Nature News Summer 2019

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Introduction from Chris Brooks (Director from Finance & Planning)

Welcome to the summer issue of JNCC Nature News – bringing you updates and information on our UK and international work. In this issue we're pleased to report on more of our work in global nature conservation as well as some of our UK activities.

It is with sadness that we report that one of our Committee members, Professor Howard Platt, passed away in August after a battle against cancer. Howard will be greatly missed. Our thoughts are with his family and friends.

The summer months are a busy time for our Marine Species Team as it's the seabird survey season. Our experts and colleagues in our partner organisations, along with an army of citizen scientists, take to the coast to monitor the UK's seabird populations. Completing the surveys can be a real challenge - some stretches are so remote there is no road access. In this issue we take a look at this work and get a taste of what happens on survey.

Mapping habitats from space gives us information that can support planning, land management and policy decisions. We've been working with our colleagues at the Northern Ireland Environment Agency to harness satellite imagery and create a habitat map for Northern Ireland. This has been an important project for JNCC, giving us the opportunity to test the use of the Living Maps method in an area that has high-quality field data. We're now also using this approach in other parts of the world.

With the 25th Conference of the Parties to the United Nations Framework Convention on Climate Change approaching, it's a significant time for considering the role of marine and coastal environments in mitigating and adapting to climate change. We're working with the host nation Chile and other colleagues in planning a Marine Protected Area (MPA) event at the conference. The event will explore the role MPAs play in climate change mitigation and open opportunities for future collaborative work to develop the evidence base.

Our science staff often make the news but JNCC's work relies on the support of a dedicated Corporate Services team. It was great to see our Finance and Procurement Advisor Dora Iantosca attending a Royal Garden Party at Buckingham Palace in May. Congratulations Dora on your 25 years' exemplary service.

Chris Brooks, Director of Finance & Resources, JNCC

News in Brief

Dora's party at The Palace

Our Finance and Procurement Advisor Dora Iantosca has been recognised for 25 years' exemplary service with JNCC.

Dora was invited to a Royal Garden Party at Buckingham Palace to mark her milestone and attended with her daughter Lucy.

Congratulations Dora!

European eels

JNCC's Vin Fleming represented the UK, alongside Alan Walker from Cefas, at the productive Convention on the Conservation of Migratory Species (CMS) of Wild Animals 3rd Meeting of Range States for the European Eel in Malmo, Sweden. The meeting sought to consider scope for future actions for eels under CMS. The European Eel has a wide geographic range from Northern Norway to North Africa and the Mediterranean. Its journey to spawn in the Sargasso Sea, around Bermuda, is one of the most impressive feats of animal migration known in nature. Listed as 'Critically Endangered' on the IUCN Red List and on Appendix II of both CMS and the Convention on International Trade in Endangered Species of Wild Fauna and Flora, there is significant concern regarding this species, due to a >90% decline over the past four decades in recruitment of 'glass eels', the product of spawning in the Sargasso.

WeBS report

WeBS is the principal scheme for monitoring the UK's wintering waterbird populations and provides an important indicator of their status and the health of wetlands. WeBS is a partnership jointly funded by JNCC, British Trust for Ornithology and the Royal Society for the Protection of Birds, in association with the Wildfowl & Wetlands Trust. Fieldwork is conducted by thousands of volunteers - in 2017/18 3,195 volunteers surveyed a record 2,847 sites across the UK's estuaries and large inland waters. The latest WEBs report is available online

Cycle to Work Day

Cycle to Work Day took place on Thursday 8 August. At JNCC, we support sustainable travel and run a cycle to work scheme that enables our staff to buy a bike for their commute.

Aberdeen beach clean

JNCC staff from our Aberdeen office recently teamed up with colleagues from the Scottish Environment Protection Agency, Scottish Natural Heritage and Marine Scotland for hands-on conservation with a lunchtime beach clean outside the Inverdee House office.

National Bat Monitoring Programme

The NBMP is run by the Bat Conservation Trust, in partnership with JNCC, and supported and steered by Natural England, Natural Resources Wales, Northern Ireland Environment Agency and Scottish Natural Heritage. Last year nearly 1,000 dedicated volunteer citizen scientists carried out surveys at 1,907 sites across the UK. The survey results allow for estimating population trends for 11 of the 17 species of bat which breed in the UK. Read the highlights and download the full report.

Disability Confident employer

We are pleased to announce that we have gained the Disability Confident accreditation. Disability Confident is a nationally recognised accreditation scheme to support businesses to attract, recruit and retain disabled employees, including people with long-term health conditions.

We already have a fantastic track record of supporting our disabled employees. Gaining this accreditation shows our commitment to continuing what we do and looking to find ways to improve.

Work is underway by the HR team to gain the next (and highest) level of accreditation, Disability Confident Leader, which requires further commitments and an external validation.

Look out for the article in the next edition of Nature News.

Professor Howard Platt – a tribute

One of our Committee members, Professor Howard Platt, sadly passed away in August after a protracted, courageous and characteristically noble battle against cancer.

Howard is a former Head of Conservation Science for the Northern Ireland Environment Agency (NIEA). He represented Northern Ireland on many UK and European advisory bodies, and before joining the Joint Committee, Howard was well known to staff in JNCC from his role on the Chief Scientists' Group. Howard previously held posts with the British Antarctic Survey, the Natural History Museum and as a Director of an environmental consultancy company. In addition to his membership of the Joint Committee, Howard served as a Council member of Ulster Wildlife and Deputy Chair of the Council for Nature Conservation and the Countryside. He also contributed extensively to the scientific literature on nematodes and, among his many talents, was a qualified diver.

Howard will be greatly missed. Our thoughts are with his family and friends.

New website in the spotlight

At the beginning of July our refreshed website went live. With a brand new look it's still a work in progress that will develop and grow over the coming months. Our team is working to deliver a more user-friendly navigation and to incorporate the latest information about all aspects of our work, alongside lots of the reference material that many users visit our website to find. It's a huge task – we have vast amounts of important information to deliver – so we're working hard to provide our users with all the resources they need.

As part of this work, we have migrated lots of our publications to the Resource Hub, but for the time- being we still have some reference material on our old website. Once this content becomes available you will be redirected to the new site.

JNCC is evolving and our website has been developed to showcase our strengths. On our new site you'll find information about our services, along with case studies and news items that highlight our work in both the UK and internationally. The new site is also now fully responsive with mobile devices, making it easy to navigate on a wide range of web browsers and devices.

We hope you like what you see. If you have any questions, comments or suggestions please get in touch and let us know at: communications@jncc.gov.uk.

Emma Durham Website Editor

New interactive mapper for Marine Protected Areas

In July we relaunched our MPA mapper – an interactive online resource presenting spatial data for 368 Marine Protected Areas (MPAs) in UK and Crown Dependency waters.

The mapper displays the boundaries of MPAs across the whole of the UK, Isle of Man and Jersey, demonstrating the impressive scale of our MPA network. You can search and zoom to specific MPAs, and click on them to see key information such as designation type,size and protected features. Sites can also be viewed according to the habitat, species and geological features that they protect.

JNCC is responsible for identifying, monitoring and providing conservation advice for the 73 MPAs in UK offshore waters (more than 12 nautical miles from the coast). Distribution data for habitats, species and geological features protected in offshore MPAs are available on the mapper, allowing users to explore the evidence underpinning the designation of these MPAs. Datasets include habitat maps from survey, modelled habitat maps, habitat point records, benthic species observations and fish records. Our team will be keeping the mapper up-to-date with the latest MPA monitoring evidence that informs our ongoing conservation advice.

MPA boundaries can be downloaded from the JNCC Resource Hub or via the JNCC website and subscribers to our email notification service will receive an alert when updates are made.

A selection of MPA feature layers can also be downloaded, using the links in the ‘active layers pane’, including the extent of Habitats Directive Annex I Reefs and Annex I Sandbanks.

EUNIS broad-scale habitat and Ocean Quahog protected feature distribution data for North East of Farnes Deep Marine Conservation Zone as displayed on the mapper.© JNCC

For more information and help using the mapper visit JNCC website. If you have any suggestions for improvements to the mapper, including ideas for additional content, please get in touch at: OffshoreMPAs@jncc.gov. uk.

Helen Woods Marine Data Specialist

Meet the Expert

In this issue we focus on Tim Dunn, Seabird Monitoring Manager, who this year celebrated his 20-year JNCC anniversary

Question: What prompted your interest in understanding the natural environment?

I spent the early years of my childhood living in Orkney and the Outer Hebrides. In those days, kids were left to roam free and much of my time was spent exploring the wilderness. This early exposure to the wonders of nature was no doubt instrumental in shaping my future path.

Question: How did you get into seabird monitoring?

After graduating from the University of Glasgow, I was given the opportunity to survey the Great Skua breeding population on Hoy, Orkney and jumped at the chance. The next couple of weeks were spent climbing up and down mountains, wading through chest-high heather and being whacked on the head by dive bombing Skuas. Who wouldn't decide to devote their working life to monitoring seabirds after such an experience?! I moved to Orkney on a more permanent basis shortly after this and spent the next three years doing short contracts for SNH, RSPB and BTO and building up my ornithological experience. I then moved to Aberdeen to work for JNCC on the Seabird Monitoring Programme and the Seabird 2000 census and the rest is history.

Question: What does your role as Seabird Monitoring Manager entail?

I manage a small group within the Marine Species Team and together we work to ensure that the conservation status of the UK's seabird populations can be assessed. This includes running the Seabird Monitoring Programme, which collects data on breeding seabird numbers and breeding success and delivers annual trends for 17 of the 25 seabird species breeding in the UK; the Seabirds Count census, which will deliver, in 2021, population estimates and trends for all 25 of our breeding seabird species; and the Volunteer Seabirds at Sea survey programme which uses volunteer networks and ferries to gather information on seabird distribution patterns at sea.

Question: Why is it so important that we monitor seabird populations?

Seabird species are protected through a range of European and international legislation and commitments. Monitoring seabirds is essential to understand their population status and trends, the causes of change in their populations and to identify where management measures are required to mitigate pressures on them. In addition, the status of seabird populations has long been considered an effective barometer of marine ecosystem health, improving our understanding of some aspects that would otherwise be difficult or more costly to monitor.

Question: Looking back on your time with JNCC, how have survey techniques evolved?

Seabird survey methods over the last 20 years have not changed a great deal. Most seabird monitoring in the UK still relies on people, especially volunteers, going to seabird colonies to count birds and gather other important information, such as numbers of successfully fledged young. In the last few years there has, however, been a step change in the availability and utility of more high-tech approaches such as monitoring using camera networks, drones and tracking devices. These have given us new insights into the lives of seabirds and may, in time, begin to replace more traditional approaches (although I doubt I'll be hanging up my boots any time soon!).

Question: What are the biggest challenges faced when conducting a seabird survey?

For breeding seabirds, the biggest challenge is often getting to the colony in the first place. Many of our largest colonies are on remote coastlines, or islands, which require a long hike or a boat charter to get to. A head for heights, climbing skills and the ability to get on with a small group of people for several days in often tough conditions also helps. Surveying seabirds at sea throws up its own set of challenges, especially in the North Sea in winter!

Tell us about your most memorable survey

This has to be surveying Black Guillemots (known locally as Tysties), which are counted in April, during the first few hours of daylight when the birds congregate in pre-breeding aggregations close to shore. The most efficient way to survey them is using a RIB (Rigid-hulled Inflatable Boat) which can travel at speed along the coast. I spent a couple of exceptional weeks surveying Tysties along the north-west coast of Scotland, sometimes at speeds of up to 40 knots. Seeing the sunrise over the Torridon Hills was an unforgettable experience and returning to the B&B for a full Scottish breakfast was the icing on the cake!

Tim Dunn Seabird Monitoring Manager

Seabird Count

Since 1986, annual monitoring of seabird colonies has been conducted by the Seabird Monitoring Programme (SMP) and volunteers. This programme is a partnership of 19 organisations and is coordinated by JNCC. Annual, sample-based trends in breeding abundance and productivity from the SMP are augmented with periodic censuses of the entire breeding population. These monitor changes in population distribution and abundance that may not be detected by sampling and provide independent validation of trends estimated annually by SMP. Seabirds Count is the fourth census of breeding seabirds to occur in Britain and Ireland. It aims to better understand how our seabird populations are changing and give an indication of what might be the drivers of these trends.

In late May, our experts travelled to the Outer Hebrides to carry out Seabirds Count surveys. A total of 13 surveyors, across four weeks, took on the task of counting all breeding seabirds in 135 known seabird colonies on the Isles of Lewis and Harris.

Week 1

Our first surveys took the team of two JNCC staff and two volunteers to the wild west coast of Lewis. A couple of rainy days allowed time for meticulous mapping, survey planning and site recces.

Even with this slow start, the team managed to survey all cliff sections (approximately 35km of coast) and several inland gull colonies in just four days. The seabird species were mainly restricted to Fulmars, Shags and Gulls during the week, and numbers were lower than those counted during the previous Seabird 2000 Census (1998 – 2002). However, the team were treated to magnificent views and were frequently visited by huge White-tailed Eagles.

Week 2

Our second week focused on counting all inland Gull colonies as well as ticking off cliff sites in the far north of Lewis and south of Harris.

The team were treated to a higher diversity of seabird species. The Butt of Lewis hosted Razorbills, Guillemots, Kittiwakes, Fulmars, Shags and all three of the large Gull species. One of the survey pairs even had a special encounter with an Otter family.

Week 3

The Eye Peninsula was the team’s next stop where they were once again graced with visits from White-tailed Eagles. Red Deer were also a common sight whilst walking the moorland that fringes most of the Lewis coast.

By early June, Gull chicks were more frequently seen. Unlike their smaller cliff-nesting cousins, Kittiwakes, gulls have an extended season. While some adults might still be incubating eggs, others can have chicks close to fledging.

Week 4

On our final week we were joined by a recruit from Marine Scotland Science to cover the remaining gaps in the north and south-east of Lewis. These stretches of coast are some of the most remote on the island and in some cases have no road access for several kilometres.

Although no official statistics have been compiled, it looks like the Outer Hebrides have, unfortunately, not escaped breeding seabird declines observed in several other areas of the UK. Fulmars, which were once abundant on Lewis and Harris appear to be in decline. However, Great Black-backed Gulls appear to have expanded their range and numbers have potentially increased since the last census counts.

Seabirds Count is due to complete survey work by the end of the 2020 season. This will mean that over 10,000 seabird breeding sites will have been counted in addition to several thousand 1km urban breeding gull squares. This huge effort is down to the hard work of our partner organisations and the incredible dedication of thousands of volunteers.

Daisy Burnell Seabirds Count Project Coordinator

Citizen science seabird bird surveys

An exciting project to develop and implement citizen science seabird surveys on the west coast of Scotland is being supported by JNCC. It's all part of Caledonian MacBrayne's Marine Awareness Programme, developed in partnership with Scottish Natural Heritage (SNH), Marine Scotland, the Royal Society for the Protection of Birds (RSPB), the British Trust for Ornithology (BTO), MARINElife and ORCA.

The Volunteer Seabirds at Sea (VSAS) programme aims to collect high-quality seabird data from ferries using volunteers. Data collection will use European Seabirds at Sea (ESAS) standards - the standard method for boat- based seabird survey across Europe - and will contribute to monitoring of trends in abundance and distribution of birds locally, as well as to updates of the ESAS database. This dataset holds over three million observations of seabirds from European waters and has proved invaluable in the designation of offshore Special Protection Areas (SPAs), and the mapping of seabird sensitivities to offshore industry, among many other projects.

To ensure data standards are met, our experts developed a training and mentoring scheme for volunteer observers. This allows less experienced observers to survey alongside, and learn from, more experienced mentors, after receiving free survey methods training from our team. This model was trialled during 2018 and found to deliver good quality data, largely thanks to our excellent volunteers and mentors!

The first of the monthly surveys was carried out in April 2019 using a bespoke VSAS data entry app, developed by JNCC for this project. Data were collected from ferries crossing from Kennacraig to Islay, Oban to Barra, and Ullapool to Stornoway. These routes are already providing fascinating insights into the distribution of birds and cetaceans, such as the difference in areas used by similar species such as Fulmar and Manx Shearwater in the Minch in spring. Temporal differences in relative abundance and distribution are also becoming apparent as the summer progresses, with numbers of Divers decreasing, and Petrels and Skuas increasing. All survey data will be available to the public, and reports from all of the surveys can be accessed.

These ground-breaking VSAS/Marine Awareness Programme surveys are providing the only regular ESAS data collected in UK waters, the only regular offshore bird survey in Scottish waters, and the only citizen science scheme regularly collecting ESAS standard data anywhere in the world (as far as we know!). We are continuing to run training courses for both mentors and volunteers to build up a pool of surveyors for the programme. This will hopefully allow new routes to be opened within the Caledonian MacBrayne area and possibly beyond.

Mark Lewis Seabird Monitoring Ornithologist

Harnessing satellite imagery to create a habitat map for Northern Ireland

Mapping habitats from space gives us a stream of information that can support planning, land management and policy decisions. This approach has been used in Northern Ireland to develop a National Habitat Map – a collaborative project between JNCC's ecosystem analysis experts and colleagues at the Northern Ireland Environment Agency (NIEA).

This detailed habitat map of the country is an important data product for NIEA to meet multiple requirements, such as assisting in planning decisions, informing strategic level policy and guiding habitat condition monitoring. A national level habitat map of this type can also underpin Natural Capital Assessments, meaning that such analyses will be able to be carried out in more detail in the future.

The map was made possible by the development of JNCC's expertise in pre-processing raw data from the Copernicus satellites to create Analysis Ready Data products that can be used easily and cost-effectively by public nature conservation bodies.

Initially the project explored mapping Fermanagh, the most westerly of Northern Ireland's counties and one containing many important areas for biodiversity; Fermanagh is ecologically rich and floristically diverse.

This tested how well the Living Maps method functioned in the area, given the data available to feed into it. The Living Maps approach was developed by Natural England (Kilcoyne et al 2017) and uses machine learning to combine multiple data sources, including satellite imagery, geology and field data.

One of the strengths of this method is that once you have prepared the data it can be easily adapted or enhanced with additional training data to generate new output maps. This allows local experts to review initial outputs and identify where the process is working well or where it is creating confusion between classes. Therefore, the process can be updated, and a new iteration of the map generated.

"Working closely with local experts throughout the process, the outputs evolve and become more representative. Our team has provided technical expertise in Earth Observation and mapping methods, with NIEA staff bringing expertise on the data that they hold, and the ecology of the area being mapped. Collaboration is key to this project," explained Paul Robinson.

Having demonstrated that the method was producing good quality outputs for Fermanagh, the project moved on to map two further counties, Tyrone and Londonderry. The aim is that by the end of this year we will have created a full national map. That will include a full accuracy assessment as well as an approach to describe uncertainty in the classification. This will enable uncertainty to be accounted for when the map is used in further analyses.

The project is making use of imagery from the Sentinel 1 and 2 satellites operated by the European Copernicus Programme. These data have been processed into

Analysis Ready Data by JNCC, using processing chains that we have jointly developed with partners, and cloud computing facilities developed to ensure that we can cope with the large data volumes.

This has been an important project for JNCC, giving us an opportunity to test the use of the Living Maps method in an area that has high quality field data, as we are also using it in other parts of the world. It has also given us the chance to learn much more about the stunning landscape of Northern Ireland.

Find out more in the following resource: KILCOYNE, A.M., ALEXANDER, R., COX, P. & BROWNETT, J. (2017). Living Maps: Satellite based Habitat Classification. Evidence Project SD170

Paul Robinson Senior Natural Capital Evidence Specialist

Iain Davies Northern Ireland Environment Agency

Daniel Colson Earth Observation Specialist

Analysing the impact of climate change

JNCC science teams are involved in an amazing diversity of activities for projects in the UK and around much of the world. Many of the projects have an element of analysing and responding to data concerning climate change. For example, the updated UK biodiversity indicators published this month include indicators of phenology, the timing of reproductive and other seasonal events, which has shown important changes over the last few decades as spring arrives earlier and autumn persists for longer. JNCC is a member of the UK Marine Climate Change Impacts Partnership (MCCIP) which produces annual reports on various aspects of climate change in the marine environment. In 2017 MCCIP's 10-year report card summarised how understanding of marine climate change impacts has developed since the first MCCIP report, with lessons for science and policy. These reports are widely read and cited, with an important policy impact. Beyond the UK, our work with Chile in preparation for the 25th Conference of the Parties to the UN Framework Convention on Climate Change is described in the accompanying article. In the Overseas Territories, natural capital evaluations of storm surge protection (by mangroves and coral reefs) under climate change scenarios, is providing advice to policy-makers who have to manage competing interests such as commercial aquaculture, tourism and fishing.

Our most significant projects on climate change are within the terrestrial surveillance programme co-ordinated by the Ecosystem Assessment team. In partnership with organisations such as the British Trust for Ornithology and the Botanical Society of the British Isles who coordinate citizen scientists, we are involved in directing work programmes and specifying outputs from which we can report species trends (distribution, abundance) for groups including birds, bats, butterflies and plants. These monitoring schemes are so robust, and the time-series are so long, with wide and dense coverage, that the large datasets are available to be used to answer major questions, with a particular focus on climate change. Modelling methods are under constant refinement to obtain the maximum amount of information from the data. For example, Bayesian occupancy modelling by the Biological Records Centre at the Centre for Ecology and Hydrology has greatly increased the number of species for which trends can confidently be predicted.

An example of the benefits of the citizen science approach is the Wetland Bird Survey (WeBS) report which comes out annually, recognising the contributions of numerous observers. Data from WeBS are combined with other datasets from the citizen science-based International Waterbird Census to get a picture of large-scale change in wetland birds. Analyses show that there has been a long-term shift in distributions, and modelling of future trends under scenarios developed by the Intergovernmental Panel on Climate Change indicates that there are likely to be local extinctions at some wetlands at the southern edge of the distribution of Waterbirds in the UK 2017/18 many species. This information can be used to determine whether additional habitat protection in this range could mitigate the effects of climate change.

Christine Maggs JNCC Chief Scientist

Climate change and the marine environment

Covering over 70% of the planet, oceans are the world's largest carbon reservoir and play a central role in regulating our climate. JNCC is embarking on a new area of work to better understand the impacts of climate change on the marine environment to inform decision making.

One of the main areas of focus is on the role of Marine Protected Areas (MPAs). The UK MPA network helps to maintain a healthy marine environment by preserving marine ecosystems and biodiversity. A 2017 IUCN review of MPAs and climate change highlights the role that MPAs can play in climate change adaptation and mitigation. For example, marine habitats can be important carbon stores and therefore protection measures such as MPAs can enhance the contribution of these habitats to climate regulation and mitigation. Understanding the sensitivity of habitats and species within MPAs to climate change impacts, the roles of these habitats and species and how MPAs may enhance them will inform management of the marine environment in the future.

Oceans is one of the priority themes at the 25th Conference of Parties to the UN Framework Convention on Climate Change (COP25) in Santiago, Chile in December 2019. COP25 comes at a significant time for considering the role of marine and coastal environments in mitigating and managing climate change, ahead of the UN Decade of Ocean Science for Sustainable Development, which will run from 2021-2030.

JNCC is working with the host nation Chile and others in planning an MPA event at COP25. The event will enable discussions to explore the role of MPAs but also the potential impacts of climate change on marine features, identify knowledge gaps, and discuss opportunities for collaborative work to improve the evidence base. The event will be an opportunity to promote JNCC's 10+ years of work on MPAs, so that our experience can be shared and used to help mitigate the impacts of climate change on a global scale.

The event comes off the back of a wider programme of work between JNCC and the Chilean Government which seeks to establish cooperation regarding the conservation and management of coastal and marine MPAs. Discussions and events at COP25 will be important for the UK, as the UK will host COP26 in Glasgow in 2020.

These plans are the first step in an exciting programme of work between the two host nations to understand the role that MPAs play in adapting to and mitigating climate change. This future programme will incorporate expertise and research from across academia, government, the private sector and NGOs in the UK and Chile, so watch this space!

Beth Flavell Senior MPA Adviser

Back to basics – supporting the UK's core conservation work

One of JNCC's functions is to work with the country nature conservation bodies in England, Scotland, Wales and Northern Ireland to develop common approaches and guidelines. Our work supports the devolved implementation of nature conservation while recognising that in some circumstances there are benefits in applying consistent standards across countries.

One important activity relates to the identification and monitoring of protected areas. For example, at the request of the country nature conservation bodies, JNCC maintains the Guidelines for the Selection of Biological Sites of Special Scientific Interest (SSSIs) which provide a consistent rationale for the evaluation and selection of biological SSSIs in England, Scotland and Wales, and are also relevant to the parallel process of site selection in Northern Ireland. The Guidelines were originally developed in the last century and periodically require updating as knowledge and circumstances change. Other examples include guidance for Common Standards Monitoring of SSSIs and other protected areas in the UK, and the Special Protected Areas (SPA) Review which updated selection guidelines, researched site adequacy and identified information gaps for UK birds.

JNCC also undertakes reviews of species listed in the Schedules of the Wildlife and Countryside Act 1981. Schedules 5 and 8 list species that are legally protected from disturbance and/or trade, and are required by law to be reviewed every five years in what is known as a Quinquennial Review (QQR). The other Schedules in this Act are reviewed irregularly and cover birds and non-native species.

To undertake a QQR, an inter-agency working group is assembled, comprising representatives from the statutory nature conservation bodies and environmental NGOs. Clear selection criteria need to be met and a broad consultation is held to collect necessary data. For the last QQR, 194 groups were invited to provide data, representing groups from fungi to fish, including Amphibian and Reptile Conservation Trust, Bat Conservation Trust, Biological Records Centre, Bumble Bee Conservation Trust, Butterfly Conservation, Plantlife, The Ramblers, zoos and national museums.

These contributors submit valuable threat and status evidence, which is analysed against the criteria of the inter-agency working group. After approval from JNCC's Joint Committee, recommendations are submitted to Defra and the devolved administrations. A public consultation may follow before final decisions about which species to add or remove from the Schedules are made. Ensuring the quality of evidence used in the QQR is a primary concern and records are kept of how this is managed. The whole process, including consultation, takes more than two years. To date, six QQRs have taken place and the seventh is due to start in 2020.

Ant Maddock Senior Biodiversity Adviser

It’s all in the DNA bringing together expertise in environmental monitoring

JNCC are contributing to a newly established Centre of Excellence for DNA-based environmental monitoring. The virtual centre brings together expertise from across the Defra network and will support greater uptake of this powerful technology for practical applications.

Rapid technological improvements are opening up a range of opportunities for using DNA to identify species and to help address the limitations in current environmental monitoring. For example, water samples can be used to efficiently detect some rare or invasive species. DNA-based methods can also be applied to identify all organisms in a sample, which is particularly important for groups that are difficult to survey using conventional means (e.g. soil biota, benthic species) providing opportunities for more comprehensive assessments of biodiversity and a fuller understanding of ecosystem health and resilience.

Implementing DNA-based methods needs protocols that give credible and consistent results and capacity to process and manage large volumes of data

Translating the potential of DNA-based monitoring into practical applications is not straightforward, and there are several challenges that need considerable resources to address. For example, species identification requires matching the DNA sequence in a sample with a database that contains sequences for that species – gaps in these databases mean it’s not always possible to assign a species to a DNA sequence. Implementing DNA-based methods also needs protocols that give credible and consistent results, and the capacity to process and manage the large volumes of data generated. In addition to technical considerations, communication and training are vital to ensure the right level of skills and knowledge within government.

To help tackle shared barriers and support greater uptake of DNA-based monitoring methods, Defra recently established a Centre of Excellence (CoE). This is being led by Natural England and Defra’s Chief Scientific Adviser’s Office and brings together expertise from across Defra-group organisations. The CoE will deliver a number of collaborative projects in 2019/20, including identifying and addressing gaps in sequence databases, improving DNA data processing and management, monitoring marine invasive species, and pollinator monitoring. JNCC are contributing to several CoE projects, and are leading one to address end-user uncertainties and produce recommendations on cost-effective best practice for applying DNA-based methods.

The CoE will have involvement from the UK’s devolved governments in its Steering Group and from agencies across the UK on individual projects. The CoE will also be working closely with the UK DNA Working Group that brings together researchers and end-users from UK environmental public bodies to support knowledge exchange and collaboration. As DNA technology continues to rapidly improve, collaborative initiatives such as the CoE and the UK DNA Working Group are key to ensuring we are equipped to identify and exploit the opportunities presented.

Paul Woodcock Evidence Specialist

Conservation crisis for world's Albatrosses and Petrels

Standing on the deck of a rolling ship in the middle of the Southern Ocean and being looked directly in the eye by a bird with a 12ft (3.5m) wingspan as it glides elegantly over the storm- tossed sea is a humbling experience. So too, is knowing that the bird seen flitting deftly between the peaks and troughs of the waves, with a wingspan of only 14 inches (38cm) and weighing a meagre 30g, flies between the high northern and southern latitudes twice a year. These denizens of the sky – the Wandering Albatross and Wilson's Storm Petrel - are both members of the highly diverse group of seabirds known as the Procellariformes or 'tube-nosed' birds, so called because of their distinctive tubular nostrils on top of the bill.

Unfortunately, many populations of albatrosses and petrels around the world are facing a 'conservation crisis',as was declared by the Advisory Committee to the Agreement on the Conservation of Albatrosses and Petrels (ACAP) at their most recent meeting held in May in Brazil.

ACAP is a multilateral environmental agreement, which seeks to conserve Albatrosses and Petrels, by co-ordinating international activity to mitigate known threats. The remote UK South Atlantic Overseas Territories (SAOTs) of Tristan da Cunha, Falkland Islands, South Georgia and the South Sandwich Islands, and the British Antarctic Territory are breeding range states for 12 of the 31 species currently listed by the Agreement and host significant proportions of global populations. In line with the commitment to protect both their own and global biodiversity, the UK and the SAOTs ratified ACAP in 2004 and established a UK ACAP co-ordination programme. This is to ensure an effective and co-ordinated approach to meeting the commitments of ACAP, and that the UK continues to be amongst the leading Parties in implementing the Agreement. ACAP work in the UK and SAOTs is co-ordinated jointly by JNCC, UK government and the SAOT governments through my JNCC post, based in the Falkland Islands.

Bycatch in commercial fisheries continues to be one of the major threats to these birds. In the SAOTs, tremendous efforts by the government, industry, and research and conservation groups have been put into researching and implementing mitigation measures to tackle the incidental killing of seabirds during fishing operations. This has resulted in significant and laudable reductions in the numbers of albatrosses and petrels caught in national fisheries. However, despite these great efforts, some incidents still occur. Furthermore, thousands of birds (many of which probably breed on the SAOTs but forage elsewhere) continue to be caught on the high seas where compliance with mitigation measures is more difficult to manage.

The lack of compliance measures adopted by Regional Fisheries Management Organisations (RFMOs) responsible for high seas tuna fisheries was identified as a critical issue at the recent ACAP meeting. To address this, ACAP will look for ways to work in a more proactive and constructive manner with the RFMOs. They will work to get their message across more broadly, engaging with fisheries certification schemes, and continuing to improve and share best-practice guidelines and advice.

Albatrosses and Petrels also face significant threats on land, particularly from invasive alien species, such as rats and mice, which predate on their eggs, or in the case of Albatrosses on Gough Island (Tristan da Cunha), attack and eat live chicks. However, the coordinated effort of the SAOT governments and organisations such as the South Georgia Heritage Trust and RSPB have led to the eradication of rats and mice on South Georgia (declared 'rodent-free' in May 2018), and a planned eradication programme for Gough Island is due to commence in 2020. Anecdotal evidence from South Georgia suggests that some burrowing petrel species have already started to recover.

Having globally significant populations of ACAP-listed species and vast experience in developing and implementing effective mitigation and management measures means the UK and SAOTs have played, and will continue to play, an important role in advancing the conservation of these ecologically important and iconic species. The priority actions in each of the SAOT ACAP Implementation Plans are currently undergoing review to ensure work is focused in the right areas to help secure a safe future for these magnificent birds.

The JNCC ACAP post is funded through the UK and SAOT governments. For more information on ACAP, and the JNCC website.

ACAP Implementation plans

The UK ACAP coordination work programme is designed to ensure an effective and co-ordinated approach to meeting the commitments of ACAP, and to ensure that the UK continues to be amongst the leading Parties in implementing the Agreement. Broadly, and consistent with the ACAP Agreement and Action Plan, work is focussed on the following areas:

- Management of threats at breeding sites
- Monitoring the status and trends of populations
- Analysis of foraging ranges of ACAP species, and spatial and temporal overlap with fisheries
- Reducing seabird bycatch, both within the jurisdictional waters of the OTs, but also internationally, by working
- with partners towards improving the effectiveness of Regional Fisheries Management Organisations (RFMOs)
- Further development and implementation of seabird bycatch mitigation
- Improving education and awareness of seabird conservation issues
- Robust data management
- Sourcing funding for the implementation of albatross and petrel conservation projects.

ACAP action plans have been developed and formally adopted for each SAOT. These plans identify the obligations of Parties in respect of ACAP, based on information taken from the text of the Agreement and its Action Plan. Actions necessary to effectively meet the obligations of ACAP are identified and prioritised,

and regularly reviewed. These plans serve as a tool to guide ACAP-related work in the OTs and internationally.

Megan Tierney Senior ACAP & UKOT Advisor

Supporting Chilean wine production: Landscape planning for sustainable supply chain

A progressive group of vineyards in Chile has embraced a scientific initiative that is working to show how biodiversity conservation and the development of the Chilean wine industry can be compatible. JNCC has teamed up with Programa Vino, Cambio Climático y Biodiversidad (Wine, Climate Change and Biodiversity Programme) - a scientific initiative of the Institute of Ecology and Biodiversity and the University Austral of Chile – to explore how evidence-based environmental management can benefit the viticulture industry.

The UK has a long-standing trading partnership with Chile – in 2017 Chile exported 9% of its wine to the UK with a value of US$203m. The Wine, Climate Change and Biodiversity Programme was established in 2008 and works with 17 vineyards. Projects such as this are critical to the UK and its trading partners in understanding how emerging science and technology can be translated for use by businesses. Sustainable supply chains can deliver long-term value, whilst protecting the ecosystems that support the global economy.

Colchagua valley is located in central Chile, 130km south-west of the capital Santiago, and is part of Chile's Mediterranean biome. Whilst it plays an important role in the productivity of Chile's agriculture and viticulture, the biome is considered a priority for biological conservation as it represents only 16% of the continental surface of Chile, yet hosts 50% of the Chilean flora and more than half of the country's endemic species.

The project demonstrates how open-source Earth observation data and modelling software can be combined with commercial and local knowledge to develop a suite of tools that meet user needs and help bring environmental data into decision-making. Open source data and software ensure that solutions can be adopted and further developed, and that access to costly software does not inhibit the capacity of users to adopt new approaches to sustainable management practices.

It is increasingly recognised that evidence-based environmental management is critical for avoiding supply chain disruption and potential infrastructure damage. Better understanding of catchment processes can lead to informed land management planning and help to predict factors such as water stress, soil degradation and pollution risk that are vital to the future sustainability of any business.

Through a number of stakeholder workshops and field visits, our experts were able to develop a Bayesian Belief Network that provided a conceptualised model of the complex landscape functions. This helps visualise how biodiversity, ecosystem services, land management practices and other environmental variables (e.g. climate and soils) interlink to support sustainable production systems.

The project mapped landcover and habitats across 6,900km². This information was used as the basis to model ecosystem services related to natural fire risk protection, soil erosion and water provision. Models also assessed future environmental

conditions under different predicted climate scenarios, as well as the impacts of different management practices on ecosystem services.

Despite being a pilot project, vineyard owners and managers have appreciated the multiple uses of this approach, not only for their business but to a range of land users both regionally and nationally. Plans are now underway to develop and improve the outputs, including application to other land management scenarios. This will help to make the value that nature provides to the economy more visible and tangible.

Matt Smith Biodiversity, Ecosystems & Natural Capital Manager

New worm species discovered

A new worm species made the headlines in June, having been discovered off the Scottish Coast by a team of scientists from JNCC, Marine Scotland Science (MSS) and Thomson Environmental Consultants. But Ampharete oculicirrata isn't an ordinary worm. This newcomer has a unique anatomy with its eyes both in its head and in its bottom.

This new species was discovered on a survey of the West Shetland Shelf Marine Protected Area (MPA). This site has been designated to protect the Offshore Sands and Gravels habitat found there and is equivalent in size to the Cairngorm National Park. The aim of the survey was to gather data to better characterise the site to inform future site monitoring. Forty-three samples were collected by 0.1m2 Hamon grab, and these samples were then sieved to 1mm on board before being analysed in a laboratory to determine what species were present. The survey, aboard the research vessel MRV Scotia, marked the beginning of a programme of long-term monitoring at West Shetland Shelf MPA.

During the identification process back onshore, it became apparent that a completely unknown species of worm was present. The worm was then identified by a team led by Ruth Barnich of Thomson Environmental Consultants, Julio Parapar from the University of La Coruña and Juan Moreira from the Autonomous University of Madrid. Now that this species has been officially identified, this new worm has a home in the collections of National Museums Scotland in Edinburgh.

Jessica Taylor Marine Evidence Advisor

Protecting vulnerable Marine Ecosystems across the North East Atlantic

The North Atlantic hosts an incredible range of deep-sea ecosystems including coral reefs, deep-sea sponge aggregations and fields of soft corals known as sea-pens. The United Nations term these ‘Vulnerable Marine Ecosystems’ (VMEs) since many of the habitats are vulnerable to human-induced impacts from bottom-contacting fisheries and oil and gas extraction in these deep (in excess of 200 m) waters. In addition, future threats are on the horizon from ambitions of the deep-sea mining industry, hoping to explore mining for minerals at depths greater than 2000 m. However, our knowledge of these ecosystems, and the effects that our activities have on them, is still very limited.

Many of these habitats and activities (with the exception of deep-sea mining) are within the UK deep sea. As part of our statutory role in conservation advice for the offshore marine environment, JNCC plays a key role in gathering data on the location of VMEs in UK waters, and developing understanding of the effects of human activities on these habitats. This information is used to support wider UK marine biodiversity monitoring and assessment, and to develop management measures for activities occurring within the Marine Protected Area network. It is also used in the international arena to support implementation of wider management measures. For example, VME data have been used by the North East Atlantic Fisheries Commission (NEAFC) and European Commission to implement a closure to bottom fisheries on the North West Rockall Bank to protect VMEs.

Data collation and advice to support implementation of such closures is provided to NEAFC and the European Commission by the International Council for the Exploration of the Sea (ICES). The ICES Working Group on Deep-water Ecology (WGDEC) collates and shares data on VMEs across the North Atlantic via the ICES VME database and VME data portal. WGDEC utilise these data to map the distribution of VMEs to support the provision of ICES advice on the location of these habitats and recommendations for VME closures.

In June 2019, WGDEC held its annual meeting, chaired by JNCC’s Laura Robson, and this year met jointly with the ICES Working Group on Marine Habitat Mapping (WGMHM) to share experience on habitat mapping and modelling techniques, and identify methods that could be used to support improved understanding of the location and density of VMEs across the North Atlantic. In addition, WGDEC reviewed developments in how Good Environmental Status, a key goal of the EU Marine Strategy Framework Directive, could be achieved for deep-sea habitats, considering the lack of fundamental knowledge on these ecosystems. A report of the meeting will be published in September 2019.

The joint meeting included representatives from nine countries including the UK, Ireland, Spain, Norway, Canada and Russia. These meetings provide an important opportunity for international experts in deep- water communities, from the policy, academic and research sectors, to collaborate and bring together their expertise to

provide essential advice to ICES, and in turn the European Commission and NEAFC, to support the protection of critical deep-water ecosystems.

Laura Robson Marine Evidence Manager

Conservation Conservation

This issue we focus on Professor Steve Ormerod, Deputy Chair of Natural Resources Wales and a member of the Joint Committee. Steve is one of the world's leading applied freshwater ecologists whose research focuses on the effects of global change on rivers, lakes and wetlands. Lately Chairman of the RSPB and Welsh Water's Environment Advisory Panel, he currently chairs the Invertebrate Charity 'Buglife'. He is Professor of Ecology at Cardiff University where he co-directs the University's Water Research Institute.

Question: Species that inspired you as a child?

I grew up in urban Burnley, where House Sparrows and Starlings were abundant visitors to our backyard wall, and Rooks flew over the house every day between a rookery in the local hospital grounds and Rowley Tip. But I was about seven when my dad's engineering apprentice, David Crossley, showed me a Dipper plunging through the froth at Stainforth Foss on the Ribble. I was mesmerised, and over 50 years later I'm still writing about this remarkable bird.

Question: What concerns you most about the natural world?

That the global juggernaut of human population growth and resource over-consumption will outrun our best efforts at nature conservation and ecosystem restoration.

Question: What do you do away from the office?

Our Goldendoodle, Leo, has a large say in that. And then there's the moth trap...

Question: Where is your favourite place?

Are there favourite places, or just special moments in time?

I'd love to go back to the forest track deep in Nepal's Royal Chitwan National Park in December 1989 - just as a Royal Bengal Tigress padded into the evening sun with her two half-grown cubs. I was 50 metres away.

Question: Who is your human hero in the natural world?

All of those who work unstintingly for nature conservation – whether it be in NGOs, the government sector or civil society.

Question: If you could dine with any four guests who would they be?

Aldo Leopold, Miriam Rothschild, Seamus Heaney, Arundhati Roy: science, natural history, the arts and political persuasion.

Question: Desert Island Disc?

I hope I'll have birdsong (ideally Lapwings and Curlews), so as a disc, Beethoven's Piano Concerto V.

Question: Place you'd most like to visit?

The Southern Andean Yungas: I need to see the only one of the world's five species of Dippers that I'm missing, the Rufous-throated.

Question: What would you like to achieve in your time at JNCC?

These are turbulent times for nature conservation and government bodies – yet organisations like the JNCC and its devolved partners have a more crucial role than ever around our national and international responsibilities. I want to help champion that role.

Question: If you could choose another job or career, what would it be?

I've had a fantastic life as an academic ecologist and public servant – so at 61 it's not easy to wish for more. My family occasionally tell me I should give my retirement (when it comes…) to creative writing.