

# Research Report 2013





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Further details of any of the studies detailed in this report can be gained by contacting the authors or the named contacts for individual projects.



South and West Wales  
De a Gorllewin Cymru

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## **Introduction**

The Wildlife Trust of South and West Wales and the wider Wildlife Trusts movement have always endeavoured both to support and encourage research into the natural environment and also to base our own operational decisions upon such work, in order that our actions are appropriate and effective, and defensible in light of the latest research available.

This report summarises all research work undertaken in partnership with or hosted by WTSWW, primarily on its nature reserves, during 2013. These studies are delivered by a huge range of individuals varying from university students and academics to interested individuals and in some cases, contracted companies. The report does not cover routine monitoring, but instead summarises original survey or research work that captures new information. Some of these studies are directly relevant to the management of our own estate and are site-specific. Others address hypotheses relevant to the wider movement and include a number of PhD and university studies generating original research that is published and of global significance.

In all cases we are indebted to the many partners and funders for their contribution of time, skills and financial support.

## **Amphibian and reptile distribution surveys**

County: Pembrokeshire, Ceredigion  
Researcher: Mark Barber, Peter Hill  
Partner organisation: ARC  
WTSWW contact: Richard Brown, Giselle Eagle, Em Foot

### **Summary**

This year ARC have supported a number of surveys on WTSWW sites. Skokholm has never been comprehensively surveyed for reptiles. Refugia have been used on both islands but have tended to be focussed around the central areas and islands' buildings. Refugia were placed around the island with financial and staff support from ARC to inform our understanding of use of the islands habitats by reptiles. Refugia surveys were also conducted at Coed Maidie B Goddard in Ceredigion.

## **Woodland invertebrates**

County: Ceredigion, Carmarthenshire  
Researcher: Hannah Burton  
Partner organisation: Cardiff University  
WTSWW contact: Em Foot, Lizzie Wilberforce

### **Summary**

Assessment of invertebrate communities in woodland habitats, taking in Coed Penglanowen, Coed Simdde Lwyd, Coed Maidie B Goddard, Castle Woods and Poor Mans Wood nature reserves. Work is ongoing.

## **Marsh Fritillary habitat quality**

County: Ceredigion  
Researcher: Julia Pschera  
Partner organisation: Aberystwyth University  
WTSWW contact: Em Foot

### Summary

This is an MSc research project based on Rhos Pil Bach and Rhos Glyn yr Helyg nature reserves, looking at habitat conservation and restoration. The final thesis will be an assessment of habitat quality mapping for Marsh Fritillaries *Euphydryas aurinea*.

### **Talley Lakes & Llyn Eiddwen aquatic plants survey**

County: Carmarthenshire, Ceredigion  
Researcher: ENSIS Ltd  
Partner organisation: NRW  
WTSWW contact: Lizzie Wilberforce, Em Foot

### Summary

ENSIS Ltd carried out aquatic plant surveys in a number of Welsh lakes during summer 2013. The purpose of these surveys is to assess the condition of protected sites (SSSIs and SACs) and report on the status of water bodies for the Water Framework Directive via NRW.

### **Fungal ecology and WTSWW nature reserves**

County: Pembrokeshire, Ceredigion, Carmarthenshire  
Researcher: Hannah Metcalfe  
Partner organisation: Aberystwyth University  
WTSWW contact: Lizzie Wilberforce

### Summary

This KESS-funded MPhil studentship is a partnership between Aberystwyth University (academic supervisor Dr Gareth Griffith) and WTSWW (SME supervisor Lizzie Wilberforce). Hannah is working with us for a year researching a number of ecological topics including the mycological associations of Devil's Bit Scabious *Succisa pratensis* in relation to establishment of the plant in different habitats with regard to marsh fritillary conservation, the ecology of Willow Blister *Cryptomyces maximus*, a red data book fungus with a very limited distribution (but several sites on WTSWW nature reserves) and the ecology of the fungal communities on Skokholm Island. There are not currently any results to report as this project is in its early stages and fieldwork will continue during 2014.

### **Collembola communities at Cors Goch and Coed Wern Ddu nature reserves**

County: Carmarthenshire  
Researcher: Robert Norledge  
WTSWW contact: Lizzie Wilberforce

### Summary

Cors Goch was visited during the summer of 2013. 8 samples were taken. 5 of these were put into tullgren funnels and the rest will be processed via flotation. Due to time constraints, the samples were all taken near the south west corner. 5 samples were taken in the bog and the remainder in the wood. The soil and litter in the wood was very moist (good for Collembola).

Coed Wern Ddu was visited on the same day as Cors Goch. Seven samples were taken, near the east end of the reserve. Again, the soil and litter in the wood was very moist and there should definitely be some good samples. 5 of these samples have been put in tullgren funnels, and the rest will be processed by flotation.

Results should be available during 2014.

### **Groundwater fauna on Skomer Island**

County: Pembrokeshire  
Researcher: Lee Knight  
WTSWW contact: Lizzie Wilberforce, Ed Stubbings, Bee Büche

#### **Summary**

There were only three locations on the island that provided potential habitat for groundwater fauna. Site 1 was the small well that supplies the farm (SM7250 0954) net sweeps collected: 1 *Proasellus meridianus*, 1 Nematoda, 6 Oligochaeta, 13 Cyclopoida.

Site 2 was the small spring near the Pigstone (SM 7147 0925). Net seeps in the small pool at the spring source collected: 145 *Proasellus meridianus*, 50 Oligochaeta, 3 *Agabus larvea*, 1 *Agabus bipustulatus*, 3 *Agabus paludosus*, 2 *Hydroporus pubescens*, 1 *Hydroporus tessellatus*, 3 *Hydroporus memnonius*, 2 *Dryops luridus*, 9 *Helophorus brevipalpis*, 1 *Microcara testacea*, 3 Cyphon sp. (adults) and 10 *Phagocata vitta*.

The final site 3 was the small spring by The Wick. Net sweeps in the small pool at its source collected: 1 Chironomidae, 4 *Proasellus meridianus*, 1 *Agabus* sp. (larva), 1 *Helophorus brevipalpis* and 1 *Laccobius atratus*.

None of the species above are particularly uncommon and are typical of small spring-fed pools. The results of the survey will eventually be published as a paper in the near future once a few other islands have been surveyed. The survey is part of an on-going survey looking at the groundwater fauna of British offshore islands.

The aim of the project is to investigate if these islands have any stygobitic (species only found in groundwater habitats and nowhere else) fauna on them and if so to come up with possible ideas of colonization etc. Sampling involves investigating wells, boreholes and springs using a combination of techniques ranging from specially designed nets lowered down boreholes and wells on a cable, to using a long-handled pond net in shallower wells and spring catchpits.

### **Roadside nature reserves in Ceredigion**

County: Ceredigion  
Researcher: Gary Hillier  
WTSWW contact: Em Foot

#### **Summary**

WTSWW has worked in partnership with Ceredigion County Council for many years to maintain a suite of roadside verge nature reserves which are managed sympathetically by the Highways department. Through this project all reserves were surveyed and compared with control sites. The Council will be using some of these results to update their cutting regime from 2014.

### **Pine Martens in Wales**

County: Ceredigion  
Researcher: David Bavins  
Partner organisation: Vincent Wildlife Trust  
WTSWW contact: Em Foot

#### **Summary**

Em Foot has worked on two candidate WTSWW reserves (Pant Da and Coed Simdde Lwyd in the Rheidol valley) with VWT who have funded boxes, hair tubes and camera traps as part

of their programme of works to establish the distribution of Pine Martens in Wales. Monitoring is ongoing.

### **Dormice in Ceredigion**

County: Ceredigion  
Researcher: Jenny MacPherson  
Partner organisation: Vincent Wildlife Trust, MISE project  
WTSWW contact: Em Foot

#### **Summary**

Dormice have an extremely restricted distribution in Ceredigion. Em Foot worked with Jenny to install Dormouse boxes at Cwm Clettwr, funded by the MISE project. During 2013 Dormice were recorded on the nature reserve for the first time. Monitoring is ongoing.

### **Immune functions in wild mice**

County: Pembrokeshire  
Researcher: Steve Abolins  
Partner organisation: Bristol University  
WTSWW contact: Richard Brown, Giselle Eagle

#### **Summary**

The fieldwork for this study was undertaken on Skokholm during the season of 2013. A small sample of the House Mouse population that lives on the island (around 30 mice) was trapped. This was achieved using Longworth live capture traps, provisioned with hay, grain and carrot.

The mice were then removed from the island and taken to the University of Bristol. The mice will be used as part of a larger project investigating the determinants of immune function in wild mice. Very little work has previously been done on how the immune system operates in wild mammals and how it might be affected by the stressors and constraints of a wild existence. The wild House Mouse is the same species as the laboratory mouse which is used as the model species for the majority of immunological studies. This allows us to compare and contrast any differences that may exist due to the different environments and selection pressures that these mice experience. Further to this, the mice on Skokholm island are unique within the UK as all populations of house mice on the mainland are commensal; only surviving when associated with human habitation. Being able to sample the mice from Skokholm provides invaluable data, which could not otherwise be collected.

### **Ecology and behaviour of the Common Guillemot on Skomer Island**

County: Pembrokeshire  
Researcher: Elspeth Kenny (PhD student)  
Partner organisation: Sheffield University (supervisor Prof. Tim Birkhead)  
WTSWW contact: Lizzie Wilberforce, Ed Stubbings, Bee Büche

#### **Summary**

The main aim of this study is to establish the way colony social structure determines breeding success in the Common Guillemot *Uria aalge*. The fieldwork will start in spring 2014 and the project comprises the following key components:

1. Measurement of the extent of site fidelity based on data from marked-individuals in the long-term database, together with observations made during the PhD itself. This will provide a detailed description of the social structure of breeding groups.

2. Measurement of the incidence of allopreening within and between groups to test various hypotheses to account for variation in allopreening and to test whether more allopreening results in greater group cohesion. This part of the study is concerned with the adaptive significance of allopreening.
3. The final part of the project is concerned with mechanisms and tests the hypothesis that allopreening results in a reduction in stress, as measured by a reduction in heart rate (measured non-invasively).

There has been a great deal of work on allogrooming in mammals, but remarkably little on allopreening in birds, and none that tests specific hypotheses in such detail. This study is based on a solid foundation of Tim Birkhead's decades of previous observations on Skomer; has clear achievable objectives, and is extremely novel. In addition, the student will contribute to the routine monitoring, because she and the field assistant will 'share' birds and information.

### **Thermal imaging techniques in the study of nocturnal seabirds**

County: Pembrokeshire  
 Researcher: Dr Matt Wood  
 Partner organisation: University of Gloucestershire  
 WTSWW contact: Richard Brown, Giselle Eagle

#### **Summary**

In late May 2013 Matt Wood from the University of Gloucestershire visited Skokholm to assess the potential of thermal imaging to study the nocturnal activities of seabirds, particularly Storm Petrels and Manx Shearwaters. The results from Storm Petrels were remarkable, shining new light on previously unseen behaviour and proving very effective in locating nest sites. Matt will visit Skokholm again in 2014 to develop this work. For more information, see: Seeing stormies in the dark | The UGlos Bioscience Blog  
<http://uglosbioscience.wordpress.com/2013/09/17/seeing-stormies-in-the-dark/>

### **Adaptive significance of egg shape in Guillemots**

County: Pembrokeshire  
 Researcher: Prof. Tim Birkhead and student/assistant  
 Partner organisation: Sheffield University  
 WTSWW contact: Ed Stubbings, Bee Büche

#### **Summary**

In 2013 consents and licences were issued for the collection of a small number of Guillemot eggs for this study, this will be continued in 2014. This study comprises two parts. The first is to test a new hypothesis regarding the adaptive advantages of egg shape and to challenge the received wisdom that it allows the egg to 'spin on its axis' preventing loss over the cliff, which is incorrect. The second part is to test the hypothesis that egg shape optimises incubation by the parent in the absence of a nest. This work is ongoing.

### **Pollen analysis in the study of historic vegetation patterns on Skomer**

County: Pembrokeshire  
 Researcher: Julia Webb, Julia McCarroll, Will Carpenter, Phil Toms, Matt Wood & Frank Chambers  
 Partner organisation: University of Gloucestershire  
 WTSWW contact: Ed Stubbings, Bee Büche

#### **Summary**



Reconstruction of past vegetation using pollen analysis. A soil core collected from Skomer in 2012 has been analysed at the UoG's Centre for Quaternary Studies, preliminary results suggesting fluctuating vegetation cover since the last glaciation 14,000 years ago. Skomer appears to have had variable grassland and heathland cover, but no evidence of forest cover was found. This work is ongoing, and aims to extend the study to Skokholm where the peat-rich soil and boggy areas offer better conditions for pollen preservation that may shed further light on the vegetation history of the islands. The University of Gloucestershire continues to develop close research links with WTSWW, with researchers receiving a Staff Excellence Award from the University for involving students in research on Skomer. Matt Wood expresses his sincere thanks to the Trust for the invaluable support of wardens and volunteers.

### **Owl pellet study on Skomer**

County: Pembrokeshire  
Researcher: Elle Daley  
Partner organisation: University of Gloucestershire (supervisor Dr Matt Wood)  
WTSWW contact: Ed Stubbings, Bee Büche

#### **Summary**

Owl pellets were collected on Skomer in 2012, later dissection revealing some changes in the diet of Little Owls and Short-eared Owls since previous studies in the 1970s and 2003. Small mammals predominate, with some surprises - Badger hair in a Short-eared Owl pellet and a rat jaw in a suspected owl pellet that may have been a misidentified Buzzard pellet. The ongoing results of these studies help inform island management decisions in terms of quarantine policy.

### **The effects of climate change on wetland ecosystems**

County: Glamorgan  
Researcher: James Vafidis  
Partner organisation: Cardiff University  
WTSWW contact: Rob Parry

#### **Summary**

Year three of a PhD with KESS funding in partnership with WTSWW. Rob Parry is the company supervisor.

Climate warming is predicted to advance the phenology, and to increase the abundance, of arthropod prey for long-distance migrant birds breeding in Europe, but the consequences of these changes for bird diet, breeding productivity, migration behaviour and survival are unknown. This study tests a series of hypotheses linking climate, plant growth, arthropod abundance and phenology, with energy regulation, fecundity and survival in migratory wetland songbirds; Reed Warbler *Acrocephalus scirpaceus* and Sedge Warbler *A. schoenobaenus*. The first chapter of this report reviews the literature on climate-driven influences on wetland ecosystems and sets out the hypotheses that lead the investigation. The second chapter examines the plant and arthropod prey resources available to migrant birds throughout their annual cycle and investigates the responses of plants and arthropods to natural and simulated changes in temperature. I show that both plant growth-rate and arthropod emergence can be strongly influenced by temperature manipulations within the 'near future' IPCC European temperature projections. The third chapter considers the possible behavioural responses of Reed and Sedge Warblers to the climate-driven changes in their food resources predicted in Chapter 2. These trans-Saharan migrants show large

and strategic spatio-temporal variations in body mass across the annual cycle. I show through observations and field-scale food supplementation experiments over two annual cycles that these changes are influenced by food availability at energetically-demanding stages of the annual cycle (e.g. migration and reproduction). Food-supplementation experiments were also used to investigate the degree to which breeding success is food limited, and hence to quantify the potential impacts of changes in food supply on breeding productivity. These experimental manipulations therefore serve as empirical simulations of climate-driven changes in food supply.

I show how the changes (increases) in food availability as may occur under projected climate change are expected to increase the survival and fecundity of reedbed warblers across their annual cycle. The food-dependent strategies of mass regulation at different points in the annual cycle demonstrated in our study are likely to be a response to season-specific costs and benefits of maintaining fat reserves. These results together imply that the impacts of a climate-driven increase in food resources on mass regulation and annual breeding productivity will have an initial positive net effect on lifetime fitness. These findings thus reveal the likely mechanisms underlying the positive population growth observed in reed and sedge warblers over recent decades, coinciding with climate warming. The same mechanisms may explain the contrasting fortunes of other long-distance migrant birds breeding in habitats (e.g. woodlands) where food availability at key periods may be decreasing.

#### **Seed use by wild birds at Parc Slip nature reserve**

County: Glamorgan  
Researcher: Lorna Baggett  
Partner organisation: Cardiff University  
WTSWW contact: Vaughn Matthews

#### **Summary**

Lorna is undertaking this project as part of her year out placement with WTSWW. The project is set in an ex-sheep grazed grass field at Parc Slip nature reserve which has now been planted with a crop of Sunflower and Millet, amongst some wildflower and arable weeds such as Corn Marigold, Corn Cockle, and Poppies. It was hoped that the arable field would provide a mix of high energy seeds for over-wintering birds. This is being tested by mapping both the distribution of seed plants across the field, and the locations of where birds are visiting the field at dawn and dusk. Hopefully this information will give us a better understanding of what this type of habitat can support, and what the preferences of over-wintering birds are. This may mean that similar fields in the future can be more tailored towards specific species. Work is ongoing.

#### **Wetlands of the Teifi Marsh- the implications of sea level rise for ecosystem conservation**

County: Pembrokeshire and Ceredigion  
Researcher: SE Grenfell, RM Callaway, CM Bertelli, AF Mendzil & I Tew  
Partner organisation: Swansea University (SEACAMS)  
WTSWW contact: Lizzie Wilberforce, Nathan Walton

#### **Summary**

This project was funded by SEACAMS' funding to support research partnerships with SMEs. Fieldwork was undertaken over the 2012 field season. A draft report is now available and

good publicity has resulted through the SEACAMS newsletter. The SEACAMS team gathered data from over 50 points across the site and its two marsh systems. Core samples were taken that allowed the SEACAMS team to examine the particle sizes and organic content through the depth of the core. These data show the rates of change of important variables that permit the development of predictive models and give an indication of future trends. The results showed that in the long term, there will be an expansion of salt tolerant marshes and tidal mudflats at the expense of tidal freshwater marsh. Newly created salt marshes are unlikely to be sustainable in the long term due to a lack of sediment supply, and they too will become inundated and convert to tidal mudflats. Ultimately, an increase in sea level will result in a reduction in marsh biodiversity, with plant communities switching toward less diverse and occasionally monospecific vegetation communities. While the loss of tidal freshwater wetland is in line with global predictions, simulations suggest that in the Teifi marshes the loss will be slower. It also suggested that at least for one ecosystem service, carbon storage, there is potential for an increase in the future in the Teifi Marshes.

### **The role of volunteers in nature conservation. A comparative study between Wales and Austria**

County: All WTSWW counties  
Researcher: Gabrielle Sloane  
Partner organisation: University of Vienna  
WTSWW contact: Nathan Walton

#### **Summary**

This study was completed as part of a Masters qualification in Landscape Design and Conservation and assessed the contribution made by volunteers to the conservation movement in each country.

### **Manx Shearwater (*Puffinus puffinus*) studies on Skomer Island**

County: Pembrokeshire  
Researcher: Annette Fayet, Akiko Shoji  
Partner organisation: Oxford Navigation Group, Oxford University (Prof. Tim Guilford)  
WTSWW contact: Ed Stubbings, Bee Büche

#### **Summary**

Our long-term tracking project of Manx Shearwaters on Skomer Island was initiated in 2008 and has been continued until now. With excellent help from the wardens, the island's staff and many volunteers, we had a very successful season in 2013. This year Manx Shearwater tracking projects, which require extensive night work to check burrows throughout the study colony all night, included on-going incubation and chick-rearing GPS tracking to compare foraging behaviour between breeding stages, which we also compare between years to study responses to environmental variability. Some birds were also tracked with geolocators (GLS) to continue the long-term tracking project of their wintering movements. Geolocators are miniature archival light loggers (~2g) which record daily approximate position and immersion data and are small enough to be deployed on shearwaters year-round.

In addition, we repeated an experiment started in 2012, carrying out the cross-fostering of chicks of different ages to manipulate parental effort, to study how this may impact their future migratory and breeding strategies – also called carry-over effects.

Projects newly started in 2013 were using GPS tracking to study the movement of immature birds when they return to the colony, and displacement tracking by translocating incubating adults at sea to study homing behaviour from a navigational view.

These results should not only be invaluable for improving our scientific knowledge to understand the behaviour and ecology of Manx Shearwaters, but also for developing conservation and management plans on Skomer and elsewhere.

The two main researchers, PhD students Akiko Shoji and Annette Fayet, were funded by JASSO (AS), BBSRC, Microsoft Research and a Mary Griffiths scholarship (AF). The research was supported by the Department of Zoology of the University of Oxford, the RPSB, the American Ornithologists' Union, the American Animal Behavior Society, the Wilson Ornithological Society, the Welsh Ornithological Society and Vortex Optics.

### **Razorbill (*Alca torda*) studies on Skomer Island**

County: Pembrokeshire  
Researcher: Annette Fayet, Akiko Shoji  
Partner organisation: Oxford Navigation Group, Oxford University (Prof. Tim Guilford)  
WTSWW contact: Ed Stubbings, Bee Büche

#### **Summary**

2013 was a pleasurable year for Razorbill researchers on Skomer, after experiencing extremely low breeding success in 2012, where many eggs and chicks were abandoned. This year, we have successfully obtained GPS and TDR (time-depth-temperature recorders) data from 6 incubating birds and 6 chick-rearing birds at the Basin colony, thanks to help provided by Chris Perrins and Dave Boyle from the Edward Grey Institute (Oxford). We also recovered 4 TDR and 2 GLS from breeding Razorbills at the Garland Stone Colony, where we deployed the devices on adults in 2012, but failed to recover them due to nest abandonment. Data were successfully downloaded.

A long-term monitoring project studying wintering movements in Razorbills started in 2009, this year we have recovered four GLS from breeding adults. The data will be analysed to study wintering movements in this species, which has seldom been investigated.

The two main researchers, PhD students Akiko Shoji and Annette Fayet, were funded by JASSO (AS), BBSRC, Microsoft Research and a Mary Griffiths scholarship (AF). The research was supported by the Department of Zoology of the University of Oxford, the RPSB, the American Ornithologists' Union, the American Animal Behavior Society, the Wilson Ornithological Society, the Welsh Ornithological Society and Vortex Optics.

### **Atlantic Puffin (*Fratercula arctica*) studies on Skomer Island**

County: Pembrokeshire  
Researcher: Annette Fayet, Akiko Shoji  
Partner organisation: Oxford Navigation Group, Oxford University (Prof. Tim Guilford)  
WTSWW contact: Ed Stubbings, Bee Büche

#### **Summary**

2013 was a busy season for Puffin researchers. The OxNav Group started of a long-term tracking project of adult Puffins on Skomer in 2007, aiming to understand the migratory strategies and destinations of puffins and potential variations over the years with changes in environmental conditions. As a continuation and expansion of this project, with the help of Dave Boyle (EGI), we deployed and/or replaced over 30 GLS on breeding Puffins. A total of 35 migrations routes were collected (one device contained more than 1,000 days of data!). They will be analysed this winter to study the Puffins' wintering behaviour. A second part of the project consisted of deploying geolocators on 30 Puffin fledglings; some of which should return to Skomer in the next 3-5 years, and the data stored on their device will inform us

about the at-sea movements of juvenile and immature Puffins, which are currently completely unknown.

In a second project aiming to elucidate the at-colony behaviour of Puffins, over 10 breeding pairs were tagged with an RFID tag (Radio Frequency Identification - a tiny chip with a unique barcode, <0.1g), and an antenna deployed on their burrow during the entire breeding season recorded all their comings and goings 24/7. Such detailed data should help shed light on their breeding behaviour.

Finally, we deployed time-depth recorders on 12 chick-rearing adults to study their foraging behaviour. This project will help understand the foraging strategies of puffins, and will aim to identify the time and energy budgets and linking diving profiles with prey items in this species.

The two main researchers, PhD students Akiko Shoji and Annette Fayet, were funded by JASSO (AS), BBSRC, Microsoft Research and a Mary Griffiths scholarship (AF). The research was supported by the Department of Zoology of the University of Oxford, the RPSB, the American Ornithologists' Union, the American Animal Behavior Society, the Wilson Ornithological Society, the Welsh Ornithological Society and Vortex Optics.

### **Guillemot (*Uria aalge*) studies on Skomer Island**

County: Pembrokeshire  
Researcher: Annette Fayet, Akiko Shoji  
Partner organisation: Oxford Navigation Group, Oxford University (Prof. Tim Guilford), University of Sheffield (Prof. Tim Birkhead)  
WTSWW contact: Ed Stubbings, Bee Büche

#### **Summary**

In a collaborative project started in 2010 between Prof. Tim Guilford (OxNav) and Prof. Tim Birkhead (University of Sheffield), who has been studying Guillemots on Skomer since 1972, Guillemots have been tracked year-round with miniature geolocators. In July 2013, an expedition of 6 Oxford and Sheffield researchers and Skomer warden B. Büche visited a key Skomer colony. We recaptured 6 adult Guillemots which had been fitted with a geocator in a previous year, downloaded the data from their device and replaced it with a new one. These wintering tracks, collected over several years, will help us understand the wintering behaviour and at-sea movements of Common Guillemots.

The two main researchers, PhD students Akiko Shoji and Annette Fayet, were funded by JASSO (AS), BBSRC, Microsoft Research and a Mary Griffiths scholarship (AF). The research was supported by the Department of Zoology of the University of Oxford, the RPSB, the American Ornithologists' Union, the American Animal Behavior Society, the Wilson Ornithological Society, the Welsh Ornithological Society and Vortex Optics.

### **Boat-based cetacean surveys in Cardigan Bay**

County: Ceredigion  
Researcher: Cardigan Bay Marine Wildlife Centre  
Partner organisation: Dolphin Survey Boat Trips  
WTSWW contact: Laura Mears

#### **Summary**

Boat-based surveys are conducted from the *Sulair*, which is used as the CBMWC research vessel and leads all of their survey boat trips from New Quay harbour. Boat surveys usually follow a set route within the Cardigan Bay Special Area of Conservation (SAC). A volunteer researcher from CBMWC joins each boat trip and is responsible for systematically recording effort (position and environmental information) and sightings data (of large marine animals)



on a series of survey forms. These data contribute to our growing understanding of the ecology of marine mammals in the Irish Sea.

### **Land-based cetacean surveys in Cardigan Bay**

County: Ceredigion  
Researcher: Cardigan Bay Marine Wildlife Centre  
Partner organisation: Ceredigion County Council  
WTSWW contact: Laura Mears

#### **Summary**

CBMWC volunteers assist Ceredigion County Council with their annual Dolphin Watch survey that takes place from six coastal sites. Initiated by Ceredigion County Council in 1994 amidst fears that relatively high levels of boat activity were causing disturbance to Bottlenose Dolphins *Tursiops truncatus* and other marine wildlife in the area, the Dolphin Watch project has developed over the years and now aims to do the following:

- To improve our understanding of Bottlenose Dolphins site use within the SAC
- To monitor trends in dolphin occurrence and levels of boat traffic
- To assess the effectiveness and need of management measures that aim to reduce the risk of disturbance or injury to dolphins by boats
- To increase public awareness and appreciation of the marine wildlife in Cardigan Bay

CBMWC volunteers are responsible for monitoring the New Quay harbour survey area and these data contribute to various research outcomes and publications.

### **Bottlenose Dolphin *Tursiops truncatus* photo-identification in Cardigan Bay**

County: Ceredigion  
Researcher: Cardigan Bay Marine Wildlife Centre  
Partner organisation: Friends of Cardigan Bay, NRW  
WTSWW contact: Laura Mears

#### **Summary**

Photo-identification of bottlenose dolphins was first conducted in Cardigan Bay in the 1980s and repeated in the early 1990s and in 2001. In 2005 CBMWC established their annual Photo Identification Catalogue, in cooperation with other Welsh marine organisations. In 2005 139 individual dolphins were photographed and identified from our survey trips. They have now identified over 250 individuals. This assists research into population size and movement. This work is undertaken under licence from Natural Resources Wales.

### **Future Fisheries**

County: All WTSWW counties  
Researcher: Sarah Perry (WTSWW)  
Partner organisation: CBMWC  
WTSWW contact: Sarah Kessell

#### **Summary**

The aim of the WTSWW Future Fisheries project is to plan a sustainable future for the traditional fishing industry and the marine environment. To do so, conservationists and marine biologists need to work directly with fishermen, combining both strands of knowledge and we need to engage the public in understanding and caring for the marine environment, thereby working with the demand and supply side to foster positive changes. We aim to use

existing knowledge and research rather than carrying out new research. Through analysis of existing information, data gaps can also be identified. The project will collate and analyse all existing relevant information with a view to understanding and planning what needs to be done and with whom. Information will include seabed habitat maps, fish species information, fishing quotas, landing information, intensity, gear, and commercially important fish stocks, as well as information about demand for fish from retailer outlets, and information from fishermen themselves. This work began in late 2013 funded by the Waterloo Foundation and The Co-op partnership.

### **Giant Lacewing ecology and distribution at Coed y Bedw nature reserve**

County: Glamorgan  
Researcher: Daisy Maryon  
Partner organisation: University of South Wales  
WTSWW contact: Rob Parry

#### **Summary**

The unusual geology of Coed y Bedw promotes a wide variety of freshwater habitats within the mixed deciduous woodland, which in turn supports a number of freshwater and terrestrial invertebrates. The project will aim to ascertain the distribution of associated invertebrate species with a particular focus on the Giant Lacewing, once recorded at the reserve. Sampling of watercourses and wet flushes will provide insights into the ecology of the species and other associated communities. There are not currently any results to report as this project is in its early stages and field work will continue during 2014.

### **Is a pre-baiting period necessary to achieve a high trapping success rate in small mammal trapping?**

County: Glamorgan  
Researcher: Paul Rodd (MSc)  
Partner organisation: University of Bristol  
WTSWW contact: Vaughn Matthews

#### **Summary**

As part of the live trapping procedures for small mammals, it is common for a pre baiting period, usually consisting of a few days, to be used prior to the live trapping to maximise the results from the live trapping period. The pre baiting period allows any animals in that area time to adjust to the presence of the trapping apparatus and the bait within it, reducing the risk of trap avoidance when the trapping period begins. However, the pre baiting period, even for a few days, will have time and financial costs associated with it. This project aimed to investigate whether the pre baiting period is indeed needed, or whether the traps/tunnels can achieve a success rate (animals within the apparatus) without using a pre baiting period, comparable to studies that have used a pre baiting period.

In this project, small mammal tracking tunnels were used, instead of traps, which show the presence of an animal inside the tunnel by using a non -toxic ink pad at the entrances to colour the animals' tracks within the tunnel. The study was carried out over a period of two nights in two sites. Ten tunnels were placed at site one for two nights and then moved to site two for two nights. Additionally, three bait types were used in each tunnel to see if there was a preference in bait type and whether multiple bait types were taken in the same night.

This project found good first night tunnel success rates for both sites (60% in site one and 40% in site two) or 50% for site one and site two combined. This was followed by even better second night tunnel success rates for both sites, (100% for site one and 50% for site two) or 75% for site one and site two combined. A good combined (site one and site two) mean number of animals per tunnel was found. Night one had a combined mean of 0.95 animals per tunnel, which increased by 74%, to a combined mean of 1.65 animals per tunnel on night two. This could represent a trap success rate of 95% (with a mean of 0.95 animals per tunnel) on night one and a 100% trap success rate (with a mean of 1.65 animals per tunnel) on night two. This is a far greater trapping success rate than any paper found in the literature.

Therefore, the tunnels success rates, combined with good animal numbers in those tunnels over a two night period, found in this study, show that a pre baiting period was not needed to achieve a high rate of tunnel success.

### **Developing our understanding of Puffinosis disease in Manx Shearwaters**

County: Pembrokeshire  
Researcher: Professor Chris Perrins  
Partner organisation: University of Oxford  
WTSWW contact: Ed Stubbings, Bee Büche

#### **Summary**

Puffinosis is a disease that affects Manx Shearwaters *Puffinus puffinus* and causes symptoms including obvious blistering to the feet. Puffinosis continues to be poorly understood and we still do not even know what the causative agent is. A new study aided by help from the Institute of Zoology (London Zoo) has been commenced. In 2013, the disease was widespread in the normal places on Skomer, in the bracken-covered areas of the middle of the island. This study aims to further our understanding of the causes of the disease and is ongoing.

### **Manx Shearwater census on Skokholm Island in 2012 and 2013**

County: Pembrokeshire  
Researcher: Professor Chris Perrins  
Partner organisation: University of Oxford, NRW  
WTSWW contact: Richard Brown, Giselle Eagle

#### **Summary**

In 1998 a census was made of the population of Manx Shearwaters *Puffinus puffinus* nesting on the three islands Skomer, Skokholm and Middleholm. Because these islands hold a significant proportion of the world population of this species, it was felt important to have a better knowledge of these populations and so a repeat census was made of the Manx Shearwaters breeding on Skomer in 2011 and plans were made to census the birds on Skokholm in 2012. Additional fieldwork was undertaken in 2013.

The estimate of the number of breeding pairs of Manx Shearwaters on Skokholm is a little over 41,000, though the Confidence Intervals of the estimate are very wide. The estimate from the 1997/98 census was 46,000, well within the Confidence Intervals of the 2012/13 survey. Indeed, they provide no evidence that there has been any change during that intervening 15 years.

## **Archaeology of Skomer Island**

County: Pembrokeshire  
Researcher: Toby Driver  
Partner organisation: RCAHMW  
WTSWW contact: Ed Stubbings, Bee Büche

### **Summary**

In a project led by RCAHMW, both Pembrokeshire islands have recently been subject to LiDAR surveys (see publications list below). This method uses a laser mounted on an aircraft to create a highly detailed terrain model of the island's ground surface. As a result, RCAHMW identified "staggering new complexity to the field systems and clear phasing of boundaries, particularly within the interior of the island". This has subsequently been followed up with field work on the island in 2012 and 2013.

### **Undergraduate projects taking place in partnership with WTSWW in 2013**

1. Eloise Neighbour (Cardiff University, final year project BSc Ecology)- study of small mammal behaviour during survey at Parc Slip
2. Dylan Foulkes (University of South Wales, project BSc Natural History)- Using Photography as a Precise Method Of Population Monitoring" -Focusing on Slow Worms (*Anguis Fragillis*) in Taf Fechan Nature Reserve
3. Gareth Morgan (University of South Wales, project BSc Natural History)- updated Phase I map of Taf Fechan Nature Reserve
4. Kristie Holder (Swansea University)- Assessing presence of the tephra (volcanic ash) signature from the Icelandic volcano in 2010 on two bogs in Scotland, using some peat from Cors Goch to see whether the tephra are apparent in south Wales as well.

### **Recent Publications**

Barker, L., Davis, O.P., Driver, T. and R. Johnston (2012). *An interim report on the recent work on Skomer Island and Skokholm Island, Pembrokeshire, by the Royal Commission on the Ancient and Historical Monuments of Wales*. *Archaeology in Wales* 51, pp. 160-3

Barker, L., Davis, O., Driver, T. and B. Johnston (2013). *Skomer Island, Marloes and St Brides, Geophysical Survey*. *Archaeology in Wales* 52, pp. 158-9.

Barker, L., Davis, O., Driver, T. and R. Johnston (2012). *Puffins amidst prehistory: re-interpreting the complex landscape of Skomer Island*, In: Britnell, W.J. and Silvester, R. J. (eds.), *Reflections on the Past, Essays in Honour of Frances Lynch*. Cambrian Archaeological Association. pp. 280-302

Dean, B., R. Freeman, H. Kirk, K. Leonard, R. Phillips, C. Perrins, and T. Guilford (2012). *Behavioural mapping of a pelagic seabird: combining multiple sensors and a hidden Markov model reveals the distribution of at-sea behaviour*. *J R Soc Interface* 10(78)

Fayet A., D. Boyle, R. Freeman, A. Shoji, C. Perrins, and T. Guilford (2013). *Tracking the migration of Atlantic puffins on Skomer Island*. *Birds in Wales* 10(1)

Grenfell S.E., Callaway R.M., Bertelli C.M., Mendzil A.F., and I. Tew (2013). *Research & Development Report: Wetlands of the Teifi Marsh – the implications of sea level rise for ecosystem conservation*. Unpublished report to WTSWW.

Macdonald, M.A., Morris, A.J., Dodd, S., Johnstone, I., Beresford, A., Angell, R., Haysom, K., Langton, S., Tordoff, G.M., Brereton, T., Hobson, R., Shellswell, C., Hutchinson, N.,

Dines, T., Wilberforce, E.M., Parry, R., and V. Matthews (2012) *Welsh Assembly Government Contract 183/2007/08 to Undertake Agri-environment Monitoring and Services Lot 2- Species Monitoring*. Published report to Welsh Government.

Meade, J., Hatchwell, B. J., Blanchard, J. L. and Birkhead, T. R. (2013). *The population increase of common guillemots *Uria aalge* on Skomer Island is explained by intrinsic demographic properties*. *Journal of Avian Biology* (44) pp. 55–61

Perrins C.M., Wood M.J., Garroway C.J., Boyle D., Oakes N., Revera R., Collins P., and C. Taylor (2012). *A whole-island census of the Manx Shearwaters *Puffinus puffinus* breeding on Skomer Island in 2011*. *Seabird* 25 pp.1–13