastage. A question must be posed - should we be charged for the water we use to make us realise that it will not always be the sustainable commodity it is at present?

Finally, it is essential that local authorities continue to have complete responsibility for the provision of water through treatment plants. GWS, which give significant water supplies to rural areas - about 11% of all household - must also be updated. People must be prepared to pay the very reasonable charges to local authorities and GWS rather than pay the massive increases householders now have to pay in Great Britain, with the privatisation of water supplies. There every householder has to pay for every litre of water used, at rates much higher than those in Ireland.

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Keeping Our Coastline Clean

By John O'Keefe

THE Republic of Ireland is a small country but possesses a lengthy and varied coastline. The coastline is often described as being about 5000 kilometres long but if every craggy inlet and island is taken into account the actual length is closer to double that figure. The coastline contains spectacular vistas, important wildlife habitats and is the living space for the majority of the country's population. It is one of the jewels of our tourism industry. It makes sense therefore to protect the environment we live in and to keep it as nature intended as far as possible.

Lets try in this article to keep away from the headline grabbing issues such as oil spills and dwell on our own contribution to fouling our coastal environment. No matter how severe once-off pollution incidents are, they rarely have long-term consequences. It is the continuous discharge of pollutants that normally overwhelms nature's recovery mechanisms. Its what we do with our waste and where it ends up year after year that really counts. And that is where you come in.

Flotsam and Jetsam

Ordinary everyday rubbish is ubiquitous over the entire coastline and growing in volume. Why is it a problem? Marine debris is harmful to marine fish, mammals and birds. It can be hazardous to craft through collision risk, propeller snagging or clogging cooling water intakes. It degrades the visual amenity both for own enjoyment and for our extremely important tourism industry. It reflects poorly on us as pollution is one of the yardsticks for a society in balance with itself and with nature.

Where does the flotsam and jetsam come from? These are old-fashioned words that used to describe the floating or cast

up wreckage from unfortunate casualties. Take a look at the photo opposite. I know it's not typical of every beach on the coastline but neither is it contrived. While it is possible that some of the waste came from a wreck or all the way from the new world it is very likely that the bulk is home produced. Lets think of the more likely sources: the fish box is probably the property of a local fish company or co-op and while it may have been lost overboard it may also have been carelessly or deliberately dumped from a myriad of other sources; the pot from a local shrimper was probably lost during a storm; the fibreglass boat debris may indeed have come from a wreck but more likely was dumped locally; the rope and netting was lost at sea or dumped overboard or from some pier; the plastic bottles and sheeting was dumped from ships fishing vessels or leisure craft at sea or into a river many miles inland. The important point to consider is that much of the waste is home produced and therefore within our power to remedy. The growing marine activity coupled with the increasing use of non-degradable materials clearly signals much increased marine debris is on the cards unless we take corrective action.

Biodegradation of marine debris

BIM, the Irish Sea Fisheries Board, has produced a poster illustrating the biodegradation timescale for many forms of marine debris. It makes for sobering reading: 3 months for a milk carton, 1 year for a biodegradable nappy, 50 years for Styrofoam and tin cans, 450 years for a disposable nappy, 600 years for monofilament netting. According to that poster most of the waste in the above photo will survive for hundreds of years. With marine debris lasting over that timescale it is clear that if we want our coastline clean we have only two options: (1)

constant shore cleanup or (2) significant reduction in the dumping of waste. You can help by joining the many local communities who organise shore cleanups and until we change our attitude to marine waste this form of community action will be necessary on a regular basis. You can put pressure on port and local authorities to provide the port reception facilities required under international agreements. However the key to the problem is undoubtedly to change our own behaviour.

Reducing the volume of waste generated in the first place is not impossible. Eliminating waste dumping at sea or on the shoreline is achievable. It largely depends on our attitude. To give you examples: The Tidy Towns campaign has transformed many of our villages and towns to the point where rubbish dumping and dereliction is unacceptable to the majority of residents in those towns. Another example is hillwalking which has in recent years become very popular in Ireland. The pioneers of this pastime put great store on respect for the environment and the many enthusiasts now on the hills have bought into this ideal and are fastidious about eliminating waste. Anything brought onto the hills and not consumed is brought back home. As a result there is remarkably little waste to be seen. Surely our coastline is as spectacular as our hills and deserves the same respect?

Ask yourself what can I do? If you are a fisherman, fish farmer, sailor or yachtsman you can see that much of the waste is generated by you or your colleagues. You can also see that much of this waste is not easily degraded naturally. Bring ashore your waste. Place it in the dedicated waste receptacle that harbour authorities are now required to provide. If one is not available at your pier, marina or landing place bring the waste home for proper disposal. Agitate for the removal of unsightly wrecks rotting or rusting on the



Flotsam - modern style.

seashore. Do not leave nets and gear in untidy fashion on piers or on foreshore where they will be unsightly and hazardous. Dispose of damaged netting properly. There is great community spirit in coastal areas. Harness that cooperation to undertake cleanups and the provision of waste receptacles.

If you are visiting the beach deposit all your cans, bottles, nappies, bags and wrappers into the proper disposal receptacle. If none is available bring your waste back home with you. Remember Ireland is a windy place and the use of solid reusable food containers rather than light wrappers at the seaside will reduce risk of material blowing away in the wind. Even if you reside miles from the shoreline bear in mind that bottles, cans, plastics and balewrap are constantly being transported to the coast by rivers.

Coastal sewage treatment

I want to end this article on a positive note by paying tribute to the many people who have prepared the plans and are currently implementing schemes to rid us of the main cause of coastal water pollution i.e. untreated sewage arising from the concentration of our cities and towns along the coast. I am glad to say that there is positive progress to report. We are about to witness a massive improvement in coastal water quality as huge schemes for secondary treatment of sewage will shortly be brought into operation in all our coastal cities. This will transform our perception of and enjoyment of the waters near our cities. An example of the scale of change is Cork



Indestructible monofilament netting.



Ubiquitous polystyrene foam.

City's €270 million main drainage and treatment scheme that will clean up the city quays and harbour for the first time in centuries. This scheme is due to come into effect in early 2004 and similar schemes in Dublin, Galway, Limerick and other towns are well advanced. These engineering works, largely going unheralded, can only be described as revolutionary improvements to our

environment. Credit should be given to the unsung people in the Dept of the Environment, local authorities and the European Union for their vision and commitment in enabling these works to be carried out.

John O'Keefe is working in the marine environment for over thirty years.

Blue Skies, White Clouds and Red Sunsets

By Anthony Toole

IF a spoonful of salt is stirred into a cup of water, the salt will dissolve to give a clear solution. If the solution is left to stand, then provided the water does not evaporate, the salt will remain dissolved indefinitely. Even filtering through a fine mesh or porous paper will not separate the components of the mixture.

A mixture of soil and water, on the other hand, is opaque. On standing, the soil slowly settles to the bottom of the container, with the water lying on top. Filtering will separate the two completely.

These contrasts are due to differences in the sizes of the particles present, those

in the coarse suspension being more than a thousand times bigger than the ones in the solution. The larger particles can be clearly seen with the naked eye, while those of the solution are too small to be detected, even through a powerful microscope.

There is also a third kind of mixture, known as a colloidal system, in which the particles cover a range of intermediate sizes, and the behaviour is different again from those of the two extremes. These systems will allow the transmission of light, and sometimes appear transparent, like a

true solution, but are often translucent if the suspended particles are larger.

The word, 'colloid', comes from the Greek word for 'glue', and indeed glues and gums, when suspended in a solvent, are generally colloidal in nature. Their particles are strongly attracted to the solvent, with the result that they tend to be quite viscous when compared to a solution.

Sometimes, the colloidal particles are large, individual molecules, such as proteins, plastics or starch. On the other hand, they may be formed as large aggregates of smaller molecules, atoms or ions. Mixtures may be made up of almost any combination of solid, liquid or gas. In fact, the only mixture that does not exist in colloidal form is one consisting solely of gases.

Paints and jellies, for example, are made of solid colloidal particles suspended in liquid. An emulsion, like milk, has liquid particles suspended in a liquid. When colloidal sized gas bubbles are dispersed through a liquid, a foam is produced, such as whipped cream.

The solvent in which the colloid is suspended is more correctly referred to as a dispersion medium. This can be a solid or a gas, as well as a liquid. If the dispersion medium is a solid, then colloidal gas bubbles can give rise to meringues or pumice. Solid particles in a solid medium result in such things as pearls and coloured glasses.

In fogs, mists and clouds, liquid particles are suspended in a gas, while smoke is an example of an aerosol, in which the colloid is a solid.



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Depending on their size, colloidal particles can some-

“The appearance of sunbeams is an example of this, in which light is scattered by particles of mist or dust suspended in the atmosphere.”

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times be detected under a microscope, by means of their ability to scatter light sideways. If smoke is observed through a microscope, while being illuminated by a bright light, tiny pinpoint can be seen to be jumping about continuously and randomly. This ceaseless motion is known as Brownian movement, and is caused by the particles being bombarded by the tiny, invisible but rapidly moving molecules of air. Particles in a coarse suspension are too heavy to be affected by this bombardment, while those of a true solution are too small to scatter light. Brownian movement is thus a characteristic phenomenon of colloidal systems.

It is this continual bombardment by tiny molecules that maintains the much larger colloid particles in suspension. If they coagulate together, then the result is eventual precipitation.

Clouds, for example, are made up of colloidal water droplets and ice crystals. If the temperature falls, water vapour from the surrounding air condenses onto these, increasing their masses until they can no longer remain suspended, and fall as rain.

Sometimes, colloid particles gather electric charges onto their surfaces. Repulsion between these charges keeps the particles separated. If the charges can be neutralised, the particles coagulate and drop out of suspension.

Smoke and dust are often charged in this way. Walls above hot water pipes also gather static electricity from hot air passing over their surfaces. If the wall carries a charge opposite to that of the dust particles, then it will attract the dust, which deposits onto the wall.

Colloidal clay in river water is precipitated by the charged ions in salt, as the river enters the sea, so that estuaries are usually surrounded by extensive mud flats. The same principle is employed when a salt like aluminium sulphate is added to the domestic water supply to precipitate colloidal materials and so clarify the water. Similarly, adding salt to a wound helps blood to clot. During soap manufacture, 'salting out' is used to precipitate soap from solution, so that it can be

collected as a solid surface crust.

Light scattering is an important property of colloidal systems. Light will pass unhindered through a solution, and is blocked completely by a coarse suspension. If the particles in suspension are colloidal, then the path of a light beam can be easily seen when viewed from the side. The appearance of sunbeams is an example of this, in which light is scattered by particles of mist or dust suspended in the atmosphere.

This phenomenon is known as the Tyndall effect. It was originally observed by Michael Faraday in 1857, but was more fully investigated and explained a decade later by John Tyndall, who was born in Leighlin Bridge, County Carlow. It leads to some interesting effects.

White light consists of radiation of different wavelengths. The shorter wavelengths give rise to blue light and the longer to red light. Intermediate wavelengths are responsible for the other colours in the rainbow spectrum.

Small colloidal particles scatter blue light more effectively than red. Smoke from a burning object appears blue because of this. When the particles approach the larger regions of the colloidal range, as in the water droplets in a cloud, all wavelengths of light are scattered, so that the cloud appears white.

The gases in the earth's atmosphere, nitrogen, oxygen etc., are present as small molecules, too tiny to have any effect on the passage of light. Suspended in the air, in addition to these gases, are particles of dust, ice crystals and water droplets, in the lower range of colloidal size. These allow the passage of light of longer wavelengths, but scatter blue light very effectively.

As sunlight passes through the atmosphere, this blue light is scattered towards the ground, causing the sky to appear blue. As the sun sinks, at dusk, the sideways scattering of the blue light leaves the red to continue, giving us the fiery spectacle of a glorious sunset.

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

Recycling Anything with a Plug or Battery

Cork County Council Prepares for the Waste Electrical & Electronic Equipment Directive

By Katherine Walshe

"ELECTRICAL waste is one of the fastest growing waste streams in Ireland. It is a source of valuable materials which can readily be recycled and which we must divert from landfill", according to Minister Martin Cullen, Minister for the Environment and Local Government, on 19 February 2003 when he launched the inaugural meeting of the Taskforce on the Implementation of the EU Directives on Waste Electrical and Electronic Equipment (WEEE) and on the Restriction on Hazardous Substances (RoHS). The taskforce has been asked to develop recommendations on how the Directives should be implemented in Ireland.

Commenting on the growth of electrical and electronic waste Minister Cullen said: "New versions of consumer products are constantly being launched. Built-in obsolescence and constant pressure to keep up with new developments mean that more and more electronic goods are being purchased. Economic growth and greater personal wealth allow more of us to enjoy the benefits of new technology from DVDs to PCs, from specialised equipment in the kitchen to sophisticated life saving equipment in our hospitals. However, the downside of this technological revolution is the significant growth in electronic waste, now estimated at around 1.6 billion tonnes in the EU every year".

The goal of the task force, which consists of a wide range of people from the manufacturing and retailer sectors, central and local government, and the EPA, is to develop an efficient system for the management of electrical waste in Ireland and to ensure the use of hazardous materials in electronic components is restricted in accordance with the new EU Directives.

In particular, the taskforce is being asked to develop proposals for a Producer Responsibility Initiative for e-waste, whereby the producers of electrical and electronic goods will be obliged to put in place systems to ensure that such waste is collected and recycled to the greatest extent possible. In accordance with the WEEE Directive, by August 2005 owners of e-waste will be entitled to leave that waste back free of charge, either to the place of purchase or to other authorised collection points.

EU Directives on Waste Electrical and Electronic Equipment (WEEE) and the Restriction of the Use of certain Hazardous Substances in electronic and electrical equipment (RoHS) came into force on 13 February 2003. The Directives are required to be transposed into

Irish law by the 13 August 2004. Arrangements for the actual operation of the Directives must be put in place in stages from 13 August 2005. For example, the requirement for producers to provide free take-back facilities for waste electrical equipment will come into operation from that date.

The Directives are intended to minimise the environmental impact of electrical and electronic waste. They follow the producer responsibility model whereby producers of electronic/electrical products must take responsibility for those products at the end of their life. It is proposed to implement the WEEE/RoHS Directives by way of an industry-led producer responsibility initiative

"The type of equipment these sites accept is essentially "anything with a plug or battery" and includes items such as: washing machines, refrigerators, cookers, computers, TVs, HiFi stereos, toys and fluorescent light tubes."

underpinned by legislation. Implementation will therefore require close co-operation between all stakeholders - producers, retailers and central and local government.

In anticipation of the new Directives coming down the track, Cork County Council at the beginning of 2000, decided to take part in the WEEE Collection Trials Project administered by the Environmental Protection Agency, co-ordinated by the Clean Technology Centre of the Cork Institute of Technology and financially assisted by the Department of the Environment and Local Government under the Environmental RTDI Programme 2000-2006. The purpose of the project is to examine the best ways in which this type of waste can be collected and recycled in County Cork. The project data on waste arisings, public response and attitude towards WEEE recycling as well as financial implications are being collected and analysed. The involvement in the project is in line with the Waste Management Plan for County Cork.

For the project, Cork County Council is availing of the services of AVR-Safeway, a company operating from an EPA licensed hazardous waste facility in Fer-

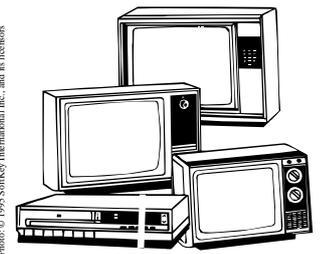


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may. The project started by setting up collection points for all types of household WEEE at three civic amenity sites: Derrycornell (Schull), Raffeen and Youghal, each catering for a different population density area. As the Raffeen Civic Amenity Site has recently been closed for development, the trial for Raffeen has been relocated at two new sites, namely Macroom and Rossmore (Carrigtwohill).

A two month long promotional campaign followed which aimed at informing the public about the availability of WEEE recycling facilities and of their locations. Special emphasis was placed on increasing public awareness regarding the potential hazard for the environment represented by inappropriate management and disposal of the WEEE. Public response was immediate and there were many people travelling quite long distances in order to dispose of their WEEE properly.

The type of equipment these sites accept is essentially "anything with a plug or battery" and includes items such as: washing machines, refrigerators, cookers, computers, TVs, HiFi stereos, toys and fluorescent light tubes. As many items of electronic and electrical equipment contain hazardous substances, it is essential that when people throw away their old equipment, these substances are managed in an appropriate way. Only approved methods and facilities can be used in recycling the collected waste.

During the first six months of the project, a total of 118.6 tonnes of electric and electronic waste were collected and treated from the participating civic amenity sites in County Cork. This is a clear indication of the strong interest this project has generated. The results of the WEEE Trials Project to collect waste from electrical and electronic equipment will be made available towards the end of this year.

Katherine Walshe, Director of Environment, Cork County Council, County Hall, Cork.



View from EPA Office in Lower Manhattan on 9/11/01

By Kathleen Callahan

ON the morning of September 11, 2001, after the first plane hit the North Tower of the World Trade Center, the United States Environmental Protection Agency (USEPA) activated its emergency response staff. Over the ensuing weeks and months USEPA staff continued to address environmental issues on numerous fronts. USEPA undertook these actions as part

of a massive federal effort to support New York City.

USEPA immediately dispatched monitoring teams throughout the areas of lower Manhattan, Brooklyn, and Northern New Jersey, directly across the river from the World Trade Center (WTC) site. Initial tests were taken of the bulk dust material that blanketed the area immediately surrounding the collapsed buildings. This material was finely pulverised concrete and structural materials as well as building supplies and furnishings.

EPA began to take air sam-

ples for asbestos, since it was known from the 1993 bombing of the WTC that some parts of the building steel structure were coated with asbestos as a flame/heat retardant. Tests were also taken on and around the debris pile of the destroyed buildings which were burning at extremely high temperatures, initially in the range of 1800-2000°F (982-1093°C), for gases and volatile organic compounds (VOCs), such as, benzene. This was done primarily to identify potential hazards to the first responders (fire fighters, searchers for survivors, operators of equipments for debris removal). Within a few days EPA brought in an on-site mobile laboratory to conduct rapid turnaround analysis of over 150 VOCs and provided daily results, within hours, to New York City (NYC) emergency management personnel. The air sampling network was quickly and progressively expanded in terms of the number of samplers and the contaminants analysed. In addition to asbestos, we added sampling for metals and semi-volatile compounds that were combustion related (such as dioxins). Several rounds of sampling for VOCs were done at further distances from WTC site. EPA tracked particulate matter levels in air for fine particles (2.5 microns per cubic meter) and coarser particles (10 microns per cubic meter), as well.

As debris from the building piles was moved, it was trucked to nearby river sites, loaded on to barges, and transported to a landfill in Staten Island. EPA sampled air and dust at the landfill to assure the safety of workers sifting through debris and dust for

Environmental Response to the 9/11 Attack on the World Trade Center

evidence and human remains, as well as the safety of those who reside in areas adjacent to the landfill.

On the debris pile at the WTC site, which became known as Ground Zero, however, there were VOCs found at high levels while the fires burned. For this reason EPA and other health and safety agencies warned workers and responders active at Ground Zero to wear Personal Protective Equipment, especially proper respirators, at all times.

EPA sampled drinking water from the water distribution system downtown and analysed samples from water towers on top of buildings. We did not find any levels above drinking water regulatory criteria. After early rain events EPA sampled run-off points along the Hudson River near the WTC site; elevated levels of some contaminants were found; however, by the second rain event after the disaster the run-off levels returned to normal. EPA also sampled water from the Hudson and East Rivers and wastewater from a sewage treatment plant in Brooklyn that accepted wastewater from lower Manhattan. EPA did not find levels that posed either human health or ecological concerns.

Over the course of ten months EPA took 24, 500 samples of air dust, drinking water and river water. Because many were analysed for more than one pollutant, these samples yielded more than 212,500 results. EPA cleaned and/or tested 4,120 residences and the common spaces (hallways, stairwells, basements) in 144 apartment buildings. EPA also cleaned the heating, ventilation and air conditioning systems of 28 buildings where world trade center dust was still observable.

EPA vacuumed dust from the streets, parks and other public spaces using Supervac trucks with high efficiency particulate air filters. EPA ran worker and truck washing stations in both lower Manhattan and on Staten Island to prevent dust from migrating from the recovery work sites. In November, 2001, EPA erected what is thought to be the largest worker wash/deconta-



An air sampler right off Ground Zero



Sampling in Brooklyn on 9/11/01



Contractor doing Residential Cleanup



Air testing of residential apartments

mination tent in the world, a 31,000 square-foot heated structure at which workers could vacuum, wash off, shower and get a hot meal from the Salvation Army.

Lower Manhattan residents were concerned about the safety of their apartments regarding dust that was deposited when the WTC towers collapsed. EPA responded by forming a task force with other federal, state and city agencies to evaluate this situation. This effort led to EPA and New York City developing a voluntary program to pro-

vide professional abatement cleaning services to residents of lower Manhattan, cleaning their apartments, common spaces in apartment buildings, and heating and ventilation systems that still contained dust from the WTC collapse. After cleaning, apartments and other areas were tested to see if asbestos remained in the air. This cleanup program is being completed now. Studies were also done on effectiveness of cleaning techniques and background levels of contaminants in upper Manhattan areas that were not affected by the WTC

results of these studies in the near future.

Based upon the data collected, EPA has drafted a risk evaluation. Its findings are 1) persons exposed to the extremely high levels of ambient particulate matter and its components during the collapse of the WTC towers and for several hours afterward were likely to be at risk from immediate acute (and possibly chronic) respiratory and cardiovascular symptoms, 2) the concentrations of contaminants within and near to Ground Zero were likely to be highest in the few days following September 11, and 3) except for the exposures on September 11 and possibly during the next few days, persons in the surrounding community were unlikely to suffer short-term or long term adverse health effects caused by ambient air concentration of contaminants.

By January, 2002, the ambient air in lower Manhattan had returned to pre-9/11 status.

Federal funding has been provided to federal and New York City health agencies to register exposed populations and track their health impacts over time.

Kathleen Callahan, Assistant Regional Administrator for New York City Response and Recovery Operations, USEPA, Region 2 Office.



A wash station to wet down and decontaminate trucks taking debris to barge sites



An aerial view of the EPA Wash Tent, with Towers of Light

Irish Seafood Producers Group

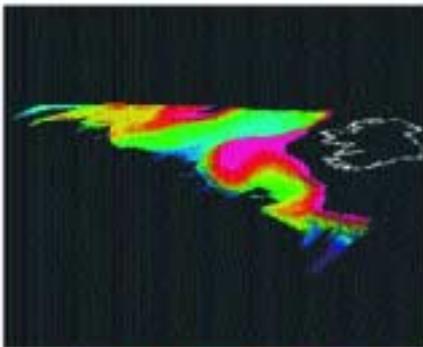
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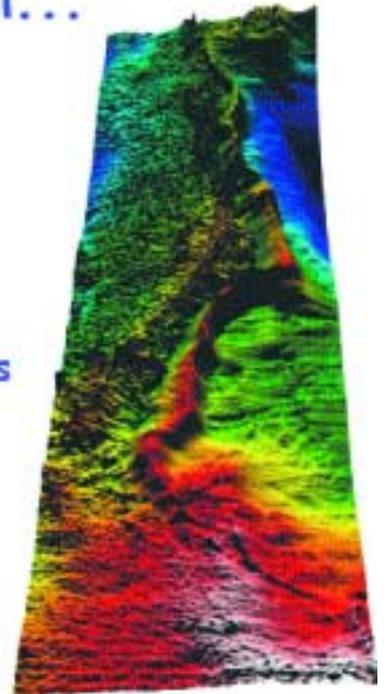
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Today, all Marcal paper products are made primarily or entirely from 100% recycled fibre content.

By Peter A. Marcalus

A Recycling Success Story

Peter Marcalus talks about “Closing the Recycling Loop with Marcal”, a business that has been in his family for four generations.

MARCAL Paper Mills, Inc., a fourth generation family business, started in 1932 manufactures high quality tissue and absorbent products in the US. Marcal produces a complete family of paper products, including napkins,

bathroom tissue, facial tissue, paper towels and granule absorbents for consumer and commercial use. The company’s products are widely distributed throughout the United States, primarily in the northeast, and are recognised

for exceptional value and performance.

Marcal’s recycling story began over 50 years ago, long before recycling to produce tissue products became popular in the United States. Today, all Marcal paper products are made primarily or entirely from 100% recycled fibre content. Much of the recyclable paper comes from municipal and office collec-

brought to Marcal’s Elmwood Park, New Jersey plant to be processed into paper products. Marcal purchases over 25 different grades of recovered fibre. Included in the “Marcal Mix” of recyclable paper grades are the following materials:

- Advertising Mail
- Books without Covers
- Colour Inserts from Newspapers

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At Marcal Paper Mills in Elmwood, Park, New Jersey, more than 190,000 tons of recyclable paper is processed each year. Magazines, school papers, flyers and thrown-away mail make up a large portion of recyclable paper.

tion programs that Marcal has set up, creating a continuous and sustainable supply of raw materials used to produce its products.

Marcal helps to make these municipal recycling programs successful by lowering waste disposal costs and by generating increased revenue for public and private recyclers. The U. S. Environmental Protection Agency has recognised the importance of recycling programs in creating jobs, saving natural resources and reducing the amount of material sent to landfills. An independent 2001 study by W. R. Beck revealed that recycling for ten U.S. Northeastern states significantly contributes to the economy by adding \$44 billion in annual revenues and creating 206,000 new jobs in the recycling and re-use industries.

Annually, Marcal recycles more than 190,000 tons of paper. Each day thousands of pounds of recyclable paper collected from hundreds of towns and businesses from throughout the Northeast are

- Composition Paper
- Computer Paper
- Construction Paper
- Fax & Photocopy Paper
- Glossy Catalogues
- Magazines
- Non-Metallic Gift Wrap & Cards
- Stationery & Envelopes
- Undeliverable Mail

Since Marcal carefully selects its recovered paper stock to produce high quality tissue products, the company’s recycling and papermaking processes are not designed to use newsprint, cardboard, chip board, food containers, paper bags, carbon paper or blue-prints.

Marcal has a capacity to produce over 150,000 tons per year of finished tissue products. Marcal’s paper recycling and manufacturing process begins with blending recovered paper grades in mixing tanks to form a wet pulp. Several cleaning stages involving environmentally safe detergents, high temperature water, and steam follow to remove inks, adhesives, clay coatings and other non-paper materials

The first part of the recycling process is to "de-ink" the recyclable paper and turn it into a pulpy mush. Marcal is one of only a few companies that can recycle papers with all kinds of coloured inks into household tissue products. To get the ink out, the paper is thrown into a large vat of hot water and detergents. This liquid is heated to about 110 degrees Fahrenheit. The hot liquid soaks the coatings off the paper and dissolves it into a grey mush, or pulp. When it is full, this vat can hold about 18 tons of pulp!



Photos © Marcal Paper Mills

After soaking in a mixture of water and detergent, the gray pulp is sprayed through a series of different-sized screens. This removes more elements, such as ink particles, glues, and other coatings. As the pulp is

screened, it gets cleaner and brighter. From here, the pulp is pumped into another vat. There, all of the remaining non-usable elements are removed.



from the cellulose fibres in the paper. This sanitises the fibres getting them ready for tissue production. All cleaned fibres then go through a final processing stage. Marcal uses pulp brightening agents that do not contain elemental chlorine. This process creates pulp that is bright and white using chemicals that are kinder to the environment than elemental chlorine.

Some Marcal products require additional softness or absorption features to meet consumer needs. A small percentage of primary fibres derived from plantation grown trees may be added to the recycled pulp. All finished tissue products are labelled with their appropriate recycled fibre content.

The finished pulp is then mixed with clean water and sprayed on to the fast moving, fine mesh screens on large paper machines. During the papermaking stage, technicians are able to control the flow of pulp to create specific performance features of the finished product. The pulp passes through a series of rollers that remove water and

During Marcal's paper recycling process, the very small cellulose fibres that are unacceptable for tissue paper production are screened out. Also extracted are the natural minerals that are used in many printing paper grades. Several years ago, Marcal recognised that there was an opportunity to combine these two materials to create a valuable absorbent granular material that Marcal calls "Kaofin®" product. Marcal now produces and markets over 40,000 tons per year of this new recycled product.

Through 12 patented processes, Kaofin® material is made into new products such as cat litter, industrial spill absorbents, livestock bedding and soil amendments. These Kaofin® products have remarkable absorbent and dust-free attributes and generally outperform the non-sustainable products they are designed to replace.

Kaofin® products have also been tested by a number of U.S. universities and independent labs and have been determined to be highly useful and environmentally safe. A unique benefit of Kaofin® products, as compared to most mined clay absorbent products, is that Kaofin® products are low in dust and free from hazardous airborne crystalline silica.

When consumers buy Marcal products, they are helping



to "Close the Recycling Loop" with quality paper and absorbent products which are sustainably manufactured in a way that preserves natural resources, reduces the burden on landfills and creates new jobs. For more information on Marcal's process and products,

visit our website at www.marcalpaper.com.

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Most paper recycling processes create some waste, but not at Marcal! All the printed coatings that are removed when the pulp is cleaned are collected in a large vat. These coatings are made mostly of clay. Marcal recycles this clay and makes a whole new line of absorbent products out of it!



Once the liquid is pressed out, the paper passes over huge, hot metal cylinders. Heated to more than 600 degrees Fahrenheit, this is the final drying step. A long blade lifts the fast-moving sheet of paper off the dryer. More than a mile of new paper is made this way every minute.

Near the end of the papermaking process, huge, nearly finished paper rolls are taken to an area for final processing. Here, the paper unwinds as it is fed into a special machine. Rollers guide the paper across cylinders that print a pattern on the fast-moving sheet.

A second set of giant rollers presses a texture into the paper as it moves through. As the paper is printed and pressed, a nearby machine makes cardboard tubes. Here, a long strip of cardboard is fed into a spinning device that rolls it tightly, glues it, and cuts it to a uniform length. These tubes await the nearly



control the paper's thickness. It then passes over a final drying cylinder called a Yankee Dryer where the temperature reaches 800° and virtually all of the remaining water is removed. Finally, the paper is wound into jumbo rolls weighing several tons each. Throughout the entire process, the paper is carefully inspected for quality to ensure that specific product standards are met.

The rolls are moved through Marcal's converting area where automated equipment unwinds, embosses, folds or rolls the finished paper, and packages the product into towels, napkins, bath tissue or facial tissue.

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We wish Sherkin Island Marine Station continued success with their valuable contribution to environmental awareness and protection.

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Greenland White-Fronted Geese

A Cause for Concern



The Owenmore slide shows a typical western blanket bog, natural habitat of dwindling numbers of Greenland White-fronts.

By Oscar Merne

MY first article in *Sherkin Comment*, back in 1989/90 (Issue No. 4) was about the famous Wexford Slobs, where thousands of wild geese, ducks, swans, waders and other waterbirds congregate for the winter months. I highlighted in particular the

flock of Greenland White-fronted Geese, for which the Wexford Slobs are internationally important, and which were the main reason for establishing the Wexford Wildfowl Reserve on the North Slob in 1968. This current article focuses on the Greenland White-fronted Goose, not just on the Wexford flock but on the population as a whole, and outlines a



The Little Brosna slide shows one of the best callows habitat of Greenland White-fronts, which are used by c.500 geese – one of the largest flocks in Ireland outside the Wexford Slobs.

conservation success story which may now be at risk of failure.

The Greenland White-fronted Goose is a distinctive, large, dark sub-species of the circumpolar Greater White-fronted Goose – so distinctive, in fact, that it is proposed to elevate it from sub-specific to full species status. The goose has a very limited range and has always had a very small total population. As the name implies, the geese breed in Greenland, on an ice-free tundra strip on the west side of this vast island. In the autumn the flocks migrate, probably mainly over the great ice-cap, to stage for a while in western and southern Iceland, before arriving on their wintering grounds in Ireland and Scotland in October. In the 1960s and 1970s the Wexford Slobs supported about 6,000 of these geese – at that time over one-third of the world population. The other very important wintering area was the Isle of Islay, a large, inhabited island off the coast of south-west Scotland, which equalled the Wexford Slobs in terms of goose numbers. Elsewhere the White-fronts were found in much smaller flocks, scattered among the bogs, turloughs, callows and other wet grasslands in Ireland, and at a number of sites on the west coast of Scotland from the Orkneys to the Solway Firth. The population at that time was estimated to be about 14,300 birds, following a decline from 17,500-23,000 in the 1950s. This decline was attributed mainly to loss of traditional wintering habitat through drainage, conifer

planting and disturbance.

To arrest this decline much effort was put into protecting this goose and its habitats and sites in both Ireland and Scotland, and an annual monitoring and censusing programme was put in place, involving both the state authorities and non-governmental

organisations. Regular counts at the two most important sites – Wexford Slobs and Islay – began in the late 1960s and showed a more or less steady increase until the early 1990s. Complete censuses of the entire wintering population in Ireland and Scotland were organised from the early 1980s and the results reflected the upward trend shown at Wexford and Islay. The increase was given impetus by the conservation designation of many of the most important wintering sites for White-fronts, and by introducing a moratorium on hunting the geese from the mid-1980s. By the mid-1990s the world population peaked at 33,000, more than twice the numbers estimated in 1979 and well above the numbers estimated in the 1950s.



White-fronted Geese in a potato field in the Wexford Slobs

which were out-competing the White-fronts for good nesting sites and food resources. Secondly, it turns out that while there has been a general trend towards global warming, the northern part of the White-fronts' breeding range has been experiencing significantly later spring thaws, causing some females to abandon breeding attempts. Added to the problems on the breeding grounds a third factor may be contributing to the recent decline in White-front numbers. It seems hunting White-fronted Geese while staging in Iceland in the autumn has greatly increased in popularity. Hunting bag statistics from Iceland show that up to 3,700 White-fronts are now shot each autumn, and this is well above the average number of goslings

produced each summer. Clearly this level of hunting is unsustainable and it is time to introduce internationally agreed measures to arrest the current decline. Already the population is half way back to where it was before the increase started. Maybe the best way forward is to activate the draft international conservation plan for Greenland White-fronted Geese which was produced at a workshop held in Wexford in 1992....

Initially it was difficult to understand what had gone wrong. On the wintering grounds everything seemed to favour the geese. Winters were getting milder, most of the sites used by the geese were protected and some were being managed to benefit the geese, and the birds were protected



The Wexford Wildfowl Reserve on the North Slob

produced each summer. Clearly this level of hunting is unsustainable and it is time to introduce internationally agreed measures to arrest the current decline. Already the population is half way back to where it was before the increase started. Maybe the best way forward is to activate the draft international conservation plan for Greenland White-fronted Geese which was produced at a workshop held in Wexford in 1992....

Oscar Merne heads the Bird Research Section of National Parks & Wildlife, Department of the Environment, Heritage and Local Government, 7 Ely Place, Dublin 2.



Towards Setting Guideline Values for the Protection of Groundwater in



This document presents proposals for the setting of environmental quality objectives and standards for groundwaters through the use of "guideline" values.

It provides useful information to all the Agencies and other bodies involved in the assessment of groundwater quality in Ireland by providing a consistent approach to conducting groundwater quality assessments.

The quality of groundwater is assessed through monitoring programmes for drinking water supplies, licensed activities and the EPA national groundwater monitoring programme.

The document is priced at €7 and is available from EPA Publications, McCumiskey House, Richview, Clonskeagh Road, Dublin 14. Ph: 01-2680100. Fax: 01-2680199 or on the EPA website www.epa.ie.



Inefficient Fishing and Bycatch

By Michael Ludwig

FISHING is inefficient. The degree of inefficiency varies with the gear but all harvesting practices suffer from being unable to select the catch before it is in hand. Trying to catch things you cannot see with devices that require they be greedy, lazy or unfortunate, are additional reasons for the inefficiency. Two environmental problems with fishing inefficiencies are 1) expanding amounts of damage to habitats and 2) captured species and sizes that cannot be used. As the demand for seafood increases, harvesting effort increases. To maintain fish stocks that sustain fishing effort, managers often make harvesting less efficient. However, every time a fishing inefficiency is invoked, fishermen try to neutralise its effect. Those two, opposite, efforts include where as well as how harvesting occurs. Areas considered unfishable just a few years ago are now routinely

fished. The result is that there are few natural sanctuaries left where fish can avoid nets, hooks, traps, spears or other harvesting methods.

We are seeing the collision of demand and supply played out "at sea" and in seafood stores. The outcome is not in question, only the date of the acceptance. Have you noticed that wild caught Cod costs more than farm reared Atlantic salmon? The public appears reluctant to accept that the oceans have limitations and that farm rearing has ecological benefits. Until acceptance occurs, traditional fishing practices will continue and we must find ways to sustain or recover harvestable levels of seafood species.

Two management options in use are "days at sea" and size limits. Not only do they effect harvesting, they work against each other. By reducing the time allowed to fish (days at sea), catches must be faster. By limiting size, catching enough of the right sizes become vital to success. If the target species congregate without regard for age or size, the conflict

becomes problematic. Looking back at our forefathers fishing practices, we see that they valued their effort somewhat differently than we do today. In hindsight, it was wrong but, when a fisherman caught a small (one or two pound) Cod or Haddock, they kept it. It hadn't spawned but the ecological consequences of keeping the fish seemed less important than the effort needed to land it and that it could be sold. Enter the word "Scrod." Scrod is a Cod or Haddock or other white meat, flake muscled, fish too small to filet and cure, but just right for a few single servings. Keeping those fish increased catch efficiency because the fisherman could keep more of the catch. With the introduction of powered boats and trawled nets, the practice continued, but the ratio of large to small fish changed as harvesting removed the target sizes. As landings increased and all sizes of fish were caught, fewer were able to grow to old age and both the pool of reproductive fish and the number of their progeny has declined. Larger fish have larger num-

bers of progeny. Because of the harvesting process, once the large fish are harvested, their replacements are not able to grow to old age prior to capture.

The American lobster industry is the textbook example of this situation. Left alone an American lobster can live for decades. Today, the preponderance of lobsters is less than ten years old. Why? In most places they do not grow beyond the legal size. (Maine is different; it has an upper and lower size limit.) To avoid landing lobsters that are illegal simply requires checking its shell length, retaining the "keepers" and discarding the illegal ones. Most American lobster harvesting uses traps or pots. Illegals can be released in good condition.

Which brings us to the problem of bycatch in the trawler fisheries. Dragging a net across the seafloor for a half-hour or more, packing the captured species into the cod end of the net, then rapidly hauling the catch out of the cold and pressurised depths, leaves the fish in poor health. If there are

rocks or species with spines or other sharp appendages in the net, the whole catch may be dead when it hits the deck. By the time the catch is sorted, almost everything is damaged or dead. The regulations say everything not meeting requirements must not be brought ashore. So, everything not legal is incidental to the catch or "bycatch." And, because it cannot be landed it must be discarded at sea. Shrimp fishing is routinely cited as the worst generator of bycatch, but I've sorted bottom fish catches where we had less than one hundred pounds of target species and several tons of bycatch.

Although there are some allowances for landing non-target species, they are for minor amounts. As fishing restrictions increase, fishermen are asking why they must discard so much of their catch even though it is dead and does little to help sustain stocks. Modern technology has enabled processing of ever-smaller fish and those products are routinely seen in the marketplace. Just as Scrod entered

the marketplace in response to the realities of fishing, many are investigating the consequences of landing everything that can be used from each fishing effort. Utilising bycatch appears to be an option. The option has problems with management and enforcement as well as uncertainty about stock impacts. And, if bycatch is used, it may put off the day when the public accepts that human needs are exceeding the limits of the Ocean's bounty. Clearly, if the stocks of consumable fish are to be sustained, either the use of trawl nets or the bycatch problem they create must be addressed. With the very survival of traditional fishing at stake, there is little time and fewer options available to fishery managers. All of the choices require hardships. However, there is certainty that doing nothing is unacceptable.

Michael Ludwig, NOAA, NMFS, 212 Rogers Ave., Milford CT USA 06460-6499

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Butterflies & Moths in the Garden

BUTTERFLIES and moths belong to the same insect order, the Lepidoptera (meaning scaly wings). Ireland has over 1,000 species of moth, compared to just 37 resident butterflies. They share many features of behaviour and appearance. Gardens are an ideal place to watch butterflies. Hours of enjoyment can be had observing these beautiful creatures dancing from flower to flower in June and July. Contrary to popular belief, many garden moths are also colourful, with beautiful wing markings to rival those of any butterfly. The majority are night fliers – to avoid predators – but a small number fly during the day alongside butterflies. As natural butterfly and moth habitats disappear at an alarming rate, a garden can be an important element in the survival of these insects.

ELEMENT IN THE SURVIVAL OF THESE INSECTS

Gardening for Butterflies & Moths

Gardening for butterflies and moths is easy and inexpensive and the results are well worth the effort involved. Here are some guidelines.

- Butterflies and moths visit gardens to drink nectar from flowers, so plant as many different nectar plants as possible in sunny, sheltered areas. Offer adult Peacock, Small Tortoiseshell and Red Admiral butterflies nectar from Buddleia, Lilac, Ice Plant, Marjoram, Scabious, Knapweed, Michaelmas Daisies, and Honeysuckle. Planting a wide variety of nectar flowers encourages many day – and night flying moths. Buddleia, Valerian, Scabious, Lavender, Candy Tuft and Hebe may be visited by moths such as the Migrant Silver-Y, the Large Yellow Underwing, Scarce Footman, Dusky Brocade, the Clay, Dark Arches and Shuttle-shaped Dart.
- In warm weather as plants experience drought, the nectar they produce becomes thick. Butterflies and moths are unable to suck thickened nectar. Watering the flowers keeps nectar thin. Collect a supply of rain water in butts placed under drain pipes from a roof top.
- Plant at least one Buddleia or butterfly bush and keep it pruned to encourage flowering. Buddleia is especially favoured by the Garden Tiger Moth and 18 species of butterfly. Plant in a sunny position and prune vigorously in March. Remove dead flowering spikes to ensure flowering from July to September. Buddleia does well grown in containers if you haven't much space.
- Position plants for butterflies and moths with as little bare earth as possible between them.
- Plant night-scented flowers to attract moths such as Bladder Campion, Evening Primrose, Sweet Rocket, Tobacco Plant, White Jasmine and Stocks. If there are lots of insects flying at night, bats may come to eat them.
- Grow caterpillar food plants such as Nettles, Ivy, long grasses and Nasturtiums.
- Avoid extensive paths or mown lawns.
- If possible, provide shelter from cold north and east winds.
- Plant ivy. The flowers produced in autumn are a source of nectar for Red Admiral butterflies and many moths. Peacock and Tortoiseshell butterflies may hibernate in Ivy over winter. Encourage ivy to produce flowering stems by pulling the top shoots away from their support so that they hang free. Ivy is also the food plant of Holly Blue butterfly caterpillars.
- Help preserve habitats for rare butterflies and

moths outside your garden. Don't buy peat-based composts, water-worn limestone or other materials that form vital natural habitats for endangered moths and butterflies.

- If you have to control Cabbage White butterfly caterpillars in your vegetable patch, never resort to chemicals. It's cheaper and more environmentally friendly to remove them by hand. Cabbage White butterfly caterpillars also eat Nasturtium so grow this plant as a diversion with your vegetables.
- Great nectar plants such as Marjoram, Thyme, Marigolds, Wallflowers, Nasturtiums and Ice Plant do well in containers and window boxes, so even the smallest garden can provide valuable food for butterflies and their caterpillars.
- Leave a corner of your garden to go wild to encourage butterflies, moths and other wildlife.
 1. In the mild heat of spring the Small Tortoiseshell (Ruán Beag) is the first butterfly to emerge from hibernation and is one of the commonest butterflies.
 2. The male Orange Tip (Barr Buí) is easy to identify on the wing. The tips of its upper wings are boldly marked with bright orange.
 3. By late spring the Large White (Bánóg Mhór) emerges and is a very conspicuous butterfly. It has white upper wings with black spots near the tips.
 4. The Peacock (Péacóg) butterfly uses the large eyes on its wings to frighten away would-be attackers. The Peacock lays its eggs on Nettles and produces an autumn generation of young butterflies which then overwinter in the hollows of trees, log piles or undisturbed buildings. It is seen in April and early May.
 5. The Common Blue (Gormán Coiteann) favours wild flowers in uncultivated pastures – it has two broods each year and is on the wing in early summer.
 6. In June the Holly Blue (Gormán Cuilinn) flits about the Holly and Ivy. It only flies for a few weeks each year.
 7. The Meadow Brown (Donnóg Fhéir) has dark brown wings showing large eyes against a background of orange. It flutters over long grasses in the garden.
 8. The Brimstone (Buióg Ruibheach) is the largest yellow butterfly in Ireland and is attracted to Buckthorn.
 9. In August the Red Admiral (Aimiréal Dearg) and 10. Painted Lady (Áilleán) butterflies migrate from southern Europe and Africa. They are too delicate to survive the winter here so the first ones you see will have flown thousands of kilometres to Ireland. At this time the 11. Wall Brown (Donnóg an Bhalla) and brightly coloured 12. Small Copper (Copróg Bheag) are seen flying in the garden.

Food for Butterfly & Moth Caterpillars

- Make butterfly caterpillars welcome. Nettles are essential food for Peacock, Small Tortoiseshell and Red Admiral Butterfly caterpillars and for Scarlet Tiger and Spectacle Moth caterpillars. Cut part of the Nettles back (check there are no caterpillars on them first) regularly to encourage fresh young growth. Limit their spread in the garden by growing them in a large container sunk into the ground in a sunny spot. Patches of long grasses and meadow plants including Fescues, Bents and herbs such as Clover, Ragwort, Bedstraw, Thyme and Bird's Foot Trefoil are essential for Speckled Wood, Gatekeeper, Meadow Brown and Ringlet butterfly caterpillars and for the

caterpillars of Large Yellow Underwing, Dark Arches, Drinker, Six-spot Burnet, Slender Brindle, Yellowshell, The Clay, Dusky Brocade, Ribandwave, Shuttle-shaped Dart and Silver-Y moths. Cut the "meadow" at the end of the summer when the grasses and flowers have set seed. Remove the "hay" afterwards.

- Trees such as Hawthorn, Gooseberry, Currants and Blackthorn are food plants for Magpie Moth, Buff Arches, Yellow Tail, Brimstone, Chinese Character, Nut-tree Tussock, Dark Dagger and August Thorn.
- Plant Ivy – the food plant for Holly Blue butterfly caterpillars.

When to Watch Butterflies & Moths

The butterfly season runs from April to September each year. The best months are probably June and July. Look out for moths in the garden in summer months as dusk falls. When it is dark a torchlight safari around your Buddleia bushes will reveal moths such as the Silver-Y, Willow Beauty, Mother of Pearl and Brimstone.

How to Attract Moths

Moths are attracted to lights. This may be due to the fact that moths navigate by maintaining themselves at a fixed angle to moonlight, but on cloudy or moonless nights they home in on any bright light.

A simple and cheap method of attracting moths to the garden is to spread a white sheet underneath a light and wait for moths to settle. Alternatively leave the bathroom light on and the window open! Be Careful to release them unharmed.

Count Butterflies & Moths in Your Garden

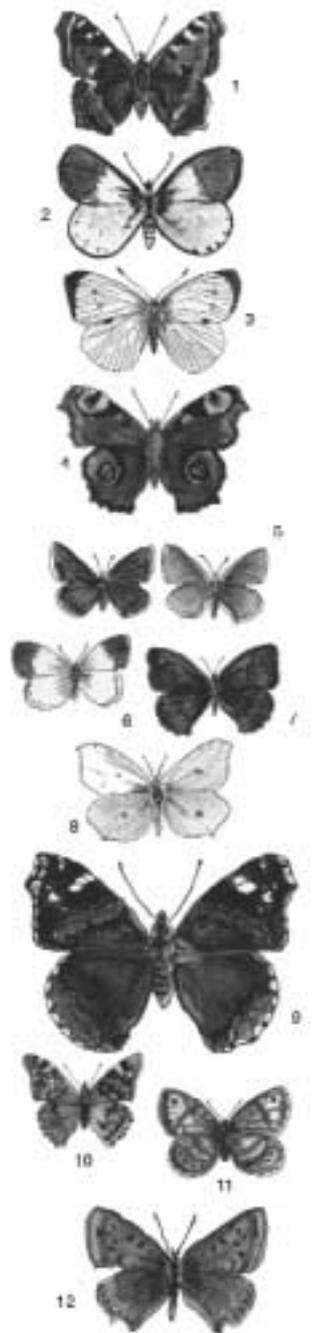
Less than 20 butterflies occur in gardens but literally hundreds of moths visit mainly at night. Recording butterflies and moths in the garden is easy and the information is of great value to ensure the conservation of these species. The survey form provided includes the butterflies commonly recorded in gardens and four day-flying moths you might also see in your garden. All you have to do is record number of butterflies and moths you see in the garden over the course of the year, and the exact date on which you see them. By making your garden butterfly and moth friendly you will increase the number and variety of butterflies recorded.

Garden Butterflies Count

The five most widespread garden butterflies are the Large White, Small White, Red Admiral, Small Tortoiseshell, Meadow Brown, Orange Tip, Green-veined White and Peacock. This is the kind of information and a lot more besides that has come from the Garden Butterflies Count co-ordinated by Butterfly Conservation, since 1990. The survey which, at present, is UK-based helps conservationists to monitor the commoner butterflies and to discover more about their behaviour. Further information from BUTTERFLY CONSERVATION, Manor Yard, East Lulworth, Wareham, Dorset BH20 5QP, England. Web site: www.butterfly-conservation.org. Irish butterfly records can be sent to the DUBLIN NATURALISTS 'FIELD CLUB (DNFC), 35 Nutley Park, Dublin 4 as part of the Millennium Butterfly Survey to record the distribution of butterflies in any location. A recording form is available on the Enfo sheet or the above organisations.

Threats to Butterflies & Moths

Habitat loss is the main threat to Lepidoptera mainly from land reclamation, removal of



hedges and tree felling, road widening, drainage and agricultural intensification. The use of insecticides is also a threat and kills not only butterflies and moths but many predatory insects as well, such as Ladybirds, Ground Beetles and spiders - the natural enemies of your garden's pests.

Further information is available on the "Butterflies & Moths in the Garden" fact sheet which, along with other fact sheets, is available from ENFO - The Environmental Information Service, 17 St. Andrew Street, Dublin 2. Tel 1890200191 (price of local call) Fax 01-8882946 Email: info@enfo.ie Fact sheets are also available at their Website: www.enfo.ie Text Prepared by Dr. Catherine O'Connell, Head of Education, Irish Peatland Conservation Council, 119 Capel Street, Dublin 1. March 2003. Butterfly Artwork Copyright Hugh W.L. Wier & Tomás Porcell, Bell'acards.

**The Wildlife Trusts
Handbook of Garden
Wildlife**

By Nicholas Hammond

New Holland Publishers,
Garfield House, 86-88 Edgware
Road, London W2 2EA, UK
www.newhollandpublishers.com

ISBN: 185974960-7

2002/£14.99 stg

This informative and well drawn guide is clearly written and easy to use. With nearly 400 species inside it any animal that you might see in your garden is likely to be found inside. The introduction tells you how to use the book, about the classification (naming) of animals, making your garden attractive to wildlife and much more.

With species of similar appearance on each page and large well drawn pictures, this book makes identification quick and easy for the beginner. Lots of fascinating background information on every animal is provided. It tells you how to tell animals apart from similar looking species, their habitats, behaviour, their value to a gardener and what they eat.

**Irish Trees Myths,
Legends & Folklore**

By Niall Mac Coitir

The Collins Press,
West Link Park, Doughcloyne,
Wilton, Co. Cork.

www.collinspress.com

ISBN: 1-903464-33-1

2003/Price: €20.00

An alternative tree guide that concentrates not on the taxonomic characteristics of trees as most florists, but on the folklore surrounding trees. This book inspires a love of trees in the reader by highlighting the myths, legends and folklore surrounding our native flora. The historical significance, the customs surrounding and the traditional applications of individual tree species are all brought to light. Enjoyable and well illustrated.

**The Complete Guide to
Ireland's Birds (Second
edition)**

By Eric Dempsey
& Michael O'Clery

Gill & Macmillan Publishers,
Hume Avenue, Park West,
Dublin 12.

www.gillmacmillan.ie

Publications of Interest

ISBN: 0-7171-3401-6

2002/Price: €24.99

A beautifully illustrated guide covers every bird ever seen in Ireland. The book provides in depth information on over 300 species and also brief descriptions on over 100 possible vagrant birds. Descriptions are provided for voice, diet, habitat and behaviour. Detailed pictures show identification features of males, females and juveniles and maps show the distribution of the birds.

The book also informs you about the history of Irish bird-watching, Irish races, migration, seabird colonies and habitats. This new edition includes changes in bird populations and distribution; extinction, declines, increases and re-introductions.

**Native Trees & Forests of
Ireland**

By David Hickie

Gill & Macmillan Publishers

ISBN: 0-7171-3411-3

2002/Price: €30.00

This book is a message, a call for conservation of our native woods and forests. Written as a celebration of the Peoples Millennium Forest Project, (a project attempting to restore the damage to our native woodlands). The volume contains many stunning photographic tree specimens as well as some useful taxonomic characters for identification. The history of trees up to the present day is documented together with some interesting stories about each species application.

Fear Sellafeld

By Colum Kenny

Gill & Macmillan Publishers

ISBN: 0 7171 3583 7

2003/Price: €12.99

From an Irish perspective, this book unambiguously tackles all the issues (fact and fiction) involved with the nuclear industry, more specifically, Sellafeld.

The author presents this information in a non-scientific very personalised format, gently introducing the science behind the technical concepts and workings of the nuclear plant. As a result the reader is lulled along effortlessly from page to page surprised by

their store of accumulated knowledge by the end of the read.

In short, the book gives a concise unbiased history of Windscale/Sellafeld, from its conception to its present day usage, exposing the problems/mistakes previously encountered and those yet to be adequately addressed.

**Choosing and Using
Statistics**

2nd Edition

By Calvin Dytham

Blackwell Publishing,
108 Cowley Road,
Oxford OX4 1JF, UK.

www.blackwellpublishing.com

ISBN: 1405102438

2003/£22.95 stg

A must for any biologist, this book is a straight forward step-by-step guide to help you choose the right statistical test for your data. The author gratefully understands that most biologists are not necessarily interested in how a statistical test works or how to do the calculations. Instead the book guides you to the correct test and runs you through carrying out the test on a computer using the packages SPSS, Minitab or Excel.

The 2nd edition is brought up to date with new versions of software and improved by feedback from the 1st edition - giving greater coverage of certain tests.

**Dugong Status Report and
Action Plans for Countries
and Territories**

By Helene Marsh, Helen
Primrose, Carole Eros &
Joanna Hugues

Available from IUCN
Publications Services Unit,
219c Huntingdon Road,
Cambridge CB3 0DL, U.K.

www.iucn.org

ISBN: 92-807-2130-5

UNEP/DEWA/RS.02-1

Price: £14.00 stg

Part of the Early Warning and Assessment Report Series for the United Nations Environment Programme. Its a comprehensive report on the endangered Dugong (Dugong dugon) and its distribution and abundance throughout the world. The book starts off by intro-

ducing the animal, its ecology and all the many threatening pressures. Then it takes a closer look at the distribution and the specific threats in all the countries and territories that its found in. It looks at current legislation, research and management and suggests further conservation initiatives through research and management for each area in its range.

**The Great Reshuffling
Human Dimensions of
Invasive Alien Species**

By Jeffrey A. McNeely

Available from IUCN
Publications Services Unit

ISBN: 2-8317-0602-5

2001/Price: €14.00 stg

Throughout the world there is the continuing introduction of alien species to habitats to which they would not naturally occur. These are generally beneficial (economically to humans) but on occasion can create disease, pest, ecological or conservation problems. Expanding populations, travel and trade is going to escalate the harm caused to health, economics or the environment.

This book is a collection of papers looking at the human influence which causes this problem and attempts to control or reduce the impact of alien species on ecosystems. Although it does not cover all aspects of invasive alien species, it does look deeply and thought-provokingly into a number of dimensions. The sections of the book look at human perceptions, economic issues, resource management, horticulture and future responses. A great resource for research.

**A Catalogue of Alien
Plants in Ireland**

By Sylvia C.P. Reynolds

National Botanic Gardens,
Glasnevin, Dublin 9.

ISSN: 0792-0422

2002/Price: €40.00 (hb)

€25.00 (sb)

This is a very careful work on alien plants by one of Ireland's finest botanists. It is a benchmark for any future study of these plants in Ireland, which have been more or less ignored by botanists to date.

Sylvia Reynolds hunted down specimens in the three major herbaria in Ireland and has consulted over 850 published works, which are all listed in the references and bibliography - a mammoth task in itself. The chapter on their history gives an excellent insight. It is difficult to understand why these plants have been neglected when over 920 alien plant taxa have been recorded in Ireland - past and present. The majority of which are flowering plants.

Highly recommended for the bookshelf of every botanist and plant lover in Ireland.

**State of the World 2003 -
Progress Towards a
Sustainable Society
20th Edition**

By Worldwatch Institute

Earthscan Publications Ltd.,
120 Pentonville Road, London,
N1 9JN, U.K.

www.earthscan.co.uk

ISBN: 1 85383 968 X paperback
2003/Price: £12.95 stg

This is the 20th edition of this book and it makes sober reading:

- 15 million hectares of tropical forest are lost to agriculture and logging
- The United States' carbon emission are up 17% since 1990
- Fisheries are in decline
- Water storage capacity is declining due to deforestation
- 38 million animals are smuggled from Brazil annually
- 80% of USA computers and electronics sent to Asia for recycling, being a threat to workers' health and the environment
- 27% of the world coral reefs are severely damaged.

Birds are disappearing which are most important, for example in feeding on fruits, scattering seeds in their droppings and eating insects. The eight chapters of this book make this a book a must for anyone interested in the environment.

**BLUE GOLD
The Battle Against
Corporate Theft of the
World's Water**

By Maude Barlow
& Tony Clarke

Earthscan Publications Ltd.,

ISBN: 1 85383 937 X

2002/Price: £20.00 stg

"Suddenly it is so clear: the world is running out of freshwater. Humanity is polluting, diverting and depleting the wellspring of life." So begins the introduction to this book. On reading the book there is no doubt that wars will be fought in the 21st century over water. Much is written about water shortages in the Third World but it is the USA which may have some of the most difficult problems. 21% of irrigation is achieved by pumping groundwater at rates that exceed the water's ability to recharge. Already farmers are hit by severe drought and dried up wells. The cost of closing American farmland because of the depletion of aquifers is over \$400 billion every year. Mexico has even worse problems - 70% of its water comes from aquifers which are being used 50% to 80% faster than replenishing.

Shockingly, worldwide international companies are zoning in on water supplies and are privatising them. The poor, as always, are suffering. Man's greed for profit, at any price, will create more poverty. Vital reading.

**Herring - Expectations for
a New Millennium**

By F. Funk *et al.*

Uni. of Alaska Sea Grant
College Program,
P.O. Box 755040, 205 O'Neill
Bldg., Fairbanks, Alaska
99775-5040, USA.

www.uaf.edu/seagrant

AK-SG-01-04/ISBN: 1-56612-070-5

2001/Price: \$40.00

Herring have contributed to major fisheries and have been important to coastal communities for centuries. The proceedings of the Symposium has eight chapters which comprehensively cover many aspects of research, including: Feeding, Competition and Predation; Growth; Hydrography; Environmental Impacts, Stock Assessment and Management.

The paper "The Role of Herring Investigations in Shaping Fisheries Science" makes compelling reading.

A decadal chronology of major themes in published herring research from the 1860s through the 20th century, to the present. We read how herring studies have contributed to several major developments in Fisheries Sciences. This is but one paper of 49 papers presented. A must for fisheries scien-

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Let Nature Guide Man and Create a New Civilization for Mankind

Professor Qu Geping

LADIES and gentlemen, during the current Mansfield Pacific Retreat successfully hosted by the Maureen & Mike Mansfield Center in co-operation with the Chinese People's Association for Friendship with Foreign Countries, we have had profound and enlightening discussions on the environmental issues from many perspectives, ranging from technology, law and policy to management. Now I would like to share with you some of my views on the future of human civilization in the new century from a cultural perspective.

Standing at the threshold of the new century, what can we say about the future? I cannot predict it for I am neither a futurist scholar, nor a prophet. However, as a veteran fighter for environmental protection, I believe that we will be able to create a better future if mankind works together and reaches a common understanding.

The twentieth century is characterized by industrial civilization. We are living in the civilization and enjoying all the benefits and convenience it has brought us. Information dissemination has become so much better than before that inter-personal communication and understanding of each other are a lot easier. We are surrounded by civilization both physically and mentally. Our thinking as well as our languages all bear its mark. But we have also realized with pain that the industrial civilization has estranged us from nature, from other people and from ourselves. We have even forgotten who we are.

It is high time for us to wake up. Mankind cannot but be alert to where the industrial civilization is leading us. Are we going to build on the planet a lifeless and apathetic world of machines? Will our homes inevitably slip into the bog of pollution? I reckon our children and our children's children, future masters of our planet, would not allow us to do so, and would hate to see such a prospect. In the new century, we and our future generations should rely on our wisdom to create a new civilization and a new homeland on the planet.

What would the new civilization look like? What shall we call it? We may call it "green civilization," "eco-civilization" or something else. Its main features, however, should remain the same: a new alliance between man and nature and between men themselves, and man's recovery of his lost self.

I am not able to give you a full picture of the new civilization here. But I understand that the crux of the value of the civilization would lie in a perfect integration of the ancient and modern civilizations, and of the Eastern and Western civilizations. This would be a brand new and attractive form of civilization.

The new civilization should readjust three relationships: the relationship between man and nature, between men, and that of man to himself. It is precisely on this point that the new civilization would bring to us an entirely new concept of value, distinguishable from the old industrial civilization.

Now I will try to describe the crux of the value of the new civilization.

Under the new civilization, what would the three relationships of most interest to mankind be like?

Under the new civilization, man's attitude towards nature should be: "Let nature guide man (Shi Ea Ziran)," as Lao-Tzu, an ancient Chinese philosopher, taught us in his Tao Te Ching. You must know the name Lao-Tzu, who

enjoyed the same reputation as Confucius, as one of the founders of Chinese civilization. His simple dialectic thinking has been accepted by the world. For example, the design of the national flag of the Republic of Korea embodies his idea "Yin plus yang means Tao (the Way).

To follow the law of nature does not mean that we should become slaves of nature like our early ancestors, who felt awed and prostrated themselves before the strange phenomena of nature as they knew very little, if not nothing, about its secrets.

Nor does it mean that we should follow in the footsteps of the founders of industrial civilization, who used science and technology to exploit nature for benefits and set their mind on conquering nature and becoming its masters.

Rather than becoming slaves or masters of nature, we should be its friends. To follow the law of nature means to acquire the wisdom of living harmoniously with nature, the most important wisdom to all mankind.

Environmental problems often result from our ignorance or insufficient knowledge of nature. Their ultimate solution does not lie exclusively in science and technology. In fact, we can often find their solution in natural ecosystems.

The ancient Chinese thought has an important concept, which calls for "integration man and nature (Tian Ren He Yi)." It pursues perfect harmony between man and nature. In the eyes of the ancestors of the Chinese people, forests are our hair, rivers our blood, mountains our heads and the earth our chests. Every natural being should be respected for its form of life. The same concept was found in many peoples' early history, such as that of the American Indians and the Mayan people. We should not think it outdated today. It is, on the contrary, what should be valued and carried on. When we come in touch with nature, we should feel grateful to it for our lives and all the happiness that comes with them.

The twenty-first century would be a century to see man forming all alliance with nature. He would find the value and truth of life in nature; and to follow the law of nature and integrate with nature would become the highest principle of mankind in the next century.

The second relationship that the new civilization should readjust is the relationship between men. The attitude of men towards each other should be "to befriend others." The great ancient Chinese philosopher Confucius said "It is harmony that is prized (He Wei Gui)," which means that peace and friendship are most important and that hatred and hostility should be discarded. We should not shift our own troubles onto others, nor seclude ourselves from others and refuse to communicate. Instead, we should respect, try to understand, learn from and help each other.

Since ancient times, our planet has witnessed countless wars. Whatever the cause, their results have been the same: devastating disasters to both mankind and the environment. Many civilizations even declined as a result of eco-system collapse caused by wars. The Mayan civilization is a typical case in point.

In the next century, should another war break out, there would be no winners but losers. It would be an unprecedented disaster to mankind. Man must learn to handle differences and conflicts between peoples and between states in a rational way. Burying the hatchet and turning swords into plowshares," seeking common ground while reserving differences through dialogue and consultation, and going for peaceful

coexistence should become important concepts of the new civilization in the new century. "Others are not hell." Instead, they are our teachers and helpful friends. Confucius said "Even when walking in a party of no more than three, I can always be certain of learning from those I am with." This is quite true.

The third relationship that the new civilization must readjust is man's attitude toward himself. The attitude should be to restrain desires and demands." The ancient Greek philosopher Socrates' admonition "to understand yourself" is still applicable today.

What does man need and how much does he need? I remember a Russian fable, which goes like this: One day, a landlord said to his farm hands: "Is it true that you all want land? All right, you start to run from the east to the west when the sun rises tomorrow morning, and return to where you start by sunset. All the land you have covered by then will be yours." The next morning, the farmers started running at sunrise. The fastest runner returned to the original place at sunset and should have expected the largest piece of land. However, he died of exhaustion. The landlord, after burying him in a hole, asked the remaining men: "How much land do you think a man really needs? You have all seen what he needs is only a small piece of no more than two meters long and one meter wide." This is thought-provoking.

If we do not control our desires and demands, I do not think our planet would be able to support the six-billion people today and the



Prof. Qu Geping, Chairman of the Environmental Protection and Resources Conservation Committee of the National People's Congress of China. Winner of the Blue Planet Prize 1999, awarded by the Asahi Glass Foundation to recognise individuals and organisations that have made major contributions to solving global environmental problems.

nine-billion in the next century. We must find a new point of balance between man's desires and the earth's bearing capacity.

At the age of 70 and as a veteran fighter for environmental protection, I feel that although I'm getting old, my will remains strong. Together with all friends, I am willing to work as an architect for the new civilization, and to contribute all my wisdom and energy to mankind's new homeland.

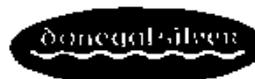
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Photo © Daphne Pochin Mould

The World's Only Herring Museum

fish today will be quick-frozen and beautifully packaged. Gone are the days of the barrel in the corner, the "buntata agus scadan" as Highland Scots called the meal, a pot of boiling potatoes with a salt fish or two on top.

So Siglufjordur, doyen of Icelandic herring ports, has, as well as its modern houses, colourful gardens, fish processing plants and harbour, the only herring museum in the world, sited in Roaldsbrakki, built in 1907 for Norwegians, Olav and Elias Roaldsbrakki.

On the lowest floor, you can see the stencils that the different firms used on the barrels, and other gear. A black and white film shows Iceland of the 40's and 50's in the last century, the women (most were women and very fast, piece work) at the salting. There are albums of old photos to look at, a display of tinned herring, the office of the old typewriter

and adding machine, ledgers, invoices. Upstairs, how the women (who came in their thousands to the summer work) lived, the bunk beds, the cooking stoves and pots, the valve radios played softly. And in summer time, they still go out to the line of salting troughs and re-enact the old days again.

In summer 2002, I found Siglufjordur in the middle of a week long music festival, ranging from classical quartets to Australians teaching the Icelandic children aborigine dances about kangaroos, whilst a Finnish group were all wearing T-shirts inscribed "Traditional Music Centre, Doolin" where they had just been. And in the harbour, I found a yacht, seeking repairs to its motor that had overwintered in Crosshaven, Co. Cork! And overall, a faint fishing smell, from the tall chimney of one of the processing plants.

By Daphne Pochin Mould

ICELAND plans to have done, by 2050, with fossil fuels. To use her abundant electricity (from water power and geothermal steam) to break the water molecule (H₂O) and develop a hydrogen technology in place of oil. Already, this year, 2003, three hydrogen

powered buses should be on the streets of Reykjavik. And if you ask what kick-started this small, technologically minded, go ahead nation into this sort of world leadership, the answer would be fish and in particular the herring. "Without herring it is questionable whether the modern society that now exists in Iceland could ever have been developed" (Icelandic Historical Atlas).

The World's only Herring Museum, Roaldsbrakki, built in 1907 for a Norwegian firm. Traditional fishing boat, and troughs for salting fish on wharf - a demo salting is done in summer for visitors.

Iceland in the 19th century was poor, remote from the rest of the world, but still with her pride, her language, her literature, and seas full of fish. The Norwegians arrived to fish herrings (and whales - which they did briefly in Ireland too). 1903 saw great fleets of their shops and a small town and port to service them in the long, narrow Siglufjordur, on Iceland's northern coast, the Arctic Circle just some 40km beyond. The Icelanders quickly got involved and took over the industry. 200,000 barrels of salted herring went out in 1916. Herring not wanted for humans was made into fishmeal for animal feed, and oil for a variety of uses. The first processing plant for this was built in Siglufjordur in 1991. Quickly, of course, other coastal ports and fishermen, developed the industry, the boats unloading enormous catches and the women gutting and salting them into barrels, working long hours through the bright summer "nights" to cope with the rush. For salting and drying were then the only way fish could be preserved, and exported. And once salted herrings ran at 25% of Iceland's whole earnings, even going up to 35% at times. They sold to Russia, Germany, America, and the Scandinavian countries, Denmark, Sweden and Finland.

With Icelanders, Norwegians, Russians, out after herrings in these northern seas, using more and more sophisticated gear, the end came in

1969. No herrings. (A ban on fishing in the Norwegian fjords, where the young herring develop, has resulted in a recovery). But your Icelandic



The thousands of women who came for the salting, were accommodated in bunk beds, and with basic cooking facilities.



Figure of a girl in the clothing worn for gutting and salting herring.



Stencils for the barrels of salted fish, of the various companies involved. In the heyday of the herring boom, fortunes were made and lost in the trade.



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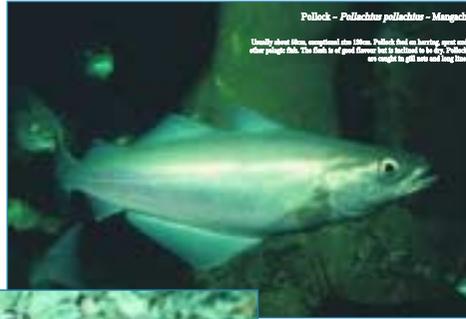
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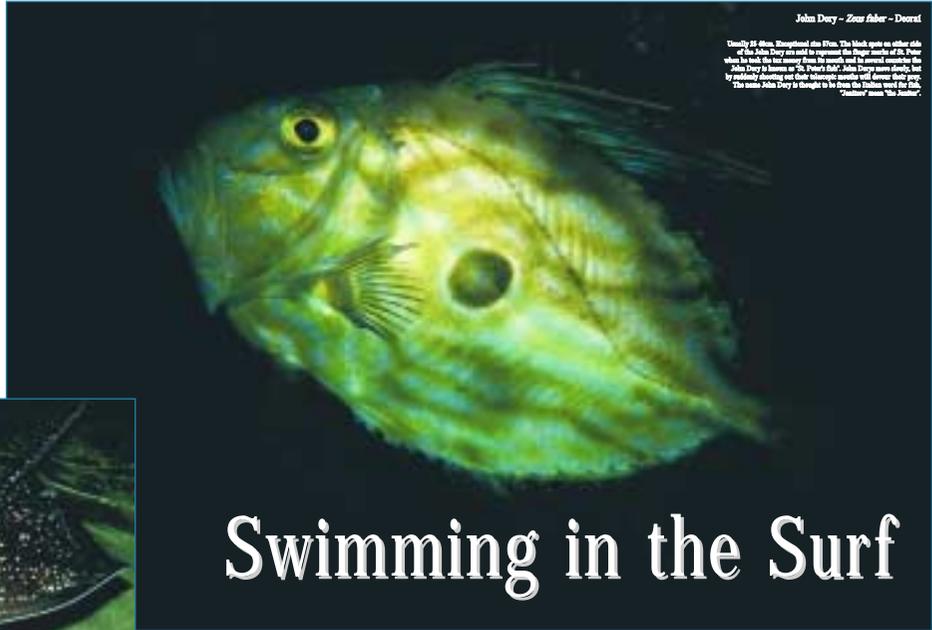
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Dublin Office Tel: (01) 825 8946 Fax: (01) 825 8847 E-mail: sean@kfo.com.net



Red Gurnard - *Aptirgala cucullar* - Cúidín dearg
 Average 30 cm. Maximum size 60cm. Gurnards make a grunting sound in water and also when they are taken out into the air. They live on worms, crustaceans, molluscs and small fish. Usually caught by trawl and long line. They must be handled carefully due to having sharp spines.



Pollock - *Pollichinus pollichinus* - Mangach
 Usually about 30cm, occasional size 40cm. Pollock feed on herring, sprat and other pelagic fish. The fish is of good flavor but is inclined to be dry. Pollock are caught in gill nets and long line.



John Dory - *Zoar doris* - Dóireáil
 Usually 25 cm. Uncommon size 50cm. The black spot on either side of the John Dory are said to represent the finger marks of St. Peter when he walked on the looney floor for seven years. The common name is John Dory because in St. Peter's day, John Dorys were plenty, but by mistake of having got their names confused with dories they say. The name John Dory is thought to be from the English word for fish. "John" means "the number".



Bass - *Dicentrarchus labrax* - Dolgan
 Length usually 30cm when adult. Maximum size 100cm. Bass are voracious predatory fish which feed on many kinds of pelagic and other fish. They have white flesh and an osseous called the white skin or the poor man's salmon. A popular fish with opening fishermen.



Thornback Ray - *Raja clavata* - Roc Garbh (adult)
 Length 80 cm, rarely larger than this. The upper side is spiny. The spines along the back of the tail are reduced in number in the case of the male adult Thornback ray. They feed on fish and crustaceans. The flesh is usually well flavored.



Common, Black or Dover Sole - *Soles soles* - Sáí Dabhl (adult)
 Length average 30 cm. Maximum 60cm. This fish is an crustaceans, worms and other small animals. They are usually found in shallow waters during summer but move out into greater depths in winter. The flesh, which is firm, is of very high quality. Sole are usually caught in trawl and seine nets.

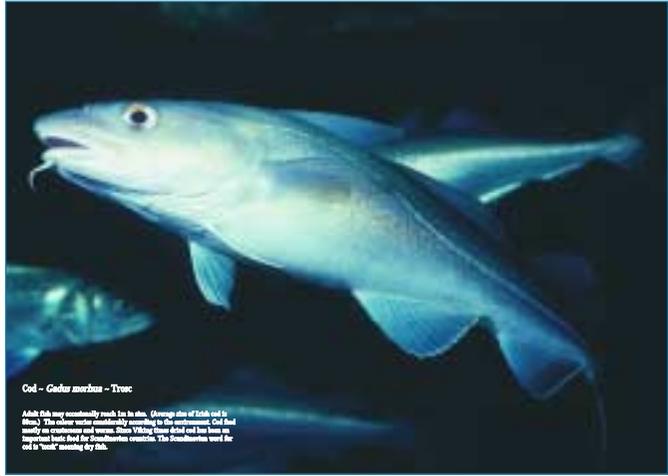


Photography by Paul Kay

www.marinewildlife.co.uk



Plaice - *Pleuronectes platessa* - Leathóg
 Maximum 50 to 60 cm when adult, occasional size 80cm. Plaice feed on molluscs, worms and crustaceans. The female plaice grows larger than the male. The male has a larger head. Some plaice can live as long as 20 years. Plaice are a very important commercial fish in Ireland. They are usually marketed fresh, packed in ice but some of the catch is filleted or smoked.



Cod - *Gadus morhua* - Tróc
 Adult fish very occasionally reach 1m in size. (Average size of Irish cod is 60cm). The silver color is particularly striking in the winter months. Cod feed mostly on crustaceans and worms. Since 1980s large fish and the large are important basic food for Southwestern counties. The Southwestern word for cod is "tróc" meaning dry fish.

Text courtesy of Bord Iascaigh Mhara - The Irish Fisheries Board

The Problems Facing the Management of Deepwater Fish Stocks

By Conor Nolan

THE effective management, of fish stocks, requires a knowledge of the species and the environment in which it lives in order to maximise output and profitability, whilst maintaining sustainability. Given the time and effort taken to get to this stage, it would be considered irresponsible to discount the consequences of the indiscriminate removal of fish, and justify exploitation purely on the basis of financial return. This, however, is the situation for a number of deepwater fisheries where sudden access to a commercially valuable and unregulated stock has created a race to cash in on the resource.

The exploitation of offshore, deepwater, fish stocks in the north east Atlantic began in the 1960s and 1970s. Basic biological information on these species was collected intermittently from landings, and was added to by observations made at sea to record the variety of new species coming from the depths. Little emphasis, however, was placed on the systematic collection of biological data, as these fisheries expanded. Instead, resources were directed towards managing the more traditional inshore species with the result that the routine collection

Codend of orange roughy coming aboard an Irish boat fishing in the deepwaters of the north east Atlantic.

and management of commercial deepwater fisheries data, essential to the understanding of the fishery, was not prioritised.

In 1979 significant populations of orange roughy, a marketable deepwater fish, were located off the coasts of New Zealand and southern Australia. In common with other species, fishing proved to be particularly appealing during the spawning season, when large concentrations of fish were attracted to relatively small areas. High price and consumer demand fuelled the rapid expansion of the fishery with few regulations, and high returns, maximising commercial investment. Technological problems were rapidly overcome, and techniques to determine the abundance of the resource were developed, albeit with practical and financial difficulties.

Although the orange roughy fishery off New Zealand is now strictly managed, distinct populations have followed a cycle of discovery, exploitation and dramatic reduction and have been fished down to an estimated 20 percent of their original size. In extreme cases, stocks have been reduced to dangerously low levels after periods as short as 7 years. In these instances, such populations have been protected from further exploitation, through the intervention of fisheries managers with the support of the fishing industry.

The most important biological parameters required for the successful management of fish



A fisheries biologist collecting information on the length and age of orange roughy by extracting the otoliths or 'ear stones' from within the head of the fish.



Blue Ling

stocks are those of age, size, reproductive rate and distribution. Although slow growth and a late age at maturity are generally assumed for deepwater species there is an active debate on the age and growth of orange roughy, in particular. Estimated maximum ages range from 20 to

Managing your Household Waste



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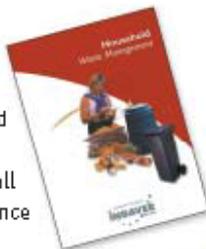
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Roughy and Sebastes

150 years old with the general opinion that the species is long lived. The importance of a resolution on this matter is related to the consequences that the growth and maturation rate has for management. For example, a species, which is very long lived and reaches maturity at a late age has a low level of productivity. To maintain the sustainability of such a population, any removal of animals must also be very low (e.g. 1% - 2% of the population) and be equal to, or less than, the annual recruitment of young fish. If this harvesting level is misguided, or ignored, then the stock can rapidly be taken down to a level, from which it will never recover. In many fisheries for orange roughy this has thought to have been the cause of their failure following a short period of abundance.

In the orange roughy fisheries of New Zealand, Australia, Namibia, Chile, the Indian Ocean and the more general deepwater fisheries of the north east Atlantic there is a general lack of knowledge on the whereabouts of young fish which complicates the management of these fisheries. There is also limited information available on many of the environmental and ecological factors, which may affect the overall population size, success and growth.

The lack of knowledge on the triggers or environmental queues which guide and influence localised spawning behaviour, coupled with the expense of dedicated research ship time to conduct spawning biomass and egg or larval fish surveys makes these assessment techniques very difficult to execute confidently.

Surveying the feeding and spawning aggregations of deepwater species using acoustics has also been frustrated because of the depth of occurrence of many of the aggregations and the sensitivity of these species to the low-frequency sound usually used to detect fish in deepwater.

In consequence, many fisheries for deepwater species report that it is difficult to assess the status of the stock, both due to the lack of information on the behaviour of the species, and due

to the depth at which the fish live.

The International Council for the Exploration of the Sea (ICES) agrees that new stocks of deepwater species and, in particular orange roughy are often overexploited before enough information is available to provide timely advice on management. The advice provided regarding the north east Atlantic, advocates strict limits on exploitation and close monitoring of stocks and populations.

Although the Irish quota allocation of 2372 tonnes of deepwater species in all ICES areas exceeded that originally proposed by the European Commission for 2003 and 2004 (Table 1), the majority of these quota species are those which are considered by ICES to be under threat and about which little is known. Other sensitive species such as the deepwater sharks remain non-quota and yet other species, with limited market demand, are also non-quota and are currently discarded.

The guardianship of deepwater fisheries is fundamentally a social responsibility, which rests with all those involved with the fishery. An interactive and proactive approach, similar to that currently operating between Irish boats targeting deepwater fish and specialists within BIM and the Marine Institute, remains a requirement for progress to be made. Continued logistical support and input from the fishing industry regarding the direction of research, complimented by the active participation and circulation of results by those gathering knowledge from the fishery is the responsible way forward and is crucial to the success and sustainability of these fisheries.

Long life may be a characteristic of the fish, but it remains our moral obligation to ensure that it is a characteristic of the fishery.

*Conor Nolan, Bord Iascaigh Mhara (BIM),
P.O. Box 12, Crofton Road, Dun Laoghaire,
Co. Dublin.*

SPECIES	NATION									
	BEL	DNK	FRA	DEU	IRL	HOL	PRT	ESP	SWE	GBR
Black Scabbard	0.0	0.0	36.6	0.7	1.3	0.0	56.0	2.6	0.0	2.7
Argentine	0.0	17.8	0.3	6.3	5.8	64.5	0.0	0.0	0.7	4.8
Tusk	0.0	0.0	47.8	5.8	3.9	0.0	0.0	3.4	1.9	34.8
Roundnose grenadier	0.0	25.4	63.0	0.3	5.0	0.0	0.0	1.2	1.3	3.7
Orange roughy	0.0	0.0	74.9	0.0	21.6	0.0	0.0	1.4	0.0	1.4
Blue ling	0.0	0.5	74.2	1.4	0.5	0.0	0.0	3.2	0.3	19.4
Ling	0.6	2.9	23.5	2.6	5.5	0.1	0.1	20.8	0.3	43.7
Red seabream	0.0	0.0	0.5	0.0	0.4	0.0	50.3	46.8	0.0	1.6
Total % of TACs	0.2	7.4	31.7	2.3	4.7	9.9	10.6	11.5	0.4	21.0

Table 1. Percentage total allowable catch (TAC) allocations for deepwater species, by species and nation, contained in Council regulation No.2340/2002 fixing for 2003 and 2004 the fishing opportunities for deep-sea fish stocks.



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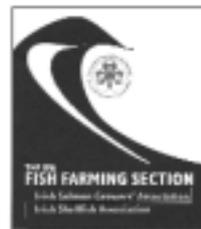
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Can we protect our remaining pristine waters?

By Martin McGarrigle

THE NEW Water Framework Directive requires us to look after our waterbodies in a new way. First, it takes an ecological approach to monitoring and managing our rivers, lakes, marine and transitional waters, rather than the traditional chemistry-based approach which European water directives have taken up to this – although in Ireland we have had a biological survey of water quality since the early 1970s. The Directive also sets a 2015 date for restoring all surface waters to ‘good’ ecological status at a minimum. Most impor-

tantly, if a river or lake is already of high or pristine status the Directive requires us to protect this high ecological status.

An examination of Irish river quality over the past 20 to 25 years shows that we are steadily losing our highest quality rivers. In the last complete national survey (1998-2000) there were just 100 sites from the total 3200 of sites surveyed that were of a quality approaching pristine. In the 1980s there were over 600 such sites. While most of these are still satisfactory in terms of water quality, their ecological status is degraded relative to what they were once like.

It is relatively easy to get people to agree to clean up obviously polluted rivers,

but it is much more difficult to raise funds and get agreement to maintain a high quality river or lake in its current high quality state. Often, restoration programmes merely bring a water body back to a mediocre state even after significant investment. But surely it is more important to hold on to our highest quality ecosystems with their irreplaceable genetic resources? The new approach of the Water Framework Directive explicitly requires us to protect our highest quality rivers, lakes and estuaries.

Some 3200 river sites on over 13200 km of main river channel are now surveyed by EPA biologists. All rivers on the Ordnance Survey catchment map of

Ireland are included in the programme. This survey has used the same basic technique since the early 1970s and it provides a unique perspective on the ecological status of Irish rivers. Obviously there is also an extensive physico-chemical monitoring programme on Irish rivers. While, on the one hand, serious pollution has largely been brought under control, the extent of eutrophication has been increasing over the past few decades. There has also been a decline in the number of highest quality stretches over the years; effectively sliding in quality to something less than pristine and eventually, perhaps, into a more eutrophic state.

We have seen dramatic land-use changes over the past 20 years. In the West of Ireland, the switch from hay-making to silage-cutting in the mid- to late 1980s was a fundamental change in land management. The resulting increase in slurry-spreading and in the use of artificial fertiliser – particularly on wetter soils – has resulted in increased loss of phosphorus to water. Irish agriculture still uses significantly more phosphorus each year than is required to produce the grass growth needed to feed the nation’s cattle and sheep. The surplus phosphorus accumulates in the soil or is lost to water; fuelling our eutrophication problem.

Phosphorus is often the most important driver of eutrophication in Irish rivers and lakes. Because it is usually in short supply in freshwaters, adding more phosphorus to a river will stimulate additional growth of algae or aquatic plants. With excessive algae and plants in a river, oxygen concentrations swing from high values in the daytime to low values at night. This is because plants produce a net surplus of oxygen in the



Photo: © 1995 SwiftKey International Inc. and its licensors

daytime, whereas at night photosynthesis switches off while respiration continues apace depleting oxygen in the overlying water. Thus, fish kills, caused by excessive plant biomass sucking

“An examination of Irish river quality over the past 20 to 25 years shows that we are steadily losing our highest quality rivers.”

dissolved oxygen from the water at night, are most likely to occur at night-time in summer during times of low river flow and high temperatures.

In the remote upland areas ecological quality is also deteriorating. Even in the most remote mountain regions a number of activities conspire to damage rivers and lakes. Sheep overgrazing, forestry drainage and fertilisation, drainage to create new pastures as well as peat harvesting in the flatter blanket bog regions all cause damage of varying degree. We see this in the loss of the more sensitive invertebrates – insects such as Perla and Dinocras, which are large stoneflies,

and pollution sensitive mayfly nymphs such as Ecdyonurus or Heptagenia. Drainage for forestry or peat harvesting can be a major cause of problems even before phosphorus is spread on the bare peat. Breaking up of the iron pan and release of peat silt causes the coagulation of ‘organic mats’ on the once-clean stony river beds. A musty-smelling coat builds up on the stones, often to a thick, rubbery consistency and usually coated with a metallic-coloured cyanobacteria, Oscillatoria. In other cases the rivers run red with ‘rust’ – iron oxide bleeding out from the drains coating over and clogging plants, mosses and spawning gravels alike. The impact of one-off houses is also growing apace. Some estimates from local authority surveys suggest that at least 50% of existing septic tanks are ineffective and leach nutrients and a range of domestic chemicals to water.

The new European Water Framework Directive provides a new catchment management approach which, hopefully, will enable us to reverse the trend and to protect and restore our highest quality rivers.

Martin McGarrigle, Senior Scientific Officer, EPA, Castlebar, Co. Mayo.

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Jerome Collins - Cork's Arctic Hero

By Paddy Leahy

In the graveyard of Curraghkippane, overlooking the Lee valley near Cork, one monument is unusual. A large stone Celtic Cross faces North, unlike all the other headstones which face either east or west. The story of the man from Cork City who was

York Herald. A wealthy eccentric, Bennett that same year had sent his reporter James M. Stanley to South Africa to find Dr. Livingstone, an expedition that was to make both Stanley and Bennett household names throughout the world. Collins met Bennett and they became good friends. Soon Collins was part of Bennett's social circle and was a well-

ship was unable to make further progress. The *Jeannette* was stuck fast. From that day on, until June of 1881, the *Jeannette* was held firmly in the grip of the ice. But the ice itself was slowly drifting north-westward, taking the ship unwillingly with it. It was to be 21 months of utter tedium for the unfortunate explorers. By hunting bears, seals and birds on the ice they kept themselves provided with food, but the tedium of the enforced confinement had a considerable affect on the crew, who could not even guess how long they were going to be trapped. But there was worse to come. On June 12, 1881, the ice crushed and sank the *Jeannette*, leaving the crew on the ice with all they could salvage from the ship. They had three lifeboats, tents, sleds, provisions and other equipment, but they were 750 miles south of the North Pole, their goal, and 500 miles from the Siberian coastline. The only course of action was to head south, hauling the three boats, laden with their equipment and provisions, over the ice. As they move slowly south and the ice started to break up a little, they were able to make faster progress by sailing the boats with makeshift sails.

In a violent storm one boat was lost with all ten of its crew. The other two

lost contact with each other but eventually reached the Siberian coast in late September. The boat with De Long and Collins landed on the delta of the River Lena, and the other boat landed about 150 miles to the north-west. The crew of the latter were lucky to find a native village, and were well looked after. De Long, Collins and the remaining eleven in their boat were not so lucky. After landing they trudged slowly south along the frozen Lena River, slowly weakening as they ran out of food.

"The only course of action was to head south, hauling the three boats, laden with their equipment and provisions, over the ice."

On October 6, one of the men died, as De Long wrote in his diary "What is to become of us!" At this stage De Long decided to send the two fittest men ahead to find help. These two men

eventually reached a village, but could not convey to the natives the plight of the seven men still struggling to survive. By October 30 four more had died and De Long recorded a poignant last entry in his diary, "Boyd and Gortz died during night. Mr. Collins dying."

Collins, de Long and the surgeon died soon after.

Because of the winter conditions and the remoteness of the location it was some time before the bodies were found and even longer before they were brought back to New York.



Jerome Collins

It was November 1883 before the bodies of the men left Russia on the long overland journey to Hamburg, from where they were taken to New York.

After ceremonies in St. Patrick's Cathedral, the body of Jerome Collins and also that of his mother Ellen who had died early in 1884, were brought aboard the City of Chicago for the journey across the Atlantic to Cobh. On arrival the two caskets were brought to St. Colman's Cathedral, and following a Requiem Mass on Sunday, March 9, 1884, the remains of Jerome and his mother were brought by boat to Cork and thence to the graveyard at Curraghkippane. The Mayor and Corporation of Cork and all the dignitaries of Cork were joined by a huge throng which followed the funeral out through Shanakiel to Curraghkippane. There mother and son were interred next to the old ruined Church.

Jerome Collins, Engineer, Meteorologist, Journalist and Arctic Explorer, had come home.

Paddy Leahy, Skibbereen, Co. Cork.



The Jeanette - anchored off Vallejo and Mare Island Navy Yard, California.

buried there on a cold wet day in 1884, is a long story. It encompasses a career as a civil engineer, as a meteorologist and journalist, a voyage on the steamer *Jeannette* to find a route to the North Pole, and finally a lonely and tragic death in Northern Siberia.

Jerome James Collins was the eldest of five sons born in South Main Street, Cork City, in October 1841 to Mark Collins and his wife Ellen (nee Ryan). He excelled in the Presentation Brothers School at Lancaster Quay, and later became apprenticed to Sir John Benson, the designer of many of Cork's buildings and bridges. When the North Gate Bridge was replaced by a Benson's cast iron bridge, Jerome Collins was the resident engineer on site. The bridge was built in eleven months and was officially opened by Cork's Mayor on St. Patrick's Day in 1864. Shortly afterwards, Jerome, whose father died some time earlier, emigrated to America with his mother and his two brothers, Daniel and Bernard. Another brother stayed behind to manage the business. Descendants of Daniel are still in the U.S., and Bernard moved to England where he has descendants in Essex.

In America Jerome worked as a surveyor for the Northern Pacific Railroad, and then as a surveyor in New Jersey. But his interest in weather and its patterns brought him into a new career in meteorology. He developed forecasting methods and made a name for himself as an expert meteorologist, using observations made in America to predict the weather on the other side of the Atlantic. In 1870 he came into contact with James Gordon Bennett, the wealthy young owner of the New

York Herald. A tall, handsome man of strong build, Jerry Collins (as he was now known) had a convivial manner and made friends easily. As an excellent pianist and singer he often entertained the guests at Bennett's lavish parties. Bennett then set up a weather department for the Herald and put Collins in charge of it. His predictions were sent by cable to the Herald's offices in London and Paris to be syndicated to other newspapers. He travelled extensively for the Herald and attended meetings throughout the U.S. and Europe as an expert meteorologist.

George Washington De Long, the man who was to die alongside Collins, was a Lieutenant Commander in the U.S. Navy. Following a short spell in Arctic waters in 1873, De Long was smitten with "Arctic fever", much as Shackleton and Scott became fascinated by Antarctica. De Long approached Bennett with a proposal to lead an expedition to find a route to the North Pole to which Bennett readily agreed. In July of 1879 the De Long led the steamer *Jeanette* from San Francisco to head northward through the Bering Strait with a crew of 33. The crew consisted of seasoned naval men under De Long, along with Jerome Collins as a reporter and meteorologist, and a surgeon, a naturalist and taxidermist, and two Indian dog handlers to manage the pack of huskies and sleds.

But by the end of August, as she sailed into the Arctic Ocean, the *Jeannette* met floating ice floes, small at first, then getting bigger and bigger. In the start of September the ice had almost totally closed in on the *Jeannette* and by September 6 the



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Mediterranean Moray Eel

Muraena helena L. in Irish Waters

By Declan T. Quigley

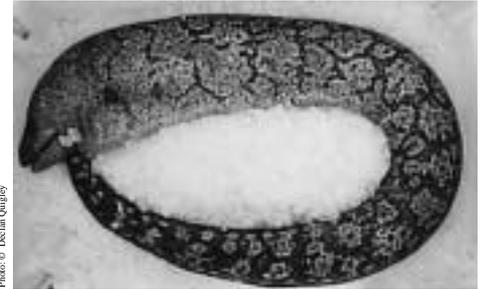
THE Mediterranean Moray (*Muraena helena*) belongs to a diverse group of eels which includes about 15 genera and 200 species found worldwide in tropical and temperate seas. However, only 4 genera, representing 7 species have been recorded in the NE Atlantic (Table 1) and only 2 of these appear to be indigenous: the Mediterranean Moray and the Brown Moray (*Gymnothorax unicolor*), while the other 5 species appear to be extremely rare vagrants.

On 6th February 1997 a specimen of Mediterranean Moray measuring 112.5cm T.L. was captured by the MFV 'Newgrange' (Skipper: Mr Brendan O'Flaherty, Ballycotton, Co Cork) while beam trawling out of Kilmore Quay, Co Wexford at a depth of c100m about 32km off Mine Head (X2882: 51° 59'N, 07° 35'W), Co Waterford (Table 2). This specimen represented the first record of *M. helena* from Irish waters, the 14th from NW Europe and the most northerly European record to date. Details on all known NW European records are summarised in Table 2. The geographical distribution of

M. helena in NW European waters is as follows: Ireland, 1; England, 4; Belgium, 1; and France, 8.

The significance of the recent Irish record of *M. helena* can best be appreciated by considering the comments of some of the world's best known expert ichthyologists. In 1978, Dr Christopher Moriarty, Ireland's acclaimed authority on eels remarked: "Morays are essentially warm-water fish. *M. helena*, which measures up to 130cm, is the only species known on the coasts of Europe. Plentiful in the Mediterranean and around Spain and Portugal, it is very rare further north and

unknown beyond the English Channel." In 1969, Dr Alwyne C. Wheeler, former curator of fish in the British Museum of Natural History, noted that *M. helena* "is exceedingly rare in northern (European) waters, but single specimens have been captured at long intervals, mostly in the English Channel... It is rare on the Biscay coast of France, but is extremely rare north of the Gironde... any captures should be reported and the specimens saved." In 1978, the same author remarked "The moray is an extremely rare fish north of central Biscay, and has occurred fewer than 6 times in the last century". More



Mediterranean Moray Eel (*Muraena helena*)

Photo: © Declan Quigley

European specimens were captured by a wide range of methods, including: trawl 4, trammel net 1, line 1, stranded 1, crab pot 1, and 7 unknown. Moray eels have large mouths with numerous fang-like canine teeth. Small specimens can inflict very severe, often septic bites, while larger specimens can be even more dangerous (traumatogenic), especially if provoked. Although moray eels are edible, they are sometimes very poisonous to eat; the poison is of the ciguatera type and leads to stomach cramps and nervous disorders. In a particularly noteworthy incident in Saipan, 57 people became ill from eating one large moray; 14 became comatose and two died. The moray was considered to be both a delicacy and an object of amusement or even affection in Roman times. Indeed, it is reputed while Augustus Caesar was dining with his favourite follower Vedius Pollio, a slave who chanced to break a valuable crystal wine vase, flung himself at the emperor's feet and supplicated that he might not be thrown to the *Muraenas*. On enquiry, it was found that the slave's master treated his offending slaves who broke decanters in this manner. Caesar, was not impressed and having first set the poor slave free, ordered that the eel ponds should be filled in and lastly that all the crystals should be broken in the presence of the master's guests!

M. helena breeds from July to September in the warmer parts of its range. The eggs, which are rather large (5.0-5.5mm in diameter), float at the surface. After hatching, the leptocephalus larvae measure c10mm and in the early stages have small pectoral fins, which are absent in the adults. There is no evidence; as yet, to suggest that *M. helena* breeds in NW European waters. So far, only adult specimens have been encountered and these were probably vagrants which may have developed from misplaced leptocephalus larvae. All of the specimens *M. helena* recorded in NW European waters were relatively large, measuring between 99.0 and 130cm T.L. In general, morays appear to be caught rather more frequently during the winter when they approach the coasts to breed. In NW European waters the majority (8) of specimens were captured during the spring (spring 1, February 1, March 3, April 3), while 2 specimens were taken during the summer (June 1, July 1) and 2 in the autumn (October 2).

The occurrence of the Mediterranean Moray Eel in Irish waters may be further evidence of the effects of global warming, but perhaps Caesar's Waterford Crystal will eventually tell all.

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recently, Wheeler (1985) described the distribution of *M. helena* as follows: "This moray is found in the Mediterranean and the E Atlantic from the Cape Verde Islands (W Africa: c16°N, 24°W) and the Azores (c38°N, 28°W), N to Biscay, although exceptionally specimens have been found in S British waters."

In 1986, the French ichthyologist, Dr M.L. Bauchot described the habitat of *M. helena* as "benthic on shelf, on rocky coasts, in crevices or places protected by overhangs or algae." Small specimens live intertidally under boulders. Morays are nocturnal territorial predators, feeding mainly on cephalopods, crustaceans and fishes. The NW

M. helena breeds from July to September in the warmer parts of its range. The eggs,

Common Name	Scientific Name	Distribution									
		Ireland	UK	Belgium	France	Portugal	Mediterranean	Azores	Madeira	Morocco	W Atlantic
Mediterranean Moray	<i>Muraena helena</i>	X	X	X	X	X	X	X	X	X	
Brown Moray	<i>Gymnothorax unicolor</i>					X	X	X	X	X	
Peixe-Lobo (Portuguese)	<i>Anarchias eurynurus</i>					X (Nice, France)	X				
Fangtooth Moray	<i>Enchelycore anatina</i>					X (Israel)	X				
Sharktooth Moray	<i>G. maderensis</i>							X		X	
Purplemouth Moray	<i>G. vicinus</i>							X		X	
Polygon Moray (USA)	<i>G. polygonus</i>							X		X	

Table 1. NE Atlantic Moray Eels

Date	Location	Method	T.L. (cm)
08.10.1834	Polperro, Cornwall, UK	line	130.0
spring 1865	Fowey, Cornwall, UK	trammel net	
1875	Biarritz, SW France		
March 1879	Eddystone Reef, Cornwall, UK	trawl	111.5
27.03.1935	Gulf of Gascony, nr Biarritz, France	trawl	
1937	Ostend, Belgium		
01.04.1938	Guethary, Biarritz, France	stranded	
08.04.1968	Central Biscay, France	trawl	108.0
08.07.1968	Urquidi, Biarritz, France		
April 1977	NW France		99.0
01.03.1979	NW France		107.0
June 1983	NW France		
03.10.1996	N Herm Island, English Channel	crab pot	c100.0
05.02.1997	off Mine Head, Co Waterford	beam trawl	112.5

Table 2. NW European records of Mediterranean Moray Eel

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A Research Worker in the Antarctic



There goes one's precious apparatus! Signy Island 1966

By Prof. G.E. Fogg

RESEARCH in the Antarctic can be fiendishly uncomfortable and dangerous. Such was "the worst journey in the world", undertaken by three of Captain Scott's men who endured five weeks in darkness, travelling over treacherously crevassed ice at temperatures down to -60°C in winds up to 50 knots, to collect eggs of the emperor penguin. It is miraculous that they survived. In the end anatomical examination of the eggs did not show the features that they had hoped for. Suffering and heroic determination count for nothing in accessing scientific results. Research in the Antarctic still sometimes calls for great determination and endurance of physical hardship but, on the other hand, much can now be done in comfortable laboratories with occasional well-organised trips by skidoo or helicopter to collect material. Investigations can even be carried out many thousands of miles from the cold, using data transmitted by satellite from automatic sensors, as in some excellent studies on the ecology of micro-organisms in the dry valleys of the Antarctic by E.I. Friedmann and his colleagues at Florida State University.

Given the variety of sciences involved and the range

of environmental conditions, it would be foolish to attempt an overall review. It is perhaps best to give a sketch of my own experiences in 1966 at the Signy Island station of the British Antarctic Survey (BAS). Like most stations it had the essential general equipment but before starting out I had to make certain that all the apparatus needed, even quite ordinary items, was going to be available - in triplicate turning out to be vital in one case - and packed with the utmost care. My object was to find out if micro-organisms in Antarctica fix nitrogen - that is to say, convert the nitrogen in air, which is unavailable to most plant life, into a combined form which can contribute to general fertility. Simpler and less expensive methods for doing this are now available but at the time the best technique was to label atmospheric nitrogen (^{14}N) with heavy nitrogen (^{15}N - not a radioactive isotope) and see whether this became fixed in the organic matter produced by the organisms being investigated. The sample to be tested was put in a flask in which the air could be replaced by a gas mixture approximating to air but containing ^{15}N . After 24 hours under natural conditions of light and temperature the samples could be preserved to be taken back to England for measurements of their fixed ^{15}N content by means of a mass-spectrometer. A prelim-

inary step, of course, was to identify suitable sites for the experiments. Microscopic examination of soils and scrapings from rocks showed that organisms one might expect to be nitrogen fixers were indeed present. The apparatus and equipment, including a small gas cylinder, needed for the field experiments weighed about 21kg and so could be carried by one person to almost anywhere on the island. Doing this alone was permitted but before setting out one had to inform the cook, who was precluded from wandering off himself, where one was going and for how long. Setting things up at temperatures below zero was trying but fine silk gloves, as worn with evening dress, kept one's hands just warm enough to handle things effectively. Reagents remained liquid if the bottles were tucked inside one's shirt. Skuas often carried out aerial attacks or flew off with any small item left unguarded. In some areas near the sea it was always possible that a 2-ton bull elephant seal might flop down for a nice snooze on the whole set up. Nevertheless, seven experiments seemed to have been carried out without hitches and when the analyses became available back home the results



Algae from melted snow, Signy Island, February 1966. The red cells are *Chlamydomonas nivalis*, a green alga which accumulates red carotenoid pigments under adverse conditions. The other green algae are *Scotiella antarctica* and *Raphidonema nivale*. The small yellowish unicells are probably a species of *Ochromonas*. The green mineral fragment is biotite (photo from a water-colour painting; G.E. Fogg).



Apparatus for field determination of nitrogen fixation using ^{15}N as a tracer. Signy Island, January 1966



Biological laboratory, Signy Island, January 1979.

were positive. Nitrogen fixation does occur in the Antarctic at temperatures round about freezing point and is nearly always associated with cyanobacteria (bluegreen algae), such as *Nostoc*, growing near basic rocks. They make appreciable contributions to the growth of communities of organisms which manage to survive in the terrestrial habitats of the Antarctic.

When working in the field, eyes should be kept open and opportunities grasped. Visiting my experimental sites I

noticed that in places the snow was no longer white but had pale pink patches of snow algae - a well known happening in alpine regions. Some patches turned blood red overnight. This gave an impression of rapid growth - but could algae really grow so fast at zero temperature? It was simple to take samples at different depths from a fairly uniform patch and count the number of cells at intervals over a period of eight days. This showed that although cell concentrations at the snow sur-



Red snow, Coronation Island, January 1966 (photo: C.H. Gimingham)

face increased 20-fold the total increase in the snow column was only 5-fold. The snow had abated (disappeared by melting or sublimation), lowering its surface level by 29 cm in the eight days and the increase at the top was more due to concentration of the cells left behind than active growth. Multiplication of the cells is only possible when liquid water is available and some measurements of rates of photosynthesis indicated that the average doubling time under the prevailing conditions was around 23 days. The predominant alga in my samples was a species I couldn't place and

the experts who looked at it on my return didn't know what it was either - another field for research.

In some ways an Antarctic station is ideal for research. On a BAS base everyone is expected to take a share of chores such as washing up and humping stores about and Saturday nights are usually spent in drinking as much as the barman sees fit to dispense while watching a film. Otherwise time for me was my own and I could manage 14 hours a day working quite comfortably. If you appeared to be unoccupied you might well get seized by the doctor to take part in a "quite harmless" experiment on this physiological effects of Antarctic weather. Communication with the outside world in 1966 was by short telex messages so that one was not bothered by what was happening in one's usual place of work. With such limited contact a young research student might be lost without his supervisor but, on the other hand, being forced to think for oneself is not a bad thing and BAS has produced many first class scientists from scratch. Things have changed now and via the internet a research student can be advised and controlled by authorities thousands of miles away. The present tendency for research to be done by teams has the advantages of better facilities and more discussion but schedules have to be kept and opportunities for following one's own ideas may be limited. All the same, research workers continue to find the Antarctic inspirational.

G.E. (Tony) Fogg, Professor Emeritus in Marine Biology, University of Wales, Bangor, UK.



The white granite sand on a Scilly strand.

By Dr. John Akeroyd

ISLANDS fascinate me, as they do others. One of the joys of an island, such as Sherkin, is that it is an independent community of plants, animals and people. Long before I discovered Sherkin in 1986, I knew the islands of Connemara; and since 1967 I have visited the Isles of Scilly off Cornwall. Sherkin immedi-

ately reminded me of these places: all have white strands, Atlantic heaths and special plants and birds, all are havens of peace – and all retain rich fragments of biodiversity.

Scilly is 28 miles off Land's End. An archipelago of rocky islands, mostly small and uninhabited, it has matchless vistas of granite rock outcrop, heather and bracken, heath and moor. The larger islands – St Mary's (with the capital, Hugh Town), Treско, St Martin's, Bryer and St Agnes – form a

mosaic of sheltered lanes, cottage gardens, bulfields bright in winter and spring, long white sandy beaches, low sand-dunes, lichened coastal rocks and blue sea – a glimpse of Paradise. A mild climate of Mediterranean winters, high sunshine levels and moderate summer temperatures not only supports a richness of plants and animals, especially marine invertebrates, but also the warm-temperate gardens of Treско Abbey. Here five generations of the Dorrien-Smith

Photos © John Akeroyd

CORNWALL'S Offshore Paradise

family have created a unique plant collection, protected from wind and spray by thick shelter-belts.

People have lived on Scilly since prehistory and in the Middle Ages there was a small Benedictine Priory. Unfortunately, as the monks fled to their cost, the islands attracted pirates, and in the 17th century piracy was so rife that Holland declared war on Scilly! King and Parliament contested possession of the islands during the English Civil War, and at the end of the 1640s Scilly was a last outpost of Royalist resistance in the west. From then on it faded into obscurity and poverty. Then in 1834 came Augustus Smith, a Hertfordshire squire who leased the islands from the Duchy of Cornwall. His first task was to plant shelter-belts of native gorse, and hardy trees such as Monterey Cypress (*Cupressus macrocarpa*) and Monterey Pine (*Pinus radiata*) from California.

Smith became a benign but ruthless 'Lord Proprietor', supporting shipbuilding, compulsory education and new infrastructure, and building Treско Abbey, the house he surrounded with a 7-acre garden of warm-temperate, shrubs and succulents. It is said that he found daffodils flowering at Christmas around the Priory ruins. A local farmer grew bulbs and in 1865 sold flowers at Covent Garden for 7/6d. The early cut-flower industry of Scilly was born, and still yields an income from November to March. My favourite Scilly flowers are the

golden-yellow and white multi-headed *Narcissus* growing in little fields and naturalised by waysides and strands. Otherwise the islands depend on tourism, not least 40-45,000 annual visitors to the Abbey Gardens.

On Smith's death, his nephew Algy Smith-Dorrien-Smith (he later dropped a Smith!) inherited the Abbey. He and his descendents have nurtured and expanded the Gardens and left a lasting legacy of tall dense green wind-break 'fences' (Cornish 'hedges' are stout walls of granite and earth) of evergreens such as *Escallonia rubra* var. *macrantha* from Chile and Karo (*Pittosporum crassifolium*) from New Zealand. Plants in the Abbey Gardens collection include *Acacia*, *Agave*, *Aloë*, *Banksia*, *Erica*, *Eucalyptus*, *Fuchsia*, assorted palms, *Protea* and

Rhododendron. Nowhere else in Britain can you see so many warm-temperate southern hemisphere plants.

Wild plants on the Isles of Scilly too are remarkable: the rare Shore Dock (*Rumex rupestris*) grows here, as do rare clovers such as Clustered (*Trifolium glomeratum*), Sunset (*T. occidentale*) and Suffocated Clover (*T. suffocatum*). Two tiny plants, Yellow Bird's-foot (*Ornithopus pin-natus*) and Dune Pansy (*Viola kitaibeliana*), occur at their only British station, as does the White-toothed Shrew (*Crocicidura suaveolens*)! Scilly is indeed a remarkable place, outstanding for scenery and natural history, and one of Britain's best-kept secrets.

Dr John Akeroyd has been working on botanical surveys at Sherkin Island Marine Station since 1990.



Fasciularia pitcairniifolia, a bromeliad, escapes from gardens on to lanesides and sand-dunes.



Evergreen hedges shelter tiny fields of *Narcissus*, which flower in winter.

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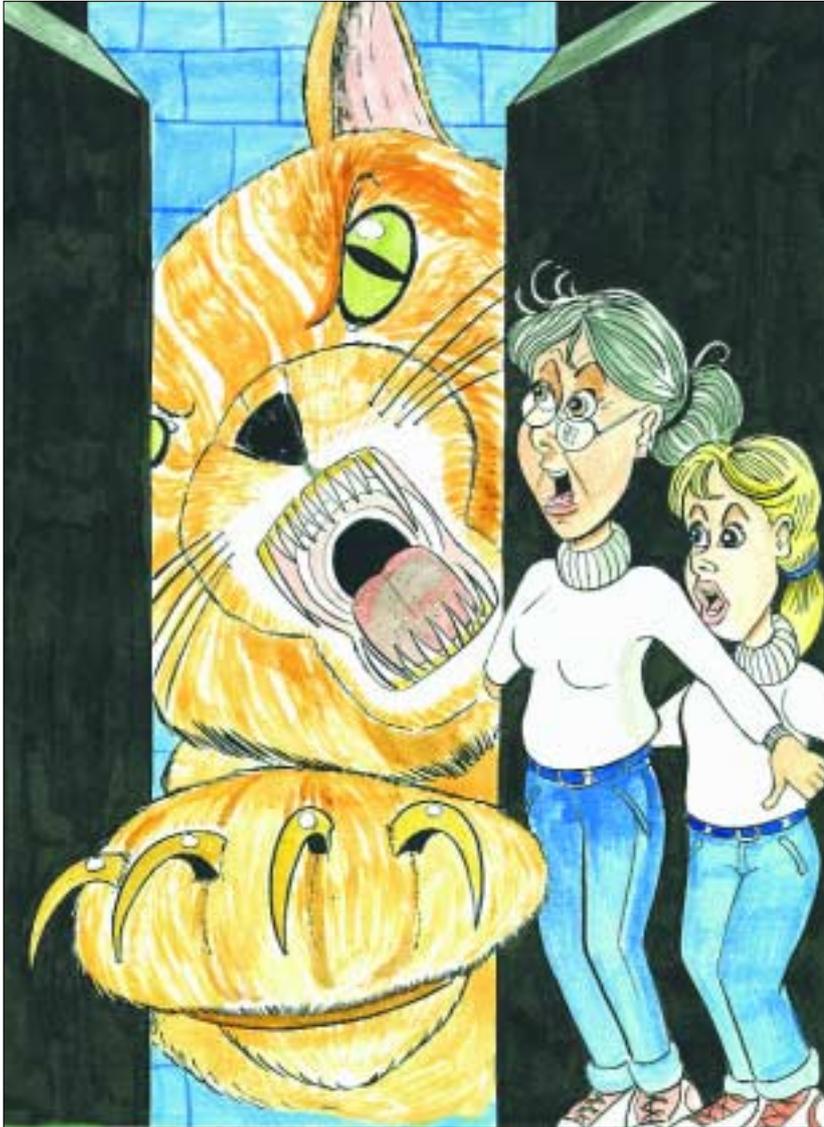
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Captain Cockle and The Pond

Abridged in four parts - Episode Four - ESCAPE



By John Joyce

THE STORY SO FAR: Captain Cockle, along with his wife Dr Catherine Cockle and their grandchildren Jenny and William, have been accidentally shrunk to the size of sausages when their amazing flying submarine, the *Cormorant*, was struck by lightning. While William and the Captain are being attacked by giant swans, Jenny and Dr Cockle have gone off in search of Captain Cockle's ROVER remote camera, which has been taken to a giant farmhouse in the stomach of a pike, and been attacked by a giant cat . . .

"Run Jenny!" Dr Cockle just had enough time to drag Jenny between a cupboard and the sink, when the cat's paw, armed with five razor-sharp claws, shot into the gap behind her, ripped her jacket and threw her on top of Jenny in the middle of a pile of bits of greasy bread, shrivelled peas and a fat-soaked chip.

"Get back!"

The cat's paw stretched down the narrow space again, but they were too far down the narrow corridor for the cat to reach. Again it tried, and again the sharp, curving claws flexed, but each time the cat's reach fell short. After another few long stretches it stopped and squatted at the entrance to the gap, hunched and ready to pounce, waiting for them!

Out on the pond, William watched as the two huge swans surged out across the pond towards him. He ducked below, slammed the yellow hatch shut over his head and raced down to strap himself into the control room seat. Through the portholes he saw the vast white bellies of the swans as they circled, their wide webbed feet churning the water and the flash of their huge heads as they darted at the submarine. The hull bumped and rocked.

"Grandad! Granny! Can anyone hear me?"

Then the tiny submarine seemed to leap up out of the

water into the sky. Through the porthole, William saw the face of a giant peering in at him and heard a voice booming against the hull.

"Well now, whoever left this toy floating in my pond?"

"Grandad! What's happening?"

"The man who caught the fish with ROVER in it has rescued you from the swans," said Captain Cockle. "He seems to be taking you to some sort of shed for safe keeping. I think he thinks the *Cormorant* is a toy. Just keep still, and I'll come and get you!"

William felt the submarine rock as the giant walked up the path from the pond, opened the door of a tool shed and set the *Cormorant* down on a bench near an open window. By the edge of the bench was an electric socket! Electricity! Perhaps they could run a wire to it and get enough power to get them back to full size after all.

But where were Dr Cockle and Jenny?

"I never really did like cats," admitted Dr Cockle. "Nasty, shifty, sly creatures. Give me a good honest dog any day!" All of a sudden the cat broke the stare with Dr Cockle as its head snapped sideways towards the kitchen door. There was a heavy pounding of feet as the cat ran away and the head of a huge brown and white dog filled the entrance of the gap. A loud bark thundered down the narrow corridor, blasting them back to the rear wall.

"What was that you were saying about dogs, Granny!" shouted Jenny above the din, as the monster terrier barked and scraped at the opening with its tough, strong paws.

"Granny! Granny!" called William's voice over their radio headsets, muffled and crackly because of the distance and the stonework of the cottage.

"William. Where are you? Where's your Grandfather?"

"I'm in the shed. Grandad's coming and we have electricity here. Can you join us.?"

The dog took in a breath for another bark. Dr Cockle saw the name printed on its collar. She shouted,

"Tim! Sit!"

The dog stopped in mid bark and sat, wagging its tail. "Good boy!" shouted Dr Cockle. "Now, stay there a moment. I think you might be able to help us get over to this shed we need to reach."

Captain Cockle was exhausted. His wet clothes clung to his body, his feet felt as if somebody had hammered them flat with a mallet and sweat was running down his forehead and into his eyes. But he had managed to walk all the way from the pond to the shed and climb up the mountain of shelves to where William and the *Cormorant* sat.

"Right William, let's unwind the emergency coil from the battery room in the *Cormorant*, run it out of the diving hatch and plug ourselves in."

All at once, they heard the roar of a giant dog, pushing its way through the door of the shed and reaching its head up to the workbench where he was standing. Captain Cockle was just looking round for anything he could use as a weapon when he heard Jenny shout, "Grandad! It's OK. It's us."

Looking down, he saw his wife and granddaughter sitting behind the collar of the biggest dog he'd ever seen.

"It's all right, Horatio," said Dr Cockle as she hopped down onto the bench beside him. "He's perfectly house trained. Now, let's get that submarine of yours plugged in and the whole lot of us back to full size. Being very very small may be a good way to observe animals and plants, but I think I've had enough of it for one day!"

The End

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

Junior Pages Junior Pages

SEARCH THE SEASHORE

Many will be able to identify at least one or two animals or plants on the seashore - but here is a chance to test your knowledge further! Below are 24 pictures which only give a little glimpse of the whole animal or plant. Can you match the names to their picture? Each name has a little description, which may help you.

When you have successfully identified each picture, see if you can pick out those that are plants and those that are animals? Photographs from *A Beginner's Guide to Ireland's Seashore* - ISBN: 1 870492 96 X

- | | | |
|---|---|---|
| <p>1. Barnacles
Tiny animals which have cone-shaped shells, made of up of 6 plates, protecting their bodies.</p> <p>2. Beadlet Anemone
This animal has blue, bead-like warts at the base of its tentacles.</p> <p>3. Black Shields Lichen
A white plant, with black reproductive bodies, that grows above the high tide mark.</p> <p>4. Blue-rayed Limpet
A sea snail, recognised by its broken electric blue lines running down its shell.</p> <p>5. Breadcrumb Sponge
This animal is green in colour and has small volcano-shaped openings on its surface.</p> <p>6. Black Brittlestar
A fragile starfish that has a central disc and long, spindly arms.</p> <p>7. Butterfish
A long, brown eel-like fish, with dark spots on either side of its back.</p> <p>8. Common Shore Crab
This animal's skeleton is on the outside, protecting its body and has five pairs of legs.</p> | <p>9. Dahlia Anemone
An anemone that bares a resemblance to the flower of the same name.</p> <p>10. Dead-man's Fingers
An animal that gets its name from its resemblance to soft, bloated fingers!</p> <p>11. Dogwhelk
This sea snail is usually grey/cream in colour.</p> <p>12. Edible Crab
A red-brown crab with "pie-crust" edging around its protective shell.</p> <p>13. Flatfish
Fish that lie on their side and camouflage themselves in the sand, hiding from predators.</p> <p>14. Hermit Crab
An crab that lives in the empty shells of sea snails in order to protect its soft body.</p> <p>15. Jellyfish
A transparent jelly-like animal that often washes up on the beach.</p> <p>16. Keel Worm
A worm that lives inside a chalky tube that it makes itself and which is permanently attached to rocks.</p> | <p>17. Limpet
A cone-shaped shell that clings tightly to rocks, with a strong sucker foot.</p> <p>18. Mermaid's Purse
The egg case laid by the dogfish. It has long twisted tendrils to attach itself to seaweed.</p> <p>19. Mussels
Animals that have slightly oval shells that may be blue, black or brown in colour.</p> <p>20. Otter Shell
This mollusc has a large white, smooth, oval-shaped shell.</p> <p>21. Prawn
This animal is transparent, although it may have fluorescent yellow leg-joints and red and black lines on its body.</p> <p>22. Sand eels
Silvery fish that can be seen swimming in shoals at the edge of the shore.</p> <p>23. Sea Lettuce
A green seaweed, similar to its vegetable namesake!</p> <p>24. Serrated Wrack
This seaweed gets its name from the saw-like edges of its fronds.</p> |
|---|---|---|

	A ----- -----		G ----- -----		M ----- -----		S ----- -----
	B ----- -----		H ----- -----		N ----- ----- -----		T ----- -----
	C ----- -----		I ----- ----- -----		O ----- -----		U ----- -----
	D ----- -----		J ----- -----		P ----- -----		V ----- -----
	E ----- -----		K ----- -----		Q ----- ----- -----		W ----- ----- -----
	F ----- -----		L ----- -----		R ----- ----- -----		X ----- ----- -----



Sea Sense

Watch the Water

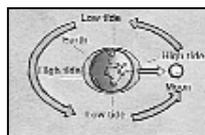
Waves and Wind

Photo: © 1995 Shutterstock International Inc. and its licensors

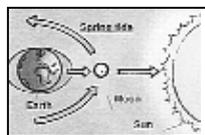
WHEREVER you go by the sea, remember that the water is very powerful and can easily hurt you. It is important that you understand the dangers there.

TIDES

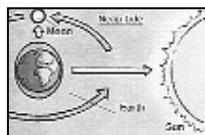
If you have been to the sea-side you will have noticed that the sea moves regularly in over the shore and then out again. This movement is called the tide. The level of the water is very high twice a day (HIGH TIDE) and very low twice a day (LOW TIDE). But what makes the water rise and fall? Tides are caused by the pull (force) of gravity of the Moon and the Sun. As the Moon travels around the Earth, its force of gravity pulls the water nearest



Low Tide



Spring Tide



Neap Tide

to it out in a bulge. The spinning of the Earth causes another bulge on the the other side. These bulges make high tides, with low tides in between.

There is also a pull from the Sun, but it is weaker than the Moon's because the Sun is farther away. However, when the Sun and Moon line up, the pull from the two together makes an even bigger bulge. This produces very high tides, and very low tides in between called SPRING tides. When you see a Full Moon or a New Moon in the sky, this is when there will be Spring tides.

When the Moon and Sun are at right angles to each other the pull is not so great, so there is not such a high tide. This is called a NEAP tide.

Tide times and tables

If high tide is at six o'clock in the morning, the level of water will gradually drop until low tide at about twelve noon. It will then rise steadily again to the next high tide at six in the evening. However, the time of each high or low tide is different every day. The Sun, Moon and Earth are continually moving and this causes changes in the time and the height of the tides each day. Although you could roughly work out the times of high and low water, a set of Tide Tables will give you exact times and height for each area along the coast.

Check yours and don't get cut off!

WAVES

When you blow across a bowl of water, your breath ruffles the surface into little waves. The same thing happens when the wind blows across the sea. It pushes and drags against the surface of the sea, producing ripples and forming waves. Waves can travel huge distances, called the fetch.

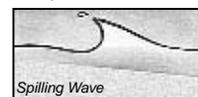
How waves move

Waves travel across the surface of the sea. You might have watched them from the seashore or from a boat. But did you know that the water itself does not travel along? If you see a bird bobbing up and down on the sea, the water just goes up and down as the waves pass through it. Each time a wave passes, the water actually moves in circles. The circles are biggest near the surface and they get smaller deeper down. If you were in a submarine 100m down you wouldn't feel the waves even in the most severe storm.

Breaking waves

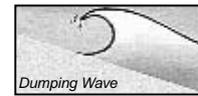
When waves approach the shore, they get taller and closer together. The bottom of each wave drags against the seabed and slows down, but

the top of the wave keeps moving. Eventually, the surface topples over and crashes onto the beach. A breaking wave can "dump", "spill" or "surge" onto the shore depending on the steepness of the underwater slope.



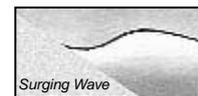
Spilling Wave

For swimmers, the types of waves can be very important. Wave can be fun - Spilling waves have crests of surf tumbling down the front - great for body surfers, swimmers and board riders - they can also be dangerous.



Dumping Wave

Dumping waves break with a huge force and can throw a swimmer to the bottom and drag them out to sea as it rushes back out.



Surging Wave

Surging waves are found on a very steep beach. They are very powerful and can knock you off your feet or even pluck you from the shoreline.

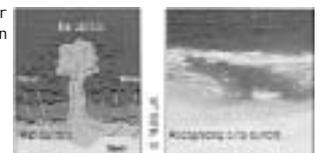
CURRENTS

Sea currents are caused by tides and winds. There are currents both at the surface and in the deep oceans. If you look at what has been washed up on a beach, you may find other things from other countries that have been carried there by currents.

A rip current is a very dangerous current seen at some beaches. It is caused by water coming into the beach, making channels in the sand, before running out to sea. These direct the waves' energy into one place and the power of the water running back out again



How waves move



Rip Currents

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may be too strong, for even the best swimmer. A rip current can often be identified by discoloured water, with brown foam on the surface beyond the breaking waves, or by debris floating back to sea with the current. Also, where there is surf, a rip current will make the waves smaller.

WINDS

Onshore winds blow from the sea onto the shore. They can make the waves so much more powerful that they become dangerous.

Offshore winds blow from the shore out to sea. Although the water may be calm close in, it may be rougher farther out and the wind can blow a windsurfer, or inflatable far out to sea.

Check to see if there is an onshore or offshore wind by looking at which way any flags are flying, or you can hold something up to be blown by the wind such as a handkerchief or T-shirt.

AND DON'T FORGET -

- Spot the Dangers
- Take Safety Advice
- Don't go Alone
- Learn How to Help

Original article sponsored by Crewsaver

Storm Force News, Issue 50 - The Magazine Exclusively for Storm Force Members!

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10 Tips to Reduce Waste in Your Home

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10. _____

Send your tips to:
"10 Tips to Reduce Waste in Your Home",
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The first 200 entries to be drawn out of the hat on 30th November 2003 will each receive copies of the Station's three colouring books: "Wild Flowers", "Birds" and "Sea Life".

Name _____

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Some of the entries may be used in publicity.



Joining the Cleanup!

Can you work out which words go together?
Be careful - one or two are a little tricky!
(Answers on page 31)

- | | | |
|--------------|-------|--------|
| 1. clean | _____ | line |
| 2. flotsam | _____ | pipe |
| 3. over | _____ | water |
| 4. pollution | _____ | dump |
| 5. rubbish | _____ | jetsam |
| 6. sea | _____ | board |
| 7. sewage | _____ | up |
| 8. shore | _____ | free |

TAKING ACCOUNT

The answer to each clue fits into the boxes on the grid.
Each row is a math equation - work from left to right.
Each column is a math equation - work from top to bottom.

1		X	2	+	3	=	
	÷		X		+		
4		+		-	6	=	
	X		÷		+		
7		X	8	+	9	=	27

1. Legs on an octopus
2. Arms on a starfish
3. Pincers on a crab
4. Shells on a bivalve
5. Legs on a spider
6. Legs on an insect
7. Leaves on shamrock
8. Legs on an otter
9. Spines on a 15-Spined Stickleback fish

(Answers on page 31)

FLOTSAM & JETSAM

With the help of the clues find the words that fit into the puzzle. The answer to number 12 is filled in to give you a helping hand. *(Answers on page 31)*

Across

3. A container in which fishermen store their catch (2 words)
6. A resin that can be melted into a shape e.g. a bottle
7. Waste water and refuse that are carried off from houses and factories
10. Unwanted goods that are dumped on the beach
11. Covering for babies' bottoms before it is toilet trained
13. A set of 6 circles made from "6 across" to aid the carrying of cans (2 words)
15. Areas where sand collects on the shoreline
16. Free from dirt or rubbish
18. A vessel for holding items e.g. a bottle or a box

Down

1. A vessel for holding a inflammable liquid, used for lubricating (2 words)
2. Another name for litter or fouling the environment
4. A vessel made out of glass or plastic, that holds a liquid
5. A mesh used for catching fish
8. A name used for floating wreckage
9. Where the land meets the sea, including the rocks, the beaches and the sea
12. A material that is used to aid buoyancy or use to make disposable drinking cups (2 words)
14. Made from aluminium and used for holding liquid
17. A mesh or cable made from metal and used for fencing.

Visiting the Seashore?

Re-arrange the tiles to read an important message.
(Answers on page 31)

E	A	N	C	O	A	C	L	U	R	I	N	E
K	E	E	P	O	S	T	L					

Looking for information on the Environment?



there are now 7 easy ways to make contact with Enfo

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

Forthcoming Exhibitions

14 - 31 July 2003:

"Re-Sculptured". The Sculpture and Combined Media Department of the Limerick School of Art and Design in association with IN-TOUCH Computer Company.

5 August - 5 September:

Seed Collection and Propagation Exhibition. Conservation Volunteers Ireland in association with ENFO will hold an exhibition on seed saving.

Grilled Whole Fish with Garlic, Lemon and Herbs

Fish cooked on the bone - the best way to experience the rich flavour of the sea. Of course you can use your favourite marinade for this.

Ingredients

- 2 small whole plaice/lemon sole or rainbow trout
- Marinade
 - 1 red pepper - roasted, skinned and diced
 - 1 green chilli
 - 1 clove garlic
- Parsley, basil, chives
- Salt and freshly milled pepper
- Lemon juice

Method

- Trim fish and make deep slashes through flesh on both sides
- Place fish in marinade for 15 minutes before cooking
- Grill fish under a high heat for 5-7 minutes each side (or steam for 12-15 minutes)
- Sprinkle with a little soy sauce before serving

* You can substitute any white fish fillets, mackerel, herring or salmon.

Serves 4

Grilling Fish

Grilling is cooking under a radiant heat and is a fast method of cooking. Suitable for fillets or small whole fish. Line the grill with foil and brush lightly with oil. Pre-heat the grill.

Use even-sized pieces of fish when grilling. If grilling whole fish make two or three slashes through the thickest part of the fish to allow the heat to penetrate. Oil the fish lightly and turn the fish only once during cooking as it is delicate and may break easily.



Bord Iascaigh Mhara
The Irish Sea Fisheries Board

lightly and turn the fish only once during cooking as it is delicate and may break easily.



Answers to Puzzles on Pages 27 & 29

JOINING THE CLEANUP! (P. 29)

1. clean up
2. flotsam jetsam
3. over board
4. pollution free
5. rubbish dump
6. sea water
7. sewage pipe
8. shore line

TAKING ACCOUNT (P. 29)

8	x	5	+	2	=	42
+		x		+		
2	+	8	-	6	=	4
x		÷		+		
3	x	4	+	15	=	27
=		=		=		
12		10		23		

FLOTSAM & JETSOM (P. 29)

- Across: 3. fish box; 6. plastic; 7. sewage; 10. litter; 11. nappies; 13. plastic rings; 15. beaches 16. clean; 18. container.
Down: 1. oil can; 2. pollution; 4. bottle; 5. net; 8. flotsam;

SEARCH THE SEASHORE (P. 27)

- | | |
|--------------------------|-----------------------|
| A = Beadlet Anemone | P = Limpets |
| B = Barnacles | Q = Edible Crab |
| C = Hermit Crab | R = Dahlia Anemone |
| D = Black Brittlestar | S = Deadman's Fingers |
| E = Otter Shell | T = Jellyfish |
| F = Breadcrumb Sponge | U = Butterfish |
| G = Serrated Wrack | V = Mermaid's Purse |
| H = Flatfish | W = Common Shore Crab |
| I = Black Shields Lichen | X = Sand Eel |
| J = Prawn | |
| K = Sea Lettuce | |
| L = Whelk | |
| M = Keel Worm | |
| N = Blue Rayed Limpet | |
| O = Mussels | |
- Only Serrated Wrack (G); Black Shields Lichen (I) and Sea Lettuce (K) are plants - the rest are animals.

VISITING THE SEASHORE? (P. 29)

keep our coastline clean

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BIM

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An Bord Iascaigh Mhara, The Irish Sea Fisheries Board,
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 Email info@bim.ie Website www.bim.ie

Sherkin Island Marine Station Environmental Award 2002



Michael Ludwig being presented with the Sherkin Island Marine Station Environmental Award 2002 by Matt Murphy

By Matt Murphy

IN 1987 we had a speaker for my then 3rd Annual Conference, Dr. Donald Squires from the USA. When I was putting together speakers for the 1988 conference, I contacted Donald, saying I needed a no-nonsense person who would tell it as it is – that person was Michael Ludwig.

He is a Senior Marine Resource Habitat Specialist at the National Marine Fisheries Services in Milford, Connecticut, USA. He has had vast exposure and experience in every type of coastal, estuarine and open ocean development activity - from impacts of docks, aquaculture development to hundreds of miles of energy pipeline habitat disturbance. His fellow scientists in Milford will tell you he makes things happen and more importantly he makes the people around him make things happen.

He and like-minded colleagues in NMFS have set the terms of reference for the agency's research on submerged aquatic vegetation and use that information to protect this important habitat. He has set standards with the

US EPA for the development of disposal criteria for dredge spoil, especially the capping of disposal contaminants at sea. These are but a small record of his achievements in his work.

However the reasons for our award to him is much closer to home. It is for his support and the clarity of his thinking for the work of our marine station. Since those days in 1988 Michael and I have spent many hours, year in year out, discussing the marine station's long-term monitoring programmes. He has, since the beginning of our friendship, understood where I was going with our rocky shore and plankton programmes and other projects. Our work at Sherkin is complex, driven solely by one criteria, that long-term data is essential to begin to understand the marine environment. Michael's understanding of long-term data in both freshwater and marine environments in the US has been of immense importance and encouragement to me over the past 15 years.

When one is running two of the longest monitoring programmes on rocky shore and

plankton in Europe there are few one can turn to. Mike's understanding, bluntness, vision and commitment to the environment, together with our similar frustrations to what should be done to protect the environment, have on many occasions kept me on the right road.

Of course he has for a number of years been a regular contributor to our newspaper Sherkin Comment. His articles are always thought provoking and I hope he will be contributing for many years to come. He always meets his deadlines!

Mike Ludwig to me has an immense love of the environment and is a doer. He is totally without arrogance but still a tough cookie. He has underestimated the role he has played in my thinking of the marine station's research. To me he has one of the finest scientific minds I have ever met. I was delighted that Michael accepted the Sherkin Island Marine Station Environmental Award for 2002.

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

4 Easy Steps to Food Safety

A simple and sensible approach

1. Clean

2. Separate

3. Cook

4. Chill

safe food