

SHERKIN COMMENT

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(Centre pages)



A Bumble Bee visiting Foxgloves
Photograph: Robbie Murphy

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Editorial

The highs and lows of island weather

By Matt Murphy

SINCE arriving to live on Sherkin in August 1971, the weather has played a huge part in our lives. We very quickly learned not to plan ahead too much, even during the summer months. Very soon I wanted to know what daily rainfall and temperatures we were having. When strong winds were forecasted, our priority was to have doors and windows in our buildings secure. As the years progressed, we found that roofs were vulnerable and we lost the odd one. We are very exposed and we have had some hellish winds in our 40 plus years here. The one that affected us most directly when in the 1990s when we lost half a laboratory roof – the first we knew was when papers were flying past our house! That was a big loss.

The weather on the island can be very different. So often we hear of freezing temperatures on mainland Ireland and yet we more often than not escape the extremes. We have been recording daily weather data on Sherkin Island since July 1972. Since then we have taken daily rainfall in a standard rain gauge which collects rain falling into a funnel, the upper edge of which is level, circular, 12.7 cm in diameter and 30.5 cm above ground level. The rain is collected in a bottle. Each morning at 9.00 GMT, what rain has fallen over the previous 24 hours is measured in a special measuring glass. The data collected is sent to Met Éireann in Dublin on a monthly basis.

In May 1974, Met Éireann gave us a Stevenson Screen, which houses a number of thermometers. Various temperatures are manually taken each morning at the same time as the rainfall is recorded and is also sent to Dublin monthly.

In August that year they installed a Campbell-Stokes sunshine recorder. This consists of a glass sphere mounted in such a way that the sun's rays are focused sharply on a card held in position concentric with the sphere. The sunshine is recorded by burn or scorch marks on the card, which is changed in the evening each day.

Recently I have been looking at temperature and rainfall data from 1973 to 2017, from an island view point, and it makes interesting reading. Addressing the temperatures first, the lowest temperature recorded for the period was -7.7°C on 2th January 1979. We have had in that period five years where we did not have one day/night that the air temperature fell below zero: 1989, 2002, 2012, 2014, 2017.

In the period 1973-2017 we have had only 322 days below zero and 218 of these days between zero and -1.5°C. On only 37 days did the temperatures fall below -3°C. This data shows the mild air temperatures over the years on Sherkin.



Snow-covered Cow Strand, Sherkin Island, Co. Cork.

Table 1
Number of days below zero
for the top 5 years:

2010	44 days
1979	26 days
1978	22 days
1980	19 days
1977	18 days

The highest temperatures for the period were in August 2003 – on the 6th 28.0°C and on the 7th 28.5°C. In the 43 years the temperature at Sherkin only went over 25°C on 11 days. In fact in 30 of these years the maximum never exceeded 23°C. In the years 1979, 1980, 1986, 1994 the temperature was below 20°C.

With regard to rainfall, the driest month was May 1991, with 1.7mm, followed in September 1986 with 6.2 mm. The wettest months were December 2015, with 348.0 mm and November 2009, with 306.6 mm. The highest daily rainfalls fell on 30th August 1998, with 63.3 mm and the 11th July 1997, with 60.0 mm.

Table 2
Rainfall for the island
over the period 1973-2017

The five driest years were:

1973	948.1 mm
1975	910.0 mm
2004	977.9 mm
2007	982.8 mm
2010	946.7 mm

Table 3
Five wettest years were:

1982	1392.4 mm
1994	1467.7 mm
1998	1407.8 mm
2009	1511.6 mm
2015	1468.8 mm

In 2003, I was approached by Met Éireann for a site for their programme of Automatic Weather stations for the Unified Climatological and Synoptic Observational Network (TUCSON). I was delighted that we would have such a station here on the island and offered them a free site – roughly a quarter of an acre at a normal rent of €1 per annum. At the time there was no automatic weather station between Roche's Point in Cork and Valentia in Co. Kerry. Latitude wise, Sherkin would become the most southerly weather station in the country and would be approximately half way between Roche's Point and Valentia. Recording hourly data, the Station gives more accurate weather conditions for the southwest coast. Though the TUCSON station has now been established on Sherkin since 2004, we continue to record at our manual station every day. Firstly the TUCSON cannot record the sunshine in the same way as the manual station, where a recording card is changed each day. There is also a slight difference in records at both sites as the manual station is more sheltered than the TUCSON site.

I feel so privileged to have Met Éireann's TUCSON site at the Station. It is so important for everyone, especially local fishing, farming and leisure communities.

Data are collected every hour via a telephone by Met Éireann. The TUCSON site measures temperatures of air, grass and soil. It also measures rainfall, solar radiation, wind speed and direction, atmospheric pressure and relative humidity.

I am fortunate to live on Sherkin and to have the sea on my doorstep. Every day is different – from cloudless blue skies to darker days, which are often signal that rain is due. I thoroughly enjoy the daily activity of weather watching and documenting each morning. Even more so, I simply enjoy admiring the weather on the island, watching the sea breaking over the rocks during winter storms or the odd thunder and lightning storm lighting up the sky. Even better, the calmest of days, especially in the winter, when the sea is like a mill pond when all thoughts of weather extremes go out of my head.

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

See page 12 to read about Met Éireann's report on Ireland's weather for 2017.

SHERKIN COMMENT is an environmental publication of Sherkin Island Marine Station, aiming to promote the awareness of our natural resources, their use and protection. *Sherkin Comment* can be downloaded for FREE at <http://www.sherkinmarine.ie/sherkincomment.htm>
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Copper Mining on the Beara Peninsula

ALLIHIES, the last village at the end of the beautiful Beara Peninsula, nestles between the rugged Slieve Miskish Mountains and the Atlantic Ocean. The saying 'a view around every corner' certainly applied here. The panoramic view from Barness Gap is unforgettable! Descending towards the village through small fields, the Engine House at the Mountain Mine stands starkly out from the grey mountain ahead. This is the edge of Europe, the edge of Ireland and a jewel on the Wild Atlantic Way. A small fishing and farming community, it is a place of unspoilt beauty offering the visitor spectacular walks, beaches, lively pubs and the opportunity to unwind in one of the quieter corners of Ireland.

Copper mining started in Allihies in 1812 when John Puxley, a local landlord, identified the large quartz promontory at Dooneen as copper bearing from its bright malachite staining. Experienced Cornish miners were recruited in the early days, and during the succeeding years many hundreds of men, women and children from the locality and from further afield worked at the mines. At its height of production in the mid 1800's, 1,800 locals were working Allihies and the surrounding mines in the area. 297,000 tonnes of ore were exported from Castletownbere to Swansea by 1912.

It is a unique story from the era of the Industrial Revolution. For almost a century, the quiet pastures of today resounded with the thud of an army of steam engines and the constant pounding of the stamping mills crushing the hard quartz. The inimitable Man Engine looking

down over the village today was used to draw water up from the mines, in order to delve deeper to mine the copper from the veins. It was used for driving gear, and also to transport workers up and down to the mineshafts. That Man Engine is the only one ever installed in Ireland, and is one of only a few surviving in the world.

As production was reduced in the 1860s, and until the mines closed in 1884, very many miners and their families were forced to emigrate out of economic necessity. Many Cornish families returned to Cornwall, although we still have descendants of Cornish families living in Allihies. Many more made the leap to the U.S.A. and onwards to Michigan's Keweenaw Peninsula and to the thriving copper mining industry in Butte, Montana, where to this day, Beara names like O'Sullivan and Harrington are commonplace.

In the mid-nineties a group of Allihies residents came together to discuss how they might preserve and present the local copper mining heritage of this unique area. The idea of Allihies Copper Mine Museum (ACMM) was born and hard work and dedication on the part of the local community brought it to fruition. Michael O'Sullivan, the then-US Ambassador turned the first sod at the site of the old Methodist Church built for the original Cornish miners and, attended by President Mary McAleese, the museum finally opened its doors in May 2007. The Copper Mine Museum tells the story of Copper Mining from the Bronze Age to the 1960s. This story which falls under the general headings of pre-historic mining, nineteenth century mining techniques, geology and various



Images courtesy of Allihies Copper Mine Museum

The story of the Industrial Revolution arriving in one of the more remote corners of Ireland is exciting and inspiring.



The Allihies Copper Mine Museum.

aspects of social history, is explored in an engaging and interconnecting way, presenting the visitor with a unique insight into a unique story. In the Museum the geology, history and geography of this unique area is demonstrated through artefacts, models, multimedia and a small library. The Museum caters for all levels of interest from the curious child to the specialist enthusiast.

The café / gallery has been developed and outdoor seating area added. The Copper Café is a bustling place in the summer. With seating indoors and outdoors our customers can savour coffee and a cake or a delicious seafood lunch and glass of wine. Our sensory garden is an oasis of peace and tranquillity where you can enjoy amazing views over the Allihies countryside and the stunning Ballydonegan Beach. During the summer season the Café & Gallery walls are adorned with works of art for sale highlighting local, national and international artists.

Allihies Copper Mine Museum, Allihies, Beara, Co Cork. info@acmm.ie



"Man Engine House" at Mountain Mine.



The sensory garden.



Café & Gallery at the museum.



Let the environment cleanse



We all depend on clean water to live and to enjoy good health. Small amounts of phosphate released into rivers and lakes can lead to eutrophication (excessive growth of algae and depletion of oxygen in water). If you are a householder or farmer in a rural area, you can make a difference by making sure that your septic tank system functions properly and that farmyard soiled water is collected and disposed of safely.

To find out more about Ireland's water quality and how you can help our environment cleanse, check out the **EPA water quality reports**, accessible at www.epa.ie

Travelling on the Trans-Siberian Railway

By Alex Kirby

IT seemed like a good idea for us to mark my wife's 70th birthday by doing something she'd wanted for a long time: to travel on the Trans-Siberian railway. It was good - three weeks, 8,293 miles (that was just the outward journey), unfamiliar food/language/experiences, and a wealth of memories. I'd go back tomorrow if I could. It didn't turn out exactly as we'd expected, though - and I'm glad of that.

Many travellers fly to Moscow by budget airline and board the train there. We wanted to go the whole way by train, so we went from our local station in southern England to London, by Eurostar to Paris, then on the once-a-week through train to Moscow before starting on the Trans-Siberian itself. As we entered the Gare de l'Est to board the Moscow train we heard the clear strains of Beethoven's *Ode to Joy*, Europe's anthem - a hopeful departure note.

The train, operated by Russian Railways, is new, clean, state-of-the-art. Then followed two days in Moscow before we boarded the Trans-Siberian proper, one hot September afternoon, bound for our first stop, Yekaterinburg, and began learning about Russian Railways' quirks.

It's a very good service, but you do need a bit of care. First,

Russia has ten time zones, from the Baltic enclave of Kaliningrad to Kamchatka on the Pacific. We crossed eight - but it actually made little difference, because for the railway the whole country runs on Moscow time. So there's no need for any mental arithmetic, because on-train life tends to regulate itself and ignore most of what's going on outside, including the time.

But there's another idiosyncrasy, which once nearly meant we missed our train. At a station you check which platform the train is due to arrive at, wait there expectantly, then find it's already sitting at some quite different part of the station. That's because, no matter what its platform, you forgot to check its track. I never did work out how tracks and platforms differ. I just took care to remember that they did.

Yekaterinburg was the scene in 1918 of the murder of Czar Nicholas and his family by the Bolsheviks. Canonised by the Russian Orthodox patriarch in 2000, they are now commemorated in an implausibly ornate new church. One of the highlights of the city for us was the railway museum, housed in the original station building, with a wonderful jumble of models, memorabilia and up-to-date equipment. Its chief jewel was the elegant middle-aged lady who presided. She spoke no English, and we regretted (not for the first time) our almost



On the way to Siberia!

total lack of oral or written Russian. Even so, when we showed how much we admired the museum she fluttered her eyelids and was (tongue-tied) friendliness itself.

She was quite rare in not speaking English; most people we met in the towns and cities where we spent any time not only spoke it, but seemed keen to do so. I noted in my diary (of Russia as a whole): "I know few places where so many people stop to help you in the street if you look or are lost."

Then it was two more days and three nights on the train to Irkutsk, once known, perhaps a bit optimistically, as the Paris of Siberia. It's a frequent stop for foreigners, partly

because it's handy for Lake Baikal, the mile-deep 400-mile-long container of about a fifth of the world's fresh water. It freezes enough in winter for vehicles to drive across it. But if you misjudge the thaw, that's it: people and animals that vanish into Baikal's depths are never seen again. The locals say that's because there are endemic bottom-dwelling bacteria which devour any organic detritus that floats down.

Most of the lake's species are endemics, including the omul, a whitefish of the salmon family, which despite being listed as endangered in Russia as recently as 2004 is still considered a delicacy.

That is why the pervasive smell of smoked omul haunts every station platform within a wide radius of the lake.

Land-borne threats to Baikal and the species that live on its banks and in its depths include industrial pollution, agricultural run-off, mining and fossil fuel extraction and pipelines. The lake's level rose by a metre after a dam was built in 1956, causing widespread ecological damage.

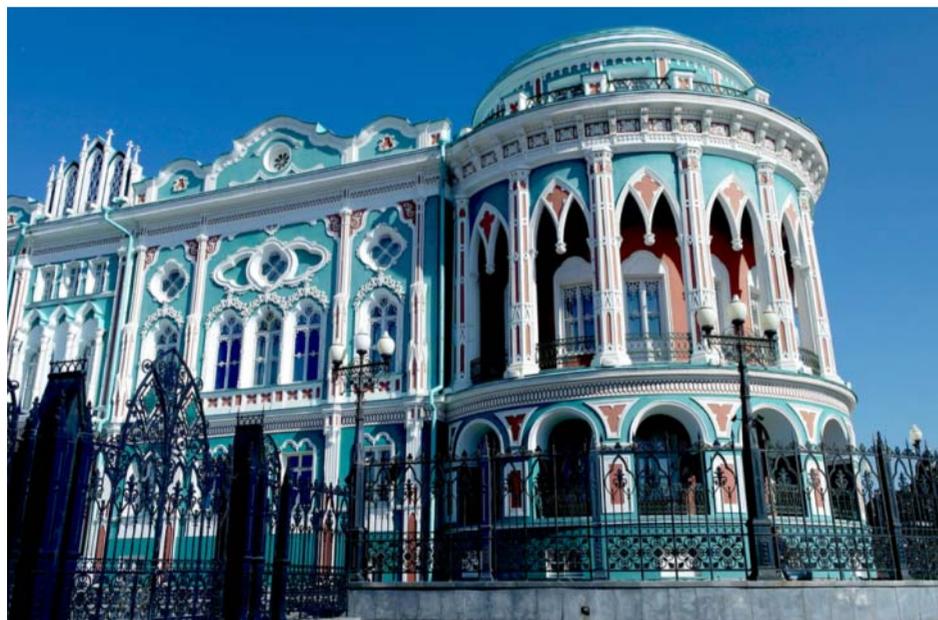
We spent several nights there and fitted in a brief excursion on the lake. Perhaps not surprisingly, we didn't glimpse a nerpa, one of the world's few species of freshwater seal. The small lakeside village where we stayed,

Listvyanka, 40 miles from Irkutsk, has an odd British connection: in 1899 a Baikal ferry, the Angara, was built in Newcastle-upon-Tyne, then taken apart and sent in sections by train to Irkutsk and on to Listvyanka, which built a shipyard specially to re-assemble it.

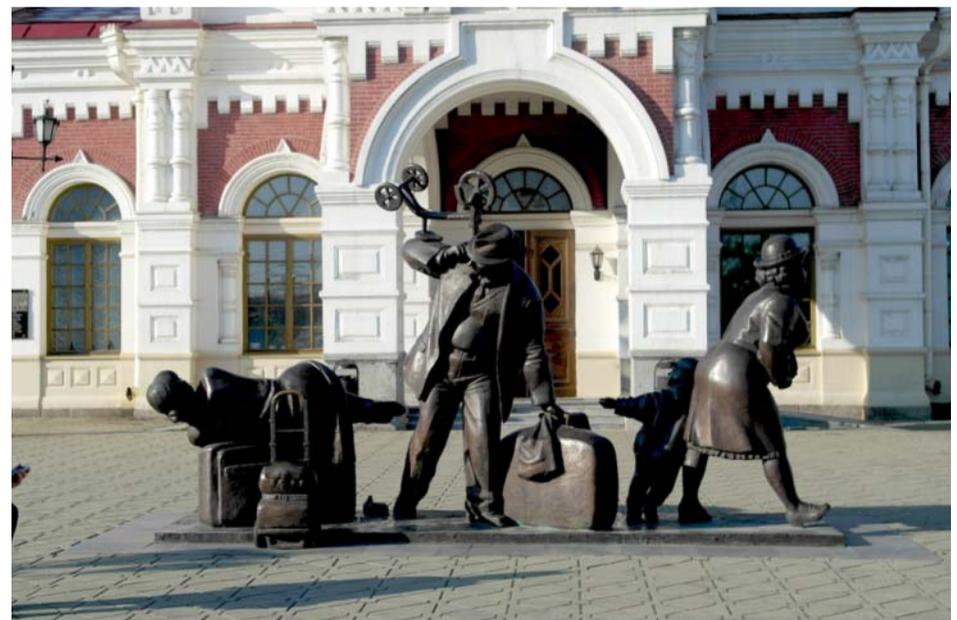
After the lake we headed back to Irkutsk and the last leg of the journey, the three days to Vladivostok - the only part of the trip where there were other passengers to share the four-berth sleeping compartment we'd booked in the hope of meeting some real Russians. The train was a through service which had set out from Moscow and took about seven days for the entire journey.

Not all trains do cover the whole distance, a reminder that "Trans-Siberian" is the name of the route, not of any particular train that runs on it. And that perhaps helps to explain why there's a workaday, nothing-special feel about the journey. That both surprised and pleased me. The trains are clean (many have shower cubicles), with well-stocked dining cars and friendly staff, bearing easy comparison with anything you'd find in the UK. But they're ordinary service trains, not grand expresses - and all the better for it.

The day we reached Vladivostok (the train was one minute late after seven days' travel) we found the city's



One of Yekaterinburg's many resplendent public buildings



Yekaterinburg railway museum



Summer sun on Lake Baikal



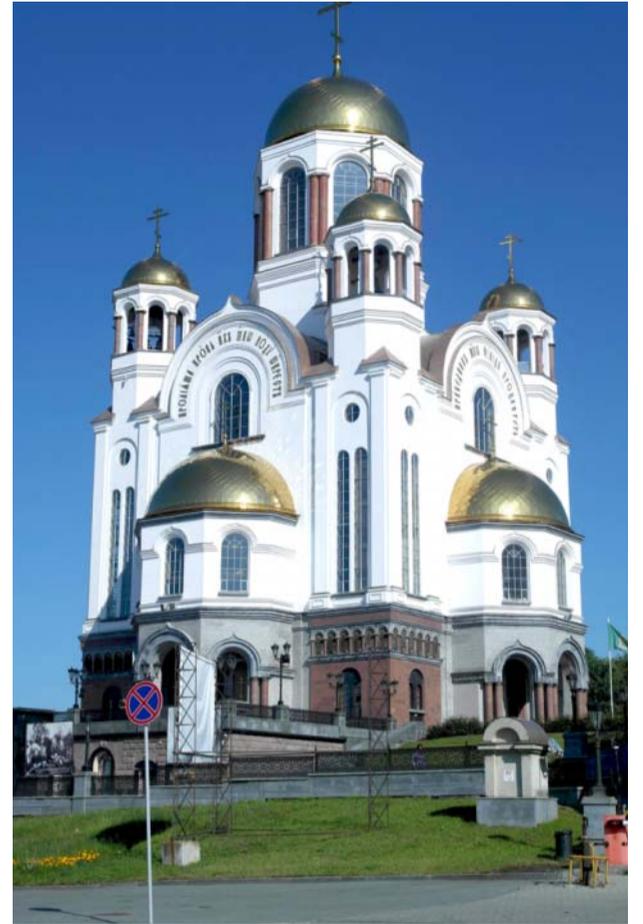
Look-out point above Lake Baikal, decorated by visitors



One in every carriage - never go without a samovar



Yekaterinburg looking forward to the footy



The Church on the Blood, the Romanovs' memorial

central square thronged with a celebration of the region's highly endangered population of Amur tigers, thought to number no more than 500-600 animals. It was fun, and it also included some quite serious and heavyweight conservation specialist agencies too.

The city, the home port of Russia's Pacific Fleet, has cold winters but mild and even sometimes humid summers, giving it a relaxed holiday air. For visitors it can be enjoyable. But a chance meeting with one foreign resident revealed a grimmer side for many Russians, especially pensioners trying to survive in poverty.

So ended our Trans-Siberian odyssey, rounded off by a ferry to Japan and a flight (sorry) home. It was a memorable three weeks, but not for any intense experience or dra-

matic scenery or really strange encounter. Many days blended into one another in a sort of mobile domesticity, as industrial landscapes gave way to more bucolic ones: forests aplenty, woodland cemeteries with graves carefully sited amongst the trees, and once the sight of two men scything a meadow in the traditional way. The carriages, each with its samovar for a cup of tea on demand and their corps of stern but friendly attendants - like uniformed aunts - were a world in themselves, and I wish we'd been able to hear some of our fellow passengers' stories.

What about the Trans-Siberian's future? One noticeable feature of long stretches of the line was how busy it was, and often with freight trains. If Russia continues to exploit its Far East,

it's likely to want to expand and develop the railway, which many think will make far better economic than environmental sense (Lake Baikal shows what can happen once the steel highway reaches you).

And it's not only Moscow which will use the rails. The Trans-Siberian is in fact several routes: it goes not only to Vladivostok but has branches to other Russian Far East cities, and to Mongolia, Manchuria and Beijing. Before long the trains will be queuing up and there'll be calls for the tracks to be doubled.

One route you may not have heard of is the Yiwu-London Railway (Yiwu is about 180 miles south of Shanghai). Opened on New Year's Day 2017, the freight-only line takes 18 days to complete the 7,500-mile journey to east

London, against 30-45 days by ship. It's part of China's Belt and Road Initiative, and London is not the only European destination for through trains from China.

My abiding memory of the Trans-Siberian remains the welcome of the Russians we met, and their passion. The attendants in each carriage are known (if they're female, as most seemed to be) as *provodnitsas*. One day, standing at dusk on the platform of a wayside station where the train had halted briefly, I asked a *provodnitsa* through a bilingual Russian why she did the job. What was the attraction for her? "Oh", she replied, without hesitation. "It's the romance."

Alex Kirby is a founder editor of the Climate News Network.



A busy platform, with uniformed provodnitsa keeping watch



Smoked omul on its way to grace another table



The new bridge across the port of Vladivostok



Vladivostok arrival - 9,288 kms from Moscow, and one minute late!

Allotment Life

By John Akeroyd

ALLOTMENTS are again topical in Britain, reflecting a public mood for good health and properly sourced food. They often feature in planning disputes and we learn that Labour party leader Jeremy Corbyn tills an allotment. Above all, they still fulfill their original function, to feed a household. As a child I loved to hear my father describe his productive wartime allotment in Chiswick. A scientist in a 'restricted profession', he served in the Home Guard but also 'Dug for Victory'. Allotments were vital during and following World War II, when one and a half million were under cultivation. Some 300,000 only remain, but are an important part of the nation's gardening life. I've had one myself for some 25 years and took on my present plot in 2012, since when (along with my garden) it's taken over much of my life. Indeed I'm now Chair of Hindon Allotment and Conservation Association (HACA).

An allotment is peaceful, relaxing and satisfying but does involve fairly hard labour. Your own little ecosystem, it provides a wealth of vegetables, soft fruits and cut flowers, it saves money and carrying heavy bags of spuds from the supermarket, it gives one exercise and fresh air, and is a place for both quiet reflection and exchange of ideas with fellow allotmenters. Allotments benefit wildlife and wildflowers (not least some rare arable weeds) through low-input, non-intensive cultivation, and benefit the local community as a green space and amenity. Composting, the heaps (mine in various containers) fuelled by everyday garden and kitchen rubbish and fired by bacteria, fungi and worms, avoids peat use, retains soil moisture, improves soil texture, and holds and recycles plant nutrients. Our allotments in Hindon lie on good soil, nurtured with compost and animal manure, on a south-facing slope over chalk, grading into deeper clay towards the bottom. We comprise a varied community, one in which younger women with families are now replacing older men. We don't own our plots, we rent for a small fee from the Council.

My allotment occupies a perch or ten rods (some 30 x 10 m) as in an Anglo-Saxon village. It lies at the top of the site, conveniently next to HACA's wildflower meadow, with the soil a bit shallow and dry over the chalk, though it drains superbly. The many flints recall little fields in Greece and Turkey or even Our Lord's parable of the sower, where "and some fell on stony ground"! The allotment year begins when we pay rent in September, and we spend winter tidying, clearing and digging. Our present warming climate makes those jobs easier, even if major activity awaits Easter when country people traditionally planted potatoes on Good Friday. To me my allotment is a Mediterranean

garden, with plenty going on from autumn to spring – brassicas and other greens and salads such as rocket and oriental mustards to harvest from raised beds, with growing plants of garlic, onions and broad beans – and other more drought-tolerant crops to grow and harvest over summer. Leeks do well and are ever-popular, although most of us have replaced the once ubiquitous cauliflower with the dark-leaved Italian kale or cavolo nero. Parsley too over-winters on my plot, sometimes helped by cloches.

Summer is a time of weeding and watering, and for harvests of peas and broad, runner and French beans, and chard and spinach beet (and a few carrots survive the stones). Above all summer means potatoes and I'm happily self-sufficient in these and onions and garlic, which have both won prizes in the village Flower Show. As on a Greek or Italian hillside terrace, in dry stony patches I grow globe artichokes and cardoons plus a few Iris for ornament, while deeper beds hold asparagus and celeriac. I also grow horseradish and herbs: coriander, dill, fennel, lovage, parsley, rosemary, sage, sorrel and tarragon. Soft fruits are popular on the Allotments, and I grow strawberries, raspberries and black, red and white currants, along with a mighty patch of well-manured rhubarb. My oddest vegetable is Good King Henry, a perennial spinach once widespread in gardens that hails from the Alps and Carpathians.

The wildflower meadow is at its finest in June and July, with Common-spotted, Pyramidal and Bee Orchids, and sheets of Ox-eye Daisy, Yellow Rattle, Bird's-foot Trefoil, Lady's and Hedge Bedstraw, Salad Burnet, Hardheads, Marjoram and other meadowland flowers. An earlier springtime carpet of cowslips gets better every year and is as good as those I see in Romania. As well as wildflowers, meadow and plots host an occasional hedgehog and grass snake, and numerous voles, shrews, frogs, toads, slow-worms and common lizards. Bird visitors include Barn Owl, Green Woodpecker and Red Kite. Butterflies include Common and Holly Blue, Brimstone (larvae feeding on nearby Buckthorn), Comma, Peacock, Red Admiral, Large Skipper, Small Tortoiseshell and Marbled White. We have bumblebees, bee-flies and hover-flies in spring and summer, and now three hives of busy honey bees sit at the top of the meadow.

I do worry about the future of allotments, as they're too special for bureaucrats to understand and protect – like village pubs. And, as G.K. Chesterton remarked, when we've lost the pubs, we'll have lost England ...

Dr John Akeroyd is a botanist, conservationist and writer, with a special interest in conservation of farmed landscapes in Romania and elsewhere.



Potatoes remain an important crop in Hindon.



The conservation meadow, with (upper right) compost bins and artichokes on John's allotment.



A vigorous patch of Rhubarb on Hindon allotments.



The potatoes had caught a late frost and most of the weeds have since been strummed or cleared! Note compost bins, artichoke plants and Iris, like on an Italian or Greek farm terrace – too stony there for anything else!

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IRISH SEED SAVERS: *Saving Seed for Ireland*

By Tansy Watson

IRISH Seed Savers Association has been in operation since 1991. At our working organic farm in Scariff, County Clare, we have 20 acres of organic seed gardens, heritage orchards and woodland trails that are open to the public, giving access to the richness of Ireland's biodiversity and ecology. Our agricultural biodiversity often gets forgotten in the debate around preserving our genetic resources. We examine the issues surrounding agricultural biodiversity, and why its loss could adversely affect us far more than we might imagine. Due to modern farming practices, it is estimated that over 75% of fruit and vegetable varieties have been lost¹. It is Seed Savers aim to create greater awareness of the importance of conserving our unique food, environmental heritage and seed sovereignty.

We began collecting and growing heritage crops with the intention of preserving and rescuing heritage varieties that were fast disappearing. As Ireland's only public Living Seed Bank, we have a duty to protect and preserve heritage and heirloom crops that would otherwise be lost to future generations.

We have since expanded into the preservation of heritage varieties from all over the world that are best suited to cultivation in Ireland's climate, putting food security on the agenda and inspiring other movements in organic farming and sustainable gardening. Irish Seed Savers currently preserves, stores and distributes the seeds of 600 heritage vegetable varieties and 48 heritage grain varieties. We also maintain over 170 different heritage apple varieties in our orchards.

Irish Seed Savers orchards on our County Clare site, help Ireland to meet its EU obligations in the area of conservation and sustainable use of Plant Genetic Resources in Food and Agriculture (PGRFA). The seeds and apple trees that we produce, are available to purchase online at www.irishseedsavers.ie or from our shop. We sell one of the largest heritage



Images courtesy of Irish Seed Savers

collections of apple trees in Ireland. If we do not have the variety you are looking for this year, we also take 'variety request' so that we can offer you first refusal the following year should your variety be available. Our apple trees go on sale in October of this year.

Irish Seed Savers grow and save open pollinated seeds, these are sensitive to the environment and flexible towards adaptation, tolerant of soil types, wet and dry conditions, cold and warm conditions as well as diseases and other factors. Open Pollinated seeds keep their elasticity to change. Because each generation of seed has been exposed to slight variations, this way they will have a greater predisposition for success each time they are grown.

We need to remind ourselves just why it is that heritage seed varieties are so valuable to us. For countless generations, farmers have been selectively breeding plants, improving the varieties from year to year by saving the seeds of those plants with favourable characteristics. These plants which have been nurtured and improved naturally are still descendants of an original wild species and are still able to reproduce themselves. This is in sharp contrast to the new wave of seeds that are now available to buy from conventional sources. Hybridised seeds are the result of a cross between

two different strains of the same species to produce a vigorous plant in the first generation. If allowed to flower and produce seeds, the offspring of this plant are almost never like the parent plant, a result of the inbreeding that has occurred to produce its parent. Genetically modified (GM) seed goes a step further with the introduction of the terminator gene (the patent for which is now owned by Monsanto). This gene, when inserted into the gene sequence of a seed variety, results in sterile seed being produced by the plant as it matures. This will mark the end of any form of plant improvement in the general population – in the future the only food available will be that which



Clockwise from top left: Volunteers selecting Limburg Yellow Carrot; Eoin Keane 'Orchard Coordinator'; The Holistic Gardener; Irish Seed Savers grow and save open pollinated seeds.



large seed companies wants to provide. This unthinkable scenario can be avoided by holding onto the democratic technology of open-pollinated varieties that can be worked on in the laboratory of a grower's back garden.

Saving your own seed is very rewarding, not just for your pocket but for the bees, insects and biodiversity of your garden.

Our gardens, orchards and woodlands are open to the public, Tuesdays to Satur-

days. We provide education and outreach programs to schools, giving talks, demonstrations and workshops helping them to attain a Green Flag award for their environmental education program. We also provide workshops for adults to learn biodiversity, growing skills and live a more sustainable lifestyle.

To buy our seeds and trees please visit our on-farm store or shop online with us and to find out more about our work please contact us as follows:

Irish Seed Savers Association, Capparoo, Scariff, County Clare, Ireland.

Opening Hours: Tuesday - Friday 10am to 4.30pm and Saturday 12:30pm - 4:30pm. E: info@irishseedsavers.ie T: 061 921856/ 921866 W: www.irishseedsavers.ie

¹<https://www.irishtimes.com/news/environment/seeds-of-change-1.2769911>



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lascach Intíre Éireann
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CLEAN WATER IS VITAL TO YOUR HEALTH

Your Septic Tank May Pose a Threat

Cork County Council's Environmental Awareness Team highlights the possible threats from domestic waste water treatment systems.

THERE are an estimated 500,000 domestic waste water treatment systems (DWWTS) (i.e., septic tanks and treatment systems) systems in Ireland treating waste water from single houses i.e. houses not connected to a public sewer system. DWWTS accept waste water from toilets, showers, sinks, wash hand basins, washing machines and dishwashers. The greater the population of the dwelling, the greater the volume of waste water produced. A DWWTS is assumed to have a daily hydraulic loading for each person of 150 litres and typical household occupancy of 2.8 people. On a national scale, this equates to a liquid discharge of 210,000 m³ per day or 46 million gallons (equivalent to 84 Olympic swimming pools). There are a number of different pollutants in domestic waste water, each of which can cause problems for health and the environment.

On-site DWWTS can threaten public health and water quality when they fail to operate satisfactorily. When the wastewater is not absorbed by the soil it can form stagnant pools on the ground surface. In such failures, humans can come in contact with the wastewater and be exposed to pathogens, e.g. faecal coliforms. Foul odours can also be generated. Typically there are approximately 1 million *E. coli* bacteria in one litre of effluent from a septic tank serving a normal household. The drinking water standard for *E. coli* and coliform bacteria is zero.

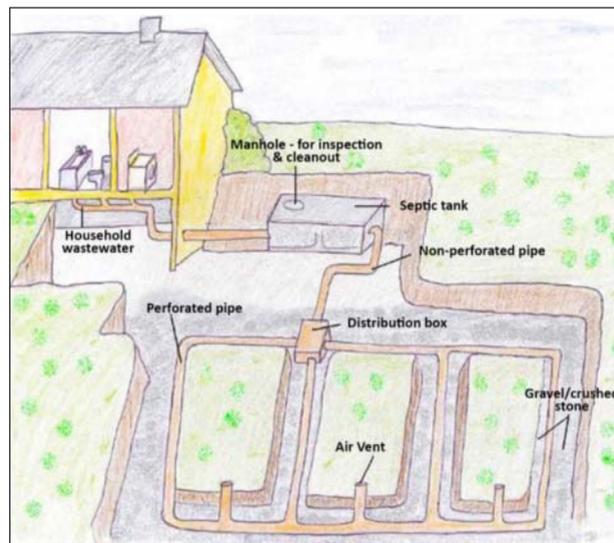
If properly designed, installed and maintained, your DWWTS (including septic tanks) can provide long term, effective treatment of domestic wastewater

If you do not maintain your system it may be necessary to replace it, which may cost a lot of money. A malfunctioning system can contaminate groundwater and therefore private wells and impact on the health of those who drink the water. It may also result in ponding of effluent, which will pose a risk of disease and create odours.

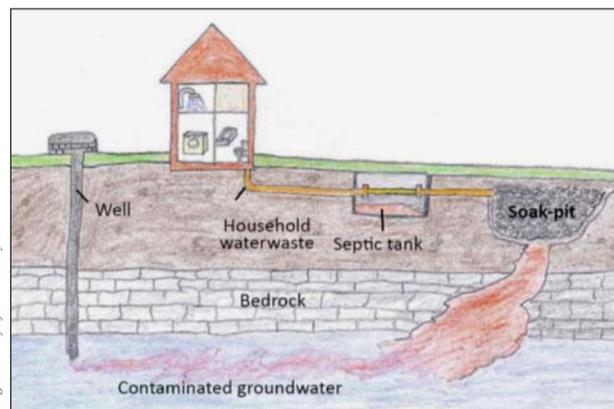
Owners of DWWTS are required to operate and maintain their systems so that they do not pose a risk to human health or the environment. New legislation was introduced in 2012 outlining the responsibilities of system owners.

Typical layout of a septic tank and percolation area

A modern septic tank system includes a double chamber tank and percolation area. Wastewater is partially digested by bacteria in the septic tank and the effluent then passes through a percolation area where it is further treated.



Typical layout of a septic tank and percolation area



Could my wastewater treatment system pollute my well?

Some signs that your wastewater treatment system may not be working include the following:

- Smell of sewage from the general area of the tank and percolation area.
- Slow draining toilets, sinks or drains or backing up of sewage at the inlet.
- Overflow of wastewater from the tank or ponding of sewage on the percolation area.
- Discolouration of nearby watercourses (greyish slime growths).

Could my wastewater treatment system pollute my well?

Yes it is possible. If you suspect that your wastewater treatment system is affecting your well you should have both systems checked. If you are concerned you should contact your local authority's Environmental Section or local Environmental Health Officer for advice.

If you suspect contamination of your well you need to have a full assessment of your wastewater treatment system carried out by a suitably qualified person.

What you can do to improve your treatment system

The following are some simple steps which you can take to ensure that your waste water treatment system does not pose a risk to human health or the environment:

non-compliant. The main reason for this is due to financial constraints. These systems do not pose a direct risk to human health, but do pose a risk to the environment.

Cork County Council continues to work in a co-operative manner with householders to encourage them to carry out any necessary remediation works to comply with their notices. Where necessary legal action will be taken to achieve compliance.

Public awareness

- Banners, posters and leaflets have been placed in Cork County Council Libraries & offices throughout the county and Cork County Council also provides updates on inspections via twitter.
- Information was provided at Cork Summer show in 2016 and 2017
- Cork County Council Environment Officers have delivered information leaflets to properties adjoining bathing areas in County Cork.



Discharge from a septic tank – system not working properly. Note dye added during test to track route of discharge.



Storm water from the roof entering a drain flowing to the septic tank – storm water should go to a separate soak away.



Wastewater also known as grey water escaping to a watercourse

- Have your system desludged regularly, (at least every 3 years), by an authorised contractor, keep records. Exclude the following from the system: grease, excessive bleach or chemicals, food, disposable items such as nappies, etc.
- Do not let rainwater from roofs or open yard areas enter the system.
- Ensure manhole covers are secure.
- Never enter a septic tank or treatment system.
- If effluent from the septic tank or percolation area is visible on the ground you need to carry out urgent repairs to stop this discharge.
- **Safety Note** – it is dangerous to enter a septic tank or wastewater treatment system as they emit dangerous gases and only certified personnel should carry out this work.

Experience tells us that the main reason for failure of a system is that the tank requires desludging. This should be done every 3 – 5 years in order to maintain the effectiveness of the system. Failure to regularly desludge the tank can lead to minor problems becoming bigger over time. Desludging should be carried out by an authorised collector who will provide you with a receipt clearly identifying the collector's waste collection permit number.

Useful links

www.corkcoco.ie – Septic Tanks
www.epa.ie - Householder Information on Septic Tanks
www.epa.ie - A Risk-Based Methodology to Assist in the Regulation of Domestic Waste Water Treatment Systems
 DECLG – www.environ.ie - Domestic Waste Water Treatment Systems support@protectourwater.ie

Environment Directorate, Cork County Council, Inniscarra, Cork. www.corkcoco.ie Cork County Council Environment gratefully acknowledges the provision of information by the Environmental Protection Agency in completing this article.

Cork County Council Experience

Inspections

THERE are approximately 59,000 Domestic Waste Water Treatment Systems in County Cork according to C.S.O figures. 51,825 of these have been registered with Protect OurWater.ie to date.

To date 459 septic tank inspections have taken place in County Cork under the National Inspection Plan with 268 systems failing the inspection. Each of these 268 properties with systems that failed inspection have received an Advisory Notice to carry out remedial works to achieve compliance. The chart below Figure 1, demonstrates the reasons for failure and the frequency of those failures.

224 of these properties with advisory notices have achieved compliance to date. 5 systems dating to 2014 and 2015 remain

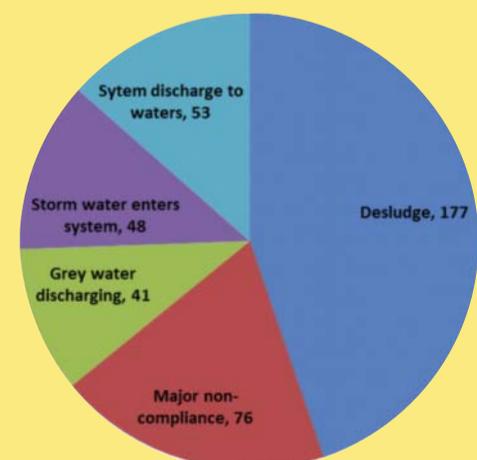


Figure 1. Reasons for systems failing inspection 2013 to 2017 Co. Cork

ECO ECHOES: Quicksilver and the Madness of the Hatters

By Walter Muggdan¹

May 2018

ONE of the engaging characters created by Lewis Carroll in *Alice in Wonderland* is the Mad Hatter; and the phrase “mad as a hatter” has been around for nearly 200 years. But why? Why should 19th century hat makers have been thought of as mad? Well, because they often were; at least, they became so after years working as a hatter.

And why did hatters become mad? Because they used a compound of mercury to stiffen the felt used to make hats. Mercury is severely toxic, but before it kills you it is likely to drive you mad — quite literally.

Mercury is an extraordinary element — a shiny metal that is liquid above -40°C, and that slowly evaporates (turns into a gas) at around room temperature. In the past it was known by its Greek name, *hydrargyrum*, meaning *liquid silver*. That’s why chemists know it as Hg, its symbol in the Periodic Table of Elements. Its common name, *quicksilver*, means much the same — quick, in the sense of “alive” (as in the biblical phrase “the quick and the dead”); and *silver*, because of its appearance.

Mercury occurs widely in nature, typically as *cinnabar*, a red ore that is, among other things, the source of the pigment *vermillion*. Because the metal is sensitive to changes in temperature and pressure, it has been widely used in instruments such as thermometers, barometers, blood pressure meters and thermostats.

Mercury has been used in medicine for over a millennium — often with unintended horrible consequences. Starting as early as the 15th century it was used to treat skin diseases. By the 16th century it was used (with some success) as a treatment for syphilis, though its benefits as a curative were eclipsed by its deleterious effects; more about those later. In more recent years mercury was put to use as a topical antiseptic for minor cuts and burns, known as *mercurochrome*. In this capacity it is quite effective; but this use has been banned in a number of countries including the United States.

When liquid mercury is mixed with powdered silver and other metals it forms an exceptionally hard, durable amalgam that has been used for hundreds of years to fill dental cavities. People may refer to these as “silver fillings,” but they contain more mercury than silver; more about this later, as well.

Mercury and its various compounds have been used in many industrial and commercial applications. Among the most common was its use in the manufacture of chlorine — another very useful but very dangerous element. Mercury conducts electricity well, and has been used extensively in motion sensitive switches, like the switch that turns on the light next to the little mirror on the back of automobile sun visors, or the light that comes on when the boot is opened. (Because it’s a liquid, the mercury flows up and down inside the switch depending on the position of the visor or the boot, and thus either completes the electrical circuit or breaks it.) Mercury switches have largely been phased out of automobiles, but to this day fluorescent light bulbs use mercury vapour that (indirectly) causes the bulb to glow when an electrical current is passed through.²

Mercury is undeniably a valuable and useful element, but there is a very dark side to this bright, shiny metal. In almost all its forms and compounds, mercury is extremely toxic, whether ingested, inhaled or absorbed through the skin. Effects include damage to the kidneys, the lungs and — as experienced by the hatters — the nervous system and the brain. Symptoms include drooling, uncontrollable muscle tremors and twitching (called “hatter’s shakes”), distorted vision, slurred speech, confused thinking, and — in severe cases — hallucinations and psychotic episodes. It’s no wonder hatters were called mad (when they weren’t mistaken for drunks). Even low-level exposure, when continued for an extended time, has adverse effects including fatigue, irritability, loss of memory, vivid dreams, and depression.

Much of the medical quackery of the past is now thankfully behind us. But people are still being exposed to mercury, primarily through environmental and dietary pathways.

Most mercury exposure today is from atmospheric mercury emissions. About half of the mercury in the atmosphere comes from natural sources, primarily volcanoes. Nearly two thirds of the remaining emissions come from burning coal and, to a much lesser extent, oil. These atmospheric emissions reach us either directly by inhaling the air, or indirectly through our food, particularly fish.

Multiple forms of mercury are highly soluble in water. Air emissions often settle out onto water bodies, elevating mercury levels in the water and

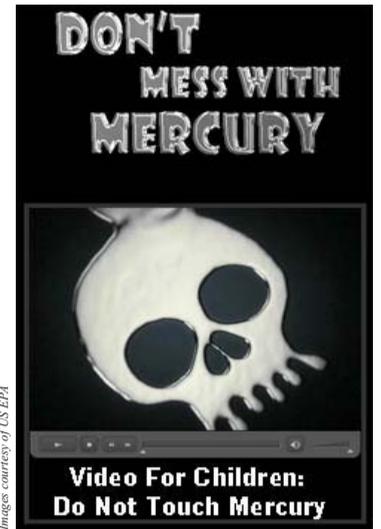
the sediments, where aquatic animals become exposed. Mercury bio-accumulates, meaning that concentrations in animals increase up the food chain. Small creatures like worms, shrimp and other crustaceans take in mercury from the water and sediment; small fish eat those animals along with their mercury load; in turn, larger fish eat the smaller fish; and finally, at the top of the food chain, people and other predators (eagles, ospreys, herons, seals, otters, etc.) eat the larger fish. At each step of the way up the food chain, the concentrations of mercury increase.

Eating fish is definitely part of a healthy diet; but the risks from mercury contamination in fish are real. An infamous case of mass mercury poisoning occurred in Minimata Bay, Japan. In the 1950s and 1960s a nearby factory discharged high levels of wastewater containing mercury, which entered the bay and contaminated the fish and shellfish — both major sources of food for the residents. Many of them died or became seriously ill. Over 10,000 people were affected, and well over 2,000 were diagnosed with what came to be known as *Minimata disease*.

A much less dramatic but nevertheless significant source of mercury in our environment comes from dentistry. Of the 10,000 tons of mercury newly mined each year, about 2% - 3% is used to make dental amalgam. When the dentist tells you to “rinse and spit,” tiny bits of amalgam enter the wastewater stream.



Image courtesy of US EPA



Due to its sensitivity to changes in temperature and pressure, mercury is widely used in instruments such as thermometers, barometers, blood pressure meters and thermostats. Though it is an extraordinary element, it is severely toxic.

Sewage treatment plants are not designed to remove mercury, so most of it passes through into the rivers and harbours. The U.S. Environmental Protection Agency (EPA) estimates that over 5 tons of dental mercury reaches American waterways every year. In the late 1990s it was estimated that up to one third of the mercury in the water of New York Harbor came from dentists’ offices. Fortunately, it’s easy and relatively inexpensive (under \$1000) for dentists to capture the mercury before it enters the sewage system. Nearly a quarter of the states in the U.S., with about 40% of American dentists, have required installation of such equipment.³

Over the past few decades, mercury has largely been phased out of common instruments such as thermometers and thermostats. But even as less mercury is being used in such products, improper disposal of mercury batteries, fluorescent light bulbs, auto parts, older thermometers, etc., remains a pathway through which this toxin enters our environment.

Every few months, some unwitting child in the U.S. finds a vial or jar of this endlessly fascinating substance and can’t resist playing with it, showing it to friends, bringing it to school and — inevitably — spilling it. The U.S. EPA spends hundreds of thousands of dollars annually to clean up these dangerous messes.

And what about hatters? In 1941 the United States Public Health Service banned mercury use in the American felt industry. By the second half of the 20th century the effects of mercury poisoning were well understood and widely recognized. And today, few men still wear the kinds of hats made of felt. Presumably, our remaining hatters are no longer going mad ... at any rate, not from hating.

¹Walter Muggdan is currently serving as Acting Deputy Regional Administrator for Region 2 of the U.S. Environmental Protection Agency, New York City, NY, USA. Any opinions expressed in this article are his own, and do not necessarily reflect the views of the EPA.

²Because fluorescent light bulbs have small amounts of mercury, they should be disposed of carefully as household hazardous waste. LED (light emitting diode) light bulbs do not use mercury; they also last longer, use less electricity, and provide a wider range of colour and “feel” than fluorescent or incandescent bulbs. ³In December 2016 the U.S. EPA finalized a rule requiring dentists nationwide to capture amalgam residue. Shortly thereafter, in January 2017, the incoming administration withdrew the rule.

MIG^{ie}



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“The Ferry Woman”

Fintan Masterson, a guide at Ballycroy National Park, Co. Mayo, speaks about his great-grandmother Peggy, from Achill, who was known locally as “the ferry woman”. It is a fascinating story and one which he researched for the *Cathair Na Mart*, the Journal of the Westport Historical Society, in 2014.

Margaret (Peggy) Lynchehaun - nee McIntyre – died on 18th February 1960 at 86 years of age. For about forty years in the beginning of the 20th century, she operated a ferry service between Tonragee (Achill) and Claggan (Ballycroy), in Co. Mayo. For a woman to be operating a ferry at that time was unusual. The ferry boat was a punt – a timber open craft, which she rowed. Without the benefit of a modern-day outboard engine, it was a demanding job for a woman, and given that it was then a male dominated world, she demonstrated a strong spirit.

The ferry provided a service for people who were geographically isolated and also helped her provide an income for her family as her husband was confined to hospital due to illness – he died in 1936. They lived at Lynchehaun’s place and had five children Michael, Sabina, Mary, Bridget and Thomas. Michael passed away from ‘flu; Mary married a Cooney; Sabina married a



Peggy Lynchehaun – “the ferry woman”

McGinty; Bridget married a Masterson and Thomas married Annie McGinty.

The ferry service would have been at the closest point of crossing between Claggan in Ballycroy and Achill Tonragee and it would have been an extremely busy area with people crossing back and forth. The main form of transport in the area would have been by boat. Martin McGinty said how his mother Sabina, Peggy’s daughter, used to help her with the ferry, especially on Fairs Days, which operated once a month. These took place on Achill and the people of Ballycroy would have used the ferry to buy provisions there. Sheep and cattle were also



Photograph from Claggan graveyard looking across at Tonragee, the waters Peggy would have travelled.

ferryed across between Ballycroy and Tonragee. The waterway between Achill and Ballycroy would serve to explain why there were a significant number of marriages between people from Tonragee and Ballycroy. Could the Ferry women have also been matchmaker?

The ferry operated down the “Fish Road”, which was constructed to connect with the railway for the export of fish. The boat was moored at the bottom of the Fish Road, opposite Oileán Fraoigh. The people who used the ferry were mainly the doctor and the priest. A white sheet would be placed flat on the Ballycroy side and this would be a sign for Peggy to ferry the doctor.

Peggy also ran a funeral service at that time. It was the practice to bury the dead of Tonragee East and Owenduff in Claggan Cemetery. It was the tradition to make the journey by sea, an easier journey rather than the long trip by land to Cloughmore Cemetery on Achill Island ten miles away.

Peggy’s daughter Mary Ann said “Peggy was like a nurse in the village but without any training”. She delivered the babies and prepared the corpse for the funerals. Peggy also used to also spin her own wool and used to share her spinning wheel with the community. Peggy once told Mary Ann a story about how a fox had taken all her hens one night. The income from the hens’ eggs was very important to women in rural Ireland at that time and Peggy was so upset by the loss of the hens that she cried. The following day different neighbours came to Peggy’s house, each with one hen, replacing all the hens she lost to the fox. This kind act by the neighbours demonstrated the generosity and wonderful community spirit of that period in



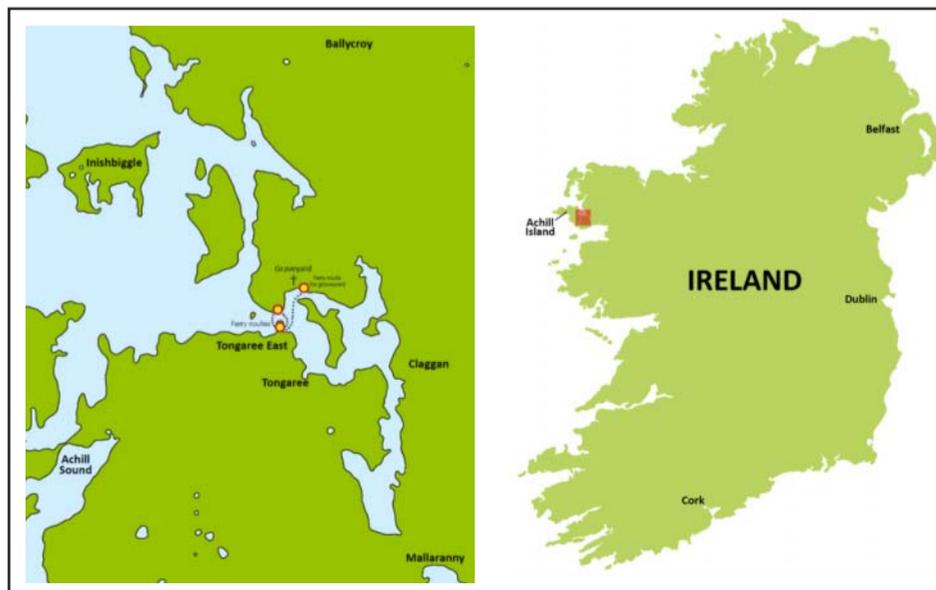
Opposite Oileán Fraoigh, an information Board at Fish Road on the The Great Western Greenway.

time. It also demonstrated the high regard Peggy’s neighbours had for her.

The ferry service finished circa 1936/37, which coincided with the last train coming into Achill. Cars and lorries were becoming more common and people could move more freely. The ferry service she ran for the monthly fair on Achill Island would also have been unable to compete with a service from merchant shops. Peggy had continued a tradition of women seafarers in Co. Mayo going back to the time of Grace O’Malley. She is fondly remembered by her descendants in the Tonragee area of Achill.

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Northumberland's Druridge Bay

Where Industry has Yielded to the Birds



By Anthony Toole

THE small, wooden bird hide was quite full. Eight or nine of us, rather than the usual two or three, snuggled together on the bench seats. Most looked through binoculars, others focussed huge telephoto lenses across the reedbeds and open water toward the acre of sand and mudflat on which upward of a couple of hundred waders, lapwings, curlews, dunlins and redshanks and a scattering of gulls rested peacefully. Another stretch of water separated the sandbank from more reeds, beneath which nestled a dozen snipe. A heron stood statue-like at the margin and a little egret picked its way through the shallows.

Suddenly, the birds on the sandbank rose, en masse, into the air.

"What's put them up?" Asked more than one voice.

The answer came rocketing in from the east, a peregrine at full speed. It shot through the body of the flock, appeared to stutter, then more slowly veered toward the hide.

"It's caught a dunlin," somebody remarked.

I swung my camera toward it and followed its flight while half-focussing the zoom, and clicked the shutter. By good luck alone, and no skill whatsoever, I managed to grab an acceptable image of the raptor and its prey.

Within a few minutes, the flock, having retreated to the far side of the pond, circled back and settled on the sandbank as peacefully as before, seemingly oblivious of the abrupt tragedy.

The Northumbrian coast from Tynemouth to Beadnell, is characterised by a series of gently curving bays punctuated by low cliffs and stony promontories. The longest indentation is that of Druridge Bay, a smooth arc of a little over six miles of sand dunes, bounded by the rocky reefs of Cresswell to the south and Bondi Carrs to the north. The latter bears little resemblance to its more illustrious antipodean namesake. Northumberland's is much prettier and far less crowded, though its waters are shiveringly colder.

To the casual eye, the Druridge dunes mark the eastern limit of a

stretch of rural county, with scattered farms linked by narrow lanes and spidery footpaths. Yet Northeast England's industrial legacy is not far away. Until recently, the skyline to the south was dominated by the chimneys of Lynemouth's aluminium smelter, while a mile from the bay, Ellington Colliery, the last deep coal mine in the region, remained working until 2005. Even the line of the bay itself shows the marks of industry, though these are now well camouflaged, and becoming more so as Nature reclaims them, for these former open cast coal sites have been transformed into a series of wetland nature reserves, owned by the Northumberland Wildlife Trust, that are of increasing importance for both resident and migrant birds.

The most southerly of the reserves, where I watched the peregrine's successful swoop, is Cresswell Pond, a Site of Special Scientific Interest, lying alongside the road just north of Cresswell village. It is linked to the sea by Blakemoor Burn, which at high tide, allows the passage of sufficient salt water to maintain a brackish quality. As a result, it is surrounded by salt marshes and reedbeds, which attract birds throughout the year. The pond can be viewed from the roadside, or from a footpath to the north, but is most conveniently surveyed from the bird hide on the southern shore, which is reached from a convenient roadside car parking space.

After periods of dry weather, extensive mud flats become exposed along the eastern shore. At any time of the year, one is likely to see mute swans, greylag geese, mallard, widgeon and shelduck. In winter, these are augmented by huge flocks of migrant pink-footed geese, announcing their arrival by honking loudly over the pond before settling to forage in the surrounding fields. Large numbers of waders come to feast on the rich invertebrate life that hides beneath the mud. Also present are likely to be terns and black-headed gulls. In recent years, little egrets have become a common sight, while springtime has seen successful breeding by two or three pairs of avocets.

A short distance north of Cresswell Pond, the road makes an abrupt turn to the left. The straight continuation,

however, runs along Druridge Links, between more sand dunes and a stretch of woodland. Hidden behind the wood are the Druridge Pools, a collection of ponds surrounded by swampland frequented by teal, widgeon, goldeneye, tufted ducks and grebes. Snipe, redshank, oystercatcher and greylag feed on the damp surrounding fields.

A wooden boardwalk passes between the pools, with wet channels on either side, in which frogs are abundant in springtime and the occasional great crested newt might be found. The pools themselves are hidden behind high embankments, built to minimise disturbance of the birds, but may be scanned from the easily accessible hides on either side of the boardwalk.

A short walk north of Druridge Pools brings one to East Chevington, the two ponds of which are surrounded by very extensive reedbeds. These provide shelter for reed warbler, reed bunting and bearded tits, in addition to coot and moorhens. The surrounding wet grasslands contain yellow flag iris, northern marsh orchid and various vetches, which attract burnet moths and butterflies like common blue, meadow brown and dark green fritillary. Darter dragonflies are a frequent sight, flying over and breeding in the pools and wet patches on the fields.

Having curved gently westward, the bay now arcs back, past the Country Park, which is more a leisure amenity than a nature reserve. Nevertheless, this pool also has its share of avian visitors. A few years ago, bird-watchers came here to observe a rare yellowleg wader. On being told of its presence I asked, "How close is it to the edge of the pond?"

"Close," gasped my informant, "you need reading glasses to see it."

Indeed, it slowly stalked through the shallows, unconcerned by the dozen-or-more enthusiasts who photographed it from a distance of a few metres.

Other rarities that have made appearances from time to time, have included a small gathering of spoonbills, a flock of shore larks, a solitary red-legged falcon, a hen harrier and a Pacific diver. These tend to hang around for a few days before moving on.

At the northernmost limit of



Images courtesy of Anthony Toole

Clockwise from top left: Druridge Bay, Northumbria, UK; Golden plovers, redshanks and lapwings; Spoonbills; Pink-footed geese; Red-footed falcon; Avocets.

Druridge Bay lies Hauxley Nature Reserve, consisting of a lake and several islands, which can be reached along the coastal footpath from the south, or by car from the north, where a rough track leads to a spacious car park. The original small but impressive visitors' centre was destroyed by fire a few years ago, in an appalling act of vandalism. Its replacement however, larger and even more impressive, was opened in June 2017. This new centre has a very commanding view over the northern end of the lake, around which tracks lead to a series of smaller hides that cover the southern reaches, which are hidden from the visitors' centre.

The islands provide sanctuaries for mute swans, shoveller and shelduck, greylag and Canada geese. The southern hides look out over shallows, which become mud flats in dry weather, populated by oystercatchers, lapwing, ringed plover, curlew, redshank and sandpiper.

The eastern track runs through planted rows of tall teasel and out onto the sand dunes, where it joins the coast footpath. Its western counterpart is much narrower and lined with

brambles and dense patches of scabious, bloody cranesbill and kidney vetch. Between the latter and the car park is a wooded area and a feeding station, frequented by yellowhammers, siskins, various members of the tit and finch families and the occasional pheasant. A lucky visitor might also spot a stoat or red squirrel among the bushes.

Most visitors to Druridge Bay are attracted to the beach and sand dunes, which must rank among the finest in the country. So extensive are they that they are never crowded, even in high summer. A walk along the links, with detours into the nature reserves is an added attraction at any time of the year, but perhaps more so in winter, when the dunes shelter the pools from Arctic winds and Scandinavian migrants swell the bird numbers that seek refuge from the same winds.

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

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Met Éireann's *Climate Annual 2017*

An overview of Ireland's weather during 2017

MET ÉIREANN has recently published "*Climate Annual 2017*", which gives some interesting information and data about Ireland's weather for that year.

ANNUAL SYNOPSIS

The year began mild and mainly dry but became unsettled at the end of January and for February with storm Doris bringing widespread gales and disruption on 23rd February. Changeable, mild weather continued through most of March. April brought mainly dry and settled conditions until the last few days of the month. May saw a good deal of dry weather but also some wetter interludes. The first half of June was changeable, with warm mostly dry weather for the second half of that month. July and August were unsettled and noticeably cool, brief high pressure ridges brought some fine days - especially to the south and east, while severe thundery downpours occurred in the North on August 23rd. The cool unsettled pattern continued during September. October was notable for storm Ophelia, an extra-tropical cyclone which made landfall on the 16th, bringing violent storm force winds to Munster, and strong gale force winds to many areas with widespread destructive gusts. During November and December the unsettled pattern continued with some colder interludes, bringing some severe frosts and falls of snow to many parts on December 10th.

LONG TERM TEMPERATURE TRENDS

According to the report, the rate of increase in air temperature in Ireland, since 1900, is consistent with the global trend. Since 1900, the average rate of increase in mean air temperature in Ireland is approximately 0.08 degrees Celsius per decade. A national average of the air temperature using five long-term stations is shown. The year 2017 ranks as seventh warmest in this time series. Of the 20 warmest years since 1900, fifteen have occurred since 1990.

Notes: Met Éireann operates 25 synoptic stations throughout Ireland, which produce real time data on a minute by minute basis. It has 70 climate stations that record daily data and a network of over 500 rainfall stations.

For further information on Ireland's weather, visit Met Éireann's website: www.met.ie
Download the report at: <https://www.met.ie/climate/past-weather-statements> (select "2017" and "Year")



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Temperature

The year's highest temperature was reported at Dublin (Phoenix Park) on 21st June, with a temperature of 28.6°C. The year's lowest air minimum was recorded on 11st December at Casement Aerodrome, Co. Dublin and Horseleap, Co. Offaly, with -6.6°C, while the lowest grass minimum was -11.8°C reported at Straide, Co. Mayo on 21st January.

Sunshine

Highest number of daily sunshine hour was 15.9 hours. Record in 2017 was 15.9 hours at both Johnstown Castle, Co. Wexford and Cork Airport on 18th June.

Annual number of hours of sunshine at selected stations:

Station	No. of Hours	Highest Daily Sunshine (hours)	Dull Days
Arklow, Co. Wicklow	1524.6	15.2	95
Sherkin Island, Co. Cork	1379.3	14.6	120
Casement, Co. Dublin	1370.5	15.5	95
Dublin Airport, Co. Dublin	1356.3	15.8	97
Cork Airport, Co. Cork	1351.0	15.9	108
Straide, Co. Mayo	1273.3	14.9	90
Shannon Airport, Co. Clare	1256.9	15.1	100
Ballincurrig (Peafield), Co. Cork	1238.3	13.9	116
Belmullet, Co. Mayo	1207.5	14.6	104
Knock Airport, Co. Mayo	972.3	14.1	132

Rainfall

The highest annual rainfall total was recorded at Cloone Lake (Caragh River area), Co. Kerry, with 3008.3 mm. The lowest annual rainfall total was recorded at Dublin (Ringsend) with 570.6 mm. The number of rain days ranged from 150 days at Ringsend to 312 days at Mulranny (Doughbeg), Co. Mayo.

Dry Spells

A period of 15 or more consecutive days to none of which is credited 1.0 mm or more of precipitation:

Synoptic Stations with a dry spell of 20 days or more:

Dunsany, Co. Meath	19th April to 10 May – 22 days
Curteenry, Co. Tipperary	4 to 24th April – 21 days
Roche's Point, Co. Cork	4th to 24th April – 21 days
Claremorris, Co. Mayo	4th to 23rd April – 20 days
Casement, Co. Dublin	10th January to 29th January – 20 days

Droughts

An absolute drought is a period of 15 or more consecutive days to none of which is credited 0.2 mm or more of precipitation. A partial drought is a period of at least 29 consecutive days the mean daily rainfall of which does not exceed 0.2 mm. The longest periods of absolute and partial droughts from the synoptic Stations are as follows:

Knock Airport, Co. Mayo	Absolute Drought	27th April to 11th May 2017	15 days
Markree, Co. Sligo	Absolute Drought	27th April to 11th May 2017	15 days
Mullingar, Co. Westmeath	Partial drought	13th April to 11th May 2017	29 days

Wind

The year's highest wind gust was 84 knots (155.6 km/hour) at Roche's Point, Co. Cork, on 16th October. This was due to Storm Ophelia.

The Storms in 2017 were:

Storm Doris	Thursday, February 23rd
Remnants of former Hurricane Gert:	Monday, August 21st
Storm Aileen:	Tuesday, September 12th
Storm Ophelia:	Monday, October 16th
Storm Brian:	Saturday, October 21st
Storm Caroline:	Thursday, December 7th
Storm Dylan:	Sunday, December 31st

SALMON who cares?

By Ciaran Byrne

'WHO cares about salmon' is a topic, which scientists and managers in IFI have been giving some thought to over recent years, particularly in light of what we know about the state of salmon stocks.

Salmon are an iconic species in Ireland, and indeed in many other countries along the north-west coast of Europe, and our love of the salmon goes back into time immemorial. This iconic fish is part of our mythology and folklore, it was on our money, and images of salmon decorate some of the earliest manuscripts known in Ireland. Even some of the earliest laws, the Brehon Laws, dating back to Celtic times, provide for the sustainable exploitation of salmon.

One can only wonder what salmon populations were like in pre-Christian Ireland, and as a biologist I often do. However the reality is we will never really know, but what we can say with some degree of certainty is that today salmon are considerably less abundant than they were, even a decade ago.

Of course the question on most people's lips is why? And we will get to that, but first I think it is important to really understand exactly the magnitude of the decline. The

graph (Figure 1) below charts the decline in the number of salmon returning to 'home waters' over a 44 year time series. The red line represents the estimated number of fish coming back to Ireland, and the blue line represents the estimated number of salmon coming back to the southern part of the North East Atlantic (NEAC), the so called 'Southern NEAC' salmon stock, which includes all salmon returning to France, Ireland, UK and South-west Iceland. One does not need a degree in fish biology or any other biological science to see that the abundance of salmon peaked in the mid 1970's when almost 1.7 million salmon were estimated to have returned to Ireland, to where it is today when returns are estimated at between 250,000 and 300,000 fish.

If we were to view this data in a different way we could look at marine survival over a similar time period, in this case between 1980 and 2017 (Figure 2). For clarity the marine survival is the number of juvenile salmon which survive at sea and return to our rivers and lakes to breed. For example, for every 100 juvenile salmon which migrate out to sea, if 25 adult salmon return then we have a marine survival of 25%, or to put it the other way a marine mortality level of 75%.

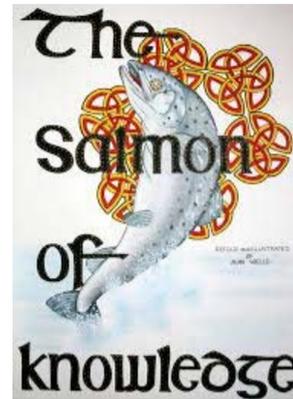
Again looking at the graphs

it is pretty clear that marine survival peaked in about 1986 at about 31%, which meant that for every 100 juveniles which migrated out of Irish river to the North Atlantic approximately 31 adults returned, compared to levels for 2017 which have been estimated at approximately 7.1% (approximately 7 adults).

I would like to be clear salmon have always had a significant level of mortality at sea, this is part of their life history strategy, this is the reason they produce thousands of eggs. Biologically they are working on the basis that only a portion will ever survive. What's different now is the level of mortality is clearly higher than the salmon have 'biologically planned for', and this is leading to decreases in abundance levels.

Given these two pieces of information, I hope you are convinced that there has been a significant decline in salmon stocks in recent decades. I do not have the space in this article to delve into much more detail but what is sadly reassuring is that the same trends in salmon abundance are being felt in many other jurisdictions too, so it's not just us!

So let's get back to the 'why'. The easy answer would be to blame sea lice and the



Salmon are an iconic species in Ireland and are part of our mythology and folklore.

aquaculture industry and be done with it. However the reality is a lot more complex than this and there are multiple factors involved in the decline of salmon stocks each of which can have a different level of influence in different years.

Yes it is true that in certain circumstances sea lice induced mortality of salmon smolts (the term for a juvenile salmon) can increase by between 12 and 39%, which can have a very significant impact and this has to be looked at. But it is also true that while water quality has improved significantly in recent years the number of very high quality, reference sites, has declined precipitously over the same period. The recent launch of the second cycle of the River Basin Management Plans, will undoubtedly have a positive impact on this stark situation.



Images courtesy of Inland Fisheries Ireland

Levels of illegal fishing for salmon have also declined from those seen during the 1980's when we had the so called 'salmon wars', and since 2006 all drift netting for salmon has ceased. So why then have abundance of salmon levels continued their slow decline?

It is likely that ocean scale changes in temperature, food availability and predation have also had dramatic impacts on salmon abundance, and while it is incredibly important to know about these factors they are effectively uncontrollable, unlike the issues mentioned in the previous paragraph.

So what we have to do as a society is to focus our efforts on 'controlling the controllables' to ensure that our juvenile salmon are given the best chance possible to survive at sea.

And this brings us back to the opening question of who cares? We in IFI care an awful lot, and so do many of our

other scientific colleagues and a huge number of the recreational salmon anglers who also have a very strong conservation focus. But the status of Irish salmon is of much wider concern than just as a fisheries biology or recreational angling question, it is a whole of Irish society issue.

Salmon is the freshwater equivalent of the canary in the coal mine. Whether you have ever or never seen, or fished for a salmon doesn't really matter, this issue still impacts on you. Healthy salmon populations are possibly one of the best indicators of a healthy environment, and every one of us will benefit from a health environment.

Dr Ciaran Byrne, Chief Executive Officer, Inland Fisheries Ireland, Swords Business Campus, Swords, Co. Dublin, Ireland.
www.fisheriesireland.ie

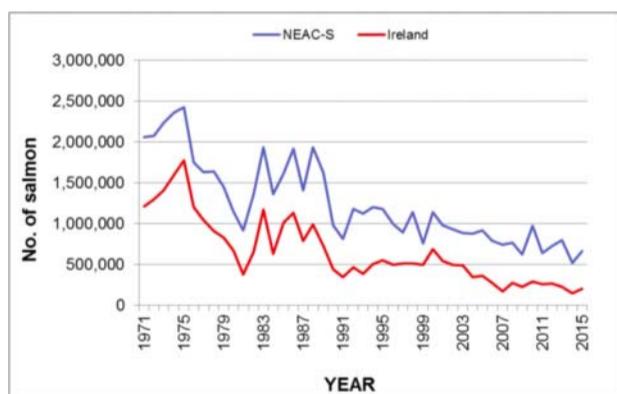


Figure 1. Returns of salmon to the coast of Ireland from 1971 to 2015. Blue Line Southern North East Atlantic Stock (S-NEAC). Red Line, Irish fish only.

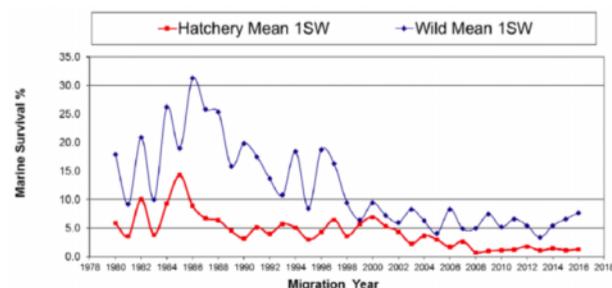


Figure 2. Average marine survival of wild (blue line) and hatchery reared salmon (red line).

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The Native Status of Scots Pine and Other Trees

By Colin Kelleher

What is native?

Determining native status is not as simple as it might seem. Even the great Irish naturalist Robert Lloyd Praeger wrote in 1941 that he was “almost weary” from thinking and writing about the native status of some of Ireland’s more puzzling plants with disjunct distributions, namely the Lusitanian elements of our flora. How we define native status varies, but we generally impose conditions on the method of colonisation and on the timing of this colonisation. Arbitrary points in time are often put down as lines in the sand to determine a cut-off date for native status. It is a question of scale rather than an absolute. With our anthropocentric world view we tend to focus on a narrow time-frame in which humans were both in existence and influencing the natural world. Ireland, along with much of Europe has gone through multiple glaciation and warming cycles, with the inevitable change in flora and fauna resulting from each cycle. From about 7,500 years ago Ireland became isolated from Britain and mainland Europe and so any plants that arrived after this date needed to float, be wind dispersed or carried some other way. As we get closer to the present day we have to consider the impact of humans as we are responsible for a mass dispersal of plants and animals and a major upheaval in native vegetation. The Neolithic farmers are implicated in potential introductions, certainly of crops and their associated weeds. The large-scale movement of Europeans and goods during

the age of discovery from the 15th to the 18th century marks the establishment of gardens containing a wide collection of globally sourced plants. Thus, many authors have used the date of 1500 to determine if a species is native or not. However, even so the evidence for each species needs to be taken individually.

What about Scots pine?

The Scots pine pollen record shows that it had colonised Ireland by about 9,500 years ago and had reached across the entire island by 8,500 years ago. However, it is known to have suffered a dramatic decline with a possible extirpation date of around 400 AD and a subsequent re-introduction from Scottish material. Could every remnant of a previously widespread species have disappeared from the landscape? Although most evidence suggests a major decline and local extinction, recent work by a number of researchers in Trinity College Dublin has indicated that Scots pine may not have been completely removed. This work shows a continuous presence of Scots pine pollen at a site in Co. Clare and this indicates that pockets of pine, at least this at this site clung on during the decline.

Along with the pollen record, another piece of evidence that can be used to determine native status is DNA or genetic signatures. As most temperate flora was restricted to a small number of refuges in southern Europe during the last glacial maximum, we can look at current DNA patterns across Europe to determine relationships and possible origins of this flora. DNA has already been used to show that Irish populations of

oak originated from a refugium in the Iberian Peninsula and that Irish alder populations came from two refugia, one in the Iberian Peninsula and the other in the Carpathian Mountains.

Ongoing work on the genetics of Scots pine in Ireland by the National Botanic Gardens is assessing Irish populations, both putative native and introduced populations. The initial results indicate a number of Irish sites may indeed be considered native. At the very least they are emerging from the genetic analysis as unique or unusual sites compared to the overall background population. Genetic work on Scots pine in Scotland has shown that while genes flow through pollen over vast areas the populations do maintain strong local signatures of adaptation, so perhaps the Irish populations are the same. There might be specific genetic signatures for Irish Scots pine, but this remains to be seen.

Other trees

It might not stop with Scots pine. Some American authors are now suggesting that on the basis of checking historical records of pollen we might have to add to our native tree list. Hornbeam and Lime are potential new additions as they show up in pollen records before the advent of Neolithic farming. These are not listed in the 8th century list of trees in the *Bretha Comaithchesa*. Did our ancestors come too late, were they taxonomically inept or will we settle on our list as it is?

Colin Kelleher, National Botanic Gardens of Ireland, Glasnevin, Dublin.
www.botanicgardens.ie



Image courtesy of Colin Kelleher

Scots pine in Co. Clare, a potential remnant of a native stand.

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Printers of Ireland's Hidden Depths

Transforming biodiversity data

The work of the National Biodiversity Data Centre

By Liam Lysaght

'IN ORDER to protect biodiversity, you first have to understand what you have'. This is the fundamental principle that underpins the work of the National Biodiversity Data Centre, and justified its establishment ten years ago. At all levels, there is a need to understand biodiversity; to know what species occur where and how distributions and populations are changing over time. This is the basic building block upon which actions and efforts to protect biodiversity should be based.

Anyone with even a basic knowledge of science understands that biodiversity is fundamental to supporting life on this planet; at a basic level biodiversity provides us with fresh air, clean water and nourishing food for our survival, but at another level the quality of biodiversity determines our quality of life. We are indeed fortunate that many parts of Ireland, particularly around the coast, supports a vibrant biodiversity but fit for purpose information management systems are needed to protect this resource.

At a time when we are launching spacecraft to explore distant galaxies, it might be surprising to hear that there is still a great deal that we have yet to learn about biodiversity on our doorstep. We know, for example, that approximately 32,000 distinct species have been described for the land area of Ireland, but we estimate that there at least another 10,000 that share our living space that have yet to be described. The marine environment is even less well understood; there is still only a basic understanding of the biodiversity of the oceans, and there are few long-term studies tracking how species and species assemblages are changing. A notable exception is the pioneering survey of the rocky shores of Sherkin Island, which has developed into one of the world's longest running such survey. The approach adopted by Matt and Eileen at the Sherkin Island Marine Station way back in 1975 needs to be replicated across the Irish territory, covering a far wider spectrum of Ireland's biodiversity so that we can better understand how biodiversity is changing into the future.

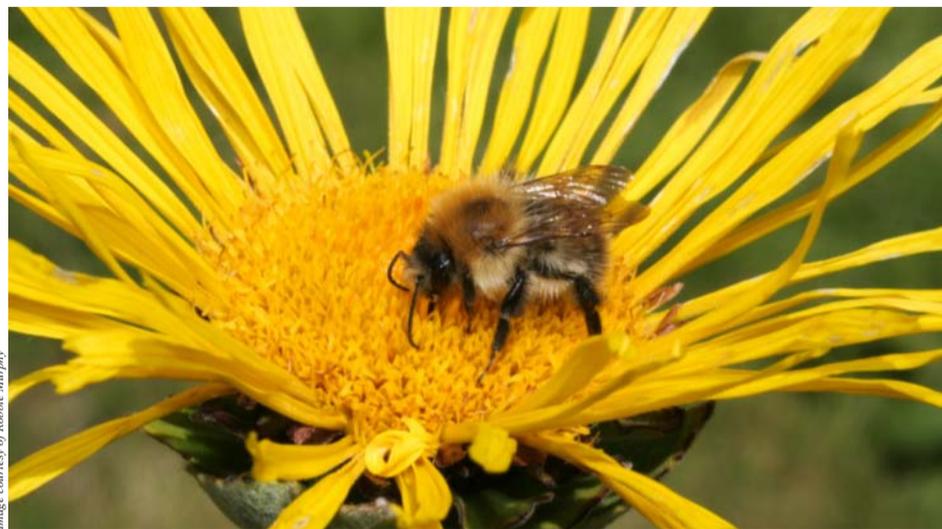


Image courtesy of Robbie Murphy

The National Biodiversity Data Centre is playing its part in doing this, *albeit* much later in the day, by working with others to mobilise existing data, to collect new data in structured formats, and providing the Information Technology backbone to bring the study of biodiversity firmly into the digital age. Already, more than 4 million observations of 16,000 species can be mapped and queried. Now, at the click of a mouse or the swipe of a screen, thanks to having *Biodiversity Maps* the online biodiversity data portal, information on knowledge of where species occur is accessible to everyone.

We tend to take these things for granted now, but think how wonderful it is when perched on a headland on Roaringwater Bay watching a basking shark in the waters below, or walking the dunes of Barley Cove and finding a grayling butterfly, to check if the species is already known for that locality? Not only finding out if it is known from the locality, but when it was last seen and by whom. Now with the use of a mobile phone, anyone can take a photograph of the species they have seen and identified, and this information can be submitted directly to the Data Centre. When information of this kind is checked and pooled with observations received from other people from all over the country, valuable baseline data is generated. Thanks to sightings submitted directly to the Data Centre,

we know that there was an exceptional influx of hummingbird hawk-moth to the south coast in 2017, yet very few Clouded Yellow migrants made the same journey. The more people that document the sighting they make, or who contribute to systematic surveys, the greater the knowledge we have about Ireland's biodiversity.

Of course, organisms don't occur in isolation. Instead their distribution is governed by their environment and how they interact with the multitude of other organisms with which they co-exist. Understanding these interactions or processes requires the pooling of knowledge and resources. The National Biodiversity Data Centre plays its part in providing a national infrastructure that promotes the pooling and sharing of biodiversity data. As a result, data on plant distribution, for example, can be combined with vegetation and landcover data, this can be overlain on soil type and topography, and information on the distribution of bees and hoverflies merged to build up a very detailed picture of species and environmental interactions. This provides us with a glimpse of the hugely complex webs of life or ecosystems. It also allows us to begin to understand how the different elements combine to deliver quality of life supporting ecosystem services, such as nutrient cycling, air purification and pollination. We have begun to do this for the terrestrial



environment but doing this for the marine environment is even more challenging.

Information and knowledge is central to good decision-making. Ensuring that information can get to those that need it is part and parcel of the work of the National Biodiversity Data Centre. Every day, decisions are made by public bodies that impact on biodiversity. The better the data available to inform these decisions, the better the decisions should be, particularly for our inordinately important foreshore and coastal areas. The ambition of the National Biodiversity Data Centre is to build and communicate the evidence for informed decision-making to whomever and however we can, and we can never do enough of this work.

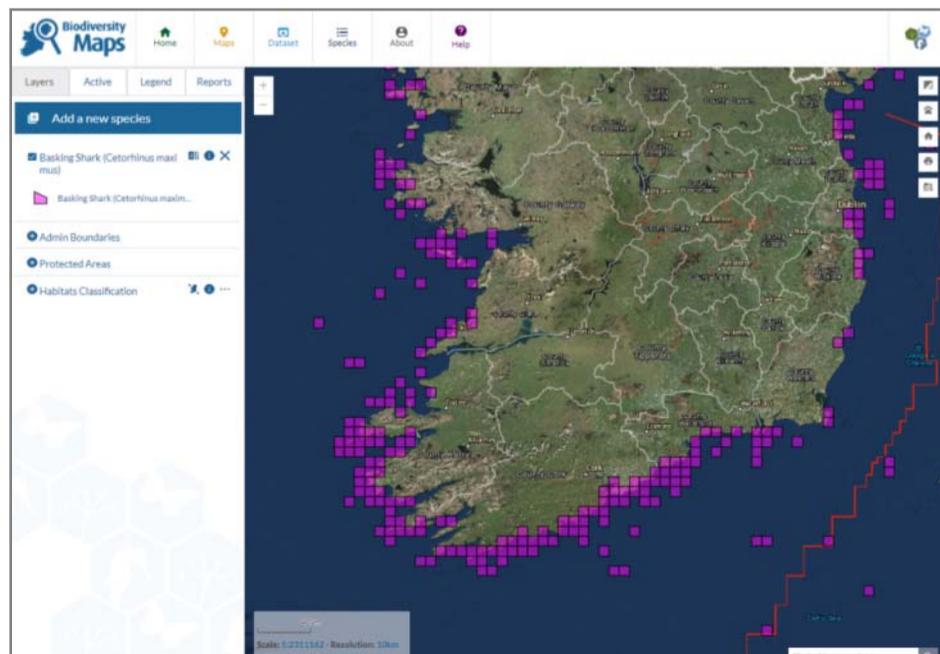
I often say that if one is interested in biodiversity one is never bored. No matter the season, some biodiversity scene or drama is unfolding that can be observed and enjoyed. But the experience and enjoyment provided by biodiversity can be enhanced with more knowledge, and particularly for the marine, special skillsets are needed to communicate these hidden treasures. The Sherkin Island Marine Station has blazed a trail in doing this, and shows how it can be done. The National Biodiversity Data Centre will try to emulate this, in order to build a support base for the conservation of biological diversity across the island of Ireland.

Dr Liam Lysaght, Centre Director, National Biodiversity Data Centre, Beechfield House, Waterford Institute of Technology West Campus, Carriganore, Co. Waterford.

Website: <http://www.biodiversityireland.ie/>

Access Biodiversity Maps:

<https://maps.biodiversityireland.ie/#>



The National Biodiversity Data Centre provides the Information Technology backbone to bring the study of biodiversity firmly into the digital age. Now, at the click of a mouse or the swipe of a screen, thanks to having Biodiversity Maps the online biodiversity data portal, information on knowledge of where species, such as the basking shark has been recorded is accessible to everyone.



Species' distribution data can be combined with other spatial information to begin to understand some of the reason why species occur where they do.

IRELAND'S Biodiversity

Photography by Robbie Murphy



Choughs



Dryad's Saddle



Common Dolphin



Grey Heron



Grey Heron



Dogwhelk feeding on barnacles



Common Blue on Heath-spotted Orchid



Fox and cub



Orb Weaver spider



Common Blue



Lichen



Fin whale



The Lane, Sherkin Island

LESSER SPOTTED DOGFISH

Scyliorhinus canicula (L.) in Irish Waters



Lesser Spotted Dogfish from the Irish Sea (58 cm TL) April 2018



Albino Lesser Spotted Dogfish (Irish Sea, September 2015)

By Declan T. Quigley

THE Lesser Spotted Dogfish (LSD) ranges from SW Iceland and SW Norway southwards to NW Africa (Senegal) and throughout the Mediterranean, and is one of the most abundant species of sharks in Irish and NW European waters. Although LSD occurs in a wide variety of habitats over a broad bathymetric range, from shallow subtidal waters to depths of 1000 m, it is most commonly found in inshore waters at depths of 10-250 m. LSD can acclimatize to relatively low salinities and are occasionally found in estuarine waters. It is a relatively small shark, attaining a maximum total length (TL) and weight of 100 cm and 2.244 kg respectively.

Although the dorsal colouration of LSD is normally sandy brown with small dark brown spots, a number of specimens exhibiting abnormal colouration have been recorded, albeit rarely, from Irish waters, including albinism, leucism, melanism and piebaldism.

Male and female LSD reach maturity at lengths of 52-57 cm and 55-58 cm respectively, with reproduction occurring throughout the year. The oviparous females lay 29-62 egg-cases (commonly referred to as 'mermaid's purses') in shallow coastal waters over a protracted spawning period, mostly between November and July, but peaking during June-July. The juveniles hatch after 5-11 months (mostly 8-9) at an average length c.10 cm. Based on recorded annual growth rates of 1-8 cm, and maximum ages of 12-17 years, LSD appear to be a relatively slow-growing and long-lived shark. Adult LSD are often found in single sex and size groups.

Tagging studies indicate that LSD have relatively small home ranges and that movements are limited, with most recaptures occurring within 30 km of release positions. This suggests that the entire stock in a given area may be composed of a succession of regional stocks. Although LSD are relatively poor swimmers, they are capable of moving at speeds of about 5 km/hour by using selective tidal stream transport, and this may account for their occasional occurrence in the upper reaches of estuaries.

LSD are generalist predators that feed on a wide range of mainly demersal invertebrates and fish. They are also opportunistic scavengers of discarded trawl-caught organisms. Indeed, due to their low commercial value, large quantities of LSD are routinely discarded by fishing vessels, but studies have shown that their survival rate is relatively high. Unknown quantities of LSD are landed, skinned and marketed for human consumption as 'flake', 'rock eel' or 'rock salmon', but most is used as whelk bait. Large numbers of LSD are also caught and generally released by recreational anglers.

Angling for Lesser Spotted Dogfish in Irish Waters

Although LSD often represent an important 'point scorer' in shore-based angling competitions, the species is generally regarded by specialist trophy-hunting anglers as a sluggish pest, with little fighting ability, even when captured on light tackle.

Despite its abundance and widespread distribution in Irish waters, LSD appears to have been neglected as a species worthy of the attention of

specimen hunters. Indeed, it is clear that for many years little was known about the species maximum potential size, and following its establishment in 1955, the *Irish Specimen Fish Committee* (ISFC) initially set an over-ambitious minimum specimen qualifying weight of 7 lbs (3.178 kg) for LSD. Although two specimens, the largest weighing 13 lbs 15 oz (6.327 kg), were recorded from Kinsale during 1959, they were obviously Greater Spotted Dogfish *S. stellaris* (L.) rather than LSD. Nevertheless, this erroneous record was listed in the ISFC's annual reports for the following decade, and although it was finally dropped in 1969, the minimum specimen qualifying weight of 7 lbs was retained for another 7 years before it was eventually reduced by almost 60% to 3 lbs (1.362 kg) in 1976. The dramatic reduction in the specimen weight resulted in an immediate influx of specimen claims from anglers over the following two years; 25 specimens were recorded in 1977 and 65 in 1978 (Figure 1). In an attempt to find a realistic specimen weight, the ISFC increased the minimum qualifying weight to 3.25 lbs (1.474 kg) between 1979 and 1983, increased it again to 3.5 lbs (1.589 kg) between 1984 and 1998, and then reduced it back to 3.25 lbs in 1999. Despite all of the minor adjustments since 1976, there have been significant fluctuations in the annual number of specimens recorded over the last 40 years (1977-2017; N=423). The reasons for these fluctuations are unclear; they may be related to either angling effort, commercial and/or recreational angling over-exploitation of local populations, the discovery of previously unexploited populations, and/or natural cycles of abundance.

The current ISFC LSD record, weighing 1.930 kg, was captured off Valentia, Co Kerry during July 1982. About 45% of the specimens weighted between 1.5 and 1.6 kg, and only 10% weighed >1.7 kg (Figure 2). The average TL of the

specimens was 74.5 cm (range 67.3-84.0 cm; N=72). However, there was a wide range of weights for any given TL ($R^2=0.0273$). The current British LSD record, weighing 2.244 kg, was captured at Abbey Burnfoot, Kirkcudbright (SW Scotland) during 1988.

Although specimens were recorded throughout the year, almost 85% were captured during the summer and autumn, with July, August and September cumulatively accounting for 60% (Figure 3). It is possible that relatively high percentage of summer/autumn specimens may be related to either an inshore spawning migration, and/or a reflection of angling effort.

Although specimens were captured on a wide variety of natural baits, including various types of fish

(mackerel, herring, whiting, coalfish & sandeel), worms (lugworm & ragworm), molluscs (squid & razor clam), and crab, 78% were taken on mackerel baits.

Although specimens were captured from all around the coast (Table 1), over 75% were recorded from counties Cork, Antrim and Kerry, particularly from Courtmacsherry, Co Cork (15.8%), Causeway Coast, Co Antrim (14.7%), Cork Harbour (12.3%), Valentia, Co Kerry (12.3%), and Red Bay, Co Antrim (8.7%).

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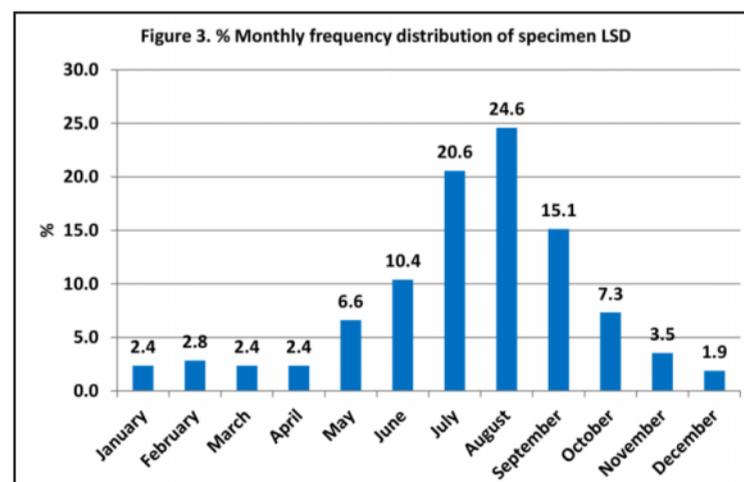
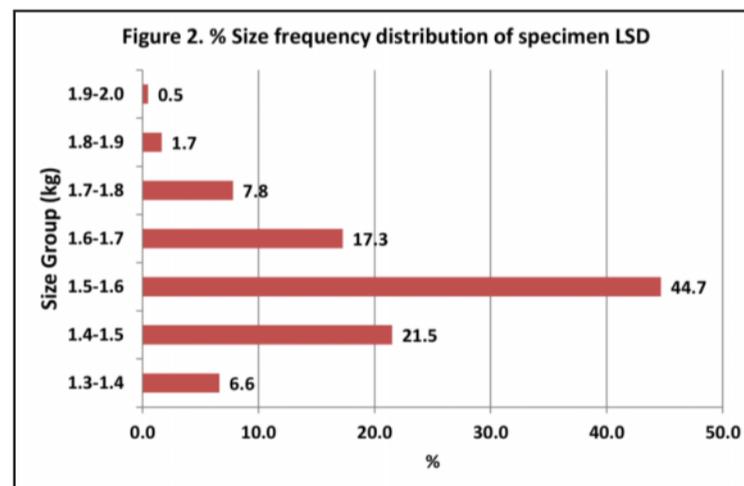
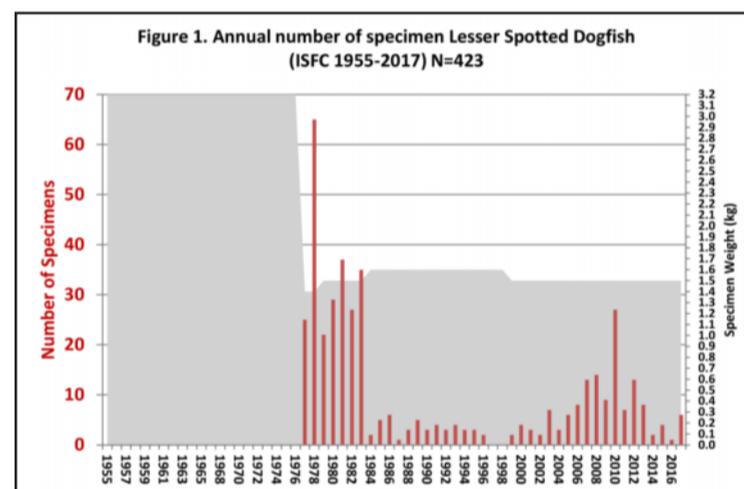


Table 1. Specimen LSD County Distribution

County	Number	%
Cork	137	32.4
Antrim	113	26.7
Kerry	74	17.5
Mayo	18	4.3
Donegal	17	4.0
Down	13	3.1
Wexford	11	2.6
Waterford	10	2.4
Dublin	10	2.4
Wicklow	9	2.1
Sligo	8	1.9
Galway	2	0.5
Clare	1	0.2
Totals	423	100.0

NOT LOST, JUST MOVING

Our Changing Coastlines



Image courtesy of Robbie Murphy

Erosion and accretion together are part of the natural order, as the coast seeks a better balance with the prevailing climate.

By Ian Townend

AS sea levels go up and down so the coast moves back and forth. The evidence of past changes includes cliffs and beaches that were formed at times of higher sea levels and are now inland and the remains of settlements and human infrastructure (such as landing jetties) that are now submerged below the sea. In some places, this is like filling and emptying a bath. The water moves up and down the side of the bath. If the bath has sloping sides you can also see the horizontal as well as vertical movement, where the water touches the side of the bath. When the shore is rocky and can only erode slowly, this is what can be seen on the coast. However, in lots of places the coast is easily eroded, providing sources of mobile sediment that form beaches, dunes and sand banks. In these places, the coast will be adjusting to the changing sea level at the same time as responding to changes that happen much more quickly. In fact, there a multitude of timescales that can affect the coast. Individual waves move sand on the beach (seconds), whereas a storm may move a lot more sediment (hours). Every day the tide will flow back and forth (days) and may lead to the gradual shift of banks and channels. There are usually more storms in the winter and longer swell waves in the summer and this creates seasonal patterns (months), as the beaches are drawn down in the winter (so that they can dissipate wave energy more efficiently) and pushed back up in the summer. As a result, a beach, or tidal flats and marshes, are a natural wave break, with the ability to recover.

This makes them a very good way of making soft coasts resilient to rapid erosion. The natural variability of the climate means that we can get several stormy years followed by quieter periods (years). In some parts of the world this is often linked to global weather patterns such as El Niño. Tides can also vary in size based on the movements of the sun and moon with cycles of approximately 8.8 and 18.6 years being particularly significant in some places (decades).

So, lots of change and where the coast is complex, with features such as inlets, channels, spits and banks, working out how the coast will change is often difficult. Where there is lots of wave or tidal energy, sediment will tend to be moved and the seabed is more likely to be eroded. At the same time, in quiet spots, any sediment that is passing may well be deposited, so that the bed accretes. The coastal system is constantly at work trying to reduce these differences, or gradients, but conditions keep changing so it is never still. However, the system is also very good at making these adjustments and will often adapt to changing conditions in the most efficient way possible, given all the local conditions and constraints. This therefore only becomes a problem when a community, or individual, does not want a particular change to take place because of the other things that are affected (properties, roads, footpaths, etc). Only in this sense is coastal erosion to be seen as negative. Erosion and accretion together are part of the natural order, as the coast seeks a better balance with the prevailing climate.

Can we stop the coast from eroding in places where we do not want it

to? The short answer is yes. Generally, it is possible to introduce some combination of hard and soft defences (structures and sand nourishment) that will prevent or limit the erosion. However, depending on the local circumstances, this may be at significant cost. So, the decision to defend a particular length of coast, or not, is a societal choice.

Traditionally these choices were made locally, as individual communities implemented defences along lengths of coast that were critical to them. However, one of the side effects of preventing the shore from eroding is that this can itself cause

problems elsewhere on the coast. In particular, if there is sediment moving along the coast, defences (or breakwaters for harbours) can interrupt this littoral drift, leading to erosion downdrift of the defended length. For this reason, there has been a move towards more strategic planning in many countries. Often this determines the policy of where should be defended and leaves decisions on just how this should be done to the local community.

Following such a strategic review in the early 90's, the Dutch made the decision to "hold the line" on their open coast. Although the policy has evolved since then, the basic principle remains. Given that half of the Netherlands is below sea level, this is an understandable decision. In contrast, a similar strategic review in the UK led to a more adaptive approach. Four broad options were identified, namely: advance the coast (reclamation), retreat or realign the coast landwards, hold the line, and do nothing.

Hence, in the UK the approach is a mix of national policy and local debate on spending priorities. These are developed and presented through so called Shoreline Management Plans. The first generation saw much of the coast allocated as hold the line. However, as the debate has progressed, there is an increasing acceptance that we cannot protect everywhere at an acceptable economic cost and a process of managed realignment is now more common. In parallel improved understanding of coastal behaviour means that we are also better able to argue the (positive)

case for allowing some lengths of the coast to evolve naturally.

The situation in Ireland remains more fragmented. Where the shoreline is being defended this makes use of locally developed protection schemes, albeit with an increased use of beach nourishment. As yet a strategic approach has not been adopted and there is no specific policy for adaptation to sea level rise. (<https://www.climatechange.gov.ie/ireland/coastal-erosion/>)

Professor Ian Townend, Visiting Professor within Ocean and Earth science and Engineering and Physical Sciences at the University of Southampton, UK.

30 August 2017

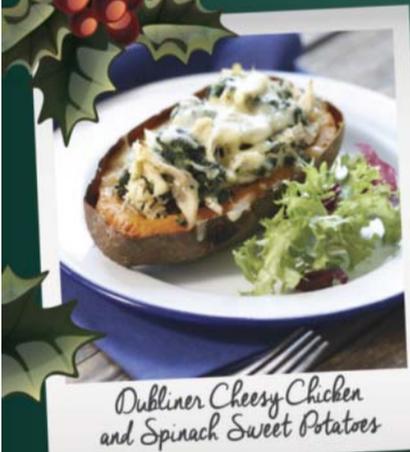
Further background reading:

Niemeyer H D, Beaufort G, Mayerle R, Monbaliu J, Townend I H, Madsen H T, De Vriend H J and Wurpts A, 2016, Socio-economic Impacts—Coastal Protection, In: North Sea Region Climate Change Assessment, Series: Regional Climate Studies, Vol, Bolle H-J, Menenti M and Rasool S (eds), pp. 457-488, Springer Online, Online.

Nicholls R J, Townend I H, Bradbury A P, Ramsbottom D and Day S A, 2013, Planning for long-term coastal change: Experiences from England and Wales. Ocean Engineering, 71, 3-16, doi: 10.1016/j.oceaneng.2013.01.025.

UK Climate Change Risk Assessment:

<https://www.theccc.org.uk/tackling-climate-change/preparing-for-climate-change/uk-climate-change-risk-assessment-2017/>



Dubliner Cheesy Chicken and Spinach Sweet Potatoes

Serves 4

Ingredients:

- 3 sweet potatoes, washed
- 2 chicken fillets
- 4 tbsp olive oil
- Juice from 1 lime
- 4 garlic cloves, crushed
- 1 tsp cumin
- 1 tsp chilli flakes
- Salt and black pepper
- 150g frozen spinach, thawed
- 120g Dubliner Vintage Cheese, grated

Method:

1. Preheat the oven to 180°C/160°C/gas mark 4.
2. Prick each sweet potato a few times with a fork. Place them on a baking tray and bake for an hour, or until tender. When ready, cut them in half and allow to cool.
3. When the potatoes are halfway through cooking, place the chicken fillets in a baking dish. Rub them with olive oil and season with salt and pepper. Add them to the oven for 30 minutes or until fully cooked, then use two forks to shred them. Cover with tin foil and set aside.
4. In a small bowl, combine the olive oil, lime juice, garlic, cumin, chilli flakes, salt and pepper. Set aside.
5. Put the spinach in a strainer and use clean hands to squeeze out all the excess water.
6. Turn the oven up to 200°C/180°C/gas mark 6. Use a spoon to scoop out the flesh of the sweet potatoes, leaving a ½cm layer intact so that the skins keep their shape.
7. In a bowl, mix the spinach, chicken, the lime and garlic oil and two-thirds of the Dubliner Cheese. Stuff the sweet potato skins with the chicken mixture. Top them with the remaining Dubliner Cheese and bake for 15 minutes or until the cheese has melted and the skins are hot and crisp. Serve with a green salad.




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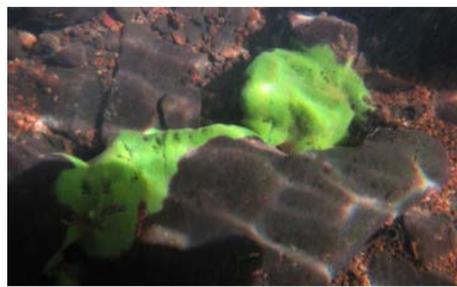

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IRELAND'S STREAMS, RIVERS AND LAKES: a world of wonder and discovery awaits!

By Hugh Feeley

HOW many times have you passed a stream, river or lake and considered what lies beneath? I have been lucky enough to have spent the past ten years or so involved in both research and monitoring and assessment of Irish freshwaters. This work has taken me to all four corners of the island and every day is different. Over my career I have been lucky enough to encounter a vast array of amazing life ranging from algae, fungi and plants to invertebrates and fish. One example is the remarkable aquatic plants found in Ireland's freshwaters known scientifically as *Utricularia*, or commonly as bladderworts. These are carnivorous plants relatively common in Irish lakes, feeding mainly on *Daphnia*, a small planktonic animal, using sophisticated mechanical bladder-like traps which take only a split second to activate. Another remarkable group is the freshwater sponges. These are widespread in Ireland and using their complex structure, provide a safe place for the algae to grow (hence the green colour) and, in turn, the algae processes sunlight into energy and provides food to the sponge.

A vast array of invertebrate life inhabits our waterways and many amaze me every time I encounter them. One such animal, the freshwater pearl mussel (known scientifically as *Margaritifera margaritifera*), has a unique and complex life cycle. Their young live as tiny lar-



vae parasitize passing trout or salmon and only become shelled adults after 7 to 15 years, in several complicated steps I won't elaborate on. They exhibit a trait known as 'negligible senescence' or more simply a lack of aging, with individuals known to live for up to 130 years, making them one of the longest-lived invertebrates in the world, and Ireland's longest living animal. They are found in many clean, low-nutrient, fast-flowing, well-oxygenated, gravelly rivers and are currently estimated to occur in approximately 160 rivers, and a hand-



Left (top): Freshwater sponge;
Left (bottom): Freshwater pearl mussel;
Above: The Killarney Lakes from Lady's View;
Right: The immature stage of the mayfly *Ecdyonurus* species.



ful of associated lakes, throughout the country. They grow extremely slowly as adults and feed by inhaling water through siphons which filter out tiny organic particles. Unfortunately, the freshwater pearl mussel is a highly threatened species, categorised as critically endangered in Ireland, with 90% of all freshwater pearl mussels having died out across Europe during the twentieth century.

Of the invertebrates found in our freshwaters it is the insects that grab my attention. My interest in the stonefly (or Plecoptera) is well known but I always love finding and learning about other groups such as the mayflies, caddisflies, dragonflies and damselflies, amongst others, too. These insects, often short-lived as adults, inhabit nearly all lakes, rivers and streams in every corner of the island and come in a variety of shapes and sizes. This diversity, however, is a result of millions of years of evolution and adaptation to their environment. Probably the most amazing features of aquatic insects is their transition from immature larval stage to the reproductive adult stage. This transformation, and movement from water to land, is triggered by a combination of temperature, morphological development and genetics, which allows insects to not only reproduce successfully but to also spread to new waterways and expand their range.

Regardless of whether you are interested in, or even care about, the wonderful life that makes their home in our lakes, rivers and streams, it sometimes behoves one to step back and just admire the beauty of our landscapes, which is only enhanced by the presence of healthy freshwaters. Whether it is the beautiful view of the Killarney lakes from Lady's View in the heart of Killarney National Park or an old bridge crossing a meandering river we are surrounded by an array of history and cultural heritage, a sense of place, a sense of wonder, and even a sense of home, which are vital to the satisfaction felt by society but is often taken for granted. Nevertheless, this, I believe, is what drives our interest and quest for knowledge of the nature within, and the eagerness of some of us to preserve our wildlife and ecosystems for the experience they provide us and for their protection for future generations.

Unfortunately, I write this article in the context of change. Every year the threat grows from invasive species being introduced to our freshwaters, endangering our native species and the natural balance which makes our rivers and lakes thrive. More recently disease has threatened our native and protected white-clawed crayfish. Similarly, the dramatic loss of our pristine waters since the 1980s as highlighted by the latest EPA Water Quality Report is alarming and needs urgent attention. As human activities, such as nutrient enrichment, pesticides and fine sedimentation, continue to put pressures on our freshwaters the health and wellbeing of our environment is at stake. Their protection, restoration and enhancement is not something that should only be the responsibility of the Government, its agencies and the European Union but the responsibility of every member of society, as we all benefit.

Next time you walk long a lake shore, stand on a bridge overlooking a river, or jump from stone to stone to cross a babbling brook just stop and think of what life lurks below or just enjoy the beauty and tranquillity waterways provide us.

A version of this article was originally published in the Spring 2018 EPA Catchments Newsletter <https://www.catchments.ie/catchments-newsletter/>

Dr Hugh Feeley is a freshwater ecologist who recently joined the ecological monitoring team at the EPA. Hugh has over ten years' experience studying and assessing Irish freshwaters and recently authored the book 'The Stonefly (Plecoptera) of Ireland'. Currently, he is involved in assessing the ecological quality of Ireland's freshwaters and you may find him splashing about in a river or lake near you soon!

Cara Partners wish continued
success to Matt and his team at
Sherkin Island Marine Station

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By Tony O'Mahony

IN past decades and centuries, many Irish children – especially country children – could readily name their local wildflowers, and often had a knowledge of which species were edible, had medicinal properties, or were poisonous. Moreover, many primary schools kept dried wildflower specimens (pressed between the pages of a large album), which acted as a memory aid and identification guide for the children. Yet, in this modern era of ever-increasing scientific knowledge, it is an ironic fact of life that each succeeding generation of the human race, appears to have less interest in, or knowledge of, the wildflowers of their neighbourhood, county or country – despite the ready availability of a wide range of wildflower identification books. The timing of this situation is all the more tragic, as it coincides with the current, rapid elimination of wildflower habitats throughout the world, as a consequence of modern-day intensive and inimical farming practises, and the uncontrolled spread of cities and towns. Thankfully, on the island of Ireland at the present time, the general public are at last becoming aware of the loss of our precious, irreplaceable wildlife heritage, and belated efforts are now being made by city councils and county councils countrywide, to provide access to nature for the pleasure and education of our people.

Ballincollig Regional Park

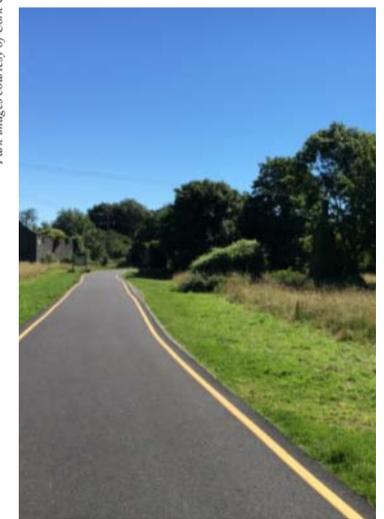
Within County Cork, no better example of an eminently accessible wildlife facility comes to mind, than that of Ballincollig Regional Park – a magnificent public amenity that includes a car-parking facility, and which is maintained by Cork County Council. Situated approximately 12 km by road, to the west of Cork City, this expansive, beautiful site, borders the right bank of the River Lee, immediately downriver of Inniscarra Bridge. The park contains a wide range of wildlife habitats and wildflowers, in addition to a playground area for children and teenagers. The wildflower display in the park (which contains some three hundred different types of plant), extends from February to September, although the spring season can occasionally be quite backward, as a consequence of poor weather conditions – just as we experienced in spring of 2018.

Wildflower Habitats within the Park

From a wildlife standpoint, Ballincollig Regional Park was at its most biologically diverse and magnificent, in the 1970s, when the mill-channels were full of water, and some ponds were also present, while the pristine river-meadows held populations of purple-flowered marsh orchids (*Dactylorhiza* genus) and the distinctive green flowers of Hairy Lady's-mantle (*Alchemilla filicaulis* ssp. *vestita*) – a plant that has drastically declined throughout Co. Cork over the past 30-40 years, as a consequence of the wholesale replacement

Ballincollig Regional Park

A Conservation Site for Wildflowers in Co Cork



of native flower-rich meadows, with commercial monocultures of Perennial Rye-grass (*Lolium perenne*) cultivars. Damage to the nearby River Lee weir in the interim period (which has drastically reduced the water-feed to the channels), has led to the loss of the ponds, while the water-level in the channels is now little more than a trickle. Hopefully, this lamentable situation will be remedied in the near future, thus dynamically contributing to the restoration, revitalisation and diversity of wetland wildflower habitats, and its attendant wildlife, within the park.

Woodland-type Habitats

These occur on the fringes of the water-channels throughout the park, especially at its eastern end within the old gunpowder mill complex. Here, in spring, the attractive mauve flowers of Herb Robert (*Geranium robertianum*), and glistering yellow blooms of Lesser Celandine (*Ficaria verna*), are a joyous spectacle, and a welcome and vital source of pollen and nectar for visiting insects in these early months of the year.

Also present, are occasional populations of Goldilocks Buttercup (*Ranunculus auricomus*) – a very local plant of lime-rich woodlands in County Cork. Scattered throughout the park in May, are stands of Bluebell (*Hyacinthoides non-scripta*) forming a visually stunning, violet-blue haze; their pendulous, tubular flowers emitting an exquisite heady perfume, which is detectable from a distance.

Wetland Habitats

The deep hollows within the gunpowder mill complex, almost always retain some standing water, and thus provide a habitat for a wide range of water-loving plant species. Of these,

one of the earliest-flowering and most spectacular visually, is the yellow-flowered Marsh Marigold (*Caltha palustris*), accompanied by drifts of Cuckoo Flower (*Cardamine pratensis*), whose four, pink or white petals, are arranged in the shape of the letter X. Occasionally encountered within the park, is the tall Wood Club-rush (*Scirpus sylvaticus*), a plant of very rare occurrence in the province of Munster. This attractive species was originally found here by the author in the 1990s, with updates for its park sites in 2006. Damp grassland supports stands of the stately Great Willowherb (*Epilobium hirsutum*) and of the exquisitely-scented Meadowsweet (*Filipendula ulmaria*), whose frothy, cream-coloured flowerheads, fancifully resemble Spanish galleons! The left (southern) bank of the River Lee, provides a home for other regionally rare plant species, such as Yellow Loosestrife (*Lysimachia vulgaris*) and Crow Garlic (*Allium vineale*) – this latter wild onion, most easily detected in March, when its subtubular, hollow, blue-green, gracefully arched leaves, catch the eye of the experienced botanist.

Dry, Neutral Grasslands

Dry, neutral grasslands are ever-receding habitats. Within the park, they are home to a wide range of plant species, such as the attractive Oxeye Daisy (*Leucanthemum vulgare*) and a suite of wild rose species (*Rosa* genus), their petal-colour varying from white to deep-pink. The numerous yellow stamens of our wild roses, provide a copious feed of protein-rich pollen, for visiting bee species.

Tony O'Mahony, 6 Glenthorn Way,
Dublin Hill, Cork.

From top (clockwise): Ballincollig Regional Park is a magnificent public amenity; The park has beautiful woodland and riverside walks; Smooth pathways within the park make it accessible to many; The Great Willowherb (*Epilobium hirsutum*); Lesser Celandine (*Ficaria verna*); Herb Robert (*Geranium robertianum*); Bluebell (*Hyacinthoides non-scripta*).



By Anthony Toole

“YOU walk along the sand,” said Dan, “I’ll take the top of the shingle. Look for any pieces of dead bird, wings, whole carcasses, anything.”

I was accompanying Dan Turner, a resident of North Shields, on one of his monthly Beached Bird Surveys of a mile-long stretch of Druridge Bay on the Northumberland coast. As we progressed, we came across fragments of herring gull, black-headed gull, curlew, cormorant, razorbill, guillemot, gannet and a few others too decayed to recognise. On his previous visits, Dan had clipped the wings of birds he had found to avoid recording them a second time. After an hour’s slow walk, we found perhaps a dozen specimens, some of which Dan stowed into his rucksack, before we retraced our steps along the beach.

He also filled a bag with pieces of plastic washed up with the seaweed and bird carcasses, many of them remnants of fishing lines. Though the birds had probably died of natural causes, their connection with the plastic was not

SEA BIRDS & PLASTIC

on the North Sea Coast

entirely irrelevant, for the Beached Bird Survey is an offshoot of a much larger endeavour.

The ‘Save the North Sea’ fulmar project was the brainchild of Dr Jan van Franker, a marine biologist at Wageningen University in the Netherlands. He devised it in 1982 as a way to monitor plastic pollution in this small patch of the global ocean. Initially, it was envisaged as a three-year research topic, but has developed into an ongoing survey, involving all the countries with coastlines on the North Sea. By 2002, only a gap along the coast of north-east England and southern Scotland remained to be covered, and it was an advert for a volunteer to manage this stretch of coast that brought Dan Turner into the project.

As Dan explained to me, “The reason fulmars are used is that they feed almost exclusively at sea, so any plastic particles found in their stomachs are most likely to have been floating in the sea, or to have been ingested by the fish upon which the fulmars prey. Other seabirds frequently forage on land, so plastic in their stomachs could have come from anywhere.”

This is not to say that other seabirds are of no interest. Dan attended his first workshop in the Netherlands in 2003, where he met Martin Heubeck, who had begun a Beached Bird Survey in Orkney and Shetland in the late 1970s, to investigate the effects the burgeoning North Sea oil industry might have on the birds. Prompted by this meeting, Dan set up a North-East England Beached Bird Survey. Advertising to get more people involved, brought in 25 volunteers, 12 of whom attended the first local group meeting, in March 2018, held at North Shields, at the mouth of the River Tyne.

After an initial training session, in which they are accompanied on a survey, and shown what to look for, each volunteer is allocated a short stretch of the Northumberland or Durham coast, which they visit approximately once each month. They will fill in a form, recording any dead birds they find and collecting any carcasses that could usefully be dissected. Photographs may be taken to assist in the identification and aging of birds, where necessary.

Dan collects whole bird carcasses, which he stores in freezers at his home. “At present,” he told me, “I have puffins, guillemots, razorbills, kittiwakes, 30 little auks, 9 shags and 3 gannets.” When he has the time, he brings these to Newcastle University’s Dove Marine Laboratory at Cullercoats, where he dissects them and prepares samples for further study.

He invited me to join him at one of his sessions at the laboratory, where he was assisted by Bethany Telford and Katherine Monaghan, two Conservation Science undergraduates from Cumbria University. Dan brought with him three fulmar carcasses that they were going to study over the next six hours. He measured the beak, head, wing and tail feather length and examined the condition of the birds, their sex and ages before dissecting them to obtain samples of liver, intestines, breast muscle and stomach. The data were recorded by Bethany, while Katherine stored the tissue samples in foil bags, which she then put into labelled plastic bags. The stomachs would be re-frozen and brought to Wageningen on Dan’s next visit, where their contents would be analysed to see what plastic fragments they contained. The other tissues would also be re-frozen and stored to be analysed at Newcastle University for possible pollutants.

Dan showed me a small sample bottle that contained around thirty tiny pieces of plastic of various shapes and colours. “This,” he said, “is an example of what can be found in the stomach of a fulmar. A typical count would consist of more than 40 pieces, weighing a total of around 0.35 grams. At present, 60% of seabirds have more than 0.1 gram, and 90% of fulmars have at least one piece of plastic in their stomachs.”

“Much of the plastic consists of broken down pieces of discarded waste, bottles, bags, toys etc., though at least two or three in each stomach are industrial granules, which are the raw materials of the plastics industry. These are found in all the world’s oceans, and attract pollutants onto their surfaces, which may be absorbed into birds’ tissues. During the 1980s, there were more industrial granules and less finished plastics. Now, the numbers are reversed.”

He showed me a bag containing more than two dozen plastic bottle tops. “This would be

the equivalent in plastic if it were found in a human stomach.”

To finance his work, Dan has received grants from the Natural History Society of Northumbria and the Northumberland and Tyneside Bird Club, which have been used for taxidermy on the undamaged carcasses, while his former employer, British Airways, has paid for freezers in which to store the specimens. Dove Marine Laboratory provides dissection facilities and a freezer for use with the fulmar project.

To communicate the results of his research, he publishes an annual report on the Beached Bird Survey in the Transactions of the Natural History Society of Northumbria, and a newsletter for the members of his group. He also gives talks about his work and more general lectures about the seabirds of the north-east coast, at which he displays examples of some of the birds he has collected.

Plastics are a major product of the Organic Chemicals Industry, and have brought us many benefits. Unfortunately, in our wasteful, ‘throw-away’ society, many of them end up in the environment, where they cannot decay naturally, but will persist for centuries. As was highlighted by David Attenborough in his Blue Planet 2 television series, they have now become a major pollutant in even the most remote reaches of all the oceans. The North Sea makes up only a tiny fraction of the oceans, so the Fulmar Project, and the work of Dan Turner and his colleagues may be relatively small, but it is through such determined steps that we will clear the planet of this insidious form of pollution.

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Dan Turner photographing bird remain while on a beach survey, Druridge Bay.



Remains of kittiwake.

Images courtesy of Anthony Toole



Fulmars for dissection, Dove Marine Laboratory.



Plastic waste in seaweed.



Bethany, Dan and Katherine begin the dissection.



Plastic from a fulmar's stomach with human equivalent.



Display of North Sea birds.



Image courtesy of Robbie Murphy

Forestry Statistics Ireland 2017

The Department of Agriculture, Food and the Marine is responsible for ensuring the development of forestry within Ireland. It recently published a very comprehensive report on the state of Forestry in Ireland, entitled "Forest Statistics – Ireland 2017". Here we summarize some of the main point of the report.

IN 2012 the National Forest Inventory (NFI) estimated that the area of forest was 731,650 hectares or 10.5% of the total land area of Ireland, excluding inland water bodies. Of the total forested area, 653,980 ha comprises areas occupied by trees or potentially occupied by trees, while permanently unstocked open area within the forest (roads, ridelines, powerlines, etc..) comprise 77,670 ha. Conifers account for 68.6%, broadleaves 17.5% and mixed forests 13.9% of the stocked area.

Sitka spruce is the most common species, occupying 52.4% of the forest area. It has proven to be one of the most productive conifers in Ireland and as such has become the mainstay in Roundwood processing. The proportion of broadleaf afforestation significantly increased after 1993, and up to the present, comprising 23% of all afforestation since that year. Tree diseases such as *Phytophthora ramorum* (mainly larch) and *Chalara fraxinea* (ash) may influence species diversity into the future. For example, the finding of *Phytophthora ramorum* in Japanese larch in 2010, led to its withdrawal from the afforestation programme and the fungal disease *Chalara fraxinea*, found in ash in 2012, resulted in the cessation of grant aid for this species.

There are three main forest ownership categories:

- **Public:** all state owned forests - mainly by Coillte;
- **Private** (in receipt of grant/premium since 1980);
- **Private** (not in receipt of grant-aid post 1980).

With the introduction of the first Forestry Act in 1928, a previous decline of forest area was largely

halted. However afforestation levels remained relatively low right up until the 1950s. The level of state afforestation dramatically increased from the 1950s up to 2000, after which state planting declined to a negligible level. One critical factor was the decision by the European Commission in August 1999 that Coillte Teoranta was not entitled to receive annual [non-farmer] forest premiums. The European Court of Justice (ECJ) subsequently upheld this decision. In the 10 years from 1990 to 1999, 43% of all afforestation was on Coillte land. As a result, Coillte reviewed its planting programme and has not engaged in afforestation to any appreciable extent since the ECJ decision. In 2016, 7,831 ha of public lands were reforested.

The Forest Stewardship Council has certified the management of the Coillte estate, which comprises 54% of the national forest estate. Certification has mainly been issued for public forests up to now. Currently, only about 6,500 ha. of private forest is certified.

Farmers and non-farmers were planting, on average, equal amounts of forest throughout the 80s and up to the early 90s. A feature of the period was the higher average forest parcel size planted by nonfarmer investors (15 ha), compared to an average of 5 ha for farmers. From 1993 up to the present day farmer planting has dominated afforestation.

The category 'Non farmers' includes landowners who in general are not actively farming; this category includes retired farmers, sons and daughters of farmers or other relatives who might have inherited land but who have careers outside of farming and this category also includes other landowners who may have recently bought the land Farmers accounted for 83% of private lands afforested between 1980 and 2016.

In the Afforestation Grant and Premium Scheme (2014 - 2020) changes were implemented to the differentiation of Farmers and Non-farmers in terms of grant and premium pay-

ments. Farmers and Non-farmers are now eligible for the same rate of grant and premium payments. The result of this change has seen the participation of non-farmers increase to 35% of the area afforested in 2016, which is the highest level since 1995 (15%). The average forest parcel size for non-farmers has increased from 3.6 ha in 2014 to 6.6 ha in 2016, bringing the size in line with average farmer forest parcel size.

Some 79% of owners have planted one forest, accounting for 146,452 ha., however it has been common for forest owners to afforest more than one forest. The age profile of forest owners is increasing. In 2006, 28% of the area afforested was by people aged 60 years or more. In 2016, this has increased to 47%. The gender of forest owners shows 84% are male and 16% female.

Forest roads enhance the economic viability of forests primarily by improving access for harvesting. In addition, forest roads also provide roundwood stacking, drying and chipping areas. Apart from economic enhancement, forest roads also improve the environmental and biodiversity value of forests by increasing edge effects, improve access to deal with fire and allow for better health and safety by providing access for emergency vehicles. Since 1944, on average 131 km of forest roads have been built annually in public forests. Between 2007 and 2016 on average of 90km private grant aided roads were built annually.

The total Roundwood harvest (including firewood) in 2016 was 3.36 million cubic metres, the highest level since records began. 85% of this came from Coillte lands. The share of private sector Roundwood for processing has increased from 7.6% in 2006 to 16.6% in 2016. The total forecast of net realisable volume production for the 2016-2035 period is estimated as being 107.8 million m³ overbark (the volume before the bark is removed). In value terms Ireland was exporting 124% sawn timber in 2015 than in 2008 mainly to the UK. In 2016, 34% of the Roundwood harvested was used for energy generation, mainly within the forest products sector. The national forest estate is an important carbon reservoir, amounting to 381 million tonnes of carbon in 2012, an increase from 348 million tonnes in 2006.

Firewood use in Ireland between 2006 and 2016 from both State and private forests has grown by 60% from 147,000 m³ in 2006 to 237,000 m³ in 2016.

In 2010 direct and induced employment supported by the forest sector was estimated to be 5,530 persons. While in the wood processing sector direct and induced employ-

ment was estimated to be 6,410 persons. An approximation of the full economic value of the forest sector in 2012 is €2.3 billion.

The importance of the public forests for recreation is mentioned. At the present time there are 150 recreation sites and 11 forest parks in forests throughout the country. In addition to providing recreation sites such picnic areas and trails, Coillte has an open forest policy that allows free public access to its 445,000 ha estate. The National Parks and Wildlife Services (NPWS) provide access to its national parks and nature reserve. Also urban forests owned by county council's on local communities are quite intensively used being close to population centre. The number of visits to Irish forests were:

Number of visits to Irish forest 1999, 2004 and 2005

Year	Number of forest visits
1999	8,500,000
2004	11,000,000
2005	18,000,000

Since 1993 nearly €2.2 billion has been expended by the state and European Union on afforestation and other measures for the forest section. In 2016, 103.8 million was spent on forest activities including afforestation grants, maintenance grants, annual premium payments and grants

for forest roading infrastructure. Expenditure in 2016 slightly decreased by €0.2 million on the previous year.

Forest cover in Ireland, at 10.5% in 2012 is one of the lowest in the EU where the average is 33.5%; Worldwide forest cover is 30.6%. Public forest ownership in Ireland at 54% is close to the EU average of 59%. Due to afforestation, the proportion of privately owned forest is increasing in Ireland.

Annual Roundwood harvest at 2.7 million m³ in 2010 compares with an EU average of 18.9 million m³ in the same year. Fellings represented at 47% of annual increment in 2010, which is below the EU average of 59%, which is a reflection of the relatively young age of Ireland's forests in comparison to the rest of Europe.

According to the State of Europe's Forests 2015 report, since 1990 Spain has had the greatest expansion of forests at 184,000 ha per year, France at 102,000 ha per year and Turkey at 93,000 ha per year. The annual rate of change, expressed as a percentage of total forest area is highest for Iceland (4.6%), Ireland (2.0%) and Spain (1.2%) for the period 1990-2015.

The full report "Forest Statistics - Ireland 2017" can be downloaded from the Department of Agriculture, Food and the Marine website: <https://www.agriculture.gov.ie/forests/forests-service-general-information/foreststatisticsandmapping/annual-forest-sector-statistics/>

POCKET-SIZED NATURE GUIDES FOR BEGINNERS

A Beginner's Guide to Ireland's Wild Flowers

showing colour photographs of each flower is available for €8.50 (including p&p within Ireland)

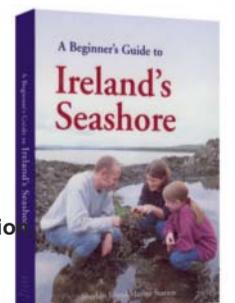
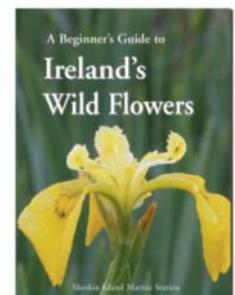
and

A Beginner's Guide to Ireland's Seashore

showing colour photographs of each animal or seaweed, is available for €8.00 (including p&p within Ireland)

Both books have 204 pages.

They can be purchased from:
**Matt Murphy, Sherkin Island Marine Station
Sherkin Island, Co Cork.**
Website: www.sherkinmarine.ie
Email: sherkinmarine@eircom.net



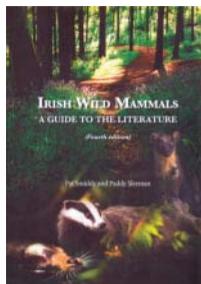
Payment can be arranged via Paypal by sending an email to sherkinmarine@eircom.net

Irish Wild Mammals: A Guide to the Literature (4th Edition)

By Pat Smiddy and Paddy Sleeman

ISBN: 978-1-906642-88-4

Price: €35.00/2016



This guide to the literature for Irish Wild Mammals is an important reference for both professionals and amateurs interested in Ireland's wild mammals. The first edition was published

in 1972 by Prof. James Fairley and listed 970 scientific journals, papers and books, published reports and higher degree thesis. The present guide, which is the 4th Edition, shows a rapid increase in publications since then, with over 3,200 references. The publications are listed alphabetically by author and each publication is given a reference number. At the back of the book is a useful index for each mammal, directing the reader to the relevant paper and its reference number. It is surprising that some animals have few references, even over the period of 100 years plus. One wonders is it from a lack of interest by funding agencies or perhaps the lack of job opportunities for graduates? A few mammals are the exception: badgers, deer, marine mammals, otters and foxes. Even then there is a need for a greater understanding of the research needed.

As can be seen from the list of references in the guide, the authors themselves have made a major contribution to mammal research in Ireland - Paddy Sleeman since 1979 and Pat Smiddy since 1983 - and have established a wonderful reputation with regard to Ireland's wildlife. It is a vital reference for anyone involved with work at all levels on Ireland's Wild Life mammals. Highly recommended.

The Oceans - A Deep History

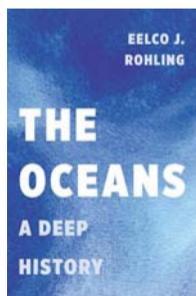
Eelco J Rohling

Princeton University Press

<https://press.princeton.edu/>

ISBN 978-0-691-16891-3

£34.93/2017



This refreshing book tells the 4.5 billion year history of our planet from the perspective of the interdependent chemistry of the oceans and atmosphere, emphasising the roles of oxygen, methane, carbon

dioxide and carbonate minerals. The most important ingredient in this mix, despite its minuscule atmospheric concentration, is carbon dioxide, the fluctuations of which have had a sometimes catastrophic effect on life's development. The book describes how these have played a crucial role in every major event in the planet's history, from 'snowball Earth', through the Ediacaran and Cambrian explosions of life, the mass extinctions and subsequent recoveries up to the recent ice ages.

While the basic chemistry of carbon dioxide is relatively simple, it is complicated by how it is physically transported through the air and water, its reactions with rocks and living creatures and the feedback mechanisms that upset the equilibria. A non-chemist might struggle in places, but the author admits that he also has difficulties with this and does not labour it beyond the necessary minimum.

Publications of Interest



Inevitably, a parallel is drawn with the present increase in atmospheric carbon dioxide. Similar rises that occurred during the mass extinction events took place over thousands, even millions of years rather than the two hundred since the Industrial Revolution. The End-Permian event saw an extinction rate of 150 species per year, while the present, human-induced rate stands at an estimated 10 per day. Recovery from that most devastating of all extinctions took several million years. We cannot hope that Nature alone will clean up our mess fast enough. We need to "stop delaying essential action through endless debate, negotiation and senseless attempts at sowing doubt against a veritable tide of evidence."

This very accessible book is yet another timely piece of ammunition against those who persistently deny the obvious.

by Anthony Toole

Management Guidelines for Ireland's Native Woodlands

John R. Cross & Kevin D. Collins

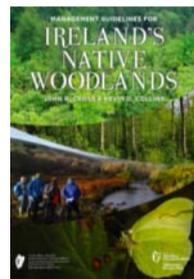
National Parks & Wildlife Service and Forest Service

ISBN: 978-1-902696-78-2

Available free online at:

<https://www.npws.ie/content/publications/management-guidelines-irelands-native-woodlands-2017>

2017



The National Parks and Wildlife Service (NPWS) and the Forest Service have produced an attractive and practical manual with guidelines for the management of Ireland's native woodlands. The manual is divided into four parts.

- Part A: An Overview of Ireland's Native Woodlands. This covers the characteristics of Ireland's Native Woodlands and Planning and Management.
- Part B: General Management Guidelines. This includes management guidelines for area, species, natural regeneration, invasive species, afforestation, amenity and interpretation.
- Part C: Management Guidelines for Native Woodland Types. This covers the woodland types of oak, ash, alder, birch, hazel, yew, willow and alluvial.
- Part D: Appendices. This includes a species list, native woodland classification, systems, references and an excellent glossary.

The country has 637,133 hectares of forest, comprised of 15.8% of native species. Although native woodlands occur throughout Ireland there is a concentration in upland area of Wicklow, Waterford, West Cork, South Kerry and in parts of Clare, Galway and the midland cutaway bogs. Ireland has only 30 species of native trees and shrubs and the NPWS recognise four principal woodland types: oak - woodrush; ash - ivy; alder - meadowsweet; birch - purple moor-grass. The nomenclature is derived from the dominant tree and herbaceous species. These have been further subdivided into 22 subtypes.

This manual is an A to Z for anyone interested in Ireland's native woodlands, from landowners who wish to enhance the

quality of their woodland to those interested in growing our native species. It is a superb manual and in producing this publication, the authors John Cross and Kevin Collins have made a major contribution to Ireland's Nature Woodlands.

Catchments Newsletter

Issue 7: Winter 2017

Download free from:

www.catchments.ie/catchments-newsletter/



The latest newsletter has many interesting articles on Catchment Management around Ireland. A photograph of the clean-up of the River Camac in Clondalkin by local community groups show 35 rubbish.

Supermarket trollies shows the appalling lack of environmental case in our waterways - an article in What is Catchment Science - the study of the connections and relationship between the physical landscape ecosystems and human activities with a water catchment. An interesting article on the "Nore Vision" project led by Kilkenny Leader Portmershe, which seeks to harness the wide and existing efforts of established River Nore Catchment initiatives and to knit these into an over-arching catchment-wide vision and ensuring action plan. A page article includes creating a vision for Dundalk Bay River, which is an important area for shellfish, wetland birds and a range of marine and coastal habitats - the vision items include protect and improve the water quality of our rivers, lakes and coastal waters, habitats and biodiversity of our aquatic ecosystems. Sustainable recreation and tourism along our waterways and loughs that provides benefits for the community, environment and local economy. These are but the tip of the iceberg of excellent articles and news in this important publication. It is online at .

There are two important articles of the farming community - "Smart farming addressing the dual challenges of improving farm returns while enhancing the rural environment and "Farming Guidelines Actions to help Pollinators".

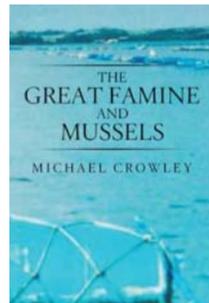
The Great Famine and Mussels

By Michael Crowley

www.Xlibrispublishing.co.uk

ISBN: 978-1-5434-8660-5 (HB)

Price: £13.99/2017



The author devoted over 25 years of his professional career to the study and culture of mussels in Ireland. His pioneering work in this field led to the development of the Irish mussel farming industry. Reflecting on the Great Famine (1845-49), the author believes that if the people of Ireland at that time had known about mussel-farming and the abundant supply of this high-

protein food source, starvation, disease and death could have been greatly alleviated, if not totally averted. With this in mind, he believes that "in the event of some future famine or global food shortage, the humble mussel could prove to be the ideal, cheap, plentiful, protein-rich food source to help mitigate the dire consequences of such a scenario."

The author wants to educate the reader about the potential of the mussel. He outlines in layman's language its life cycle and other characteristics, as well as discussing the best areas to grow mussels at sufficient depth for the suspended mussel sets.

The author and his wife Mary organised three mussel seminars in Ireland, which he believes to have been the first in the world. This chapter makes very interesting reading. He chose Leenane, Co. Galway as the first venue as he had initiated some successful preliminary suspended mussel culture and the area appeared to him to have great mussel-growing potential. Experts from Holland, the UK, Italy and the USA came to deliver lectures and one hundred and fifty potential Irish mussel farmers attended. The other seminars, at Tralee and Bantry - two other sites that had mussel-growing potential - proved to be as successful as the first. These three seminars more than anything else contributed to the success of mussel farming in Ireland as many mussel experts contributed greatly to the potential of mussel farming in Ireland.

Today 15,500 tonnes are grown annually in Ireland, mostly for exported, and the industry is valued at €21 million and employs 375 people.

Irish Specimen Fish 2017

Available for free download at

www.irish-trophy-fish.com

The Irish Specimen Fish Committee (ISFC) in 2017 processed 422 claims, of which 382 were ratified, including one new record. This was a Golden Grey Mullet caught by Ian Mulligan from Dublin, at Rosscarbery, Co. Cork, weighing 1.29 kg (2.8 lbs). The species included 7 freshwater and 29 marine fish, of which over 50% were ratified for 5 species. Carp had 38, with all but one was caught at The Lough in Cork; Spur Dogfish 50, Golden Mullet 25, Thick Lipped Mullet 33 and Smooth Hound 62.

A young Cork girl, Amy O'Brien, having caught the heaviest specimen of Thick-Lipped Mullet, was awarded the Dr AEJ Went Award for the Young Specimen Angler of the Year. She also caught two other specimens of the same fish.

The Best International Fish Award was awarded to Eric Van Dijk, from The Netherlands, for his Greater Spotted Dogfish at Kenmare Bay, Co. Kerry.

Special awards are made to anglers for cumulative specimen fish captures of 10 species, 20 species, 10 specimens or 50 specimens. In 2017, the 50 Specimens Award went to Patrick Lombard from Dunmore, Clonakilty, Co Cork, who caught the specimens between 2008 and 2017 and to Jerry O'Connor from Tonevane, Tralee, Co. Kerry, who caught his between 2009 and 2017.

It is interesting to read in the Irish Records for fish that a number of records stand over 100 years. Freshwater species include the heaviest salmon, which was caught in 1874, weighing 57 lbs and a Brown Trout caught in 1894, weighing 26 lbs 2 oz. In Marine species, a Pollack caught in 1904 weighed 19 lbs 3 ozs and a Common Skate, weighing 221 lbs was caught in 1913.

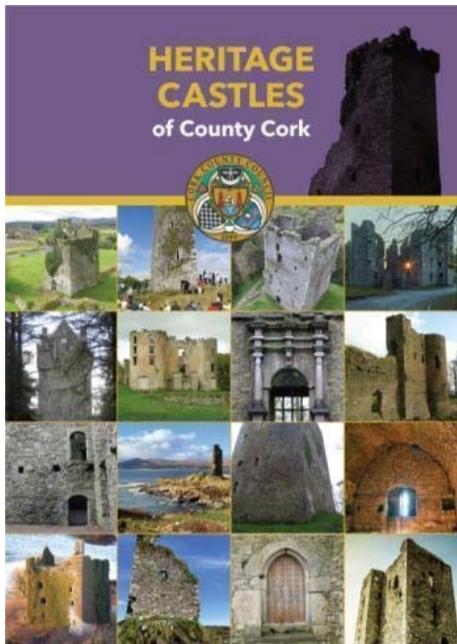
The chairman of ISFC Dr. Robert Rosell, in his review for 2017 had a sobering message: "Put straight unless the broad collective of stakeholders provide further support now and most particularly secure ongoing arrangements, there is only a cash reserve for perhaps three years life left in ISFC. The on-line donation facility at the ISFC website facilities fuss-free donations and the Committee requests your support". In the financial balance sheets only a few hundred euro was donated. To me it seems that the stakeholders such as angling clubs, hoteliers and Failte Ireland need to be more involved in helping the ISFC fund this publication and purchase of awards etc.. The volunteer committee that verify, record and publicise the capture of large (i.e. specimen) fish caught on rod and line by anglers, play an important part in tourism in Ireland.

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Sherkin Comment



www.sherkinmarine.ie/sherkincomment.htm

Heritage Castles of County Cork



A review by Matt Murphy

This is the fifth in Cork County Council's Heritage of County Cork Series. The publication tells the stories of the County's castles, the family names that are synonymous with their structures and also informs us as to what life in the County during Medieval Times was like, both within and outside Castle walls.

In the introduction, we are asked what is a castle and how do we define it? One widely-accepted definition of the castle is "a fortified residence which might combine administrative and judicial functions, but in which military considerations were paramount". It goes on to say however, that as we understand it today the word castle is generally understood to be a particular building or group of buildings which once formed the fortified residence of a lord or noble. In discussing castles we are told modern archaeologists and historians have divided castles into four categories – Earthwork castles, Anglo-Norman masonry castles, Tower houses and Fortified houses. Three chapters in the book are dedicated to these structures. Cork



Top left: Buttevant castle south façade. Bottom left: Togher castle from the northwest, showing its well-preserved bartizan. Right: Ballincollig Castle at a recent Heritage Event.

County was densely castellated with a total of 346 castle sites recorded. Of these 184 are identifiable in the field and a further 162 are known from early maps and other documentary sources but have not survived.

The aim of this heritage book is to provide the reader with a broad understanding of the wide range of castle types which are found in Cork County. How castles would have featured in society and the landscape, who would have built the castles and why cas-



cellent descriptions and photographs of the building, with an ordinance survey map of the area.

The history of the Anglo-Norman Castle at Kilbolane in North Cork is interesting. When the Lord of Kilbolane, Gerard de Prendergast, died around 1250 without a male heir, Kilbolane Castle passed to his daughter Maud. As marriage was often used to create and solidify strategic alliances, under the instruction of King Henry III, Maud was married off immediately to Maurice de Rochford though she was only ten years old.

Conna Castle probably built in the mid 16th century is an excellent example of a Cork Tower House. It is perched high on a rock overlooking the River Bride close to the village of Conna in East Cork. It was built by a branch of the Fitzgeralds.

Kilcoe Castle in Roaringwater Bay is featured. It was restored by the famous actor Jeremy Irons in recent times but is not open to the public.

Another building recently restored for private use is Monkstown Castle in Cork Harbour, which was built by the Archdeacon family in 1636 - a long established merchant family.

The final chapter documents various other castles in the county, which were not included in the exemplar list. Images, both exterior and interior, include castles such as Belvelly, Ballyclough, Ballyhooley, Carrignamuck and Castlemagner. This chapter also gives the reader information on where they can learn more about Heritage castles in County Cork, such as the Cork Archaeological Survey (1982-2009), who carried out a comprehensive survey of castles within the County of Cork. Some of the files can be viewed on the Cork County library. Another source of information is Cork County Council's own heritage website www.corkcoco.ie/arts-heritage. This book is highly recommended and an important and valuable addition to the Heritage Series of County Cork.

Heritage Castles of County Cork, Heritage Unit of Cork County Council, ISBN: 978-0-9935969-3-3

Free to download from:

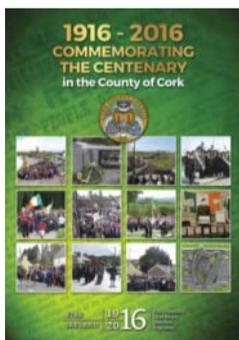
<https://www.corkcoco.ie/arts-heritage/publications-documents-links>

Price: €14.00 / 2017

(Available for purchase at:

<http://skibbheritage.com/shop/>)

1916-2016: Commemorating the centenary in the County of Cork



Compiled and edited by Conor Nelligan, Cork County Council 'Ireland 1916' County Coordinator

<https://www.corkcoco.ie/arts-heritage/publications-documents-links>

ISBN: 978-0-9525869-1-3

2016, a centenary year in the county, saw a year-long undertaking by Cork County Council and the people of County Cork of commemorating the defining year of 1916, reflecting on the past one hundred years and looking to the future of Ireland with pride.

In February 2015, at the behest of Minister Heather Humphries TD, an 'Ireland 1916' coordinator was appointed by each local authority in the country. Soon after, the elected members of Cork County Council agreed to the setting up of an all-party 1916 commemorative committee. In the working document the committee "set out that events and initiatives should aspire to be community driven, creative, inspiring and respectful and engage of all ages".

Four open workshops were held at four locations for anyone interested in participating in delivering Cork County's local programmes as part of Ireland 2016. Numerous ideas were suggested, including exhibitions, museums, legacy of the Rising, local stories about 1916 leaders, important roles of women in

1916, local history stories gathered by children in schools, re-enactment of various marches, such as the march from Macroom to Banna Strand to meet with Casement, and school tours to sites involved with 1916.

The Department of Arts, Heritage and Regional, Rural and Gaeltacht Affairs introduced a 1916 Centenary Funding Scheme with the aim of providing financial assistance to groups, organisations and individuals that were getting involved in the 1916 initiative in their own community. The successful applicants were included in the official County Cork Centenary Commemorative programme, as were a range of other events and projects put forward by the groups who had not applied for funding under the Scheme. The resulted programme consisted of 565 events and initiatives organised by 235 groups which surpassed anywhere else in Ireland.

The majority of this book documents these events and initiatives. With so many superb events organised by communities through the county, I found it an almost impossible task to pick just a few to mention here:

- The Dunmanway Knitters knitted a 6 foot long replica of the GPO (Dublin) in wool to mark the centenary.
- The ship "Aud" featured in a number of projects. For example, the Muskerry Local Historical Society organised a talk about its sinking in 1916.
- A re-enactment of a march by the Beara Volunteers from Eyeries, Co Cork to Lauragh, Co Kerry. The Volunteers were to

assist in the distribution of the German rifles from the "Aud", a plan which never came to fruition.

- The anchor from the "Aud", which was scuttled in Cork Harbour on 22 April 1916, was, for the very first time, put on display in Cobh.
- A celebration of life in 1916 undertaken by the National School Rathcoole Co Cork.
- Carriganima Easter Sunday 1916 Commemoration included the recreating of the dramatic oration of Padraig Pearse, which was delivered from "the eggstore" to the local volunteers in 1915.
- Wreath laying at the Pearse altar at the Parish Church in Clonakilty.
- A talk organised by Blarney and District Historical Society highlighting the extraordinary women of Cumann na mban in 1916.
- Castlelyons Commemoration Committee held a number of events commemorating Thomas Kent, one of the those executed in 1916.
- The long awaited new Independence Museum Kilmurry was officially opened on Sunday 21st August 2016 by Uachtarán Michael D. Higgins.

This book is a marvellous record of the 1916 celebrations in the County of Cork during the centenary year and an important record for future generations.

JUNIOR PAGES



Black John the Bogus Pirate

The Ocean is Largely Unexplored

The Sixth Principle of Ocean Literacy tells us that the Ocean is largely unexplored. This is because the deep sea is one of the most hostile environments for humans on our planet due to the enormous pressure of the surrounding water at depth, the lack of breathable oxygen and the effects of storms, currents and waves. Here's Smithy - our resident shipwright and inventor - to tell you all about it ...

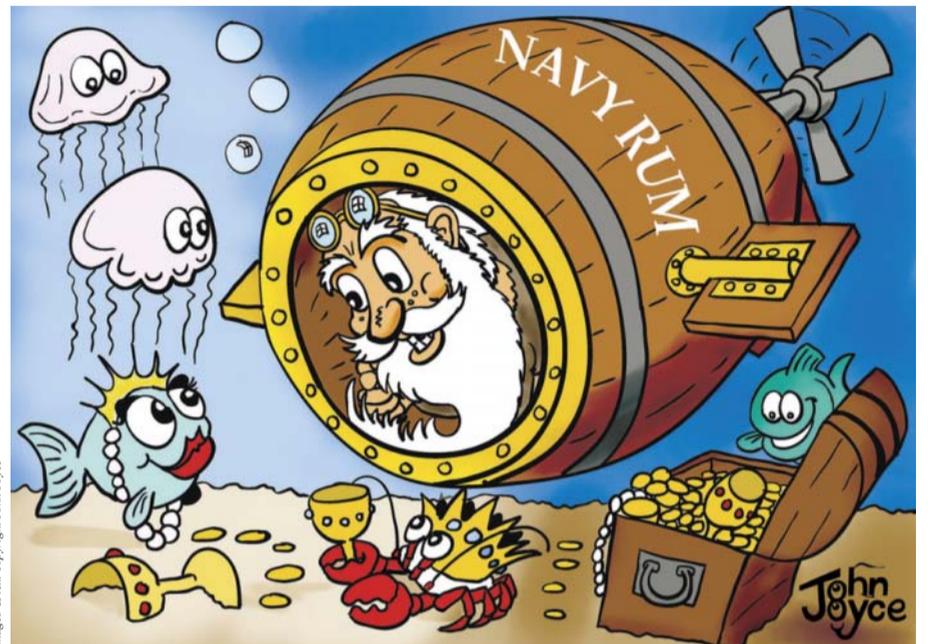
New technologies, such as Remotely Operated Vehicles (ROVs), underwater mapping systems using sound waves, and advances in satellite imaging systems have now replaced the old 'lead line' method of charting the depths.

In the past, this problem was overcome by pumping high pressure air down to the diver with a hand pump. But in 1942 the French naval officer Jacques-Yves Cousteau adapted a special valve invented by Emile Gagnan of the Air Liquide company to create the 'Aqualung' – a device capable of changing the pressure of compressed air from a metal tank worn by a diver to that of the surrounding water. This 'Self-Contained Underwater Breathing Apparatus' or SCUBA, allows divers to free themselves of any connection with the surface and to freely explore the underwater world.

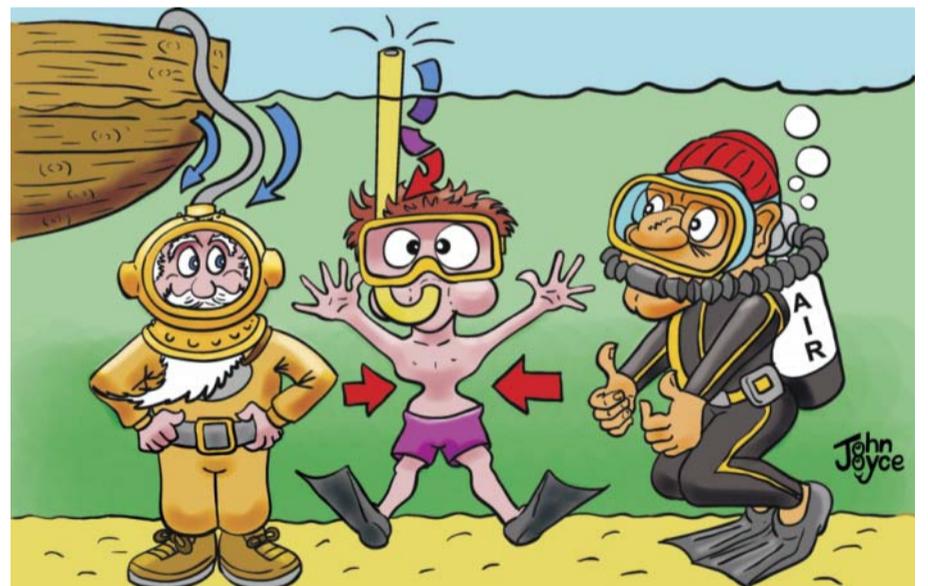


Under the United Nations Convention of the Law of the Sea (UNCLOS), Ireland has sovereign rights to explore and develop the natural resources in this vast area, which is nine times the size of the land mass of Ireland itself.

In 1999, the Irish National Seabed Survey set out to map Ireland's 220 million acres (880,000 square kilometres) of underwater territory using sound waves. This project, which later evolved into the INFOMAR project, was a joint venture between Ireland's Marine Institute and the Geological Survey of Ireland.



In the year 322 BC Alexander the Great is said to have employed divers to destroy underwater defences around the city of Tyre and even to have been lowered into the depths himself in a glass diving bell. Since then underwater vehicles called 'submarines' have been developed, both as instruments for peaceful exploration and salvage, as well as weapons of war. But if we want to leave the confines of a submarine and swim freely under the sea, we must find a way of taking an air supply with us, since we do not possess gills and cannot take oxygen directly from the water as fish and other marine animals do.



In shallow water, this can be done with a simple snorkel to suck air down from the surface. But, as we go deeper, the weight of the water above us creates pressure all over our bodies. This squeezes our lungs so hard as to make it impossible to suck in air from the surface.

One danger of breathing normal air at high pressure however, is that the nitrogen it contains starts to have a similar effect to alcohol, creating a drunken condition known as 'rapture of the deep'. To overcome this, divers going beyond 30 metres depth for long periods breathe a mixture of oxygen and the inert gas helium. This protects them from 'rapture of the deep' but gives their speech a high pitched 'Donald Duck' effect.

USEFUL LINKS: Alexander the Great - <http://www.mlahanas.de/Greeks/UnderWater.htm> Pressure - <http://pmel.noaa.gov/eoi/nemo1998/education/pressure.html>
 Irish National Seabed Survey - <http://www.marine.ie/Home/site-area/irelands-marine-resource/real-map-ireland>
 Check out the Principles of Ocean Literacy at <http://oceanliteracy.wp2.coexploration.org/>
 Follow Black John the Bogus Pirate and his crew on Facebook at <https://www.facebook.com/BlackJohntheBogusPirate/>

LIFEJACKETS & Personal Flotation Devices



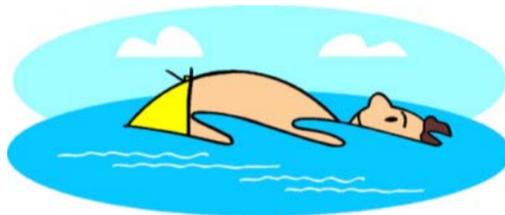
It is really important to wear personal buoyancy or a lifejacket when afloat or if your activity takes you near the water. You must ensure that it is the correct size, properly fastened and that you understand how to operate it. Wearing an appropriate personal flotation device can give you extra time for the search and rescue services to find and rescue you.

What is a personal flotation device (PFD)?

This is a generic term used to describe lifejackets and buoyancy aids. The main difference between lifejackets and buoyancy aids is that a lifejacket is designed to turn an unconscious person face up on entering the water. A buoyancy aid is not guaranteed to do this and is as the name describes, an aid to keeping you afloat.

Buoyancy of Lifejackets

Buoyancy is measured in Newtons – 10 Newtons equals 1kg of flotation. There are 4 European standards for personal flotation devices, which must all carry the CE mark:



1. 50 Newtons buoyancy aids are only for use by swimmers in sheltered waters when help is close at hand. They are not guaranteed to turn a person from a facedown position in the water.



2. The 100 Newton buoyancy aid is for those who may still have to wait for rescue but are likely to be in sheltered and calm water.



3. The 150 Newton lifejacket is for general offshore and rough weather use where a high standard of performance is required.



4. The 275 Newton lifejacket is primarily for offshore and extreme conditions and those wearing heavy protective clothing.

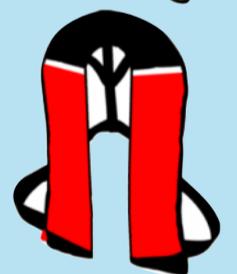


5. IMO / SOLAS approved lifejackets are generally used for abandoning ship and are not intended for everyday use as they are generally bulky.

What is the right PFD for you?

The most suitable type for you will depend on the type of activity and the distance you are likely to be from the shore:

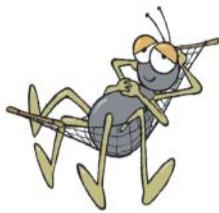
- Foam-only personal flotation devices provide buoyancy at all times. They may be bulky, but in addition to providing buoyancy, they often provide additional protection against wind and cold.
- Air-only lifejackets are likely to be the most compact and comfortable and may be automatically inflated on entering the water or inflated manually or orally. Spare gas cylinders and automatic inflation mechanisms should be carried. It is recommended that all personal flotation devices are fitted with a whistle, light and retro-reflective strips and should have under-leg straps. Under-leg strap is a very important feature especially for children to ensure a secure fit and prevent child from slipping out of the PFD.
- For some sports such as jet skiing, water skiing, dinghy sailing, windsurfing and canoeing, specialised personal flotation devices are available which are specifically designed to suit these sports.



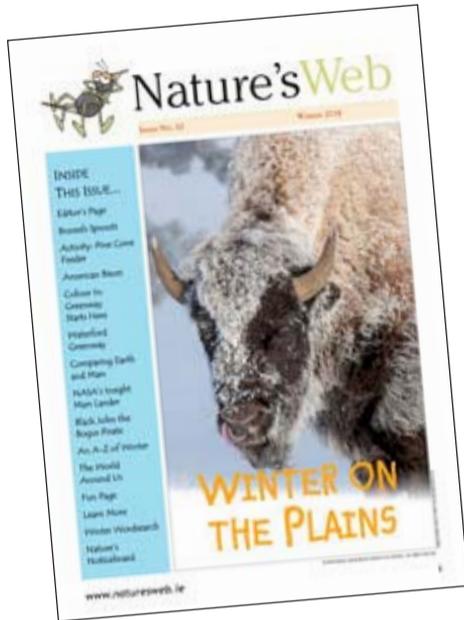
Care for your PFD

You should have your PFD serviced in accordance with the manufacturer's recommendations. On a regular basis, you should check for wear and tear, and wash it out with fresh water to remove salt and allow to dry. Remember to disarm any automatic inflation first to avoid accidental inflation.

Information provided by **Irish Water Safety**, Long Walk, Galway, Ireland. For further information on all aspects of water safety, visit their website: www.iws.ie



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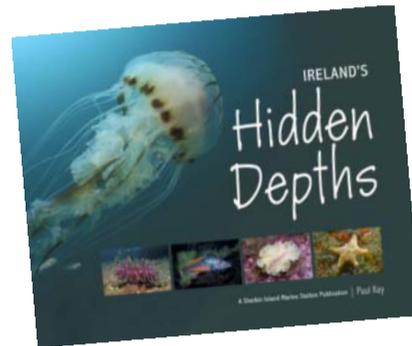
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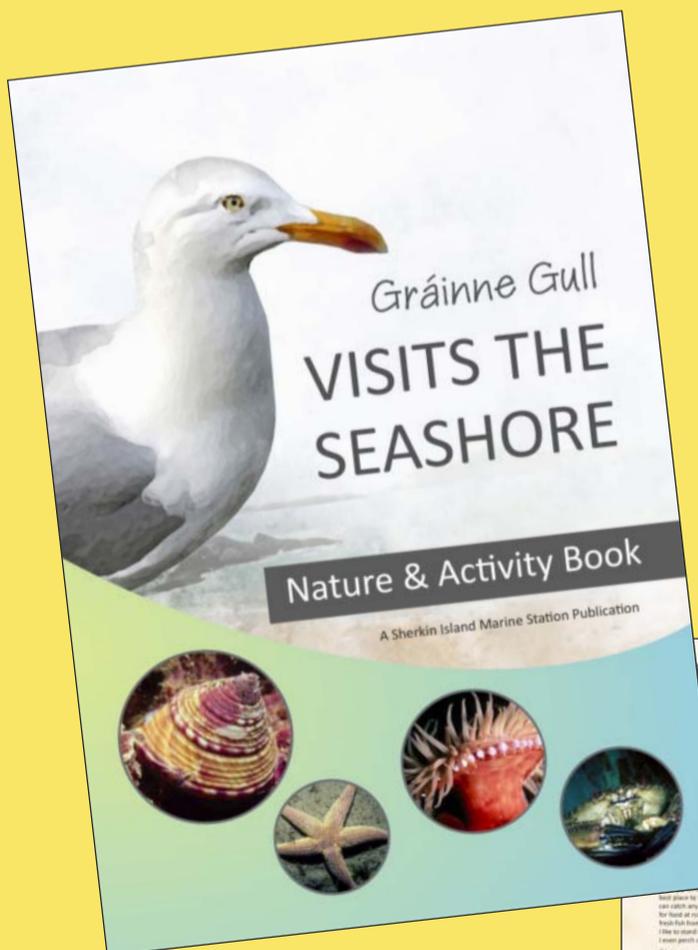
ANSWERS TO "A to Z of Meteorology" page 31: 1=Jet Stream; 2=Front; 3=Snow; 4=Observation; 5=XYZ; 6=Atmosphere; 7=Dangerous Weather; 8=Lightning; 9=Evaporation; 10=Rainbow; 11=Ultraviolet; 12=Pressure; 13=Nimbus; 14=Ice; 15=Cloud; 16=Gale; 17=Khamasin; 18=Temperature; 19=Mercury; 20=Humidity; 21=Burning Sun; 22=Quality Forecasts; 23=Wind.

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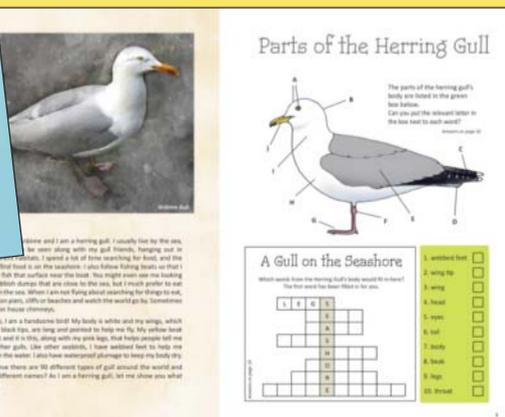
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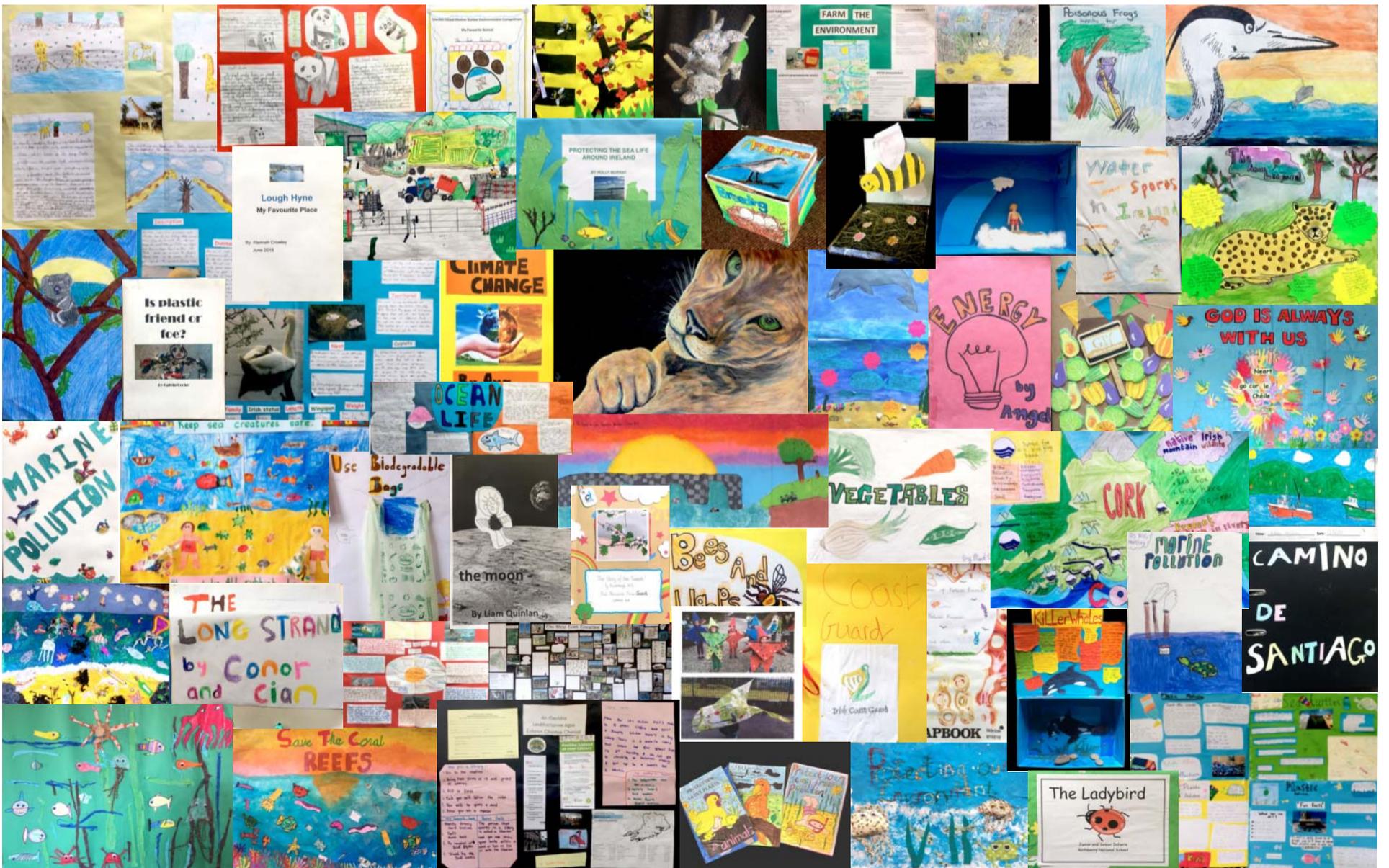
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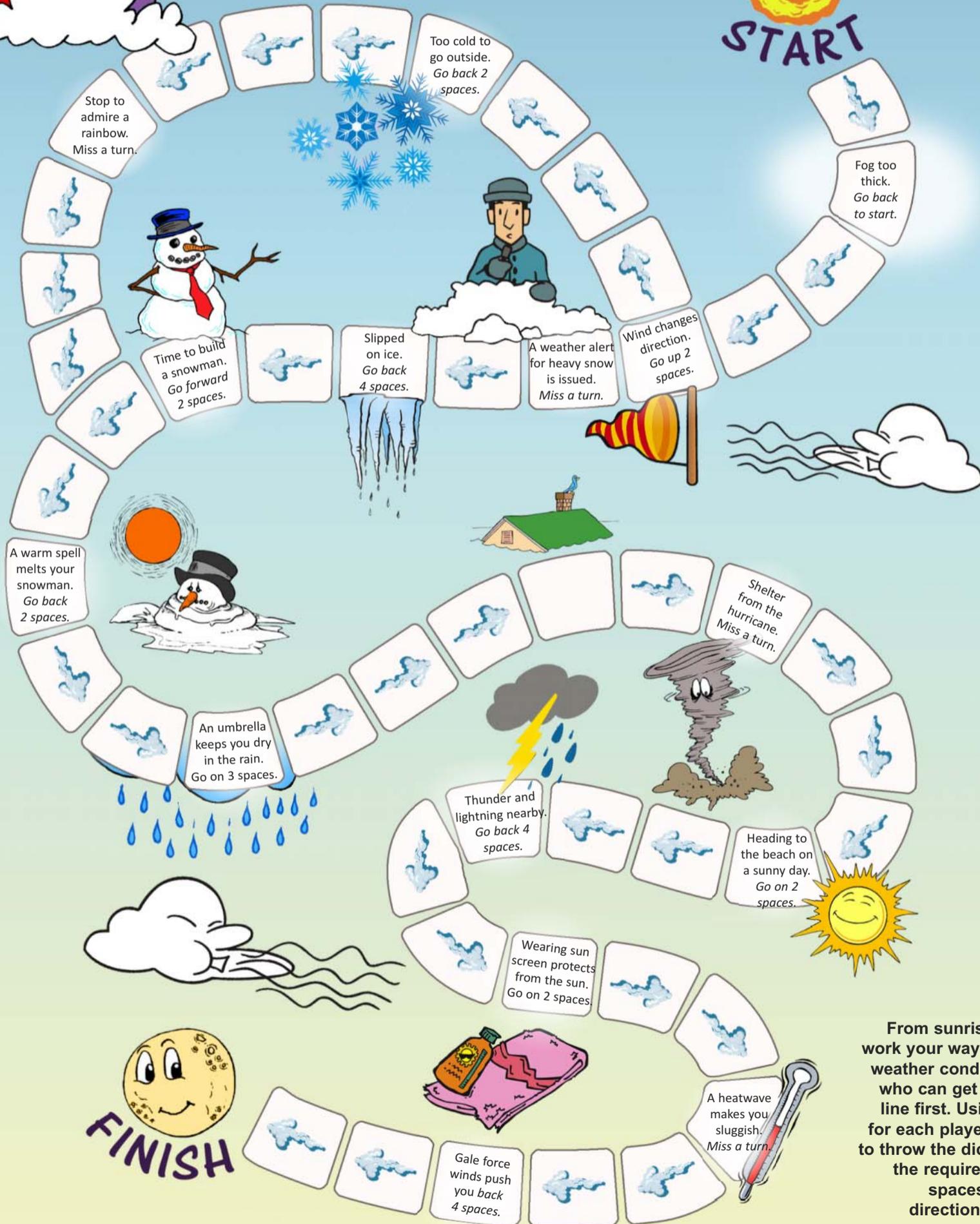
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From sunrise to sunset, work your way through the weather conditions to see who can get to the finish line first. Using a marker for each player, take turns to throw the dice and move the required number of spaces. Follow the directions as you go.

A to Z of Meteorology



In the column on the left is an A to Z list of words relating to Meteorology. From the descriptions on the right, can you match the correct description with each word? Place the correct number in blank box next to the word. (Information is courtesy of Met Éireann www.met.ie) Answers on page 28.

	A tmosphere
	B urning sun
	C loud
	D angerous weather
	E vaporation
	F ront
	G ale
	H umidity
	I ce
	J et stream
	K hamsin
	L ightning
	M ercury
	N imbus
	O bservation
	P ressure
	Q uality Forecasts
	R ainbow
	S now
	T emperature
	U ltraViolet
	W ind
	XYZ... is up to you!

1. An air stream blowing from west to east, which has important effects on the formation of weather fronts.
2. The invisible line between a cold air mass and a warm air mass.
3. Ice crystals that fall from clouds. On cold days they remain frozen until they touch the ground.
4. How we look at the sky and keep a watchful eye on the changing weather.
5. Three letters that you must find words for yourself!
6. A blanket of air surrounding Earth
7. Examples of this are floods, thunderstorms, ice and gales.
8. This is caused by electrically charged cumulonimbus clouds.
9. When water is turned into vapour by the heat of the sun.
10. An effect that is made up of 7 colours and seen in the sky around the time of a sun shower.
11. Be careful to wear plenty of sun protection on warm days to protect your skin from these rays.
12. Similar to the weight of the air above us. Cool air is heavier than warm air.
13. The Latin word for rain. It also describes a certain cloud group from which rain is falling i.e. cumulonimbus.
14. Frozen water. The freezing point of water is 0°C.
15. A visible body of fine water droplets or ice particles suspended in the atmosphere.
16. When the wind speed is very strong and dangerous.
17. The name of a dry dusty hot wind blowing over the Red Sea from the Sahara Desert.
18. The degree of hotness or coldness of something. Celsius and Fahrenheit scales are used when measuring temperature.
19. A substance found in thermometers.
20. The amount of water vapour in the air. When this is high it is known as a muggy day.
21. An object which is a million times greater in size than the Earth. It is our main source of heat and light.
22. These are issued by Met Éireann to the public.
23. A noticeable movement of air in a particular direction.

Pacific Salmon Population Stories

By Mike Ludwig

THERE is little doubt that the Pacific Salmon population is increasing and there are a number of stories floating around about why. The stories use Global Climate Change, enhanced habitat, Mother Nature, reproduction improvements and hatchery successes to lay claim to the changes. At their core is the fact that there are increasing numbers of some Pacific Salmon species using the Pacific Ocean as their open ocean home. And, there are a number of reasonable explanations for the improvement. However, there remains a number of concerns about those increases, what they could mean and they all merit some specific consideration before a sigh of successful fishery restoration relief is released. At the top of my list of concerns are just which of the Pacific salmon species are experiencing the increases and are they the species that merit the improvement? There are eight species of Pacific Ocean Salmon species compared to the single species called the Atlantic Salmon. The eight Pacific species are the Cherry, Cutthroat, Pink, Sockeye, Coho, Chum, Chinook and, Steelhead. While the number of species is different between the two oceans, the problems associated with salmon man-

agement in general are pretty similar. The Pink, Coho, and Chum are on the top of the population list because of abundance, distribution or just biomass. The Cutthroat and Steelhead have very high species diversity because of their lifestyle of travelling deep into river systems to spawn and are closer to the population bottom. Sockeye have greatest market value while Chinook grow to be the largest but have low abundance. The Cherry Salmon is typically found in the western Pacific off Japan and northward, not in the US or Canada. Each of the species has special adaptations that cause the individual fish to seek the waters in which it was hatched. This individualization (or species "strain") is a critical component of a species wellbeing as they derive much of the population "strength" from that species' strain diversity.

Clearly, commercial fishermen want species that grow fast, are easy to catch, and commercially valuable. In that regard the Pink or Chum salmon is the hatchery favourite. Unfortunately, those objectives don't appear to fully consider the nature of Pacific Salmon and how the fish interact with their environment. Resource Managers are looking for a "balanced indigenous population" for successful management. Researchers

report that one-third of Alaska's 2010 harvest was of salmon from five hatcheries in the Prince William Sound and Copper River watersheds. The problem being created by the use of hatchery reared salmon is the loss of species diversity found in the various strains. Typically it takes only two successful egg hatchings to sustain a population of the strain needed so, survival success is very small. By taking only a couple of salmon from one area and growing their eggs to a size that are ready for the open ocean the other, less successful members of their own species risk extinction by reduction of the gene pool.

These issues are further complicated by the unknown factor of how many salmon can the ocean support? As the open-ocean feeding grounds become more crowded with salmon seeking a meal but the availability of smaller fish, krill, and other prey items continues to remain steady or decline the problem of "carrying capacity" appears to be growing worse. Proof of this carrying capacity stress is found in the immediate benefits to salmon reported from the iron sulfate project. Typically the open ocean is low in nutrients and so food is in short supply. Dispersing a 120 tons of iron sulfate caused a significant but only temporary increase in organic growth of



Sockeye Salmon, *Oncorhynchus nerka* – seven groups of sockeye salmon have been identified in the Pacific Northwest.

prey items but virtually all the salmon species landings increased. But as in most things, the dumping has created conflicts and complaints. The largest obstacle is the fact that the dumping violated the International Ocean Dumping Act. Intended to restrict the dumping of wastes at sea, iron sulfate falls into that restricted category.

But these Habitat Enhancements can improve the overall environment for individuals in the open ocean. These are invaluable because they may not influence species diversity. However, enhancements can alter the abundance of one group (stock) over another and modifies species diversity becoming a cause for concern. So, while improving plankton (prey items) availability by

dumping iron sulfate in the ocean appears to benefit all salmon in the area, interspecies competition can cause further declines of species that are already in threatened or endangered status.

Adding to this competition dilemma is the increasing use of hatcheries. Taking the spawn from just a few individuals effects the availability of species diversity by changing survival ratios. The question has been raised more often as more and more salmon are hatchery reared and survival is influenced. While it seems difficult to believe, hatchery reared salmon have more than doubled the number of salmon swimming in the North Pacific in the last fifty years. In the years between 1970 and the late 1980s the US, Canada

and their coastal neighbours have increased hatchery releases from about 500 million to more than 5 billion (yes, 5 BILLION!). This increase has caused a number of Fishery Biologists to express the concern that the carrying capacity of the whole Northern Pacific may be exceeded. The evidence is that a number of species are not growing as large as they once did. This size reduction adds further strain to the populations by causing returning fish to lack the mass needed to successfully reach their native spawning grounds and produce the same numbers of offspring.

Mike Ludwig, Fishery Ecologist, retired.

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