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The National Biodiversity Data Centre

ANNUAL Review 2018

National Biodiversity Data Centre
Documenting Ireland's Wildlife

GBIF Global Biodiversity Information Facility

The National Biodiversity Data Centre

Annual Review 2018

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GBIF Global Biodiversity Information Facility

Ireland's GBIF Node

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Chair's Statement

As Chair of the National Biodiversity Data Centre it gives me great pleasure to present the Annual Review 2018 which sets out some of the key highlights of the work delivered during 2018. The Management Board and small staff complement of the National Biodiversity Data Centre works closely together to document Ireland's biological diversity, to track how it is changing and to test evidence-based actions to assist with its conservation. The Data Centre's annual programme is also adaptive and expands to reflect Ireland's biodiversity data needs. This work is becoming all the more important as decision-makers are increasingly looking for information and solutions to ensure that everyone can play their part in addressing the biodiversity crisis we all face.

Biodiversity Maps, the national biodiversity mapping and data portal continues to grow and is now one of the most important starting point for accessing data about Ireland's biodiversity. By the end of 2018 the portal mapped more than 4.25 million records comprising more than 16,000 different species and published from 147 separate datasets. This data is now freely available to inform those working across a wide range of policy and/or decision-making sectors, whether in climate change, agriculture, planning and land-use management, etc, as well as educational and research.

The Data Centre has developed a very active programme of outreach and engagement with the citizen science community. Over 3,000 people have now been trained through the Data Centre's workshop programmes, and this has built capacity to improve the quality and quantity of data submitted to the Data Centre through its online recording systems. 2018 saw a very significant milestone reached when more than 100,000 records were submitted through Ireland's Citizen Science Portal during the year.

Much of the success of the Data Centre has been built upon the important survey work that is being carried out by its network of recorders on a voluntary basis. The collective contribution of volunteers to the butterfly and bumblebee monitoring programmes for example, is phenomenal. In 2018 alone, volunteers in these two programmes surveyed for 2,000 hours and walked more than 3,500km to allow us to track populations. Thanks to their effort we know that the butterfly population has declined by 6% since 2008 and bumblebees a worrying 17% since 2012. Having this kind of quantitative data for Ireland is hugely important to show that Ireland is not immune from the world-side declines in biodiversity that are being increasingly reported upon. This data we believe is hugely important for policy makers as policy decisions are more than ever required to be evidence based.

To this end, the Data Centre is not only involved in collation of data, but increasingly this data is being actively managed to enable its use in reporting at different levels. For example, National Parks and Wildlife Service (NPWS) is now relying on the work of the Data Centre to compile and manage data and information on invasive alien species to assist reporting under the European Union Regulation on Invasive Alien Species. The production of the National Biodiversity Indicators and their yearly update is an important objective assessment methodology to track how successful public policy is at meeting its biodiversity commitments.

Perhaps one of the key 2018 highlights for the staff and supporters of the centre was when the National Biodiversity Data Centre and Compass Informatics won the prestigious 'Best use of data to achieve social impact' award at the annual DatSci Awards. This is a well-deserved endorsement by the data science and analytics sector, recognising the work done in applying state-of-the-art technologies in the field of biodiversity data and analytics.

Finally, I would like to once again thank the Director and staff of the Data Centre for their continued dedication, hard work and impressive achievements in 2018, the Management Board for their generous and invaluable input and support of the Data Centre, and to the NPWS, Heritage Council and Department of Culture, Heritage and Gaeltacht for their continued support and faith in the Centre to carry out this critical work and the Management Board to assist in overseeing it.

Ms Rachel Kenny
Chair,
National Biodiversity Data Centre

About the National Biodiversity Data Centre

Our Mission

The National Biodiversity Data Centre is a national centre that collects and manages data on Ireland's biodiversity, to document Ireland's wildlife resource and to track how it is changing over time. It was established by the Heritage Council in 2007 and is funded by the Heritage Council and the Department of Culture, Heritage and the Gaeltacht.

The Data Centre's mission is

'...to provide national coordination and standards of biodiversity data and recording, assist the mainstreaming of biodiversity data and information into decision making, planning, conservation management and research, and encourage greater engagement by society in documenting and appreciating biodiversity.'

Our rationale

In order to conserve Ireland's biological diversity we need to document what biodiversity we have, understand how it is distributed across the island of Ireland and its marine waters, track how it is changing over time, and communicate the importance of conserving biodiversity. Addressing some of these knowledge gaps and building the scientific evidence base to help its conservation is central to the work of the National Biodiversity Data Centre. In so doing, the National Biodiversity Data Centre supports the work of the National Parks and Wildlife Service and assists in the delivery of many key actions outlined in the *National Biodiversity Action Plan 2017-2021.*

Our approach

To enable us to delivery on our overall mission and objectives, we:

- apply state-of-the-art information technology to manage data and information on Ireland's biodiversity;
- provide expertise to increase our understanding of Ireland's biodiversity;
- provide coordination to encourage greater collaboration between our partners;
- communicate the evidence-base to inform decision-making;
- support partner organisations by offering shared-services and other shared resources;
- build recording capacity by providing biodiversity identification training and training resources;
- provide leadership to promote the conservation of biodiversity;

Our objectives

The Data Centre has set itself seven primary objectives that seek to deliver on its core mission. The seven objectives are:

1. **Mobilising data:** Serve as a national hub for the storage, display and dissemination of biodiversity data through the online data portal Biodiversity Maps.
2. **Tracking change:** Identify the need for, and assist the production of high quality, scientifically robust data to track changes in Ireland's species and habitats.
3. **Informing decision-making:** Facilitate and promote the use of biodiversity data to inform public policy and decision-making through data analysis, interpretation and reporting.
4. **Develop strategic partnerships:** Support and collaborate with the Data Centre's partners to assist efficient delivery of their objectives.
5. **International collaboration:** Facilitate the provision of Irish biodiversity data to international initiatives.
6. **Communicating:** Communicate the value of Ireland's biological diversity and raise awareness of how it is changing.
7. **Strengthening the recording base:** support the recorder and citizen science network to increase the quantity and quality of biodiversity data generated in Ireland.

Our achievements to date

Since its establishment in 2007, the National Biodiversity Data Centre has developed into an essential component of the national heritage infrastructure to make information on Ireland's biodiversity more accessible for decision-making, to assist engagement by both the public and private sectors with biodiversity and to support the conservation of biological diversity in Ireland.

Some of the achievements of the Data Centre to date include:

- ✓ It supports a citizen science biodiversity network of more than 8,000 recorders,
- ✓ It manages 4.3 million records of more than 16,000 species from 147 different datasets so that these data are available for evidence-based decision-making,
- ✓ It has built a biodiversity data and mapping portal and a bioinformatics infrastructure to underpin a national biodiversity information management system for Ireland, which is offered as a shared-service to partner organisations,
- ✓ It provides a repository and data backup for important national datasets on biodiversity and as meta-data to advise data users of the provenance, temporal and geographical scope and availability of the data,
- ✓ It provides data to assist reporting under Article 17 of the EU Habitats Directive,
- ✓ It manages reporting to the Commission on the Invasive Alien Species Regulations (No 1143/2014),
- ✓ It has produced, for NPWS, the 5th National Report to the Convention on Biological Diversity (CBD) and is actively supported the production of the 6th National Report,
- ✓ It produced the State of Biodiversity for Food and Agriculture in Ireland in 2014 on behalf of the Department of Agriculture, Food and the Marine,
- ✓ It operates and reports on Ireland's National Biodiversity Indicators,
- ✓ It serves as Ireland's node of the Global Biodiversity Information Facility (GBIF),
- ✓ It operates the Irish Butterfly Monitoring Scheme which provides valuable information on the impacts of climate change,
- ✓ It operates the Bumblebee Monitoring Scheme which tracks changes in our pollinators,
- ✓ It has provided training to more than 3,000 participants under the Data Centre's annual training and professional development programmes.
- ✓ It developed and manages the All-Ireland Pollinator Plan 2015-2020.
- ✓ It has received funding under the European Innovation Partnerships (EIP) Programme to roll out a Protecting Farmland Pollinators project over the next five years to test pollinator actions on farms.

Under the All-Ireland Pollinator Plan alone, it has engaged with 140 communities through the Tidy Town Network, has gained the buy in from 102 businesses to help implement the Plan, resulting in more than 800 sites across the country, where individual and communities are taking direction action to help pollinators.

Our Management Board

The National Biodiversity Data Centre is overseen by a Management Board, established by the Heritage Council. The Management Board is responsible for setting the strategic direction of the work of the National Biodiversity Data Centre and for overseeing and assisting delivery of the work programme.

The composition of the Management Board is:

Ms. Rachel Kenny (Chair)	An Bord Pleanála
Ms. Beatrice Kelly	The Heritage Council
Dr. Ciaran O'Keeffe	National Parks and Wildlife Service
Dr. Micheál Lehane	Environmental Protection Agency
Dr. Peter McLoughlin	Waterford Institute of Technology.
Mr. Jack Nolan	Department of Agriculture, Food and the Marine
Mr. Nigel Monaghan	National Museum of Ireland – Natural History Division
Dr. Matthew Jebb	National Botanic Gardens
Mr. Declan Quigley	Sea Fisheries Protection Authority
Ms. Bernadette Guest	Heritage Officer, Waterford City and Council

Our team

During 2018, eight employees contributed to the delivery of the National Biodiversity Data Centre's work programme. The delivery of the work programme is by way of a Service Level Agreement awarded to Compass Informatics by the Heritage Council for the running of the Data Centre. The full-time staff are supported by a team of developers, employed by Compass Informatics, who are responsible for development of the Data Centre's core mapping system and online data portal.

National Biodiversity Data Centre
Documenting Ireland's Wildlife

COMPASS INFORMATICS

Staff

Dr. Liam Lysaght	Centre Director
Dr. Úna Fitzpatrick	Senior Ecologist
Dr. Tomás Murray	Senior Ecologist
Barry O'Neill	ICT & Data Manager
Ben Malone	Administration & Engagement Officer
Colette O'Flynn	Invasive Species Officer
Gemma Hughes	Pollinator Plan Agri-Business Officer (part-time)
Juanita Browne	Pollinator Plan Community Engagement Officer (part-time)

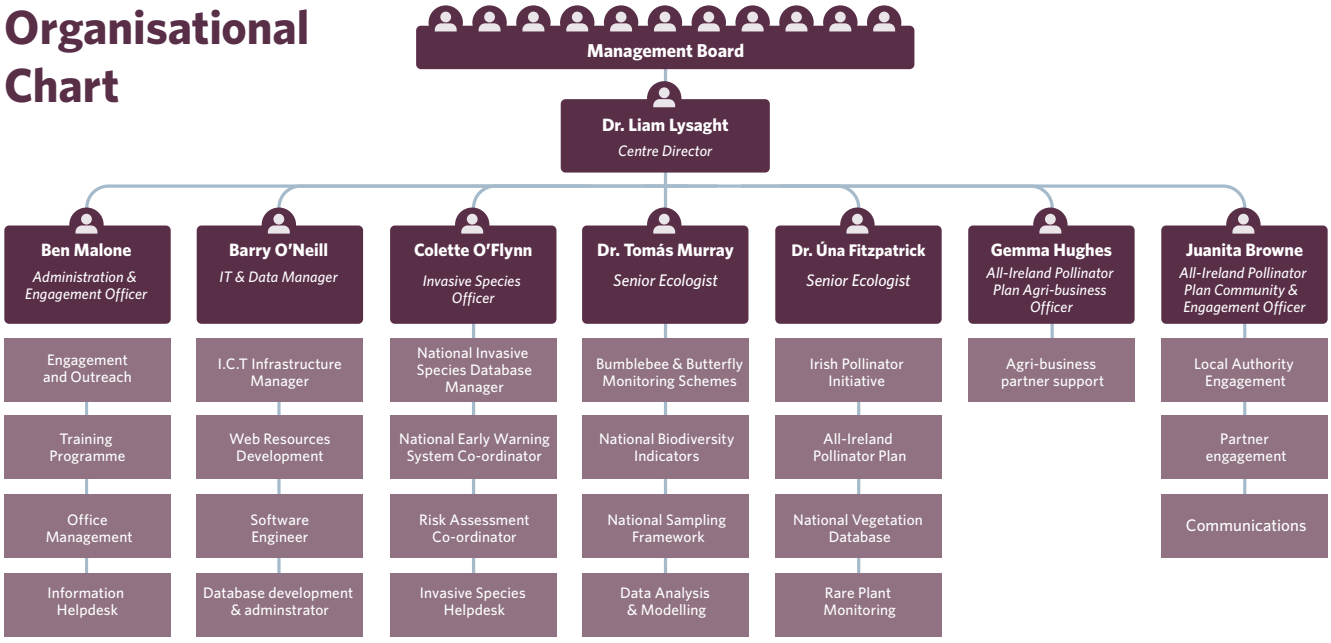
IT & Admin Systems team

Pavel Janda	Informatics developer
Gert Conradie	Informatics developer
Ken Dowling	ICT infrastructure manager
Walter French	GIS & data analyst
Rob O'Loughlin	GIS & data analyst
Paulina Furmaniak	Financial management services

Contract management

Gearóid Ó Riain	Director, Compass Informatics Limited

Organisational Chart



Our Budget

Income (NET) 2018

Core funding		€
The Heritage Council	SLA	497,486
sub-total		**497,486**

Additional project funding - outside core budget	Project	Total
Heritage Council/Dept of Culture, Heritage and Gaeltacht Affairs	Invasive Species Research Officer	51,220
Heritage Council/Dept of Culture, Heritage and Gaeltacht Affairs	Project Officer (Pollinators) Pollinator Plan – Promotional materials	48,781
Dept Agriculture, Food and Marine		27,977
Heritage Council/Dept Culture, Heritage and Gaeltacht Affairs	Vegetation Classification	24,927
Kilkenny County Council	Website Development	2,000
Dublin City Council	Recorder 6 deployment	650
Dept. of Agriculture, Food & the Marine	Protecting Farmland Pollinators	7,200
The National Parks and Wildlife Service	GBIF GB25 Funding	5,000
Dept Agriculture, Food and Marine	GBIF GB25 Funding	5,000
Compass Informatics Ltd	GBIF GB25 Funding	2,000
The Heritage Council	GBIF GB25 Funding	5,000
Kilkenny County Council	GBIF GB25 Funding	5,000
Fáilte Ireland	GBIF GB25 Funding	2,585
Environmental Protection Agency	GBIF GB25 Funding	3,000
Various customers (Workshop online sales)	GBIF GB25 Funding	5,046
Publications surplus 2017	GBIF GB25 Funding	5,000
Publications surplus 2017	Marsh Fritillary Surveying 2018	1,847
	sub-total	**202,232**

Total Income 2018 (NET)	**699,718**

National Biodiversity Data Centre

Data Centre Publications		Total
Publications Sales		24,404
Publications surplus (2017)		8,124
	sub-total	**32,528**

Expenditure (NET)

Centre's operational costs - Core funding		
Staff (Research)		-360,068
Staff CPD		0
Additional IT services		-39,310
Less overspend on Additional IT Services 2017		-22,608
Finance and administration		-27,144
Equipment		0
Software		-16,753
Centre running costs		-16,247
Data Project		-7,300
Travel & subsistence		-13,564
	sub-total	**-502,995**
	overspend	**-5,509**

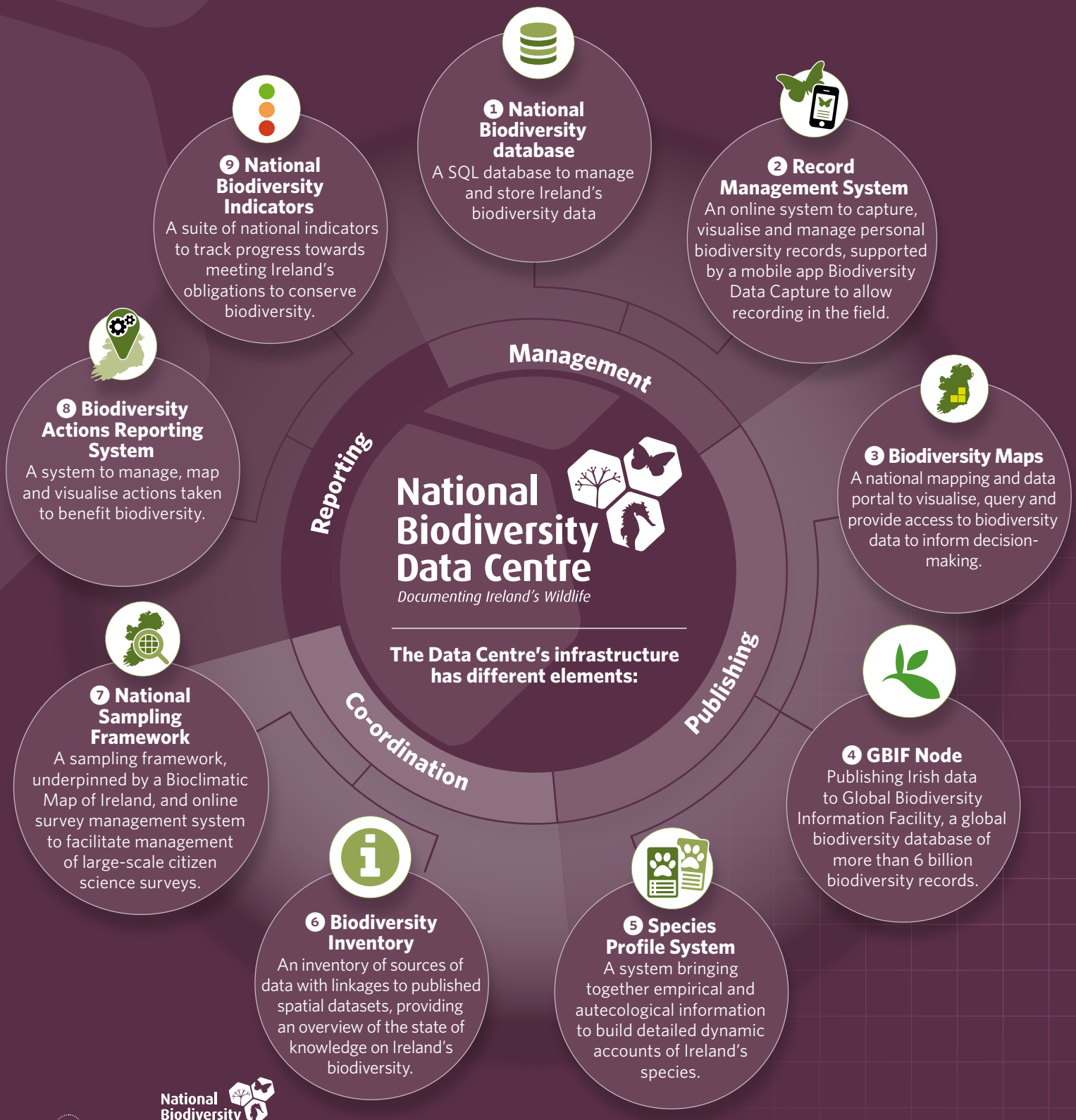
Additional projects expenditure - outside of core budget		
Invasive Species Research Officer		-44,414
Project Officer (Pollinators)		-35,934
Pollinator Plan – Promotional materials (Net costs)		-24,820
Vegetation Classification		-24,927
Hardware		-3,764
GBIF GB25 Funding		-41,016
Marsh Fritillary Surveying 2018		-2,196
	sub-total	**-177,072**
	surplus	**19,651**
	Total Expenditure 2018 (NET)	**680,067**
	Total Surplus 2018 (NET)	**19,651**

Publication expenditure		Total
Publication costs		-13,717
	sub-total	**-13,717**
	Total Surplus 2018 (NET)	**18,811**

Our bioinformatics infrastructure

Underpinning the delivery of the National Biodiversity Data Centre's work programme, and the range of services that it provides, is a state-of-the-art bioinformatics infrastructure developed and maintained by the Data Centre. This infrastructure supports the full information cycle from data management, through publishing and coordination, to reporting on biodiversity data and information. This has been invested in and developed as an important national infrastructure and is offered by way of shared-services to partner organisations, from both the public and private sectors, to assist their own biodiversity data management needs.

The different elements of the bioinformatics infrastructure is described below.



Ensuring data security and business continuity

The management of such a large ICT infrastructure with so many distinct and dynamic systems requires strong business continuity and disaster mitigation systems, including robust data security protocols. Data publishers and partners that avail of our shared-services also need to be assured that any data or information managed by the National Biodiversity Data Centre on their behalf adheres to the highest standards and that data are secure. Systems and processes have continued to be developed and improved upon throughout 2018.

The Data Centre's business continuity plan is as follows:

- Daily incremental back-ups are run every night, allowing for the roll back/recovery of those files altered since the last full backup.
- Weekly full back-ups of all Data Centre data holdings and live systems are run every Thursday night. This weekly back-up is always stored off-site in a secure location.
- Monthly full back-ups are taken on the last Thursday of each month and are saved to the Cloud. These monthly backups are held for a period of 12 months.
- Yearly full back-ups are taken at the end of each year and stored in the cloud for a period of five years.
- Bi-weekly bare metal back-ups are taken of the Data Centre's server infrastructure. Bare metal back-ups can be thought of as a carbon copy of an entire machine, including its host operating system and all associated data. In the event of a failure, bare metal back-ups drastically cut the time required to restore systems onto new hardware.

During the year, the Data Centre's fibre optic network backbone was improved via Waterford Institute of Technology upgrades. This has increased the Data Centre's uplink speed to 1 Gigabit, allowing faster delivery of resources to users but also enables large data transfers to and from the cloud.

Setting a high standard – DatSci Award

One of the major achievements in 2018 was winning the prestigious DatSci Award for the **Best Use of Data to Achieve Social Impact**. The DatSci awards, sponsored by Deloitte, bring together the best and brightest data scientists in Ireland to recognise the important work being done in one of the fastest growing sectors in the country. Data science and analytics are rapidly becoming big business in Ireland. It has been estimated that there will 40,000-60,000 analytics roles in Ireland by 2020. The 2018 DatSci Awards, hosted by Next Generation, in association with CeADAR, brought together more than 300 data science industry leaders and honoured those who have accomplished and contributed most in the rapidly expanding field of data science and analytics.

The 'Best Use of Data to achieve Social Impact' award was sponsored by Deutsche Bank, and attracted entrants from across Europe. The award was announced at a special ceremony held in Croke Park, Dublin, on September 7th, attended by over 300 data scientists and industry representatives. This award recognised that the *"National Biodiversity Data Centre has made a strong positive impact on our national understanding of Ireland's biodiversity, an important natural resource that contributes a minimum of €2.6 billion to the Irish economy each year. Using scientific methodologies combined with innovative data analytical techniques, and supported by modern technologies, it is raising the profile of biodiversity, encouraging citizen engagement through biodiversity recording and conservation, and influencing policy through the provision of robust data-driven insights".*

This was a strong endorsement by the data science and analytics sector of the high-quality work being done by the National Biodiversity Data Centre and Compass Informatics in applying state-of-the-art technologies to the field of biodiversity data and analytics.

Ms Vivienne Kelly, Chief Operating Office of Compass Informatics (centre) and Dr. Tomás Murray (right), Senior Ecologist with the National Biodiversity Data Centre accepting the award for 'Best use of data to achieve social impact' at the DatSci Awards 2018.

Highlights of the work programme in 2018

The National Biodiversity Data Centre continues to deliver a comprehensive work programme during 2018. Some of the highlights of the year are presented below, showing how the different elements contribute to the overall objectives that have been identified to frame our work programme.

Strategic objective 1.

Mobilising data: Serve as a national hub for the storage, display and dissemination of biodiversity data through the online data portal Biodiversity Maps.

> ***Expected benefit:*** *a greatly expanded knowledge base on Ireland's biological diversity and increased availability of data for decision-making, planning, conservation management and research.*

Published datasets

The National Biodiversity Data Centre serves as the national hub for data on Ireland's biological diversity, bringing together datasets from different partners to showcase the state of knowledge on Ireland's biodiversity. At the end of 2018, 147 datasets were published through Biodiversity Maps by partners from both the public and private sectors. The list of datasets and data providers is presented below.

Name of dataset	Publisher	No. of records	No. of species
All-Ireland Marsh Fritillary Database	National Biodiversity Data Centre	7251	1
All-Ireland Non-Marine Molluscan Database	Conchological Society of Great Britain and Ireland	79184	198
Amphibians and reptiles of Ireland	Collated by the National Biodiversity Data Centre from different sources	2277	6
An Atlas of Breeding Birds of the Burren and Aran Islands 1993 - 1996	BirdWatch Ireland	5913	126
Anisopodidae and Thaumaleidae (Diptera: Nematocera) of Ireland	Irish Biogeographical Society	84	7
Aquatic Oligochaeta of Ireland	Pascal Sweeney	1636	53
Atlas of Mammals in Ireland 2010-2015	Collated by the National Biodiversity Data Centre from different sources	31468	46
Badger and Habitats Survey of Ireland	National Parks & Wildlife Service, Department of Culture, Heritage and the Gaeltacht	4176	12
Badger Setts of Ireland Database	Department of Agriculture, Food & the Marine	36144	1
Bats of Northern Ireland	Northern Ireland Bat Group	1660	8
Bee Records for Ireland (BWARS)	Bees, Wasps, and Ants Recording Society (GB)	748	66
Bee Records from Don Cotton	Don Cotton	1141	17

Name of dataset	Publisher	No. of records	No. of species
Bees of Ireland	Collated by the National Biodiversity Data Centre from different sources	55357	103
Bird Atlas 2007 - 2011	BirdWatch Ireland	458187	286
Birds of Ireland	Collated by the National Biodiversity Data Centre from different sources	67229	351
Bryophytes of Ireland	British Bryological Society	198263	944
BSBI tetrad data for Ireland	Botanical Society of the British Isles	349988	2137
Butterflies of Ireland	National Biodiversity Data Centre	79734	40
Caddisflies (Trichoptera) of Ireland	James P. O'Connor	15230	153
Caddisfly Records, Edenvale, Co. Wexford 2010	Martin Gammell	32	19
Centipedes of Ireland	Biological Records Centre, UK	1229	26
Chondrichthyans Of Ireland	Collated by the National Biodiversity Data Centre from different sources	7721	43
Chondrichthyans Of Ireland Restricted Records	Collated by the National Biodiversity Data Centre from different sources	20350	61
Clare Biological Records Centre Dataset 2004-2007	Clare Biological Records Centre	3687	479
Coastal and Marine Species Database	Collated by the National Biodiversity Data Centre from different sources	374	146
Collembola of Ireland	Centre for Research in Ecology, Roehampton University	1364	174
Conopidae of Ireland	Ryan Mitchell	153	11
Corrib Mammal Atlas Records (Shell E & P Ireland Limited)	Shell E & P Ireland Limited	142	16
Craneflies of Ireland	Irish Biogeographical Society	3311	202
Crayfish of Ireland	National Parks & Wildlife Service, Department of Culture, Heritage and the Gaeltacht	260	1
CréBeo Earthworm Database 2006-2007	University College Dublin	355	18
Deer of Ireland Database	National Museum of Ireland	794	4
Discrete Vascular Plant Surveys	Collated by the National Biodiversity Data Centre from different sources	23428	690
Distribution Atlas of Butterflies in Ireland 1979 (An Foras Forbartha)	National Biodiversity Data Centre	13527	33
Dragonfly Ireland	Centre for Data and Environmental Recording (CEDaR)	33522	36
Dragonfly Records	Collated by the National Biodiversity Data Centre from different sources	5157	28
Earthworms of Ireland	National Biodiversity Data Centre	1210	25
European Seabirds and Sea (ESAS) Cetacean Sightings 1980-2003	Joint Nature Conservation Committee (UK)	2613	21

Name of dataset	Publisher	No. of records	No. of species
European Seabirds at Sea (ESAS) bird sightings 1980-2003	Joint Nature Conservation Committee (UK)	264441	108
Fleas (Siphonaptera) of Ireland	University College Dublin	2398	43
Flesh Flies (Sarcophagidae) of Ireland	Dr. Ruth Blackith	529	16
Flora of County Cavan	National Botanic Gardens	34493	623
Freshwater Fish in Irish Lakes	Inland Fisheries Ireland	6035	27
Fungal Records for Ireland	British Mycological Society	14319	2275
General Biodiversity Records from Ireland	Collated by the National Biodiversity Data Centre from different sources	8302	1860
Grasshoppers, Crickets and Allied Insects (Orthoptera) of Ireland	Collated by the National Biodiversity Data Centre from different sources	2985	26
Grey Seal (*Halichoerus grypus*) Distribution 2009-2014	Michelle Cronin	48931	1
Hare Survey of Ireland 2006 & 2007	National Parks & Wildlife Service, Department of Culture, Heritage and the Gaeltacht	1601	19
Harvestmen (Opiliones) of Ireland	Martin Cawley	2109	17
Hazel Dormouse in Ireland	Dr. Emma Sheehy and Dr. Colin Lawton	16	1
Heritage Trees of Ireland	Tree Council of Ireland	724	143
Historic Reference to the Grey Wolf (*Canis lupus*) in Ireland	Dr. Kieran Hickey	34	1
Hoverflies (Syrphidae) of Ireland	Dr Martin Speight & Dr Tom Gittings	36298	186
Hypogean Crustacea of Ireland	Lee Knight	107	4
Ireland's BioBlitz	Collated by the National Biodiversity Data Centre from different sources	43154	5274
Irish Butterfly Monitoring Scheme	National Biodiversity Data Centre	105735	35
Irish Crop Wild Relative Database	National Biodiversity Data Centre	19303	208
Irish Federation of Sea Anglers Catch Data	Irish Federation of Sea Anglers	724	50
Irish Marine Turtle Database	Simon Berrow & Gabriel King	1022	9
Irish National Frog Database	Irish Peatland Conservation Council	3483	1
Irish Squirrel Survey 2012	Dr. Colin Lawton	2389	3
Irish Vascular Plant Data - Paul Green	Paul R Green	76252	1514
Irish Vascular Plant Data - Robert Northridge	Robert Northridge	35233	949
Irish Vascular Plant Data 1999-2009	Dr David Thomas Holyoak	39615	1041
Irish Wetland Birds Survey (I-WeBS) 1994-2001.	BirdWatch Ireland	10909	132
Irish Wire Weed (*Sargassum muticum*) Database	Collated by the National Biodiversity Data Centre from different sources	106	1
Irish Wood White Database	National Parks & Wildlife Service, Department of Culture, Heritage and the Gaeltacht	187	2

Name of dataset	Publisher	No. of records	No. of species
IWDG Casual Cetacean Sightings	Irish Whale & Dolphin Group	5578	19
IWDG Cetacean Strandings Database	Irish Whale & Dolphin Group	2651	26
IWDG Chondrichthyan Database	Irish Whale & Dolphin Group	1393	1
IWDG Constant Effort Cetacean Sighting Scheme	Irish Whale & Dolphin Group	1485	8
IWDG Ferry Survey Sightings 2001-2015	Irish Whale & Dolphin Group	1579	13
IWDG Ship Surveys Sightings – Heritage Council Surveys 2004	Irish Whale & Dolphin Group	99	11
IWDG Ship Surveys Sightings – ISCOPE Surveys 2005 - 2009	Irish Whale & Dolphin Group	412	14
IWDG Ship Surveys Sightings – IWDG Surveys 2003 - 2015	Irish Whale & Dolphin Group	806	21
IWDG Ship Surveys Sightings – Non-effort related sightings 2003 - 2015	Irish Whale & Dolphin Group	313	18
IWDG Ship Surveys Sightings – PRECAST Surveys 2003 - 2011	Irish Whale & Dolphin Group	1094	21
Kingfisher Survey 2010	National Parks & Wildlife Service, Department of Culture, Heritage and the Gaeltacht	6883	74
Lacewings (Neuroptera) of Ireland	Irish Biogeographical Society	272	31
Ladybirds of Ireland	Collated by the National Biodiversity Data Centre from different sources	3837	18
Leafminers of Ireland	Collated by the National Biodiversity Data Centre from different sources	166	50
Lice (Phthiraptera) of Ireland	Irish Naturalists' Journal	306	122
Lichens of Rocky Seashores	Biology.ie	620	114
Littoral Macroinvertebrate Data From Irish Lakes	Environmental Protection Agency	4055	215
Local BioBlitz Challenge 2013	Collated by the National Biodiversity Data Centre from different sources	2009	711
Mammal Recording Scheme 1970-1985 (An Foras Forbartha)	Collated by the National Biodiversity Data Centre from different sources	1635	22
Mammals of Ireland 2016-2025	Collated by the National Biodiversity Data Centre from different sources	6376	37
Marine sites, habitats and species data collected during the BioMar survey of Ireland.	Trinity College	53985	1480
Marine Species in Irish Coastal Waters	Seasearch	53231	1183
Mayflies (Ephemeroptera) of Ireland	Dr. Mary Kelly-Quinn	6645	35
Meniscus Midges (Dixidae) of Ireland	Irish Biogeographical Society	89	12
Microlepidoptera collections (National Museum of Ireland)	National Museum of Ireland	7175	586
Mid Ulster Hare Surveys 2012-2015	Anthony Caravaggi	1104	8

Name of dataset	Publisher	No. of records	No. of species
Millipedes of Ireland	Biological Records Centre, UK	4834	43
Mosquitoes (Culicidae) of Ireland	Irish Biogeographical Society	253	18
Moth Records of Ireland	Collated by the National Biodiversity Data Centre from different sources	3076	383
Moths Ireland	Moths Ireland	251339	1391
Muntjac (*Muntiacus reevsi*) of Northern Ireland.	Jamie. T. A. Dick & Kayleigh Hogg	78	1
National Bat Database of Ireland	Bat Conservation Ireland	41533	10
National Feral Ferret (*Mustela putoris furo*) Database	Daniel J. Buckley	134	1
National Frog Survey of Ireland 2010/2011	National Parks & Wildlife Service, Department of Culture, Heritage and the Gaeltacht	505	1
National Invasive Species Database	Collated by the National Biodiversity Data Centre from different sources	12940	108
National Lesser Horseshoe Bat Database	National Parks & Wildlife Service, Department of Culture, Heritage and the Gaeltacht	4164	8
National Pine Marten Survey of Ireland 2005 - 2007	Dr Declan O'Mahony	151	1
New Zealand Flatworm (*Arthurdendyus triangulates*) Database	Collated by the National Biodiversity Data Centre from different sources	1359	1
Newt Survey 2010-2014	Irish Wildlife Trust	304	1
Northern Ireland European hare (*Lepus europaeus*) survey 2005	Dr. Neil Reid	38	1
Northern Ireland Mammal Database	Centre for Data and Environmental Recording (CEDaR)	31163	46
North-west Ireland Machair Breeding Waders 2009.	BirdWatch Ireland	88	7
NPWS Seal Database	National Parks & Wildlife Service, Department of Culture, Heritage and the Gaeltacht	5452	3
ObServe Acoustic Surveys for Cetaceans in the Irish Atlantic Margin	Department of Communications, Climate Action & Environment	16696	65
Online Atlas of Vascular Plants 2012-2020	Collated by the National Biodiversity Data Centre from different sources	106168	1377
Otter (*Lutra lutra*) records 2011-2015	Mammals in a Sustainable Environment (MISE) Project	2357	2
Otter Survey of Ireland 1982	National Parks & Wildlife Service, Department of Culture, Heritage and the Gaeltacht	2166	2
Otter survey of Ireland 2004 & 2005	National Parks & Wildlife Service, Department of Culture, Heritage and the Gaeltacht	373	1
Pine Marten (*Martes martes*) Database (NPWS)	National Parks & Wildlife Service, Department of Culture, Heritage and the Gaeltacht	175	1
Pseudoscorpions of Ireland	Irish Biogeographical Society	235	17
Quantitative Phytoplankton data from Irish lakes	Environmental Protection Agency	3275	91
Rare birds of Ireland	Irish Rare Bird Committee	10343	272

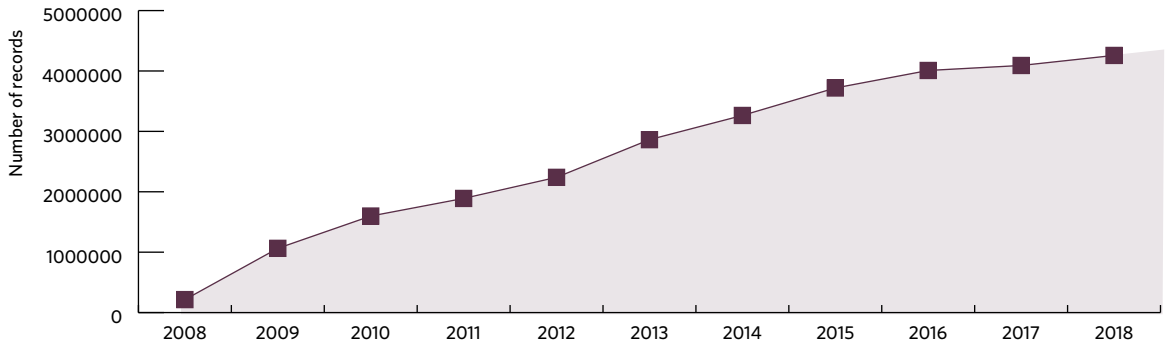
Name of dataset	Publisher	No. of records	No. of species
Rare marine fishes taken in Irish waters from 1786 to 2008	Sea-Fisheries Protection Authority	1135	140
Records from Lichens.ie	Paul Whelan	895	313
Reptiles and Amphibians Distribution Atlas 1978 (An Foras Forbartha)	National Parks & Wildlife Service, Department of Culture, Heritage and the Gaeltacht	766	4
River Biologists' Database (EPA)	Environmental Protection Agency	31014	103
Road Kill Survey	Biology.ie	3220	11
Rocky Shore Macroalgae	Environmental Protection Agency	2839	142
Saproxylic Beetles of Ireland	Dr. Roy Anderson	3725	262
SCANS II Survey Data (2005)	Sea Mammal Research Unit, University of St Andrews.	372	11
Seabird 2000	BirdWatch Ireland	1990	24
Seaweeds of Ireland	The British Phycological Society	49812	521
Shieldbug Records	Collated by the National Biodiversity Data Centre from different sources	233	13
SIAR Survey Data (2000)	Coastal & Marine Resources Centre (CMRC)	106	15
Species Data from the National Vegetation Database	Collated by the National Biodiversity Data Centre from different sources	387504	1001
Spiders of Ireland	Myles Nolan	2200	237
Sponges of Rathlin Island	Ulster Museum	18078	1091
Stoneflies (Plecoptera) of Ireland	Dr. Hugh Feeley	10465	19
Survey of the native freshwater opossum shrimp (*Mysis relicta*) in Ireland	EcoServe	18	1
The Chironomidae (Diptera) of Ireland	University College Dublin	21047	500
The First Atlas of Breeding Birds in Britain and Ireland: 1968-1972.	BirdWatch Ireland	63985	143
The First Atlas of Wintering Birds in Britain and Ireland: 1981/82-1983/84.	BirdWatch Ireland	55690	204
The Flora of County Clare	Botanical Society of the British Isles	1735	391
The Flora of County Waterford	Paul R Green	184156	1485
The Flora of County Wexford	Paul R Green	178071	1465
The Gibson spider collection	National Museum of Ireland	1709	106
The Irish Squirrel Survey 2007	COFORD	1627	3
The Second Atlas of Breeding Birds in Britain and Ireland: 1988-1991	BirdWatch Ireland	247842	174
True Bugs (Heteroptera) of Ireland	Dr. Brian Nelson	13342	309
Water Beetles of Ireland	Balfour Browne Club	34392	323

List of the datasets and publishers published through Biodiversity Maps at the end of 2018

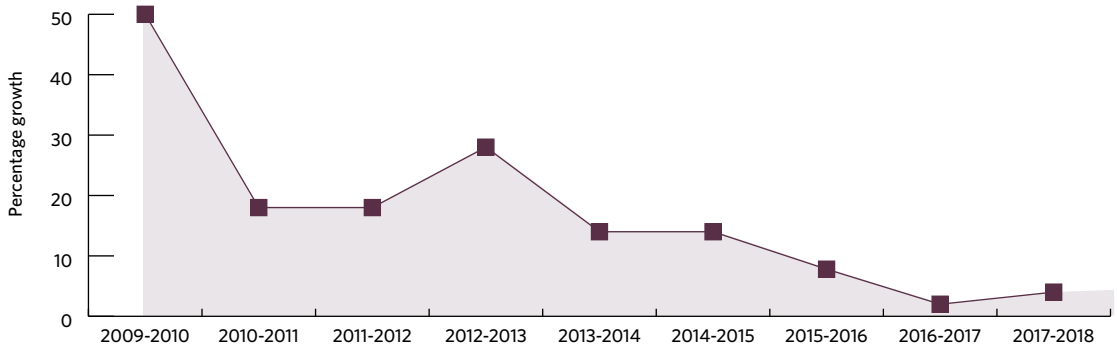
The National Biodiversity Database

Data from all these datasets are stored and managed by the National Biodiversity Data Centre in the National Biodiversity Database. This large database serves as the national repository for species data recorded in Ireland and its marine waters, and ensures that these data are available for everyone to access whenever empirical data on biodiversity are needed - either for information or to improve decision-making for biodiversity. The dataset providers are offered the choice of publishing their data as open (licenced as Creative Commons CC-BY, with attribution) or restricted. All datasets licenced as open are automatically published to the Government of Ireland's Open Data Portal, data.gov.ie, and also to the Global Biodiversity Information Facilities global data portal: gbif.org.

Growth of the National Biodiversity Database

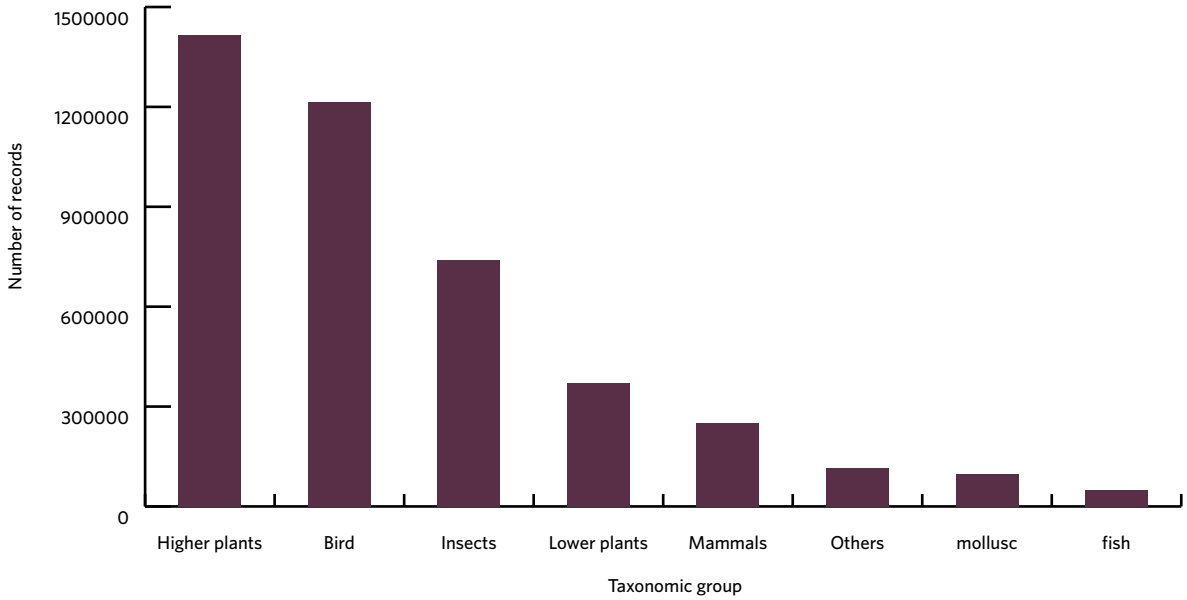


The number of records in the National Biodiversity Database continued to increase during the year, and at the end of 2018, the database contained 4,257,298 records of 16,139 different species.



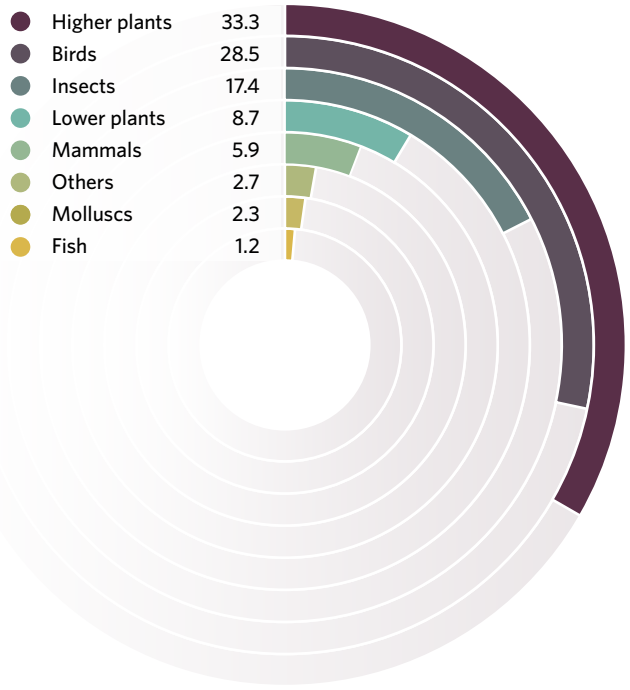
2018 saw the number of records in the database increase by 6%. As expected, the rate of growth of the database (in percentage terms) is reducing year on year.

Taxonomic composition of national biodiversity database



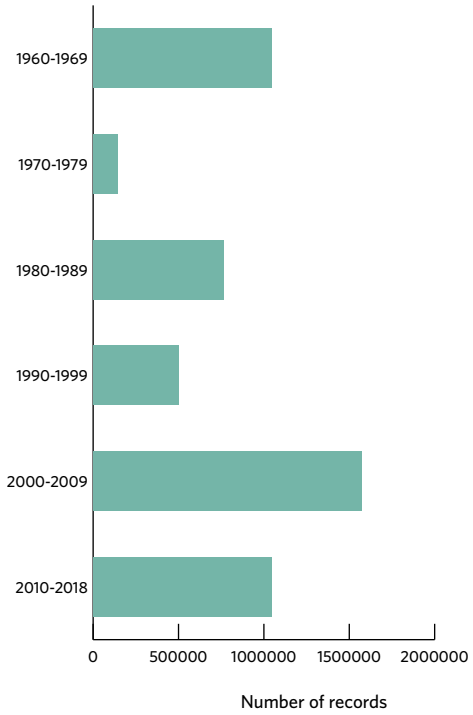
The greatest number of records in the database are of higher plants and bird, followed by insects, lower plants and mammals.

Percentage of database comprised of the different taxonomic groups



Higher plants and birds together comprise more than 60% of all records in the national biodiversity database. Records of lower plants and mammals together make up another 27%, with the records of all the remaining taxa making up just 12% of the total.

Number of records by decade 1960-2018

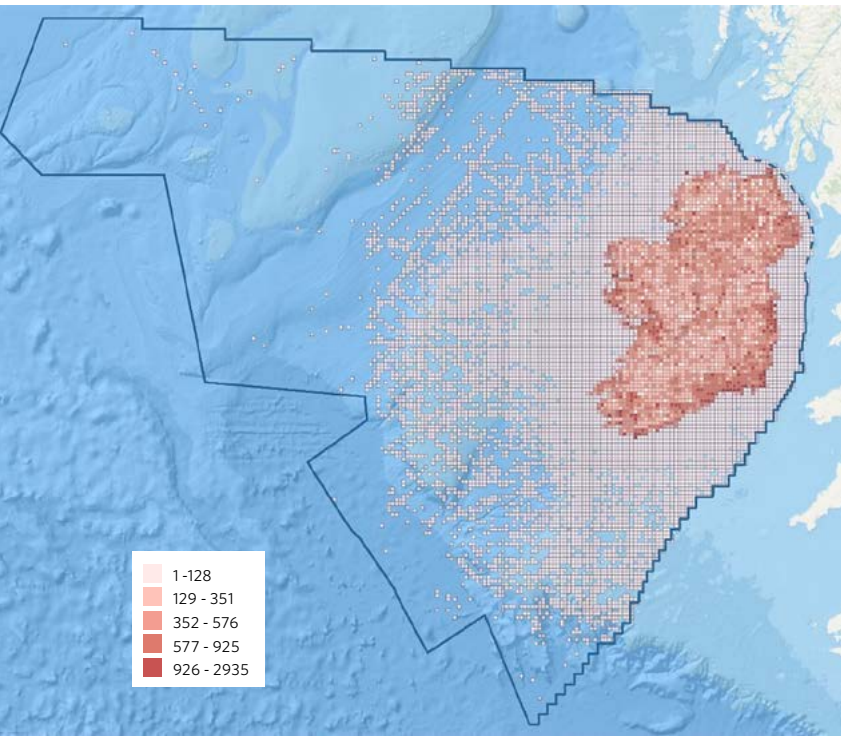


Almost 98% of all the records are of occurrences since 1960, so historic data forms a very small component of the dataset.

Species composition

The top 10 European regulated invasive species with the most records

Species (Scientific name)	Number of records
Grey squirrel *(Sciurus carolinesis)*	5,875
Himalayan balsam *(Impatiens glandulifera)*	2,902
New Zealand flatworm *(Arthurdendyus triangulatus)*	1,367
Giant hogweed *(Heracleum mantegazzianum)*	1,320
Giant rhubarb *(Gunnera tinctoria)*	463
Nuttall's waterweed *(Elodea nuttallii)*	445
African curly waterweed *(Lagarosiphon major)*	300
Muntjac deer (Muntiacus reevesi)	133
American skunk cabbage *(Lysichiton americanus)*	98
Parrott's feather *(Myriophyllum aquaticum)*	49



The top 30 species with the most records

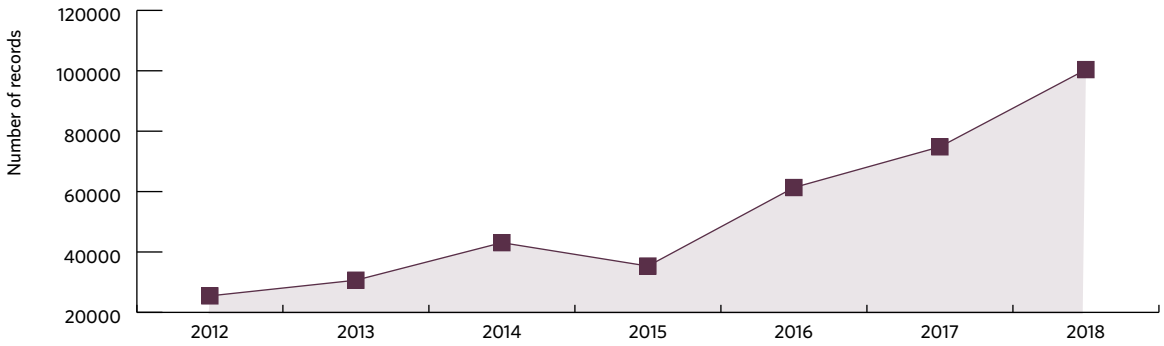
Species (Scientific name)	Number of records
Northern Gannet (*Morus bassanus*)	57350
Northern Fulmar (*Fulmarus glacialis*)	52478
Grey Seal (*Halichoerus grypus*)	51059
Eurasian Badger (*Meles meles*)	45489
Common Guillemot (*Uria aalge*)	39440
Manx Shearwater (*Puffinus puffinus*)	32214
Kittiwake (*Rissa tridactyla*)	31212
Speckled Wood (*Pararge aegeria*)	29930
Blackbird (*Turdus merula*)	25212
Robin (*Erithacus rubecula*)	24888
Wren (*Troglodytes troglodytes*)	24239
Green-veined White (*Pieris napi*)	24112
Chaffinch (*Fringilla coelebs*)	23542
Magpie (*Pica pica*)	21888
Woodpigeon (*Columba palumbus*)	21742
Hooded Crow (*Corvus cornix*)	21463
Jackdaw (*Corvus monedula*)	20577
Rook (Corvus frugilegus)	20475
Blue Tit (*Cyanistes caeruleus*)	20292
Song Thrush (*Turdus philomelos*)	19868
Common Starling (*Sturnus vulgaris*)	19856
Meadow Brown (*Maniola jurtina*)	19601
Dunnock (*Prunella modularis*)	19525
Meadow Pipit (*Anthus pratensis*)	17815
Small Tortoiseshell (*Aglais urticae*)	17765
Swallow (*Hirundo rustica*)	17466
Pied Wagtail (*Motacilla alba yarrellii*)	17403
Great Tit (*Parus major*)	17380
House Sparrow (*Passer domesticus*)	16407
Herring Gull (*Larus argentatus*)	15882

Plotting the number of records for each 10km square (or equivalent) across the Irish territory shows there is a strong terrestrial bias.

Ireland's Citizen Science Portal

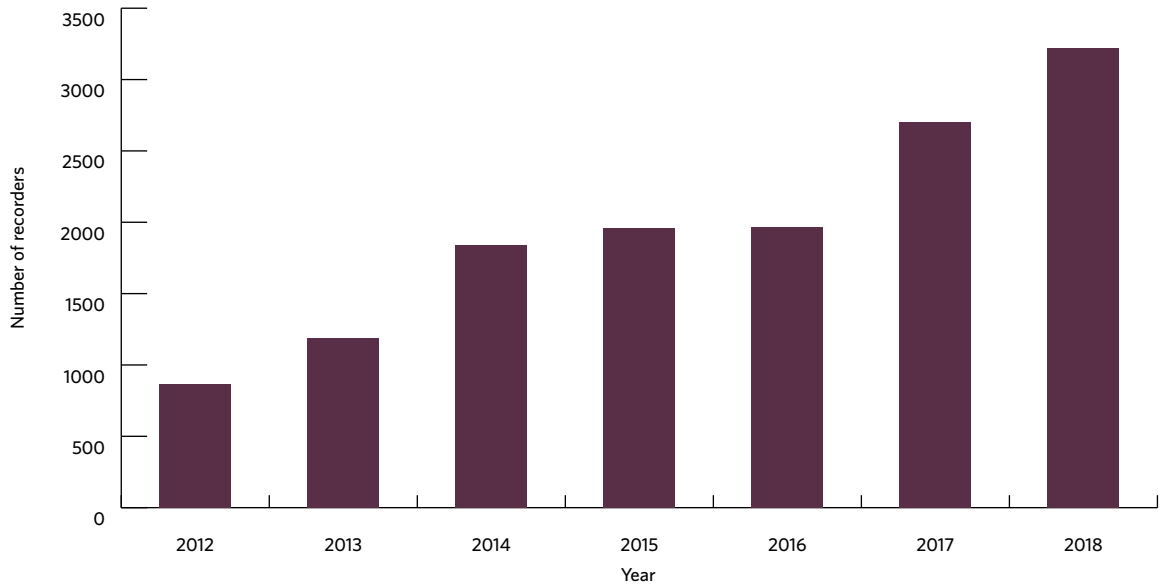
The National Biodiversity Data Centre has developed and maintains Ireland's Citizen Science Portal as an effective means for recorders to submit sightings directly to the Data Centre. This application has seen a steady growth in the number of records submitted each year, culminating in more than 100,000 records submitted in 2018. For such a small recorder base, this is a remarkable level of recording. These data, when validated, are then added to the National Biodiversity Database.

Citizen Science data mobilisation



Peacock has shown a 196% increase in populations between 2008 and 2018.

Number of recorders who submitted records 2012-2018



There has been a steady increase in the number of recorders who submitted data through Ireland's Citizen Science Portal.

Strategic objective 2.

Tracking change: Identify the need for, and assist the production of, high quality scientifically robust data to track changes in Ireland's species and habitats.

Expected benefit: *An increased understanding of how Ireland's biological diversity is changing*

Case study 1: Irish Butterfly Monitoring Scheme

Background

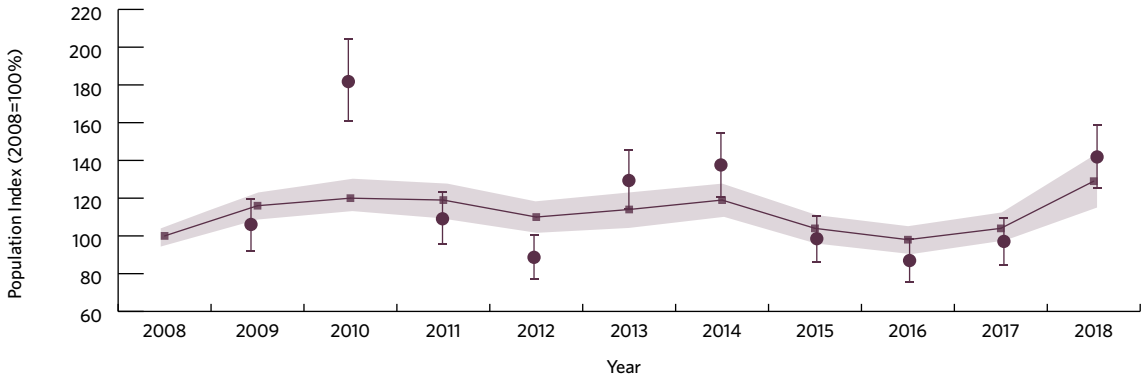
In 2010, the International Union for the Conservation of Nature Red List of Irish Butterflies found that 18% of our butterfly species are now under threat, with another 15% designated as 'near threatened'. In the same year, the European Red List found that 9% of butterflies across the continent are threatened; with another 10% 'near threatened'. In addition, the 2016 European Environmental Agency Grassland Butterfly Index has found that since 1990 Europe has lost 30% of its grassland butterfly populations. Ireland was identified as being in the top five out of 21 countries for declines in both widespread and specialist species. Established in 2007 by the National Biodiversity Data Centre, the Irish Butterfly Monitoring Scheme supports and coordinates a network of citizen scientists across Ireland in recording and systematic monitoring of butterfly populations. Over the past five years the network has expanded dramatically in both size and scope, with the establishment of an additional all-island project, the *Butterfly Atlas 2021* in 2017. This project was prioritised by the Data Centre for butterflies are known to be a good indicator of climate and land use change.

Expected benefits

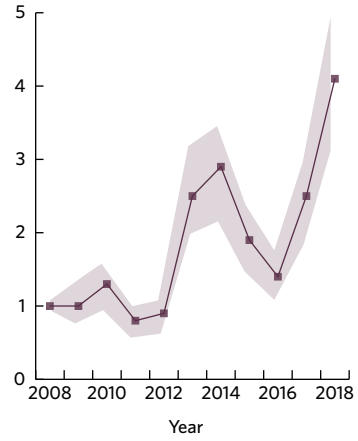
- provide quantitative and spatial data that track changes in butterfly biodiversity, providing sensitive indicators of climate change, land use and habitat fragmentation.
- provide quantitative data to the National Biodiversity Indicator project in support of Ireland's National Biodiversity Plan 'Actions for Biodiversity 2017-2021'.
- provide quantitative data to the European Environmental Agency for the ongoing delivery of the European Grassland Butterfly Index and Animal Phenology Climate Change indicators in support of the EU Biodiversity Strategy to 2020.

What has been achieved in 2018

The core Irish Butterfly Monitoring Scheme is being maintained at 110 recorders across 115 transects. In terms of commitment achieved by the recorders in the network, they collectively contributed 1,412 hours and walked 2,628 km, recording 46,065 butterflies, representing 33 species. Of the 15 species that can be formally analysed using international best practice approaches, five are in decline, three are increasing, four are stable and three are too variable to assign a trend. Despite counts in 2018 being up by 29% from the 2008 baseline, overall there are now 6% less butterflies flying in the Irish landscape since the monitoring scheme began. Finally, the Butterfly Atlas 2021 has dramatically expanded the broader network of butterfly recorders, with 995 recorders in the Republic of Ireland submitting 18,800 records across 8,790 locations, a 358% increase in records and 251% increase in recorders prior to the initiation of the Atlas project. In addition, the Atlas has facilitated the establishment of the Five Visit Monitoring Scheme, with 29 recorders across 36 sites providing reduced-effort estimates of butterfly abundance in support of the Atlas and core Monitoring Scheme. Finally, six workshops and two talks were delivered to support existing recorders and engage new recorders with butterfly recording and monitoring.

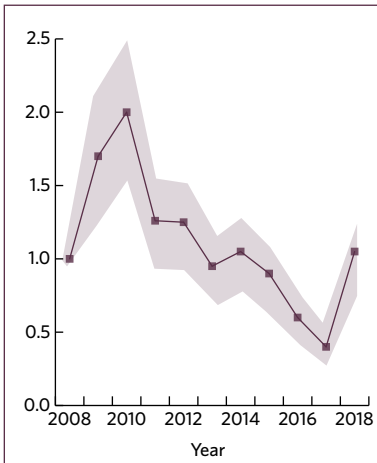


Irish Butterfly Monitoring Scheme multi-species index of Irish butterfly populations 2008-2018 derived from 15 native species. Across the 11 years of the monitoring scheme, the current long-term trend is of moderate decline (-0.5 ± 1.1% p.a.) equating to an overall loss of 6% since 2008.



Peacock ***Aglais io***	
Ave. sites per year in monitoring scheme:	>50
Change 2008-2018:	+196%
Generations per year:	2
Overwinters as:	Adult
Conservation status (2010):	Least Concern

Peacock has shown a 196% increase in populations between 2008 and 2018.



Small Heath ***Coenonympha pamphilus***	
Ave. sites per year in monitoring scheme:	20-50
Change 2008-2018:	-47%
Generations per year:	2
Overwinters as:	Larva
Conservation status (2010):	Near Threatened

Small heath has shown a 47% decrease in populations between 2008 and 2018.

Case study 2: Marsh Fritillary Monitoring Scheme

Background

The Marsh Fritillary has been assessed as having 'Vulnerable' conservation status in Ireland, is listed on Annex II of the Habitats Directive and has legal protection under Schedule 5 of the Wildlife Order (1985) Northern Ireland. The species has suffered regional extinction in some parts of Northern Ireland and the south east and a population reduction (>30%) has been observed in the past as a result of decline in habitat quality and habitat fragmentation and loss. Established in 2014, the all-island Marsh Fritillary Monitoring Scheme has for the first time established a standard, replicable methodology to survey Marsh Fritillary population size and habitat quality.

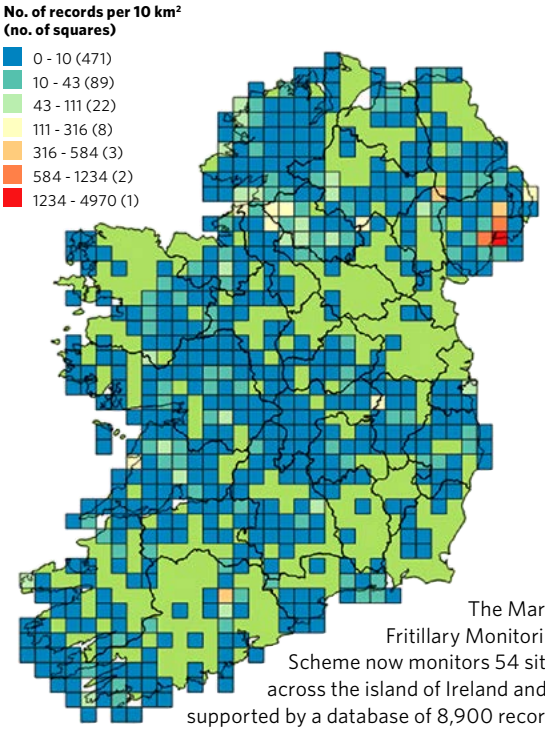
Expected benefits

- provide quantitative and spatial data that track changes in population size and distribution.
- provide qualitative data on habitat quality and its impact on population size.
- Deliver a monitoring programme in support of the EU Habitats Directive.

What has been achieved in 2018

The Marsh Fritillary Monitoring Scheme has now grown to its target size, with 54 sites (44 in Republic of Ireland and 10 in Northern Ireland) being monitored across the island of Ireland and supported by a database of 8,900 records from 1892 to present. For the first time since this priority species has been designated, we can produce preliminary estimates of larval web density change (180% increase on the 2015 baseline) and relate this directly to sward height and host-plant density.

Source	Record
Centre for Environmental Data & Recording	7,937
National Biodiversity Data Centre	2,453
National Parks and Wildlife Service	3,003
Northern Ireland Environmental Agency	2,084
Total	**15,477**



The Marsh Fritillary Monitoring Scheme now monitors 54 sites across the island of Ireland and is supported by a database of 8,900 records from 1892 to the present.

Case Study 3: Bumblebee Monitoring Scheme

Background

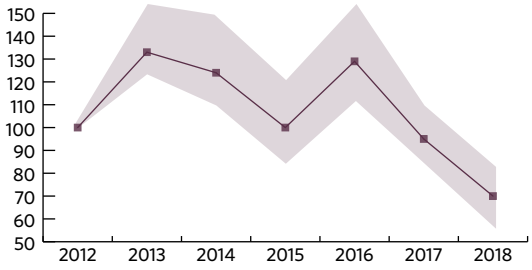
In 2006, the International Union for the Conservation of Nature Red List of Irish Bees found that 30% of our bumblebee species were under threat, with another 15% being designated as 'near threatened'. In 2014, the European Red List affirmed this trend, with 24% of 68 European bumblebee species assigned to a threat category and a further 4% being 'near threatened'. Bumblebees are Ireland's most abundant and widespread wild pollinators, but we don't know how many of our species have declined or even how our more widespread species are coping. By monitoring our bumblebee populations, we can identify species who most need our help, and detect the early warning signs of a general threat to wild bees and to Irish pollination services. Established in 2011 by the National Biodiversity Data Centre, the All-Ireland Bumblebee Monitoring Scheme supports and coordinates a network of citizen scientists across Ireland in the systematic monitoring of bumblebee populations.

Expected benefits

- provide quantitative data to track changes in bee biodiversity and assess the impact of actions under the All-Ireland Pollinator Plan.
- provide quantitative data to the National Biodiversity Indicator project in support of Ireland's National Biodiversity Plan 'Actions for Biodiversity 2017-2021'.
- deliver a monitoring programme that provides a broad-scale indicator of land use and habitat fragmentation.

What has been achieved in 2018

The scheme has now grown to 76 recorders monitoring bumblebee populations across 106 sites across the island of Ireland, with 14 new recorders joining the scheme in 2018. In total, five workshops were delivered to support recorders in identification skills and correctly applying the survey methodology. In particular, two of the workshops were delivered in support of staff of key partners on the All-Ireland Pollinator Plan: Dún Laoghaire-Rathdown County Council and the Office of Public Works. In terms of commitment achieved by our citizen scientists, collectively recorders spent 538 hours walking 935 km and recorded 10,614 bumblebees across 17 species. Of the eight species we can formally analyse according to international best practice, two are decreasing and six are too variable to assign a trend. However, 2018 proved to be the worst year since the scheme began in terms of overall bumblebee counts and the second year in succession where a marked decline in populations could be detected. As of 2018, bumblebee populations are now 17% below the 2012 baseline and are currently declining at a rate of 5% per annum.

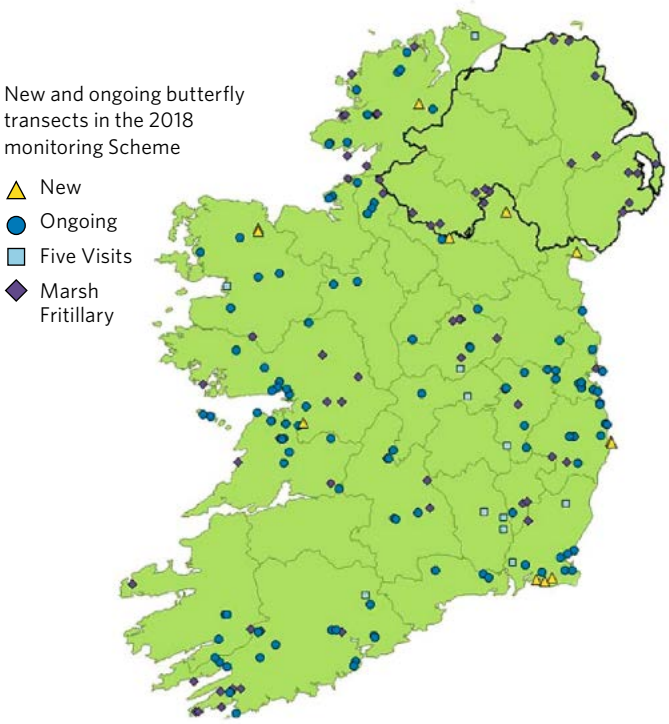


The Irish Bumblebee Monitoring Scheme multi-species index of Irish bumblebee populations 2012-2018 derived from eight species. The scheme has found that bumblebee populations have decreased by 17% since 2012.

Case Study 4: Rare Plant Monitoring Scheme

Background

The Rare Plant Monitoring Scheme was launched as a small pilot scheme in 2017. When assessing the national conservation status of very rare species according to IUCN Red List methodology, it is recommended that annual population count data are used. Given the numbers of rare plant species a country might have, this information can be difficult to collect in any volume. This citizen science scheme relies on the generosity of expert volunteers to 'keep an eye' on rare populations near them and to submit standardised count data once a year.



Map showing the location of the monitored transects under the three insect monitoring schemes in 2018

When collated centrally, over time it will provide early warning signs of threats and will help improve the accuracy of future conservation assessments of the species. It is the intention of the Data Centre that this is a longer-term data stream to support rare plant conservation in Ireland.

Expected benefit

- provide quantitative data on changes to rare plant populations to assist their conservation.

What has been achieved in 2018

The project is designed to gain a greater understanding of the status of rare plant populations and to make this information available to the National Parks and Wildlife Service (NPWS) to assist its conservation efforts. The scheme is framed around the 2016 Vascular Plant Red List and is mainly focused on monitoring vulnerable, near threatened and rare species. During the initial year of the scheme in 2017, volunteers monitored 37 populations across 22 species. In 2018, expectations were greatly exceeded, with volunteers monitoring 108 populations across 53 different species.

Strategic objective 3.

Informing decision-making. Facilitate and promote the use of biodiversity data to inform public policy and decision-making through data analysis, interpretation and reporting.

Expected Benefit: *Improved evidence-based policy development to assist the conservation of Ireland's biological diversity*

Case study 1: National Biodiversity Indicators

Background

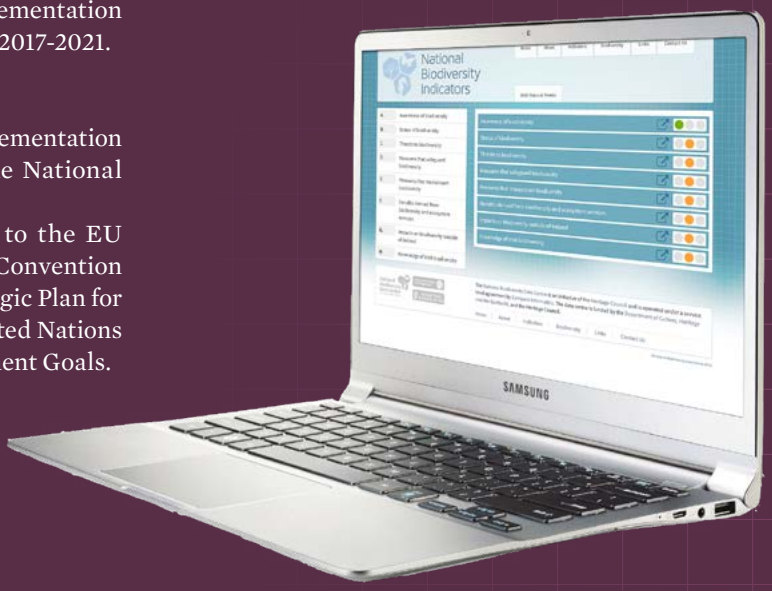
In 2010, the Parties to the Convention on Biological Diversity (CBD) agreed to a Strategic Plan for Biodiversity 2011-2020. The Strategic Plan also includes a series of 20 targets, commonly known as the Aichi 2020 Biodiversity Targets, relating to the sustainable management and use of the world's biological resources. In 2011, Ireland updated and published its 2nd National Biodiversity Plan 'Actions for Biodiversity 2011-2016', but at the time had yet to develop national biodiversity indicators that could both measure implementation of the plan and progress towards attaining the Aichi 2020 Biodiversity Targets. In 2013, the National Parks and Wildlife Service initiated the development of the National Biodiversity Indicators, a suite of indicators that monitor changes in Ireland's species, habitats and landscapes, as well as reflecting broader changes relating to biodiversity in Irish society. In 2014, the National Biodiversity Data Centre was given responsibility for their collation and reporting, and in 2017 the indicators were adopted under Action 1.1.18 as a key tool for tracking the implementation of the National Biodiversity Action Plan 2017-2021.

Expected benefits

- provide objective indicators of implementation and monitoring of progress on the National Biodiversity Action Plan 2017-2021
- support supranational reporting to the EU Biodiversity Strategy to 2020, the Convention on Biological Diversity (CBD), Strategic Plan for Biodiversity 2011-2020, and the United Nations Agenda 2030 Sustainable Development Goals.
- provide an open and valuable evidence base for the public and decision makers on the status, trends, pressures and conservation actions relating to biodiversity.

What has been achieved in 2018

52 out of 71 sub-indicators have been completed to date. Due to variability in reporting cycles, not all sub-indicators can be updated each year. In total, 30 sub-indicators were updated and an additional two indicators collated in preparation for the publication of the second public report 'National Biodiversity Indicators: 2018 Status and Trends', in early 2019. In parallel, an extensive tagging exercise has been completed between indicators and the actions in the National Biodiversity Action Plan 2017-2021 and the United Nations Agenda 2030 Sustainable Development Goals. This linkage matrix will be fully implemented within the Content Management System of the existing website, but will not be visible until the next phase of development of the online indicator resources is completed. Finally, in line with the iterative review process established for the indicators, an annual report on the Indicators has been submitted to the Biodiversity Working Group and presented to the Biodiversity Forum for consultation.



A dedicated website https://indicators.biodiversityireland.ie/ has been developed to display the National Biodiversity Indicators

Case Study 2: Support reporting under EU Regulations on Invasive Alien Species (1143/2014)

Background

Invasive alien species can easily spread across borders. This is why the EU has adopted a law - the IAS Regulation (*Regulation on the prevention and management of the introduction and spread of invasive alien species*) - to tackle the problem in a coordinated, joint effort across all Member States. It is a binding legal tool for all Member States that came into force in January 2015. The Regulation lays down rules to prevent, minimise and mitigate the adverse impacts of the introduction and spread, both intentional and unintentional, of invasive alien species on biodiversity, related ecosystem services, as well as other adverse impacts on human health or the economy.

At the core of the IAS Regulation is a list of Invasive Alien Species of Union concern. The IAS Regulation imposes restrictions on the keeping, importing, selling, breeding and growing of the listed species. Member States are also required to take measures for their early detection and rapid eradication, and to manage populations that are already widely spread in their territory. Prevention is the priority because established populations can be expensive to manage and difficult or impossible to eradicate. There is a phased introduction of the IAS Regulation requirements. The National Biodiversity Data Centre has a key role in supporting its implementation in Ireland.

Expected benefit

- track the status of Invasive Alien Species in Ireland
- have a greater understanding of the threat posed by Invasive Alien Species to Ireland's biodiversity
- deliver the reporting needs of Ireland under the EU Regulations on Invasive Alien Species
- assist National Parks and Wildlife Service to implement the national invasive species regulations and policy
- provide data and information to support decision-making and action on invasive alien species.

What has been achieved in 2018:

The invasive species work programme for 2018 focused on provision of information and support to the National Parks and Wildlife Service in implementation of the European Regulation on Invasive Alien Species (1143/2014) and the national invasive species regulations and policy. Specifically, the following reports were drafted for submission to the European Commission under three articles of the EU IAS Regulation:

Article 13 – comprehensive analysis and prioritisation of unintentional pathways of introduction and spread related to the first list of 49 Invasive Aliens Species of European Union concern. Prioritised pathways are taken forward for development of Pathway Action Plans.

Article 14 – report on surveillance systems to be used to detect the occurrence and monitor the distribution and spread of the Invasive Alien Species of European Union concern.

Article 19 – drafting of management plans for widely spread species. Seven species from the full list of 49 Invasive Alien Species of European Union concern are widely spread in Ireland and so are beyond possibility or feasibility of eradication. Two-page management plans have been drafted. Following public consultation, the plans will be updated and submitted to the European Commission. A supporting report has also been drafted.

American Skunk Cabbage one of the Invasive Alien Species of EU Concern

Case Study 3: Alert system on Ireland's Invasive Alien Species

Background

Invasive Alien Species are, after habitat loss, the second greatest threat to biodiversity, worldwide. Having early detection and rapid response systems in place to deal with new or potentially new arriving species is a prudent and cost-effective way to mitigate the impact of the threat posed by Invasive Alien Species to Ireland's biodiversity. The National Biodiversity Data Centre operates Ireland's Invasive Alien Species Automated Record Alert System, in conjunction with key partner organisations. This involves tagged species triggering an automatic alert to staff of the Data Centre who then follow a protocol to alert the appropriate national authority depending on the species recorded. If appropriate, this alert then triggers a rapid response for follow-up actions, often resulting in the removal of the species.

Expected benefits

- Centralised record submission system and verification protocol to facilitate early detection and rapid response to the threat posed by newly arrived Invasive Alien Species

What has been achieved in 2018

In 2018, 70 automated invasive alien species record alerts were received (Table 1). Species tagged for alert are those that are new arrivals or are not yet established in Ireland but could become high impacting invaders if they were to become established.

Of the 70 records submitted:

- 33 were verified as the species recorded;
- 32 were unable to be verified because of lack of supporting evidence, such as a photograph;
- 5 of the records when followed up were found to be mis-identifications.

General Taxon Group	*No. of alert records submitted*	*No. of each species reported*	*No. of records verified*	*No. of records unable to verify*	*No. records verified as a different species*
Freshwater Invertebrate/Pathogen	5	2 Non-native crayfish; 2 Crayfish Plague; 1 Asian clam	2	0	3
Freshwater Vertebrate	9	6 *Trachemys scripta* species; 3 Rainbow trout	5	3	1
Freshwater Plants	11	3 New Zealand pigmyweed; 3 Nuttall's waterweed; 3 Parrots feather; 2 Curly waterweed	9	2	0
Terrestrial Invertebrate	3	3 Asian hornet	0	3	0
Terrestial Vertebrate	29	14 Raccoon; 6 Coypu; 6 Muntjac deer; 2 Black rat; 1 Siberian chipmunk	7	22	0
Terrestrial Plants	10	10 American skunk-cabbage	9	1	0
Marine	3	2 *Didemnum vexillum*; 1 Wakame	1	1	1
Total no. of alert records	**70**		**33**	**32**	**5**

Details of the records submitted through the Invasive Alien Species Automated Record Alert System in 2018

Case Study 4: Supporting action to mitigate impact of Crayfish Plague

Background

Crayfish are freshwater relatives of marine lobsters, which they resemble closely. There are seven European species, including the White-clawed Crayfish, which is the only species naturally occurring in Ireland. The populations of European crayfish have been affected by the impact of introduced species and the crayfish plague. The White-clawed Crayfish is listed on Annex II and Annex V of the Habitats Directive and is protected in Ireland under the Wildlife Acts. Ireland has a particular international responsibility for White-clawed Crayfish conservation as it was, until 2017, the only part of the EU with no introduced species of crayfish and no proven incidences of crayfish plague. However, since then there have been more reported cases of crayfish plague, initiating a programme of multi-agency actions to halt the further spread of this disease. The National Biodiversity Data Centre plays a central role in the coordination and dissemination of information about the status of the plague to help stop its spread and to support the actions of other state bodies.

Expected benefits

- Publishing of up-to-date information on the occurrence of Crayfish Plague
- Increased awareness of the threat posed by Crayfish Plague
- Coordination and support of mobilisation efforts to mitigate the impact of Crayfish Plague

What has been achieved in 2018:

The National Biodiversity Data Centre continues to collate and coordinate the dissemination of information on Crayfish Plague (*Aphanomyces astaci*) through the dedicated webpage http://www.biodiversityireland.ie/crayfish-plague-2017 and through its social media channels. The webpage provides an overview of where outbreaks of the plague have been confirmed; information on which catchments have been affected; information on how to identify evidence of the plague; and how to report sightings. It also helps to promote the voluntary Emergency Containment Measures and the 'Check, Clean, Dry' biosecurity protocol for all users of Ireland's rivers and lakes.

The Crayfish Plague Alert —where submission of sightings of mass mortality of White-clawed crayfish or any suspected non-native crayfish to the National Biodiversity Data Centre are encouraged— has been one of the most active alerts during 2018. When a sighting is reported, it triggers an automated alert, and each sighting is processed for validation and communicated to the National Parks and Wildlife Service and the Marine Institute. In 2018, there were three suspected reports submitted, and one for the River Al tested positive for Crayfish Plague.

It is unknown how Crayfish plague has been introduced to Irish waters, but it can be introduced and spread by plague-carrying non-native crayfish or by contaminated equipment. As an action arising from an Inter-agency Crayfish meeting in late 2017, the National Biodiversity Data Centre drafted a Contingency Plan for Non-native Crayfish Species. This plan sets in place the protocols needed to prevent the introduction of freshwater non-native crayfish into Ireland and how government and agencies should respond in the event of an outbreak.

Case Study 5: All-Ireland Pollinator Plan 2015-2020 informing decision-making

Background

The All-Ireland Pollinator Plan was developed voluntarily by the Steering Group in 2014-2015 and the subsequent implementation is managed by Dr Úna FitzPatrick within her current role as Senior Ecologist in the National Biodiversity Data Centre. Given the huge level of support and engagement with the Plan, two other organisations, the Heritage Council and An Bord Bia, have stepped in to provide funding for a Project Officer position (divided between two part-time officers) and in return are provided with expertise on decision-making with respect to the management of biodiversity as a resource within their respective sectors of local community engagement and agri-businesses.

Expected benefits

- support to local authorities and local communities to facilitate greater local engagement to deliver action for the conservation of pollinators
- support to enable more agri-businesses to sign up as partners of the All-Ireland Pollinator Plan
- structure framework for sustainably managing biodiversity with the Origin Green programme

What has been achieved in 2018

Thanks to annual funding received from the Heritage Council and An Bord Bia, two half-time posts have been created to assist engagement with partners of the All-Ireland Pollinator Plan.

Funding for one half-time post has been received from An Bord Bía to deliver aspects of the plan supporting the agri-business sector. This post supports the work of Bord Bía by providing a structured framework for sustainably managing biodiversity within the Origin Green programme. As of the end of 2018, a total of 72 businesses have signed up as a business supporter of the All-Ireland Pollinator Plan. They are provided with support to assist them in taking actions to better support biodiversity.

Funding for a second half-time post is provided by the Heritage Council to support implementation within Local Authorities and local communities. This post supports both Councils and local groups in taking evidence-based decisions to support biodiversity. As of the end of 2018, a total of 140 different local communities have taken a range of actions to make their local area more pollinator friendly.

Thanks to funding from the Heritage Council and Bord Bia two part-time post have been created to help implement aspects of the All-Ireland Pollinator Plan 2015-2020.

An Chomhairle Oidhreachta
The Heritage Council

Bord Bía
Irish Food Board

Case Study 6: Protecting Farmland Pollinators - European Innovation Partnership project

Background

Bees and hoverflies are particularly important groups of species for the provision of pollination services. A conservation assessment on the status of Ireland's hoverflies has not yet been done, but with bees we know that one third of all species in Ireland are threatened with extinction. Understanding the links between pollinators and agriculture is vitally important if actions for the conservation of pollinators are to be successful, as farmland accounts for more than 60% of the total land area of Ireland. Building the evidence base for measures to protect and enhance farmland pollinator populations, and testing their practical implementation in real farming settings, is essential to justify their roll-out nationally. The Protecting Farmland Pollinators European Innovation Partnership project is to test if farms can become more pollinator-friendly without impacting on production - as a precursor to the future roll-out of a more wide-scale programme of practical pollinator measures.

Expected benefits

- improve the evidence base for how pollinators utilise the farmland landscape
- test the effectiveness and practicality of targeted pollinator-friendly actions on farmland
- test a whole-farm pollinator scoring system that can be easily calculated, easily understood and easily improved
- make evidence-based recommendations for the roll-out of a wider farmland pollinator-friendly programme of actions

What has been achieved in 2018

In autumn 2018, the Data Centre was awarded €1,194,679 to deliver a five-year project to test farmland pollinator measures under a European Innovation Partnership programme run by the Department of Agriculture, Food and the Marine. The project will develop and test a whole-farm pollinator scoring system that can be easily calculated, easily understood and easily improved (and in line with the All-Ireland Pollinator Plan's farmland pollinator guidelines published in 2017). The five-year project will be run with a group of 40 farmers across farm types and intensities in Co. Kildare. It will be a result-based system – the higher the pollinator score of the farm, the more the farmer will get paid annually. The project will also include significant insect/plant surveys to test whether farms that do have higher scores have more pollinators (bees, hoverflies) and more biodiversity generally. It will also test the effectiveness of each of the individual pollinator measures in Ireland. All farms can become more pollinator-friendly without impacting on production, and it is hoped this project will demonstrate this, and how it could be rolled out on a wide scale in the future. The operational group for the project includes the Data Centre, Trinity College Dublin, Bord Bia, Glanbia, Teagasc, Macra na Feirme and four representative farmers across farm types.

From 2019, this European Innovative Partnership project will employ a full-time Project Manager within the National Biodiversity Data Centre.

eip-agri
AGRICULTURE & INNOVATION

An Roinn Cultúir, Oidhreachta agus Gaeltachta
Department of Culture, Heritage and the Gaeltacht

The Data Centre was awarded €1,194,679 to deliver a five-year project to test farmland pollinator measures under a European Innovation Partnership programme run by the Department of Agriculture, Food and the Marine

Contributing to research

Resilience Project – development of Important Biodiversity Areas

As part of the €1.2 million Science Foundation Ireland-funded Resilience project coordinated through University College Dublin and Queen's University Belfast, the Data Centre is collaborating with researchers in University College Dublin on developing best-practice analytical pipelines for the use of unstructured citizen science-derived data. Once established, these statistical methodologies will facilitate the identification of 'Important Biodiversity Areas' for a much wider range of species data than can currently be mobilised for such analyses. To date, models of bias in birds, bryophytes and moths have been successfully developed with extension and publication on-schedule for 2019.

Strategic objective 4.

Develop Strategic Partnerships: Support and collaborate with the Data Centre's partners to assist efficient delivery of their objectives.

Expected Benefit: *Greater efficiencies in project delivery and programme implementation through collaborative effort and the use of shared services.*

Case study 1: All-Ireland Pollinator Plan 2015-2020

Background

The All-Ireland Pollinator Plan was published in September 2015, making Ireland one of the first countries in Europe with an approach to address this problem. It is now supported by 90 governmental and non-governmental organisations and it has identified 81 actions to make Ireland, north and south, more pollinator-friendly. A 16-member steering group provide oversight of the Plan with implementation coordinated by the National Biodiversity Data Centre. Within each objective, targets have been set and actions have been identified to help achieve that target. The All-Ireland Pollinator Plan was developed from the ground up to meet the challenge of pollinator declines across the island. In the 2018 mid-term review, the Plan was assessed based on what has been achieved to date within each objective. Within each, key successes were identified as well as key obstacles.

Expected benefits

- make Ireland pollinator-friendly (farmland, public land & private land)
- raise awareness of pollinators and how to protect them
- manage pollinators – supporting beekeepers and growers
- expand knowledge on pollinators and pollination service
- collect evidence to track change and measure success

What has been achieved in 2018

Based on the mid-term review that was completed in 2018, the All-Ireland Pollinator Plan is exceeding expectations. It is a proven example of effective north-south cooperation across the island, with both jurisdictions coming together to work within a common framework. It is also regarded as an example of best practice internationally. Organisations are supporting the Plan in word but also in deed. As of the end of 2018, 92% of the 81 actions in the Plan were either completed or in train as agreed. Responsibility for the actions is shared out between the original supporting organisations. Support from the public has been significant. A nationally representative poll carried out in September 2018 found that 88% of people want the Irish government to do more to help bees (Source: Market Research Agency iReach Insights, September 2018).

In terms of actions on the ground to return food and shelter for pollinators to the landscape, there have been many successes to date:

- A total of seven guideline documents has been published, outlining evidence-based actions for different sectors: Farmland, Councils, Local Communities, Businesses, Schools, Faith Communities and Gardens. These are further supported by other evidence-based resources freely available at www.pollinators.ie
- At the end of 2018 approximately 57,000 guideline documents have been distributed, along with 30,000 bookmarks and 15,000 fliers. Six short videos and an animation have been produced.
- Councils across the island are changing the way that public land is managed.
- Over the last three years, 140 local communities have become more pollinator friendly and have entered the special Pollinator Award in the Tidy Towns competition.
- Our most threatened bee, the Great Yellow Bumblebee, has been adopted by Mayo County Council.
- 72 businesses become supporters of the Plan and agreed to take actions to help.
- Thousands of gardens are becoming pollinator friendly.
- More and more research on pollinators has been happening in Irish universities
- More and more people are engaging with the National Biodiversity Data Centre and learning how to identify bees and hoverflies and collect data to track changes in their populations.
- A publicly available mapping system has been developed by the National Biodiversity Data Centre to track what actions are being taken across sectors to help (Actions for Pollinators: https://pollinators.biodiversityireland.ie). It is the first system of its kind to track progress across multi-partners within a biodiversity plan. By the end of 2018, more than 800 individual sites where pollinator-friendly actions were taken have been logged.
- Since its publication, the Pollinator Plan has been promoted via approximately 82 newspaper articles, 12 video interviews, 40 radio interviews, 42 magazine articles and more than 140 presentations/workshops.

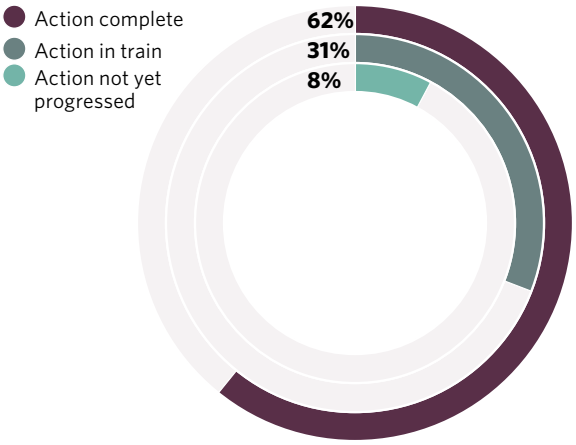
Much has been achieved in the first three years despite very limited funding. The All-Ireland Pollinator Plan does not have project funding, nor has a large project budget ever been envisaged. It was set up to be as cost-effective as possible. Partner organisations, who agreed to support the Plan and take actions on the land they manage, did so on the understanding that they would fund that themselves. The Department of Agriculture, Food and the Marine has provided €15,000 in 2016, 2017, and 2018, and this has been invaluable in allowing the publication of resources and outreach material.

The All-Ireland Pollinator Plan has made a very positive start, but much remains still to do. The greatest difficulty to date has not been in getting support and engagement across sectors, but in seeing the interest and the potential for further growth, but not being able to take advantage of it fully due to limited resources.

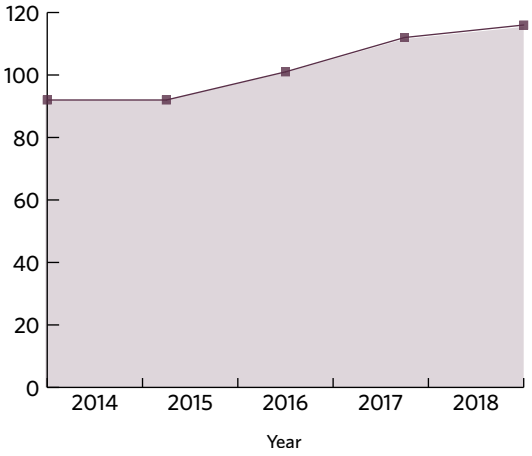
All-Ireland Pollinator Plan

Year 3 Review: At a glance

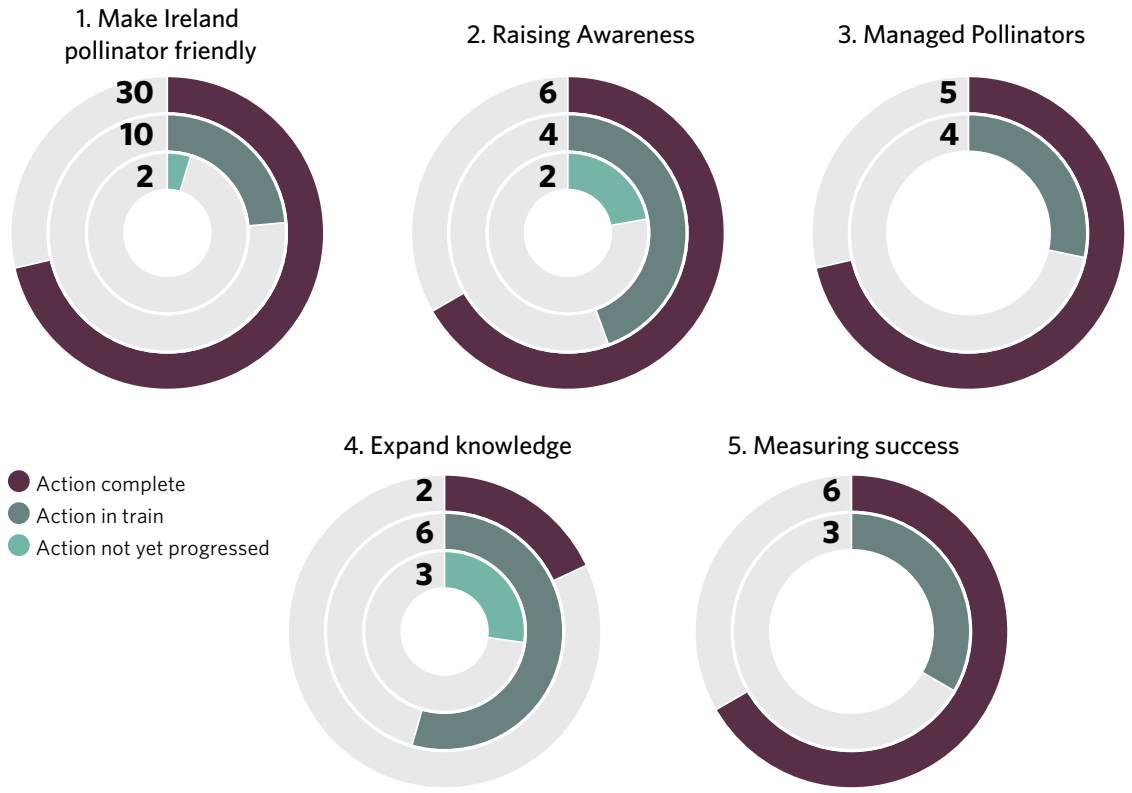
Status and progress of the Pollinator Plan's original 81 actions at the end of year 3 (2018)



Bumblebee monitoring scheme walks performed



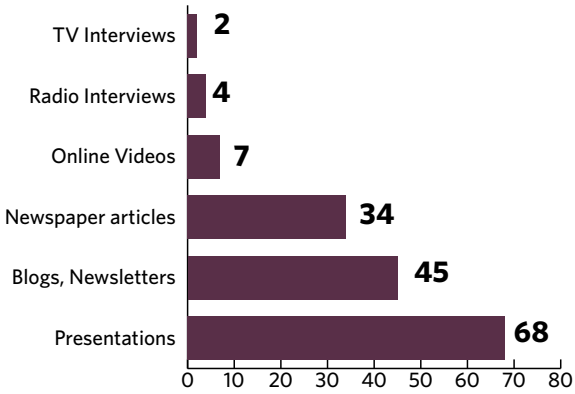
Status of the original actions broken down by the Pollinator Plan's 5 main objectives



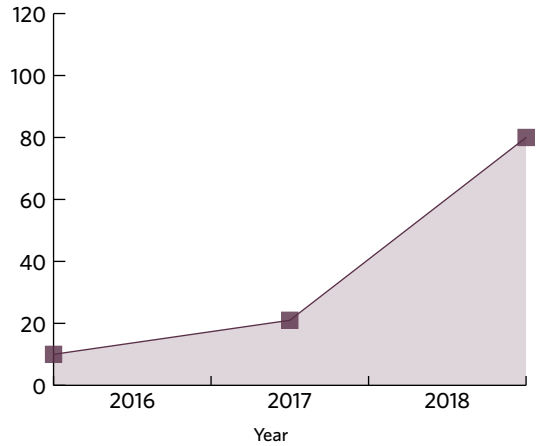
Additional major resources released in 2018

Evidence based guidelines for Faith Communities, Group Water Schemes Sites, How-to-guide on developing a school pollinators plan

Year 3: Raising awareness

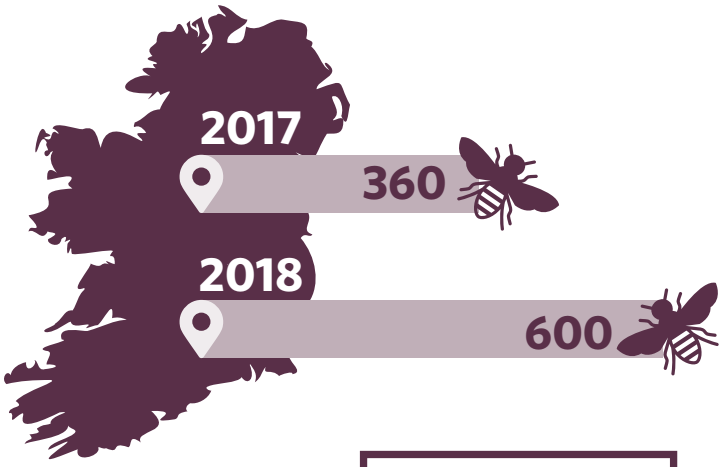


Number of business supporters



Sectoral engagement

Total number of sites logged on the 'Actions for Pollinators' map: 600 (up 360 from 2017)



Total number of Tidy Towns groups when entered the pollinator award since 2016: 140

Strategic objective 5.

International collaboration: Facilitate the provision of Irish biodiversity data to international initiatives

Expected Benefit: *Having Irish data contribute to regional and global biodiversity initiatives to inform decision making at an international level*

Hosting the 25th Governing Board meeting of the Global Biodiversity Information Facility (GBIF)

The National Biodiversity Data Centre hosted the 25th meeting of the Governing Board of the Global Biodiversity Information Facility (GBIF) in Kilkenny on October 15-19th. GBIF is an inter-governmental global network of 59 Participant Countries and 38 international organisations and initiatives, working together to share data and information on the world's biological diversity. The National Biodiversity Data Centre serves as Ireland's GBIF Node. To mark the occasion, the Data Centre held a one-day symposium, on October 18th, showcasing how the work of the National Biodiversity Data Centre bridges the gap between the global and regional work of GBIF and delivers of on-the-ground actions for biodiversity at national and local levels. The symposium served as a very valuable networking opportunity and helped to strengthen the international links on aspects of the work of the National Biodiversity Data Centre.

The Data Centre continues to automatically feed any datasets and surveys published as open data to the GBIF data portal, thereby contributing to the global biodiversity portal. The GBIF data portal reached its own milestone in 2018, when it exceeded more than 1 billion biodiversity records published through the portal. All these data are freely available to download and form a valuable resource for scientists in Ireland to use for their research.

The National Biodiversity Data Centre hosted the 25th Governing Board meeting of the Inter-governmental Global Biodiversity Information Facility in Kilkenny in October 2018.

Collaboration with South African National Biodiversity Institute

The National Biodiversity Data Centre, with Compass Informatics, has signed a collaboration agreement for expertise exchange and shared learning with the South African National Biodiversity Institute (SANBI). The formulation and signing of the Agreement builds on existing working links and will formalise a much closer working relationship between Ireland and South Africa. The South African National Biodiversity Institute contributes to South Africa's sustainable development by facilitating access to biodiversity data, generating information and knowledge, building capacity, providing policy advice, and conserving biodiversity in its beautiful Kirstenbosch National Botanic Garden under Table Mountain. The National Biodiversity Data Centre and Compass Informatics has built a reputation for development of state-of-the-art data management and mapping infrastructure and is actively involved in building the knowledge base on Ireland's biodiversity, with the objective of improving decision-making for biodiversity.

The Collaboration Agreement covers three areas;

1. Development of research infrastructures,
2. Advancement of data science, biodiversity assessment and monitoring, and policy advice, and
3. Collaboration on funding proposals to support special initiatives.

There is clearly overlapping roles and experiences that both organisations can learn from each other. The collaboration agreement was formally signed on the fringes of the Global Biodiversity Information Facility meeting in Kilkenny in October.

The National Biodiversity Data Centre, with Compass Informatics, signed a collaboration agreement for expertise exchange and shared learning with the South African National Biodiversity Institute (SANBI) in October. At the signing of the agreement in Kilkenny were (from left) Jeff Manuel and Kristal Maze (SANBI), Ciaran O'Keeffe (NPWS), Gearóid Ó Riain (Compass Informatics), Dr. Yonah Seleti (Dept. of Science and Technology, South Africa), and Dr. Liam Lysaght (National Biodiversity Data Centre).

Supporting European Research

1. **European Butterfly Monitoring Scheme**

Irish butterfly monitoring data was included in an exploratory data analysis by Butterfly Conservation Europe on behalf of the European Environmental Authority, with the aim of developing performance indicators for the Natura 2000 network. The original tool developed by Wageningen University and the private consultancy Alterra, BioScore 2.0, has now been extended to include monitoring scheme data and the data have been used to test European butterfly atlas and monitoring scheme data. Overall, the predictive power was highest in north and west Europe and lowest in the south and east, in parallel with the density of monitoring transects. Ultimately, for future Irish studies the tool would be fit-for-purpose with refinement but not so for European-wide models (Van Swaay et al., 2018. Technical report: making Bioscore distribution models based on Butterfly Monitoring Transects. Report VS2017.029, Dutch Butterfly Conservation, Wageningen, Netherlands).

2. **Separating Environmental Changes and their effects on commUnity tRaits in European butterflies (sECURE) project**

To facilitate alignment with European-level analyses and the European Butterfly Monitoring Scheme, a high resolution section-level database of the Irish Butterfly Monitoring Scheme has been developed and submitted to the German government-funded Separating Environmental Changes and their effects on commUnity tRaits in European butterflies (sECURE) project. Currently comprising 170,000 butterfly counts, 18,500 sampling events and environmental metrics across 2,300 sections, this is the first time Irish data has been incorporated into European-wide research coordinated by the German Centre for Integrative Biodiversity Research (iDiv). The results will be published as a peer-reviewed paper in mid-2019, and a report prepared for the European Environmental Agency by the end of 2019.

3. **LepiDiv Project**

Detailed information on species' ecological niches are indispensable to predicting changes in their abundance and distribution with ongoing land use and climate change. The LepiDiv project coordinated by the Helmholtz Centre for Environmental Research (UFZ) in Germany aims to collate high resolution spatial butterfly data across Europe, detect changes in their distribution over time and predict future changes in their distribution under differing land use and climate change scenarios. In 2018, the Data Centre joined the LepiDiv projects and will coordinate the use of Irish data to support future European distribution and climate change risk atlases.

4. **University of Bern Red Admiral Migration Project**

By using the migratory Red Admiral butterfly (*Vanessa atalanta*) as a model species, researchers at the Menz Laboratory of Insect Migration are collating citizen science data on Red Admiral distribution from across Europe to understand changes and drivers of its migratory behaviour and pathways across Europe since 2015. The Data Centre was one of the first organisations to support the project and, to date, have provided over 8,800 Red Admiral records from Ireland.

Strategic objective 6.

Communication: Communicate the value of Ireland's biological diversity and raise awareness of how it is changing.

Expected Benefit: *An increased awareness among the Data Centre's stakeholders and wider public of the importance of conserving Ireland's biological diversity*

Engagement Programme

What is it?
The Data Centre is increasingly engaging with a larger audience year-on-year through a variety of activities. An Engagement Programme was formalised in 2018 that frames these activities, offering greater insight into how the Data Centre communicates to the public. Quantitative figures are presented for each of our core methods of engagement within the programme, which presents an opportunity for closer examination of these activities, how effective they might be, and if there needs to be a re-prioritisation of efforts. The Engagement Programme groups these activities under seven high-level categories, namely: websites, print media, social media, workshop programmes, special events, feedback from the recorder network, and general information services to the public.

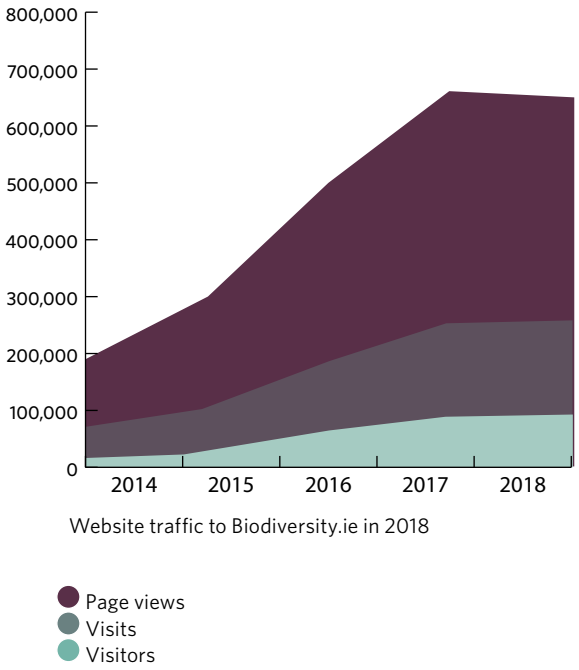
A summary of some of the Data Centre's core methods of engagement are presented below:

a **Engagement through websites**
The use of websites is one of the primary vehicles of engagement and communication, providing users with a large repository of information on our biological diversity. A number of websites are currently maintained and managed, including the main website of the Data Centre [biodiversityireland.ie], which welcomed 101,072 users in 2018, a 7.9% increase on 2017. Ireland's Citizen Science Portal [records.biodiversityireland.ie] received a significant increase in traffic also, with the number of users who visited the site at least once rising by 32.3% to 15,897 relative to the previous year. A website for the All-Ireland Pollinator Plan was also launched in May 2018 and performed well. It saw 17,878 visits by 11,796 visitors.

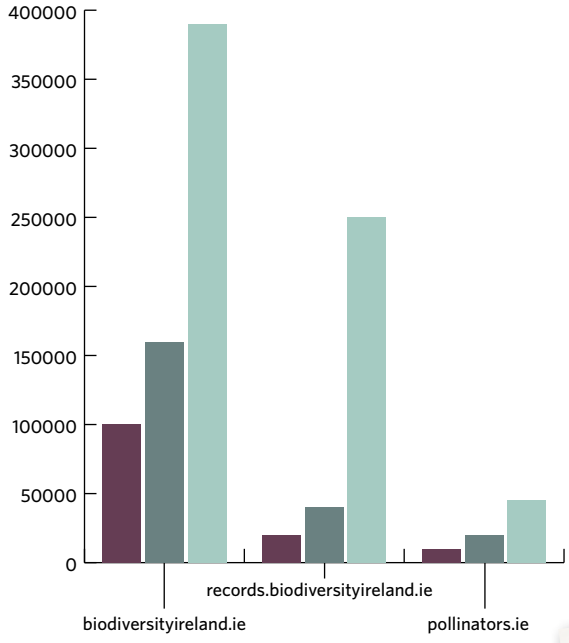
b **Engagement through print media**
The Data Centre was brought to the attention of national print media readers on several occasions throughout 2018, approx. 25 newspaper articles that we are aware of.
Among topics covered, including the All-Ireland Pollinator Plan, the issue of invasive species in Ireland was a topic which the Irish Times engaged with, along with a feature article on the decline of Irish bumblebee populations on another occasion. The Irish Examiner also featured a series of articles written by Dr. Liam Lysaght to coincide with National Biodiversity Week. These articles were supplemented by the distribution of 56,000 A2 size posters of Ireland's butterflies in Irish Examiner newspapers for the first day of National Biodiversity Week 2018.

c **Engagement through social media**
Much of the casual communication with the recording community is done through social media, in particular, via Facebook and Twitter.
The Data Centre's Facebook page showed a 30% growth, rising from 9,782 to 12,558 likes over 2018. In general, it is estimated that on some 924,834 occasions in 2018, our page's posts were on screens. Our most popular post was an animated video for the All-Ireland Pollinator Plan which reached 100,407 people and was liked 1,619 times.

The Data Centre's @BioDataCentre Twitter account proved a very successful communication channel during 2018. At the end of the year, @BioDataCentre had 10,263 followers, increasing 36% relative to the year previous. In total, the Data Centre's tweets generated approximately 1.74 million impressions, i.e. the number of times somebody saw a tweet of the Data Centre's on Twitter. This represents a 60% increase relative to 2017. Our most popular tweet was the animated video mentioned above, which was observed on Twitter 21,643 times and engaged with 479 times.



Website traffic to Biodiversity.ie in 2018



The National Biodiversity Data Centre has established and maintains a number of websites to customise engagement and communications of different aspects of the work of the Data Centre. These have seen significant traffic over the year.

Biodiversity Ireland

Two issues of Biodiversity Ireland, the Data Centre's newsletter, were published in 2018. These contained items of news from the Data Centre and its partners, including reports on significant developments in recording across the different taxonomic groups.

Butterflies of Ireland Poster

A post depicting all 36 species of Ireland's butterflies was published in hard copy. An electronic version of the poster is also available for download from the Data Centre's website.

Mammal Identification Swatch

Identification of Mammals was the latest of the identification swatches to be published by the Data Centre. It profiled the identification of all the terrestrial mammal species found in Ireland, excluding the bats.

Strategic objective 7.

Strengthen Recorder Base: To support the recorder and citizen science network to increase the quantity and quality of biodiversity data generated in Ireland

Expected Benefit: *A larger and sustained network of individuals, groups and agencies interested in, and observant of, Ireland's biological diversity, and contributing to its documentation and conservation*

Workshop Programme 2018: Identification and recording of Ireland's biodiversity

The Data Centre facilitates an extensive annual programme of workshops, which are led by national experts from the ecological sector, with the aim of increasing capacity for biological recording in Ireland. Each workshop is designed to improve and build upon species identification and field skills of the recording community. as well as meeting the needs of the professional ecologist. The 2018 programme was developed based on feedback provided from workshop participants in previous years and was released in three phases: Spring, Summer and Winter.

A total of 24 workshops was held in 2018, in conjunction with 20 partner organisations, providing training to 424 participants. This represents a 28% increase in the number of participants trained compared to 2017. The workshops largely provided training in species identification, habitat classification, and data analysis. Topics covered were:

- Mapping Biological records with QGIS
- Identifying wetland birds
- Squirrel and pine marten tracking
- Your garden: how to create a wildlife haven
- Appropriate Assessment - purpose, process and pitfalls
- Cetacean (and basking shark) identification
- Introduction to Ireland's pollinators
- Introduction to botanical keys
- Identifying Ireland's shieldbugs & ladybirds
- Yellow Asteraceae and others
- Identifying orchids and other dune plants
- Identification and management of high impact species in Ireland
- Identifying common vascular plants, lichens and mosses of raised bogs and understanding their ecology
- Live strandings and the identification of Ireland's cetaceans
- Identification of freshwater aquatic macrophytes
- Introduction to Botanical Keys
- Anatomy and ecology of Ireland's lichens
- Bryophytes as indicators of Annex 1 habitats: old oak woodlands
- Identifying species of Salix (Willow)
- Ecological data analysis through R
- New Wetlands Manual for Ireland: Putting it to good use in identifying Ireland's wetland types
- Identifying autumnal edible plants and mushrooms
- Identifying Ireland's wetland birds

Attendees	Year	Workshop
146	2009	8
237	2010	13
226	2011	13
367	2012	23
387	2013	24
389	2014	20
234	2015	21
269	2016	19
332	2017	24
424	2018	24

2018's Identification and recording of Ireland's biodiversity workshop programme trained 424 attendees, which was more than any other year. Over the ten years of the programme, almost 1,000 people have now received specialist training.

Participant Feedback: SurveyMonkey

A SurveyMonkey evaluation form was distributed to all those who participated in workshops throughout the year. In all, 71 responses were received and overall the feedback was very positive. Everything from overall organisation, to teaching performance, choice of venues, and value for money all received high rating marks of 4/5 or higher. Judging from the service ratings, additional comments and personal feedback, it is very clear that the provision of this service and training is highly regarded and sought after in Ireland. Some of the more useful constructive feedback which was received highlighted the work we need to do to have a more geographical spread of workshops available to participants.

Supporting citizen science in partnership with the Environmental Protection Agency

The National Biodiversity Data Centre has collaborated with the Environmental Protection Agency to run a three-year project to promote citizen science engagement in recording of water-based habitats. The initiative will focus around two work streams: the first on recording of dragonflies to assess their value for highlighting freshwater habitat quality, and the second on building capacity around intertidal marine biodiversity recording.

Supporting and promoting biological recording initiatives

1 **New Year 2018 Recording Challenge**

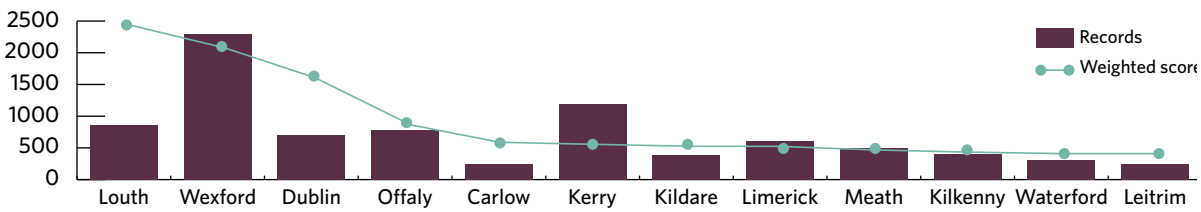
The National Biodiversity Data Centre oversaw a New Year 2018 Recording Challenge, with the general aim of encouraging people to record biodiversity over the first two weeks of the New Year. The focus of the event was to see which county would generate the most records, when counties were weighted by area. Overall, this recording challenge proved a great success.

Over the course of the two weeks, a remarkable tally of 12,119 records were submitted, averaging out at 866 records for each day of the challenge. An average of 250 different species were recorded each day over the two weeks. 348 individual recorders contributed records to the challenge. One recorder submitted 906 individual records, while another submitted records of 231 different species. Co. Louth won the challenge as more records were submitted than any other, when the number was weighted by county area. County Wexford was a close second, followed by County Dublin. Overall, the most records were submitted by County Wexford (2,287), followed by County Kerry (1,157) and County Louth (938).

2 **Winter Heliotrope Challenge**

Between the 8th December 8th 2017 and 31st January 2018, the National Biodiversity Data Centre coordinated the Winter Heliotrope Challenge in collaboration with the EPA RESEARCH project Prevention, Control and Eradication of Invasive Alien Species. Winter Heliotrope, a non-native invasive species in Ireland, was suspected to be greatly under-reported across the country. By launching this challenge, it was hoped biological recorders could be encouraged to help map the extent of Winter Heliotrope in Ireland and were further incentivised to participate by the inclusion of a competition for prizes for participants.

The challenge proved to be highly useful for the project as it helped to garner an extra 645 records of Winter Heliotrope around Ireland. Some 114 recorders got involved. Such initiatives demonstrate the value of species-specific recording challenges to contribute to research and how citizen science can be a useful way of boosting our knowledge of species distribution in Ireland.

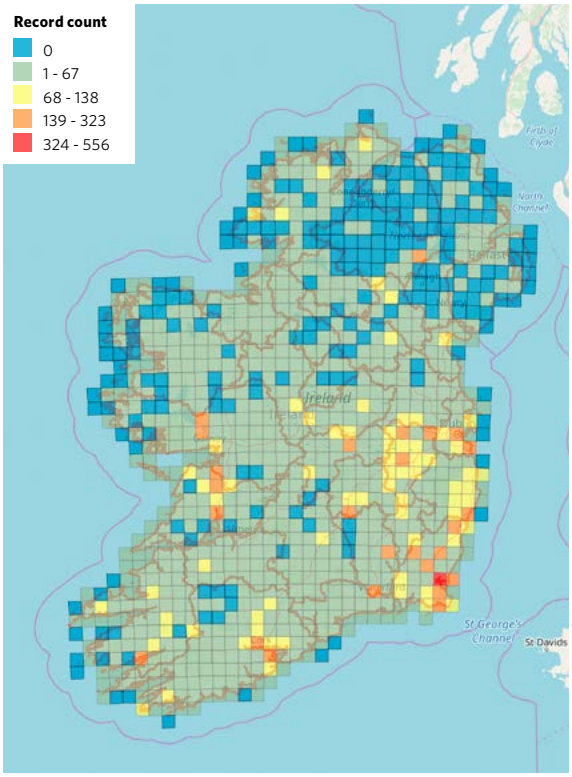


The National Biodiversity Data Centre began the year with a New Year 2018 Challenge inviting everyone to get outdoors and record any biodiversity they saw. This was a resounding success with 12,119 records generated.

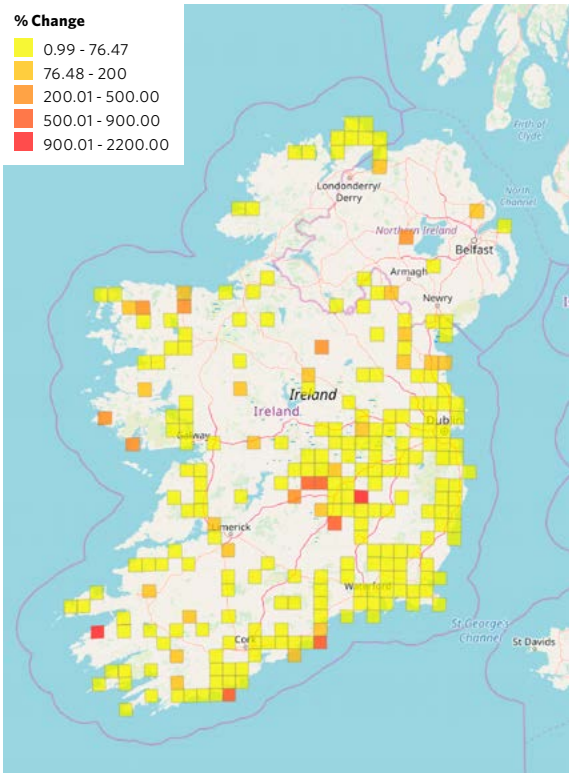
3 Butterfly Bash

The Butterfly Bash is a themed recording challenge that focuses entirely on butterflies. Its main aims are to not only encourage people to get out and record biodiversity, but also to promote the Butterfly Atlas 2021 and help the Data Centre map the distribution of Irish butterflies.

Two Butterfly Bash events ran to coincide with Biodiversity Week (May) and Heritage Week (August), overlapping with peaks in butterfly phenology in Ireland, and contributed significantly in terms of records and profile of the Butterfly Atlas 2021. Recorders who got involved helped to collect some 1,096 records within the first of the two bashes. In particular, the Heritage Week Butterfly Bash was designed to incentivise recorders to target under-recorded 10 km2 squares and by the end of the event 1,740 records were submitted (a 300% increase on the same week last year), 324 of which were submitted from 49 previously poorly recorded squares. This exercise thus demonstrated the value of identifying areas that have been previously under-recorded.



The Butterfly Bash run during Heritage Week 2018 helped to increase the number of butterfly records for prioritised squares for recording (blue = highest priority).



The map above shows the increase in recording activity with red squares showing the highest increase.

National Biodiversity Data Centre

Acknowledging support

The National Biodiversity Data Centre could not achieve as much as it has without the huge support that it has received from individuals and organisations during the year. The individuals who support our work in a multitude of different ways are too many to mention, but we greatly appreciate everyone's support over the year.

The National Biodiversity Data Centre is entirely dependent on the support and collaboration it receives from its partner organisations, from both the public and private sector, with the delivery of its work programme during the year. Partners that we have worked with during the year are listed below.

Organisations:

A

Agri Food and Biosciences Institute, Northern Ireland; Airfield Estate; Annascaul Adventures; An Bord Pleanala; An Tasice; Ards and North Down Borough Council; ARENA Network, Business in the Community, Northern Ireland; Athlone Institute of Technology;

B

Ballyhoura Development Ltd; Bat Conservation Ireland; BEC Consultants; Bees, Wasps, & Ants Recording Society, UK; Belfast City Council; Belfast Hills Partnership; BirdWatch Ireland; Bord Bia; Bord Iascaigh Mhara; Bord na Mona; Botanical Society of Britain & Ireland; British Bryological Society; British Mycological Society; Buglife, UK; Bumblebee Conservation Trust, UK; Burrenbeo Trust; Business in the Community Ireland; Butterfly Conservation Ireland; Butterfly Conservation, Northern Ireland;

C

Centre for Environmental Data and Recording, Northern Ireland; Chartered Institute of Ecology and Environmental Management, Ireland; Cork County Council; COFORD; Coillte; College of Agriculture, Food and Rural Enterprise, Northern Ireland; Community Gardens Ireland; Council for Nature Conservation and the Countryside, Northern Ireland; Conchological Society of Britain & Ireland,

D

Department of Agriculture, Food and the Marine; Department of Agriculture, Environment and Rural Affairs, Northern Ireland; Department of Culture, Heritage and Gaeltacht Affairs; Dublin City Council;

E

Environmental Protection Agency;

F

Fáilte Ireland; Federation of Irish Beekeepers' Associations; Fingal County Council; Friends of the Earth, Ireland; Friends of the Earth, Northern Ireland;

G

Gas Networks Ireland; GB Non-native Species Secretariat; GLAN Tralee; Global Biodiversity Information Facility; Green Sod Ireland; Grow it Yourself;

H

Hedge Laying Association of Ireland; Heritage Council;

I

Inland Fisheries Ireland; Institute of Northern Ireland Beekeepers; Iranród Éireann; Irish Beekeepers Association; Irish Biogeographical Society, Irish Naturalists' Journal; Irish Organic Association; Irish Peatland Conservation Council; Irish Ramsar Committee; Irish Seed Savers; Irish Soft Fruit Growers Association; Irish Whale and Dolphin Group; Irish Wildlife Trust;

K

Keep Northern Ireland Beautiful; Kerry County Council; Kilkenny County Council; Killarney National Park; Killarney National Park Education Centre;

L

Lagan Valley Regional Park; Learning Through Landscapes, UK; Limerick's Buzzing; Lisburn & Castlereagh City Council;

M

Marine Institute; Maynooth University; Mayo County Council; Mayo North East; Monaghan County Council; MothsIreland;

N

National Botanic Gardens; National Trust, UK; National Federation of Group Water Schemes; National Museum of Ireland – Natural History Division; National Museums Northern Ireland; National Parks and Wildlife Service; Native Irish Honeybee Society; Natural History Museum London; NOBANIS (European Network on Invasive Alien Species); Northern Ireland Environment Agency; Northern Ireland Environment Link; NUI Galway;

O

Office of Public Works; Open Air Laboratories, UK; Organic Trust;

P

Plantlife International; Representative Church Body, Church of Ireland House;

R

Roscommon County Council; Rothamstead Insect Survey, UK.; Royal Society for the Protection of Birds, UK;

S

Scouting Ireland; Sea Fisheries Protection Authority; Seasearch Ireland; South and East Cork Area Development; Swift Conservation Ireland;

T

Teagasc; The Causeway Coast & Glens Heritage Trust; Tidy Towns; Translink; Transport Infrastructure Ireland; Transport Northern Ireland; Tree Council of Ireland; Trinity College Dublin; True Harvest Seeds;

U

Ulster Beekeepers Association; Ulster Farmers' Union; Ulster in Bloom; Ulster Wildlife; University College Dublin;

W

Waterford County Council; Waterford Institute of Technology; Waterways Ireland; Wexford County Council; Wexford Naturalists' Field Club; Wild Kildare; Woodlands of Ireland.

Beechfield House,
WIT West Campus,
Carriganore, Waterford.
Tel. +353 51 306 240
Email: info@biodiversityireland.ie
Web: www.biodiversityireland.ie

National Biodiversity Data Centre
Documenting Ireland's Wildlife

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