

# SHERKIN COMMENT

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**Island of Ireland Precipitation Series 1850–2010**  
*Séamus Walsh explains the importance of such long-term high quality observations.* 5

**The Miniature World of Lichens**  
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## The Smaller Islands of Roaringwater Bay

View of Badger Island and  
Cape Clear from Sherkin Island.  
*Photograph: Robbie Murphy*

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## Editorial

# Custodians of the environment

By Matt Murphy

RECENTLY I read the book "Something's Rising – Appalachians Fighting Mountain Top Removal" by Silas House and Jason Howard. They write about the coal industry's destroying entire mountains for a relatively thin seam of coal. Giant machines pushed dirt, rocks and trees into the valleys below, destroying streams, wildlife and above all the lives of people. In the book, the authors' interview ten people who live, work and raise families in Central Appalachia. When I read about the devastation caused there by corporate America, it reminded me of a 19th century letter we published in our first *Sherkin Comment*. Chief Seathl of the Suquamish tribe in the State of Washington dictated the letter to the President of the United States of America in 1855. In it he pleads for the white man to be Good Stewards of the land they took from the people. I often read his letter, which I am reprinting again here, and am still in awe of what he wrote 160 years ago.

Chief Seathl: *The Great Chief in Washington sends word that he wishes to buy our land. The Great Chief also sends us words of friendship and goodwill. This is kind of him, since we know he has little need of our friendship in return. But we will consider your offer, for we know if we do not do so, the white man may come with guns and take our land. What Chief Seathl says, the Great Chief in Washington can count on as truly as our white brothers can count on the return of the season. My words are like the stars – they do not set.*

*How can you buy or sell the sky – the warmth of the land? The idea is strange to us. We do not own the freshness of the air or the sparkle of the water. How can you buy them from us? We will decide in our time. Every part of this earth is sacred to my people. Every shining pine needle, every sandy shore, every mist in the dark woods, every clearing and humming insect is holy in the memory and experience of my people.*

*We know that the white man does not understand our ways. One portion of the land is the same to him as the next, for he is a stranger who comes in the night and takes from the land whatever he needs. The earth is not his brother, but his enemy, and when he has conquered it, he moves on. He leaves his fathers' graves behind and does not care. He kidnaps the earth from his children. He does not care.*

*Our children have seen their fathers humbled in defeat. Our warriors have felt shame. And after defeat, they turn their days in idleness and contaminate their bodies with sweet food and strong drink. It matters little where we pass the rest of our days – they are not many. A few more hours, a few more winters, and none of the children of the great tribes that once lived on the earth, or that roamed in small bands in the woods, will be left to mourn the graves of a people once as powerful and hopeful as yours.*

*One thing we know which the white man may one day discover: Our God is the same God. You may think now that you own our land. But you cannot. He is the God of man. And His compassion is equal for the red man and the white. The earth is precious to Him. And to harm the earth is to heap contempt on its creator.*

*The whites, too, shall pass – perhaps sooner than other tribes. Continue to contaminate your bed, and you will one night suffocate in your own waste. When the buffalo are all slaughtered, the wild horses all tamed, the secret corners of the forest heavy with the scent of many men and the view of the ripe hills blotted by talking wives, where is the thicket? Gone. Where is the eagle? Gone. And what is it to say goodbye to the swift and the hunt; it is the end of living and the beginning of survival.*

*We might understand if we knew what it was that the white man dreams, what hopes he describes to his children on long winter nights, what visions he burns into their minds, so that they will wish for tomorrow. But we are savages. The white man's dreams are hidden from us. And because they are hidden, we will go our own way. If we agree, it will be to secure the reservation you have promised. Those perhaps we may live out our brief days as we wish.*

*When the last red man has vanished from the earth, and the memory is only the shadow of a cloud moving across the prairie, these shores and forest will still hold the spirits of my people, for they love this earth as the newborn loves its mother's heartbeat. If we sell you our land, love it as we've loved it. Care for it, as we've cared for it. And with all your strength, with all your might, and with all your heart – preserve it for your children, and love it as God loves us all. One thing we know – our God is the same God. The earth is precious to Him. Even the white man cannot be exempt from the common destiny.*

*His fathers' graves and his children's birthright are forgotten. His appetite will devour the earth and leave only behind a desert. The sight of your cities pains the eyes of the red man. But perhaps it is because the red man is a savage and does not understand...*

*There is no quiet place in the white man's cities. No place to hear the leaves of spring or the rustle of insects' wings. But perhaps because I am a savage and do not understand – the clatter only seems to insult the ears. And what is there to life if a man cannot hear the lovely cry of a whippoorwill or the argument of the frogs around a pond at night? The Indian prefers the soft sound of the wind darting over the face of the pond, and the smell of the wind itself cleansed by a midday rain, or scented with pinion pine. The air is precious to the red man. For all things share the same breath – the beasts, the trees, the man. The white man does not seem to notice the air he breathes. Like a man dying many days, he is numb to the stench.*

*If I decide to accept, I will make one condition. The white man must treat the beasts of this land as his brothers. I am a savage and I do not understand any other way. I have seen a thousand rotting buffalo on the prairies, left by the white man who shot them from a passing train. I am a savage and I do not understand how the smoking iron horse can be more important than the buffalo that we kill only to stay alive. What is man without the beasts? If all the beasts were gone, man would die from great loneliness of spirit, for whatever happens to the beast also happens to the man. All things are connected. Whatever befalls the earth befalls the sons of the earth.*

Though this letter was written a century and a half ago, it is still so relevant. Many large corporations have been ruthless in their pursuit of the Earth's resources. However, we are ALL custodians of the planet and our demand for these resources must also be called into question.

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

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# The Northern Lapwing

## *Vanellus vanellus*

### PEEWIT

### GREEN PLOVER

## Pilibín

By Oscar Merne

THE names in the title of this article are all used for this familiar bird of the Irish countryside, wetlands and coasts. There is a long-standing fondness for Lapwings in our agricultural community, not least because the species is credited with helping to keep liver-fluke in livestock under control, because they eat the snails which are part of the life cycle of that parasite.

In the field, with the naked eye, Lapwings look black-and-white, but close-up and in good light you can see that their dark upperparts are in fact iridescent green, with purple on the fore wings. This gives the species its alternative name of Green Plover. In Ireland the Irish name *Pilibín* is still widely used, but I once heard a man, not a gaelic scholar, refer to them as "those philistine birds"! Lapwings have two



In flight, Lapwings have extraordinarily rounded wings, which they deploy in a very flappy flight.

other notable plumage features: their unique (to this part of the world) long, backwards bending, crest of about four feathers, and their orange under-tail coverts, which are prominent during courtship display. In flight, Lapwings have extraordinarily rounded wings (described as "frying-pan wings"), which they deploy in a very flappy flight.

The Northern Lapwing breeds in a broad swathe across the temperate zone of Eurasia, from Ireland and parts of Iberia in the west to c.140° E, but not as far as Kamchatka and the Bering Sea. I remember, back in the 1960s, being surprised to find Lapwing chicks feeding in the midnight sun on the shores of the Gulf of Bothnia near the Arctic Circle in Finland, but later discovered that the species extends much further north on the Norwegian coast, where the North Atlantic Drift keeps the summer climate relatively mild.

Our Northern Lapwing has an estimated population of between 5.1 and 8.4 million birds in Europe (west of the Ural Mountains), but numbers in China and other parts of Asia are not well known and the total may well be much higher than this. There could be up to 10.0 million birds in Russia!

In the past, Lapwings were common and widespread breeders over much of the lowlands of Ireland, but by the second half of the 20th century, with post-war mechanisation and intensification (later moved up a gear by the Common Agricultural Policy of the EU), aided by arterial and field drainage schemes, resulted in huge losses of suitable breeding habitat and a decline in Lapwing numbers. The Breeding Bird Atlas survey of 1988-91 estimated c.21,500 pairs to be nesting in Ireland, but, in retrospect, this number was probably too high as it was calculated by extrapolation from Britain. The Birds of Conservation Concern project, published in 2007, suggested a 85% decline over 20 years and placed the Lapwing firmly in the Red List of most threatened breeding species here. The latest Breeding Bird Atlas (2007-2011) does not attempt to estimate current numbers, but does show a further 33% contraction of the breeding range. So, I'm afraid, our Lapwings are in serious trouble.

The Irish Wetland Bird Survey (I-WeBS) estimates that c.85,000-120,000 Lapwings occur in Ireland in winter nowadays, but these



Our Northern Lapwing is one of 23 *Vanellus* lapwings that are spread around the world.

numbers may be on the low side as many Lapwings are scattered around the country away from the main wetlands monitored by I-WeBS. Furthermore, the species is very sensitive to severe weather, and when conditions are frozen in Europe and Britain large numbers seek refuge here in our relatively mild conditions. Weather fugitives have even got as far as the Azores, and the north-east parts of Canada and the USA.

Two very severe winters in the early 1960s, which caused prolonged freezing conditions throughout Europe and extended to Ireland, resulted in very heavy mortality among Lapwings everywhere. On another occasion, in the early 1970s, I recall c.90% of Ireland was frozen, apart from a band along the south coasts of Wexford, Waterford and Cork. I happened to be driving from Wexford town to Cork city, along the main N25 road, a distance of c.180 km, along what was effectively a belt transect about 2.0 km wide, encountering flocks of Lapwings in the fields and in the air most of the way. By the end of the journey I'd estimated at least 110,000 birds were present – and that did not include unknown numbers that were probably concentrated along the south coast out of view from the road!

Because they are so vulnerable to severe winter conditions, Lapwings move to milder coastal areas in the west and southwards to the Mediterranean and Africa, the Middle East and China as far as the Tropic of Cancer.

Our Northern Lapwing is one of 23 *Vanellus* lapwings that are spread around the world.



The breeding range of the Northern Lapwing in Ireland has contracted in recent years.

Eight of these are found in Eurasia (mainly in Asia), ten are in sub-Saharan Africa, three in South America, and two are in Australia (one of which extends to New Zealand).

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

*Before he died in January 2013, Oscar wrote a number of articles for Sherkin Comment to be published in future issues. This is the final article Oscar wrote – in all he wrote sixty articles. We have been privileged to be able to publish them.*



Northern Lapwing has an estimated population of between 5.1 and 8.4 million birds in Europe.

# Praeger's Purple Line

By Matthew Jebb

IRELAND is a pleasant country for the botanist. So begins Robert Lloyd Praeger's book, *The Botanist in Ireland*, in 1934. He was over 70 years old when he first published his seminal *The way that I went* – quoting James Thompson in his preface to the book, “*Thank God for Life*” – Praeger explains his desire to share his love of Ireland. He made a special point that his book was not the Ireland of the motorist, but one appreciated best by “*stopping often, watching closely, listening carefully.*”

*The way that I went* represents a lifetime's knowledge of Ireland, but at its heart lie the golden years of Praeger's 'footwork' for his remarkable *Irish Topographical Botany*. ITB, as it is more familiarly known amongst botanists, was a landmark work in the history of Irish Botany. For the first time a detailed geographical analysis of Ireland's vascular flora was compiled. Most remarkable is that the work was largely undertaken by Praeger and in the space of just 5 years.

Praeger had moved to Dublin in March 1893, to take up his role as assistant librarian at the National Library of Ireland. He busied himself on a number of geological and botanical excursions close to home before opening a gift from Frederick Hanbury in 1895. As he states in the Preface to ITB:-

“*THE need of an Irish 'Topographical Botany' was forcibly brought to my mind in 1895, when perusing a copy of the ninth edition of the 'London Catalogue of British Plants,' sent me by the editor, Mr. F.J. Hanbury, F.L.S., on noticing that Ireland was still necessarily excluded in the census-numbers appended to the species, owing to absence of detailed information concerning the distribution of plants in this island. In the 'London Catalogue,' in fact, Ireland was placed on the same footing as the Channel Islands, its very existence being recognized only when a plant occurred in Ireland, but not in Great Britain. To assist in remedying this unsatisfactory state of affairs, if nothing more, I set about collecting information respecting the county-distribution of plants in Ireland.*”

(Irish Topographical Botany, 1901)

Indeed, Praeger set about the project with typical zeal. He spent over 200 days in the field: this occupied essentially every weekend for the years 1896 to 1900. In each year Praeger covered an astonishing 1,000 miles on foot. It is worth noting that he did not meet and marry Hedwig, his wife and constant companion thereafter, until the year after this work was finished. These days of exploration, many it has to be admitted in rather boring sites from the botanical point of view, clearly hugely influenced him and gave him a life-long love of Ireland that he finally confided to paper with *'The way that I went'*.

“*The long summer days spent in the Limestone Plain, where the gentle undulations of the ground only occasionally hid the distant rim of brown and blue hills; the marshy meadows, heavy with the scent of flowers; the great brown bogs, where the curlews alone relieved the loneliness; the bare limestone pavements and gaunt grey hills of Clare and Galway; the savage cliffs of the Mayo coast; the flower-filled sand-dunes which fringe the Irish Sea; the fertile undulations of southern Ulster; the swift brown current of the Barrow; the fretted limestone shores of the great western lakes; the*



Laois and Longford Catalogues



County Laois



The Purple Line

*towering cones of the Galtees: all have left memories that can never be effaced. Ireland is a delightful country for the pursuit of work in the field. Enclosed or preserved ground is but seldom met with, and the country is free and open. Few rivers but can be, forded; few marshes or bogs but can be crossed; few precipices but yield their treasures to the mountaineer; few spots are so remote but they may be visited in a good day's walking from the nearest stopping-place.*”

(The Way that I Went, 1937)

At the National Botanic Gardens we are fortunate to have Praeger's original London Catalogues, in which he recorded precise details of his walks and the plants he saw. The archive comprises 22 copies of the London Catalogue, one for each county he surveyed. In each he carefully marked the routes he followed in red ink on a map from the *Philips' Handy Atlas of the Counties of Ireland*.

Praeger described the methodology of his field work thus:- “*With a large vasculum, a 'London Catalogue,' and the one-inch hill-shaded Ordnance Survey map as my constant companions, progress was smooth and rapid.*”

It was while Rosemary Goode was transcribing Praeger's itineraries for us and scanning the



April '95

maps for the gardens' website (<http://www.botanicgardens.ie/herb/books/itbitineraries.htm>) that we became aware of a remarkable, and overlooked feature of these maps. Starting (or ending?) at Portlaoise in County Laois (then at Maryborough in Queens County) is a thick purple crayon line, marked “Apr '95” - the year before Praeger began his epic explorations. This line crosses five counties and covers almost exactly 100 miles.

Starting from Portlaoise, the line travels through Mount Mellick, where an annotation tells us that Henry Hart told Praeger that there was ‘Good accommodation’ to be had. It may be that Praeger spent his first night there. The next day the route takes us into Offaly via the villages of Clonygowan and Geashill to Tullamore where it may be Praeger spent his second night after 25 miles. Crossing into Westmeath next morning via Kilbeggan to Mullingar would have brought the total to 46 miles. He passed the southern end of Lough Deravaragh and passed through Castlepollard and Coole village before reaching Granard in county Longford, bringing his total to 74 miles. On his apparent last day he entered Cavan and made a detour to the centre of Lough Gowna before retracing his steps to Drumhawnagh station. From here he no doubt returned to Dublin. The

total route is just shy of 100 miles and if we presume Praeger probably spent 3 nights along the route, no doubt after sampling the ‘Good Accommodation’ at Mount Mellick – that equates to four marathons in four days.

It seems likely that this was a ‘trial walk’. A way to gauge whether his mental image of the work he set himself was physically and technically possible. It seems the experiment satisfied him, that his goal of walking 20-25 miles a day could be combined with accurate botanical recording. Never an overtly religious man, Praeger's lonely pilgrimage gave him a profound respect for the beauty of the natural world, and in his description of the Nephinbeg ranges of Co Mayo he wrote: -

“*Go up to the hills, as sages and saints have done since the beginning of the world, and you will need to be a very worldly worldling if you fail to catch some inarticulate vision of the strange equation in which you stand on the one side and the universe on the other.*”

(The Way that I Went, 1937)

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[www.botanicgardens.ie](http://www.botanicgardens.ie)

# The Island of Ireland Precipitation Series 1850-2010



By Séamus Walsh

AN Island of Ireland Precipitation (IIP) series covering the period 1850-2010 for 25 locations has been constructed by researchers at Maynooth University and Met Éireann. Such long-term series are critical for understanding past and emerging changes to the precipitation regime and the hydrological cycle. The resulting dataset provides the second-longest regional precipitation archive in the British and Ireland.

The value of high quality observations to the meteorological and climatological scientific communities cannot be overstated. Historical observations are of particular value since an observation once made in time cannot be retaken, and if observations are not taken we have no way of directly knowing what the past weather and climate were like. The history of organised weather observations in Ireland goes back to the late 1700s with Observatories in Dunsink (1787) and Armagh (1790). In the first half of the 19th century readings were taken at Birr Castle(1845), Markree Castle(1824), the Phoenix Park(1829) and Trinity College, Dublin (1838). From the mid 19th century the number of stations increased and some standardisation of observations took place in line with international developments. By the early 20th century there were over 100 locations measuring rainfall, by the time the Irish Meteorological Service was formed in 1936 the number of rain-gauges was over 200. Since then the network has expanded further, there are now just under 500 raingauge locations in the country.

All rainfall data since 1941 has been digitised and is

already available for analysis; data prior to 1941 for the most part is still in the original paper format. These early records are particularly valuable, but for the data to be used it must be 'rescued'. Data rescue is the term used to describe the process of cataloguing, scanning and keying in data from old climate records to make it available for use. The data must then undergo quality assurance, for example what type of instrument was used, what was the precise location and height of the recording, this type of information is known as metadata – or data about data, and is crucial to construction a homogenous climate time series. A homogenous climate time series is defined as one where variability is only caused by changes in weather or climate, so any changes due to different types of instrument or changes in the location of the observation are identified and a correction is applied to the raw data, this process is known as homogenisation.

Another issue that must be addressed in constructing long time series is that many stations do not have continuous observations over long periods of time, to overcome this 'bridging' is undertaken. This is where time series are extended using observations from neighbouring 'donor' stations where a sufficiently long overlaps exist to allow a relationship be established between the target station and its neighbours, in this way gaps in a time series can be infilled.

A number of long term rainfall records (16) were available from the Climate Research Unit at the University of East Anglia and a long term data series from Armagh Observatory was provided by Professor John Butler. An additional

eight stations were recovered from the archives at Met Éireann from archived precipitation records collected prior to 1941 and held in paper form and then digitised for selected stations (post 1940) as follows: firstly quality long term series are identified and the data for that station are rescued, then donor stations are identified for any gaps in the time series and the data for the donor stations is rescued, a mathematical relationship is derived between the long term station and the donors and this is used to infill any missing data.

The 25 time series are now complete, but they must be homogenised to ensure that the values are a true reflection of the weather and climate without any artificial variations due to observational changes or bridging techniques. The

homogenisation process involves three stages: first basic quality control of the data was carried out, second a software package called HOMER was applied to the time series to identify breaks by comparing with 12 neighbouring stations. Of the breaks identified only those supported by station metadata were adjusted in stage three, where the HOMER package is used to adjust the time series, and infill missing data back to 1850 if necessary.

The expanded long-term monthly rainfall network for

the Island of Ireland (1850-2010) is now available for analysis. This reveals positive (winter) and negative (summer) trends over the period 1850-2010. Trends in records covering the typical period of digitisation (1941 onwards) are not always representative of longer records, indicating the importance of long term records. The National annual rainfall times series for the Island of Ireland (25 station is shown in Figure 1. Since the original work was published, the lead author Simon Noone of Maynooth University has

extended the times series to 2015 including winter of 2015/16. The winter rainfall series (December, January, February) from 1851 is shown in Figure 2 and clearly shows that winter 2015/16 was the wettest winter on records, followed by winter 2013/14, and that these two winter and the only winters where rainfall totals in excess of 500mm were recorded.

*Séamus Walsh, Met Éireann, Glasnevin Hill, Dublin 9, Ireland. www.met.ie*

Figure 1 Island of Ireland Annual Rainfall 1850-2015

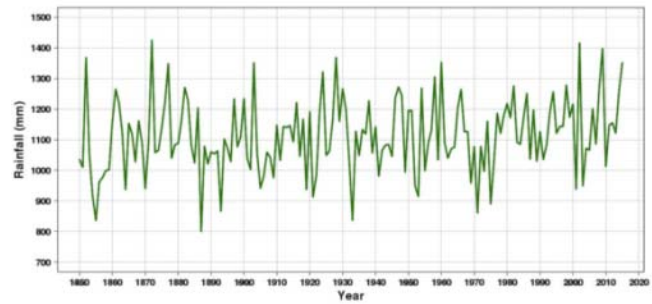
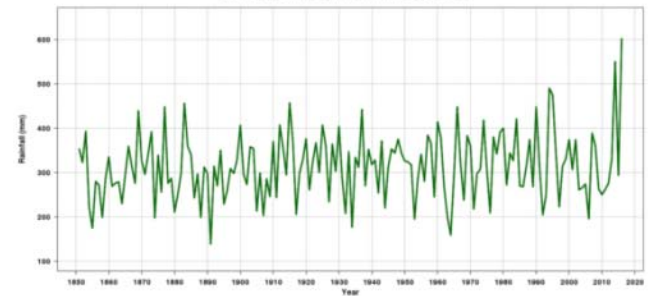


Figure 2 Island of Ireland Winter Rainfall 1850-2016



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Lichens provide the colour and texture to this rock outcrop overlooking Roaringwater Bay.



The typical 'heads down' posture of lichenologists at work with their hand lenses!



Checking for a colour change reaction in response to a chemical spot test applied in the field.



Labelling a specimen envelope with appropriate date, site and habitat details for later reference.

# The Miniature World of Lichens

By Chris Spurrier

LICHENS occur all around us and make up an important part of the rich biodiversity of our environment but often we are oblivious to their presence and they are usually under-appreciated. Yet lichens provide the rich colours and texture on buildings, walls, gravestones, rocks and the bark of trees and they are responsible for the 'softened' aesthetic appeal of all these old structures and are a welcome contrast to the stark appearance of new buildings. In effect they are the natural paint of our landscape.

Most people would be hard-pressed to give an accurate definition of a lichen and there is often a degree of uncertainty in how to even say the word. Although it is sometimes pronounced with an 'itch,' the harder sound as in 'like' is generally more acceptable.

A lichen is not just a single organism, but an assemblage of three or four different species that work together in partnership. The fundamental understanding of textbook lichenology that has been accepted for around 150 years has been thrown into disarray by recent research with the revelation that lichens are composed of two different fungi, instead of just one species as was previously thought to be the case. The bulk of a lichen is fungal, the part known as the mycobiont, but their symbiotic partner is a photobiont, usually an alga or a cyanobacterium. A few lichens have both an algal and a cyanobacterial partner. Research has shown that this type of partnership has existed for at least 600 million years. The photobionts are able to make their own food from water and carbon dioxide using the sun's energy in the process of photosynthesis and the fungi are able to make use of this food source.

In a few cases the fungi concerned are related to mushrooms (a group known as Basidiomycetes), but the majority are related to moulds (from the group known as Ascomycetes) or 'sac fungi' which produce spores for sexual reproduction in sacs or asci. Ascomycetes may also produce structures called isidia and soredia for asexual reproduction. The scientific, or Latin, name attributed to the lichen is that of the ascomycete fungal partner; the photobionts and the second fungal partner do not contribute to the name. The thread-like filaments of the fungus form the underlying spongy structure or body of the lichen which is known as the thallus and this usually has a dense outer layer. The algal and cyanobacterial photobionts are contained within the thallus. The second, recently discovered, fungal partners are from the basidiomycete group of fungi and they are

found in the outermost part of the thalline crust.

The complement of photobionts and the variation in the thallus structure results in a huge diversity of growth form and colour in lichens. Their identification depends largely on the examination of the thalline anatomy and the sexual and asexual reproductive structures including details such as colour, texture, pattern and the shape and size of the asci and spores. Whilst some can be identified *in situ* using a hand lens, others require more detailed microscopic examination. In some cases, chemical tests can produce colour changes which give valuable clues to their identity, while exposure to ultra-violet light can also help to differentiate between similar species. Anyone wishing to study lichens in more detail will need a greater understanding of their anatomy and although that is beyond the scope of this article, the excellent book by Paul Whelan entitled 'Lichens of Ireland' is an introductory guide that gives details of over 250 species accompanied by a comprehensive account of their structure, biology and ecology.

Armed with little more than a x10 or x20 hand lens, and perhaps a copy of the book, you will be able to discover an almost magical miniature and largely undiscovered world beneath your feet.

My own scientific background as a marine biologist led to an interest in the animal group Bryozoa, sometimes called 'moss animals'. It was perhaps the need to study bryophytes (mosses and liverworts) and lichens at a similar scale of detail that captured my attention when I was introduced to these groups through my local Field Club in Kent. My amateur interest in lichens was nurtured by members of the club who had built up a considerable knowledge of these fascinating organisms, and one lady in particular, Ishpi Blatchley, patiently encouraged me, one day visiting me at home where we found an impressive number of different species in my own fairly small garden.

When I revisited Sherkin Island for the 40th anniversary of the Marine Station in May 2015, I conceived the idea of returning in the summer of 2016 with Ishpi to survey the island's lichen flora. By her own admission she is not an expert in marine and maritime lichens, her main area of interest lying in churchyard lichen communities. When a fellow lichenologist, Ken Sandell, expressed an interest in joining us with his invaluable experience he was eagerly co-opted on to our mini-expedition. And so for six days in August we explored the island examining the graveyard, buildings, trees, bushes, walls, roadside banks, lowland and hilltop rock outcrops, heaths and of course the seashore, these being examples of the wide variety of habitats and

substrates that are colonised by lichens. One passer-by was fascinated by our activity so I lent her my magnifier so she could look in close-up at what she said was like a 'miniature landscape'. It certainly is reminiscent of Alice's adventure through the looking-glass!

By the time we left the island 156 different species had been listed and subsequent examination of specimens that were collected produced a further 47 lichens, and with additional records from earlier studies the total for the island is now in excess of 250. This reflects the remarkable island biodiversity that has already been recognised by studies of other plant and animal groups on Sherkin and in its surrounding waters. The collection of 109 specimens identified to species, that include 83 new additions to the collection, from our recent study has been incorporated into the Marine Station's herbarium which now holds over 250 lichen specimens that represent 142 different species.

When Matt established the Marine Station with his late wife Eileen in 1975, their philosophy was that in order to understand the environment and what's in it you have to get out there and look. So I am sure that it was with a wry smile that he greeted the news that a minuscule lichen specimen of *Gyalecta biformis* that I discovered almost by accident, colonising the dead stem of a Thrift plant, only a few hundred metres from his house has turned out to be a species that is new to Ireland! And just a few days later in the vicinity of Slievemore, the high backbone of the island which overlooks the Marine Station, we made two more interesting discoveries. A specimen of *Verrucaria*, found in a freshwater stream, is believed to be an undescribed species and another closely related species of *Hydropunctaria* from higher ground may also be new to science. These finds are due to be published in the forthcoming summer Bulletin of the British Lichen Society (no.120, 2017). In addition, a full report that brings together all of the records for Sherkin will shortly be available in an on-line publication which can be accessed through the Marine Station's website at [www.sherkinmarine.ie](http://www.sherkinmarine.ie)

This is not the first time that the Marine Station's scientists have produced new species records for Ireland. For example, four beetles were added to the Irish checklist by Rosemary Moore from her study in 1981-2 (see *Sherkin Comment*, No. 52, p.5) and the Marine Station's publication of the 1996 *Flora* (ed. John Akeroyd) included three wild plants that were new Irish discoveries.

The lichen data collated in the current report is a valuable resource because lichens play a significant part in our understanding of the environment. They can perform the role of bio-monitors as some species can accumulate heavy metals, and they can also be used as air pollution indicators; some are particularly sensitive to increased levels of sulphur-dioxide. So in this regard it was reassuring that we relocated three Irish Red Data Book species during our survey, including the beautiful Golden Hair Lichen *Teloschistes flavicans* which has a very low tolerance to pollution. Lichens also play an important part in food webs as they are often the first colonisers of bare surfaces enabling nutrients to accumulate for other plants. They can be a food source for grazing animals and they are frequently used by birds as nesting material. But for most of us, without our really noticing it, they simply make our environment more pleasing on the eye.

*Chris Spurrier is a freelance marine biologist (see Sherkin Comment, Nos. 60 & 61) who is based in Kent, England. He also has a keen amateur interest in lichens; he was guided in writing this article by his two field companions, Ishpi Blatchley and Ken Sandell.*



Close-up of an encrusting lichen showing the 'jam tart' reproductive structures on the surface of the thallus.



The brightly coloured fruiting bodies are held on stalked structures in this species of *Cladonia*



The beautiful Golden Hair Lichen on a rock outcrop amongst heathland on Slievemore.



This small lichen community shows around ten different species growing together at a coastal location.

## Free Bicycles Reducing Pollution in China

Innovative bicycle schemes in China and India are tackling chronic air pollution problems and congestion by encouraging people to stop using cars.

By Paul Brown

LONDON, 24 April, 2017 – In China everyone used to travel by bicycle, then along came an urban middle class and the cities were choked with private cars. Now the bicycle is making a comeback, and, at least if you live in Hangzhou in Zhejiang province, you don't even have to own one because the city will provide a bike for you to ride for free.

What began as an experiment to see if it was possible to reduce both air pollution and congestion has become a major success story, not just in Hangzhou but in 175 cities across the country.

Perhaps the most surprising aspect of the Hangzhou Bicycle Service is that it makes a profit. Companies pay for advertisements on the bicycles and on the kiosks where they are stored and rented from. This pays the wages of those who run the scheme.

### Made in China

The experiment in Hangzhou started in 2008 with 2,800 bicycles, and there are now plans to scale up to 200,000 due to its popularity.

There are several keys to the scheme's success. For starters, although a card is required to hire a bicycle, the first hour is free so if you can get to work, to a train or to a bus stop in under an hour you never have to pay. More than 90% of all rides taken are free.

Plus, the organisation provides a cycle park every 300 metres, with attendants nearby to solve any problems. Each attendant runs 35 stands. A central control room keeps an eye on the entire operation, ensuring there are plenty of cycles available where they are needed.

Another reason it works so well is that it is integrated with all other forms of public transport, so the card that you use for bicycle hire also works on buses, the metro, water taxis and trains. Across the city there is a network of bicycle lanes and bicycle traffic signals providing access to every public transport hub. The authorities have boosted the scheme by imposing parking restrictions and, in some parts, banning petrol-powered motorcycles and scooters.

The Chinese based the idea on a bicycle hire project that operated in Paris. It is one of a number of projects competing for an award in the sustainable transport category at the Ashden Awards in London, which will be presented on 15 June by Al Gore, the former US vice-president turned climate campaigner, at the Royal Geographical Society. The winners will receive £20,000 towards their businesses.

### Indian bicycles

Another bicycle project has taken off in India, a country that also has serious problems with air pollution and congestion. Based in the city of Coimbatore, in Tamil Nadu, Ampere Vehicles make low-cost electric bicycles, scooters and flatbed vehicles for carrying loads. The company is a candidate for the same Ashden award as the Hangzhou Bicycle Service.

To date, Ampere has sold more than 14,000 long-life battery-powered vehicles. Many of the load carriers are being used by municipalities for collecting refuse and by large factories for carrying goods.

Private buyers tend to use their electric bicycles to get to work or are people who run small businesses and carry samples or goods on their bikes – for example, coconut collectors and tea sellers.

The machines have no gears and are simple to operate. The Ampere versions of electric vehicles fall into the same category as bicycles because they are regulated to a maximum speed of 25 kilometres an hour.

*Climate News Network is a free and objective service publishing a daily news story on climate and energy issues.*  
[www.climate news network.net](http://www.climate news network.net)

# Will the Paris Agreement survive the Age of Trump?

By Alex Kirby

THE new US president is full of surprises. Nobody (and that probably includes the Donald himself) is quite sure what he's going to come up with next. Here's someone who's made a fine art of spontaneity, to the point where he seems sometimes to say the first thing that comes into his head. If this unpredictability spreads from what he says to what he does, we could be in for uncomfortably interesting times.

So what's he going to do about climate change? Mr Trump has dismissed the very idea as a gigantic hoax dreamed up by the Chinese in order to sabotage the US economy (which suggests he thinks little of the intelligence of American scientists, or of the Pentagon, a normally hard-bitten bunch which has warned that climate change could threaten US national security). But the Trump line has now moderated. The president says he has "an open mind".

Where that leaves his undertaking before the election to "cancel the Paris climate agreement," which he said "gives foreign bureaucrats control over how much energy we use right here in America" (it doesn't and couldn't), is unclear. Neither Trump nor any other national leader can cancel the

Agreement: all they can do is withdraw from it.

If the US administration does repudiate the Agreement, it will face emphatic domestic opposition. A *New York Times* editorial in December reported: "California and New York plan to cut greenhouse gas emissions to 40% below 1990 levels by 2030. Hawaii hopes to get all of its electricity from renewable sources by 2045. This month . . . the Republican governor of Massachusetts proposed new rules for power plants and vehicles to make sure the state achieves its goal of a 25% cut from 1990 levels by 2020. Emissions are already down by around 20%."

States with plans and achievements on that scale - and experience of the economic benefits they bring - won't abandon them easily, if at all, no matter what the White House does. And it's not just states that can see why a low- or no-carbon future makes sense. There's a long list of US cities headed the same way.

This is an argument that may speak persuasively to President Trump, a deal-maker and businessman to his fingertips. Couple it with the growing international swing from fossil fuels to renewable energy, to ditch investments in coal and oil resources which are liable soon to prove frozen assets,

and to develop and sell equipment which will help other countries to follow suit, and Trump may decide to moderate his condemnation and start taking climate change seriously. What better way, after all, to make America great again than to phase out the rust-belt industries that still cling to life and replace them with the new technology that will keep America competitive and Americans employed?

The Trump that can't resist playing to the gallery when he has an audience, or coming out with any spine-chilling soundbite that wanders into his head, is not the only Trump. There's a shrewd operator in there somewhere, who may yet realise that his country's interests, and his own, are better served by thinking than by barnstorming. Time will tell.

In the meantime, though, the rest of us could usefully ask ourselves several other questions about the future of the Paris Agreement, with or without Donald Trump.

First, what is the most it can achieve in slowing the human contribution to global warming, most of it through the burning of coal, oil and gas?

Writing on the ProPublica site (<https://www.propublica.org/>) in December, the environment journalist Andy Revkin said: "The Paris Agreement itself was far

more a diplomatic achievement than a climatic one. Its 2030 pledges leave unresolved how to cut emissions of carbon dioxide essentially to zero in the second half of the century in a world heading toward 9 billion or more people seeking decent lives. That plunge in emissions is necessary because, unlike most other pollutants, carbon dioxide stays in circulation for centuries . . ."

The Agreement, in other words, is a significant achievement after 20-odd billion years of largely pointless argument on how to tackle climate change - but it is only a start towards achieving the greenhouse gas emissions cut the planet needs. Making the Paris Agreement work for the world matters far more than what even a country as powerful as the US does, or refuses to do.

Again, how likely is it that the Agreement's signatories will settle how to cut emissions fast enough? Paris ended with a huge sense of relief, and a nagging realisation that it had, at best, made the mountain easier to climb. But the mountain is still there. Almost a year after the Agreement was concluded a contributor to *Forbes* magazine wrote an article entitled 'Expect Climate Catastrophe: Paris Agreement Lacks Enforcement'. It began:



"Enforcement mechanisms for climate change targets are not being implemented, including in the Paris Agreement of December 2015. We are actually sliding backwards on this critical element of a global climate deal."

Finally, whatever the policymakers are doing, out on the glaciers, the oceans and the drought-parched fields, the science of climate change is moving fast. Three headline stories from this year alone show what's amiss. Climatologists who have looked again at possible major climate change in and around the Atlantic Ocean now say there's an almost 50% chance that part of the

North Atlantic could cool suddenly and rapidly, within the space of a decade, before 2100. A new study shows that oil production can result in methane emissions up to twice as high as estimated. And even with dramatic cuts in carbon dioxide emissions, small island states still face threats: other, shorter-lived greenhouse gases could drive the expansion of the oceans for centuries to come.

The Donald is not the only threat to the climate, nor probably the greatest.

Alex Kirby is a founder-editor at the Climate News Network. [www.climate-news-network.net](http://www.climate-news-network.net)



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Inland Fisheries Ireland now has a 24 hour Confidential Hotline. The hotline should be used only to report **emergency incidences** of **Pollution, Poaching or Invasive Species**.

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If you have previous received a set, these are the same stamps.



# The Smaller Islands of Roaringwater Bay

JOHN AKEROYD looks at the flora of some of the often forgotten tiny islands of Roaringwater Bay.

In this series of articles I've been describing the numerous and varied islands of Roaringwater Bay. More recently I've covered some of the smaller, uninhabited, remote and seldom visited islands – Calfs, Carthys, Goats, Skeams, Spanish – but there are others, smaller still or just completely ignored and forgotten by most visitors. Sherkin Island Marine Station botanists have visited all these, perhaps not regularly but persistently, and the rocky shore teams have become familiar with many of their foreshores. They are little more than sea stacks, jumbled rock outcrops, emerging reefs or accumulated shingle and sand. But even the smallest island can be plant-rich, or at least possess particular botanical specialities. And no study is ever complete without exploring every possible site, preferably by repeat visits.

Geologically, all the Roaringwater Bay islands are built of rocks of Upper Devonian age (350 million years ago), comprising the fine-grained purplish mudstones of the Castlehaven Formation, with slightly older and harder slates of Sherkin Formation of Cape Clear Island and most of Sherkin, although the Carthys consist of younger, softer grey Carboniferous shales. All the smaller islands, however bleak and rocky, have some vegetation clinging on in mostly thin, stony or peaty or sandy soils, requiring seabirds and the vagaries of the tides to introduce nutrients in the form of seaweed, guano, seashells and crab debris. Few have been or are inhabited – remains of a croft or farm on Goat is tragic reminder of how people once lived at the very limits of cultivation and survival. Some are visited by otters, which make paths around the margins and leave more nutrients in the form of spraints. Most are just rocky but sometimes there are sandy or shingle beaches, and several smaller islands have patches of muddy saltmarsh,

especially those lying towards the more sheltered head of the Bay near the outflow of the River Ilan.

Among the islands with saltmarsh fragments are Jeremiah's and Quarantine. One of their specialities is Glasswort (*Salicornia europaea*), a miniature salt-marsh with fleshy, branched stems, no leaves and minute flowers, rather like a tiny pale green Christmas tree. Glasswort is found on few of the large islands but is present, as well on Sandy and Inishleigh, the latter island yielding few plant records. Recent autumn records from Sherkin of rare Orache (*Atriplex*) hybrids, plants with inconspicuous green flowers from late summer, in the same family as glasswort, and characteristic of drier saltmarshes and waste places near the sea, suggest that further exploration might for these alone might be worthwhile. I never cease to be amazed at how Roaringwater Bay constantly produces new treasures and surprises – as long as we keep looking.

Sandy has the distinction of yielding one of the few records of Pyramidal Orchid (*Anacamptis pyramidalis*) from Roaringwater Bay apart from the population around Cow Strand on Sherkin. This was apparently recorded almost by chance late one afternoon as rain and mist descended and the botanists eagerly awaited the boat home. It is, with Sherkin plants, the only site for the orchid in this part of West Cork apart from Barley Cove near Crookhaven and a locality just east of Rosscarbery. Botanists from the Marine Station have also recorded three more orchids, Early Marsh-orchid (*Dactylorhiza incarnata*), Western Marsh-orchid (*D. majalis*) and Heath Spotted-orchid (*D. maculata*) on Sandy, Quarantine and the nearby islets of the Catalogues.

Another more exotic inhabitant of a small island is St Patrick's Cabbage (*Saxifraga spathularis*), found on Castle Island, an obscure islet off the NW coast of Sherkin, and otherwise known from no nearer than Turk Head. A speciality of the highlands of Munster, this saxifrage is one of 16 Irish wild plants that do not occur in Britain.

Even Badger, off the west coast of Sherkin, and Bird,

off the north-east coast of Cape Clear, which are little more than rocky bird roosts, have some vegetation. Badger has the elegant Sea Aster, autumn-flowering and similar to the Michaelmas daisies of gardens, more a plant of cliffs but one that favours small islands. It is found too on Sandy, Quarantine, Jeremy, Innishleigh and Mannin, together with Lax-flowered Sea-lavender (*Limonium humile*), which is rare locally and local in Ireland generally. Tiny Jeremy just off Spanish, thus makes a substantial contribution to the Bay's flora!

Few weeds of cultivation such as poppies or fumitories occur on these smaller islands, although Common Knotgrass (*Polygonum aviculare*) was recorded on Badger. One curious small island plant – but one that perhaps profits from bird manuring and rotten seaweed cast up on the rocks – is Hogweed (*Heracleum sphondylium*), the familiar coarse hedgerow and wayside weed. This we have found to be common on the large islands but also well dispersed on Goat, Little Goat, the Catalogues, Sandy, Quarantine and Innishleigh. The plants on Goat may represent a last vestige of lush ruderal vegetation around the tiny farm that a family once occupied on the island.

Finally, a very rare and sporadic Irish plant, Sea Pea (*Lathyrus japonicus*), may have a niche on the smaller islands. It is probably something of a vagrant in Ireland, the seeds drifting across the Atlantic from the shores of North America. The Irish plants are more similar to American than to those in Britain, where the species is locally common on shingle beaches in the south and east. One of very few Roaringwater Bay records is from Jeremy, washed in on the tide to add to that island's small but remarkable flora.

So, never miss any of those rare opportunities to land on even the smallest islands in Roaringwater Bay – every visit may yield something new.

*John Akeroyd, who has visited Roaringwater Bay since 1986, edited The Wild Plants of Sherkin, Cape Clear and adjacent islands of West Cork (1996) and its Supplement (2011).*



The beacon on Goat Island.



Looking out from The Catalogues towards Sherkin and Cape Clear.



Quarantine Island, off Turk Head.



The view of Kilcoe Castle from Mannin Island.



Western Marsh-orchid



St Patrick's Cabbage



Common Knotgrass



Lax-flowered Sea-lavender



The Newport Research Facility with Nephin Beg freshwater catchment ecosystem in the background and brackish Lough Furnace ecosystem in the foreground.



The Newport Research Facility with rearing tanks and hatchery to the right, main laboratory in the centre and the Mill Race traps on the right. The freshwater Lough Feeagh is in the background while the brackish Lough Furnace is in the foreground.

# New Era at the Marine Institute Newport Research Facility

By Paul Connolly

In January 2017, the Taoiseach Enda Kenny visited the Marine Institute's Newport Research Facility (NRF) in County Mayo and announced 20 new research posts and €6 million in research funds. The 20 new positions are based at the NRF, where they will be engaged on a number of research projects, funded from a secured pot of €6 million in research grants. These grants were won from a number of national and international funding agencies including Science Foundation Ireland, Interreg, EU H2020/European Research Council, European Maritime and Fisheries Fund (EMFF) and the British Research Council.

The NRF is situated in Furnace in the Burrishoole catchment, near Newport, County Mayo. The facility is close to the foothills of the Nephin Beg mountains, whose streams and rivers run into Lough Feeagh, Lough Furnace, Clew Bay and the Atlantic ocean. The NRF has been operating since 1955, when it was established by the Salmon Research Trust of Ireland. Guinness were involved in the financing and running of the facility. Throughout the 1980s Guinness gradually phased out its involvement and the facilities were donated as a gift to the State. On 1st January 1990, The Salmon Research Agency (SRA) took charge of the facilities on behalf of the Minister for the Marine. In July 1999, the SRA was amalgamated with the Marine Institute.

The NRF is a site for integrated research into the interactions between freshwater, brackish and ocean ecosystems and climate change. The work carried out on Lough Feeagh is part of the ongoing long term ecological monitoring of the Burrishoole catchment ecosystem and is an integral part of the GLEON (Global Lake Ecological Observatory Network). The physical, chemical and biological characteristics of Lough Feeagh are monitored including temperature, oxygen profiles, nutrient availability and the biomass and diversity of microbes, phytoplankton and zooplankton. These data sets represent a unique asset that can be used by researchers to answer questions on ecosystem impacts. In 2016, funding was secured for a Marie Curie PhD at the NRC, focused on climatic extreme events in rivers and lakes across Europe. The work in the catchment ecosystem is facilitated by the local landowners and Coillte.

The NRF fish traps are positioned between Loughs Feeagh and Furnace and have the unique advantage of being able to monitor all movements of fish to and from the freshwater ecosystem. The "Salmon Leap Trap" and the "Mill Race Trap" both monitor fish moving upstream and downstream. These traps enable full census to be carried out on wild salmon, released reared salmon, sea trout and eels. In 2016, a total of 7,362 salmon smolts were recorded moving out of the Burrishoole catchment ecosystem from the traps monitoring programme.

The "Shrarevagh River Trap" located further up towards the mountain slopes allows the isolation of a small portion of the upper catchment ecosystem for carrying out detailed studies related to juvenile fish production and fish genetics.

NRF staff also work on various fish stock assessment and advice programmes. The team work closely with Inland Fisheries Ireland (IFI) on the Standing Scientific Committee for Eel (SSCE) and the Standing Scientific Committee for Salmon (SSCS) to formulate national scientific advice for these valuable resources. The MI team also participated at many international meetings of International Council for the Exploration of the Seas (ICES) and the North Atlantic Salmon Commission (NASCO) to assess the international state of these stocks and to propose international management measures. In 2016, the research work at the NRF was broadened to include work on the ecology of pollock, sea bass and bluefin tuna.

The NRF also operates a comprehensive range of freshwater salmonid fish rearing facilities. These facilities comprise a broodstock holding pond, two isolated hatchery units for egg incubation and hatching and indoor and outdoor rearing tanks for on-growing in biosecure locations. The rearing facilities have supported a wide range of both commercial and research and development projects on brown trout, rainbow trout and Atlantic salmon. The facilities are central to the ongoing salmon ranching programme which involves the release of groups of micro-tagged salmon smolts and the recovery of adults in the fish traps on their return. Reared smolts derived from Burrishoole grise have been released into the system since 1956 but it was not until 1964 that sufficient adults were available to establish a breeding population. Since that time adult returns from reared smolts have been used to establish the line-bred Burrishoole ranch stock.

A considerable amount of damage was caused to parts of NRF during the severe winter storms of 2016. The Mill Race channel had to be rebuilt and the fish passage restored. The rearing unit also underwent considerable repairs with dislodged ponds reinstated and roadways and paths replaced.

The NRF is a unique research facility and forms one of the greatest natural laboratories for studying migratory fish in Europe. The facility offers researchers a unique opportunity to investigate catchment ecosystem events, fish genetics, fish movements (telemetry), fish stock assessment, fish mortality at sea, climate change, oceanography and aquaculture. The facility is attracting multiple Irish Higher Education Institutions and international partners including University College Cork, Queens University, University College Dublin, Galway Mayo Institute of Technology, Dundalk Institute of Technology, NUI Galway and the University of Glasgow. Projects involving these partners include the impact of environmental factors on gene expression, freshwater and marine fish telemetry, carbon cycling and coastal lagoon ecology. In addition, the Marine Institute is working with Mayo County

Council to actively develop new initiatives at the facility (e.g. education and outreach) to further enhance what the Marine Institute can offer to benefit the local area.

As the national agency for marine research, technology, development and innovation, the Marine Institute seeks to assess and realise the economic potential of Ireland's marine resource, promote sustainable development of marine industry through strategic funding programmes and essential scientific services, as well as safeguard Ireland's natural marine resource through research and the environmental monitoring. In September 2015, the Board of the Marine Institute adopted a new Strategy for the NRF which is focused on securing external funding to conduct collaborative world class research, using the unique characteristics of the facility. This strategy represents a new era for the NRF and as it begins to bear fruit, 20 new scientists (Senior Scientists; Post-Doctoral Researchers and PhDs)

will work at the facility over the next 5 years on a range of research projects including linking salmon energetic to microbial diversity, why some brown trout become sea trout and the impact of catchment ecosystems on fish survival.

On his recent visit to the NRF, the Taoiseach emphasised that "The Newport facility is a real example of innovation taking place in a rural community and creates exciting opportunities both now and in the years ahead. Scientists at doctoral and post-doctoral level working at the facility are involved in conducting research with not only national implications, but also international relevance. In other words, it firmly brings what is a rural area into a national and international context". These are exciting times for the NRF.

*Paul Connolly, Director Fisheries Ecosystems Advisory Services, Marine Institute, Rinville, Oranmore, Co. Galway.*

**LEAVE YOUR FOOTPRINTS ON THE SAND AND NOT YOUR WASTE.**

On your next beach visit REMEMBER:

- Stay safe. Adhere to safety signage. Not all beaches are life guarded.
- Know which are – and obey the LifeGuard flags when displayed.
- Use litter and recycling bins, provided at the beach or better still follow the **Pack it in Pack it out** initiative implemented on many of our Cork beaches and bring your litter home with you.
- Respect the fragile habitat, particularly the sand dunes. Sand dunes are a very important ecosystem and coastal defense system. Please do not trample the dunes – use footpaths and designated pathways. Driving, motorcycling, scrambling and horse riding prevents the dunes. Please try and prevent these activities.
- Bring your camera!!!!!! The Environmental Education unit of An Taisce are running a Clean Coast Photographic Competition as part of their Clean Coast programme. This is open to all amateur photographers. For more visit [www.cleancoastphoto.org](http://www.cleancoastphoto.org)
- Cork County Council Beach Byelaws 2011 have recently been implemented on our Cork Beaches. For further information on Commencement, Interpretation, Authorised Persons, Prohibited Acts, Control of Dogs, Horses, Recreational Craft and other Offences etc please visit [WWW.CORKCOUNCIL.IE](http://WWW.CORKCOUNCIL.IE)
- THE BEACH IS A PUBLIC PLACE. Dog owners please respect the safety of others. Keep your dog on a leash and clean up after your dog. On the spot fine of €150 for dog fouling. Protect public health and the responsible.
- Get your school involved in beach activity days-marine education days organised by your local authority.
- Remember – There is a BLUE FLAG CERTIFICATE awarded to schools who carry out marine/beach activities. For more information contact the Blue Flag Team at [blueflag@eiu-an-taisce.org](mailto:blueflag@eiu-an-taisce.org)

BEACH AWARDS have benefits to the local community where amenities and environment are enhanced and a shared responsibility for the beach and the local environment is promoted. These awards also have a positive knock on effect for tourism in the County. The local Authority depends on the full cooperation of the public in maintaining and progressing the blue flag and green coast awards along our beautiful coastline.

## 2017 Beaches Awards for County Cork

**Blue Flag Award**

An Taisce-The National Trust for Ireland, with support from the Department of the Environment, Community & Local Government and on behalf of the Foundation for Environmental Education (FEE). The International award is one of the worlds most recognised Eco Labels and is universally recognised as the benchmark for beach quality. The Blue Flag Award requires the adherence to 32 criteria including:

1. excellence in water quality and a committed monitoring programme.
2. provision of adequate safety and services, safety equipment and warning signals of potential hazards.
3. beach management programme, good infrastructure, accessibility and litter control
4. provision of environmental information and education.

**Green Coast Award**

The Green Coast Awards were first operated with Authorities in Wales and now extend to the coastline of Ireland for the sixth year running. The Green Coast Award is a symbol of excellence which recognises:

- Excellent Water Quality
- High Environmental Standards
- Good Management
- Community Involvement

Green Coast beaches may not have the necessary built infrastructure required to meet the criteria for Blue Flag Status, however they are exceptional places to visit and enjoy a rich coastal heritage and diversity. Community involvement through local Coast care groups is a requirement for the Green Coast Award and Cork County Council would like to commend the excellent work and commitment of our local community/Coast Care groups in the management and care of their local coastline. To find out how you can adopt a beach and form a coastcare groups contact [www.beachawards.ie](http://www.beachawards.ie)

An Taisce recently announced 7 Blue Flag awards and 12 Green Coast awards for County Cork bathing areas. The Blue Flag and Green Coast certificates were presented to Cork County Council at a ceremony in Cork on 25th May 2017.

|                   | BLUE FLAGS   | GREEN COAST  |
|-------------------|--|--|
| <b>East Cork</b>  | Redbarn  | Ring<br>Ardnahinch<br>Inch   |
| <b>South Cork</b> | Garretstown<br>Garrylucas                          | Rocky Bay<br>Fountainstown<br>Oysterhaven  |
| <b>West Cork</b>  | Inchydoney<br>Owenahinch<br>Tragumna<br>Barleycove | Inchydoney East<br>Red Strand<br>Ballyrisade<br>Galley Cove<br>Garrinish<br>Dooneen Pier |

**IT'S A GREAT DAY TO BE AT THE BEACH!**



# ECO ECHOES: ASBESTOS

## *The Miraculous but Deadly Mineral*

By Walter Mugdan<sup>1</sup>

January, 2017

WELL over 4,000 years ago people had already discovered the extraordinary properties of a group of minerals we know as *asbestos*. Unlike other rocks, these minerals are made of countless tiny fibres. But like other rocks, these minerals and the fibres of which they are composed are essentially fire-proof. Together these two characteristics explain why asbestos was for millennia thought of as an almost miraculous material, and why during the past century it came to be used in an astonishing array of industrial, commercial and consumer products.

Alas, this miracle material is a silent killer that has caused debilitating disease and death for hundreds of thousands – perhaps millions – worldwide.

Asbestos fibres are truly tiny. The fibres you can see with the naked eye are actually composed of many smaller fibres, which are themselves made up of even smaller fibres. These microscopic fibres range from 1/5 to 1/10,000 the width of a human hair. The fibres are long – typically twenty times as long as they are wide.

Size and shape matter. Because they are so tiny, the fibres become readily airborne and are easily inhaled into the lungs. And because they are shaped like needles, they become embedded in lung tissue, causing scarring and cellular damage, thought to be the physical mechanisms that cause the diseases.

It seems a cruel trick of nature that a substance so useful in so many ways should also be so dangerous.

The earliest evidence of use comes from Finland, where potters 4,500 years ago mixed asbestos fibres into clay to strengthen earthenware pottery. By the first millennium AD, from Europe to China, cloth woven from asbestos fibres was being used for its fire-proof qualities ... or sometimes just to facilitate a neat parlour trick, as when the Persian king Khosrow II would clean his table napkin by throwing it into the fire.

Extensive utilization of the miracle fibres began in the second half of the 19th century with successful manufacture of asbestos yarn in Germany and Scotland. Soon dozens of other uses were invented: fire-retardant coatings for structural components, pipes and pipe insulation, furnace and fireplace brick and cement, electric wire insulation, flooring, roofing, exterior siding, plaster, drywall, joint compound, clothing irons ... even children's crayons. By the middle of the 20th century asbestos products were ubiquitous – widely used in both commercial and residential construction as well as consumer products.

Yet the role of asbestos in causing disease had been identified as early as

1898. Lung diseases and early deaths had been noted in asbestos factories and mining towns. In 1900, at Charing Cross Hospital in London, the autopsy of a young man who had died of pulmonary fibrosis after working 14 years in an asbestos textile factory found asbestos fibres in his lungs. In 1902 Britain's Inspector of Factories, Adelaide Anderson, listed asbestos as a harmful industrial substance.

In 1924 the death of Nellie Kershaw, a young woman who had worked seven years in a factory spinning asbestos into yarn, led to the first diagnosis of asbestosis, one of two "signature" diseases associated with asbestos. The other is mesothelioma, a virulent form of cancer that affects the lining of the lungs and other organs; its association with asbestos was confirmed in the 1940s. We now know that hundreds of thousands have died from these two diseases.

The ship-building industry used asbestos extensively for fire-proofing and insulation on boilers and steam fittings. The workers who applied the stuff were particularly vulnerable. In the United States alone an estimated 100,000 have died, or are terminally ill, from asbestos-related diseases, through exposure from ship-building. (This includes family members of workers who brought asbestos fibres home on their clothing, and residents who lived near the shipyards.)

It is estimated that some 10,000 people die each year in the U.S. from asbestos-related diseases. Asbestos workers who smoked are at significantly higher risk than those who did not.

It also became apparent over the decades that asbestos is most dangerous when in "friable" form, which means easily crumbled or pulverized. This makes sense: if asbestos-containing material can easily be crumbled (for example, by crushing between the fingers), then the fibres are likely to be liberated from the "matrix" in which they have been manufactured and become airborne and breathable. That's why asbestos in fluffy insulation is more dangerous than asbestos in a solid concrete matrix.

Despite the relatively early understanding of the terrible health effects of asbestos exposure, use of the material in myriad applications continued to increase. In the U.S. it reached its peak in 1973, with consumption exceeding 800,000 tons that year; worldwide, peak consumption was in 1977 with 4.8 million tons produced.

Since then, asbestos use has fallen significantly. The decline followed creation of the United States Environmental Protection Agency in 1971. Among the new agency's earliest actions was a 1973 ban on spray-applied asbestos-containing material for fireproofing and insulating purposes. That was followed in 1975 by a ban on many forms of asbestos pipe insulation, and in 1978 by a ban on

additional types of spray-applied surfacing materials.

EPA also regulated renovation and demolition activities that involved removal of asbestos-containing materials. And in 1977 the U.S. Consumer Product Safety Commission banned asbestos use in artificial fireplace embers and wall patching compounds.

In 1989 EPA finally banned asbestos in nearly all uses and products. However, this rule was challenged by the industry and overturned by a U.S. appellate court. As a consequence, a large number of uses remain legal in the U.S., though the amount of asbestos in yearly production is greatly diminished. Continuing uses range from cement shingles, to disk brake pads and clutch facings, to specialized fireproof garments.

Though the U.S. led the way, bans are now broader elsewhere in the developed world, including the European Union, Australia, Hong Kong, Japan, and New Zealand. On the other hand, in places like India, China, Russia and Brazil, there is continued extensive use of asbestos, primarily in asbestos cement building products for roofing and siding. Though these products themselves are not friable, cutting and drilling them for installation liberates the asbestos fibres. Similarly, the fibres can be mobilized when pieces fall to the ground and get crushed.

In the U.S., numerous locations where asbestos was mined, manufactured or disposed have become "Superfund" sites – places EPA has designated as high priority hazardous waste cleanup sites. Among the most notorious is the small town of Libby, Montana, where the W.R. Grace company operated a vermiculite mine. Vermiculite is a mineral similar to mica which is sometimes naturally contaminated by small amounts of asbestos. At its height, the Libby mine supplied 80% of the world's vermiculite, and it did contain asbestos. Not only did many Libby residents work at the mine, but the mine's byproducts were used throughout the town in buildings, backfill and landscaping. Nearly 10% of the population has died from asbestos-related diseases. The U.S. government criminally prosecuted the W.R. Grace company and seven officials for knowingly endangering the residents, though the defendants were ultimately acquitted. In the meantime, the company declared bankruptcy, and EPA has spent over \$425 million on the cleanup of the town including homes, yards and public areas.

The Grace company bankruptcy was due partially, but not entirely, to the Libby situation. Grace – like over 8,000 other companies involved in some way with asbestos – was named as a defendant in lawsuits by persons suffering from asbestos-related diseases.



Top from left: Warning on a building, contaminated with asbestos; Asbestos fibres may be released into the air by the disturbance of asbestos-containing material during product use, demolition work, building or home maintenance, repair, and remodeling; Asbestos pipe wrap (joint partially removed).

The first lawsuits against asbestos manufacturers were brought in 1929; but the number of claims skyrocketed after 1982 when a retired boiler-maker won a record award of \$2.3 million in compensatory and \$1.5 million in punitive damages. In the following decades nearly a million people have filed claims. In response, many of the defendants, like Grace, declared bankruptcy, starting in 1982 with the Johns-Manville Corporation, a Fortune-500 company – at the time, the largest company ever to file bankruptcy. In due course, more than half the major asbestos manufacturers sought bankruptcy protection. The total costs of asbestos litigation in the U.S. are estimated to eventually reach \$250-\$275 billion. (Litigation has also occurred in other countries, including Ireland, Scotland and England, but the awards have not been as large as in the U.S.)

Construction of the first of the twin towers of the ill-fated World Trade Center in New York City was underway when EPA's 1973 ban on spray-on asbestos coating went into effect. The first 40 floors had already been built with asbestos coating. On September 11, 2001, after the terrorist attacks, both towers collapsed. Among the many terrible consequences of the attacks, an estimated 1,000 tons of asbestos was in the huge dust cloud that billowed through lower Manhattan, and in the pile of debris left where the towers had stood. EPA mounted an intensive cleanup throughout the surrounding area, initially focused

on outside areas but ultimately including indoor spaces.

Many firefighters and other emergency responders have suffered serious health effects, but these are believed to be primarily associated with exposure while working directly on the debris pile. They were exposed not only to asbestos, but to a mixture of dangerous fumes from the fires that burned for weeks deep within the pile.

To date, there is no evidence that people who lived or worked near the World Trade Center site in the months and years after 9-11 were also harmed by asbestos or other substances. But it is sobering to reflect that the time between harmful exposure to asbestos and the appearance of disease is typically between 10 and 20 years, and can be as long as 40 years. And the U.S. Occupational Safety and Health Administration states: "[T]here is no 'safe' level of asbestos exposure.... Asbestos exposures as short in duration as a few days have caused mesothelioma in humans. Every occupational exposure to asbestos can cause injury or disease; every occupational exposure to asbestos contributes to the risk of getting an asbestos related disease."

<sup>1</sup> Walter Mugdan 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.

# In Search of Quality

By Ian Townend

In his book, *"Zen and the Art of Motorcycle Maintenance"*, Robert Pirsig explores the meaning of Quality. He arrives at an understanding (but not a definition) that encompasses reality itself and acknowledges both a romantic part (we somehow know quality when we see it) and a classic part (that is based on the underlying form). The same idea can be found in Lao Zi's book, the *Dao De Jing*, written some 2,400 years ago. For Pirsig, Quality is the coming together of this elusive presence (romantic part) and the definitions we give it when we define subjects and objects (classic part).

That was back in 1974. More than 40 years on we have seen an explosion in scientific publications. Does this mean we have lost sight of quality, or are there just more people, more outputs and so more papers? In the digital age, has the ability to count what is published and who makes use of the published outputs (by tracking who cites which papers), led to a set of measures, or metrics, without ever identifying the actual value (real quality) of a paper? There are a lot of signs that suggest this is the case. In this age of big-data and continuous on-line feeds of information (and dis-information), we are being swamped and we do not yet have the tools to sort the wheat from the chaff.

The scientific community has long claimed that peer review provides this filtering for us. But does it?

Much has been written about how the peer review process provides a process to ensure that papers are checked and those that are not good enough do not get published. So how do we know when something is not good enough? Well, if things are blatantly wrong it should be easy. Although my father once commented about the number

of times he found mistakes in the mathematics within the first few lines of published work. So, even this is not guaranteed by the review process. More usually it is not so clear cut. Spotting whether a paper is really an advance, makes use of the most appropriate methods, synthesizes the results with existing knowledge and draws robust conclusions, depends on the knowledge and experience of the reviewers. When the community was (comparatively) small and the pace of academic life was intense but measured, the focus was more on publishing meaningful work than quantity of output. Criticising the work of others was an integral part of one's own work. This meant that reviewers took time to review work carefully and set a high standard for publication. The corollary was that it could be difficult to get new ideas published, if they countered the established order.

This standard seems to have been eroded by the rapid growth of the scientific community. The number of researchers now seeking to publish from all around the world has burgeoned. At the same time the number of specialisms and the outputs are broken down into progressively smaller and smaller silos. Even within these silos, the number of researchers and the pressure to publish (usually several papers a year) means that it is far less likely that a paper will be reviewed by a leader in the field. Indeed, I have spoken to several Editors recently who claim that their biggest challenge these days is finding reviewers (any one!).

What has caused this? The pressure to publish is now intense. It is bad enough that staff at most universities and research institutes around the world are tasked to produce so many papers a year. A more recent "innovation" is that PhD students are also required to publish at least one paper.



Within the Chinese system, those studying abroad and seeking rapid promotion need to publish 7 papers in international journals! Gone is the opportunity to develop a thesis as a solid, well-argued and integral piece of work. Salami-slice and publish is the order of the day.

So much of this is driven by metrics. Two of these are particularly invidious, namely the number of times an author is cited by others and the, so-called, impact factor of the individual journals. The latter was originally a metric to help journals assess their performance but has now been turned on its head and is used by government funding agencies as a measure of individual performance. Hence, not only is the measure of dubious value in the first place (the range from the highest to the poorest is similar to the global distribution of financial wealth, the top few being astronomically

more highly valued than the vast majority, leading to a system that is misrepresentative and dangerously out of balance in any attempt to identify quality), it is now being used for a purpose for which it was never intended or designed.

I have a colleague who is both saddened and annoyed by his most cited paper. The work presents field measurements of the seabed in the summer and winter and shows how things change quite dramatically. This paper is cited extensively because it provides values that can be used to set-up a numerical model. However, most use an average value, so ignoring completely the main conclusions of the original paper - that the value changes throughout the year!

From my own experience, I have also had to deal with editor/reviewer comments that are not aimed at improving quality but rather at improving the index factor of the

journal (after all if you are publishing in the journal and your performance is being judged by these metrics, it is in your own self-interest to help improve the impact factor of the journal). For example, I have often made use of work from the 50's and 60's which, frankly, has not been bettered and yet I am asked to find more up-to-date references (usually with some helpful suggestions of papers by the reviewer, or papers from the journal in question).

Having worked in industry, I am all too aware that what you measure and how you measure it drive behaviour. The same is true in academia. If an academic is to be judged by the number of papers published in journals with high impact factors these journals get swamped, the best referees develop review fatigue and the quality goes down. If an institution is judged (and hence funded) by whether it hosts an international journal, then it will set one up and the number of journals grows yet further. The dominance of metrics as the (lazy) way to judge quality means that behaviour is driven towards achieving the metrics, rather than high quality output. An attempt to address this, in part, is to include some measure of impact, as was used in the last assessment of university research in the UK. This helps to identify the value of research that is readily applied but still misses quality

in research that may provide an intellectual advance, or lie dormant for years until we see a use for it (so called blue skies research).

The idea that peer review provides some sort of gold standard is clearly misguided at best and foolhardy at worst. Some academics have even gone so far as to suggest that outputs produced by commercial companies are somehow of a lesser quality if they have not been peer reviewed. This fails to understand quality. For those in industry the metric driving behaviour is of course to make a profit but you do not stay in business if you do not achieve a level of quality that the client considers to be good value.

If you were hoping for a silver bullet, I am sorry but I do not have one. Maybe we should see the review process for what it all too often is these days, 'an informed proof read'. This does one level of filtering for us. Beyond that we need to look and engage with the work. To go back to where I started, we know quality when we see it and can only see it when we engage with it properly. The idea that the peer review system will deliver this, without putting in the time and effort, is pure academic vanity.

Ian Townend, Ocean and Earth Sciences, University of Southampton, Southampton, UK

## Ireland's Environment

### An Assessment 2016

Provides the national evidence base about the condition of Ireland's natural environment and the challenges and opportunities associated with its protection and management.

ENVIRONMENTAL INDICATORS

IRELAND'S environment

[www.epa.ie/irelandsenvironment/](http://www.epa.ie/irelandsenvironment/)

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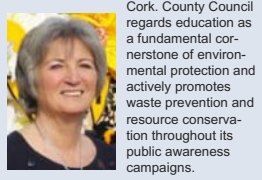


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The Environmental Awareness Research Unit of Cork County Council was established in 2005 by Dr Mary Stack, the Council's Environmental Awareness Officer. The Unit has responsibility for developing and implementing environmental awareness programmes in Cork County



Cork County Council regards education as a fundamental cornerstone of environmental protection and actively promotes waste prevention and resource conservation throughout its public awareness campaigns.

# Cork County Council

## Environmental Awareness & Research Unit

Showcasing initiatives from the 2007-2010 & 2011-2015 Environmental Awareness Strategies

The new five-year strategy (2016–2020) outlines key objectives of Climate Change, Sustainable Living, Antilitter Awareness, Water Conservation, Protection of Freshwaters and Coastal Environments, Protection of Biodiversity and Control of alien plant and animal species. These topics require integration into public education programmes.



**Fota Wildlife Park\***  
Fota Wildlife Park is a significant national tourist attraction with over 500,000 visitors per annum. It participates in the Local Authority LAPN waste prevention programme. Fota reduced their waste disposal to landfill and created GREEN ZONES throughout the Campus. Sustainable practices are embedded in the daily operations. The "Friday is Environment Day" initiative, lead by Dr Mary Stack and Lynda Mc Sweeney, Education Manager at Fota, is running for 10 years and has been very popular with hundreds of school children. The LAPN demonstrates that this sector of business can operate in a positive manner and reduce environmental impacts.

**Action at Work\***

The Environmental Awareness and Research Unit (EARU), managed by Dr. Mary Stack, commenced a pilot initiative 'Action at Work,' with County Hall staff, Charleville Area Office staff and Youghal Town Council participating. The initiative targeted paper reduction, phasing out of non-reusable batteries, reduction in use of ink cartridges, through electronic payments of salaries, increase the use of electronic messaging, doubled-sided photo copying, reduced colour printing, centralised printing, promotion of recyclable batteries. Conservation talks and demonstrations and supporting staff surveys, competitions on awareness.

Staff awareness events, including lunch time talks on managing green wastes/used clothes and unused presents collections for local charities, were organised at Council offices and civic amenity centres. An energy conservation talk and email/internet awareness campaigns supported the initiative. It is now Cork County Council policy to lead by example and conduct best practice in waste segregation and prevention as an exemplar to business and the wider community.



**Resource Efficiency in Public Swimming Pools\***



This pilot project provides information on how to reduce resources i.e. water, energy, chemicals and waste, which are required to operate a Cork County Council public swimming pool. This successful project acts as a platform and continues to be built upon in 2017, with continuous upgrades in lighting and heating equipment.

**Eco-Business Mentoring Programme\***

Cork County Council implements a mentoring programme which advises small and medium sized business on how to reduce consumption of raw materials, water and energy. Three examples include:  
1. The greening of Fota WLP initiative, an Initiative developed by EARU under the National Local Authority Network Waste Prevention Programme (EPA – LAPN).  
2. Participation in the Eco Merit Scheme for business. Five premises in Cobh Town are now accredited with Eco-Merit recognition. This scheme is now mentored by the South Waste Region Authority.  
3. Cork County Council's Energy Office through its staff graduate Internship programme on energy conservation has assisted many businesses to reduce their energy consumption and change over to smarter technology.

**Green Festivals\***



Greening public street festivals, such as the Midleton Food Festival where over 15,000 visitors a day attend, is challenging. Food festivals are a celebration of locally produced fare with food stalls, a farmers market, street entertainment, craft exhibitions and much more.

The EARU worked for 3 years with the festival committee. Volunteers were recruited to help with on-street waste segregation. Rates of waste being diverted for composting and recycling went from zero, prior to greening, to 41%. Stallholders were invited to become Green Members. A Sustainability Award for the best in show was awarded to the trader who demonstrated best sustainable practices. Towns/villages like Macroom, Cobh, Skibbereen, Eyeries and Castletownbere have all adopted the Greening Festival!



**Blue Flag Beach Awareness Raising**

Each summer our beaches and strands are entered into the Green Coast and Blue Flag beach awards. Annual ceremonies are held across the county. Environmental awareness is raised via public education events on Blue Flag beaches. These initiatives are run by Cork County Council lifeguards and the Environmental Awareness Unit. Cork County Council also raises awareness by supporting environmental photographic competitions and Sherkin Island Marine Station's Competition for schools.

**"May is Compost Awareness Month"**

The "May is Compost Awareness Month" initiative has been successfully running for over 10 years. Initially held in partnership with garden centres across the County, the number of events continues to grow with allotment groups and GIY (Grow It Yourself) groups supporting this initiative.



Cork County composting demonstration areas are open to the public. As a supporter of the national Stop Food Waste Programme, Cork County Council has developed a demonstration composting area which aims to show people how different composting systems work. There are many different types of composting systems and figuring out which one is best for you, and how to use it properly, can be difficult. So if you'd like to learn more about composting and see composters in action, you can visit composting demonstration sites at:

1. Cork County Council, Inniscarra Waterworks. 021 4532700. www.corkcoco.ie
2. Life Time Laboratory, Lee Road [opposite County Hall]. 021 4941500.
3. Youghal Links Co-op Garden Centre.
4. Bandon and Cobh Allotments.

Schools, Tidy Town and Community Groups are all welcome. You must phone ahead to make an appointment.

**Marina & Harbours Initiative\***

Marinas and boaters can impact directly on the health of the ecosystem, and increasingly we need to learn to value and protect the beauty and diversity of our aquatic ecosystems. Marinas can influence boaters by establishing policies that prohibit operation and maintenance of vessels in ways that add pollutants to the water or hazardous wastes to the general waste bins. Two marinas in West Cork piloted the Local Authority Waste Prevention Programme Clean Marinas Initiative. These were Baltimore Harbour and Sherkin Island, a privately owned marina.

Union Hall, a commercial port, is participating in an initiative providing an Upcycling and Recycling compound for fishermen. This is to encourage the recovery and reuse of nets, ropes, boxes and other equipment. Hazardous waste i.e. oil, oil cartridges, oil rags etc are collected by a authorised providers. Fishermen are requested to participate in the Fishing for Litter project (BIM) which is supported by Cork Co. Council.



The Port is registered with the Council's Resource Exchange Network called SMILE, an online web site for commercial waste recovery and reuse. (www.smileexchange.ie)

**Green Flag Programme**

Cork County Council's Environmental Awareness Unit co-ordinates the Green Flag education initiative, which is an international programme for schools. In Cork, 342 of the 359 national and secondary schools are working on a Green Flag. Every year at an awards ceremony in May approximately 90 flags are awarded to Cork schools by the accrediting body An Taisce. The green flag programme is the most successful youth initiative in Cork County.

**West Cork Islands 'Be Green' Initiative\***

The Council is assisting island inhabitants to find long term sustainable solutions to protect scarce resources and safeguard safe guard the islands fragile environment. A 50-page guide: Managing Your Household Waste & Domestic Water Usage" has been distributed to all island householders. Island schools participate in the Green Flag Programme and each year the islands achieve Tidiest Island Awards in National Tidy Towns Competition. Annual environmental initiatives are supported on the islands, with the assistant of the Development Committees e.g. environmental workshops supporting summer youth camps.



**School Water Conservation Project\***

Many schools projects are supported and can be viewed in the environmental awareness annual reports posted on the Cork County Council website. One example is a Cork County Council /CIT water conservation pilot project, in which West Cork schools participated. The project involved the development of an easy to use online tool for recording and comparing water use in national schools. This tool allowed these schools to record these readings online and produce graphs that reflected their water use. The information collated allowed for a key performance indicator (KPI) to be measured. This KPI determined the unit volume of water per pupil per day at school.



**Anti-Litter Awareness**

Three very successful programmes are run each year. In April are national spring clean events, with over 400 group and individual registrations. In May, the national CHEW IT BIN programme is launched to target chewing gum pollution on our streets. June to August sees the county-wide anti-litter challenge for villages and towns with over 90 entries.

\* Funded by the EPA / LAPN (Local Authority Waste Prevention Programme)



# Fifty Years of Heritage Interpretation at Muckross House Killarney

By Patricia O'Hare

MUCKROSS HOUSE, Killarney, was built for Colonel Henry Arthur Herbert and his Scottish wife Mary Balfour. Completed in 1843, it was designed by the well-known Scottish Victorian architect William Burn. Herbert reached high office and briefly served as Chief Secretary for Ireland in 1857-1858. However, the Herberts reached the pinnacle of the social ladder in August 1861 when they hosted a two night visit of Queen Victoria to Muckross House. Thereafter, the financial fortunes of the family experienced a decline. Colonel Herbert died in February 1866 and was succeeded by his son, Major Henry Arthur Herbert (Harry).

Over the following decades, the Muckross Estate became heavily mortgaged to the Standard Life Assurance Company of Scotland. The company

foreclosed on the mortgage early in 1898 and the following year the property was purchased by Lord Ardilaun, of the Guinness family. He, in turn, sold it to Mr William Bowers Bourn of California, in 1911. Bourn purchased the estate as a wedding present for his only child Maud. The previous year she had married Arthur Rose Vincent of Cloonlara, County Clare. Following Maud's early death in 1929, her husband and her parents gifted Muckross House and its Estate to the Irish nation. Thus it was that Ireland's very first National Park came into being on January 1, 1933.

For the following three decades, Muckross House stood vacant and forlorn, although its gardens were open to the public. Over that period of time many suggestions were made as to how the House might be utilised. A proposal made in November 1963 that it should be converted into a luxury hotel

was met with a swift and vigorous outcry. Instead, at a public meeting held in the town, local man Dr Frank M. Hilliard suggested that the House should be developed as a Folk Museum. This idea was met with approval. Negotiations took place with James Ryan, then Minister for Finance and the man responsible for Muckross House. As a result of these successful talks, the House officially opened to the public on June 14, 1964. During that first season, 19,500 people, of 48 different Nationalities, crossed the threshold. Following this success, the Minister granted a ten-year lease of the House on condition that a limited company would be formed. As a result, the Trustees of Muckross House (Killarney) Ltd., was incorporated in May 1965. To this day, the Trustees have remained a voluntary body, its members drawn from all walks of life from within the local community.

The early years were very challenging for the Trustees but despite this they did establish a number of craft workshops. Today Muckross is home to a very successful weaving workshop, a pottery and a paper conservation and bookbinding studio. All are located in the Walled Garden Centre, which is situated adjacent to Muckross House. This centre also incorporates a shop and a 170-seat restaurant, both of which are popular eating and shopping locations.

Since the early 1980s, a series of joint partnership agreements have periodically been signed between the State and the Trustees of Muckross House. The State has retained overall responsibility for the upkeep of the House, while the Trustees have developed Muckross Traditional Farms and other supporting facilities. During the 1990s much effort was also expended in restoring important rooms within Muckross House, such as the Billiard-room, Dining-room and the Queen's suite.

Muckross Traditional Farms first opened to the public in 1993. These are real working farms, which portray a way of life that was familiar to most Irish people during the 1930s and 1940s. Today the yearly cycle of traditional agricultural and seasonal activities continue here, as if time has been suspended and the horse still reigns supreme. The Farms also incorporate an animal petting area and a playground, both of which are very popular with our younger visitors.

From their inception, the Trustees have collected books, documents, photographs and other items relating to the social history of County Kerry. These collections now form the nucleus of the present Research Library, which aims to document the social history of County Kerry. One of the most important collections we have received in recent years is the extensive photographic collection belonging to Dr Daphne Pochin Mould. A frequent contributor to this paper, Dr Mould was also a long-time friend of Muckross. As a result, she bequeathed her entire collection to the Trustees and a selection of her aerial photographs will shortly be made available online. ([www.muckrosshouse-researchlibrary.ie](http://www.muckrosshouse-researchlibrary.ie))

The Library supports the educational and outreach projects undertaken by the Trustees. Since 1996, the annual *Muckross Newsletter* has been distributed free to all schools, colleges, libraries and tourist offices within the county. This publication contains items of news and events relating to Muckross, as well as articles relating to our most



Mucros bookbindery.



Autumn colours at Muckross Gardens.



Local school children meet 'Queen Victoria' at Muckross in March 2017.

recent areas of research. The Library staff organise educational tours of Muckross House, with local re-enactors, for primary school children during the winter months. Eyes widen in surprise when the pupils find themselves face to face with 'Queen Victoria' in the Drawing-room, or the 'Victorian cook' in the Kitchen!

Situated close to Killarney's world-famous lakes, Muckross House takes full advantage of its beautiful setting and wonderful natural environment. It is also an exciting and vibrant location. This summer why not come and see for yourselves?

Patricia O'Hare,  
Muckross House, Gardens & Traditional Farms,  
The National Park,  
Killarney, Co Kerry.  
[www.muckross-house.ie](http://www.muckross-house.ie)

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Buttermaking at Muckross Traditional Farms.



Foley's dwelling, Muckross Traditional Farm.



Muckross Traditional Farms are actual working farms complete with people and animals.



## *Fifty Years of Heritage Interpretation*



Fowl at the farm.



Queen Victoria's Bedroom at Muckross House.



Labourer's cottage – the farm dwellings are furnished in traditional style, complete with dressers, settlebeds and mealbins.



Traditional dresser Muckross Traditional Farms.



The Kitchen at Muckross House.

Images courtesy of Muckross House





Installing a temporary monitoring platform at Carrowkeel Turlough, Co. Roscommon.

Images courtesy of GSI



Road closure due to groundwater flooding, Gort Lowlands, Co. Galway.

# GW Flood

## Groundwater flood monitoring, mapping and modelling programme

By Rebecca Bradford<sup>1,2</sup>,  
Ted McCormack<sup>1</sup>, Owen  
Naughton<sup>1,3</sup>, Caoimhe Hickey<sup>1</sup>

IN response to the unprecedented flood events of 2009 and 2015, the Irish Government included a commitment on flooding in the latest Programme for Government (2016) under Climate Action. *“Turlough Systems: We will provide resources to the OPW to commission studies into individual problematic (prone to flooding) Turlough systems, if requested by a local authority or another relevant State agency.”*

In order to deliver on this, Geological Survey (part of the new Department of Communications, Climate Action and Environment) has commenced a new project, GW Flood, to investigate flooding specifically related to groundwater and turloughs. The project builds on long standing expertise in house on karst and groundwater, and existing academic collaborations in the area. The phenomenon of groundwater flooding can pose a significant flood hazard for many rural communities and its increased frequency in recent years highlights the clear need for further research into the issue of groundwater flood prediction and risk assessment in karst regions. Groundwater flooding is primarily associated with turloughs, seasonal lakes which are found in lowland karst groundwater flow systems. These lakes typically flood on an annual basis due to winter rainfall and increased groundwater levels and over 400 are known to exist, primarily located on the pure bedded limestone lowlands in counties Roscommon, Galway, Clare and Mayo. The Geological Survey, in collaboration with Trinity College Dublin is developing a monitoring, mapping and modelling programme to address the knowledge gap regarding these complex karst systems. This programme will enable the OPW and local authorities to develop flood mitigation strategies for groundwater flooding and allow for better informed decisions regarding future groundwater flood risk management. The primary objectives of the project are to:

- Establish a permanent, telemetered monitoring network to provide long-term data and real-time monitoring of groundwater flooding.
- Use novel remote-sensing and hydrological

modelling techniques to improve national groundwater flood hazard maps. .

- Develop modelling/analysis methodologies for estimating flood frequency including the potential impact of climate change on groundwater flooding on turlough hydrological systems in the future.

To date over 40 temporary monitoring stations have been deployed in counties Roscommon, Galway and Clare with additional stations currently being installed in County Mayo. Construction of permanent monitoring stations will commence at selected turloughs in mid-2017 and continue through to 2019. Remote sensing technologies such as airborne LiDAR and Satellite Synthetic Aperture Radar (SAR) systems are being utilised to generate high resolution terrain models and delineate flood extents. With these monitoring and mapping strategies in place, hydraulic models will be developed for priority turlough sites to investigate the causative relationship between rainfall quantity, duration and flooding (flood frequency analysis), to reconstruct long-term hydrological records for key sites and investigate the potential impacts of climate change on groundwater flooding. Data from the monitoring will be made public via the web using [gsi.ie](http://gsi.ie) and other online resources.

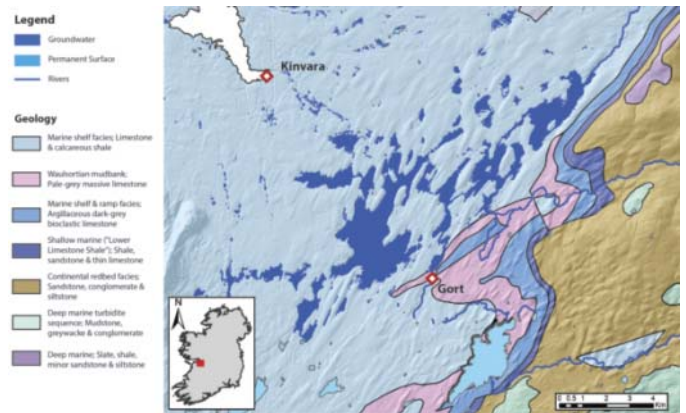
The project is overseen by an Advisory Committee with representatives from OPW, NPWS, EPA, relevant Local Authorities, TCD and experts in karst flooding. This project will provide the essential technical knowledge through the monitoring, mapping and modelling of turloughs to facilitate decision makers and relevant stakeholders with greater information on the drivers and mechanisms of groundwater flooding, enabling them to make scientifically informed decisions regarding flood mitigation measures.

Further information see [www.gsi.ie](http://www.gsi.ie) (new website coming in 2017!)

Follow us on twitter @GeolSurvIE & @GSIGroundwater

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Flood extent and Geology Map, Gort Lowlands, Co. Galway.

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# Restore and Protect Water Quality

## A key message from the EPA State of Environment Report

By Brendan Wall

THE Environmental Protection Agency published its sixth State of the Environment Report in November 2016. The report entitled "Ireland's Environment - An Assessment 2016" provides the national evidence base about the condition of our natural environment and the challenges and opportunities associated with its protection and management. The report covers both the successes and failures of national environmental policy. It examines the quality of our environment through assessments covering thematic areas such as climate, nature, waste, as well as assessments on key sectors.

Overall, there are many positives in the Report and people can take heart from those. We have made progress in many areas over the last 20 years, but we are still losing much of what is positive, beautiful and economically valuable about our environment. What is absolutely clear is that we are at a crossroads and the choices we make now will have implications for the future of Ireland's environment. The seven key environmental actions for Ireland are summarised in the table below.

You can read the full report at: <http://www.epa.ie/ireland-environment/stateoftheenvironmentreport/> and messages covering water from the report are outlined below, to provide an overview of the type of information contained in the report. To complement this report the EPA has developed the "Ireland's Environment" section on the EPA website which provides up-to-date online information that includes environmental indicator data.

### Implement Measures that Achieve Ongoing Improvement in the Environmental Status of Water Bodies from Source to the Sea

Water protection measures are needed to ensure that we continue to have healthy rivers, lakes and estuaries and clean beaches in order to protect human health, to preserve fish and biodiversity and to allow our important water resources to be a driver for sustainable jobs and tourism. We are still a long way from meeting the full legal requirements of the Water Framework Directive, against which water quality is measured. Preliminary results indicate that there has been no overall improvement in water quality over the first river basin cycle (2009-2015). The target of a 13.6% improvement in the ecological status of surface waters (from the 2009 baseline) by 2015 was not achieved. Water quality improvements are required at approximately 50% of rivers, lakes and estuaries that are impacted by pollution or other pressures. The report notes that the two main suspected causes of pollution in rivers are agriculture and municipal sources, accounting for 53% and 34% of cases, respectively. More recent figures published in February 2017 as part of the draft River Basin Management Plan for Ireland 2018-2021, which is open for consultation, now indicate that the balance is shifting more towards agriculture being the most significant pressure due to the recent investment in urban waste water treatment.

Physical modifications, such as barriers to fish migration, are also a key pressure that needs to be tackled. While overall the length of unpol-

luted river channel has remained relatively constant, there has been a substantial loss in the number of highest quality river sites (i.e. Q value of 5). In the most recent monitoring period (2013-2015) only 21 sites were classified as the highest quality river sites (0.7% of sites) compared with 575 between 1987 and 1990 and 82 between 2001 and 2003. This is an area where substantial effort is required to protect the few remaining sites and, where feasible, return impacted ones back to their earlier extremely high quality.

Urban waste water is still one of the principal pressures on water quality in Ireland. There is a need for continued investment in waste water treatment facilities. This investment is needed to provide, upgrade and manage the sewer networks and treatment facilities necessary to treat sewage and industrial water to the standard needed to protect human health, and water quality in our rivers, lakes and coastal areas.

One of the measures being implemented to improve and protect water quality is the use of a new risk-based approach to managing water catchments. This new approach will require much better targeting of interventions to restore and protect water quality as well as a greater community involvement in protecting and managing our water resources.

Ireland's marine environment has remained relatively unpolluted; however, the level of environmental stress both from internal and external sources has increased. The sustainability of fish catches continues to be an issue; 36% are considered to be sustainably fished. Overfished stocks have declined to 26%, and 38% remain at an unknown

status. Untreated sewage is discharged at 36 estuarine or coastal locations. Overall, 71% (46 out of 65) of the urban areas that have inadequate treatment or do not meet mandatory EU standards, discharged to estuarine or coastal locations in 2015. Marine litter is now a global issue and the impacts can be seen on even the remotest of our beaches. While litter is a key marine environment and biodiversity challenge, its generation and prevention are linked to a variety of human activities and policy areas.

Successful implementation of a comprehensive targeted waste policy is a prerequisite to avoid plastic litter entering the marine environment.

Other stresses on our coastal environment are wider and link to the impacts of climate change. From a climate perspective, rising sea temperature, ocean deoxygenation, rising sea levels and ocean acidification (the effects of which are being seen in Irish waters) are major causes of concern worldwide. The rich coastal marine grasses and kelp forests are significant car-

bon sinks (as well as important biodiversity reservoirs) that need protection and enhancement. Issues covered in this report on the marine area point towards the need to protect coastal, estuarine and marine areas through better integration of the actions required under different water, marine and nature directives.

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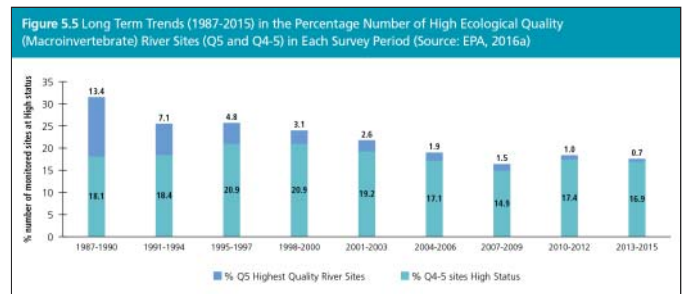


Figure 13.1 Seven Key Environmental Actions for Ireland on the State of the Environment in 2016

|                   |  |   |  |
|-------------------|--|---|--|
| SYSTEMIC MESSAGES | <b>Environment and Health &amp; Wellbeing</b><br>Recognition of the benefits of a good quality environment to health and wellbeing.  | <b>Climate Change</b><br>Accelerate mitigation actions to reduce greenhouse gas emissions and implement adaptation measures to increase our resilience in dealing with adverse climate impacts. | <b>Implementation of Legislation</b><br>Improve the tracking of plans and policies and the implementation and enforcement of environmental legislation to protect the environment. |
|                   | <b>Restore &amp; Protect Water Quality</b><br>Implement measures that achieve ongoing improvements in the environmental status of water bodies from source to the sea.               | <b>Sustainable Economic Activities</b><br>Integrate resource efficiency and environmental sustainability ideas and performance accounting across all economic sectors.                          |  |
|                   | <b>Nature &amp; Wild Places</b><br>Protect pristine and wild places that act as biodiversity hubs, contribute to health and wellbeing and provide sustainable tourism opportunities. | <b>Community Engagement</b><br>Inform, engage and support communities in the protection and improvement of the environment.   |  |

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# WILD & CULTIVATED MINTS

## The Genus *Mentha*



Peppermint (*Mentha x piperita*)

By Tony O'Mahony

MINTS (the genus *Mentha*) are a member of the large family **Lamiaceae**, which latter includes many aromatic species that are used in cooking, medicines and perfumery. Most of the members of this family bear four-sided stems, their leaves disposed in opposite pairs, while their fruits consist of four nutlets. The flowers of Mint are unspecialised, but provide copious nectar that is avidly availed of by numerous insect species – such that an incessant buzz of activity radiates from the vicinity of the mint populations during their flowering period. The very distinctive sweet or peppery taste and scent of mints are familiar to virtually everyone, given their use in cooking, and their commercial use in products such as ice-cream, chocolate, biscuits, sweets, toothpaste and medicines. Yet, most people are unfamiliar with the general appearance of the living plants' themselves, while many botanists shy away from the study of *Mentha*, and thus have little knowledge of its species and hybrids. At the root of this problem, is the complicated taxonomy of mints (see notes below), which is of long standing. In reference to this matter, R.M. Harley (a world expert on this genus) once stated: "There are only ten species of *Mentha* recognised from Europe now, but in the *Index Kewensis*, the names of over 900 species and hybrids are listed, chiefly from Europe. The majority of these are worthless". In the same

article, Harley attributed most of the blame to "taxonomic ineptitude" during the 19th century and early part of the 20th century, but commented that modern taxonomic methods (such as gas chromatography, which is used to analyse the aromatic mint oils) have provided welcome new characters as diagnostic aids. Harley also noted that "There is a long history of [mint] cultivation in Europe, N. Africa and Asia, going back into antiquity. Cultivated mints are known from funeral wreaths from Thebes, in Upper Egypt".

### British & Irish Mint Species

Only four mint species are native to Britain: Pennyroyal (*M. pulegium*), Water Mint (*M. aquatica*), Corn Mint (*M. arvensis*) and Round-leaved Mint (*M. suaveolens*) – of which the first three are also native to Ireland, while Round-leaved Mint has a long history of cultivation in Ireland, where it is widely naturalised in the wild. Of these four, Pennyroyal is now nationally rare in both countries, and is legally protected as a consequence. Yet, in past centuries, Pennyroyal was of locally frequent occurrence, so that its catastrophic decline in numbers in recent times is something of a mystery, though it is probably related to habitat loss and the short-lived nature of its rhizome-segments, which must be renewed frequently, in order to conserve the population. In Britain, the major extant site for Pennyroyal is the New

Forest National Park in Hampshire, where rutting of the ground by the resident ponies, provides ongoing micro-sites for the establishment of new shoots of this species. Today, on the island of Ireland, the most steadfast colonies of Pennyroyal are to be found on the margins of Lough Beg, a satellite lakelet, to the north of Lough Neagh – the latter the largest inland lake in either Ireland or Britain. Water Mint, by contrast, is abundant along river-courses and in other damp habitats, where it often cohabits with Corn Mint, while their interspecific hybrid, Whorled Mint (*M. x verticillata*) frequently accompanies both of its parents in these wetland habitats. Over the past thirty years or so, Corn Mint has greatly declined in its cornfield habitat, given the reduction in tillage, but it is still of common occurrence in its natural wetland/paludal habitats. As is evident from the photograph of Round-leaved Mint, its upper leaf-surface is *densely wrinkled*, while another distinctive diagnostic feature of this species, is the fact that many of its leaf- and stem-hairs are *branched*, whereas simple, non-branched hairs are the norm in most mint species.

### Hybrid Mints

Most mint species have the potential to readily hybridise when growing in close proximity to each other, while the



Round-leaved Mint (*Mentha suaveolens*)



Pennyroyal (*Mentha pulegium*)

rhizomatous growth-habit, ensures that their hybrid offspring can persist and flourish independently of their parents in the wild. Moreover, the hybrids can freely backcross to one or both parents, resulting in a bewildering array of variable offspring – two factors that add immeasurably to the taxonomic complexity of this genus! (Note: I have observed that many mint taxa sold commercially – especially those from plant nurseries – are frequently misnamed.) Of the many mint hybrids in existence, perhaps none is better known, or more commercially valuable, than Peppermint (*M.*

*x piperita*), the *pollen/seed-sterile* hybrid between Water Mint and Spearmint (*M. spicata*), a hybrid that is widely naturalised throughout Britain and Ireland, often along stretches of riverbanks. Intriguingly, while Peppermint exhibits the spire-like inflorescences of its Spearmint parent (rather than the blunt, head-like inflorescences of its Water Mint parent), the roles are reversed when it comes to its acquired scent – Peppermint inheriting its invigorating (and much amplified) *pungent* odour from Water Mint, rather than the deliciously sweet scent characteristic of

Spearmint. In Ireland, most, if not all, populations of Peppermint found in the wild are of *garden* origin, these displaying hairless, purple-flushed stems. Three other (usually seed-sterile) hybrids involving Spearmint – and retaining its sweet (*carvone*) scent – are naturalised in Britain and Ireland, but have different distributions and frequencies in both islands. These are: Ginger Mint (*M. x gracilis*), Tall Mint (*M. x smithiana*) and Apple Mint (*M. x villosa*).

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**GSI**

# Springtime on the Farne Islands

Anthony Toole visits the Farne Islands, a group of islands off the coast of Northumberland, England.

THE outlook was not encouraging. We arrived in the fishing village of Seahouses in a thick mist. The tide was out and what heat there was in the watery sun merely served to draw more clouds from the harbour mud. We were hoping to join the 9.30 am sailing to the Farne Islands, but on arrival at Billy Shiels' ferry kiosk, we were told that landings on Staple Island had been cancelled because of a dangerous sea swell. We would only be able to book the 12 pm sailing to Inner Farne. Having driven for an hour to get here, we had no choice but to accept the alternative.

The harbour mouth was completely obscured by the mist, but with little else to do, we strolled to the end of the pier. A few herring gulls and a solitary black-backed gull slopped through patches of marooned seaweed pecking for titbits, while eiders glided along the narrow channels that flowed between the banks of mud. A photographer we met told us that he had so far made six unsuccessful attempts to reach Staple Island.

At noon, along with about forty others, we boarded the *St Cuthbert II*, that bobbed in water just deep enough at the end of the pier. The mist still hung about, but in a thin layer low over the sea, for as we looked upward, it was to a clear, blue sky streaked with feathery cirrus. As the fog slowly dispersed, we spotted the occasional puffin, gull or cormorant flying past, followed by a group of half-a-dozen gannets. Things were looking more promising.

We sailed past Inner Farne and the smaller rocky islets of the Wideopens to its east, where a few grey seals wallowed in carpets of kelp, and slowed down only as we approached Staple Island. By this time, the mist had almost completely gone, and we saw for the first time, the enormous flocks of sea birds that packed the cliffs.

Kittiwakes perched, often two abreast, on ledges that appeared almost too small to support them, with the broader ledges and cliff tops taken over by vast numbers of guillemots. A much smaller number of razorbills mingled with the guillemots, while cormorants chose high points above the throngs to stand upright with wings outstretched. Some of the guillemots dived close to the boat, swam in clear visibility a metre below the surface, and emerged completely dry, with residual drops running off their water-repellent plumage.

The Farne Islands are outcroppings of the hard, quartz dolerite of the Great Whin Sill, that makes up the crags beneath Hadrian's Wall and the bedrock of Teesdale, well exposed at High Force and Cauldron Snout. Along the Northumberland Coast, it forms the prominences on which stand the castles of Bamburgh, Dunstanburgh and Lindisfarne. A volcanic intrusion, it forced its way through the earlier deposits of limestone and sandstone some 280 million years ago, and survives because these softer rocks have eroded during the millennia since then.

We passed the 20-metre tall pinnacles that stood to the east of Staple Island, and continued past Brownsman, Big Harcar and other smaller rocks that rose just proud of the waves. These were occupied by grey seals, that watched us drift slowly by with what looked like a measure of bored curiosity. Hunted for their skins and oil until the nineteenth century, their numbers fell to about a hundred. Today, there are three-to-four thousand here, making the Farnes one of

the most important breeding sites in the country. More than a thousand pups are born each autumn, though fierce winter storms often lead to only a 50% survival rate.

Before turning back toward Inner Farne, we continued past Longstone, from which in 1838, local heroine, Grace Darling and her father, William, the lighthouse keeper, braved the waves in a rowing boat to rescue survivors of a shipwreck on Big Harcar. The present lighthouse is said to have the most powerful light in Europe.

Landing at the jetty on Inner Farne was easy, and we followed it up toward the National Trust Visitor Centre, the 15th century Pele tower and the two small chapels that date from the 13th and 14th centuries. To our left was a curve of sandy beach across which ran a few ringed plovers. To the right lay a more rocky beach populated largely by terns. One of these landed on a nearby stone wall, holding in its sharp beak, a sand eel almost half the length of its own body.

A wooden boardwalk led us south past a huge colony of black-headed gulls, diluted by smaller groupings of Arctic and common terns. Puffins popped into and out of burrows in the soil and female eiders sat contentedly on nests of thick down, within a metre-or-so of the pathway. The southern end of the island was occupied by a lighthouse compound, and beyond that lay cliffs crowded with nesting guillemots, razorbills, kittiwakes and shags, many of them within touching distance, though a National Trust warden stood close by to answer questions and ensure that the birds were not disturbed.

A razorbill, one of a pair, stood up to reveal on its bare ledge, a single speckled egg, that appeared too big to have been laid by such a relatively small bird. By comparison, a much larger shag sheltered three smaller, plain coloured eggs resting on a layer of twigs that were continually being added to by her mate. Beneath another shag were three featherless chicks that resembled miniature dinosaurs.

By now, the mist had cleared completely, and Bamburgh Castle was sharply visible on the mainland coast. We moved round to a small picnic area on the sunny side of the lighthouse and ate a leisurely lunch, watched by a pair of scavenging herring gulls and a black-backed gull. The cliffs beyond were packed almost to capacity with noisy guillemots. The fishy smell of their guano, while quite strong, was not unpleasant.

Following the board walk farther west, we passed a sloping rocky shore occupied mainly by colourful male eiders. Locally referred to as 'Cuddy's ducks', these beautiful birds were beneficiaries of one of the first ever wildlife protection laws, instigated in 676 AD by St Cuthbert, whose constant companions they were during his last years on Inner Farne. Farther inland, the gull colony had now been augmented by the arrival of a flock of Sandwich terns.

We returned to Seahouses in bright sunlight on the *St Cuthbert III*, the companion boat to the one that had brought us to the islands. I kept a watch for the dolphins that have swum past on previous trips I have made to the Farnes, but I saw none this time. But that did not matter. The abundance and variety of birds we had seen brought enough thrills for one day. And I was already anticipating spending some pleasant hours sorting through the hundreds of photographs I had taken.

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From top: Seahouses Harbour, Inner Farne; Arctic Tern; Grey Seal; Puffin; Guillemots.

# Mud, Birds & Poppycock

By John Goss-Custard

Shorebird conservationists insist correctly that our coastal flats are vital to the survival of hundreds of thousands of shorebirds and the UK, again quite rightly, is committed to their protection by EU Directives.

UNFORTUNATELY, the Directives are sometimes applied in a way that suggests that many shorebird conservationists have come to believe that any human activity on the coast is bound to be detrimental. Although anthropogenic activities can indeed degrade shorebird feeding grounds, this does not mean that all human activities necessarily do so, every time and everywhere!

Most shorebirds occur in the UK from August to April when on migration or over-wintering. When exposed by the receding tide, intertidal flats provide food: most eat invertebrates but some wildfowl are herbivorous. The best environmental management issue with which to illustrate the culture that underpins the approach of many shorebird conservationists is disturbance from people due to dogwalking, kite-surfing, bait-digging etc. These activities are often viewed as self-evidently damaging to shorebirds. As a result, Environmental Impact Assessments (EIAs) seem more often designed to collect enough information to support a preconceived concern than rigorously to test the hypothesis that disturbance actually harms shorebirds, which is what good ecological science should do.

This is the biology of the issue. Shorebirds must survive until spring with sufficient body reserves to migrate to often distant breeding grounds. Birds that fail to do so may not even survive the journey let alone breed successfully when they arrive. Disturbance could reduce survival and body condition on the wintering grounds in these ways. Flying uses lots of energy, so being disturbed into flight increases birds' daily demand for food. As a shorebird cannot feed while flying, disturbance reduces the time available for feeding. Disturbance concentrates birds in disturbance-free areas – often of poorer quality than the ones vacated – where the increased density may intensify competition. Disturbance therefore increases the birds' energy requirements while making it harder for birds to meet them.

Acknowledging that disturbance affects the birds does not mean, however, that it necessarily has a significant impact, defined as follows. The Directives aim to maintain shorebird numbers. Disturbance could impact on numbers by reducing the birds' chances of surviving the winter and/or preventing them from achieving good enough body condition to migrate and breed successfully in spring. But all depends on the severity of the disturbance. One occasional dog-walk lasting five minutes may momentarily affect the behaviour of nearby birds but it would be too trivial to have a significant impact on their survival and body condition, and thus on population size. But if dogs (improbably!) occurred continuously in all areas, night and day, it almost certainly would. Whether there is an impact will depend on the amount of disturbance, its frequency, intensity and duration, as indeed the Direc-



The oystercatcher is a distinctive wader with its long orange-red bill and black and white plumage.



When exposed by the receding tide, intertidal flats provide food for shorebirds.

tives themselves make clear. And if there is no impact, the ill-defined notion of the 'integrity' of the site will not be affected either.

The main challenge for the objective shorebird ecologist is to identify the threshold at which increasing disturbance (or other environmental change, for that matter) begins to have an impact rather than merely an insignificant effect. This approach is by no means always adopted in EIAs. Often, only eye-catching behavioural effects are measured, like the distance birds take flight as people approach and how far they then fly.

Frequently disturbed patches of mud are shown to have fewer birds than undisturbed ones without any attempt being made to assess whether this re-distribution has a significant impact on the birds. Maps show that one kite-surfer may range over a large area, the untested implication being that much foraging space is thereby denied the birds for significant amounts

of time. Observations show that flocks of shorebirds may make a major disturbance flight about once every daylight hour without testing whether this causes the average bird to lose significant amounts of time and energy. The inference from all these observations is that the natural activities of the birds are so badly affected by disturbance that there simply must be an impact.

This approach can give a badly distorted impression of the magnitude of the disturbance experienced by shorebirds. It focuses research attention on the places and times where people and birds do occur together while overlooking the sometimes many other circumstances where they do not. In fact, most shorebirds feed for most of the time in places and at times where the risk of being disturbed is low. Most people occur on estuaries during the warmer months whereas shorebirds are most vulnerable, and usually most numerous,

during the coldest. Most shorebirds feed in the muddy areas that most people avoid. Over high tide when most water sports are carried out, most shorebirds are feeding or roosting elsewhere because the tide covers the flats. Very few people visit intertidal flats at night when most shorebirds also feed – some by preference. Disturbance often makes a bird bring forward a flight it would have done later anyway – to reach, for example, better feeding areas downshore as these low-lying places become exposed on the receding tide. Once birds have been disturbed from an area by the first few people to arrive, there are few, if any, left to be disturbed subsequently, however many more people arrive. A false impression is often given that shorebirds and people are not as segregated in time and space as actually they often are.

How has such questionable research come to be accepted as sufficient for devising policies to 'manage' recreation disturbance in coastal areas? I believe that there are three reasons: (i) the beliefs held by many conservationists and their supporting ecologists, (ii) the ecological and scientific naivety of some decisionmakers and (iii) the over-enthusiastic and un-balanced application of the Directives' precautionary principle.

## Culture

Perhaps exacerbated by the assertions of powerful, single-issue pressure groups, the constant repetition of the mantra that shorebirds are 'sensitive' and live in 'fragile' habitats fosters the belief that anything people do simply must harm the birds. The evidence shows that this is by no means always the case: indeed, human activities on estuaries can sometimes benefit shorebirds and can even be managed to do so! Yet many shorebird ecologists seem to feel that their research should support the preconceived and widely-held concerns of shorebird conservationists. Conservation is the good cause that provides a shared *raison d'être* for many shorebird ecologists and conservationists.

An anecdote illustrates the expectation some conservationists seem to have of their scientific colleagues. I advised that the removal of Cardiff Bay mudflats under a fresh-water lake created by a barrage across the mouth of the River Taff would put at risk the shorebirds that fed there, even though they could feed on the adjacent Severn estuary. I was asked whether anything could be done to mitigate this impact. I presented my solution at a public meeting. The idea was to puncture a nearby seawall alongside the main Severn estuary to convert the adjacent field into a mudflat. This 'lagoon' would have remained accessible to the birds for some 30-40 minutes after the estuary itself had been covered at high water on Spring tides because the narrow entrance culvert would have delayed the ingress of the tide. This would have extended the birds' intertidal feeding time, probably to their great benefit. After the meeting, I was berated long, hard and very publicly by three enraged conservationists. According to them, I should never have proposed anything that might have undermined their case against the barrage. Such arrogance! Surely, as a scientist, I had no right to attempt to distort public decision-making by selective use of knowledge that had been largely acquired at public expense!

### Decision-makers

The second reason that this doctrine has taken hold is the naivety of some of those charged with making decisions on matters that actually demand a good grasp of the science. It is not difficult to raise doubts in their minds that the 'science' is uncertain when some of them seem to know rather little about the scientific method in general and shorebird ecology and population dynamics in particular. See, for instance, some case histories in Jones, G. (ed.) 2012. 'The Habitats Directive: A Developer's Obstacle Course?' Hart Publishing.

### Precautionary Principle

The last and, I suspect, over-riding reason lies with the EU Directives themselves, and in particular, the precautionary principle. This loads the dice heavily in favour of those who view human activities on estuaries as inevitably damaging to shorebirds. In scientific research, of course, conclusions are presented in probabilistic terms. Scientists know that new ideas or new data may at any time challenge their current understanding. In such an open, self-critical and self-effacing intellectual climate, it really is not difficult to raise enough doubt for the precautionary principle to be invoked.

This is the fundamental contradiction: the Directives require that science be used to evaluate an impact but don't encourage the use of a fundamental concept of scientific judgement – probability. A very strong scientific case that there is minimal risk of significant damage to the birds can be ignored simply because someone says: 'We hear what you say but we have to be precautionary. Sorry!'

The precautionary principle is all well and good when there is uncertainty about impacts, when the risk, though low, is not negligible and the potential cost to conservation is high. But to apply the principle without a careful balancing of the magnitude of the risk against the magnitude of the consequences is an abuse of the principle – and it is not what it is meant to achieve. Its use is supposed to be 'proportionate' whereas, in practice, its use can seem absolutist instead. To demand, in effect, zero risk simply demands impossible science.

In fact, it sometimes feels as if just enough research is done to raise sufficient doubt to enable the precautionary principle to be invoked! On these occasions, contrary scientific evidence appears to be something to get round rather than to be used to assess risk! The approach of the objective scientist, however, should be rigorously to test the hypothesis that bird survival and body condition are likely to be decreased by disturbance and, importantly, to evaluate the risk that this will happen. But too often, discussion descends into a legalistic concocting of just believable scenarios rather than an objective appraisal of the evidence. This is made possible by the exaggerated implementation of the precautionary principle. The process seems often to be more of an exercise in absolutism than an objective assessment of the magnitude of the risk.

An example: On the Exe estuary, a levy is being charged on every new dwelling built near the estuary to provide 'mitigation' – of questionable and (to a scientist, disgracefully)



Redshank with a lugworm in its mouth.

untested effectiveness – for the impact that additional disturbance from the new householders may have on shorebirds. This has caused increased costs, yet more delays in planning and in the construction of much-needed dwellings. Equally sadly, it also increases the frustration with shorebird conservation.

My own independent and self-funded research has thrown overwhelming doubt on whether any mitigation is necessary because so little shorebird feeding is done in places and at times when there is a risk of disturbance. Additionally, Bournemouth University's (rightly cautious) model of shorebird disturbance in Southampton Water – in terms of shorebirds, very similar to the Exe – showed that it would require huge numbers of people for there to be a significant impact on Exe shorebirds. It would take 15,000-30,000 people to visit the estuary regularly to reduce shorebird survival, or approximately 10-20% of the entire population of the region! Needless to say, nothing like this number has, or ever will, occur there. Instead of employing an over-precautionary approach, the risk to shorebirds should have been assessed as being so minute as to be, for all practical purposes, non-existent.

There should be no room for this culture of eco-pessimism! It infringes the civil rights of people if they are prevented without good reason from carrying out otherwise perfectly legitimate activities. Objective, hypothesis-testing, ecological science should always be done to make intelligent risk-assessments of where mitigations really are both necessary and effective. Members of the public are becoming increasingly sceptical that mitigation funded by an enforced levy and restrictions on their activities are justified by the evidence: 'Why are birds more important than people' I often hear said. Such mounting anger threatens long-term support for a good cause. Shorebird conservation needs to be protected from the effect that the Directives have had on the culture of many shorebird conservationists!

I would like to thank Mike Begon for excellent advice on how to improve the wording. Also, my grateful thanks to the 20 or more very experienced colleagues who read various drafts, with especial thanks to those (about half) who replied, all of whom said that their experiences coincided with mine. Thanks also



A Greenshank on the left with a Little Egret on the right.

to the other half who did not reply and so did not retort that I must have been unlucky and my experiences singular.

*John Goss-Custard BSc PhD DSc was a professional shorebird scientist for 40 years, for most of that time being employed by the Natural Environment Research Council, latterly as senior Individual Merit scientist. Over thirty years, he and his colleagues developed and tested individual-based models of shorebird populations that predict the impact of a whole range of human activities – ranging from shellfishing through barrage construction to recreational disturbance – on the birds' survival and body condition over the non-breeding season. He has described this approach*

*in a non-technical account 'Birds and people: resolving the conflict on estuaries' which can be downloaded to an iPad, Kindle etc. at: <http://www.amazon.co.uk/dp/B00JMCBBQO/> After his retirement, he became Visiting Professor in the School of Applied Sciences at Bournemouth University, where the models are continuing to be developed and applied to a much wider range of animals and issues by the research team led by Professor R A Stillman.*

This article was first published in the Bulletin of the British Ecological Society (BES), June 2016. I am grateful to the BES for permission to reprint this article.

Marine Harvest currently employs 260 staff in the West of Ireland, supporting local communities in rural coastal areas to produce the finest salmon in the world, which is proudly presented to customers all around the world.

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### Answers to "Wordsearch about the Pygmy Shrew" on Page 31

**ANSWERS (Over,Down,Direction):** Bodyweight (25,1,SW); Bogland (15,2,SE); Enemies (7,7,W); Foxes (17,2,SE); Fur-covered Body (14,10,W); Gardens (23,1,SW); Hedgerows (9,6,W); High-pitched squeak (1,8,E); Humans (9,7,NE); Insectivores (1,9,E); Long tail (1,4,E); Mammal (13,7,NW); Meadows (24,3,S); Owls (22,6,S); Pygmy Shrew (26,1,S); Short life-span (13,2,W); Small (4,5,E); Small eyes (21,10,NW); Stoats (23,9,N); Whiskered snout (9,1,E); Woodland (25,9,N).

## The Irish Wildlife Collection Wildlife and nature writing from Ireland - Vol 1

By Calvin Jones

www.irelandswildlife.com

ISBN: 9781520402253

Price: £8.20/2017

This collection of wildlife and nature writings is a selection of articles, which the author has published in Ireland's Own magazine and a number of other high-profile publications. The reader is introduced to over twenty animals and plants, each with a dedicated chapter. The first is the Barn Owl and we get an insight into how it hunts and the animals it eats. They have exceptional hearing and can pinpoint the position of a mouse in complete darkness purely from the tiny sounds it makes. Unfortunately Barn Owl populations in Ireland and the UK are in serious decline due to intensive agriculture. For me, one of the most fascinating chapters is the one about the Fin and Humpback whales. The author lives in West Cork and regularly goes whale-watching along its coast. He describes, on one occasion, being amongst at least thirty Fin whales in the immediate vicinity with more blowing in the distance. On another occasion he witnessed a sight seen by few – a 30 tonne humpback whale leaping clear of the water. Humpback females give birth to a single calf every 2 to 3 years. The calves are about 16ft long at birth and weight 1.3 tonnes.

It is interesting to read that the recovery of the Pine Marten population in Ireland has caused a corresponding crash in non-native grey squirrels and a return of the native red squirrel. If one wants to know about bats there is an excellent chapter "Batty about Bats". He quashes a few of the common bat-related myths – for the record they are not dangerous. They are insect eaters and don't drink blood!

The author tells us that the Dandelion is not the useless weed that many dismiss it for. It has been advocated as treatment for a variety of ailments and is used for herbal drinks, wine, etc... In the chapter, "In defence of weeds", Calvin make an excellent case in the role weeds play in attracting insect and other invertebrates, birds and mammals, for which they depend very much on for their survival. He suggests weeds are much more than the garden pests they are labelled. There's a bit of room for native wild flowers in forgotten corners of everyone's garden.

Calvin Jones is a lifelong wildlife enthusiast, freelance writer and author. Living in rural West Cork, with his wife and three daughters, he love nothing better than getting face to face with Ireland's wonderful natural heritage. Bringing together these articles in one volume, means we can continue to share in Calvin's enthusiasm and learning a lot along the way! The book can be bought through Amazon, where a preview of the book is available.

Matt Murphy

## An Ornament to the City Holy Trinity Church & The Capuchin Order

By Patricia Curtin-Kelly  
The History Press of Ireland

www.thehistorypress.ie

ISBN: 978 1 84588 861 9

Price: €16.99 / 2015

This book gives an interesting history of the Holy Trinity Church and the Capuchin Order in Cork City. The church is situated at the South Channel of the River Lee off the South Mall. We learn the planning of

the Church began in 1825 by Fr. Theobald Matthew, a member of the Capuchin Order – a man born into wealth and privilege but who spent his life working to improve the lives of poverty-stricken people. The foundation stone was laid in 1832 but due to financial and other problems the church did not open for mass until 1850 and even then it was in an incomplete state. Fr. Matthew was the founder of the total abstinence (for alcohol) movement. The statue on St. Patrick Street (bridge end) is a monument to him. In the book there are chapters on the completion of the initial building of the church, the Architectural context of the building and its additions and alterations.

Chapter Three has a number of wonderful coloured photographs of the stained glass windows – they include memorial windows to Daniel O'Connell, Fr. Thomas Dowling OSFC (donated by the Cork & District Traders and Labour Council in appreciation of his work as mediator between trade unions and employees), and the Adoration of the Immaculate Conceptions. The final chapters "The Capuchins in Irish Civil and Cultural Life" and "The Capuchins and Irish Nationalism" give an insight into the important support various members of the Order gave in the late 19th century and the 20th century. Some members of the Order in Ireland were active in nationalist circles in 1916 – 1921 period. Fr. Dominic O'Connor, based at Holy Trinity, was with the Lord Mayor Terence McSweeney when he died on hunger strike in Brixton Prison in England. He was also the first to appear at Thomas McCurtin's home in Blackpool on the morning that the Sinn Fein Lord Mayor was murdered. He was but one of the Capuchin priests involved in the Nationalist movement in Dublin and Cork. Members of the Order have made a major contribution to Irish educational institutions, particularly University College Cork. For forty-seven years, between 1930-1977, the Order published "The Capuchin Annual", which championed Irish artists such as Harry Clarke, Sean O'Sullivan, Jack B. Yeats, John Lavery, Maurice Walsh, Ben Kiely, Francis MacManus.

This book is a fascinating history of both Holy Trinity and the Capuchin Order in Ireland, which through the 19th and 20th century had a special place in the hearts of the people of Cork.

Matt Murphy

## Catchments Newsletter

Issue 4: Winter 2016

<https://www.catchments.ie/download-category/catchments-newsletter/>

Price: Free Download

In the 2016 Winter issue of the newsletter from the EPA Catchment Management Unit, editor Donal Daly outlines the main themes: citizen science and biodiversity – designed to foster

"thinking outside the box" and to encourage the relevant disciplines, work units, organisations, communities and individuals, who may have different but related responsibilities and values. He explains how voluntary citizen scientists are playing an increasingly important role in environmental matters, from helping to map river obstacles, man-



# Publications of Interest



aging local water environments, accessing the biodiversity of Lough Derg to slowing the spread of invasive species.

With over 20 articles in this issue of the newsletter, it is a great resource for environmental groups, school and community groups and for each and every one of us. It highlights problems that concern all of us, ones which we must all help to solve. This recently established EPA Catchment Management Unit has been a most positive development and its very informative newsletter is a most worthy initiative, focusing on the further protection of our environment.

Matt Murphy

## Irish Renewable Energy Atlas

2016-2017

### A guide to utility scale renewables in Ireland

La Tene Maps  
www.latenemaps.com

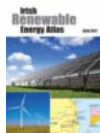
Price €30.00/2017

This Atlas and Guide covers mainly utility scale renewable energy projects. These are projects over 1MW in size and are grid connected. Some smaller installations are shown for some technologies eg: Hydro, Biomass and Biogas. The atlas does not cover domestic installations.

The maps firstly give overviews of the various technologies together with some resource maps. This is followed by a series of maps that show a county or group of counties per two page spread. These show the renewable installations within the area against the electricity grid. The final section of the Atlas and Guide provides listings of the various operators and developers in Ireland together with a list of the major service companies.

In his introduction, the author John Coleman states: "I feel that a massive public awareness programme is needed on renewables in Ireland not only to explain to the public how the various technologies work but how they can generate employment and income locally and assist in reducing the levels of imported energy."

Matt Murphy



prime farmland became totally submerged, effectively obliterating all the associated communities along the river's banks.

This untold saga of the River Lee is narrated by two Corkonians, Alan Nolan and Kevin Corcoran. Alan, who grew up beside the lower reaches of the river, is a World Class Salmon angler who passionately describes the present dilemma of the River Lee's 'King of Fish', the wild Atlantic Salmon (*Salmo salar*). A prime indicator species of a healthy river, the River Lee was once known as the 'Silver Lee', due to the abundance of Atlantic Salmon. Through his lucid and brilliantly told stories, Alan highlights the changing fortunes of the Lee's salmon stocks, which are now critically close to annihilation. The intriguing story of this migratory fish has never been told in such detail as he explores the complex truth of what happens under the surface.

Matt Murphy

## Britain's Birds

### An identification guide to the birds of Britain and Ireland

Rob Hume, Robert Still, Andy Swash,  
Hugh Harrop and David Tipling  
Princeton University Press (2016)

ISBN 978-0-691-15889-1

€19.95/Euro 25.99

This is the best and most comprehensive bird identification guide I have seen, documenting all 650 species recorded throughout the British Isles: residents, migrants, sporadic and accidental visitors and escapes. Even extreme rarities, with appearances numbering single figures, are included.

Six pages of thumbnail images act as an expanded contents list and easily searchable index. Each individual species of resident or regular migrant is given a page, with a half page devoted to the rarities and vagrants. Each page is illustrated with photographic images, sometimes upward of half-a-dozen, showing the birds in adult and immature plumage, resting and in flight, together with size, wingspan and population statistics and a map detailing summer and winter distributions, and where relevant, migration routes. Distinguishing marks are pointed out, and additional pages allow comparison of similar species in flight.

The text is concise, yet highly informative, while the 3000-plus photographic images are uniformly excellent, making identification easy. With 560 pages, this is quite a weighty tome, but will be valued, and referred to frequently by anyone who watches or studies birds, whether they be an interested amateur or a dedicated enthusiast or professional.

Anthony Toole

## Banner Rocks The Geological Heritage of County Clare

By Matthew Parkes

ISBN: 978-0954187057

Available for download at  
<http://www.clarelibrary.ie/eolas/oclare/heritage/downloads.htm>

The Heritage Council has been funding many informative books lately and this

book from the Heritage Office of Clare County Council is another winner.

Author Matthew Parkes has enlisted the input and assistance of various experts to produce a fascinating guide to the geology of County Clare.

The main body of the book starts with a brief introduction to geology, with plenty of colourful maps and diagrams. This is followed by three regional sections, covering East, North and West Clare, where the author explores the multitude of landscapes and landforms. Each geological process is explained and referenced by visits to various sites shown in the photographs. The final section explains the evolution of the geology of County Clare.

The whole book is liberally illustrated with clear, and sometimes intriguing, photographs and the text is informative, without being overly technical.

This is a lovely book for anybody with an interest in County Clare, or in geology, either as a field guide or as an armchair companion, whichever is your inclination.

Terry Farnell

## Irish Specimen Fish 2016

Available for free download at  
[www.irish-trophy-fish.com](http://www.irish-trophy-fish.com)

The Annual Report of the Irish Specimen Fish Committee is always of interest. Five hundred claims were submitted for 42 species from marine and freshwater venues around Ireland, of which 486 were ratified. Compared to recent years, tourist anglers from abroad showed an increase of Dutch anglers accounting for 9% of all notifications. It is wonderful to see youngsters featuring in the ratified lists. Sean Ward for his Bream from Lough na Blahy, Sarah Lynch and Amy O'Brien both caught carp on the Lough in Cork. Indeed they each have two specimen ratified. Aran Darcy caught Dace at Thomastown, Evan Ryan a Mackereel in Wicklow waters and Alannah Doherty a Ballan Wrasse at Ballyreen. If angling in Ireland is to grow, youngsters must be encouraged. Marine fish ratified take up the greater part of this report and one can see the increasing number of overseas submissions with their catch of various fish. From a tourist point of view this seems to be an increasing sector, which is essential for the angling industry. There is a fine piece by Norman Dunlop, titled "Twenty Species of Specimens – No. 1 on My Bucket List". He caught his first "official" specimen in July 1973 – a whiting – he is short four species to reach his target. As he said he is "the eternal optimist and tomorrow is another day". The major award in 2015 went to Paddy Barry, Ballyvolane, Cork, who received the 50 specimens award for his catches from 1984 to 2015.

Finally what is sad to read is the lack of sponsorship for the committee's work. It was mere a €3,140 in 2015. Faight Ireland and others who are associated with angling should come onboard as the Committee needs financial support. In the report, the Chairman said "We have been eating into reserves for the past three years".

Matt Murphy



# Atlas of Mammals in Ireland: 2010–2015



Red deer (Dave Walsh)

explaining which species are protected and what that entails. Along with a table of these protected species, it also includes a table of open and closed season dates and locations for red, sika and fallow deer and hares. These protected mammals can be hunted as game at certain times.

This is a fascinating book about the distribution of Ireland’s mammals. It is great to read about the methods used to put the atlas together and the current mammal research being carried out in Ireland. The National Biodiversity data centre has made a huge contribution to Ireland’s knowledge of a section of wildlife which, in many areas, is coming under threat from humans. One hopes that every county library in the country have a copy on their shelves. For school libraries this book is a must – it is the younger generation who are going to protect our mammal species into future decades. To anyone with an interest in Ireland’s wildlife this book is invaluable.

45,000 records each. The Daubenton’s and Common Pipistrelle bats, the otter and the red fox are the next highest. Cetaceans are well represented in the dataset with approximately 13,000 records, with the harbour porpoise topping the list.

the muskrat, has become extinct in that period. The chapter on “legislation and wild mammals in Ireland”, addresses national and European legislation on invasive alien species, as well as

## Atlas of Mammals in Ireland: 2010-2015

By Liam Lysaght & Ferdia Marnell  
National Biodiversity Data Centre

www.biodiversityireland.ie

ISBN: 978-1-911172-04-8

Price: €30.00 / 2016

The *Atlas of Mammals in Ireland 2010-2015* is the first publication to map the distribution of terrestrial and marine mammals that occur in Ireland and its marine waters.

The atlas has three primary aims:

- To gain the involvement of the key mammal data holders to contribute data to a national mammal databased.
- To identify and review and digitise all existing mammal observations.
- To encourage increased mammal recording by citizen scientists to generate good quality contemporary data.

The data set used to generate the maps contained 228,323 records of 72 species. The badger and grey seal top the list with over

The chapter “Species Accounts” forms the majority of the book. Each of the species is presented with two maps – one for 2010 and the other 2010-2015, giving the total number of Irish National Grid 10km squares for which there has been a sighting of the species. This set of maps is accompanied by a photograph of the animal, along with detailed information, covering identification, distribution, habitat, ecology, and population.

The introductory chapters are excellent; the chapter on the origins of mammals in Ireland explain how the arrival of mammals here is intertwined with the origin of the island itself. An illustrated timeline showing the arrival and extinction of various mammals from the pre-Holocene (12,000 years ago) to the 21st century. For example, pre-Holocene the Great Irish deer, Arctic fox, reindeer and collared lemming became extinct and the 18th-21st century saw the arrival of eleven species, including the American mink, grey squirrel, European hare and brown rat. One mammal,



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

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Email: [sherkinmarine@eircom.net](mailto:sherkinmarine@eircom.net)

Payment can be arranged via Paypal by sending an email to [sherkinmarine@eircom.net](mailto:sherkinmarine@eircom.net)

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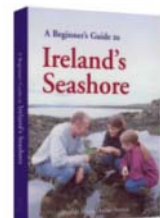
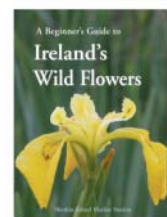
showing colour photographs of each flower is available for €8.50 (including p&p within Ireland)

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.

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# JUNIOR PAGES

## Black John the Bogus Pirate

By John Joyce

Avast there, Mateys! Today I'm going to hand over to Amos, our ship's cat - Zelda the trainee Voodoo witch to talk about the Fourth Principle of Ocean Literacy which says that "The Ocean has made our planet a habitable place to live, and here's how . . .



### A habitable place to live

One theory offered for the origin of all life on Planet Earth is that it started around hydrothermal vents at the bottom of the deep ocean. Hydrothermal vents occur when seawater seeps down through cracks in the seabed, along mid-ocean ridges at junctions between the vast 'tectonic plates' that cover the Earth. This seawater is heated to boiling point and vented back into the ocean above, taking dissolved and suspended minerals with it. It is theorised that these dissolved minerals then combined to form increasingly complex compounds until eventually 'organic' proteins known as DNA – deoxyribonucleic acid - were created.



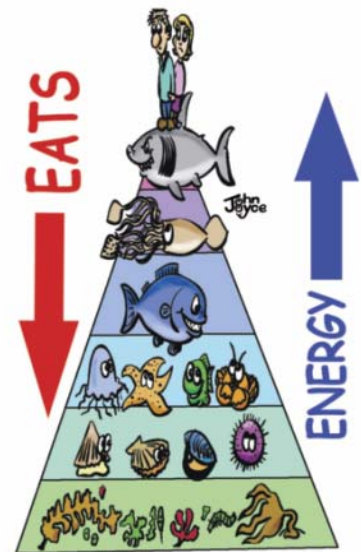
Then, protected by the walls of microscopic pockets in the volcanic rock around the vents, which acted as 'cell walls' these DNA proteins split, reproduced and formed the first 'living cell', which would have resembled a modern bacterium. Over millions and millions of years, these primitive 'cells' grew more and more sophisticated, became mobile, and began the evolutionary process that created the vast variety of living things on Planet Earth – including you and me.

### The Marine "Food Web"

One vitally important step in the development of life on Earth was evolution of the organic chemical 'chlorophyll' which uses the energy of sunlight to create oxygen and a variety of other chemicals from carbon dioxide and water. This led to the creation of 'phytoplankton' – tiny cells that between them produce around half of all of the oxygen in Earth's atmosphere. This is why it is so vitally important to protect the health of the Ocean because, if it can no longer produce the oxygen that we need to breathe, then all our futures will be at risk. Not only do phytoplankton and other ocean plants produce half the oxygen in the air we breathe, they also form the foundation of the 'Food Chain' in the ocean that gives us the fish and other marine food products we need to eat.

Phytoplankton and larger seaweeds convert energy from the sun and chemicals from the ocean into plant tissue which is eaten by 'herbivores' such as limpets, winkles and sea urchins or filtered out of the water by shellfish such as mussels and cockles. These 'herbivore' animals are then eaten by predators such as jellyfish, starfish, crabs and small fish in the next level up what scientists call 'The Marine Food Pyramid'.

Remember that each level in the Pyramid requires 10 kg of food from the level below to produce one kilogram of living material in its own body or a kilo's worth of living energy to drive it. So each large carnivore (such as a shark) needs to each 10 kg of mid-level predators like squid or smaller fish. Each squid needs to eat 10 kg of smaller fish and so on down the Pyramid. So that top predators – such as sharks (and you and me) rely on there being a staggering 1,000,000 kg of marine plants for every kilo of weight we put on or each kilo of energy we use up. Which is why we have to care for the Ocean all the way down the food pyramid by making sure we look after the marine environment in which it operates.



A marine 'Food Web' showing the importance of marine plants such as seaweeds and phytoplankton which harness energy from the sun and chemicals from the Sea to make plant protein, forming the basis of the web on which all animals – including ourselves – depend.

Join me – 'Black John the Bogus Pirate'- on Facebook at <https://www.facebook.com/BlackJohntheBogusPirate/>



# Ireland's National Parks

Ireland has six National Parks. Killarney National Park, established in 1932, was the first. Ballycroy National Park, established in 1998, the most recent.

## Killarney National Park, Co. Kerry

South and west of the town of Killarney in Co. Kerry is an expanse of rugged mountainous country. This includes the McGillycuddy's Reeks, the highest mountain range in Ireland which rise to a height of over 1000 metres. At the foot of these mountains nestle the world famous lakes of Killarney. Here where the mountains sweep down to the lake shores, their lower slopes covered in woodlands, lies the 10,236 hectare (26,000 acres), Killarney National Park. The distinctive combination of mountains, lakes, woods and waterfalls under ever changing skies gives the area a special scenic beauty.



## Glenveagh National Park, Co. Donegal

Glenveagh National Park lies in the heart of the Derryveagh Mountains in the north-west of Co. Donegal. It is a remote and beautiful wilderness of rugged mountains and pristine lakes. The 16,000 hectare Park consists of three areas, the former Glenveagh Estate, including most of the Derryveagh Mountains; to the west, the quartzite hills around Crocknafarragh and to the south, the peatlands of Lough Barra bog, Meenachullion and Crockastoller. Glenveagh is home to many rare and interesting plants and animals and is famous for its fine herd of red deer.



## Connemara National Park, Co. Galway

Situated in the West of Ireland in County Galway, Connemara National Park covers some 2,957 hectares of scenic mountains, expanses of bogs, heaths, grasslands and woodlands. Some of the Park's mountains, namely Benbaun, Bencullagh, Benbrack and Muckanaght, are part of the famous Twelve Bens or Beanna Beola range. Connemara National Park was established and opened to the public in 1980. Much of the present Park lands formed part of the Kylemore Abbey Estate and the Letterfrack Industrial School, the remainder having been owned by private individuals. The Park lands are now wholly owned by the State and managed solely for National Park purposes.



## Wicklow National Park, Co. Wicklow

Wicklow Mountains National Park covers part of a mountain range that extends over most of County Wicklow on the east coast of Ireland. The upper slopes and rounded peaks are blanketed with heath and bog. The views are interrupted only by forestry plantations and the winding mountain roads. Fast-flowing streams descend into the deep lakes of the wooded valleys and continue their course into the surrounding lowlands. Over one million people visit the 17,000 hectare park each year. The most visited area is the scenic Glendalough Valley where the ancient monastic settlement of St. Kevin is located.



## The Burren National Park, Co. Clare

The word "Burren" comes from an Irish word "Boíreann" meaning a rocky place. The Burren National Park is located in the southeastern corner of the Burren and is approximately 1500 hectares in size. The Park land was bought by the Government for nature conservation and public access. It contains examples of all the major habitats within the Burren: limestone pavement, calcareous grassland, hazel scrub, ash/hazel woodland, turloughs, lakes, petrifying springs, cliffs and fen.



## Ballycroy National Park, Co. Mayo

Ballycroy National Park was established in November 1998. It is Ireland's sixth National Park and is located on the Western seaboard in northwest Mayo. It contains 11,000 hectares of Atlantic blanket bog and mountainous terrain, covering a vast uninhabited and unspoilt wilderness dominated by the Nephin Beg mountain range. To the west of the mountains is the Owenduff bog. This is one of the last intact active blanket bog systems in Ireland and Western Europe and is an important scientific and scenic feature of the National Park.



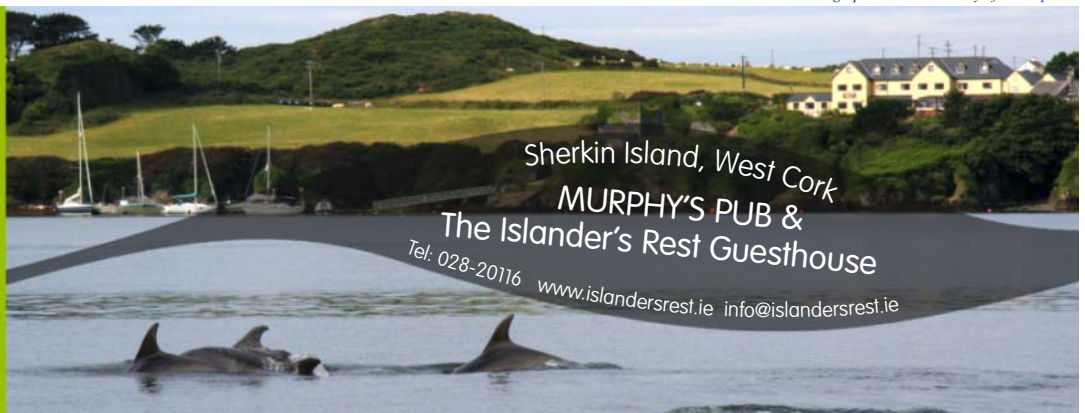
Photographs and text courtesy of [www.npws.ie](http://www.npws.ie)

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- Scenic Boat Tours
- Fishing Trips

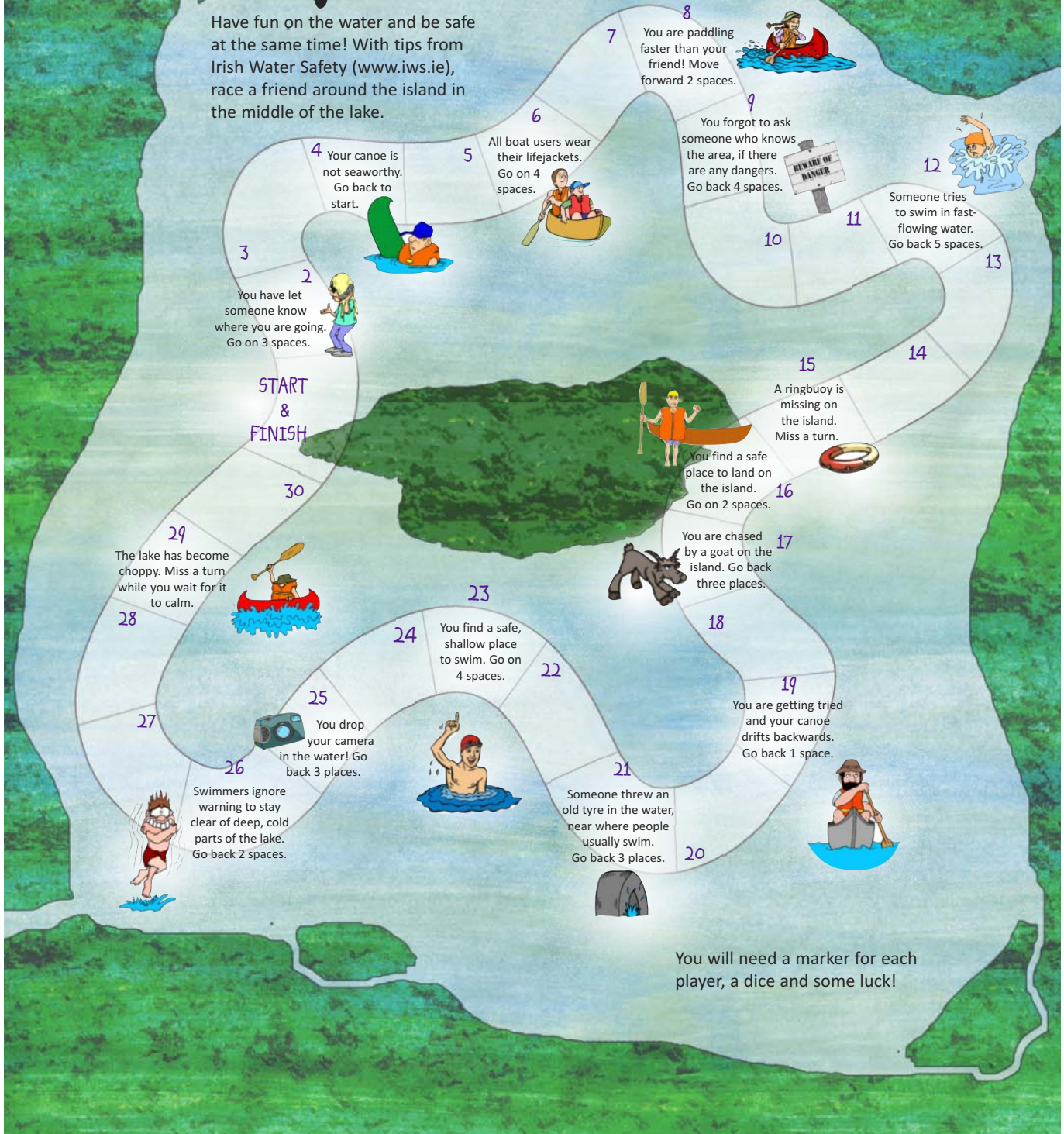
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(\*Booking required Nov-Mar)




# Safety on the Water


Have fun on the water and be safe at the same time! With tips from Irish Water Safety ([www.iws.ie](http://www.iws.ie)), race a friend around the island in the middle of the lake.




You will need a marker for each player, a dice and some luck!



**Irish Water Safety**  
Sábháilteacht Uisce na hÉireann




**Irish Water Safety**  
Sábháilteacht Uisce na hÉireann



**Irish Water Safety**  
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## Inland Waterways



**Canals**  
Stay away from the edge, as canals are man made and have very steep sides. If you fall in it can be very difficult to climb out.  
Locks are dangerous places - the water is very deep.

- Keep away from the sides. Once you fall in it is almost impossible to get out.
- Ringbuoys can often be found on the canal bank. If they are tampered with they will be of little use to a drowning person. Do not remove them unless you have to. They could save a life. It may be yours or your friend's. Report missing ringbuoys on [www.ringbuoys.ie](http://www.ringbuoys.ie).
- Never walk on ice-covered canals. If someone falls in remember to reach first with a rope or stick or piece of clothing.
- If you are hot and thirsty, never drink the water even if it looks clean.

**Reservoirs**  
These are deep and cold, with sudden changes in depth.

- Never go to a reservoir alone - you may fall in and have no assistance to get out.
- Never play near reservoirs.

**Gravel Pits**  
These are sometimes used as bird sanctuaries but they are dangerous places.

- Do not enter even if the water looks inviting - they are very cold and can be very deep. Weeds often grow thickly beneath the surface.
- Gravel sliding down steep sides makes it very difficult to climb out.
- Even good swimmers have drowned in gravel pits.

**Piers**  
Be very careful walking along piers that you do not trip or be blown into the water by the wind.

- When fishing, make sure that an adult is always with you.
- Never reach out after tangled fishing lines in case you fall into the water.

**Ice**  
Remember that even if ice is a foot thick in one area on a lake, it can be less than one inch thick just a few metres away.

**THERE IS NO SUCH THING AS SAFE ICE.**

- Do not walk on a frozen river or canal - use a bridge instead.

**Lakes and Wetlands**

- Cold water in lakes and wetlands can be very dangerous. It is often much colder beneath the surface than you think. Suddenly getting into cold water can give you a cold shock. If you feel cold, get out of the water straight away or you could suffer from Hypothermia.
- The bottom of lakes and wetlands can be soft and uneven. Look out for submerged objects.
- Large lakes and rivers may look calm, but remember wind will create choppy waves that make it dangerous to swim or go out in a small boat.
- Do not use floating toys on lakes or wetlands - you can be easily blown away from shore and away from safety.


**Construction sites**

- You cannot tell how deep a hole is if it is water filled.
- Ground churned up by digging machinery can be very soft and become water filled, acting like "quicksand".
- Sides of trenches can collapse.
- Stay away from construction sites!

**Cliffs**

- Keep clear of cliff edges, as they can be slippery when wet or loose underfoot.
- If you see someone in difficulty, tell an adult and stay clear of the edge.
- Remember - stay SAFE and Stay Away from the Edge.
- Never jump from cliffs into water.

**In an Emergency**  
**Dial 999 or 112 on your mobile or nearest telephone**



For more information on water safety visit the Irish Water Safety website at: [www.iws.ie](http://www.iws.ie)

In order to get the most fun at waterways, it is important that you follow some simple safety guidelines. Follow the SAFE message - Stay Away From the Edge!

**Rivers**

Rivers have swift currents and very deep areas. Tragedy can be avoided if you check it's safe before you enter the water.

The best way is by asking an adult who knows the area; a lifeguard, a shopkeeper, caravan park owner or someone who lives nearby. They are most likely to know the dangers and direct you to a safe spot.

**River Safety Tips:**

- Check where ringbuoys are placed. They could save a life. It might be yours. Report missing, stolen or vandalised ringbuoys on one of Irish Water Safety's websites, [www.ringbuoys.ie](http://www.ringbuoys.ie).
- Never wade into a river to retrieve an item that has fallen in.
- Do not jump off bridges - even if you see friends do it.
- Never push a friend into the water "for a laugh".
- Be careful of slippery grass by the water's edge.
- Always pay attention and keep your eyes open to avoid tripping over things.
- Never swim in fast flowing water. If you feel that it is dangerous then do not swim, even if your friends say that it's okay. Check first by throwing in a twig to see how fast the current is travelling. Remember that the current can be faster under the water and river currents are often stronger than they appear.
- If you are caught in a current, float on your back and travel downstream feet first to protect your head.
- Beware of submerged objects - they can be very dangerous. Watch out for trees, branches, rocks and rubbish. Always enter the water feet first.
- Do not play near the edge of overhanging riverbanks at the water's edge. It can crumble away suddenly

**Leisure centres and parks**

These areas can contain swimming pools, paddling pools, model boat ponds and boating lakes. All are safe, if you follow the rules.

- Go swimming with someone who can swim well.
- Stay within your depth.
- Learn to swim and always watch out for those who cannot.
- Wait for an hour after meals before swimming.
- Do not retrieve model boats by wading in.
- Do not swim in the dark and check first for a lifeguard.

**1**



**Beware of submerged objects. Always enter the water feet-first**

**2**



**Cold water in lakes can be dangerous - it is often much colder beneath the surface than you think**

**3**



**Don't play near the edge of riverbanks - they can crumble away suddenly**

**4**



**Do not retrieve model boats by wading in**

**5**



**Never walk on ice-covered waterways**

**6**



**Reeds and grasses often obscure the edge of a pond**

**7**



**The banks of a pond may be weak and give way under your weight**

**8**



**When angling, always make sure an adult is with you**

**9**



**Be cautious riding horses near and into water**

Remember these rules - Enjoy yourself - Come home safely

# Youth Angling

By Dr. Ciaran Byrne

SPORT is defined as an athletic activity requiring skill or prowess and not unsurprisingly many sports are considered as the preserve of young people, whether it be the local GAA club or swim team inevitably the participants are young people. I am regularly shocked into silence, which for those who know me is a serious thing, when I hear of this sports person or that, announcing their retirement. What is shocking is not their retirement per se, but the age at which they have to retire from their chosen sport. And of course different sports have their own unique age dynamics, so a soccer player is very much a veteran in their late twenties, by their early thirties they are veritable antiques.

Angling on the other hand is one of those activities which transcends the boundaries of sport and recreation, and most

importantly age. Angling as I regularly tell people can be practised from the age of 5 to 95, which must surely give it a leg up on other sports. But unfortunately this does not appear to be the case. I have had much experience attending angling meetings up and down the country and the common feature is that in almost all cases I am one of the younger people in the room, and in a significant number of cases I am the youngest person in the room. Given as I am in my fourth decade this is not a great claim to fame. So while angling has an even longer 'lifespan' than golf or practically any other sport, like many sports the gra for angling is developed at a young age. This is the crux issue. Many of the anglers of today first took up a rod when they themselves were children and may, over their lifetimes, have left the sport or returned to it, but seeds have been sown from an early age. Yes many



Images courtesy of Inland Fisheries Ireland



Top: Boyne Valley Fishing Hub; Above left: Nicky O' Hagan and Matthew McDonald of Whitechurch Youth Group; Above right: Alana Kerr (9) of Dunmoe, Co. Meath, and Brendan Kerr and Oisín Cahill, Inland Fisheries Ireland.

of the clubs and Angling Federations have done and are doing sterling work in establishing youth angling sections and developing and promoting

youth angling teams, but there appears to be an emerging crisis in the sector. This might sound a bit strong, but I do not believe so. Unless something serious is done, and soon, angling itself may end up being a forgotten sport amongst young people and become the preserve of a retired few. This emerging crisis in angling could be characterised as one of relevance. The question is how relevant is angling to young people today, will the 'millennials' as they are called be willing, inclined or able to take up the sport of angling.

To be fair to the sector the issues with youth angling are likely part of a wider societal disconnect from our natural environment. In common with practically all developed societies Ireland is seeing an increasing degree of urbanisation, a shift away from the country to our urban areas. The import of this is that our young people have considerably less interaction with the natural environment than previous generations and this can and likely does impact on angling participation rates.

In the Irish context this disconnect also has a geographic dimension and that is that in many cases the young people and quality angling are in different places. The very best of the angling is generally in the rural areas and the largest

number of young people are located in our urban areas. This disconnect between the rural and urban areas was recently highlighted in the launch of the report Ireland 2040 – our Plan, which is going to inform the how we achieve long term sustainable regional development.

If angling is to have any chance into the future this discrepancy must be addressed, and in my view there is a strong case for the development of youth angling / angling development venues in, or very close to urban areas. These venues would effectively be put and take or catch and release waters which are especially designed to facilitate the novice angler and stocked to reasonable fish densities, such that the possibility of catching a fish was high. Many in the angling community would not consider a put and take fishery as 'real' angling however the fact is that if we want to encourage young people into angling you have to give them a starting chance. Sending a novice angler out to the great Western lakes and expecting them to develop a love of the sport might be overly optimistic, or lunacy depending on your particular perspective. I guess the analogy would be expecting a first time jogger to go out and do a marathon. So the way of getting young people into angling is to give them a good experi-

ence a high chance of catching a fish at a reasonable cost, both in terms of monetary and time cost. As with all sports some will take to it and some will not. From this initial beginning a number of additional venues could be developed as stepping stone facilities which will gradually progress to the full 'wild' fishery. A good example of a stepping stone facility for trout fishing would be Lough Owel in Co Westmeath which is a wonderful medium sized lake fishery which is easily accessible from Dublin. By progressing along this pathway is that we do not have to reinvent the wheel in this regard, it has already been done. The GO Fish BC initiative ([www.gofishbc.com](http://www.gofishbc.com)), based in British Columbia, Canada, this initiative has followed this roadmap, of highly stocked fisheries in urban areas to encourage novice anglers, progressing right up to fully wild rural based fisheries for more experienced anglers. So, and as the good people in NIKE say, lets just do it.

*Dr Ciaran Byrne, Chief Executive Officer, Inland Fisheries Ireland, Swords Business Campus, Co. Dublin, Ireland. [www.fisheriesireland.ie](http://www.fisheriesireland.ie)*




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# The Pygmy Shrew

**Scientific Name:** *Sorex minutus* **Irish Name:** Dallóg fhraoigh

The smallest mammal in Ireland is the Pygmy Shrew. It is so small it only weighs 3 to 6 grams, depending on the time of year. Shrews live alone, with each having its own territory. They are very aggressive towards each other and will fight other shrews if they meet. They live on the edges of woodland, in hedgerows, bogland, meadows and gardens where they search day and night for food. To keep their bodies warm and in order not to starve, they must eat their own body weight in food every day. Considering they are so small, it doesn't seem a lot but it is when you compare it to the amount of food larger animals eat. They have a very short life-span, living only for about 13 months.



Pygmy Shrews are insectivores, which means their diet is mostly insects. They love all creepy crawlies - flies, beetles, earwigs, spiders and small worms - but they are so small that earthworms are too big for most of them to eat!

It is thought that Pygmy Shrews have been in Ireland since the last ice age. They are a protected species here.

## Their Enemies

The Pygmy Shrew has a few enemies such as foxes, owls and stoats. Domestic cats also catch them but rarely eat them because the shrew has very strong scent glands that most predators don't like. Humans rarely see Pygmy Shrews and are not a threat to them, though in a roundabout way humans may kill shrews by using pesticides.



## What are they like?

Pygmy Shrews are not rodents, like rats and mice are. They are more closely related to moles.

The Pygmy Shrew has a fur-covered body, which keeps it warm in the winter months and a long tail, relative to the size of its body. It has a pointed, whiskered snout, small eyes and ears that are partly hidden by its fur.

The Pygmy Shrew makes a very high-pitched squeak, which most people cannot hear, though some children can!



## FACT FILE

**Length:** 7-10cm

**Weight:** 3-6 grams

**Colour:** Dark brown and pale grey underneath.

**Habitat:** The edges of woodland, hedgerows, bogland, gardens and meadows.

**Diet:** Lots of creepy crawlies, such as flies, beetles, spiders, earwigs and small worms.

**Young:** It has 2 to 3 litters per year, with about 6 young each time. The young are born blind and weigh only 0.25g!

Answers on page 23.

## WORDSEARCH ABOUT THE PYGMY SHREW

- Body weight
- Bogland
- Enemies
- Foxes
- Fur-covered body
- Gardens
- Hedgerows
- High-pitched squeak
- Humans
- Insectivores
- Long tail
- Mammal
- Meadows
- Owls
- Pygmy Shrew
- Short life-span
- Small
- Small eyes
- Stoats
- Whiskered snout
- Woodland

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

By Michael Ludwig

THE FAO reports that approximately 520 Million people work in fisheries (about 8% of the world population) and they are providing about 3.1 Billion people approximately 15% of their annual protein needs. Climate changes such as rising temperatures, ocean salinity, acidity and oxygen levels are likely to decrease catches. A further concern is that different rates of fish relocation could result in altered species use spatial patterns, thereby disrupting interactions and potentially increasing the fishery population effects of those climate-driven changes.

Climate change became a real probability for doubters in 2012 after a summer when much of the US and Europe had experienced a drought and then "Super Storm Sandy" came ashore in New Jersey. At the same time, Fishery Scientists were reporting noticeable shifts in fish stocks throughout the world. Intended to assess the North Atlantic "Mackerel Wars" one such effort described the "War" situation, which began in 2006 and was finally resolved, for now, in 2014. The war was a nasty disagreement over mackerel landing quotas between Scotland, the European Union, Iceland and the Faroe Islands Fishermen. That event is a case example of climate induced fishery relocations creating the social costs of habitat use changes. Beginning in 2006 the Mackerel population centre shifted north creating a stock management conflict as Icelandic

# FISHERIES & CLIMATE CHANGE

## THE EVIDENCE

Fishermen began fishing the Mackerel migrating to new habitats while in the EU Fishermen resisted a reduction in their landing quotas to reflect stock declines. The competing actions jointly threatened to overfish the stock. Although resolved in 2014, the resolution only works in the unlikely event that the mackerel stay where they are now.

NOAA Researchers hoping to get a clearer understanding of climate change impacts in the western North Atlantic reviewed forty years of landings data (1972 to 2008) looking at the location of concentrations of black sea bass (*Centropristis striata*), Scup (*Stenotomus chrysops*), Summer flounder (*Paralichthys dentatus*), and the southern component of the Winter flounder (*Pseudopleuronectes americanus*) stocks. Their findings revealed that northward relocations are occurring but fishing pressure and fishery management have influences that can result in unclear understanding of the consequences of global climate change. The Researchers report that while black sea bass and scup are trending northward in response to rising water temperatures, the summer flounder relocation had a different driver. Summer flounder has a trait that its

larger members migrate farther northward. The summer flounder population centre relocation was influenced by fishing pressure and it reacted by concentrating in more northerly areas when fishery management allowed recover. Climate change had little influence on them during the study period. The force causing relocation was not recognized by management when quotas were adjusted to allow the fish to grow larger, but as their stock recovery advanced, the population centre shifted northward due to the larger fish favouring those habitats.

Meanwhile, the southern New England/mid-Atlantic Bight stock of winter flounder showed no change in their distribution. This may mean nothing regarding water temperature but may simply reflect that the stock is so overfished and too scattered to provide any meaningful insights at this time.

A similar study of North Sea Benthic finfish species used similar criteria to assess 36 species found in the North Sea. They identified a comparable pattern of climate change (temperature) and fishing pressure/habitat impacts. The report concludes that 21 of the 36 species are showing distribution shifts in response to ocean warming. Exclud-

ing fishing pressure and species management it appears that the relocation rate is being driven by faster life histories producing smaller body sizes, faster maturation, and smaller sizes at maturation. Body growth rates do not appear to vary significantly between relocating and non-relocating species. It appears that Blue whiting (*Micromesistius poutassou*) and redfishes (*Sebastes* spp) could be gone from the North Sea by 2050. Conversely, Bib (*Trisopterus luscus*) [pout whiting, pout or most commonly pouting] is expected to be found throughout the entire North Sea.

It is important to understand that warming oceans cause a number of environmental changes beyond temperature. The changes include dissolved oxygen and carbon dioxide levels, ocean acidity, predatory/prey relationships, habitat suitability, speed of growth and size fish at maturation, and life success. These impacts remain to be assessed.

Collectively research reveals that Fisheries are relocating at a rate of between 20 and 100 Km / decade (1960 to 2009). This is faster than fisheries harvesting efforts have moved (3 to 9 Km/decade). The discrepancy may reflect that southern elements of the harvesting community are fishing "harder" for the



Black sea bass at Gray's Reef National Marine Sanctuary in Georgia, USA.

dwindling stocks and obscuring the location of the principal concentrations as described above. The evidence of this effect is found in fleet sizes and their associated landing volumes.

Ocean currents may not be altered but simply reflect thermal loading of their flows. Existing fishery stocks had grown to accept those conditions. Their spawning, nursery, and maturing areas typically reflected the confluence of species and supportive habitats. As Oceanographic conditions shift, it is possible that species will not find sustaining habitats for their lifespans. For instance it has been reported that 15 of the 36 demersal species common to the North Sea have shifted latitudinally (north or south) or into deeper water. The species seeking deeper waters are doing so at a rate of 3 metres per decade. While there is usually some flexibility in habitat suitability, there is, also, a limit.

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