



SHERKIN COMMENT

Issue No. 40

Environmental Quarterly of Sherkin Island Marine Station

2005

INSIDE

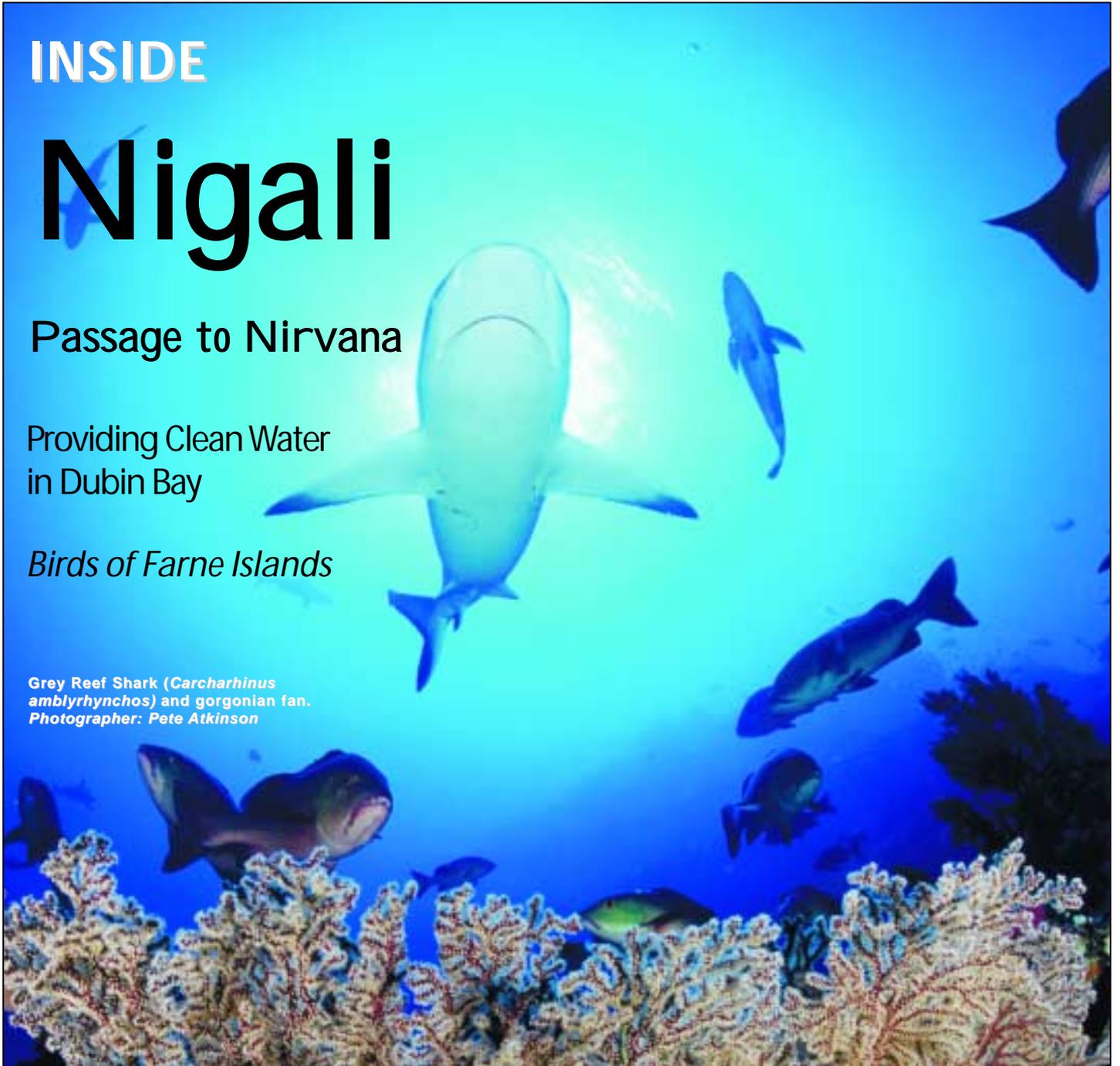
Nigali

Passage to Nirvana

Providing Clean Water
in Dubin Bay

Birds of Farne Islands

Grey Reef Shark (*Carcharhinus
amblyrhynchos*) and gorgonian fan.
Photographer: Pete Atkinson



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Editorial

Management of Ireland's Wild Salmon

By Matt Murphy

MUCH is being written about the effects that drift netting of wild salmon is having on stocks. If one is to believe those that want this type of fishing banned then everything would be fine and our rivers will be well-stocked again after many years of decline. Of course, stocks will improve but to what extent? Sherkin Comment believes much more will be needed to solve the problems of salmon stocks in Irish rivers.

A management program must be introduced, together with much scientific research. Major issues need to be addressed.

Rarely have there been any discussions on the impact of hydro dams on salmon on the rivers Erne, Lee, Liffey and Shannon. Although these installations are technically passable (fish passes) by adult salmon, they are not considered to have self-sustaining salmon populations. These rivers have been defined as non self-sustaining in the Central Fisheries Board "Freshwater Salmon Habitat Asset" 2003.

The loss of potential salmon producing habitat for the four Hydrodams is estimated at 35.5% of the total riverine habitat accessible to salmon in Ireland (see Table 1). The Central Fisheries Board is strongly of the view that serious consideration should now be given for adequate and effective free passage of returning adult salmon upstream to their spawning grounds and the unhindered migration of smolts downstream, particularly during peak runs in these very important wild salmon rivers.

The design of the hydro dams in these rivers should be reviewed to allow for these fish to travel freely during the peak runs. The board also adds that this new approach would also benefit other dendromonus species such as shad, lamprey and eels.

The contribution of the generating stations on the four dams to the ESBs national grid only amounts to a maximum of 4.9% in a full year (see table 1). One solution to the problem would be to turn off the generators for the peak migratory period. The loss for the short period would be negligible ± 1.06% against the total capacity being generated by the ESB Generation Stations (see table 2).

A proper management system needs to be introduced in the rivers to ensure there is (a) greater policing of illegal fishing (b) increased spawning areas and improvement in the quality of many of those already there (c) ownership of many fisheries on the rivers is unclear and uncertain and must be addressed (d) reasonable access for locals and visitors/tourists.

Research in the marine environment is

vital. It is recognised by salmon research scientists that there is a major survival problem in the North Atlantic. Ireland is not alone with declining salmon stocks. The USA and Canada have similar problems. Changing sea temperatures in the North Atlantic need to be investigated more to see what effects they have on the salmon. For instance, do they affect migration speeds, routes and food availability? Another issue is to what extent are post smolts being caught as a bycatch in mackerel fisheries. Maybe one of the Marine Institute's two research vessels should have as its priority an extensive period each year on salmon research in the North Atlantic.

Exploitation of salmon should be confined to the estuaries or river mouths thus avoiding a mixed salmon stock fishery at sea. This would allow each fishery to be individually managed and strict quotas could then be enforced for each river basin.

The above issues we raise show that there are many problems that need addressing on the decline of salmon stocks, most as important as drift netting.

Critics of commercial fishermen must remember that they have a legal right to carry out drift netting. Most drift netters are fishing at sea in small boats not large trawlers - it is one of the most dangerous occupations. The weather conditions are mostly difficult to say the least. For many the period (now very short) is a very important income for them. A voluntary buy out or set aside scheme along the lines of the decommissioning scheme for sea fisheries is now essential.

To quote from remarks by Niall Greene, Chair "Stop Salmon Drift Nets Now" at a meeting in Cork City 18th March 2005:

"The campaign to end drift netting for salmon at sea is being maliciously portrayed by some as a row between anglers and the commercial sector as to which should have the right to kill most fish. It is nothing of the kind. It is a campaign for

Table 1: ESB Generation Stations listed with capacity (in Megawatts) and Fuel Type

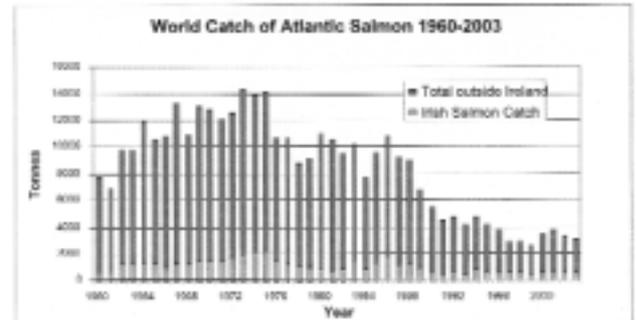
Station	Capacity (in Megawatts)	Fuel Type
Glencorribke	126	Peat
Armagh	55	Peat
Ballacork	40	Peat
Ennagh Hill	202	Hydro (Pump Storage)
Liffey	38	Hydro
Ardsinna	88	Hydro
Lee	50	Hydro
Clady	4	Hydro
Lee	27	Hydro
Interconnect	318	Coal
Tarbert	500	Oil
Carraigpoint	240	Oil
Aghalea	500	Gas
Cherryhill	1,000	Oil and Gas
North West	200	Oil and Gas
Shannon	110	Gas

(Source: ESB Website)

measures to be taken that will ensure the survival of the Irish salmon as an economic, social and recreational resource. And it is a campaign that will, at the end of the day, require sacrifices by all of those who exploit the runs of salmon. Far from arguing that there can be no commercial net fishery we envisage achieving a situation in which it might very well continue to catch many more salmon than the angling sector." It is hoped that this is the view of the various groups that oppose drift netting.

Finally, the drift net fishermen around the coast need to organise themselves into one group so that they can negotiate a fair deal of compensation and also be involved in the management of salmon stocks. There are too many splinter groups, each going off at tangents. They need one spokesperson that can put their case with clarity. They should take a lesson from the "Stop the Salmon Drift Nets Now" group who have had one of the most effective and united PR campaign for many years on an environmental issue.

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



Source: Wild Salmon and Sea Trout Tagging Scheme Fisheries Statistics Report 2003-2004 (Central Fisheries Board)

Table 2: World Catch of Atlantic Salmon 1960-2003

The Rise and Rise of the Gannet



Gannet *Morus bassanus*

By Oscar Merne

BACK in 1990, one of my first articles for *Sherkin Comment* was titled *Gannets Galore*, which outlined the healthy state of the breeding population of the Northern Gannet *Morus bassanus* in Ireland and elsewhere. Fifteen years later, this article updates the situation here and places it in the context of the population as a whole, based largely on the results of the international census of the species carried out during the breeding seasons of 2003 and 2004 (Wanless, S., Murray, S. and Harris, M.P. 2005. The status of the Northern Gannet in Britain and Ireland in 2003/04. *British Birds* 98:280-294).

First, let's take a look at how Gannets have fared in Ireland since 1990. Well, no new colonies have been established here, since the last one started up on Ireland's Eye in the late 1980s. However, there has been a continuing increase in the overall numbers, at four of the five breeding sites. By far the largest and longest established colony at Little Skellig, off the Co. Kerry coast (known since at least 1700), now has 29,683 breeding pairs and appears to be full to overflowing. First-time breeders reared at that site are now probably having great difficulty finding vacant ledge space on Little Skellig, and many may have moved to the nearby Bull Rock, off Dursey Island in West Cork. Here numbers have increased at over 7% per annum to 3,694 breeding pairs. While this is a very small island there appears to be suitable nesting space for a doubling of the population there over the coming years. The third Irish colony, on Great Saltee Island, off the Co. Wexford coast, has also increased at about 7% per annum and now stands at

2,446 pairs. There's ample room for further expansion on this island. The tiny colony on a stack off Clare Island, Co. Mayo, has made no progress at all, probably because of a severe lack of space: it still has only three pairs. However, if young birds wanting to breed there set up on the main island cliffs close to the stack, the colony could "take off" in future. Our newest colony on Ireland's Eye has increased by over 20% per annum and now stands at 313 pairs, some of which are nesting on the main cliffs opposite the stack, which is now looking very crowded. I'd like to thank Alyn Walsh for taking the aerial photographs of the colonies on Little Skellig and Bull Rock, from which Stuart Murray and Sarah Wanless laboriously made the counts of all the little white dots representing occupied nests. Also Sue

Callaghan, who checked the little Clare Island colony. I myself carried out the censuses on Great Saltee and Ireland's Eye.

So, adding together the individual totals given above, we have an Irish breeding population of 36,139 pairs of Northern Gannets. While this is an impressive number, it is somewhat dwarfed by the 182,511 pairs recorded in Scotland. There the largest colonies are on St. Kilda, west of the Outer Hebrides (59,622 pairs), Bass Rock, at the mouth of the Firth of Forth (48,065 pairs), Ailsa Craig, in the Firth of Clyde (27,130 pairs) and Hermaness, Shetland (15,622 pairs). Scotland has ten other colonies. In England there is only one colony, at Bempton cliffs on the north-east coast, with 3,940 pairs. In Wales there are 32,094 pairs on Grassholm, off the Pem-

brokeshire coast, while a new "colony", with one pair, was found at St. Margaret's Island in the Bristol Channel. There are two colonies, of 2,500 and 3,450 pairs, on the Channel Islands, bringing the grand total of the Northern Gannet population of Britain and Ireland to 260,635 pairs. So the Irish population is nearly 14%

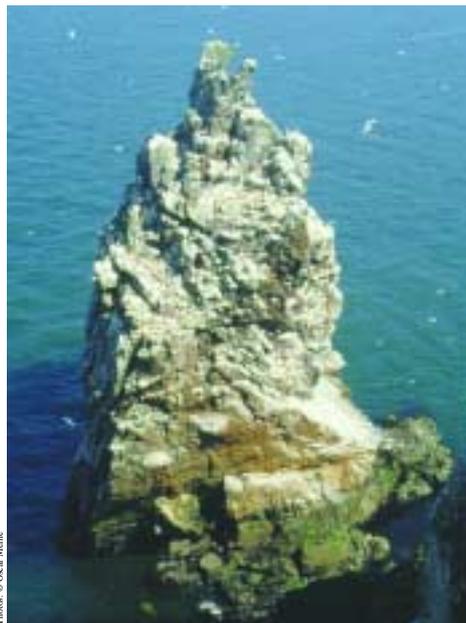
of this, which is certainly not insignificant. About one hundred years ago it was estimated that the British and Irish total was about 47,000 breeding pairs.

Elsewhere in the North Atlantic, Gannets are found nesting in Canada (six colonies, with 103,026 pairs), Iceland (five colonies, with 28,536 pairs), the Faeroe Islands (one colony, with 2,340 pairs), Norway (five colonies, with 4,500 pairs), France (one colony, with 17,000 pairs), with small numbers in Russia (35 pairs) and Helgoland, Germany (190). In respect of the Helgoland colony, it is interesting to note that some of the colonists there originated from Great Saltee, known from resightings of ringed birds. So the world population of Northern Gannets is currently about 417,600 breeding pairs, of which 62.5% are found in Britain and Ireland.

The increase in the Gannet population during the 20th century, and the consequent foundation of new colonies, is thought to be due, initially, to the cessation of human exploitation of the species' eggs and chicks for food. This

very adaptable species, with a foraging range of up to several hundred kilometres, probably benefited from exploiting fishery discards, resulting in higher adult survival rates and increased breeding numbers. Paradoxically, the over-exploitation of some commercial fish stocks by man in recent times may have improved the food situation for Gannets, as the removal of the larger fish, which are predatory and sometimes cannibalistic, increases the numbers of small and medium-sized fish, which are favoured by the Gannets. The main concerns for the future of the Gannets in the North Atlantic are space limitations at many of the large colonies, and changes in ocean temperatures and currents due to climate change, which are already affecting the distribution of fish species.

Oscar Merne retired in January 2004 as head of the Bird Research Section of the National Parks & Wildlife Service, Department of the Environment, Heritage and Local Government.



The Gannet colony on Ireland's Eye has increased by over 20% per annum and now stands at 313 pairs.



On Great Saltee Island, off the Co. Wexford coast, the Gannet colony has increased at about 7% per annum and now stands at 2,446 pairs.



Little Skellig, off the Co. Kerry coast, has the largest and longest established colony of Gannets (known since at least 1700). It now has 29,683 breeding pairs and appears to be full to overflowing.

Photos: © Oscar Merne

The Problems Facing Copenhagen from Transport Pollution

By Finn Terp

Introduction and main problems

Denmark has 5 million inhabitants and Copenhagen has approximately 500,000 citizens. Copenhagen is the capital of Denmark and the centre of the Øresund region.

As a local authority, Copenhagen does not have the most effective instruments for reducing air pollution at our disposal. Such instruments include higher taxes on fuel, cars and transportation in general and other commodities.

However, given the current political climate of the Danish parliament tax increases do not seem a realistic option, and local authority initiatives are necessary if we are to make significant progress. A change in behaviour on the part of private households, businesses and institutions is a key prerequisite for bringing down the emissions. Close contact with citizens and businesses gives local authorities an opportunity to influence this behaviour.

Environmental Protection Agency, City of Copenhagen

The energy, water and environment administration is responsible for matters relating to the environment and utilities. Major responsibilities

include electric power, gas, district heating and water supply as well as environmental control, sewage and waste handling.

The Environmental Protection Agency supervises businesses generating pollution and handles tasks relating to polluted soil, water and air as well as pest control and noise. Waste and recycling is also a responsibility, which involves daily contact with waste companies. The Agency is also involved in the implementation of Agenda 21 projects and plays an important role in ensuring that Copenhagen becomes an environmentally healthy corporation.

Main problems

The main effects of transportation in Denmark and Copenhagen are the number of dead and injured people caused by car accidents. Air pollution causes also main health problems. Surveys say that we have 150 too early deaths caused by the emissions of ultra fine particles. In Denmark 150,000 people are exposed by traffic noise above 65 dB. One third of them are living in Copenhagen. Finally CO₂ emissions are increasing.

The governmental answers to the problems are as follows:

- Many good words
- The main problems are in the cities, so the cities have to act and pay
- Major investments in new roads
- Minor investments in public transport, especially the new Metro in Copenhagen

cially the new Metro in Copenhagen

The only direct environmental action from the Government during the last years is funding installation of particles filters on heavy vehicles. The funding amounts €4.5 million in 2004 and 2005 in total.

Copenhagen, Statistics and Trends

Car traffic is the most significant cause of air pollution in Copenhagen. In particular, nitrogen dioxide (NO₂) and small particles from car exhausts are a health problem. Between 2005 and 2010 Copenhagen must comply with new EU limit values for air pollution. This is a considerable challenge. Our goal is to ensure, that the air quality of Copenhagen must be at such a level that the environment and health are not a risk.

Another goal is that environmental work must be a natural part of citizens, organisations and enterprises everyday lives. Everybody must participate in making Copenhagen a sustainable metropolis – at work, at home, and wherever we are.

- The trends in Copenhagen are as follows
- The number of inhabitants is growing
- More families with children stay in the city
- More jobs are created
- The average income is getting higher
- The living costs are increasing

Since 1995 the commuting out of the city has increased by 25%, the car ownership has increased by 40%, car traffic 15% and cycle traffic 40%.

Monitoring air pollution

Copenhagen has been monitoring air pollution since 1964. During most of the time we have been monitoring in a joint monitoring programme with the national monitoring system.

In the 70s and 80s the sources to air pollution were industrial activities, individual heating and power plants. Now, car traffic causes 85% of the pollution in the streets.

To get a daily picture of the air qualities where people are living and staying we have a monitoring station on a street with heavy traffic. We measure NO, NO₂, NOx, SO₂, O₃, CO TSP, PM₁₀, PM_{2.5} and ultra fine particles.

In order to follow the back ground pollution we also measure on the roof of a high building. We measure NO₂, O₃, Toluene, Benzene, o-m-p Xylene, formaldehyde, acetaldehyd and lead. The results are published in two news papers, in the local television and on our home page. www.miljoe.kk.dk

New traffic and environment plan

In 2002 Copenhagen started the preparation of a new traffic and environment plan, especially due to the increased traffic. We have now been through a three year long process with intensive public participation – public meetings, opinion polls, interviews with groups of stakeholders, hearings etc. The public priorities are:

- 34 % – less noise and air pollution
 - 24 % – improved public transport
 - 20 % – improved facilities for cyclists
 - 11 % – better conditions for cars.
- The plan propose following initiatives
- Major improvements for cyclists (new cycle lanes, better parking etc.)
 - Better public transport (more metro, improvements for buses, better facilities)
 - Noise reduction measures (district plans, new asphalt, insulation)

- Environmental zone
- Funding cleaner technology
- Environmental aspects in physical and other planning
- Behaviour change campaigns
- (Road pricing)

The plan will be adopted by the politicians in May or June this year. We have no idea if we get the finances to implement the plan.

Particle filters on municipal vehicles

Particles can be filtered from the exhaust of diesel vehicles by a particle filter. The efficiency is 80% - 99% of all particles – including the ultra fine. The price for a filter inclusive installation is between €3,000 – €7,000 depending on the vehicle.

In 1999 Copenhagen decided that all our own diesel cars and cars used by our contractors etc. should have particle filters. It has taken five years to implement this decision, so now there are particle filters in 90% of our own cars and in 96% of our own machines. We also require the use of particle filters to be included in every municipal contract and agreement. But there is still need for focus in this area.

Environmental zone in half of the city

In 2003 Copenhagen applied to the Ministry of Justice for permission to create an environmental zone as a three year pilot project. Heavy diesel vehicles over 3½ tonnes need to have installed a particle filter to get permission to drive inside the zone, which is half of the city.

The goal for this project is to see, if an environmental zone is a proper tool to limit the air pollution, in particular ultra fine particles caused by transport with diesel vehicles. The system must be easy to communicate and control with essential effects on air pollution and health.

The expenses for the transport business are calculated to lie between 0.5 - 1 million DKK. The health benefits due to less early deaths etc. are calculated to lie between 1 and 5 million DKK. So, overall a good project for society.

Findings

Make plans and strategies

Maybe this don't provide resources in the first place, but it can be a tool for allocating new resources to actions aimed to bring down pollution

Order in your own house

It is a hard job to get the environment prioritised when in competition with schools, health care etc. But necessary, if you have to convince the public and the industry to do better

Co-operation between politicians, public administration and other stakeholders. Identify and showcase visible projects. Use simple arguments and reliable data. This can help getting across the main message and relevant arguments to citizens, businesses and the community in general.

Finn Terp, Environmental Planner, Architect MAA, Environmental Protection Agency, City of Copenhagen, Kalvebod Brygge 45, P.O. Box 259, DK-1502 Copenhagen V, Denmark. Tel.: +45 3366 5877, E-Mail: fiterp@mf.kk.dk Information about air pollution in Copenhagen and links to air pollution in Denmark can be found on our web side www.miljoe.kk.dk

This paper was presented at Sherkin Island Marine Station's 21st Annual Environmental Conference in April 2005.

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Providing Clean Water for Dublin Bay

By Caroline O'Reilly

UNTIL the mid 1990's most of Dublin's wastewater was pumped to a primary treatment facility at Ringsend. Sludge produced as a by-product of this primary treatment was shipped out to sea in "sludge boats" where it was dumped in the Irish Sea. Despite being an enviable resource at the heart of the city for numerous marine activities, Dublin Bay did not have an enviable reputation. Public pressure as well as various legislative instruments have changed this situation dramatically.

The EU Urban Wastewater Treatment Directive (1991) was transposed into Irish law on 14th December 1994 by S.I. no 419/1994 Environment Protection Agency Act, 1992

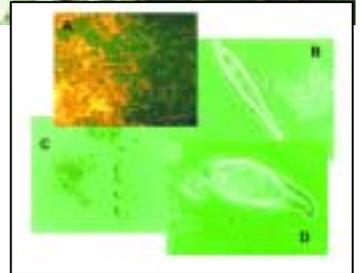
(Urban waste water treatment) regulations, 1994. This piece of legislation is probably the most important tool in improving the water quality of both sensitive and coastal areas. This together with the EU ban on marine dumping of sewage sludge meant that wastewater treatment standards had to be significantly improved, not only in Dublin but across the country.

The bathing water Directive (76/160/EEC) also provides for monitoring of the water quality at designated bathing areas in Ireland. The purpose of the directive is to ensure that the quality of bathing water is maintained and, where necessary, improved so that it is in compliance with specified standards designed to protect public health and the environment.

In general, the quality of Ireland's bathing



Ringsend Wastewater treatment works



Some of the bugs in activated sludge: A; nitrifiers, B; Rotifers, C; stalked ciliates, D; Free swimming ciliates.

waters is of a high standard, according to findings released by the Environmental Protection Agency (EPA) in May 2005. The EPA's Bathing Water Report 2004 also points to the positive impact of wastewater treatment facilities on bathing water quality.

Bathing waters are assessed for compliance with two sets of EU standards: minimum quality standards (EU Mandatory Values) and more stringent quality targets (EU Guide Values). The EPA also monitor compliance with additional parameters set by Ireland (National Limit Values) to examine areas such as water colour, transparency, faecal streptococci and dissolved oxygen.

The blue flag Scheme is a voluntary scheme administered in Ireland by An Taisce and at European level by the Foundation for Environmental Education in Europe (FEEE).

According to the EPA the bathing areas that showed the most notable water quality improvement were Malahide, Portmarnock, and Dollymount. Due to tidal movements in the bay, Dollymount strand is the beach most directly affected by the Ringsend treatment works and effluent quality.

Construction on the upgrade to the Ringsend treatment works commenced in October 1999 and the official opening of the plant was held in June 2003.

The plant provides preliminary treatment in the form of screening (6 mm fine screens) and fats, oil, grease and grit removal, and primary treatment in the form of sedimentation, using Lamella plate settlement technology. The settled wastewater is pumped to 24 sequencing batch reactors (SBR's) for secondary treatment to achieve Biochemical Oxygen Demand (BOD)/Chemical Oxygen Demand (COD) removal and partial nitrification. The SBRs at Ringsend are the largest in the world and, uniquely, are contained in a two storey structure due to site limitations.

During this secondary treatment, settled sewage is exposed to a dense microbiological population (activated sludge) under aerobic conditions in an aerated tank. Microorganisms (mainly bacteria) convert soluble and colloidal organic matter (food) into new cells (biomass), energy and carbon dioxide.

Aeration and mixing of activated sludge together with incoming flow of sewage (food) provide excellent condition for a wide variety of microorganisms (see below). The predominant type of micro-organism depends on (i) The influent wastewater (ii) Plant operational mode (iii) Process design.

The Ringsend Plant provides tertiary wastewater treatment in the form of a state of the art Ultra Violet (UV) Radiation Plant. This UV

plant, through its 1000 lamps and 5 flow controlled channels, is responsible for the sterilisation of the final effluent. When exposed to UV-C light, microorganisms are inactivated within seconds through a physical reaction with the organism's DNA. They lose their ability to reproduce and are considered dead. Using UV treatment as a disinfection method eliminates the introduction of chemicals into the water, thus eliminating the need for further post-treatment of the water. The UV dosing is linked into the plants main SCADA system where dosage rates can be controlled and monitored by the computer system in relation to the wastewater flow through the plant. During the summer months the plant will be run 24 hours a day and daily monitoring upstream and downstream of the plant will determine the efficiency of the radiation effect. To ensure the effectiveness of the UV plant it is essential that the other upstream processes i.e secondary biological treatment in sequencing batch reactors, on the plant are working effectively and are continuously monitored.

Final effluent quality is monitored rigorously onsite with strict compliance standards being consistently met. Compliance limits are 25 mg/l BOD, 125 mg/l COD, 35 mg/l TSS and 18.75 mg/l Ammonia. To achieve these standards the plant must remove >95% of the organic pollutants present in the wastewater. During the bathing season, a further bacterial standard is imposed. This standard of 10³ faecal coliforms/100ml is achieved consistently by careful use of the UV tertiary treatment plant.

Less than 2 years after the official opening of the Ringsend WwTW, operational performance results are promising and the best accolade to this is the announcement by the EPA of the Blue Flag award to Dollymount strand at the beginning of June 2005.

Caroline O'Reilly, Celtic Anghian Water, Ringsend Waste Water Treatment Works, Pigeon House Road, Ringsend, Dublin 4, Ireland.

How do Repak members work for the environment?
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A lot of people don't realise it but many large companies that put packaging on the market are obliged to have a scheme in place to handle the recovery and recycling of that packaging.

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Repak members also fund education and awareness programmes including Repak Green Christmas, Repak Recycling Week and Repak Cash for Cans. That's Repak members paying for the recovery and recycling of their used packaging. That's Repak members working for the environment.

- Household waste electrical appliances (HWA) such as vacuum cleaners, hair clippers, hair shavers, etc.
- Household electrical appliances (HEA) such as kettles, toasters, coffee makers, etc.
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- Household electrical appliances (HEA) such as kettles, toasters, coffee makers, etc.

Repak
LARGEST WORKING FOR THE ENVIRONMENT

* Based on EPA 2002 Database and Repak estimated projections.

Birds of the



Guillemot with sand eel.

By Anthony Toole

NUMBERING from the low teens to the high twenties, depending on the tides, the Farne Islands rise from the cold waters of the North Sea, between one-and-a-half and five miles from the Northumberland coast. They are the most easterly remnants of the dolerite intrusion known as the Great Whin Sill, which appears sporadically across eighty miles of northern Eng-



Nesting kittiwakes.

land. Some of the islands are no bigger than rocks, poking just above the swell. Others are cliff-bound, or rise as tall stacks to heights of more than twenty metres.

In 678 AD, St Cuthbert retreated from the monastery on Holy Island to live as a hermit on Inner Farne, where he stayed for most of the last nine years of his life. For many centuries afterwards, Inner Farne was a place of pilgrimage.

The rocks were always a danger to shipping, and lighthouses have been built on several of the islands at various times. The most famous incident involved the wreck of the SS Forfarshire, in 1838, when Grace Darling, the 22-year-old daughter of the keeper of the Longstone lighthouse, twice braved the stormy sea in a rowing boat to rescue survivors. Sadly, Grace enjoyed her fame for only a short time, dying of tuberculosis in 1842. Her quite elaborate tomb stands in St Aidan's churchyard in nearby Bamburgh.



Crowded nesting on The Pinnacles, Staple Island.



The Longstone lighthouse.

Lighthouses still occupy Longstone and Inner Farne. In fact the Longstone is said to have the most powerful light in Europe. Nowadays, however, the lighthouses are unmanned. The only permanent inhabitants are the birds.

Much of the Farne islands consists of bare rock, with only a coating of lichens and hardy sprigs of grass or salt-tolerant flowers sheltering in cracks. Where Ice Age glaciers have deposited boulder clay on the larger islands, a thin layer of peat has developed, which supports a few small shrubs, but extensive carpets of sea campion, thrift and scurvy grass. In fact, nearly 120 species of plant have been recorded here.

There is little in the way of sand, the largest of only three beaches being on Inner Farne. This, however, is where most of the terns are found. More than 2000 pairs of Sandwich terns nest here, and often an even larger number of Arctic terns. In contrast, and despite their name, there are only a few hundred common terns, while roseate terns can be counted in single figures.

These are aggressive birds and readily dive-bomb anyone

who approaches their nests. This is sometimes a problem, as Inner Farne is one of the few islands on which people are allowed to land. Visitors need to wear some form of headgear to avoid pecks from the rapier-sharp beaks.

The terns all fly south for the winter, most to Africa, though one ringed bird is known to have travelled as far as Australia. Some individual Arctic terns have bred successfully on the Farne Islands for over twenty years.

More than 270 species of bird visit the Farnes, most of them during migration. Around fifteen species nest here regularly, including gulls, shags, cormorants and auks. In addition, among occasional and unexpected nesters are lapwings, moorhens, wagtails, blackbirds, wheatears and meadow pipits.

Around 250 pairs of cor-

morant breed across several of the islands, with more than twice that number of shags on Staple Island alone. The population of kittiwakes is now in the thousands. Their nests occupy tiny, precarious ledges,

and often appear to be just stuck onto the bare, vertical rock.

The most abundant birds are the auks. Though there are relatively few razorbills, the number of guillemots is now



Nesting shag.



Puffins, Staple Island.



Tern colony, St Cuthbert's Cove, Inner Farne.

Farne Islands

approaching 20,000 pairs. Huge colonies crowd with little space to spare along flat ledges on Staple Island and the nearby rock stacks known as The Pinnacles. Almost twice as numerous are everyone's favourites, the puffins, which nest wherever there is sufficient depth of soil to dig a burrow.

Though these populations appear healthy at present, concern has been expressed at their fluctuations in recent years, not just on the Farne Islands, but elsewhere along the whole of the North Sea coast. Over the past forty years, possibly as a result of global warming, cold-water plankton species in the eastern Atlantic have migrated north by ten degrees of latitude (1000 kilometres). This appears to have affected the sandeels on which many of the birds depend for food. 2004 saw a near catastrophic fall in bird numbers around some parts of the North Sea. Many dead fulmars washed up on the North-east coasts of Britain were found to have died of starvation. Scientists of the Dove Marine Laboratory at the University of Newcastle upon Tyne continually monitor the bird populations around the Farne Islands.

The grey seal colony is one of the most important in the British Isles. The seals tend to

congregate on the smaller rocks of the archipelago, but can be readily approached in a boat. In fact they will often swim close to boats and pop their heads out of the water in apparent curiosity.

Until the end of the nineteenth century, seals were hunted on the Farnes for their skins and oil, and numbers fell to about a hundred. Today there are around 3500 individuals. About a thousand pups are born each year, though the fierce North Sea storms can often lead to only a 50% survival rate.

Small boat trips to and around the Farne Islands leave the nearby fishing village of Seahouses most days from April to September. The outward journey reveals some of the spectacle of this historic coastline. To the north is Holy Island, while the west is dominated by the impressive structure of Bamburgh Castle and the Cheviot Hills in the distance.

Landings on Inner Farne and Staple Island depend on the weather, and restrictions are imposed to keep visitor numbers down during the breeding season, from May to July. Whether one lands or not, these trips are magic for the proximity to which one can approach huge numbers of sea birds and seals. And there is always the possibility of an

extra touch of magic in that one of the many dolphins that frequent the Northumbrian coast might accompany the boat back into Seahouses harbour.

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



Guillemots, Staple Island.



Sea Campion.



Grey seals.

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THE FARNES ISLANDS CHARITY

Backyard Burning

– but it is what we have always done!

Over 2.7 million tonnes of municipal (household and commercial) waste was generated in 2001, an increase of 31.5% since 1998. This was the equivalent of almost 700kg of municipal waste for every person in Ireland. Some of this ends up being burned in backyards.

If you are burning your waste at home, you need to STOP!

Many people in Ireland burn waste on their own property.

The materials burned are varied and include paper, cardboard, textiles, timber, food, garden clippings, synthetics such as plastic and even glass, metal and household chemicals.

This 'backyard burning', as it is known, is mistakenly seen as a cheap method of keeping waste out of already overflowing landfills and many presume that it is not harmful to the environment. Nothing could be further from the truth. Practically all uncontrolled low temperature burning of waste releases toxic pollutants directly into the air without treatment or filtering. This is one of the major sources of some pollutants impacting on air quality in Ireland today.

Almost 73% of the dioxins emitted to air in Ireland came from the uncontrolled, low temperature burning of waste. This makes backyard burning of waste the single biggest source of dioxins released into the Irish environment.

Surely it doesn't do any harm?...

If this is what you believe then you need to read on.

Uncontrolled, low temperature burning of municipal waste can impact on human health, food safety and the environment. In fact this uncontrolled "backyard burning" of municipal waste is far more damaging than previously thought. Current research indicates that when municipal waste is burned, in piles in the open, in barrels or open pits, or in commercially available home incinerators, toxic pollutants are released into the air.

How bad can it really be?.....

The amount of toxins released from uncontrolled low temperature burning in backyards depends on the composition of the waste being burned, the temperature of the fire and the supply of oxygen. The major problem with backyard burning is that it is rarely carried out at high enough temperatures to destroy toxic substances. Under calm weather conditions toxins released from this type of uncontrolled low temperature burning can remain at dangerous levels near the ground for a long time, causing high amounts of contamination at source. Below is a list of pollutants that can potentially be generated by uncontrolled low temperature burning:

- Dioxins and furans, some of which are classified as carcinogenic (i.e. they can cause cancer).
- Volatile organic compounds (VOCs), which

can aggravate respiratory and heart illnesses and lead to kidney and liver damage. They also contribute to the formation of ground-level ozone (photochemical smog).

- Polycyclic aromatic hydrocarbons (PAHs), which are generated when elements of municipal waste are not completely combusted. PAHs are known carcinogens.
- Carbon monoxide (CO), small amounts of which can cause nausea and headaches when inhaled. CO contributes to the formation of harmful low level ozone.
- Hexachlorobenzene (HCB), which has similar properties to dioxins as it is persistent and builds up in humans and the environment. At certain levels of exposure it may cause serious health problems such as cancer, kidney and liver damage.
- Nitrogen oxides (NOx), which contribute to acid rain and the formation of ground level ozone. Short term exposure to very high concentrations of Nitrogen Dioxide (NO₂) can result in adverse effects on the respiratory system.
- Microscopic particles, which can be small enough to get deep into our lungs. They are associated with health problems including bronchitis, asthma and heart attacks. People who already have respiratory or heart problems, the elderly and infants are most at risk when exposed to these particles. These particles are known to transport dioxins in the environment.
- Ash, which may contain mercury, lead and arsenic. These are toxic to humans and animals when consumed, causing heart problems, kidney and brain damage. If deposited in the garden, vegetables can accumulate them and they can then be passed onto humans when eaten.

But I Thought Dioxins only come from Incinerators?

Wrong!

Dioxins and Furans are chemical compounds released during the combustion of most substances when chlorine is present, especially plastic and rubber but even ordinary paper and newspaper. When dioxins are released they decompose so slowly that they become persistent pollutants in the environment for many years. Once dioxins enter the environment or body, they persist due to their chemical stability and can accumulate in fat in animals and humans. Some dioxin compounds are toxic and exposure to high levels has been linked with chloracne (skin lesions). Also, a particular dioxin, TCDD, is recognised as being the most toxic and has been classified as a known human carcinogen (cancer causing).

Where exactly are dioxins coming from in Ireland?

Dioxins in the Irish environment primarily result from incomplete combustion of wastes, and the main source of dioxins according to the Environmental Protection Agency (EPA) is from uncontrolled burning of domestic waste. The EPA estimated that 93g of dioxins were generated in Ireland in 2000. Of this, 73% of emissions were generated by uncontrolled combustion activities. The principal such activities are the domestic burning of waste (accounting for 58% of emissions) and accidental building fires (accounting for 11% of emissions).

Dioxin emissions are projected to increase from 93g in 2000 to 110g in 2010. Uncontrolled combustion activities will continue to be the largest contributor of dioxins to the Irish environment – even if all of the planned municipal waste incinerators are constructed and operating. The construction and operation of incinerators for municipal and hazardous waste, as proposed in regional and national plans, are forecast to contribute 1.8% of projected dioxin emissions to air in 2010. Uncontrolled burning is projected to account for 84% of such emissions. The dioxins identified as being emitted from waste incineration and ending up in land are those dioxins contained in the ash arising from the burning of the waste. This ash can be treated and isolated from the general environment by deposit in secure landfill facilities.

So why are we building Incinerators?

There is no comparison between uncontrolled, low temperature burning of waste and the controlled and regulated high-temperature conditions under which incinerators operate. In fact, the dioxins emitted from the uncontrolled burning of one tonne of household waste (the average level of annual waste per household in Ireland) are 55 times greater than the dioxins emitted if the same tonne of waste was treated in a modern municipal waste incinerator.

The temperature at which incinerators operate is a key factor distinguishing such facilities from uncontrolled backyard burning. Modern municipal incinerators are designed to burn waste at temperatures in excess of 850°C and at these temperatures dioxins are destroyed. In addition, modern incinerators have very effi-



cient flue gas cleaning technology which means that most of the pollutants produced when waste is burned are not released to the atmosphere.

In contrast, uncontrolled low temperature burning of waste occurs at a temperature of about 200 - 400°C, the temperature at which dioxins are formed. All pollutants produced are then released directly into the environment with no treatment or filtering.

Incineration is not the full answer to our waste challenge. However, as part of an overall waste management strategy, as reflected in the EU Waste Hierarchy, incineration coupled with waste prevention, reduction, recycling and other treatment methods, has an important role to play.

In a report published in 2003, the Food Safety Authority of Ireland indicated that properly managed incineration facilities will not contribute to dioxin levels in the food supply to any significant extent and will not affect food quality or safety, human health or the environment.

What can we do?

Ireland is moving towards more sophisticated management of waste with a high emphasis on reducing the amount of waste we produce, recycling as much as possible, thermally treating waste that cannot be recycled and minimising landfill. While all waste management options impact on the environment, this integrated approach means that impact is kept to a minimum. Uncontrolled, low temperature burning of waste impacts on the environment more than any other waste management option.

We must stop this practice NOW.

A modern municipal incinerator treating 1 million tonnes of waste in controlled conditions, releases just 0.54 grams of dioxins to the atmosphere. A recent EPA report (2001) estimates that 60,000 tonnes of waste burned in the back yard produced 18 grams of dioxins.

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A Spotlight on World Environmental Matters

by Alex Kirby

No Progress on Climate Change

The G8 set-to at Gleneagles in July did make some progress on Africa, if less than many had hoped and a few had proclaimed. But on climate change it was disappointing. True, it set a date for a formal meeting between developed countries which have ratified the Kyoto Protocol and developing giants like China and India, which haven't ratified it and are not yet within its ambit. That's worthwhile, but it's not world-changing. For all the diplomacy, no new targets, timetables or money emerged from Gleneagles, nor any hint of urgency. And the problem is now so urgent it demands action without delay, most scientists agree.

Flying Fish off British Coast

It could be coincidence, of course, but a species found normally in warmer southern seas has been reported twice from British coasts recently. Flying fish are familiar to visitors to places like the Canaries. But an adult was spotted off Devon, and a schoolboy netted (and then released) four infant fish which he and his mother are convinced were also flying fish. That was at Colwyn Bay, in North Wales, a long way north for the species.

Importing Gray Whales

The Irish Sea could in a decade or so be a livelier (and more crowded) place than today, if two scientists from the University of Central Lancashire have their way. They propose importing around 50 gray whales from the population which breeds off California and Mexico, to be the nucleus of a whale-watching industry in north-west England. There used to be gray whales in European seas till they were exterminated by the hunters several centuries ago. The scientists think the imports could survive and thrive, and even spread elsewhere in Europe. The West Coast grays were reduced by the whalers to about 160 animals in the nineteenth century, but are estimated now at more than 20,000. They're docile and friendly, and even at 40 tonnes and up to 50 feet could (the scientists say) be safely flown from California to the UK. Their 12,000-mile annual round trip from their breeding grounds to feed in the Arctic could leave some disappointed would-be whale-watchers, though.

Test-tube Sharks in Australia

Australia is trying a different way of conserving marine life — test-tube sharks. The young of the endangered

gray nurse shark eat each other in the womb, so Australian scientists plan to artificially inseminate females to save the species, which faces local extinction in 20 years. It is called the "labrador of the sea" from its docility. The sharks have two wombs, in which a dominant pup will consume its siblings, leaving only two surviving pups every two years when the shark breeds. Artificial insemination won't stop intra-uterine cannibalism, so marine scientists plan to breed the embryos in individual test tubes, until they have outgrown their cannibal phase and can survive safely in artificial wombs.

African Elephants on the Increase

For some African elephants, the news is good. IUCN-The World Conservation Union says that between the late 1990s and 2002 savannah elephants in the south and east of the continent increased by about 4.5% a year, from around 283,000 to nearly 355,000. In southern Africa densities have been rising for a century, so much so that some countries now want an elephant cull, arguing that their success threatens other species and whole habitats. The smaller population increase in eastern Africa suggests that poachers and drought may now be less of a threat than they were, though the elephants' recovery is still fragile. But there are no hard facts for west and central Africa, where most of the continent's forest elephants live, and where there is no let-up in the demand for bush meat and ivory.

Bears make a comeback in Switzerland

Just over a century after the last bear was killed in Switzerland, it looks as if the species could be preparing for a comeback. Three people have said they saw a brown bear high in the Alps of eastern Switzerland, near the border with Italy, where the animals are already established. The Swiss are keen to see them return, and earlier this year they started setting aside land which they hoped might provide a corridor for bears to migrate from Italy. The three said they had watched the bear for 20 minutes through binoculars from a distance of 600m. But the light was too poor for photography. Reintroduced lynx are viewed with suspicion by Swiss farmers, and a wolf which wandered in from France was found dead not long afterwards.

Sheep Dip Concerns

Conventional organophosphate sheepdips, which are derived from Nazi nerve gases, are known to damage the nervous systems of susceptible people. Now a UK charity, Buglife, the Invertebrate Conservation Trust, says some supposedly benign replacements for OPs are themselves unacceptable, because they kill wildlife. It says synthetic pyrethroids are poisoning rivers and damaging terrestrial ecosystems. Buglife says pyrethroids are a thousand times more toxic to wildlife than OPs, with a tiny amount dripping from the fleece of a dipped sheep capable of killing all invertebrates up to six miles downstream. Over 400 million litres of used dip are sprayed annually on British fields. Buglife says this will reduce the availability of food for breeding birds and kill off the insects needed to pollinate flowers.

"Superweed" at GM Trial Plot

There was dismay in the UK over reports that a study had found a so-called "superweed" growing at a site

where a trial plot of genetically-modified crops had been sown. A charlock plant, a relative of oilseed rape, failed to shrivel up when treated with the herbicide used to manage a GM crop grown in the same field. Groups opposed to the use of GM technology have feared for some time that wild plants which develop the characteristics of biotech crops could emerge. But researchers say their work shows there is only a slim chance of such transfers happening. And they say the study reinforces the belief that the environmental impact of GM crops is negligible. Dr Les Firbank, who headed the consortium of scientists on the recent UK Farm-Scale Evaluations (FSEs) of GM plants, said: "Herbicide-tolerant weeds tend to under-perform compared with wild type, so unless all its competitors have been sprayed out with the same herbicide, [the charlock] won't thrive."

Alex Kirby is a former BBC environment correspondent, now writing and broadcasting on environment and development.



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Sea Turtles

Introduction

There are seven species of sea turtle but only one of these, the Leatherback Turtle, occurs regularly in Irish waters. As reptiles, sea turtles are 'cold blooded' and are unable to control their body temperature. They are found mainly in tropical, subtropical and warm temperate waters. The Leatherback is an exception and studies have shown that it can maintain its body temperature as much as 18°C above that of the surrounding water. Sea turtles are adapted for a life in the open ocean and most species travel long distances during their annual cycle, moving between nesting areas and feeding zones. All except the Leatherback have a hard shell for protection and all species have long front flippers for swimming. Whilst sea turtles breathe

by means of lungs and need to come to the surface for air they can remain submerged for long periods and are even known to hibernate in mud on the sea bottom. Over the last few decades the numbers of sea turtles have diminished greatly throughout the world's oceans and most species are now considered to be endangered and under threat of extinction.

Leatherback Turtle

The Leatherback Turtle is unique among sea turtles in having a rubbery carapace with seven longitudinal ridges instead of a hard shell and is by far the biggest living sea turtle. The largest specimen ever recorded was a male found entangled in a buoy rope at Harlech, North Wales, in 1988. It measured 2.91m in length and weighed 916 kg. Adult females normally weigh

up to 500 kg. Leatherbacks have a thick oily layer under their skin and a unique physiology to protect them from the cold and this allows them to penetrate even Arctic waters in search of their preferred food – jellyfish. There are 682 records of Leatherbacks occurring in Irish and UK waters during the period 1960–2004, 161 of these from Irish waters. Leatherbacks are most abundant along the south

and west coasts. It is undoubtedly the abundance of jellyfish in our waters that attracts Leatherbacks. Recent studies in the Irish Sea have linked the occurrence of Leatherbacks in certain Welsh bays (Tremadoc Bay, Carmarthen Bay) to the abundance of the Barrel Jellyfish (*Rhizostoma octopus*). Most sightings are made in summer (July – October) with a peak in August.

Leatherbacks, like other turtles, come ashore on sandy beaches – mainly in tropical countries – to lay their eggs, with important nesting areas found in Surinam, French Guiana, the Caribbean, Gabon and Indonesia. The eggs hatch after about 60 days and the juvenile turtles scurry down to the sea in a 'frenzy' to avoid predators. The Leatherback is a very ancient species which has been in existence for 100 million years, but sadly it is now threatened with extinction and only 25,000 breeding females are thought to remain, down from 115,000 in 1980. Heavy mortality occurs as a result of commercial ling-line and gill net fisheries. It also suffers from persecution on the nesting beaches and marine pollution such as plastic bags, which it swallows in mistake for jellyfish.

Loggerhead Turtle

The Loggerhead is a medium to large sea turtle weighing up to 277 kg (normally 80–180 kg). It has a large head with heavy jaws adapted to crushing shellfish and crabs, its main diet. Since

1960 it has been recorded 31 times in Irish waters. Specimens stranded or captured alive in a weak condition have been rehabilitated at the NI Aquarium or at Oceanworld, Dingle, and later released off Madeira or the Azores. Loggerheads occur throughout the tropics, subtropics and warm temperate waters and have the widest geographic range of any sea turtle. They nest in great numbers in Florida (21,000 females) and are the commonest turtle found in the Mediterranean, with about 2,500 females nesting in Greece, Turkey and Cyprus.

Kemps Ridley Turtle

This is a small sea turtle weighing about 50 kg and one which is mostly limited to the Gulf of Mexico. Juveniles range between tropical and temperate coastal areas of the north-west Atlantic and six individuals have been recorded as strandings in Irish waters (one since 1960). The Kemps Ridley is the rarest and most endangered of all sea turtles with a nesting population of only 3,000 females. It nests twice every season, en masse, with hundreds of turtles arriving on the beach at the same time (arribadas).

Hawksbill Turtle

The Hawksbill is so called on account of its hawk-like bill. It possesses a beautiful patterned shell and has been persecuted for centuries for the trade in tortoiseshell. This is the

most tropical of all sea turtles and is typically found around coral reefs. The Hawksbill's narrow head and jaws allows it to obtain food from crevices in coral reefs. It feeds on sponges, anemones, soft corals, squid and shrimp. The Hawksbill is extremely rare in European waters and the only record for Britain and Ireland is an individual which was caught in herring nets off Cork Harbour in 1983. The most important nesting populations are found along the Great Barrier Reef (Australia), in Indonesia, in the Indian Ocean and the Caribbean.

Other Turtles

The Green Turtle is unique amongst sea turtles in having a herbivorous diet: it feeds mainly on sea grasses. It is a large turtle that is widely distributed throughout the tropics and subtropics. It has been recorded seven times from Britain but has never been found in Irish waters. The Olive Ridley, similarly, occurs widely throughout tropical and subtropical seas but has never been recorded here. Despite its relatively large population (about 2 million nesting females) it is vulnerable as it nests in dense concentrations on a small number of beaches (e.g. in Central America and India). The remaining species, the Flatback Turtle, is found only along the northern coast of Australia and unlike other turtles does not venture into the open ocean. The Flatback lays fewer eggs than other turtles but they are large in relation to its body size.

Threats to Sea Turtles

The number of sea turtles has declined worldwide due, primarily, to human activity. Many nesting sites have been lost to development as sandy beaches are turned into tourist destinations. Artificial light from coastal development disorients

nesting turtles and they – and their hatchlings – get lost as they make their way to the sea. Deliberate persecution of turtles on nesting beaches and harvesting of their eggs has led to a decline of turtle populations in many areas and their extinction at a regional level (e.g. Malaysian leatherbacks). Commercial fishing activities are a major threat to turtles. It is estimated that 250,000 loggerheads and 60,000 leatherback turtles are inadvertently snared each year by long lines, with tens of thousands dying. Entanglement in coastal fishing gear is also a problem. About 23% of turtles found in British and Irish waters (n = 104) were reported entangled in buoy ropes of shellfish pots, caught in fishing nets or on hook and line. Plastic bags, styrofoam fragments, balloons, tar and other marine debris is often swallowed by turtles in mistake for food, blocking their digestive tracts and causing death.

Where to Report Turtle Sightings

Any sightings, strandings or accidental captures of sea turtles should be reported to the following: Republic of Ireland: Prof John Davenport (UCC) 021-4904140 (work) 021-4897392 (home) Northern Ireland: Ulster Museum 02890-3831144 (all records) Portrush Countryside Centre 02870-823600 (live records/entanglements)

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This is part of an ENFO leaflet. The full leaflet and many others related to different aspects of the environment are available for downloading on ENFO's website. Contact details: ENFO – The Environmental Information Service, 17 St. Andrew Street, Dublin 2, Ireland. Tel: 1890 200191 Fax: (01) 888 2946 e-mail: info@enfo.ie www.enfo.ie ENFO is a service of the Department of the Environment and Local Government.

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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 stand at your local Authority office or County/City Library

It's easy to make a difference

On-site Treatment of Waste Water

By Gerard O'Leary

DOMESTIC wastewater contains many substances that are undesirable and potentially harmful to human health and the environment. Local authorities, through the planning system, can ensure that housing developments in suitable areas have minimal impacts on water quality. In our most recent water quality report, published in May of this year, we warned local authorities that the

risk presented by a proliferation of on-site sewage treatment systems needs to be kept under surveillance if increased groundwater contamination is to be avoided.

A variety of on-site systems are available in Ireland, the most common system being the conventional septic tank system. There are over 350,000 of these systems currently installed in Ireland. They consist of a septic tank and below surface soil disposal field or percolation area. Other system types, collectively called

packaged secondary treatment systems, take the form of mechanical aeration systems, filter systems and constructed wetlands.

The EPA has repeatedly stated that in many cases a lack of understanding of the treatment and disposal processes involved in small scale domestic wastewater treatment has led to poor design, siting and installation of on-site treatment systems. To redress this situation the EPA has published two guidance documents on the proper selection, design, operation and maintenance of these systems to enable sustainable development to take place in Ireland. The guidance is not intended to suggest that all housing development should consist of one-off housing as engineering cannot be used as substitute for poor planning.

A search on google.com using the words septic tank reveals over six hundred and fifty thousand worldwide hits, a staggering number. When you restrict the search to Ireland there are over seventeen thousand hits alone. With the high number of websites it is not surprising that a number of myths have crept in over the years. The first hit on the Irish search is the Shannon Regional Fisheries Board website (<http://www.shannon-fishery-board.ie/aboutus/septic-tanks.htm>). The EPA agrees with Board that the main threats to the river Shannon come from an increase in the amount of nutrients, including phosphates being released into the water. An excess of phosphates in the water leads to increased algal growth which often results in algal blooms in summertime. The algae in turn uses up oxygen in the water reducing its capacity to support fish life. The phosphates come from a number of sources including agricultural, industrial and domestic (including on-site treatment systems such as septic tanks).

Perhaps to counteract the number of myths that have grown up with these systems the website sets out the "do's" and "don'ts" of a septic tank as follows:

- DO consult the EPA Manual, Treatment Systems for Single Houses before constructing a septic tank
- DO construct a tank and percolation area in accordance with regulations
- DO desludge when necessary



In Ireland there are currently over 350,000 on-site wastewater treatment systems installed.

- DON'T site a septic tank or percolation area within 10 metres of a watercourse or stream, or 50 meters from a lake.
- DON'T allow pesticides, paints, thinners, solvents, disinfectants, or household hazardous substances to discharge into the tank
- DON'T allow rainwater to enter the tank.

With the large number of existing on-site treatment systems in Ireland, the EPA felt it necessary to commission research on small-scale wastewater treatment systems in order to improve the functioning of wastewater treatment systems widely used across

"Those who are responsible for treating waste water on-site must ensure that the system is properly designed, installed and maintained."

the country and so protect water quality. A number of research projects have been awarded since the mid 90's.

The most recent research involved a series of rigorous trials of various wastewater treatment systems to assess the performance of septic tanks and other small-scale secondary treatment applications. Researchers from the Environmental Engineering Group in Trinity College undertook the project, on behalf of the EPA.

The main findings from four separate field trials covering a range of different soil types over a twelve month period are:

- The systems studied were all capable of treating wastewater from a domestic house.

- The conventional septic tank and percolation area provided a comparable performance to the packaged secondary wastewater treatment system and percolation area.

An interesting aspect of the study was the exposure of the Researchers to the existing practice of on-site system installation amongst some practitioners in Ireland. It seemed that common practice for builders is to divert at least some storm water drains into the septic tank, presumably because this saves on the expense and time involved in laying extra pipework. This is disastrous as such practices will impact significantly on the environment as the treatment system will be incapable of handling the increased volume of wastewater. This is akin to asking a garden lawn mower to cut fields of silage. This observation prompts the need for closer supervision of builders during the installation of such treatment systems.

To conclude the EPA supports the view of Geological Survey of Ireland that groundwater is an important resource in Ireland which is under increasing risk from human activities with contamination arising from both 'diffuse' (generally agricultural) and 'point sources' again generally farmyards (manure and silage storage) and septic tank systems. Those who are responsible for treating waste water on-site must ensure that the system is properly designed, installed and maintained.

Gerard O'Leary, Programme Manager, Office of Environmental Assessment, Environmental Protection Agency, PO Box 3000, Johnstown Castle Estate, Co Wexford, Ireland. www.epa.ie

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Thresher Shark (*Alopias vulpinus*) in Irish Waters

By Declan T. Quigley
& Gary Hannon

Threshers belong to a small family of sharks (Alopiidae) which is represented by a single genus (*Alopias*) and only three species. Although they are a wide-ranging family, occurring worldwide in tropical, subtropical, warm and cool temperate seas, only two species have been recorded from European seas: the moderately common Thintailed Thresher Shark or Fox Shark (*Alopias vulpinus*) and the much rarer Bigeye Thresher Shark (*A. superciliosus*). The Pelagic Thresher (*A. pelagicus*) appears to be absent from the North and South Atlantic Oceans, but wide ranging throughout the Pacific and Indian Oceans.

Threshers are easily distinguishable from other sharks by their extremely long curving asymmetrical caudal (tail) fin which is nearly as long as the rest of the shark as well as their large eyes. They are large, active, strong-swimming predators, ranging from coastal to offshore waters, from the surface down to depths of at least 500m. Threshers appear to be specialised for feeding on small to moderately large schooling fishes and squids. They have been observed, sometimes in pairs, swimming in circles around a school of prey, narrowing the radius and bunching the school with their long, strap-like caudal fins which are then used like a whip to stun and kill prey.

Thintailed Thresher (*A. vulpinus*)

The Thintailed Thresher Shark is a widespread species found virtually circum-global in oceanic and coastal waters from the surface down to 366m from tropical to cold-temperate seas but commonest in temperate waters. In the eastern Atlantic it is found from Norway southwards via the British Isles to Madeira and the Azores, including the Mediterranean and Black Seas.

In UK waters, the species occurs frequently during the summer and autumn off the south Cornish coast, as far east as the Isle of Wight, and occasionally from the Pembroke coast, but less frequently from the

North Sea and only very rarely in Scottish waters. Considering the significant number of very small (91-152cm long) threshers caught by anglers during late summer in southern British waters, it is thought that following an inshore migration by sexually mature adults, the pups are born during this time.

Mature threshers (females measuring 315-400cm; and males measuring 314-420cm) are ovoviviparous and produce litters of only 3-7 fully-formed pups (measuring 114-160cm) after a gestation period of 9 months in inshore waters in the eastern Atlantic; the developing embryos are apparently inter-uterine cannibals (oophagous). Threshers reach maturity at an age of 3-8 years and are estimated to live up to 45-50 years. Although the largest authenticated thintailed thresher recorded measured 5.73m, there are unconfirmed reports of specimens measuring up to 7.60m. The current UK rod & line caught record weighing 146.5kg (captured off Portsmouth in 1982) is small in comparison with the present IGFA World (Rod & Line) Record of 348kg (Bay of Islands, New Zealand, 1983). The Irish specimen (rod & line) qualifying weight is still unclaimed at 54.4kg.

Despite its apparent widespread distribution in the north eastern Atlantic, there are surprisingly few unequivocal records of *A. vulpinus* from Irish waters (Table 1). Apart from a few anecdotal references during the 1800s, there are only a handful of authenticated records since 1905, primarily from the west and southwest coast.

Although William Thompson (*A Natural History of Ireland*, Vol. 4 posthumously published in 1856), acknowledged McSkimmin's and Templeton's records, he cautiously remarked that the thresher "Can be announced only on circumstantial evidence as frequenting the Irish coast."

He then went on to recount that "Major Walker, of The Lodge, County Wexford, noticed this species in a letter written to me in July, 1846, from the statement of fishermen who had seen a large fish beating a grampus or small whale in the Sound, between the two Saltee Islands, and who reported that every blow sounded like the distant report of a canon."

At a meeting of the *Dublin Natural History Society* on the 9th February 1854, Mr William Andrews "presented the tail-fin of a fox shark, or thresher (*Carcharias vulpes*), taken from a fish captured in Dingle Bay. Mr Stopford informed Mr Andrews that he and the crew of his yacht had noticed the thresher shark in Dingle Bay. Mr R. Callwell mentioned that in one of the tours of inspection in the Belfast Office steam vessel, he had visited Carlingford Lough in the month of August. Herrings at the time were plentiful in the Lough, and he had noticed a species of shark frequently springing several feet out of the water, which the crew pointed out to him as the thresher shark, from the peculiarity of the action of its tail-fin."

In his *Glances into the Ichthyology of the County of Dublin* (1866), Harry Blake-Knox remarked that the thresher "Is often very common in this Bay" and went on to state that "last winter I saw one rise and kill a wounded diver with a slap of its tail, and then swallow it. When rising in the water the thresher is known from the porpoise by its long dorsal fin (sic). I have frequently given a thresher a charge of shot, and caused him to jump clean out of the water. When up for sport they make a great noise by striking the water with their tail. Have seen them of enormous sizes." Ogilby (1885) was sceptical of Blake-Knox's report and noted "That no specimen has ever been captured there, and no competent ichthyologist ever recorded it from so thoroughly well-known a locality". It is possible that Blake-Knox may have confused the thresher with the basking shark which may have been relatively common in the Irish Sea at this time. The latter species is frequently observed on the surface, has a large dorsal fin (the thresher's is relatively small) and grows to an enormous size.

Bigeye Thresher Shark (*A. superciliosus*)

The Bigeye Thresher Shark is a widespread but infrequently caught species typically inhabiting oceanic and coastal waters from the surface to depths of 500m. Its distribution is considered to be virtually circum-tropical with a preference for warm



Thintailed Thresher Shark (*Alopias vulpinus*): female weighing c350-400kg and measuring 4.23m T.L. captured by MFV "Northern Cell" out of Dunmore East, Co Waterford during July 2005 (Photo: courtesy of Sean Doran, Howth).

temperate to tropical waters. In the eastern Atlantic, it has been recorded, albeit rarely, southwards from the Bay of Biscay. Only one specimen has been recorded from Irish waters to date: during August 1995 a large female measuring 4.84m and weighing 318kg (gutted) was captured in a tuna drift-net set at a depth of 5m in waters more than 2000m deep in the Porcupine Sea Bight area (51°N, 13°W). This is the largest and most northerly authenticated specimen of this species to date.

It is possible that the Bigeye Thresher Shark occurs more frequently in offshore waters off the European coast than is currently known, particularly during warmer years. However, the subsequent EU ban on tuna drift-netting will probably preclude verification of this

hypothesis for the foreseeable future. Indeed, a number of other (primarily epipelagic) species, previously regarded as extremely rare in northern European waters, were captured in tuna drift-nets prior to the current ban on this politically and biologically controversial method of fishing.

Since at least two species of Thresher Shark are currently known to occur in Irish waters it is clear that all specimens should be critically examined in order to verify them to species level.

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Table 1. Irish records of thresher shark *Alopias vulpinus*

Date	Location	Method	T.L. (cm)	WL (kg)
early 1800's	off Copeland Islands Co Down			
1946	Saltee Islands Co Wexford			
c 1804	Dingle Bay Co Kerry			
August 1995	Carlingford Lough Co Down			
winter 1885	Dublin Bay Co Dublin			
15.06.1875	Portsmouth Co Antrim	salmon net	1,425	
1890	SW coast of Ireland off Ballycotton, Co Cork			
end October 1899	Barragh Strand Kilala Bay Co Mayo	stranded	4,050	
c22.11.1899	Kilala Bay Co Mayo	stranded alive	c2,400	
1905	Shoanavin Bay Co Donegal	net	4,750	
summer 1906	Port na Ragh Sheep Haven Bay Co Donegal		5,475	
1970's	Trillick Bay, Co Kerry			
Jul-02	192m SWW Dingle Co Kerry	tuna drift-net	4,200	68.2
Jul-05	off S coast Co Waterford	trawl	4,230	350-400

In his *History of Carrickfergus* (1829), McSkimmin (1829) remarked that the thresher is "sometimes seen off the Copeland Isles; and heard after night making a noise with its tail against the water." Robert Templeton (*List of Irish Vertebrates* 1836-37) also mentioned that the species was "occasionally seen about the Copeland Islands" but concluded that it was "rare on the (Irish) coast."



The German "Gorch Fock" in Cork, a shot taken back in the 1960s. Square rigged on all three masts, she is, in the scale of names of sailing vessels, a Ship.

By Daphne Pochin Mould

I SAW it once – so long ago. I was eight or ten and it was the end of the twenties – hardly 1930. From the blue sea, with the horizon sharp against the sky, came a towering pyramid of white sails. It was heading west down the English Channel for the Atlantic. I was

wildly excited – would she come close to land? The place was Bournemouth and nobody else was bothered. I wondered if she would shore at Poole? But she was a wind ship heading across the oceans long distance, powered only by her sails and the wind on them. No engine to get her out of trouble, too huge to make use of oars. She was the biggest wind ship I've ever seen.

Around the same time, in



"Kathleen and May" restored in England returns to visit her old hometown of Youghal. She, and many other schooners like her, traded back and forth to England, and carried goods all around Ireland right into the 20th century. Till very recently, it was easier to go by sea than by land. Now the coastal schooners' work is done by big trucks on the roads.

Torbay in Devon, I saw the Brixham fishing fleet setting out with their red sails powering them along.

Much later, in the 1950s, some hookers still worked out of the Claddagh in Galway, and I went out in one with the Dominicans for the blessing of the bay and the ships. I went on the pilgrimage to St. MacDara's island, riding in one of the fleet of hookers, which having landed their devout cargo, set about the traditional race – and a Galway hooker racing under sail is some sight.

The glamour of the traditional sailing ship is still with us and the interest is growing. One just had to witness the crowds who came to Waterford to see the Tall Ships, and the start of the Tall Ships race off Hook Head – delayed for days by lack of wind. If you can, get yourself aboard a sailing ship, and feel her movement through the seas. It is so different from the engine driven vessel forcing its route against wind and wave. The modern Tall Ships are beautiful replicas but not real wind ships, for they have engines to fall back on or make up time, or enter a tricky port. They are warm and snug below, have toilet facilities, good food, radio, GPS, a multitude of navigational aids, including radar. And if things go really wrong, help can come both from the air and from ships in the same area.

But none of these aids were available to any of the world's shipping for almost all of human history. Only in the early 19th century did crude, fuel-hungry steam engines come aboard and laboriously turn paddle wheels. It was another hundred years before ships began to carry radio and use Mr. Sam Morse's new code. Had the "Titanic" sailed a few years earlier, we would never have known what happened to her. Those faint dots



The French Navy's sail trainers are "Etoile" and "Belle Poule" and are topsail schooners, replicas of the great Brittany fleet that each year sailed to Iceland to fish there all summer. Seen here leaving Kinsale harbour.

and dashes of the code brought rescue ships to pick up survivors. In the old days, in the open ocean, you sank alone. Once a ship passed out of sight of land, there was no news of her until she came to some port. In Brittany, there is a cross called the Widows' Cross, for here the wives would gather when the top sail schooner fleet came back from the summer fishing off Iceland, and count the vessels returning and know how many would not return.

Wind powered ships sailed and explored the world, mapped and discovered, carried armies to war and built empires, carrying all the goods and luxuries people wanted. From Cork, the "Ring Mahon Castle" (whose log book survives) was fast and she ran quickly to the West Indies for coffee and sugar. Another little brig made its way to China to load up with tea. The Cork papers would give notice of her expected return, and then of the date and place of the Tea Auction and of the many vari-

eties of China tea brought back.

The wind ships are beautiful, from the fast, streamlined Viking ship to the chunky, colourful Spanish galleon, to the crowded warships of navies, including the "wooden walls" of England – Nelson's navy, "heart of oak are our ships, jolly tars are our men". "Beautiful ships but badly found" wrote one man who had worked on them. Those great sailing ships of the 19th century and early 20th – the kind I saw so long ago – might have been run by mean owners, with badly paid, badly fed crews. Many were undermanned and clawed their way round Cape Horn against contrary gales, snow, ice, struggling with frozen sails. There were no safety harnesses in those days – if you fell, you fell. Comforts were none existent, only the cook's fire below, which was put out in really bad weather (fire was the great hazard of wooden ships). There were no washing/toilet facilities and the food was bad.

A wind ship can stay at sea indefinitely while a power one must stop for fuel. They carried salted and dry provisions including salted "horse", which was actually beef, pig in casks (Cork produced vast amounts of salt meat), "Liverpool pan-tiles" for bread, hard biscuits made of flour and water without fat so they could keep indefinitely (the modern "water biscuit" of our canapes is the same mix), dried peas and oatmeal. Scurvy, due to lack of vitamins was the scourge of

long distance voyages until it was found that lime or lemon juice would provide the essential vitamin C.

The wind ships could mend themselves to some extent. Battle or storm damage to masts and rigging could be repaired by handy men who could make some sort of a "jury rig" and get the ship to a port.

Now with fossil fuels running out, will the wind powered bulk carriers come back, saving on the engine's scarce fuel? Not the old tall ship pattern, but using new materials for sails, with their controls linked to the weather forecasts and GPS, and controlled by computer on a snug bridge. The wind still blows as strong as ever it did: why not ride along with it again?

Suggested further reading:

Derek Lundy. "The Way of a Ship" Jonathan Cape, London, 2002. 445pp. An important account of life on a wind ship in the last days of sail. Round the Horn in the worst of weather, including fire at sea, disease and a history of long haul sailing.

Sheila Mulcahy. "A Gallant Barque" The story of the "Port Yarrock". The Kerryman, Tralee 1999. "Port Yarrock" was lost with all hands and stranded in Brandon in 1894.

Patrick O'Brien's long series of novels of the British navy in Napoleonic times, are a lively but genuine account of what life was like then on a fighting wind ship and how she was sailed.



Deck, "Kathleen & May"

New Developments and Flooding Risks



By Paddy Leahy

THE first settlers in Ireland established themselves on the coast, at the mouths of rivers where there was shelter for their boats. Penetration inland would have been initially by boat on the larger rivers, and all old towns and cities were on the banks of rivers. The bigger rivers were a transport system, a source of water, and a useful waste disposal system. As time went on and populations grew, bridges were built across rivers and the towns expanded to cater for the increasing industrial and commercial activities.

Approaching the modern era, buildings became more substantial and longer lasting. Sometimes marshes alongside the rivers were filled in and canalisation of the rivers was achieved by building embankments along the river banks.

Historically, developments have contributed to river flooding in a number of ways. Many of our old bridges, built of stone in the nineteenth century or even earlier, have substantial river piers which restrict the flow. Often too, such bridges have approach embankments on the flood plain that restrict the river flow or reduce storage capacity. It was only natural that large bridges would be built in or adjacent to towns, and as the towns expanded, flooding upstream of the bridge became a major problem. Before the 1964 Planning Act, and even in the initial decades after its introduction, developments also took place on river banks and increased the flood risk in the immediate vicinity.

Following calls from local authority engineers and others, a more enlightened attitude to flooding risks is now taken, and proposals for development that would increase flooding are either refused permission or only allowed proceed if appropriate flood mitigation measures are put in place. New developments can

worsen flooding in a number of ways. The flood plain can be obstructed, either by the development itself, or even by embankments built to keep flood waters out of the proposed development. All developments increase the amount of impermeable sur-

In the development of the Irish road network in the nineteenth century, many bridges, sometimes with raised roads approaching them, imposed considerable restrictions on the flood plain. Quite often one can observe in aerial photographs

and reduce the incidence of flooding, but it is not always possible to carry out such works, particularly in an area that already is relatively well developed. Any proposal for development on a flood plain that will have an adverse effect on flooding,

ber of developments is taken into consideration. A "green field" site is often exactly that, a field of green grass or trees. In a spell of heavy rain, the rain that falls on that field soaks into the ground and may take some time to permeate through the ground before reaching a stream or river. The effect is to hold back a proportion of the rainwater for a considerable time and reduce the possible flood. If however, the green field site is built upon, the rain falling on roofs, paved areas and streets is generally piped directly to the nearest drain, stream or river. This leads to a very quick and efficient run-off, and causes major problems downstream. It is particularly a problem relating to areas upstream of towns where the existing

river channel is not always capable of dealing with a flood. Sometimes such a river is confined between, or even under, buildings and cannot be widened. In such cases the cumulative effect of new development can have a huge impact on floods. One solution to this problem is to install storm water retention tanks or ponds. These have the effect of storing storm water on site and releasing it at a slow rate, effectively mimicking the water retention properties of a green field site. The proper design of the size of the tanks or ponds and of the mechanism to control the rate of the water discharge is critical to the success of the system, as is its ongoing monitoring and maintenance.

Any development that could possibly impact on flood levels should have a flood risk assessment carried out and where necessary, flood mitigation measures, properly designed, should be utilised to offset any additional flooding risk.

Paddy Leahy, retired Senior Engineer, Cork County Council, Skibbereen, Co. Cork.

"In this age of increased urban development and the pressures on open spaces around our towns and cities, the most likely obstruction on a flood plain is likely to be new development. For this reason, local authorities have to deal very carefully with proposals for development on a flood plain."

faces, such as roads, paved areas and roofs. This results in much faster run-off of rain water, thus increasing the risk of floods.

Many rivers in Ireland, particularly the larger ones, flow alongside substantial flood plains on their lower reaches. Such flood plains are formed over thousands of years by the filling of the original river valley with gravel and silt washed down from the upper sections of the river, where steep gradients cause rapid run-off and contribute to the erosion of rocks and overburden. Thus flat areas can extend for considerable distances on either side of the normal river channel. Usually above the normal water level, the flood plain is inundated when particularly high flood levels are reached.

Flood plains themselves can carry a proportion of the flood flows. While the main river channel will take the vast bulk of a flood, the flood plain can have a significant additional flow capacity, depending on the depth of water over the plain, and whether or not there are any obstructions. Obstructions can consist of ordinary field boundaries constructed of sod and stone or other materials that will impede the flow of water. Even tall crops or dense woodlands can substantially lower the flow capacity of a flood. Any obstruction of the flow of water on a flood plain can reduce the capacity of the river to deal with a substantial flood, and sometimes to a considerable extent.

of serious river flooding the bottleneck effect that a bridge can have on floods. Although a small number of these bridges have been replaced with longer span bridges, in general subsequent adjacent development has precluded the construction of new bridges.

In this age of increased urban development and the pressures on open spaces around our towns and cities, the most likely obstruction on a flood plain is likely to be new development. For this reason, local authorities have to deal very carefully with proposals for development on a flood plain. Such proposals need not necessarily cause flooding. It can happen that a flood plain is already obstructed by, for example, a bridge and its approach road. Often in such cases a building on the flood plain immediately upstream or downstream is unlikely to have any adverse effect, but often extensive surveys and hydrographical studies are required to determine accurately the effect a proposed development will have on the flood regime. Where it is shown that there will be an adverse effect on flooding, then mitigation measures to compensate can be considered. Mitigation methods can include river widening to increase the capacity of the river channel, channel realignment to shorten and/or streamline the course of the river, and improvements in bed levels and gradients. Such measures can improve flows in the river

should not proceed, unless mitigation measures that will at least cancel out the additional flood risk can be put in place.

Rapid rainwater run-off from new developments can also be the cause of major flooding, especially when the cumulative effect of a num-



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Nigali

Passage to Nirvana



Photo: © Peter Atkinson

Rob Barrel, owner of the live-aboard dive boat Nai'a with his dental hygienist, cleaner shrimp *Lysmata amboinensis*.



Brown-marbled grouper, *Epinephelus fuscoguttatus*. Grey reef shark and red snappers in the distance. The groupers are curious, especially when you have food stuffed into the top of your wetsuit.

By Pete Atkinson

LET'S get the pronunciation out of the way; Nigali is said something like Ningali when you really need to blow your nose. But however you say it, some giant Fijian guy will correct your pronunciation with a word that sounds not unlike Naigani, which is another island miles away and leads to all kinds of confusion. Nigali is on Gau, said in the hollow nasal Ngau fashion. Add, "In Lomaiviti, in Fiji" if that will help. Fifty miles east of Suva.

Quite simply, it's the best dive I have ever done, anywhere. Bliss, from my point of view would be to let loose with a rebreather at 7 a.m., three hours after high water on a clear day, at the outside of Nigali Passage. Alone, of course.

The clear ocean water is entering the lagoon at this time, and since the pass is only 50m wide you can see the coral rubble bottom 25m below and both steep sides with their fans, soft corals, and in deeper water thin red sea whips. The shoal of barracuda are often hanging in the knot of current somewhere out here, and if this is your first dive, the huge school of big-eye jacks will cascade out the pass to escape your intrusion. But they will be back.

Loitering in the current will be a few very large groupers who associate divers with food, some grey reef sharks and a large number of red snappers. If feeding fish is on your agenda, take more care with the snappers and groupers than the sharks.

About two-thirds of the way towards the lagoon the pass divides, a shallower sandy chute to your right, a deeper cut to your left. The bottom is 30m here and in the cleft of the divide rises coral reef covered with soft corals and fans. Near the bottom is a big red fan which by now will have a big grouper posed in front of it. In the early morning you can get a sunburst with a shark swimming through it with the grouper and fan in the foreground. You can photograph several of these in the time it takes to say, "Adobe Photoshop eat your heart out." By the time your dive computer is swearing at you in Morse, the big-eye jacks will have returned and joined a big shoal of black snappers. You can hardly see the other side of the pass for fish. Finning against the current you can side-slip into the shoal of jacks so they are all around you, or get below them so they can swirl into a vortex with the sun at its apex. When greys pass through the shoal they are mobbed by the jacks, the way surgeonfish mob morays, or passerines mob raptors. (The bird, not the dinosaur.)

Indecision about which fork of the pass to take is usually over by now, your computer and contents gauge saying the shallower, right fork is the way to go. Over a sandy bottom with very approachable garden eels (but I defy you to dive with a 105 micro at Nigali) past small coral heads wilting under the weight of soft corals, with white tip reef sharks hiding underneath. Cut to the left a bit to end up between where the two forks enter the lagoon and you'll find a

large area of cabbage coral, which in late afternoon light is stunning.

There is a steep drop-off into the lagoon on the inside of the barrier reef and the visibility drops from 30m to 20m. Here, whoever dropped you off at the beginning of the dive, will, with luck, pick you up. And make you a milo (an antipodean chocolate drink) when you get back to the boat.

Sometimes the lagoon is clear too. When a storm in southern latitudes drives big swells up into the tropics, clear ocean water is driven over the barrier reef, flushing out a lot of the more turbid lagoon water. At these times Nigali can be dived on the outgoing current. Shoals of snapper and sometimes barracuda hang around at the inside end of the pass. More occasionally there are mantas and spotted eagle rays.

Not so good photographically, but probably superior to any mind altering substance, is a late afternoon dive. Pretty much the same animals in the same places. Hundreds of big fish, accepting your presence, bathed in orange light, the sunburst just over the north side of the pass dancing spears into the deep blue depths. Walu, a kind of spanish mackerel cruise by, and on a few occasions divers saw a sailfish here.

If I could make any place on earth a marine reserve, this would be it. There are several villages on the island of Gau, but Sawaieke in effect owns the lot. It is here you must go when you arrive at the island to offer a *sevu sevu* of kava which looks like half a kilo or so of twigs

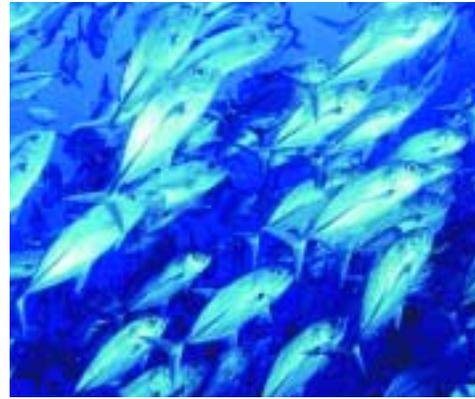
wrapped in newspaper. Presenting a gift of kava in Sawaieke then gives you access everywhere. The chief of Sawaieke is the highest chief on Gau, which is why you go there first, rather than any of the other villages. On all the offshore islands in Fiji, this protocol is required before doing anything; in some ways it's a good introduction to the village, and village life. Kava is roots of the *Piper mythicicum* plant which are crushed and infused to make a narcotic drink, which is central to Fijian life and ceremonies. It's pretty disgusting. I would like to think that the chief of Gau will see the long-term benefits of creating a reserve just around Nigali. At present it is fished occasionally. There can be solid economic benefits to the island for sustaining a world-class dive site which far outweigh the transient benefits of an elderly humphead wrasse or grouper for dinner. Nigali without the animals would be like the Masai Mara without animals.

At present, in the absence of your own boat, the only way to dive Nigali is with Nai'a or one of the other live-aboard dive boats in Fiji. I would hire the whole boat myself, and pass by all the other great sites and just dive Nigali on my own, twice a day until I get bored. Or ran out on money.

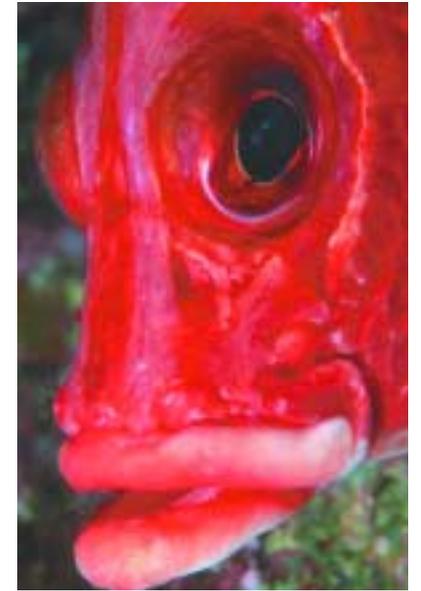
Pete Atkinson, PO Box 2875, Cairns, Qld 4870 Australia. yachtvigia@hotmail.com



Brown-marbled grouper (*Epinephelus fuscoguttatus*) and sea whips (*Ellisella* sp.)



Big-eye Jacks (*Caranx sexfasciatus*).



Long-jawed squirrelfish (*Sargocentron spiniferum*).



Cabbage coral, *Turbinaria reniformis*.



Sea fan (*Subergorgia mollis*), soft coral (*Dendronephthya* sp.) and red snappers (*Lutjanus bohar*).



Manta ray (*Manta birostris*) and remora (*Echeneis naucrates*).

Nigali

Passage to Nirvana

Photography by Pete Atkinson
 (see article on previous page)

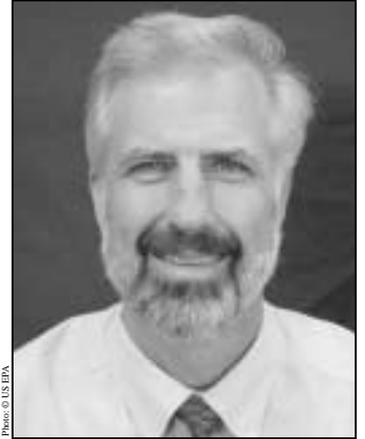


Grey reef shark (*Carcharhinus amblyrhynchos*) and (red snappers) *Lutjanus bohar*.



Big-eye jacks (*Caranx sexfasciatus*) forming a spiral.

Thirty-Five Years of Pollution Control in America



Walter Mugdan

An interview with Walter Mugdan, Director, Division of Environmental Planning & Protection, U.S. Environmental Protection Agency, Region 2, New York City July, 2005

Matt Murphy: When and why was the U.S. Environmental Protection Agency created?

Walter Mugdan: The modern environmental movement is usually reckoned to have begun with the publication, in 1962, of Rachel Carson's book *Silent Spring*, in which she alerted the world to the dangers of pollution by industrial and agricultural chemicals. By the end of the 1960s, citizen environmental activism had become one of several powerful mass movements (along with the civil rights, anti-war and women's rights movements) which profoundly changed America.

Until 1970, pollution control in the U.S. – where it existed at all – was implemented almost entirely by state and local governments. It was at this level that sewage treatment plants were built, drinking water systems operated, solid wastes managed, and the occasional air pollution limit enacted. During the 1960's Americans realised that to be effective, tough pollution control laws would have to be established at the national level.

The U.S. Environmental Protection Agency (EPA) was established in 1970 to coordinate the nation's fledgling environmental research

efforts and, more importantly, to administer the extraordinary body of laws passed by Congress starting in that year and continuing through 1980 (often called the "environmental decade"). During this period all the basic laws were passed requiring regulation of air and water pollution, hazardous and non-hazardous solid wastes, pesticides and toxic chemicals, ensuring the safety of public drinking water supplies and providing for the cleanup of abandoned hazardous waste dump sites.

Matt Murphy: What is the role of EPA with respect to environmental protection in America?

Walter Mugdan: EPA provides for the United States about half the role played by the Ministry of the Environment in many other countries. EPA is responsible for most pollution control programs, while other U.S. government agencies are responsible for land preservation and wildlife management. Like other U.S. government agencies, EPA is headquartered in Washington, D.C. But to a considerable extent the agency is de-centralised, with ten regional offices around the country. Headquarters is generally responsible for writing national regulations and setting policy, while most implementation and enforcement is managed out of the regional offices.

Matt Murphy: How large is EPA, and what kinds of professional staff do you have?

Walter Mugdan: EPA today has about 18,000 employees, down from a high of about 19,000 in the early 1990s; nearly half of those are stationed in regional offices and laboratories. The agency's annual budget is \$7.8 billion, about 40% of which is passed through as direct grants to the states (which are authorised to manage many of the national environmental programs). Around \$1.4 billion is for the "Superfund" program, used to clean up toxic waste dump sites.

Among EPA employees are engineers, scientists and planners who develop regulations and programs, write environmental permits, manage hazardous waste cleanup projects, do original research, run our laboratories and process the millions of dollars in grants we provide to state governments. There is also a sizeable contingent of field inspectors and lawyers to carry out a vigorous enforcement program.

Matt Murphy: What is U.S. EPA's approach to enforcement of environmental laws?

Walter Mugdan: The most stringent environmental rules are meaningless if not enforced.

EPA's enforcement philosophy maintains that compliance rates will be highest if those who are regulated are familiar with requirements applicable to their operations; believe there is a reasonable chance that violations will be discovered; and believe that when a violation is discovered, there is a substantial likelihood that unpleasant consequences will ensue.

Matt Murphy: How do you accomplish those three objectives?

Walter Mugdan: EPA has an active "compliance assistance" program to help ensure that regulatees, particularly those that are not highly sophisticated (such as small manufacturing companies, dry cleaners, auto repair shops, printers, pesticide applicators, etc.) are offered guidance on what is required of them. Though "ignorance of the law is no defense," EPA recognises that knowledge of the law is essential for compliance.

To monitor compliance and detect violations, EPA uses a combination of mandatory self-reporting augmented by unannounced inspections, environmental sampling and remote sensing (e.g., aerial photography and other high-tech analytical tools). When violations are discovered, EPA has detailed enforcement response policies designed to ensure a measure of consistency and predictability. The "unpleasant consequences" for noncompliance generally consist of monetary penalties, although particularly egregious or intentional violations may be prosecuted criminally and can result in lengthy jail sentences. The size of a penalty or fine imposed for a given violation varies in accordance with the gravity of the violation, the degree of environmental harm, and the economic size and previous compliance history of the violator.

Matt Murphy: EPA has been writing and enforcing pollution control rules for 35 years now. How would you gauge the agency's success?

Walter Mugdan: After 35 years it is fair to ask whether EPA has been "successful" in its mission. The answer depends largely, of course, upon one's definition of the term, but a fair assessment would have to conclude that many very notable successes have been achieved, with much more left to be done.

Matt Murphy: Please give us some examples of pollution control successes in the U.S.

Walter Mugdan: During 35 years when America's population and economy have

continues on page 19...

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...continues from page 18

expanded dramatically, and usage of motor vehicles has nearly doubled, air pollution has been cut in half. It is now rare to see smoke from a factory, and cars today emit a tiny fraction of the pollutants they formerly spewed out. Water bodies like the lower Hudson River, accurately described as a "biological wasteland" three decades ago, now teem with fish. Over this period the U.S. government has spent more than \$60 billion to assist local governments to build sewage collection and treatment systems and drinking water purification plants, and another \$50+ billion to clean up old toxic waste sites. Hundreds of billions more have been spent by state and local governments and private industry. These programs have been very effective in eliminating major sources of pollution and contributing to one of the world's safest water supplies.

The use of toxic chemicals and the generation of new hazardous wastes by industry have continued to decline for many years, even as the overall size of the American economy has grown; and management of the significant volume of hazardous waste that continues to be generated is generally very good. Lead, once widely used in both paint and gasoline, has been eliminated from both, greatly reducing exposure to this dangerous element. Hundreds of sub-standard solid waste landfills around the nation have been closed, and those still operating are increasingly sited and operated in a manner that prevents dangerous leachates from escaping. Burning refuse to make electricity remains controversial, but where it is done the incinerators operate under exacting emission limits.

Matt Murphy: What are the major challenges that you see as still lying ahead?

Walter Mugdan: Many challenges remain. These are among the most important:

Air Pollution: Lower atmosphere ozone, commonly called smog, is still a serious health concern in the more urbanised parts of America. Fine particulates – many times smaller than the diameter of a human hair – are now understood to pose grave health threats, and are a widespread problem resulting from combustion of fossil fuels in mobile sources (particularly diesel engines, both "on-road" like trucks and "non-road" like construction equipment and portable generators) and stationary installations (particularly coal-burning power plants). EPA has recently promulgated national rules to require stringent further controls on these kinds of sources – though some critics assert that the new power plant rules do not go far enough or fast enough; and indeed, it will be many years before the full benefits of these rules are realised.

Water Pollution: Though sewage treatment plants are generally very effective, in many older cities it is still common for stormwater and sewage to be carried in the same pipes. When it rains the pipes can't carry all the flow, and so diluted raw sewage gets discharged into rivers and bays from "combined sewer overflow" points. With increasingly large areas of land paved over, stormwater runoff carries tons of pollutants like oil and silt into rivers and streams. Large animal feedlots, which can pour as much sewage as a small city into adjacent waterways, have only very recently been regulated. Air pollution like nitrogen oxides, along with overuse of chemical fertilisers on

farms and suburban lawns, is deposited in the water and causes unhealthy algal blooms and associated "anoxic" conditions (insufficient oxygen for fish and other wildlife) in some of our most important estuaries such as Chesapeake Bay, Long Island Sound and the Gulf of Mexico. "Suburban sprawl" continues to gobble up open land, and the total amount of wetland acreage in the U.S. is still shrinking despite a national goal of increasing wetlands by three million acres in five years.

Toxics: The nation still suffers the legacy of decades of use of highly toxic chemicals like PCBs (used widely in electrical equipment from the 1940s to the 1970s), TCE (the most commonly used industrial solvent) and mercury. Many groundwater sources have been contaminated, requiring costly treatment if they must be used for drinking supplies or if dangerous chemical vapours migrate upwards into homes and offices. And sediments at the bottom of some urban rivers and harbours are still so contaminated that fish cannot be safely eaten.

Hazardous Site Cleanups: The U.S. has done a remarkable job in cleaning up thousands of toxic waste dump sites over the past 25 years under the "Superfund" law. Included among these are some of the most complex and notorious sites like Love Canal. But funding has remained flat as the demands have increased, so the pace of cleanups is slowing down.

Refuse: America generates a huge amount of solid waste – estimated at 369 million tons in 2002, about a ton per year for every man, woman and child in the country. This works out to about 4.3 pounds of garbage per person per day, an increase of nearly 60% in the past thirty years ago. And though the nation's recycling rate has crept up to about 31%, this is still inadequate given the scale of the problem. (EPA has set a target of 35% recycling by 2008.)

Matt Murphy: What about global warming?

Walter Mugdan: The U.S. has not yet moved to regulate the emission of greenhouse gases to limit the effects of global warming, which may be the most serious, global environmental threat. EPA is actively promoting a variety of voluntary programs to encourage industry and citizens to conserve energy and resources; but though energy efficiency rates have improved in recent years, U.S. per capita energy consumption remains among the highest in the world. Thirty-five years ago EPA was created to provide a national response to pollution control problems that were proving difficult for individual states to tackle; today, a number of states have taken the lead in proposing to regulate emissions of carbon dioxide (the most common greenhouse gas).

Matt Murphy: Is there a lesson to be learned from the past 35 years of pollution control efforts?

Walter Mugdan: The challenges we face today are perhaps even more daunting than those of a generation ago: the remaining sources of pollution are less visible, and more deeply enmeshed with our energy-intensive way of life. But the clear lesson of the past 35 years is that unimagined improvements are possible with innovation, persistence and leadership.



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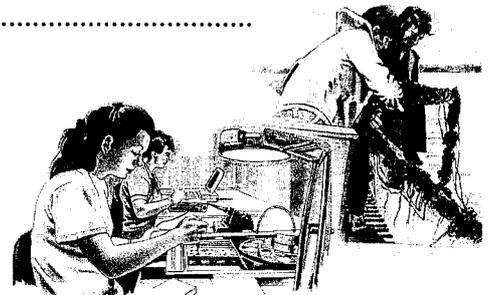
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Breeding Birds in Roaringwater Bay, 2005

By Julian Wyllie

THE annual breeding birds survey of the islands of Roaringwater Bay took place between April & June this year. The survey has been carried out in 24 of the past 30 years, and provides a unique insight into the status of breeding species on the islands. This year a total of 45 islands and islets were surveyed, the exception being Cape Clear, which of course has its own bird observatory.



Gull nests in Roaringwater Bay have been counted in 24 of the past 30 years.

Mute Swans attempted to breed on Sherkin for the first time in many years, with the nest situated in the centre of the reed-bed at Tramore pond. However, no cygnets were seen and it is probable that Mink were responsible for their failure – it has been a prolific year for this most unwelcome of aliens. Shellduck were certainly more in evidence than in 2004, and breeding is considered likely at two sites, at least, with fur-

ther pairs suspected on the mainland along the north of the bay. The usual scattering of Mallards was observed around the bay. Gadwalls were again proven to breed on East Calf, with a female and seven ducklings seen there in early June. Birds were frequently seen on Sherkin early in the season and there is also suitable habitat on Heir, but their secretive habits make this a difficult species to confirm as breeding. Although Gadwalls are now increasing throughout the country, the Roaringwater Bay population is an interesting one, having been in existence for at least 15 years, at which time the entire Irish population was only around 30 pairs, with the nearest breeding birds in Waterford. Red-breasted Mergansers again bred on the Carthies.

Fulmars were present as usual on Sherkin and Goat/Little Goat, both supporting a slightly higher population than in 2004, with 128 apparently occupied territories compared to last years 119. Prospecting birds were again seen on Heir and Long – perhaps both these islands will support small colonies before the decade is out? Cormorants were again present at three sites, but it is interesting to note that the exact location of two of these had shifted by a few hundred yards, only the colony at Dooneen, off East Calf, remaining in the same place.



Approaching the gull colony on Goat Island.

Shags were also slightly up in numbers. Two pairs of Grey Heron bred successfully on Sherkin, the site also being frequented by a pair of little Egrets. Considering the success of the latter species further eastwards along the Cork coast, can we hope for future colonisation on Sherkin? A pair of Peregrines again held territory on Sherkin and showed every sign of breeding. However, no young were ever seen and it is likely that they fell victim to the weather soon after hatching. Water Rails were present on Sherkin and East Calf, with a juvenile seen at Tramore on Sherkin in mid-August.

Oystercatchers and Ringed Plovers were both present in good numbers, with 52 and 16 pairs respectively. Snipe could be heard drumming over Sherkin in May and June, although at fewer sites than in 2004. Lesser Black-backed Gulls continued to do well at their usual colonies on the islands, with over 650 pairs counted. Sadly, the same cannot be said for Herring Gull, which showed a further decrease to fewer than 75 pairs. Great Black-backed Gulls maintained their numbers. Arctic Terns appear to have done reasonably well, with around 30 pairs present on the Carthies and a small colony off East Calf apparently replacing the one on Carrigmore, which was occupied last year. In excess of a hundred birds, including juveniles, were present in the bay in early August, indicating a measure of success. Common Terns made a welcome reappearance, with four pairs on Carrigvigliash, the first recorded there since 1997.

Cuckoos were scarce with only five males holding terri-



A adult Lesser Black-backed Gull keeping a close check on proceedings.

tory around the bay. Long-eared Owls were again present on Sherkin, although as with the Peregrines, no evidence of successful breeding came to light, or darkness for that matter. Again no Rock Doves were present on Sherkin – although it is unlikely that the population consisted of “pure” wild birds, this species has not been recorded breeding there since 1998, the year Peregrines returned to the island as a breeding species. Passerines had mixed fortunes, two species in particular down in numbers this year - Rock Pipit and Reed Bunting. No Sand Martins bred on Sherkin and the Horse Island colony was severely depleted to around five pairs - however, the colony on East Calf was re-established, with 11 pairs there. Skylarks and Wheatears both maintained last years numbers. Coal Tits were seemingly absent from all the islands,

despite extensive searching on Spanish Island, which held the only birds in the bay last year. Choughs had a good year on Sherkin with a 100% increase to four pairs, including one pair in the ruins of Dun na Long Castle, with at least a further five pairs around the bay. Ravens also did well, with pairs on Sherkin, East Calf, Castle, Heir and Long. Linnets and Goldfinches also appear to have had a good year, with several mixed flocks totalling several hundred birds on Sherkin during August, all including good numbers of juveniles.

In conclusion then, a fairly typical year with its ups and downs, but as always leaving us with that all important sense of anticipation for next season.

Julian Wyllie is a volunteer ornithologist at Sherkin Island Marine Station.

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Aquatic Bugs of Sherkin Island (Hemiptera, Heteroptera)

By Christopher Barry

AQUATIC bugs are insects which belong to the Order Hemiptera sub-order Heteroptera. Sixty three species in eleven families are currently recorded as breeding in Britain and Ireland, 20 of these species are present on Sherkin Island. They are most often confused with beetles but can be distinguished by their wing cases which overlap (in beetles they meet in a straight line along the back) and their usually long, tube-like, sucking mouth-part (beetles have mandibles).

Aquatic bugs live mostly in or on water but with some species inhabiting the damp terrestrial margins of freshwaters. Accordingly many of them have special adaptations for an aquatic life. The 'stinging' tail of the water scorpion for example really functions as a breathing tube allowing the animal to hang down below the waters surface where it can lie in wait for a passing meal to snatch. All aquatic bugs (except the Corixidae) are predatory and feed on living or recently dead animals (usually other insects). Surface bugs such as the pond skaters react to surface vibrations and can therefore capture prey which lives or falls onto the water surface.

Wings are a variable feature of water bugs and even within the same species it is possible to find individuals with and without them. Flightlessness is thought to be a common adaptation to a stable freshwater environment; why spend money on wings when you don't need them!

All true bugs (Hemiptera) have an incomplete life cycle in that they grow from eggs into larvae (or nymphs or juveniles) into adults in much the same way as the dragonflies and damselflies (Odonata) and Mayflies (Ephemeroptera).

In recent years certain families of aquatic bug, in which the species show different habitat and water chemistry preferences, have been used in assessments of water quality. In the years to come (with the increasing nutrient and chemical loading of the land and thus watercourses) it is likely that we will have to place a higher and higher value on our naturally occurring freshwater habitats; if we were to attempt to carry out the filtering and detoxifying processes that occur naturally the bills would surely run into six-figure sums.

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

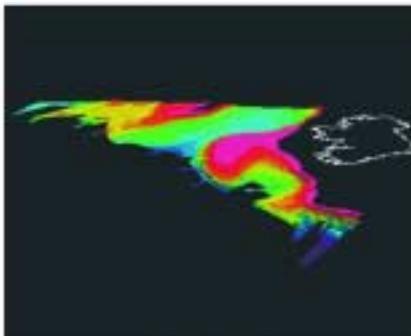


Top left: Backswimmer or Water Boatman, *Notonecta marmorata viridis* Delcourt
 Bottom left: Common Pond Skater, *Gerris lacustris* (Linnaeus)
 Bottom right: Water Scorpion, *Nepa cinerea* Linnaeus
 Top right: Water Measurer, *Hydrometra stagnorum* (Linnaeus)
 Top middle: Water bugs /Corixidae, *Sigara distincta* (Fieber)

Photo © Christopher Barry

National Seabed Survey

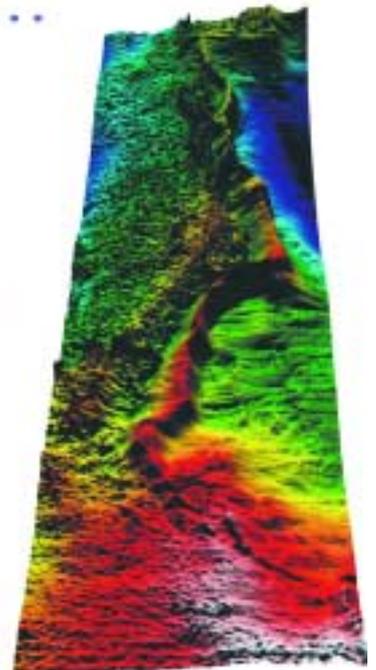
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Back to Saxon Transylvania



The rare Burning Bush, a handsome feature of south-facing hillsides



Hay-meadow with ancient woodland backdrop.



John Akeroyd, Andrew Jones and friend recording grassland species

12th–13th century to defend the then Hungarian frontier. Self-reliant, independent farmers, craftsmen and merchants, they built fortified churches and spacious planned villages, nurturing the land by careful husbandry. Now most have returned to Germany – a strange exodus after 800 years – and Romanians and Gypsies have moved into the villages. Mechanisation came late and mowing is still by scythe, weeding by hoe. Meadows receive no fertiliser, assorted poultry scratch on village greens, and horses provide mechanical muscle. At dawn animals leave their barns for pasture, returning at dusk. Roads are few, often un-surfaced. Fortunately the Saxon cultural legacy endures, notably their elegant 18th century farmhouses. This is indeed a Lost World, albeit one with increasing numbers of cars, tractors and satellite dishes!

By John Akeroyd

I WROTE in *Sherkin Comment* 32 about the unspoiled countryside of southern Transylvania. Since then I've returned several times to this secret and special part of Romania – a tantalising glimpse of Europe's medieval landscape. Great churches, old farms, barns, yards and gardens blend into a gentle tapestry of orchards, hop-fields, arable strips, pastures and hay-meadows. From May to July roadsides and meadows – set in rolling hills and dark woods of beech, hornbeam and oak where bears and wolves still roam – are a profusion of varied, colourful wildflowers, astonishingly rich in all wildlife. My work here has been with ADEPT, an Anglo-Romanian project promoting mixed, non-intensive and organic farming – a living for village people, along with sensitive tourism – and the conservation of biodiversity.

Until 15 years ago, most villages were 'Saxons', German immigrants who settled in the

colleagues were surprised, even suspicious. Now we are all friends, and as one told me, recalling an old visit: "In those grasslands I found nearly all the Romanian clovers – and you have found plants I never saw!" For example, this summer we counted over 50 plants of Red Viper's-bugloss, threatened in the EU and not seen here before. Like the study of Roaringwater Bay, West Cork, the work has involved carefully picking our way through the countryside over several seasons. We have found over 1000 different plants – and internationally rare grassland, woodland and wetland habitats.

The magical hay-meadows are a source of quality honey, especially clovers and other legumes, and a last living link with an older Europe. They are ever-changing, and years and seasons vary. Pink orchids and legumes, Purple Mullein and white Dropwort flowers characterise May. In June and July yellows are prominent, with hay-rattles, Agrimony and Lady's Bedstraw among pink Sainfoin. By late July dark pink and purple knapweeds predominate, with greenish-white Field Eryngo – a plant that famously and mysteriously turned up on Sherkin a century ago – on dry slopes. In August it is white Wild Carrot, in September lilac sheets of Meadow Saffron or Autumn Crocus, with other late gems such as Fringed Gentian.



The rare Nodding Sage, locally forms violet patches on hillsides'.

As Dr Andrew Jones of the Grassland Trust says, "These grasslands are substantially richer in quality and extent than even in parts of Russia, surviving within a framework of traditional farming in harmony with both landscape and biodiversity." One cannot over-estimate the cultural and botanical importance of this magical place and the need to protect it. It is the very heart of our common European heritage.

Dr John Akeroyd edited The Wild Plants of Sherkin, Cape Clear and adjacent islands of West Cork (1996) and remains active in botanical recording at the Marine Station.



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SILICON



From Flint Axe to the Space Age

By Anthony Toole

THROUGHOUT human history, there has hardly been a single era in which the technology of the day did not depend in some way on the element silicon. In fact so dominant has its use been that in many periods it has defined the age. The advanced implements of the Stone Age were the flint axe and arrowhead. Later came the pottery and ceramics of the first settled societies, the buildings of the towns and cities that followed and the window glass in the houses. All were made from silicon compounds. The information age of the 21st century depends almost entirely on the silicon chip.

One reason for this is that silicon is everywhere. It makes up about 26% of the mass of the Earth's crust, and is exceeded in abundance only by oxygen, with which it is invariably combined.

Igneous rocks, such as granite are composed mainly of crystals of quartz, feldspars and mica. The feldspars comprise the most abundant group of minerals and are five times as plentiful as quartz. They are made of aluminium silicates with varying amounts of potassium, sodium and calcium. Mica consists of thin, transparent, crystalline sheets. The high melting point and electrical resistance of mica makes it useful in windows of stoves and furnaces and in electrical equipment.

Quartz is silicon dioxide in the form of large, white or colourless crystals. Flint is the same compound, but composed of microscopic crystals. Impurities in quartz give rise to coloured gemstones such as amethyst and opal. Banded forms of flint are found as the semi-precious onyx and agate. Other gems like topaz, emerald, zircon and garnet

contain metals in addition to silicon.

Erosion of igneous rocks by wind, water and ice, breaks them down into smaller fragments, and ultimately into sand and clay. Transport of these finer materials by rivers, followed by their deposition on lake and sea shores builds them up into layers, which slowly harden to the sedimentary rocks, sandstone and shale. If these are subjected to the high pressures and temperatures of volcanic activity, their crystalline structures change to those of the metamorphic rocks, quartzite, gneiss, schist and slate.

Silicon also has a role in biology. It forms the basis of the skeletons of sponges and the tiny sea creatures known as diatoms, and gives strength to the stinging cells of nettles. It appears to have a role in bone structure and is found in human bodies to the extent of about one gram. Though it is non-toxic, its presence in rock dust can cause the lung disease silicosis in miners, while the needle-like structure of the magnesium silicate, asbestos, can damage lung tissue to the extent of causing cancer.

Despite the abundance and long usage of its compounds, silicon was first isolated as the pure element, by the Swedish chemist, Berzelius, as late as 1824. It is a member of a group, or family of elements that includes carbon, tin and lead.

The family resemblances are not immediately obvious. Carbon is non-metallic and mainly exists in the diverse forms of diamond, graphite and charcoal. Tin and lead are soft metals with low melting points. Silicon is a very hard, shiny non-metal with a high melting point. However, when Mendeleev proposed his structure for the Periodic Table of elements, in 1869,

he used the similarities rather than the differences to predict the existence and properties of a fifth family member that was then unknown. When this element, germanium, was discovered in 1886, it was found to have the predicted properties, thus helping to confirm Mendeleev's theory.

Whether as granite or sandstone, and in the forms of sand, cement and mortar, silicates have been the basis of the construction industry for as long as it has existed. Glass is a form of silicon dioxide made by melting sand with smaller amounts of oxides of metals such as sodium, calcium, lead or zinc. When this is allowed to cool, it slowly hardens to a solid without crystallising.

The ubiquity of quartz and its high melting point cause problems in the extraction of metals such as iron from their ores. When heated in a furnace, quartz does not melt and would quickly block up the furnace. To prevent this, the ore is mixed with limestone, which reacts with the quartz to form calcium silicate, a compound with a low melting point, known simply as slag. This former unsightly waste product of the steel industry has largely been disposed of by using it as a bedding material in the building of roads.

When subjected to an electric current, the particles in a quartz crystal vibrate at a fixed frequency. This permits their use to measure time very accurately in quartz clocks and watches.

The pure element, silicon, can be obtained from quartz by heating it to 2000°C with coke in an electric furnace. About 4 million tonnes of the element are produced each year. Much of this is used to make ferrosilicon steels, for which a more purified silicon is needed than that present in the ores from which ordinary steel is

made. The properties of aluminium are also enhanced by the addition of 99% pure silicon.

Silicones constitute a large group of liquid compounds in which alternate silicon and oxygen atoms are linked together to form long chains and rings. The silicon atoms are also joined to small groups of carbon and hydrogen atoms, which branch off from the main chain. These compounds remain liquid even at high temperatures, and are excellent lubricants. Cross-linking of the chains leads to the formation of rubbers of the kind used, for example, to make the boots worn by the astronauts who visited the moon.

The employment of silicones in cosmetic and

reconstructive surgery is well known. They are also highly water-repellent and resistant to chemical attack, and are widely used as waterproofing for brickwork and fabrics such as tent material, as well as bathroom and window sealants.

The semi-conductor properties of silicon have led to the information technology revolution that is set to dominate human society in the 21st century. Extremely pure silicon is required to manufacture microchips, though this needs to be 'doped' with other elements such as arsenic or gallium to the extent of one part per million, to facilitate its use in transistors.

When Neil Armstrong landed on the moon, in

1969, something approaching 90% of all the silicon chips in the world were used to get him there. Now, they are present in everything from computers to cars to cameras, and from washing machines to mobile phones. Much telephone communication is now reliant upon optical fibres made from that other silicon compound, glass.

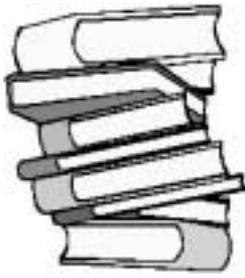
Whatever further directions technology might follow in the future, it is likely that silicon will have a part to play. And it has the advantage over most other elements in that it will never be in short supply.

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

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The Long Summer How Climate Changed Civilization

By Brian Fagan
Granta Publications
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ISBN: 1 86207 751 7
Price: £9.99stg/2004

An archaeological journey, ranging from the end of the last ice age to the present day, showing global weather changes on varying scales. This book follows the adaptations of civilisation in an exciting and easy way.

Making a wealth of archaeological knowledge available to a wide audience, Fagan covers the last 15,000 years with a large number of clear examples and explanations of changing behaviour and climate, and the links between them.

Although not a reference book, this is a good general knowledge guide for anyone who is interested in learning more about the subject. A thoroughly enjoyable read.

Michael Hole

Securing Protected Areas in the Face of Global Change: Issues and Strategies

Edited by Charles Victor
Barber, Kenton R. Miller and
Melissa Boness

IUCN
www.iucn.org/bookstore
ISBN: 2-8317-0831-1

Price: £14.50stg/2004

The World Conservation Union (IUCN) have produced a comprehensive guidebook for the protection of natural resources. This is a detailed textbook of what global changes we should be concerned about, what kinds of areas need protection and what methods exist for protecting these sites. It reads like a standard operating procedure so it may not be an engrossing read for those not especially interested in the subject but it is a treasure trove of information for anyone willing to invest the time. It is a valuable textbook for all the managers and would-be-managers of protected areas of the world and will fire up a passion for holding on to what we have left.

Chris Lambert

Integrating Biodiversity Conservation and Sustainable Use Lessons Learned from Ecological Networks

Graham Bennett
IUCN Publications
Services Unit
www.iucn.org/bookstore
ISBN: 2-8317-0765-X
Price: £10.50stg/2004

This 55-page booklet reviews eight of the 150 or more "ecological networks" worldwide. These in-

clude the Baltic states ecological networks, the Meso-American biological corridor, the Yellowstone to Yukon Conservation initiative or "Y2Y" (Rocky Mountains), and the Green Wood network in the densely populated Netherlands. All are striving to conserve biodiversity-rich ecosystems while allowing sustainable economic development and the use of precious natural resources i.e. integrated and holistic conservation at a national and international level, involving government agencies, NGOs and individuals. Above all, ecological networks must be seen to be of value to local communities.

John Akeroyd.

A New Agenda For Forest Conservation And Poverty Reduction: Making Markets Work for Low-Income Producers

by S.J. Scherr, A. White,
D. Kaimowitz

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This book begins by showing us that "the future of the world's forests and the future of millions of the world's poorest people are inextricably linked". More than a billion people now live within the world's 19 forest biodiversity "hotspots" and over ninety percent of those earn less than a dollar a day. This series of papers outlines a set of strategies to promote forest conservation in ways that positively contribute to local livelihoods and community development in these areas. They identify specific market niches where low-income producers could develop a competitive market advantage. Real world cases described in the book illustrate their potential and feasibility. This book is a must for those interested in the socio-economic and conservation issues of the world's forests.

Fergal Twomey

World Heritage No.35

Edited by Francesco Bandarin
UNESCO
www.unesco.org/publishing
ISSN: 1020-4202
Price: €7.00/2004

World Heritage magazine provides facts on interesting heritage sites around the world, as well as stunning photographs of locations guaranteed to make people go and see for themselves. The cover feature is Quebrada de Humahuaca, a valley that, situated as it is between multicoloured mountains, is of immense beauty as well as being a connection between the peoples and cultures separated by the Andes. Also in this issue are the vineyards of Europe: a portrait

of a landscape shaped by wine growing. Other treasures include Djenné and its ornately ornamented mud buildings, the wooden churches of Poland and the cultural identity they provide, and Persepolis, a city founded by Darius I the Great with the riches of a mighty empire.

Chris Lambert

On Garbage

By John Scanlan
Reaktion Books

www.reaktionbooks.co.uk

ISBN: 1 86189 222 5

Price: £14.95/2005

This highly original and intellectual work considers that as Western culture develops greater and more far reaching know-how and technologies, constituting the efficient disposal of the unusable, it can also be seen as a history of garbage. By detailing the waste, ruin and concepts that we have discarded, the author argues that we can learn new things about the building blocks of our culture. What this book does, is ask us to consider the possibility that the surprising core of all we value results from garbage. This book then might be read as a shadow history of Western culture as a history of disposal.

Fergal Twomey

The New Amateur Naturalist

By Nick Baker

Collins

www.collins.co.uk

ISBN: 0 00 715731 2

Price: £19.99 stg/2004

No matter what aspect of natural history you may want to explore, this book will give you sound advice on how to approach your subject and set you well on your way. Other than microscopic organisms, I could not think of any group of animals or plants not covered within these pages. Clearly and informatively written, this is THE Christmas book for anyone over the age of twelve who is remotely intrigued by the natural world.

Julian Wyllie

Freshwater fishes in Britain The species and their distribution

Compiled and edited by
Cynthia Davies, Jonathan
Shelley, Paul Harding, Ian
McLean, Ross Gardiner and
Graeme Peirson

Harley Books

www.harleybooks.com

ISBN 0 946589 76 3

Price: £25.00 (hbk)/2004

This concise account of native and introduced British fishes derives from the Database and Atlas of Freshwater Fishes (1996-2002).

The editors and their collaborators present not only distribution maps for each of the 62 species, considerably updating maps published in 1972, but also a wealth of information on their ecology, distribution, taxonomy, conservation status and human use. Appendices summarise freshwater fish, legislation on conservation of native species and control of non-natives, and some useful websites. There is an extensive bibliography. The book, unlike some Atlases, has black-and-white illustrations (and some colour photos of habitats) and should reach a wide readership, including ecologists, anglers and, perhaps, decision-makers.

John Akeroyd

The New Naturalists (2nd Edition)

Peter Marren

HarperCollinsPublishers

www.collins.co.uk

ISBN: 000 719716 0 (hb)

ISBN: 000 719715 2 (sb)

Price: £40.00 (hb) £25.00 (sb)
2005

The New Naturalists Library has proved one of the most influential series of books on scientific natural history ever written. Launched in 1945 with "Butterflies" by ecological geneticist E.B. Ford, this all-embracing review of field botany, zoology, geology, geography, conservation, even folklore and art, in Britain and Ireland now comprises just over 100 volumes, each in a distinctive cover. The present volume, by an all-round naturalist with a sharp journalist's eye, is a second edition – to celebrate 60 years of "New Naturalists". Packed with biographical detail and personal stories, this is a worthy tribute to a remarkable group of naturalists who made science accessible to a wide readership, especially the young. May this tradition endure.

John Akeroyd

A Natural History of Nettles

By Keith G. R. Wheeler

Trafford Publishing

www.trafford.com

ISBN: 1-4120-2694-6

Price: £15.00stg/2004

Nettles (*Urtica* species) are the sort of plants we all take for granted or just love to hate. They are weeds, they sting, they are workaday; and yet they have an important place in ecosystems, not least as food for insects. They have also many uses: fibre, dye and food. This hugely entertaining and enthusiastic account of nettles, profusely illustrated with black-and-white photos and drawings (plus a bonus CD of colour images!), delves into every conceivable aspect of these plants. Above all, the book is packed with the sort of detail that distinguishes the best natural history writing. The author

has not only made numerous field observations but also has scoured the literature in arts and science. Here is a most eccentric book – but a small masterpiece.

John Akeroyd.

Britain's Orchids

by David Lang

WILDGuides Ltd
www.wildguide.co.uk

English Nature
www.english-nature.org.uk

ISBN: 1-903657-06-7

Price: €15.00/2004

Head-and-shoulders above similar orchid books, this concise, authoritative, up-to-date, user-friendly field guide covers the 51 British and Irish orchids (plus another nine unconfirmed). Introductory sections cover structure, biology and habitats, with an easy key. Each species has a description, notes on subspecies and varieties, similar species and hybrids, and information on pollination, habitats and conservation; plus distribution (with map), height, number of flowers and flowering period, and conservation status. Final sections cover conservation, photography, glossary, useful addresses and select bibliography.

John Akeroyd

Plows, Plagues and Petroleum - How humans took control of climate.

By William F. Ruddiman

Princeton University Press

ISBN: 0 691 12164 8

Price: £15.95stg/2005

The hypothesis presented here is that global warming has been proceeding for the past 8000 years. The evidence, from many disciplines, tells of up to fifty Ice Age cycles during the last 275 million years, correlating with fluctuations in atmospheric carbon dioxide. These have been driven by regular shifts in the tilt of the Earth's axis and the shape of Earth's orbit around the sun.

For the past 11000 years, the carbon dioxide concentration and the global temperature should have shown a steady fall. Since 6000 BC, these figures have risen in line with the spread of agriculture and the destruction of the forests. In addition, the rise in methane concentration coincides with large-scale irrigation and the cultivation of rice. Anomalous falls in carbon dioxide concentrations during the past 2000 years are linked with major pandemics. The overall warming, however, may have forestalled an Ice Age.

The book is concise, very well written and free of scientific jargon. The arguments are clearly presented, and supported by graphs that are easy to understand. Anyone wishing to take part seriously in the global warming debate could do no better than start here.

Anthony Toole

Collins Need To Know? Birdwatching

By Rob Hume

Collins

www.collins.co.uk

ISBN 0-00-719527-3

Price: £8.99 stg/2005

At last, a really useful book about how to go about birdwatching, written by someone who knows and understands their pastime. Divided into five main sections, its 190 pages are packed with sound advice and useful information on both the birds and the art of watching them, liberally illustrated with colour photos. Part one deals with "getting started" and is followed by an outline of the birds themselves, which should be enough to stir an interest in all who read it. Part three takes us through the fundamentals of bird identification, offering solid tips all along. Next comes the habitat section, covering the full range of habitats available in this corner of the world, from city centres to remote mountain tops. By the time you reach part five, you should be ready for it – it's called "getting involved". Go on, you won't regret it.

Julian Wyllie

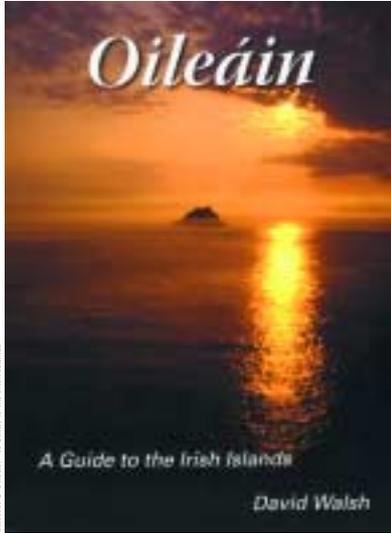
Oileáin – A Guide to the Irish Islands

MANY people have a fascination with Ireland's offshore islands and try to visit the odd one or two. One individual has however made island exploring and documenting his pastime over a dozen years. David Walsh, a Dublin solicitor, has set foot on over 300 of Ireland's offshore islands since 1991 - what a wonderful obsession. He travelled by kayak with various friends. So, travelling clockwise around Ireland from the North, I will introduce the reader to some of the lesser known islands he visited.

Sheep Island, Co. Antrim, lies off Ballintoy Harbour and is owned by the National Trust, N. Ireland. It is an important nesting site for puffin and cormorant. The island is flat topped with steep cliffs on all sides, essentially a large sea stack.

Moving down the coast one meets Copeland Island, off Belfast Lough, Co. Antrim. It is one of three in a group - the others being Mew Island and Lighthouse Island. It lies 3 km north of the village of Donaghadee. There are a number of homes on the island. It has sandy beaches. The population was evacuated in 1946. The island is grassy and bracken covered in parts.

Kayaking south to Dublin one meets St. Patrick's Island off Skerries, which is in a group of three islands - all are listed as areas of Scientific Interest by the National Parks and Wildlife. David says camping is possible but there is no drinking water available. The presence of a healthy population of rats may discourage an overnight! Whether St. Patrick ever landed here is a source of some debate. There is however a ruin of an Early Christian Church and a small monastery. It is important enough to merit a synod being held in 1148 in which fifteen bishops and two hundred priests assisted. The island has an internationally important



Photos © Oileáin - A Guide to the Irish Islands

breeding population of 550 pairs of cormorants (Census 2001), other species breeding include gulls, shags, fulmars. Moving down the east coast, some other islands he visited include Shenick and Ireland's Eye.

Reaching Ireland's most south-easterly island Tuskar Rock, which is 9km from the mainland. The trip planning requires thought, weather and of course the tides must be just right. The island has an impressive list of recorded bird species with records going back to the 1800s. The lighthouse was constructed in 1815 with 11 men losing their lives during construction.

One must mention the Saltees especially the Great Saltee Island and its references to Prince Michael of Saltee. He bought the island in 1943 crowned himself Prince in 1973, he died in 1998. Members of the family are usually in residence in August, long weekends or periods of settled good weather. The tradition of flying the Prince of Saltee flag from the flagpole above the landing when the family is in residence has been

renewed. There are several new signs at the landing point regarding the terms by which people will be tolerated. No camping is permitted at these times and day-trippers must vacate the island by 14.50 hours.

Padddling along the coast to Co. Cork one meets Capel Island, owned by the late Bill Swanton, a wonderful conservationist of the old school, who died in the 1990s. It is now a Bird-Watch Ireland Nature Reserve. As a youngster in the 1940s I was an altar boy with the Dominicans at St. Mary's in Cork City and our annual day excursion was to

their summer camp at Knockadon on the mainland and the great treat was to be rowed in fishing boats to the island. My memories are of it being infested with rats and with their burrows everywhere on the ground. As David moved west he visited many of the islands in Cork Harbour, then those off Lough Hyne, Ireland's only Marine Reserve, and of course Roaringwater Bay. He visited our marine station having landed on the island's beautiful Silver Strand. I envied him his kayaking as it brought back memories of my pioneering days of canoeing (kayaking) on the River Lee and Munster Blackwater in the 1950s and 1960s. My wonderful joy was to paddle at leisure down the Blackwater - enjoying the beauty of its wild life and scenery. I first canoed in Sherkin waters in 1954 and my great event was to circumvent the island on summer days, much to the consternation of some islanders who thought the canoe was too frail for such a journey.

In Roaringwater Bay David visited over 18 islands including the Skeams, the Calf Islands and Goat Island. David continued west visiting islands in Dunmanus Bay and Bantry Bay after which he journeyed north along the west coast, visiting amongst others Two Headed Island, and of course Skelligs and the Blaskets. David contin-

ued his journey northwards landing on many of the islands off Counties Clare, Galway, Mayo and Donegal with island names such as Mattle, Straw, Deer, Golan, Inisherik, Turbot and Friar.

For the seafarer, each island description in the book has grid references, tide details, wind directions, details of where to land and when it is safe to venture to the place.

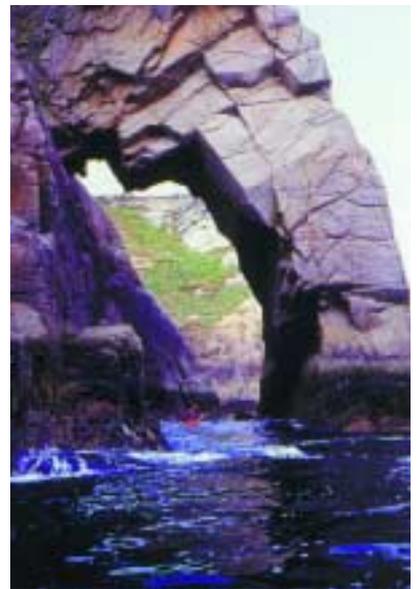
This book is a must for any lover of islands who has been to one or still dreams to visit one. It refreshed my own memories of over 50 years ago when even canoeing on the river Lees north channel would bring crowds to the quay walls between St. Patrick's Bridge and North Gate Bridge, looking at what they thought was a flimsy craft on the water. Imagine if they could have looked into the future and read the exploits of David Walsh and his friends, a man who visited 300 islands off our shores in a kayak. What a wonderful achievement.

"Oileáin - A Guide to the Irish Islands" By David Walsh, www.oileain.com. Published by Pesda Press 2004 ISBN: 0-9531956-9-4 Price €30.00 (p&p €3.00)

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



Saint MacDara's Island, Co. Galway (Séan Pierce)



Rock arch, Tory Island, Co. Donegal (David Walsh)



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Ingredients: 8 corn or flour tortillas, 8 slices of Dubliner Cheese, 250g hot refried beans (refritos), 2 teaspoons chopped fresh jalapeno or serrano chilli, quarter crisp lettuce, such as iceberg, 100g pitted olives, green or black, 250g salsa, 125ml soured cream, 8 cherry tomatoes (optional), sprigs of coriander (optional), 2 fresh red chillies, chopped (optional). Serves 8.

Method: Soften the tortillas with a little water and put in a preheated oven at 180°C (350°F) Gas Mark 4 for about 12 minutes. Spread 2-3 tablespoons of the refried beans on each tortilla. Add Dubliner Slices, chilli, lettuce, olives, salsa and cream. Fold the base of the tortilla, then fold over the 2 sides like an envelope. Serve warm with cherry tomatoes, coriander or chillies.

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Junior Pages

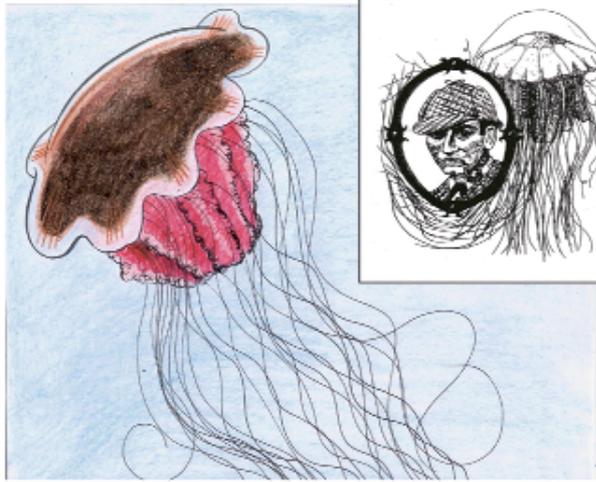
Elementary Dear Watson . . .

. . . The Culprit is a Jellyfish!

The jellyfish that caused such a panic around our beaches this summer was the "Lion's Mane" (*Cyanea capillata*) which starred as the villain of the piece in the Sherlock Holmes short story of the same name.

Lion's Mane jellyfish occur from the Arctic to Mexico and resemble a pulsating brown soup plate with tentacles that can reach up to thirty metres long.

Stings can be severe, but rarely fatal, although several people were hospitalised in the Dublin area this year. Tentacles continue to sting even when detached from the body or washed up on the beach. To be safe, do not swim when red flags are flying on beaches and never touch jellyfish of any kind, even if they appear dead.

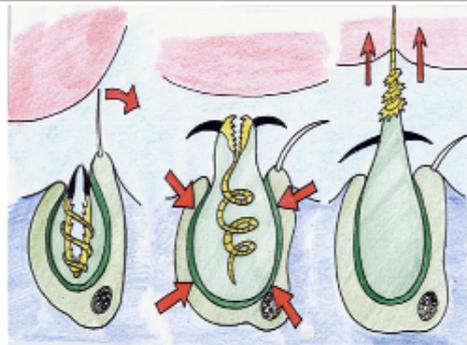


Stop Press



Marine Institute Activities Books

The Marine Institute's new activities book, based around the research vessels *Celtic Explorer* and *Celtic Voyager*, illustrated by artist and TV personality Don Conroy, is available free from the Marine Institute, Ballybrit, Galway. Phone 091 730400 or check it out on the MI website at: www.marine.ie



How Jellyfish Sting

Jellyfish tentacles are lined with thousands of stinging cells, each resembling an inside-out rubber glove with one finger and a poisonous fingernail.

If the trigger hair is touched, the cell squeezes, the glove turns right-way-out and the fingernail injects poison through a hollow thread.

These cells live on in tentacles that otherwise appear dead, which is why it is unsafe to touch even beached jellyfish that appear dead.

Captain Cockle's Log



Welcome aboard shipmates! Together, we'll be taking a look at the world's greatest natural resource -- the sea!

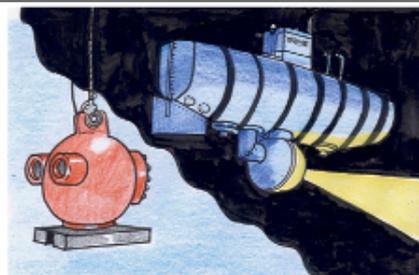
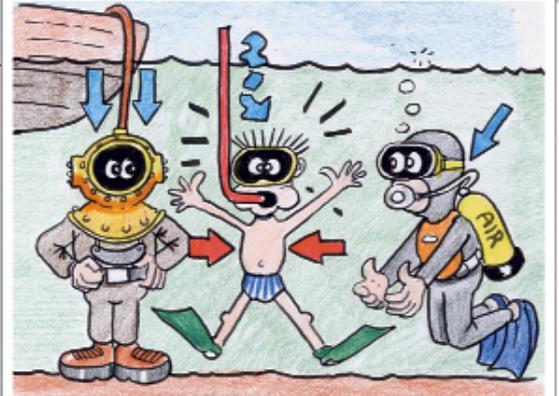
Words & pictures by John Joyce
www.cockle.com © John Joyce 2005

Put yourself under **PRESSURE!**

One of the first problems people faced in undersea exploration was water pressure due to the weight of water pressing in on any body immersed in it. Even a few feet below the surface, water pressure will squeeze a divers' lungs so tightly that he cannot breathe air directly from the surface. This is why divers must be supplied with air equal in pressure to the surrounding water in order to breathe.

Up until the Second World War, this air was usually supplied under pressure from a pump on the surface directly into the diver's helmet. In 1943 however, the famous French underwater explorer Jacques Cousteau and his partner Emil Gagnan invented the "aqualung" or SCUBA - the Self Contained Underwater Breathing Apparatus - that supplied compressed air from a tank at the same pressure as the water outside.

This invention freed divers from cumbersome air tubes and led to the exploration of the underwater world.



Deeper and Deeper . . .

The best shape to resist the enormous pressures of the deep sea is a simple sphere. In 1930 William Beebe dived to over 400 meters in steel sphere 6 cm thick.

In 1963 the bathyscaphe "Trieste" - consisting of a steel sphere below a gasoline filled steel float - dived over eleven KILOMETERS to the deepest part of the ocean, the "Challenger Deep" of the Marianas Trench in the Pacific.

See for yourself . . .



Wrap your hand in a plastic bag and push it into a bucket of water. Water pressure will "shrink wrap" the bag around your hand!

Check out these cool websites:

Lions Mane Jellyfish: www.marlin.ac.uk/species/CyaneaCapillata.htm

Jellyfish: www.bsd.sk.ca/~mkozlow/ocean/jellyfish.html

Bathyscaphes: http://en.wikipedia.org/wiki/USS_Trieste

Water Pressure: <http://science.howstuffworks.com/question193.htm>



Or, punch holes down the side of a soft-drink bottle and fill it with water. Water at the bottom is under more pressure from the weight of water above it and will flow out faster.



East Coast Nature Reserve

By
Declan Murphy
& Jerry Wray

IN 2003, with the aid of funding from the EU Life/Nature budget, BirdWatch Ireland purchased a parcel of land in Newcastle, Co. Wicklow called Blackditch Wood with the intention of creating a nature reserve adding to a list of reserves BirdWatch Ireland either owns or helps to manage. This reserve, 220 acres in all, will also form part of a large network of reserves across Europe known as the Natura 2000 network.

To successfully protect and conserve any bird, animal or plant species it is clear that the only way to achieve this in the long term is the protection of its habitat. Without this protection of habitats, the conservation of any species would be all but impossible. Over time many species become extinct. Their failure to adapt to naturally changing conditions, sudden local or global events and persecution have all played their part but the loss of habitats is without doubt the biggest single factor threatening our birds.

So what exactly is a "habitat"? The simplest definition is the place where a bird or any other animal lives. It

includes all the living and non-living elements which also live or are to be found there. Let's look at a Willow Warbler, a bird of woodland habitats, for example. Its habitat includes the insects that it feeds on, the plants that support those insects, trees for nesting in as well as all the other birds, animals and insects that compete with it for those same resources. If we protect any given habitat we not only protect the target species but a huge variety of other species that co-exist with it. If we lose any one of those species the remainder of the habitat and its communities will suffer as a result.

So what is BirdWatch Ireland doing with Blackditch, now alternatively known as the East Coast Nature Reserve? Previously it was part of a large farm complex which was used mainly for the grazing of cattle and sheep. Initial surveying by BirdWatch Ireland prior to the purchase of the site found that it comprised four major types of habitat: lowland wet grassland, wet birch wood and two types of fen, Calcareous and Alkaline. The first of these fen habitats is listed as an Annex 1 habitat and was at risk owing to the fact that it had been drained over time in order to make it suitable for agriculture. In addition a plantation of conifer trees had been planted adding to the problem. The restoration of this fen was identified as a primary objective of the project and would include the cutting down of the trees and controlling of the drainage which



Management of the site will provide a leisure and educational facility which will benefit not only the birds, animals and insects but also the local community and the public of Wicklow and beyond.

serve to increase the biodiversity of the reserve as a whole.

Creating a Nature Reserve is one thing, but what birds will benefit from all this restoration work? Having established what habitat species were present, the next stage was to look at the key species which could potentially benefit from the restoration and management work. Wintering grey geese were known to have previously used the reserve and were still present at a number of sites along the east coast. Of these Greenland White-fronted Geese, an Annex 1 species, and Greylag Goose were selected as target species together with Little Egrets and Kingfishers and a management programme put in place which would encourage them to use the area again. As well as those target species the management of the reserve will provide conditions for a range of birds like Lapwing and Redshank which will hopefully stay and breed.

One year of management work



The project site, located in Newcastle, Co. Wicklow.

Learn about birds with BirdWatch Ireland

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

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

Website: www.birdwatchireland.ie

will lead to a greater diversity of plant life and subsequently those creatures which depend on them. Control of the movement of water across the site will also be of general benefit to the other habitats and will

Natura 2000: a large network of reserves across Europe known as the Natura 2000 network.

Annex 1 habitat: one that is in particular danger of being lost.

Annex 1 species: one that is particularly endangered

Biodiversity: the number and range of plant and animal species

later and we have had some early success with small numbers of Greenland White Fronted geese and Greylags using the

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Established in 1968, BirdWatch Ireland is the largest and most active conservation organisation in Ireland, with over 15,000 members and supporters, a nationwide network of more than 20 local branches and a growing number of nature reserves around the country. Our primary objective is the conservation of Irish wild birds and their habitats.

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BirdWatch Ireland (DVD Office), Rockingham House, Newcastle, Co. Wicklow

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New Arrival!

Visit www.naturesweb.ie and download a trial issue of “*Nature’s Web*”, a new and exciting newsletter for children, featuring interesting and informative news on nature and the environment.

“*Nature’s Web*” is edited by Audrey Murphy, Sherkin Island Marine Station.

www.naturesweb.ie



TASTE OF THE SEA

STIR-FRY



To PREPARE

Use any vegetables and seafood you like. Meaty fish like prawns, mussels, squid, rock salmon, eel, ling, pollock, hake or cod work best.

INGREDIENTS

- 450g/1lb fish of your choice, cubed
- 1 onion - sliced
- 1 clove of garlic - crushed
- 1 tsp chopped ginger
- 2 scallions - cut slantwise
- 1 green pepper - thinly sliced, lengthwise
- 1 red chilli - finely chopped
- 1 tbsp oyster sauce
- 1 tbsp light soy sauce
- 1 tbsp dry sherry



METHOD

- Heat wok or large deep pan.
- Add oil and stir-fry onion, garlic, ginger, scallions, pepper and chilli for a few seconds.
- Add fish and stir-fry for 2 minutes.
- Add oyster sauce, soy sauce, sherry and stir-fry for 30 seconds.

* Serve with noodles and cucumber salad. Courgette, spinach and baby sweetcorn can also be added to the dish during cooking. Serves 4.

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Damien Walks for Gold

By Damien O'Donovan

MY name is Damien O'Donovan, I am 23 years old and I live in Bantry, Co. Cork. I have a very busy life. I attend the National Learning Network training centre in Bantry four days a week and I work two days a week as a pool attendant at the Westlodge Hotel Leisure centre. I only have one day a week off but that's ok. I was very proud to receive my Gold Gaisce award from President Mary McAleese in Dublin in February last. I had already received my Bronze and Silver Awards, but the Gold was very special. I had to do four different parts for the Gaisce Award. I liked some parts more than others, specially the sport and

ished I am still a member of the shore crew and go every Monday night. The lifeboat crew are great guys.

I love swimming and I won a gold medal at the Special Olympic national games in 2001. My best swimming stroke is freestyle and the longest distance I could swim was 50 metres. For my Gold Gaisce I set a goal of swimming 100 metres for competitions. I was one of the lucky athletes that got through to the Special Olympic World games in 2003. For the Gold Gaisce Award I had to do one hour training a week for 52 weeks, but when I was training for the world games I went training four times a week. Dunmanway swimming pool is the closest 25 metre pool to Bantry. It's 20 miles from home. I used to get the bus to Dunmanway twice a week to

freestyle. I beat U.S.A. I was so proud for my family, for West Cork and for Ireland that day. I also got a bronze medal in the world games in the relay race. Two other special Olympic athletes from Bantry got gold medals in the world games, Emily Meagher and Micheal O'Grady. When we came home to Bantry after the world games there was a huge crowd of people to meet us. It seemed like everyone in Bantry was there. There was the fire engine and two Garda cars, there was a bonfire lighting and the square was packed with people all cheering.

For my venture I walked from Killarney, Co. Kerry to Bantry, Co. Cork – 80 kilometres. My mom, my aunt Siobhan and my sister Laura did the walk with me. I did the walk for charity and raised €6,400 for two charities, CoAction West Cork and the National Learning Network, Bantry. We walked to Ladies View the first day and it was all uphill, really hard work. The second day we walked from Ladies View to Kenmare, that day wasn't too bad. We stayed in a hostel in Kenmare. When we were in Kenmare I met a really nice man in a pub who promised he would send me Roy Keane's autograph, and he did. Roy Keane is my greatest sports hero; he's a Cork man too. The third day we walked from Kenmare to Glengarriff. This was really, really hard. It was 26 kilometres, a lot of it uphill. More of my family and friends joined in on that day, my brothers, uncles and cousins. We had great fun even though it was a really hard walk. We were walking from 8 o'clock in the morning until 5 o'clock in the evening. When we got to Glengarriff I was very, very tired. The fourth day we walked from Glengarriff to Bantry. This was a great day. There was another charity walk from Glengarriff to Bantry the same day and we all joined in together. There was loads of cars on the road and people were cheering and clapping. I was so happy when we got into Bantry that I ran to the finish. This was the last part of my Gold Gaisce and I felt great to be finishing the challenge.

I really liked doing the Gaisce challenges. What I like is trying new things, making new friends, learning new skills. Robert Shannon was my Gaisce PAL, he is a great leader and helped me a lot. I was really nervous about



Photos © Damien O'Donovan

Arriving back in Bantry, Co Cork - nearly home!

Right: Damien O'Donovan from Bantry, Co. Cork, with his PAL, Robert Shannon receiving his Award from President McAleese.



Above: Stopping for rests is important - but stretching is more important! No problem with Damiens flexibility!

community pieces. For my bronze and silver awards I did judo and boxing for sports and helped at the fire station and community centre for community work.

For my Gold Gaisce I did a FETAC computer course for the skills. This was okay. I learned a lot. For the community work I joined Bantry Inshore Search and Rescue. This is the lifeboat crew. I really loved this work. We meet every Monday evening and do training. I made loads of friends at the lifeboat. I help to wash down the crew and the lifeboat, keep the boathouse clean, and check the maps. I love going out in the lifeboat, and I helped to drive the boat a couple of times. Even though my Gold Gaisce is now fin-

ishing I am still a member of the shore crew and go every Monday night. The lifeboat crew are great guys. I love swimming and I won a gold medal at the Special Olympic national games in 2001. My best swimming stroke is freestyle and the longest distance I could swim was 50 metres. For my Gold Gaisce I set a goal of swimming 100 metres for competitions. I was one of the lucky athletes that got through to the Special Olympic World games in 2003. For the Gold Gaisce Award I had to do one hour training a week for 52 weeks, but when I was training for the world games I went training four times a week. Dunmanway swimming pool is the closest 25 metre pool to Bantry. It's 20 miles from home. I used to get the bus to Dunmanway twice a week to

freestyle. I beat U.S.A. I was so proud for my family, for West Cork and for Ireland that day. I also got a bronze medal in the world games in the relay race. Two other special Olympic athletes from Bantry got gold medals in the world games, Emily Meagher and Micheal O'Grady. When we came home to Bantry after the world games there was a huge crowd of people to meet us. It seemed like everyone in Bantry was there. There was the fire engine and two Garda cars, there was a bonfire lighting and the square was packed with people all cheering.

For my venture I walked from Killarney, Co. Kerry to Bantry, Co. Cork – 80 kilometres. My mom, my aunt Siobhan and my sister Laura did the walk with me. I did the walk for charity and raised €6,400 for two charities, CoAction West Cork and the National Learning Network, Bantry. We walked to Ladies View the first day and it was all uphill, really hard work. The second day we walked from Ladies View to Kenmare, that day wasn't too bad. We stayed in a hostel in Kenmare. When we were in Kenmare I met a really nice man in a pub who promised he would send me Roy Keane's autograph, and he did. Roy Keane is my greatest sports hero; he's a Cork man too. The third day we walked from Kenmare to Glengarriff. This was really, really hard. It was 26 kilometres, a lot of it uphill. More of my family and friends joined in on that day, my brothers, uncles and cousins. We had great fun even though it was a really hard walk. We were walking from 8 o'clock in the morning until 5 o'clock in the evening. When we got to Glengarriff I was very, very tired. The fourth day we walked from Glengarriff to Bantry. This was a great day. There was another charity walk from Glengarriff to Bantry the same day and we all joined in together. There was loads of cars on the road and people were cheering and clapping. I was so happy when we got into Bantry that I ran to the finish. This was the last part of my Gold Gaisce and I felt great to be finishing the challenge.

I really liked doing the Gaisce challenges. What I like is trying new things, making new friends, learning new skills. Robert Shannon was my Gaisce PAL, he is a great leader and helped me a lot. I was really nervous about

meeting President Mary McAleese to get my Gold award, but she was really nice and I was very proud when she said "well done" to me. I was picked to give the President flowers and I got my photo

taken with her loads of times. I'm sad now that my Gaisce is finished.

For further information about the awards contact Mr. John

Murphy, Chief Executive, The President's Award – Gaisce, Dublin Castle, Dublin 2. Tel: 01-4758746 Email: p-award.net or Website: www.p-award.net

2005 International Blue Flag Beaches in County Cork

The International Blue Flag campaign is a voluntary scheme co-ordinated in Ireland by An Taisce – The National Trust for Ireland, with support from the Department of the Environment, Heritage and Local Government and on behalf of the Foundation for Environmental Education (FEE, www.fee-international.org). This international award ensures the following Beach Quality criteria:

- excellence in water quality and a committed monitoring programme
- Provision of adequate safety and services, safety equipment and warning signals of potential hazards.
- Beach Management programme, Good Infrastructure, accessibility and litter control.
- Provision of environmental information and education

This year Cork has been awarded 10 Blue Flag Beaches an increase of one from the 2004 bathing season. These awards reflect the work carried out and the continued commitment by the Councils local area offices, Environment Department and Voluntary Community Groups. The International jury were very pleased with the efforts of Cork County Council and the Owenahinchá local community groups who worked in partnership to address their 2003 litter problems to regain their Blue Flag status for the 2005 bathing water season.

- | | |
|-----------------------|--------------|
| ◆ Youghal | Frontstrand |
| ◆ Shanagarry | Claycastle |
| ◆ Old Head of Kinsale | Garryvoe |
| ◆ Clonkilty | Garrylucas |
| ◆ Roscarbery | Garrettstown |
| ◆ Skibbereen | Inchydoney |
| ◆ Mizen Head | Owenahinchá |
| | Warren |
| | Tragumna |
| | Barleycove |

For further information :

- > on issues of beach management and water quality contact the environment section, cork county council 021- 4532700 www.corkcoco.ie or local area office.
- > For information on Blue Flag Beaches contact: An Taisce Blue Flag Office, Tailors Hall, Back Lane, Dublin 8. tel 01- 7077068 www.blueflag.org
- > On issues of information regarding special protection areas, natural heritage areas contact Heritage unit, Cork County Council 021-4818006
- > On issues of water safety contact www.lws.ie

BE PROUD OF YOUR BEACH
CARE FOR IT
LEAVE YOUR FOOTPRINTS ON THE SAND AND NOT YOUR WASTE.

The Blue Flag Operators in Ireland urge the public to help retain Blue Flags at beaches by doing some simple things when visiting the beach. On your next beach visit:

- Use litterbins provided and recycle where possible
- Proper disposal of your pets waste, nappies, glass and cans.
- Keep dogs on a leash
- Join in beach activity programmes eg Environmental information roadshow where provided.
- Organise your own beach clean/activity days or local improvement schemes and let your local authority know - We may be able to help!
- Obey beach safety guidelines
- respect fragile dunes

The Blue flag award has benefits to the local community where amenities and environment are enhanced and a shared responsibility for the beach and the local environment is promoted. These awards also have a positive knock on effect for tourism in the County.

Sherkin Island Marine Station Environmental Competition for Primary School Children in Munster 2005



Above: Scoil Dhairbhre, Darrara, Clonakilty, Co. Cork.



Above: Dromclough N.S., Bantry, Co. Cork.



Above: Watergrasshill NS, Watergrasshill, Co. Cork.



Above: Rathgormack N.S., Carrick-on-Suir, Co. Waterford.



Above: St. Michaels Clerihan NS, Clerihan, Clonmel, Co. Tipperary, including the winners of the Dr. Michael Kennedy Awards, presented by the Central Fisheries Board.

Sherkin Island Marine Station would like to say a BIG THANK YOU to all who entered their *Environmental Competition for Primary School Children in Munster 2005*. The competition received a marvellous response and a wonderful day was had at the prize-giving ceremony at the Carrigaline Court Hotel, Carrigaline, Co. Cork, where Cllr. Michael Creed, Mayor of Cork County, presented the prizes.

A special thank you to the sponsors for this year: BIM (Irish Sea Fisheries Board), Central Fisheries Board, City Print Cork, Cork City Council, Cork County Council, Denis McSweeney Photoshop, Cork, Dept. of the Environment, Heritage & Local Government, Evening Echo Newspaper Cork, Janssen Pharmaceutical Ltd. and Pfizer Ireland Pharmaceuticals.

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

Presenting the prizes on the day were:
Dr. Mary Stack, Cork County Council;
Vincent Smith, Janssen Pharmaceutical Ltd;
Hazel Dobbyn, Central Fisheries Board; Cllr. Michael Creed, Mayor of County Cork; Mary Kelly/Thelma Kingston, Pfizer Ireland Pharmaceuticals; Bob Cooke, Bord Iascaigh Mhara; Matt Murphy, Sherkin Island Marine Station.



Above: St. Killian's School, adjacent to Bishopstown Community School, Bishopstown, Co. Cork.

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An Post - Irish Stamps celebrates Ireland's natural heritage with the recent issue of two series of stamps featuring Fauna & Flora - Butterflies and Biosphere Reserves. The Butterflies series is issued in association with the World Wildlife Fund while the Biosphere Reserves series is a joint issue with Canada Post. All of these stamps and associated products are available from The Philatelic Shop, G.P.O., Dublin 1 and you can order online at www.irishstamps.ie or call (+353 1) 705 7400. The stamps are also available at main Post Offices.

www.irishstamps.ie

Listening for Answers

By Michael Ludwig

HYDROACOUSTICS or “echo sounding” is the study and use of sound in water. Sound is the best available means of seeing things in the ocean. Sound moves through water easily and for great distances without losing strength, conversely, light is limited by the clarity of water. Other

“sensing” techniques are limited, usually to small areas. Although the use of sound in water pre-dates SONAR (sound navigation and ranging), it was the development of sonar that triggered the science of hydroacoustics. Emitting sound and “listening” with hydrophones (microphones) or just listening to the sounds produced within the oceans can help advance investigations and the understanding of natural phenomena. Simply, sound is a very effective

method for observing geological and biological phenomena in the ocean.

Fisheries researchers, commercial fisherman and regulatory agencies have utilised marine hydroacoustic assessment techniques for decades. One need only look on any “committed” fisherman’s boat to find an example of hydroacoustic technology at work. The typical “fish finder” is a hydroacoustic device. Today, we assess current velocity, suspended sedi-

ment, fish breeding and marine mammal movements all with sound waves. One area of hydroacoustics that has had some interesting activity is the use of sound to characterise fish populations. While sound can’t be used on any organism laying on the seafloor or swimming near the surface because of the way sound reflects from those surfaces, it is useful for things that are swimming in the water column. These “pelagic” swimmers such as tuna, herring,

mackerel and sharks can be located and with some learned skill, characterised to varying degrees. The degree of success is related to the nature and Behaviour of the fish as well as the system and its operators. But, even with these limitations, the results of hydroacoustic studies are important to many fisheries harvest decisions worldwide.

Echo reading and interpretation of reflected sound waves has been advanced to where it can give very accurate fish abundance information. Investigators collect the information on pelagic species in terms of their spatial, temporal and size distributions. Modern hydroacoustic systems can collect and record data from targets ranging in size from plankton to whales and process the data into a surprising number of facts. Recent advancements in the systems and their processing software enables scientists to use hydroacoustics for assessment of bottom substrate, aquatic vegetation and aquatic organisms in marine and estuarine environments.

While acoustic surveys are being used throughout the world to assess fish stocks, they are still hampered by the problems of gear limitations and groundtruthing. Problems still exist in estimating biomass, especially when fish are near the surface, near the bottom, or have avoided the sound field. For these reasons, caution in their application is warranted. Biomass is a measure of how much biological mass or fish are in a school. Because the reflection of sound begins at the outer edge of a fish school, the number of individuals within it and their size must be estimated by the shape, area and “strength” of the recorded image. Finding the schools is another problem. Because the fish are not evenly spread out, but rather clumped in groups that move up and down in the water column in response to light availability, one must find the schools and not sample the same school multiple times.

Additional sampling problems are related to the sampling vessel causing dispersal of fish schools, sea conditions causing inaccurate data collection, and hydrophones incorrectly positioned resulting in bad signal reception. Another potential problem is related to the size of the sound signal. To make the signals as effective as possible they must be focused, but the beam width spreads out as it descends through the water column. This means that the amount of water “seen” at thirty meters is much larger than that seen at three meters. Groundtruthing is the verification that the fish are there and of the right species.

Relying heavily on hydroacoustics at this point in the development of sustainable fish-

eries involves some risk due to our incomplete knowledge of resource populations. For instance, sea herring is a highly mobile, pelagic, schooling fish that is an important food source for everything from starfish to Atlantic cod and humans. Juvenile and adult sea herring undertake a complex north-south and inshore-offshore migration pattern for feeding, spawning, and overwintering while providing a moving source of food themselves. With so many species relying on sea herring it is important to cautiously harvest to insure that the rest of the predator community has adequate supplies of this prey species. Sea herring schools are thought to usually contain different spawning groups. They separate into specific spawning groups for reproduction. Thus, the wellbeing of a spawning group can be disrupted by overfishing the general stock if one spawning group dominates the catch. With fishermen targeting both adults and unspawned eggs for meat and roe markets, and harvesting occurring in the spawning season the ability to manage is problematic. Resource Managers must guess at reproduction success and juvenile survival because it takes about three years after a harvest to get an adult sea herring.

The Canadians have a hydroacoustic sampling program that uses commercial fishermen. There are numerous advantages to using commercial fishing vessels. First, vessels equipped with automated logging systems are on the water almost nightly and available to survey throughout the entire fishing season. Captains with acoustic survey gear can run a survey whenever they see something to document. This means no more fishermen – researcher conflicts over available stock sizes. An industry/Government survey conducted in 1997 (over an area of 1,028 km²) estimated a 34,000 tonne biomass. Just two weeks later, during the fishing season, an industry survey conducted with government supervision documented approximately 215,000 tonnes in a much smaller area. Groundtruthing, or verifying the species being pinged, is also easy, particularly for purse seiners that tend to collect a representative sample of the fish observed. Once biomass estimates have been determined, the agreed management strategy is to allow a 10% take of the fish; this is considered a precautionary approach.

We may be making progress but we don’t always listen to what we hear.

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Harvesting the Sea’s Renewable Resources



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