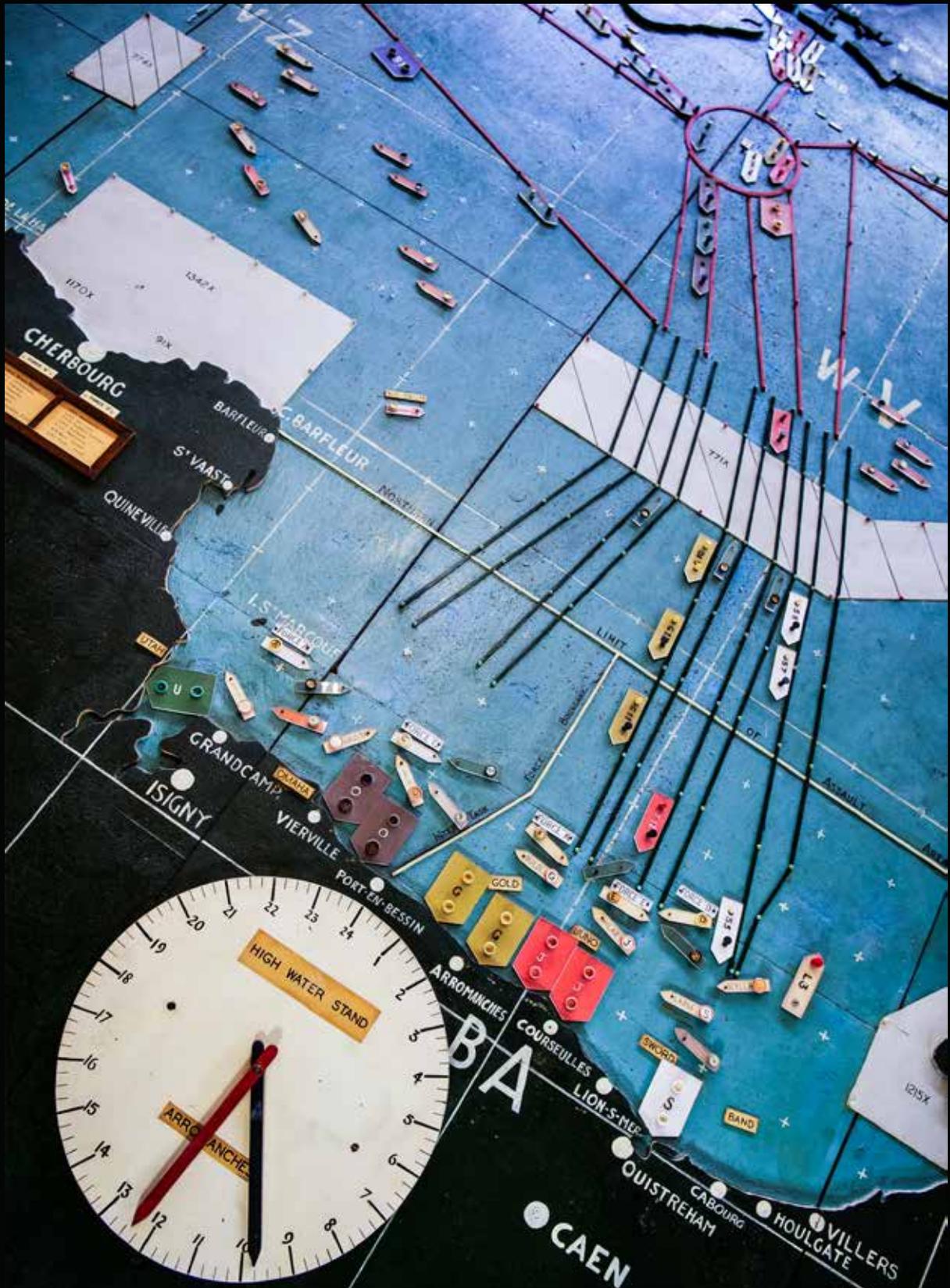


SANCTUARY

THE MINISTRY OF DEFENCE SUSTAINABILITY MAGAZINE

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SANCTUARY

Editors

Holly Broomfield
Iain Perkins

Editorial Board

Julia Powell (Chair)
Richard Brooks

Contact

Defence Infrastructure
Organisation (DIO)
Building 88
Westdown Camp
Tilshead
Salisbury, SP3 4RS

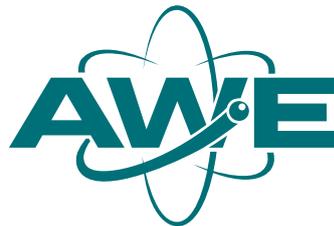
dio-sanctuary@mod.gov.uk
01980 674807

Sanctuary is an annual publication about sustainable development in the Ministry of Defence (MOD) and the sustainable management of the natural and built assets across the MOD estate. It illustrates how the MOD is undertaking its responsibility for stewardship of the estate in the UK and overseas. It is designed for a wide audience, from the general public, to the people who work for us or volunteer as members of the MOD Conservation Groups.

Sanctuary is produced for the MOD by the Defence Infrastructure Organisation.

Sponsors

The Sanctuary Team would like to give a big thank you to our sponsors. Each year our industry partners kindly sponsor the publication of Sanctuary Magazine. Without their contribution, we would not be able to produce hard copies of the magazine for people to enjoy and pass on to others. Once again, this year we have received enough money to print 4,500 copies. We appreciate our sponsors continued support which allows this iconic magazine to be published.



Sanctuary Awards

- 2 Foreword by Lt Gen Richard Wardlaw OBE
- 3 The Sanctuary Awards 2019
- 3 Award Tool
- 8 Conservation Stewardship Fund

Sanctuary Features

- 9 Richard Osgood. Archaeologist of the Year 2019
- 10 Overpaid, oversexed and over here – digging Band of Brothers
- 12 The Sovereign Base Areas' fight to eradicate illegal bird trapping
- 14 Gems in the Dunes at Altcar
- 16 Archaeology through the ages at Otterburn
- 18 Freight trains and the circular economy
- 19 RAF Valley – Isle of Anglesey Coastal Path
- 20 Hidden treasure – lichens at Kinloss
- 22 Military photographic training – conserving more than a century of history
- 24 Bee Aware – saying 'no-mow' to the decline in pollinators
- 25 UK Climate Projections
- 26 Unlocking a deeper understanding of our oceans
- 28 Boost for rare invertebrates at Ash Ranges
- 30 Kirkcudbright Training Area and D-Day
- 32 Multi-user routes around Aldershot – the Safe Ways Strategy
- 34 Saving Corsham's War Headquarters GPO telephone exchange
- 36 The Brecks pingo ponds – helping to protect a national freshwater treasure
- 38 In their footsteps – celebrating the Kiwi's 100th birthday
- 40 Walking underwater and breeding under bridges at Otterburn
- 42 Under the surface – UXO at the MOD Access Forum
- 44 Grand designs at Bourlon Barracks – renovating a Grade II listed building
- 46 Restoring dune slacks at Magilligan Training Centre
- 48 Fort George Renaissance of the Point Battery
- 50 Tackling waste from all directions
- 52 Skylarks soar alongside the Banshee unmanned target
- 53 Grazing on Fort Grange and Fort Rowner, HMS Sultan
- 54 Celebrating one of the world's oldest ornithological societies
- 56 Waste away – HMS Drake diverts 100% of waste from landfill

- 57 Southwick Park's magnificent D-Day map
- 61 Water treatment works upgrade for Okehampton Camp
- 62 The beauty of bunkers at Otterburn
- 64 Holmestone's globally unique holly wood
- 66 Replacement of drinking water pipeline in Natura area, Cyprus
- 68 The return of the Monuments' 'Men'
- 70 Professional Development Schemes Outreach Initiative
- 71 Leading change – how Air Mobility have delivered innovative Fuel Efficiencies
- 72 Going with the flow – flood scheme benefits wildlife at AWE Burghfield
- 74 The Army Basing Programme Tidworth Garrison – old and new
- 76 Breathing new LIFE into Welsh sand dunes
- 78 Archaeology under pressure below the tracks of Salisbury Plain
- 80 Abbey Wood takes a stand on World Environment Day
- 81 Ten Tors and YoGA
- 82 Assessment of invasive non-native species in Cyprus – the RIS-Ký Project
- 84 Charting coastal change at Pembrey – airborne technologies old and new
- 86 Take the Lead – in support of responsible dog ownership
- 88 Ancient field systems on Thorney Island
- 90 Obituary – Guardsman Mathew Talbot 1 COLDM GDS

Sanctuary Around the Regions

- 92 **Spotlight on** Predannack Airfield, Cornwall
- 94 **Kent and East Sussex**, DTE South East
- 95 **Northern Ireland**, Ballykinler and Magilligan
- 96 **Essex**, Carver Barracks
- 97 **Wiltshire**, Dstl Porton Down
- 98 **North Yorkshire**, Catterick
- 99 **Surrey**, Hankley Common
- 100 **Hampshire**, Defence Munitions Gosport
- 101 **Essex**, Fingringhoe Ranges
- 102 **Wiltshire**, SPTA Conservation Group
- 104 **Oxfordshire**, Bicester
- 105 **Hampshire**, HMS Excellent
- 106 **Pembrokeshire**, Castlemartin
- 107 **Isle of Wight**, Newtown Range
- 108 **Environmental Support & Compliance Update**
- 108 **Contacts**

Foreword by Lt Gen Richard Wardlaw OBE

Chief of Defence Logistics and Support

I am delighted to have been asked to write the Foreword to the 2019 edition of *Sanctuary* magazine, the Ministry of Defence (MOD) annual sustainability publication, which has been in print for over 40 years. The magazine highlights conservation efforts across both the UK and international MOD estate, by our serving personnel, volunteers, MOD staff and industry partners.

As one of the UK's third largest land owners, the MOD takes its obligations as responsible stewards very seriously indeed. As this latest edition of *Sanctuary* highlights, the result is a wide and far reaching level of engagement in preserving, nurturing and sharing this rich heritage with our own people as well as the wider UK public.



It is therefore no surprise that this year's *Sanctuary* magazine focuses on the themes of commemoration, volunteering and preservation.

In the year of the 75th anniversary of D-Day, a selection of articles from across the MOD estate commemorate the sacrifices made by our World War Two service personnel during the Normandy landings. Operation Nightingale's archaeological excavations of perhaps the most famous Allied military unit involved on D-Day, Easy Company of the 506th Parachute Infantry Regiment, 101st Airborne, US Army can be read on page 10. Other features include an exploration of the role that Kirkcudbright Training Area played in preparing Polish tank regiments for the Normandy invasion (page 30) and the history of the D-Day map used by General Eisenhower, General Montgomery and Admiral Ramsey at the Headquarters of the Supreme Headquarters Allied Expeditionary Force, Fort Southwick, Hampshire (page 57).

As custodians of the estate the articles highlighting the triumph of the Community Action Team over illegal bird trapping (page 12), the use of Horizontal Directional Drilling to ensure the continued supply of fresh drinking water to Episkopi Garrison and RAF Akrotiri (page 66), and a university led project investigating the risk of invasive non-native species to the SBAs (page 82) are important examples of valued work. The Sovereign Base Areas (SBAs) of Akrotiri and Dhekelia is a British Overseas Territory on the island of Cyprus. I am delighted that the hard work of staff and volunteers at the SBAs prominently feature in the 2019 edition of *Sanctuary*.

As in Cyprus, much of the MOD estate is coastal and as such we manage a surprisingly large proportion (over 6,500ha) of the UK's sand dune habitat. Much work is being carried out to restore and enhance dune slacks and examples from Northern Ireland (page 46), Wales (page 76) and England (page 14) are explored throughout the magazine. This is but one example of the varied habitats across which we live, work and train – an estate we hold in trust as custodians.

The Year of Green Action (YoGA) runs throughout 2019. It aims to connect people with nature, inspire people to enhance the environment and help individuals, communities and businesses to make greener decisions. The editorial team have highlighted some articles that demonstrate the MOD's long-standing commitment to these aims by marking them with the YoGA badge. I extend my thanks to the hundreds of volunteers who donate their time to helping maintain both the natural and historic environment across the MOD estate. Your dedication and assistance are much valued and appreciated.



Finally, I congratulate the Winners and Runners-up in this year's *Sanctuary* Awards. I understand that the standard of entries was high and as such your awards are very well deserved!

The *Sanctuary* Awards board for 2019 comprised of:

FINANCE AND MILITARY CAPABILITY (FMC)

Julia Powell

Deputy Head
Infra Policy & System

Ray Dickinson

Assistant Head
Policy Environment Compliance

DEFENCE INFRASTRUCTURE ORGANISATION (DIO)

Alan Mayes

Chief of Staff Regional Delivery

Richard Brooks

Principal Environmental Advisor
Environmental Support & Compliance

Mark Hill

Deputy Head
Energy, Utilities & Sustainability

EXTERNAL JUDGE

Martin Baxter

Chief Policy Advisor at the Institute of Environmental Management & Assessment (IEMA)

The judges would also like to thank Commerce Decisions, see page 3 for details.

Sanctuary Awards 2019

The Sanctuary Awards have been recognising outstanding conservation efforts across the Ministry of Defence (MOD) estate since 1991, when the Commandant of Otterburn Training Area donated the 'Silver Otter Trophy'; to be awarded annually to the best Conservation Group led project, or best individual conservation effort, on MOD land.

Over the years the Sanctuary Awards have expanded to recognise the wider sustainability agenda. The Sanctuary Awards 2019 invited entries to five categories; Heritage Project Award, Sustainability Project Award, Individual Achievement Award, Environmental Project Award and the Utilities Project Award. The winners of each category were then considered for two further awards. The coveted Silver Otter trophy is awarded to the Conservation Group, individual, MOD personnel or MOD led project that is deemed most impressive by the judges. The Sustainable Business Award is presented to more commercial projects, that have achieved a particular success in ensuring sustainable solutions that deliver against the commitment to the Armed Forces by enabling them to live, work and train. The Awards are presented by the Defence Minister at MOD Main Building, London.

The standard of entries was high and the Sanctuary Awards Board had a difficult decision in determining the winners! The Sanctuary Team are grateful to Commerce Decisions for the sponsored use of their Award Tool software.

Award Tool

Commerce Decisions is proud to provide continued support to the MOD's Sanctuary Awards, for the third consecutive year. The Awards play an important role in recognising the commitment to sustainability from staff, volunteers, industry partners and contractors across the MOD estate. The annual Sanctuary Awards showcase the achievements of teams and individuals working to preserve and protect the MOD estate, both in the UK and globally. The judging of the Sanctuary Awards is supported by Commerce Decisions' AWARD® evaluation solution which enables all submissions to be assessed in a robust, controlled and objective manner; ensuring absolute integrity. The process involves the entries for each category being assessed in AWARD® by a panel of judges followed by a moderation exercise where a final score is recorded.

A geographically dispersed judging team, tight timescales and a large number of documents to manage means AWARD® ensures an efficient, transparent and auditable judging process. Samantha Bevan-Talbot, MOD Account Director, Commerce Decisions commented *"we are so pleased that AWARD® is being used again for the judging of the Sanctuary Awards, our software brings process, efficiency and environmental savings by supporting a paper free, travel free, online process for judging nominations."*

Supporting sustainability across the MOD

Delivery of AWARD® via a secure hosted service enables multiple stakeholders across the MOD to access their work at a time and a place to suit them. The ability for users to access AWARD® from any workstation with an internet connection has negated the need for regular travel for geographically dispersed MOD teams; resulting in substantial time savings and drastically reducing the cost of travel and subsistence.

AWARD® is proven to support sustainability targets, significantly simplifying the management of large volumes of information on complex projects. A total of over 45 million pages are electronically submitted into AWARD® each year, saving the equivalent of 5,400 trees in printed paper. Commerce Decisions recognises the increasing importance of incorporating sustainability and social value into procurement projects and supports the inclusion of measurable targets such as environmental impact and local economic development in the planning process.

About Commerce Decisions

AWARD® has been deployed by the MOD in the UK since 2001 for preparing and executing tender evaluations. A corporate licence has been in place since 2013 and Commerce Decisions is working with the MOD to ensure that procurement processes are standardised and efficiencies are maximised across the organisation, supporting the MOD to achieve significant savings.

Entries for the 2020 Sanctuary Awards will open in March 2020. For further information please contact the Sanctuary Team via email at DIO-Sanctuary@mod.gov.uk



Marcea Goodman, Application Support and Samantha Bevan-Talbot, MOD Account Director from the Commerce Decisions team supporting the judging of Sanctuary Awards 2019
© Commerce Decisions

HERITAGE PROJECT AWARD WINNER

The **Sandhurst Block Project** at Catterick Garrison was a complex refurbishment scheme to create modern, fit-for-purpose office space for 21st century soldiers in the Grade II listed 1930s accommodation block.

The project team included specialists from the Defence Infrastructure Organisation, the principal support provider WYG, the principal contractor Galliford Try, mechanical and electrical engineering specialists Lorne Stewart, and specialist restoration and joinery contractor, IWP Dansk.

The project requirements varied from installing bat boxes in the eaves to renovating the original iron downpipes and guttering. For this the team used an innovative modern technique, installing a fibreglass lining inside the pipes and hoppers to seal cracks without affecting the external appearance.

Around 750 historic timber sash windows were also refurbished on site using traditional woodworking methods. This results in windows which at first glance look no different to when they were installed, but that now

include modern draught-proofing and meet Ministry of Defence requirements for protection from explosions.

This sensitive approach was characteristic of the methods used on the rest of the building and great care was taken to maintain original features as much as possible while still making sure the new facility would meet modern requirements and be suitable for the needs of today's soldiers.

See article on page 44



Panoramic view of Sandhurst Block, Bldg 11, Bourlon Barracks taken in January 2019 © Galliford Try

HERITAGE PROJECT AWARD RUNNER-UP

Since 2011 **Coquetdale Community Archaeology (CCA)** have worked on the Otterburn Training Area.

CCA's first excavation involved the rediscovery of a medieval fulling mill on the River Coquet, high in the Cheviot hills. Built in the early 13th century by monks from Morpeth, it processed woollen cloth from the sheep on the abbey's upland estates. During the excavations a fine masonry wheel pit was uncovered, probably designed by the stonemasons that built the abbey.

The team then looked for more signs of the monks' local wool industry. A study of earthworks outlining the ruins of a nearby building revealed an agricultural structure dating from the 17th and 18th centuries. However, beneath its cobbled floor lay another of carefully laid medieval

paving – superior to anything normally found in a rural farmhouse.

Most recently, CCA have investigated a site three miles downstream, near Alwinton. Two years of excavation has revealed a sturdy medieval building that incorporated stonework which probably came from a chapel or a church. The team's next challenge is to find out where this ecclesiastical building was located.

CCA have made impressive efforts to publicise the results of their work, having published excavation papers, written books, led guided walks and given dozens of talks to community groups. Their dedication has enhanced local knowledge of the archaeology on the Otterburn Training Area.

See article on page 16



The abandoned farmhouse of Yearning Hall © CCA

SUSTAINABILITY PROJECT AWARD WINNER

Project Anvil is a Ministry of Defence major infrastructure investment project to improve existing facilities at RAF Marham station for the arrival of the F35 Lightning stealth aircraft.

The Galliford Try Lagan Construction Joint Venture was the contractor appointed to deliver Project Anvil's final and main works package on behalf of the Defence Infrastructure Organisation. The works package, with a construction value of £120 million, involved the reconstruction of RAF Marham airfield as well as the design and construction of a new aircraft hangar with associated support structures.

The key sustainability elements of the construction process included the reinstatement of an abandoned freight train station and use of a freight train for the delivery of 241,147 tonnes of aggregates to site. This reduced the distance travelled by lorries by 87%, halving the carbon emissions associated with delivery. The project achieved 100% diversion from landfill of excavated materials with 320,000 tonnes of



GTLC JV works at RAF Marham during construction © Leo Hillier Photography

arising materials processed and re-used on site, in accordance with a CLAIRE Materials Management Plan.

Other sustainability elements included:

- Proactive environmental management across the construction team
- Sustainable procurement plan for materials and timber from 100% sustainable or recycled sources
- Fuel Use and Energy Management Plan, for the asphalt and concrete plants on site
- The use of solar powered lighting columns during construction

- Successful Ecological Management Plan with pre-clearance ecology and tree surveys.

The construction went beyond minimum environmental compliance and achieved an Excellent in the CEEQUAL award scheme, with a score of 84.9% for the Sustainability Performance Rating and a DREAM Excellent for the Hangar and Feeder buildings.

See article on page 18

SUSTAINABILITY PROJECT AWARD RUNNER-UP

The **Burghfield Flood Alleviation Scheme** has been constructed at AWE Burghfield to protect the site from future flooding, thus defending the nuclear licenced site and Continuous At Sea Deterrent (CASD). The Scheme widened the brook along the south and east boundaries of the site and through adjacent Ministry of Defence land for approximately 1.5km, from a single narrow channel to low and high flow channels.

Major challenges included managing high rainfall events, service diversions, asbestos contaminated soils and spatial constraints. A significant win was the reuse of 30,000m³ of spoil within the scheme and 24,500m³ in two externally managed flood alleviation schemes. Stakeholder engagement was key to the success of this multifaceted project.

The primary ecological mitigation work prior to construction involved the surveying and translocation of a medium population of grass snakes, maintaining 3km of reptile fencing, relocating mussels from the stream bed, controlling vehicle movements near nesting lapwings and removing ragwort adjacent to neighbouring land. Post construction improvements include a

more natural river course with riffles and meanders, and the topsoil being stripped from the Upstream Storage Area allowing establishment of a flower rich meadow. The intention is to further develop this site to facilitate wider Biodiversity Net Gain on the AWE estate.

See article on page 72



The work in progress © Crown

INDIVIDUAL ACHIEVEMENT AWARD WINNER

Dickie Bennett. Operation Nightingale is a Ministry of Defence (MOD) initiative established in 2011 that aims to assist the recovery of wounded, injured and sick military personnel and veterans through archaeology. UK and overseas fieldwork has been carried out with hundreds of military personnel having taken part.

Following medical discharge from the Royal Marines, Dickie Bennett founded Breaking Ground Heritage, which provides veterans and logistics support to Operation Nightingale. His personal drive has ensured that this programme has continued to be a huge success. Obtaining both a First Class Honours

and Masters degrees in archaeology on the way, Dickie has mentored large numbers of service personnel on their recovery journeys in archaeology and much of this work has taken place on the MOD estate. Dickie's dedication to the programme and to the mental health requirements of others provides an outstanding example for all.



Dickie Bennett undertaking a demonstration with a veteran and volunteer at the Exercise Magwitch Forensic Workshop, Cranfield Forensics Institute, Defence Academy © Harvey Mills Photography

Dickie is setting standards on utilising heritage as part of efforts to improve wellbeing in society. He has recently been invited to address an All Party Parliamentary Group in The House of Lords on this subject, as well as speaking on national radio. He draws upon his military skills in organising the Operation Nightingale fieldwork assistance and demonstrates impressive people skills in addressing the many challenges faced by participants in their endeavours on the excavations. Without Dickie, quite simply, Operation Nightingale would not succeed and both the MOD heritage estate and the happiness of many new budding archaeologists would be the worse for it!

INDIVIDUAL ACHIEVEMENT AWARD RUNNER-UP

Maj Alan Grant MBE SCOTS is the Training Safety Officer for the British Army Training Support Unit Belize (BATSUB) Ranges in Belize. Maj Grant has been in this role for two years and has put the environment and conservation at the forefront of range control management.

The Training Area covers 13,000 square kilometres consisting of diverse habitats including, mountainous pine covered hillsides, jungle, grasslands and rivers. These areas contain endangered species including scarlet macaw, tapir, jaguar, harpy eagle and puma, to name just a few. When Maj Grant came to Belize he realised how precious this environment was and has worked tirelessly to research novel methods of protecting the flora and fauna whilst facilitating military training.

Maj Grant has devised and organised a multi-agency environmental major incident exercise. This was not mandated by the Belizean Government, but Maj Grant felt it would be an extremely valuable exercise to test the responsiveness of BATSUB, the Department of Environment, Fire Department, Belize National Energy, Belize Coast Guard, National Emergency Management Organization, Police, Ministry of Health and the Belize Defence Force. This exercise involves a fuel tanker crashing on a bridge causing multiple casualties and an oil spill into the river. With so many stakeholders it was a huge organisational task but will improve the environmental response system across the whole of Belize.

Maj Grant works closely with NGOs and landowners to ensure BATSUB are a positive force for environmental protection in Belize and this has been

recognised both by them and the British High Commission.



Maj Grant, at Jurassic Park, one of the environmental clean-up projects on private land © Naomi Ginnever

ENVIRONMENTAL PROJECT AWARD WINNER **SILVER OTTER WINNER**

Bird Trapping Steering Group, Cyprus, including the Sovereign Base Areas (SBAs) is recognised as a hotspot for illegal bird trapping in the Mediterranean. Consumer demand drives the use of non-selective trapping methods, resulting in the indiscriminate killing of millions of migratory birds. In 2016, it was estimated that 800,000 birds were killed during the autumn season in the SBAs using mist nets.

The UK Government and the SBA Administration had come under significant political and media criticism in their dealing with the problem. Under the direction of Commander British Forces, the 'Bird Trapping Steering Group' was established to combat the problem. Chaired by the SBA Police and working alongside military colleagues and other internal and external stakeholders, including, the RSPB,

BirdLife Cyprus, Committee Against Bird Slaughter and local communities, anti-poaching strategies and action plans have been developed.

Set against the 2016 figures, considerable effort has been made to combat poaching activities, including increased enforcement and improved cooperation with stakeholders. During the previous two seasons, 21 individuals were successfully prosecuted; some receiving fines as high as €6,600 and seven receiving jail sentences, suspended for three years.

BirdLife Cyprus' latest report on autumn trapping shows a positive and continuing decrease in bird trapping levels in Cyprus. Their trend analysis programme has been in place for almost two decades. The analysis of the field data for autumn 2018 has shown a 90% decrease in trapping levels with mist nets within the survey area compared to 2002.

See article on page 12



SBA-Police using drone technology to combat illegal bird trapping © Davy Reynolds

ENVIRONMENTAL PROJECT AWARD RUNNER-UP

Salisbury Plain Stone Curlew Conservation Partnership. The stone curlew *Burhinus Oedicnemus* is one of the UK's rarest breeding birds, with less than 400 pairs. The Ministry of Defence (MOD) sites support over 40% of the Wessex population, which is one of two remaining strongholds for this species. The Salisbury Plain Stone Curlew Conservation Partnership is a group of organisations that work together to further the conservation of the species across Salisbury Plain Training Area (SPTA) and Porton Down, Wiltshire. The RSPB, MOD, Defence Science and Technology Laboratory (Dstl), farmers, Natural England and Wiltshire Council all contribute to the partnership.

The RSPB Wessex Stone Curlew Project is at the heart of the partnership. It was established in

the mid-1980s and the RSPB field team and its volunteers collect essential data about breeding outcomes. The Dstl Estates team at Porton Down undertake intensive monitoring and management of nests and cultivated plots at that site. The Defence Infrastructure Organisation (DIO) Ecology team funds and delivers plot management across the SPTA and controls the impact of military exercise on the birds during the breeding season. Landmarc Support Services are DIO's main contractor and they deliver the plot management on the ground.

The number of breeding pairs recorded on MOD sites has remained largely stable with some fluctuations due to severe weather. In 2017 the SPTA population recorded its highest productivity (over 0.9 fledged chicks per nesting attempt) for many years. Productivity at Porton Down has historically been lower but it has

increased in recent years. This project shows the combined efforts of the partnership to optimise plot management, protect nests, eggs and chicks and share good practice, is paying dividends. The commitment of all members is making a difference.

See [Sanctuary No. 44, 2015 page 54](#)



Fledged stone curlew youngster © Ian Grier

UTILITIES ACHIEVEMENT AWARD WINNER

The **Fuel Efficiencies and Emissions Reduction Project**, based at Air Mobility Force (AMF) Headquarters, RAF Brize Norton, is at the vanguard of delivering efficiencies in a military environment, adopting Airline Industry Best Practice and tailoring initiatives to the AMF. The project was developed under Programme Gateway, in delivery by the AMF Transformation Programme and is led by Air Commodore Stamp, under Air Officer Commanding 2 Group.

The project seeks to embed sustainable behavioural change to reduce fuel usage and carbon emissions by 2 Group aircraft. Significant saving opportunities have been identified across mission planning, policy, in-flight fuel management, engineering, logistics, and contractual arrangements with a focus on reducing the delta between the funded position, planned and actual usage. The project looks at the way 2 Group fly, how they are tasked, how their aircraft perform, how much fuel they carry, what they pay for fuel, how they are contracted and invoiced, and how they reduce their



2 Gp Air Mobility Fuel Efficiencies Team at RAF Brize Norton © Crown

carbon footprint. Implementing over 60 efficiency initiatives on four aircraft types, with varying mindsets, support solutions and data acquisition capabilities is no mean feat. Industry advise that no other Air Force has delivered such benefit with such rapidity. Initiatives have realised £24.4 million in benefit since 2015.

The project was a collaborative success. The team, comprised of regular,

reservist and civilian data analysts, are hugely supported by RAF Brize Norton personnel, 2 Group's Tasking Authority, Fuel Finance and wider Defence and Industry fuel-related organisations. Such is the project's success that crews now regularly challenge and drive end-to-end Mission efficiencies.

See article on page 71

Conservation Stewardship Fund

The Conservation Stewardship Fund (CSF) is an internal Ministry of Defence (MOD) budget aimed at improving and promoting nature conservation, archaeology, heritage or public access across the MOD estate. It is administered by the Defence Infrastructure Organisation (DIO) Environmental Support and Compliance Team (ES&C). CSF funding is available to any part of the MOD estate but in the last five years the majority of the budget has been spent on the Training Estate, which includes the vast majority of MODs rural estate, but work has also been carried out at RAF, Navy, RFCA, Qinetiq and Dstl sites.

There are two main components to the Conservation Stewardship Fund programme. The first is the MODs Sites of Special Scientific Interest (SSSI) Condition Improvement Programme. The second is a wider conservation stewardship programme of work that delivers natural environment (non-SSSI), heritage, landscape and public access related projects.

SSSI improvement works are managed and delivered by DIO's team of Ecologists in consultation with MOD contractors and external partners to ensure funding is targeted to achieve maximum benefit. In 2018-19 £1.1m was invested in MODs 85,000ha of SSSIs and spending in 2019-20 is likely to exceed this with management taking place across more than 60 SSSIs throughout the UK.

Funding for the wider conservation stewardship programme is allocated on an annual basis through an application process led by the different functional heads in the DIO ES&C team. Priority is given to projects that fulfil MODs statutory and policy obligations and ensure MOD maintains an excellent reputation for responsible stewardship and sustainable land use. Some projects deliver added value through engagement with other government departments, statutory bodies, MOD Conservation Groups and Non-governmental Organisations. They include contributions to third party organisations delivering improvements on the MOD estate through good partnership working. In 2018-19 almost £1.2m was allocated to the Conservation Stewardship Fund programme of work and the same will be spent in 2018-19 with more than £350,000 invested in overseas projects.

Richard Osgood wins Archaeologist of the Year 2019



Richard conducting research for Digging Band of Brothers © Harvey Mills Photography

Richard Osgood, Senior Archaeologist for the Defence Infrastructure Organisation (DIO) has been recognised in the prestigious 'Current Archaeology Awards 2019'. Richard was awarded top honours as the winner of 'Archaeologist of the Year 2019' for his work with Operation Nightingale. In 2011, Richard co-founded Operation Nightingale – an initiative that uses archaeological fieldwork to aid the recovery of Wounded, Injured and Sick (WIS) serving military personnel and veterans – and since then the project has gone from strength to strength.

Richard continues to be the driving force behind Operation Nightingale, with the help of professional archaeology companies, support groups, and charities such as the Defence Archaeology Group, Breaking Ground Heritage and Help for Heroes. The programme assists the curation and care of heritage on the Ministry of Defence (MOD) estate and provides recovery opportunities for service personnel and veterans, all at minimal cost to Defence.

The award was presented by the archaeologist, author and broadcaster Julian Richards, who said "Richard is an experienced and highly professional archaeologist who uses his considerable communication skills to motivate

and inspire, bringing the past to life and engaging both individuals and communities. It has been my privilege to work with Richard both in the field and on TV. It gave me genuine pleasure to present him with his well-deserved 'Archaeologist of the Year Award.'"

Since 2004, Richard has worked within the archaeology team of DIO, responsible for managing and preserving monuments and archaeological sites across the MOD estate – including over 770 scheduled monuments and parts of 10 World Heritage Sites. The Operation Nightingale programme enables WIS participants, local community and conservation groups, educational establishments, and military volunteers to work alongside professional archaeologists across the MOD estate. The work has been recognised nationally and receives much media attention. Richard is frequently featured in the pages of 'Current Archaeology' and 'British Archaeology' magazines as well as regularly appearing on screen, on programmes such as 'Digging for Britain,' 'Meet the Ancestors' and 'Time Team' where he continues to demonstrate his passion and commitment to the Operation Nightingale programme and its successes. Sanctuary magazine has regularly featured Operation Nightingale projects since 2011.

Richard has developed a fabulous opportunity to share cultural heritage opportunities with WIS participants, local volunteers and the military, both as part of his Civil Service role and by volunteering during his own time. Chris Bayne, CEO of Wessex Archaeology commented that "Richard is instrumental to the success of Operation Nightingale. With no public funding, the sustainability and legacy of this programme is largely down to Richard's selfless commitment and infectious enthusiasm. His efforts have brought together many communities and organisations to meet common social purposes. He is a great ambassador for the vital work of the DIO."

Operation Nightingale's appeal to military personnel is undoubted – over 200 people have participated to date. Participants are completing their archaeology 'skills passports' and are reporting an upturn in well-being assessments. It is also important to emphasise the good work that Operation Nightingale does for heritage alongside the recovery benefits – it was awarded a 'Heritage Angel Award' from Historic England in 2016 for 'Best Rescue Project'. The programme has also reduced wider Government's Heritage at Risk through appropriate intervention.

Richard has considerably enhanced the MOD's reputation. As Richard's line manager I am hugely proud of what Richard, his team and supporters have achieved, and I am pleased that the 'Current Archaeology Awards' have recognised Richard's efforts. It is a credit to Richard's hard work, DIO and the MOD that his achievements in the delivery of Operation Nightingale projects and the involvement of both serving and veteran WIS personnel have been recognised with this award.

Richard Brooks
Principal Environmental Advisor
Environmental Support & Compliance

Overpaid, oversexed and over here – digging Band of Brothers



How the Easy Company Sergeants Nissen Hut would have looked © Harvey Mills Photography

Thanks to many publications and even a television series, perhaps the most famous Allied military unit involved on D-Day was Easy Company of the 506th Parachute Infantry Regiment, 101st Airborne, US Army. These were the so-called 'Band of Brothers.' The group parachuted into Normandy in the early hours of the 6th June 1944 with the objective to secure locations and destroy enemy positions that might hinder the landings, particularly at Utah beach. The group's exploits became legendary, fighting through Normandy, the low countries and the Battles of Arnhem and Bastogne (part of the 'Bulge') before finally ending at Hitler's 'Eagle's Nest' at Berchtesgaden, Germany. What is less well known is the presence of these paratroopers, the 'Screaming Eagles,' in Wiltshire before and after the D-Day landings in Europe.

As was the case in World War One (WW1), troops from around the globe were based in Wiltshire thanks to the presence of the Salisbury Plain Training Area. The American soldiers did much of their final preparation for the campaign on the Ministry of Defence (MOD) estate. One can still see their traces, from tree carvings left behind by GIs, through to fired rifle cases of American manufacture and the occasional find

of sun cream tins and other bottles. The 101st Airborne exercised in close proximity to the training feature that is called 'Beaches Barn' on the east of the Plain and their soldiers refer to marching to and from these Training Areas from their camp. It was this camp location, in the idyllic Wiltshire village of Aldbourne, that formed one of the recent excavations for Operation Nightingale.

This MOD programme, using archaeology to assist with the recovery of military personnel, has enjoyed great success in excavating old military sites in the past. These sites hold a resonance with the participants; an expression of

kinship and of shared experience and knowledge. From 1943, Easy Company were based in several locations in the village – around the village green and church (a location so picturesque that one of the unit, David Webster, "thought I'd passed out on a Hollywood movie set") through to the Quonset huts corralled around the village football pitch. The aim for the team of veterans and archaeologists was a specific hut in the latter area. In particular the hut used by the Sergeants of the Band of Brothers, who were some of the most celebrated and decorated individuals of D-Day. Unlike some traditional archaeological excavations, there was even a photograph of some of these soldiers fronted by Sgt Carwood Lipton standing on parade outside the building that the team were looking for.

The project started with a visit to the Historic Environment Record in Chippenham and an examination of air photography with Historic England in Swindon. Geophysical survey was conducted to see if elements of the Sergeants' hut still survived below the sports field, as no surface undulations were visible. The results were astonishing, with not only elements of the football ground and its lighting visible but the footings of a number of the old haunts of Easy Company. The team were thus in the perfect position to start a week of excavation.



Sgt C. Carwood Lipton (2nd from right) with his 3rd Platoon outside the Easy Company Sergeants Barracks Hut at the Aldbourne Camp. This is the hut that the team were searching for © The Lipton family, via Neil Stevens

Surprisingly, given that much of the site had been demolished shortly after the war, a great deal still remained. The footings of this 'Quonset' hut soon became apparent. These were square pads of concrete with iron reinforcement, over which the curved sheets of corrugated iron which formed the hut superstructure sat. Bitumen sheets of the damp-proofing course adhered to the pads and some bricks were also still in situ. This enabled the team to discern the method of construction and also the final shape of the building, even though no evidence could be seen for the stove that would once have been in the middle of the hut. The finds team were also kept extremely busy by a most eclectic collection of discoveries, including the toy marbles and cooking pots of those 'squatters' that had used the huts after the war. There were even pre-decimalisation plastic crisp packets that gave a timely environmental message to the schoolchildren that visited the site with their teachers.

Of most interest however were the artefacts that linked to the presence of the young Americans in the village. The team found small traces of their lives, from food (Pepsi Cola bottles and Spam tin keys) through to their happy participation in local 'hearts and minds' campaigns – a perfectly preserved Brylcreem bottle and even a stocking! Coins of a wartime denomination (and with dates that fitted the American presence) were also recovered, with the most intriguing being a 'thrupenny bit' with a bullet hole right through the middle. The diameter of the hole was a perfect fit for an American Garand round.

The site was extremely poignant as it was being excavated in the lead-in to the commemorations of the 75th anniversary of D-Day. The team were acutely aware that this was the last oasis of calm for many of the men of Easy Company prior to the maelstrom of the liberation of Western Europe. Many of these servicemen would never again reach the shores of America. The excavation began with a flypast of a C-47 Dakota/Skytrain aircraft, of a type from which the soldiers would have parachuted on D-Day.

Soon the team were finding American ammunition and rifle clips within



The dig team watch a C47 Dakota fly over the site on the first day of digging © Harvey Mills Photography

the hut. The most astonishing finds however linked to the specific role of these men, including part of a parachute, now brown due to its age and presence in the mud, but once white. It was probably part of a reserve parachute. One of the veterans also recovered a T-shaped object which really was perfect; it was the handle for a reserve parachute. Why was it in the hut? Theories were plentiful but one of the most elegant, provided by a current paratrooper, was that it represented a souvenir of a first jump into a combat zone. Whatever the truth of the matter, the find was one that really could not have been bettered. The team had thus found the hut, traces of the lives of villagers, Americans and paratroopers; a perfect result.

There is still a plethora of other traces of these soldiers around the village and in the neighbouring fields, with

foxholes, ammunition and tree carvings providing little glimpses into those pivotal days of 1943-1944. These troops were just some of the many located across the villages and Training Areas of Britain and yet a small excavation carried out in a bucolic Wiltshire village served as a reminder that archaeology need not relate to the ancient, simply to good stories and to people. One of the military participants on the dig wore a 'Help for Heroes' sweatshirt emblazoned with the phrase 'Band of Brothers.' This identity has been handed down through generations. The Operation Nightingale veterans are certainly a modern day 'Band of Brothers', one that deals with Cultural Heritage, be it on the MOD estate or further afield, and be it ancient or modern.

Richard Osgood
Senior Archaeologist
Defence Infrastructure Organisation



The reserve parachute rip cord handle (left) and keys from Spam tins (right) © Harvey Mills Photography

The Sovereign Base Areas' fight to eradicate illegal bird trapping



Indiscriminate and illegal capture of birds using mist nets © SBA Police (camera)

The British Eastern Sovereign Base Area (ESBA) of Cyprus has long been a location of environmental significance and for the past 10 years, authorities have been battling to overcome one of the island's most controversial traditions – bird trapping. The illegal trapping of migrating birds, including blackcaps *Ambelopoulosia*, sees birds lured into mist nets and onto lime-sticks by trappers using imitating devices, before they are barbarically killed and either sold for profit by organised groups, or consumed by individuals.

The problem of bird trapping is an island-wide issue, with 10 areas known to be rife with the activity. Unfortunately for the Bases authorities, two of those 'hot-spot' areas happen to fall within the ESBA – Cape Pyla, which is used as a Training Area for forces personnel and Ayios Nikolaos.

In 2014, the Honourable Chairman of the Royal Society for the Protection of Birds (RSPB), His Royal Highness (HRH) The Prince of Wales, wrote a letter raising concerns that the Bases authorities were not doing enough to tackle the problem of illegal trapping. HRH's letter was linked to claims that close to one

million birds were being captured and killed annually. In 2016, a report released by BirdLife Cyprus estimated that 800,000 migrating birds were killed during the autumn season. Following the public and political outcry in the UK, Bases authorities took decisive action and set about eradicating the problem within the SBAs. This is an extremely challenging task as the hunters believe that the traditional method of using lime-sticks to trap birds is part of their cultural heritage – indeed it is not so long ago that the use of lime-sticks was legal in Cyprus. The cultural perception in Cyprus remains that 'Ambelopoulosia' is the meat provided by God. This should not be disguised by the fact that the primary motivation for the trappers has nothing to do with 'culture' or 'tradition' and everything to do with financial gain!

Superintendent Andreas Pitsillides, from the Sovereign Base Area Police's Dhekelia Division, has been working on the bird trapping problem for many years and described the action Bases authorities took to combat the problem. "With the start of the 2016-2017 migration season, Commander British Forces Cyprus, Maj Gen James Illingworth, the SBA Administration and the SBA

Police Chief Constable, Chris Eyre, made bird trapping one of their priorities and developed the appropriate strategies to effectively tackle the problem."

One of those strategies was to form what has become known as the Community Action Team (CAT), which is effectively a dedicated group of officers working around-the-clock to capture the perpetrators of the illegal activity. Superintendent Pitsillides continued "working alongside the newly-formed CAT team, led by our high-integrity officers, we undertook what seemed to be in the eyes of the public, partners and colleagues, an impossible task to achieve. Our strategy was to prevent bird trapping in our areas, pursue bird trappers and protect the environment and with that strategy in place, a robust approach was adopted by the team to enforce a zero-tolerance attitude towards offenders."

Bases authorities were quick to realise that this monumental task could not be achieved alone and a partnership approach was quickly identified as the way forward. Fortunately, support was forthcoming and CAT are now able to work closely with members of the British Military, the SBA Administration, the Defence Lands Estates, Defence Infrastructure Organisation (DIO) and environmental Non-governmental Organisations including; BirdLife Cyprus, RSPB and the Committee Against Bird Slaughter (CABS).

Their support meant that in the past two years, the SBA Police have been able to introduce a wide-range of technological upgrades and improve the efficiency of patrols. This, coupled with the removal of 80km of illegal irrigation pipes which are used to water acacia plants, an invasive species which provides ideal camouflage for mist nets, has been the reason for the success according to Superintendent Pitsillides. "Many incremental and new radical changes have been introduced which have improved the efficiency of the policing team and our partners by working closely to achieve the strategic objectives."

The new methods introduced have included; enhanced communication with community leaders, embarking on a long-term programme of cultural change, education in schools promoting the protection of wildlife and biodiversity and the distribution of leaflets highlighting the strategic intentions to effectively tackle the problem to the hunting associations and the wider-community. Other highlights included a most-wanted 'Hot Net' list of offenders, DIO revoking the leases of known trappers on Ministry of Defence and Crown land, exclusion orders, heavier sanctions to EU farming subsidies for convicted trappers and the increase of sentencing thresholds to include much heavier financial penalties and prison sentences.



CAT and military personnel preparing for a campaign © SBA Police

However, some of the most effective methods employed, according to Superintendent Pitsillides, have come through a technological evolution. *"In 2017, we began using Police drones deployed to capture evidence of trappers which led to more intelligence-led, targeted operations, that could be effective from 2km away and up to 1km in the air. The RSPB also supported us with the use of covert surveillance cameras deployed in trapping areas and now DIO have been able to provide funding for the Police to buy their own."* The implementation of these methods quickly proved a success and the amount of bird trapping taking place within the SBAs began falling sharply, with Police intelligence confirming that trappers felt they were no longer safe.

In 2018, Defence Minister, Mark Lancaster, visited the ESBA and said *"today we are here to mark a success story."* The success the Minister alluded to has been a culmination of three years tireless work and it is now reported that there has been a 75% decrease in the bird trapping cases and an 85% drop in mist net seizures between 2016-2019, clearly demonstrating the effectiveness of targeted operations by officers and the new methods employed.

The obvious success however has not been easy and for many of the officers deployed on CAT, it has made them a target for organised crime and individuals whom stand to lose thousands of Euros as a result of the

work. *"Police CAT officers, on numerous occasions, have received threats against their lives and their loved ones. However, not even that was able to deter them from the operations against the organised bird trappers. The integrity, motivation and courage exhibited by the CAT officers, supported by their leadership, was enough to prevent, intercept and minimise, the illegal activities of the bird trappers and achieve these outstanding results"* said the Superintendent.

The latest report from BirdLife Cyprus released this year has confirmed that there remains a continued decrease in bird trapping levels in Cyprus. The analysis of the field data for autumn 2018 has shown a 90% decrease in trapping levels with mist nets within the survey area when compared to 2002.

But despite the widespread acclaim for the Police and the wider-Command within the SBAs and the various other partners involved, Superintendent Pitsillides said there would still be no let-up. *"We are committed to continue with the same zeal and enthusiasm on a partnership approach in the years to come until we eradicate the problem of bird trapping within the SBAs once and for all."*

Davy Reynolds
DIO Overseas, Environmental Advisor
Defence Infrastructure Organisation

Kristian Gray
Media Advisor/News Editor
Media Operations HQ BFC



A policeman surveys irrigation pipes and other paraphernalia used by the trappers, confiscated during a joint Military - CAT operation © SBA-P

Gems in the Dunes at Altcar



A rejuvenated natterjack toad breeding pool © John Houston

The sand dunes of the Sefton Coast are a biodiversity hot spot and home to some of the UK's rarest flora and fauna. The 20km of dunes stretching unbroken from Southport in the north to Crosby in the south makes up over 20% of England's sand dunes and holds 40% of all dune slacks (flooded hollows in the dunes) in the country.

The Gems in the Dunes project began in 2017, its aim being to work with the different landowners along the Sefton Coast to conserve the habitat of nationally protected species. These included the natterjack toad, sand lizard and northern dune tiger beetle as well as three species of bryophyte; petalwort, sea bryum and matted bryum. This Amphibian and Reptile Conservation (ARC) led project is one of 19 that make up the national Back from the Brink programme (funded by the National Lottery Heritage Fund) whose ambitions are to save 20 species from the brink of extinction and to benefit more than 200 others.

The Reserve Forces and Cadets' Association for the north-west of England and the Isle of Man (NW RFCA) owns and manages the sand dunes of Altcar Training Camp. The camp lies at the mouth of the River Alt, and forms part of the Sefton Coast Special Area of Conservation (SAC)

and Site of Special Scientific Interest (SSSI). Altcar covers over 4.45km² including over 2km² of beach and dune habitat and is an incredibly important area for some of the UK's rarest wildlife.

One of the greatest threats to the richness of species found in the dunes is the loss of open and bare sand habitat. Since 1941, 81% of the total area of bare sand has been lost on the whole coast and this can be attributed to less grazing, the spread of non-native plants and a general lack of disturbance to the dunes. Grazing animals, such as large populations of rabbits, were historically responsible for keeping the dunes in good condition. However, the outbreak of Myxomatosis in the 1950s wiped out up to 90% of the rabbit population and so taller vegetation slowly began to colonise areas of the dunes.

Another major problem is the threat of invasive plant species, especially Japanese rose *Rosa rugosa* and sea buckthorn *Hippophae rhamnoides* taking over large areas of sand dune and dune slack. Whilst sea buckthorn was introduced in the 19th century to protect pine plantations, Japanese rose is a more recent arrival, and is most likely to have come from garden escapes. Japanese rose is now recognised as a

growing threat to dunes in north-west Europe. Both species are highly invasive. Their seeds are spread by birds and other animals (Japanese rose can arrive from sea-borne fragments) and both spread by suckering. Japanese rose can spread at a rate of over 20% a year.

The growing dune system at Altcar supports an important population of northern dune tiger beetles that are close to the southernmost extent of their range. Found at only two sites in the UK, this beetle is dependent on areas of open and bare sand to bask, hunt and lay their eggs. In recent years, fewer beetles were being recorded on the site and this was because the newly formed dunes had gradually become more fixed over time and the areas of bare sand shrank. As the dunes became more fixed and vegetated, it likely had an equally negative impact



A northern dune tiger beetle basking on the sand © Fiona Sunners

on sand lizards in the area that depend on similar habitat characteristics as the beetle. The decrease in areas of bare sand was coupled with growing stands of Japanese rose. Gems in the Dunes planned to remove Japanese rose from a 400m stretch of sand dune at the north-western edge of the site which would create areas of bare sand. Extra sand patch creation would also take place on southerly facing dune slopes.

Japanese rose is a very difficult plant to eradicate. Plants can regrow from small segments of root left behind after digging and seeds can lie dormant for some time too. Stands of rose were mechanically excavated to a depth of around 1-1.5m to remove all the roots and a further 1m of sand was dug out to create a hole for the rose to be buried in. The fresh sand was then used to fill in the remainder of the holes. It is expected that some regrowth may occur and these will be either hand-dug or treated with herbicide.

Over 1,100m² of Japanese rose was removed and, added to the additional sand patches created, it resulted in an area of over 3,300m² of bare sand. In total, bare sand now covered approximately 20% of the work area, in line with what is recommended for a good quality dune habitat.

A number of natterjack toad pools were created in 2011 as part of the Million Ponds Project, which were used for a number of years by natterjack toads as breeding pools. Natterjack toads prefer shallow, open pools of water that get very warm in the summer months to aid the tadpoles' development into toads. As natural succession takes place, the pools become more vegetated and slowly fill in. This is not only unfavourable for the natterjacks but it also makes the pools more attractive to common amphibians that can outcompete and



A female natterjack toad © Andrew Hampson

predate on the natterjack spawn and tadpoles. To remedy this, five pools were rejuvenated over the winter months so that any aquatic life was not disturbed. An excavator scraped off the surface vegetation from within and around the edges of the pools and replaced it with fresh sand. As well as this, vegetation was scraped from areas of surrounding dune slopes to provide bare sand for the natterjacks to burrow into.

Following the work, volunteers have been taking to the dunes of Altcar to survey for the key species and, within months, northern dune tiger beetles were found to have colonised the newly created areas of bare sand. Several night-time surveys and regular monitoring of the pools has shown that the natterjacks have been using the rejuvenated pools and toadlets have been spotted emerging from a few of them. In May 2019, sand lizards were recorded in two locations along the dunes almost 1km apart. The newly created areas of sand will improve connectivity and provide areas for egg-laying.

Following on from the work of Gems in the Dunes, the Ministry of Defence

(MOD) has funded additional work from the Conservation Stewardship Fund, tied into the original scope of the project. This includes a programme to eradicate Japanese rose from the remaining stretch of sand dunes and create bare sand, clearing stands of sea buckthorn and simultaneously creating a new dune slack.

John Houston, of the MOD Conservation Group adds that *"the Gems in the Dunes project has been a real catalyst for NW RFCA and the Defence Infrastructure Organisation to draw up a programme of action to continue the work across the site. We are very grateful for the help from the project team and for the work of the volunteers in surveying, mapping and practical conservation tasks. We are seeing real improvements in the quality of the dune habitat."*

The Gems in the Dune team would like to thank the Altcar Commandant Lt Col Gordon Black for his support.

Andrew Hampson
Project Officer
Gems in the Dunes – Back from the Brink
Amphibian & Reptile Conservation Trust



Japanese rose being mechanically excavated before burial © John Houston

Archaeology through the ages at Otterburn



CCA volunteers working at the site of the Medieval floor © CCA

In 1910, so the story goes, the young Home Secretary, Winston Churchill, joined a shooting party organised by Lord Redesdale, whose estate covered thousands of acres in north Northumberland. Perhaps unlucky with the birds, Churchill concluded that his host's moorland would be better suited to a different sort of gunfire. Although he had no responsibility for defence, the War Office listened to him and started buying farms and land the very next year, establishing the Redesdale Ranges. In hindsight, Churchill's recommendation may not have been entirely disinterested. These purchases helped Redesdale, who at times was short of money and who was rumoured to have been the biological father of Clementine Hozier, Churchill's wife.

As military requirements developed, so the ranges grew. Covering some 58,000 acres and a substantial part of the Northumberland National Park, the Otterburn Training Area (OTA), as it is now known, contains the largest Artillery impact area in the UK. Although a keen student of history, Churchill may not have realised that he was not the first to instigate military activity in the area.

Over 1,800 years earlier, the Roman General Agricola, the Governor of Britain,

moved his legions north to annexe Caledonia and make it part of the Empire. The still-embryonic road system would have meant the troops would have used existing prehistoric tracks, one of which crossed the present ranges before climbing through the Cheviots and dropping down into Scotland. 'Dere Street' is perhaps the best known of the ancient routes through the hills that have been studied and researched by Coquetdale Community Archaeology (CCA). Called the 'Border Roads', others include tracks such as 'The Street' and 'Clennell Street', whose origins are lost in the depths of time.

With the support of OTA's Commanding Officers, Lt Col Niall MacGregor-Smith and Maj Frank O'Kane, as well as the Defence Infrastructure Organisation (DIO) archaeologist, Phil Abramson, CCA's fieldwork projects around the 'Border Roads' started in 2011. Working from records found in archives, volunteers walked the banks of an upland river, the Coquet, and located the remains of a long-lost fulling mill near 'The Street.' Built by monks in the 13th century, it processed wool from herds of sheep on an estate that was owned by Newminster Abbey, a Cistercian foundation based some 30 miles away in Morpeth.



The Medieval floor (in the foreground) under the 17th century building © CCA

Four seasons of excavation revealed the remains of the best-preserved medieval wheel pit in the country. Curved grooves on its sides showed that the mill wheel it held had been about 11 feet in diameter, and the design of the masonry blocks at the pit's entry revealed that the water powered the wheel with a technique hitherto thought to date from as much as three hundred years later.

Investigations on the bank exposed a crudely paved area surrounded by low walls, some medieval coins and pottery and two drains that may have fed water to the fulling tanks. Here newly-woven, wet cloth was pounded by hammers driven by the wheel, thereby removing grease and enabling the cloth to be dyed and tailored.

Concluding work at the mill, the group switched focus to a set of earthworks half a mile away in a small hidden valley. These outlined a rectangular building measuring about 60'x30'. On initial excavation it appeared to have been an agricultural building, probably used for managing sheep. Large numbers of smoking pipes dated activity there to the 17th and 18th centuries. Further investigations however, revealed that under this building was an earlier, medieval one. With a carefully-laid, paved stone floor, the building's function is still unclear, but the quality of the floor suggests it was commissioned by the monks responsible for the mill and so may have been connected with their wool business.

Most recently, excavations have started on a structure that forms part of a deserted settlement on the banks of the Coquet four miles downstream from the mill. Probably a farmhouse, it may have medieval origins, but seems to have gone through several construction phases before being abandoned in the early 17th century. Of real interest is a substantial stone block found lying just outside the ruins. Chamfered and with some decorative tooling, it has been identified as probably ecclesiastical in origin and from the late 12th century. Medieval documents describe a now lost chapel somewhere in the area, and research has found that the settlement where CCA is working was used in the 19th century as a source of hewn stone. A geophysics



The mill's wheel pit on the River Coquet © CCA

survey of the site is being planned to see if the original ruin can be located.

Although excavation is often the most visible aspect of an archaeological project, it is not the only one. CCA volunteers have walked the 'Border Roads' in the OTA extensively, surveying, photographing and recording the many archaeological sites along them. Little modern development means the relics of thousands of years of activity in the hills are clearly visible. This ranges from prehistoric camps and enclosures, through medieval field systems to illegal 19th century whisky stills and abandoned farms. As 'Dere Street' crosses the Otterburn Ranges for example, it passes a ruined Neolithic cairn over 100 yards long that may have been used for burials, and practice trenches built by troops five thousand years later during World War One. Along the way there are Roman forts and marching camps used by legions travelling north to Caledonia or returning south.

Non-military uses of the 'Border Roads' are equally interesting. For three hundred years before the Crowns were unified in 1603, these were the routes used by raiders, known as the 'reivers', as they crossed and re-crossed the border, stealing cattle, burning farms and destroying settlements. Later, the tracks were used for the commercial cattle trade, as Scottish drovers brought their stock south to satisfy the demand for meat in burgeoning English cities. Meanwhile, smugglers of goods such as whisky and salt moved secretly along

them, exploiting tax differences on either side of the border.

CCA's work was supported by grants from the Heritage Lottery Fund, English Heritage and the National Park, together with extensive help in kind from the OTA. In turn, CCA members have focused on spreading the word about their findings, giving dozens of talks to local interest groups around the north-east and in Scotland. Working with local schools, they have run classroom sessions on archaeology and taken pupils, parents and teachers out on field trips and visits to excavations. They have led guided walks and, last but not least, published two books.

'The Old Tracks through the Cheviots' blends archaeology with history, painting a picture of how the hills have been used over the centuries and recording the traces people have left on the landscape. 'Walking the Old Tracks of the Cheviots' has been designed as a portable guide to specific walks that visit key upland archaeological sites. Both books act as a legacy and a permanent record of work that in 2018 won an award from National Parks UK.

Over the years the project has involved nearly 100 volunteers, reached thousands of people and significantly advanced the overall knowledge of archaeology in both the Cheviots and the OTA.

David Jones
Chair
Coquetdale Community Archaeology

Freight trains and the circular economy



The completed runway 06-24 RAF Marham © Leo Hillier Photography

Project Anvil is a major infrastructure investment project to improve existing facilities at RAF Marham station for the arrival of the F35 Lightning, an advanced 5th generation aircraft. The improvements made will help meet the operating, technical, communications and security requirements of the new aircraft.

Project Anvil's final work package, completed in June 2019, involved the reconstruction of RAF Marham airfield as well as the design and construction of a new aircraft hangar with associated support buildings and structures.

The project, delivered by Galliford Try Lagan Construction Joint Venture (GTLG JV) on behalf of the Defence Infrastructure Organisation (DIO), was faced with a challenge in the haulage of materials to site, as it required the delivery of 241,147 tonnes of aggregates to RAF Marham, a rural area of Norfolk, for the on-site production of concrete. This would have required the haulage of aggregates from Dove Holes quarry in Derbyshire, a distance of more than 230km, using an estimated 8,612 return lorry (HGV) journeys.

In response to the challenge, the project enabled the reinstatement of an abandoned rail freight station, which had been disused for a number of years. Based on a privately funded initiative, the appointed haulage company has reinstated rail sidings at Brandon station.

The reinstatement enables freight trains to transport aggregates directly from Dove Holes quarry to Brandon, thereby re-connecting CEMEX Dove Holes quarry with Suffolk.

Brandon is located 30km from RAF Marham, subsequently reducing the total distance travelled by lorries by 87%. This has greatly reduced the road freight, reduced environmental impacts associated with traffic impacts, reduced congestion and fuel use and demonstrated that economic drivers can stimulate more environmentally sustainable construction initiatives. In addition, a carbon calculation carried out for the project identified that the carbon emissions (in terms of greenhouse gas as carbon dioxide) were halved through use of combined freight trains and HGVs, in place of HGVs alone.

The project also achieved 100% diversion from landfill of excavated materials with 320,000 tonnes of arisings re-used on site. Excavated materials were crushed or processed as required on site to produce engineering materials in accordance with the design specification. A small percentage of excess asphalt was re-used for other construction projects. The reuse of materials has provided environmental benefits in terms of avoiding use of virgin aggregates and the additional transport this requires.

HGVs delivering aggregate from Brandon freight station to the site also collected

excess asphalt arisings from the runway refurbishment, returning them to the Brandon freight station materials sorting facility for re-use on other construction projects. This provided the additional environmental benefits of reducing empty HGV journeys, the diversion of material from landfill as well as reducing the amount of raw materials used in other construction projects.

The reuse of excavated materials and the use of freight trains undoubtedly contributed to the achievement of an 'Excellent' score in the CEEQUAL Whole Team Award. The Project has achieved an 'Excellent' in the Sustainability Performance Assessment with a score of 84.9%. Proactive environmental management of the site team and close collaboration with the RAF Marham Station Environmental Safety Advisor and the DIO Regional Head Forester throughout construction also contributed to this score, in particular in relation to ecology and arboriculture.

The processing of excavated materials and reuse as engineering materials created a closed loop in the construction and a successful example of a circular economy. Each freight train removes 55 HGVs from the roads and the use of Brandon freight station will continue, thereby providing additional benefits in the future.

Eleni Antoniadou Snell
Project Environmental Lead
GTLG JV

RAF Valley – Isle of Anglesey Coastal Path



Gp Cpt Chris Moon enjoying his first beach clean at RAF Valley with Flt Lt Joanna Murray © Crown

The Isle of Anglesey Coastal Path forms part of the All-Wales Coast Path, a 870 mile route extending from Chepstow to Chester, which was officially opened on 5th May 2012.

The Isle of Anglesey Coastal Path is maintained by the Isle of Anglesey County Council, supported by the Friends of the Isle of Anglesey Coastal Path, a local charitable organisation. The Friends operate a scheme called 'ABC – Adopt a Bit of the Coastal Path', whereby 40 members have each adopted a section of route, check it regularly and carry out minor works.

A three mile section of the Isle of Anglesey Coastal Path was 'adopted' by RAF Valley on 1st April 2016. This involves working in partnership with the County Council, Friends of the Isle of Anglesey Coastal Path and other stakeholders in development of the route. Adoption includes regular inspection of the route and reporting of issues to the Isle of Anglesey County Council.

Volunteer days involve service personnel, their dependants and civilian staff from RAF Valley, as well as County Council staff, in conjunction with stakeholder groups. The days include practical tasks on the coastal path, for

instance installing signage, repairing or improving path furniture or broader tasks such as beach cleans.

As part of the adoption RAF Valley;

- Undertakes two path condition surveys per year along the length of the adopted path segment
- Completes annual litter picks on the path segment – operational and/or manpower commitments permitting
- Reports any incidents or issues arising on the path segment to the authority as soon as practically possible and vice versa.

Plastic pollution is crippling the earth's ecosystems with more than eight million tonnes of plastic entering the ocean every year. A staggering 600 items of litter were found on every 100 metres of beach in the 2018 Great British Beach Clean, meaning beach litter is currently at its highest level since records began. Beach clean events arranged by RAF Valley since April 2016 have collected circa three tonnes of waste from the beach. The Station has arranged for this to be disposed of via a local waste contractor who has recycled 99% of all the waste collected. Our beach clean events play a small role in reducing the amount of litter in our oceans. Most importantly it raises

awareness of how important it is to recycle (where possible) and/or dispose of waste in the correct manner.

The Adoption of the Coastal Path for the Station has increased awareness to all personnel of the importance of the wildlife and environment that surrounds us. It has also raised awareness to the next generation of local children, through hosting awareness events with local primary and secondary schools.

The Station has worked very closely with several key organisations including the Royal Society for the Protection of Birds, Keep Wales Tidy, Isle of Anglesey County Council and Natural Resources Wales, in ensuring that our Station leads the way with the adoption of this piece of land.

RAF Valley are passionate about supporting and inspiring people to act to protect and care for their local environment, creating a safer, cleaner, healthier and more sustainable United Kingdom. It is the policy of RAF Valley to initially protect, and subsequently improve, the environment both on and around the unit.

Aled Rowlands
Station Environmental Adviser
RAF Valley

Hidden treasure – lichens at Kinloss



Lichens grow on pebbles, soil, pine trees and heather stems © Heather Paul

In 2012 Kinloss Barracks was transferred to the British Army from the Royal Air Force, who originally opened the site in the 1930s. It is the base of 39 Engineer Regiment of the Royal Engineers and is located on the coast of the Moray Firth in Moray, north-east Scotland, 30 miles east of Inverness. The climate is mild and relatively dry. The sandy, stony, acidic soil is free-draining and nutrient-poor and lichens flourish in the bare areas such as at the edges of pine woodlands and tracks.

A lichen is a partnership between a fungus and one (or more) alga. The visible part is the fungus, with the alga living inside the lichen and making food by photosynthesis. The alga makes carbohydrates by combining water with carbon dioxide in the air, using energy from sunlight. The fungus benefits, but this arrangement is successful as the fungus is careful to protect its algal partner.

Lichens grow in a huge variety of size, shape, form and colour. Some are so tiny they are hard to see, others are easy to spot. Some lie flat on pebbles or on bark, making beautiful patchwork patterns where different lichens adjoin. Others are spiky, leafy or cup-shaped.

Lichens grow on at least 6% of the earth's land surface and in Scotland

there are approximately 1,500 species. They grow on trees, rock, soil, man-made surfaces, and from mountain tops to the coast. Some lichens can grow on a wide variety of substrates, but others need very precise conditions. As lichens absorb air and water to survive they are exposed to pollution in the atmosphere. Some are sensitive to pollution and have been used as indicators of pollution, however others can tolerate or even thrive with some forms of pollution. At Kinloss there are lichens which can thrive in both situations.

Lichens are an important part of biodiversity yet are rarely noticed or talked about. They are pioneers in building soil fertility and help fix carbon and sometimes nitrogen. They contribute to oxygen in the air, as this is a by-product of photosynthesis.

Birds use lichens to make nests and also eat the tiny invertebrates that feed off, and shelter amongst, the lichen. At the other end of the web of life, lichens are an important part of reindeers' diet. Moths have developed wing colouration so they are camouflaged against a background of lichens. People have used lichens to make beautiful dyes for cloth, historically doing so for Harris Tweed, whilst others have been used to make food, drink and antibiotics.

Lichens contain certain compounds that cannot be found anywhere else in nature. However, much is still unknown and lichenologists across the world are continuing to gain new insights into these fascinating organisms.

Kinloss Barracks lies east of the Findhorn Dunes, which is a site of national importance for lichens. This is a coastal lichen-heath, low in nutrients, which is a rare landscape in Britain as much has been lost to development. Across the nearby River Findhorn, Culbin Forest is a Site of Special Scientific Interest because of its coastal morphology, plants, invertebrates and lichens and Findhorn Bay is internationally important for birds. To the west, Roseisle Forest also has areas of lichen-heath.

The importance of the lichens at Findhorn was recognised when Sandy and Brian Coppins carried out the Findhorn Dunes Trust Lichen Survey in 2008. The survey recorded 145 species, with 62 growing in exposed sandy soil, 40 on pebbles and 38 on woody substrates such as heather stems (excluding trees). Some tiny fungi growing only on lichens were also recorded (*lichenicolous fungi*). This figure now stands at 185 species.

Kinloss Barracks was expected to have similar lichen ecology, especially where the ground was undeveloped. Staff helped to identify parts of the base which had exposed sand and shingle and three visits have been made to begin to record lichens. It was found that many of the species recorded at Findhorn also grow at Kinloss.



Spiky and red-tipped *Cladonia* and *Hypogymnia* species growing in sand © Heather Paul

Peltigera malacea was seen growing in sandy, open areas and at the edge of the pinewoods. This leafy lichen is a beautiful greeny-blue when damp, but when dry it is brown and curled up. It is Nationally Rare, endangered in Britain and is a priority species for biodiversity in Scotland. This species thrives at Findhorn and work has been done to encourage its growth in Culbin Forest, with a few records in Roseisle Forest.

Common species recorded at Kinloss include the 'dog lichens' *Peltigera canina*, *P.hymenina*, *P. membranacea* and *P. didactyla*. Many *Peltigera* have cyanobacteria (blue-green alga) as the photosynthesizing partner, instead of green alga, and this fixes nitrogen from the air and helps with nitrogen build up in the soil when the lichen decays. *Peltigera* species grow relatively quickly and have a shorter life span but a quicker turn-over than some others.

Nearby the Nationally Scarce *Stereocaulon condensatum*, a pioneer species, looked like tiny silver-grey granular spikes of coral dotting the sand.

Leptogium palmatum, Nationally Scarce and near threatened, was growing in a sandy area which is used for Scout camps. This dark brown lichen rolls into small tubes and is papery when dry but expands and becomes rubbery when wet. This is one of the 'jelly lichens' which have a cyanobacteria as the partner.

Five species of *Cladonia* were recorded growing in sand including *Cladonia uncialis* subspecies *uncialis*, near



Peltigera malacea and *Leptogium palmatum* growing in sandy soil © Heather Paul



Xanthoria parietina and a *Caloplaca* species on a junction box © Heather Paul

threatened and Nationally Scarce. This will be an underestimate as 27 *Cladonia* species were recorded by Brian and Sandy Coppins at Findhorn. As some of the land at Kinloss Barracks is similar to that at Findhorn it is expected that there will be similar *Cladonia* species there.

Cladonia grow in many forms including tiny leafy squamules on the ground, many branched grey-white 'reindeer lichens' a few centimetres high, brown spiky ones, or ones with tiny 'pixie-cups' or goblets which can be surrounded by bright red apothecia (the fruiting body containing spores for reproduction).

On pebbles *Rhizocarpon geographicum* was recorded. This is a common slow-growing lichen on siliceous rocks. It is

called the 'map lichen' because of the network of black lines running under the yellow-green body. This species was sent into space in 2005 and exposed to space conditions. On its return it continued to photosynthesize and live as before.

Xanthoria parietina is a common lichen that can thrive where there is nutrient enrichment, e.g. on bird perches such as roofs, rocks and trees and in areas where there are higher levels of ammonia from some farming activities. At Kinloss it was seen on man-made structures.

Kinloss Barracks supports many ground-dwelling lichens, and this is a snapshot of the lichen-heath part of the base. Regarding management, colonisation by coarse vegetation and scrub, and excessive trampling should be avoided as this would damage these fragile organisms.

It is planned to provide the staff and their families with information about these tiny, beautiful and delicate neighbours that live on Kinloss Barracks and the adjacent dunes.

For those who wish to look further at lichens, a x10 hand lens or a macro camera setting is recommended.

Heather Paul
Local lichenologist
Member of the British Lichen Society

Military photographic training – conserving more than a centenary of history



Ernest Brooks and the actual camera he used during WW1 © Crown

A brief history of military photography and photographic training

Military photography and photographic training have a proud and well documented history, extending beyond 1915 and the first School of Photography (SOP), which was founded during the days of the Royal Flying Corps (RFC) and the Royal Navy Air Service. This continued after the formation of the Royal Air Force (RAF), meaning the subject is one of the first and oldest technical training schools in the RAF.

The expansion of the RFC could not have taken place without a huge increase in training and facilities. Photography from the air, and the equally difficult darkroom techniques, were identified as subjects that needed to be taught. Consequently, the SOP formed at South Farnborough under the command of 2nd Lieutenant Victor 'Daddy' Laws. Daddy Laws was instrumental in promoting the use of photography for aerial reconnaissance and is today rightly renowned as the father of RAF Photography.

However, photography from the air was not the only use made of photography during World War One

(WW1). In 1915 Ernest Brooks, a freelance press photographer, enlisted in the Royal Navy Volunteer Reserve and was appointed as the Admiralty official photographer, although it was not until 1919 that the Royal Navy opened their own SOP at Tipner Ranges, HMS Excellent. In 1916 Brooks was transferred to the War Office, given the honorary rank of 2nd Lieutenant and assigned the official photographer on the Western Front – the first official war photographer.

The stagnation in photographic training after WW1 changed into a frenzy of activity after the outbreak of World War Two (WW2) to meet an increasing use of aerial reconnaissance. A second RAF SOP was opened in Blackpool and together both schools trained 6,510 photographers during the war period. From the millions of reconnaissance photographs produced during this time, probably the best known are the post-strike pictures of the Dambuster raids and the V1 and V2 rocket sites at Peenemunde, Germany.

Aerial reconnaissance was not the only use made of photography in WW2. The Nazi hierarchy recognised the

use of photography as propaganda to influence morale of the German people, whereas the British military saw war photographs as having the reverse effect. This was to change, and as a result the British Army Film and Photographic Unit (AFPU) and the RAF Film Production Unit (RAFFPU), based at Pinewood Studios, found themselves in a catch-up situation. After a slow start both grew in strength and produced such films as 'Desert Victory' and 'The True Glory'. Such was their expertise that both films won Hollywood Oscars.

After WW2 the RAF SOP moved from Farnborough, eventually settling at Wellesbourne-Mountfield in 1963, followed by a relocation to the present purpose-built building at RAF Cosford. The Royal Navy and British Army moved to RAF Cosford in 1972, merging with the RAF SOP to become the Joint School of Photography (JSOP). In 2003 the governance for JSOP was transferred from the RAF to the Joint Force Command under the Command and Control of the Defence Intelligence Security Centre, subsequently renamed the Joint Intelligence Training Group (JITG). To recognise the event and a wider training commitment across the Ministry of Defence (MOD), JSOP became the Defence School of Photography (DSOP).

Conserving a centenary of military photographic training

Leading up to the centenary of military photographic training a decision was made to establish a collection of military photography concentrating on the period between 1915 and 2015. The aim of the project was to chart the evolution of photographic equipment used by the military and how military photography related to world events. Such a collection had previously existed and was housed in a purpose designed museum, but was moved to the Cosford RAF Museum when classroom space was needed.

A small team led by WO Andy Malthouse and Tim Robinson, along with a group of ex DSOP trainers, Dave Humphrey,

Mal Price, George Fenney and John Freestone, affectionally known as 'Dads' Army', had the considerable task of researching and tracking down equipment. Much of this was now in long-term storage or simply lay in the back of cupboards. Although the bulk of the equipment had been transferred, many documents, photographs, training and equipment manuals had been retained in DSOP. Unfortunately, these had not been archived, so an essential task was copying and cataloguing the documents and photographing each item of equipment onto a database.

It was the intention from the start that the items would all be displayed in an appropriate environment. Funding from JITG enabled purpose designed display cabinets to be purchased. The Defence Infrastructure Organisation (DIO) refurbished the original museum room, installing new electrical circuits and LED lighting. The room was named the 'Centenary Room,' to honour the occasion, and was officially opened as part of the DSOP's centenary celebrations.

However, only part of the story had been fully displayed and there was opportunity to expand on the original brief. Therefore, the team set about the greater task of finding and restoring obsolete photographic reconnaissance related equipment which lay discarded in hangars around the RAF. Nearly all of this equipment was in a very poor state of repair and needed extensive restoration. Fortunately, enough spares were still available, and Dads' Army had the necessary skills and knowledge to undertake rebuilds.

Following extensive self-help refurbishment work, the equipment went on display in 2019. It is displayed in a realistic darkroom environment which gives the visitor the sense and smells of a photographer's working life during the Cold War period of history. The room is named in honour of Dave Humphrey, one of Dads' Army, who sadly passed away before he had a chance to see the completed exhibits.

Photographic training today

Over subsequent years there have been many changes in photography and photographic training; the days of film, chemicals and aerial



Aerial reconnaissance (vertical) photograph showing the breach in the Mohne Dam caused by No 617 Squadron, Royal Air Force's raid on 16th May 1943. The Eder Dam was breached in the same operation by means of 'bouncing' bombs designed by Dr Barnes Wallis © Imperial War Museum (CH 9687)

reconnaissance are long gone. Today DSOP delivers 19 photographic and video courses using the latest digital cameras, printers and software to edit and produce the imagery. Courses are delivered to service personnel whose primary task is photography and range from basic trade skills to advanced training covering video production, media operations and trade management. Other courses are delivered to personnel who use photography in their roles, including a diverse range of Intelligence, Surveillance, Reconnaissance (ISR) gathering requirements, to specialist requirements for material scientists, air accident and police investigators.

Visiting the collections

The museum displays have ensured a nationally, historically valuable and irreplaceable collection is conserved for future generations. The displays, which have already proved popular, are open to visitors. To visit, please email JITG-DSOP-iHub@mod.gov.uk with your details, and a member of staff will contact you.

Further reading

There are several books which give more detail about the history of military photography. The origins of the RFC and aerial photography are well documented in 'Eyes of the RAF – A History of Photo Reconnaissance' by Roy Conyers Nesbit.

An in depth history of Royal Navy photography and film is recorded in 'A History of Royal Navy Photography' by Maurice (Jan) Larcombe. The work of the AFPU is well documented in the book 'The History of the British Army Film & Photographic Unit in the Second World War' by Dr Fred McGlade.

Frank Tomlinson Cert Ed FBIPP
Officer Commanding
Defence School of Photography



'Dads' Army' – George Fenney, John Freestone and Mal Price © Crown

Bee Aware – saying ‘no-mow’ to the decline in pollinators

It is amazing to think that creatures just centimetres long can have such a big impact on our lives. Their work contributes over £651 million to the UK economy every year and they help to provide one in every three mouthfuls of our food. These creatures are of course pollinators!

These small yet powerful creatures are depended upon by plants, animals and humans across the globe. However, in recent years the pollinator population has been rapidly decreasing, with a 2016 United Nations report warning that a shocking 40% of the world’s pollinators could be facing extinction.

There are various factors as to why pollinator populations are decreasing, including disease and exposure to parasites and pesticides, but one main cause is due to the increase in human land-use. Britain has lost 97% of its flower-rich grassland meadows since the 1940s, with only a tiny fraction being recreated as farmland.

The UK Government has recognised the decline in pollinators and launched the National Pollinator Strategy in November 2014. The strategy details a 10 year plan, setting out a number of actions and goals which aim to counteract some of the issues surrounding the decline. In support of this the UK Ministry of Defence (MOD) estate managers agreed to adopt measures such as introducing flexibility into MOD grass cutting contracts to support pollinators.

During 2017, Defence Infrastructure Organisation (DIO) ecologists requested that a small area of grassland within Westdown Camp on Salisbury Plain Training Area, Wiltshire be left unmown as part of a very informal pilot project to observe what flowering plants might appear and set seed. The results were astonishing as the area became alive with pollinating creatures thriving in the flourishing pollinator-friendly habitat that quickly developed.

In the summer of 2018, Landmarc Support Services (Landmarc) conducted a ‘No-Mow, Bee Aware’ campaign trial at Westdown Camp, together with the support of a DIO ecologist and the Landmarc Sustainability team. Eight areas were designated to undergo no mowing or cutting from June to September.

The areas had to be sensitive to contract requirements and the traditional perception of how military land should be presented. Therefore, nearly all of the areas that were chosen were situated out-of-sight of regular transit routes and various military headquarter buildings – this also reduced human disruption in the areas.

Monthly surveys tracked developments and observations throughout the summer with progress seen almost automatically. A variety of herbs, flowers and shrubs thrived throughout all eight areas and reseeded upon the close of the trial. This attracted a busy and diverse

insect population and it was even reported that swifts had begun nesting in two buildings close to uncut areas.

Landmarc site operatives assisted in mowing two separate parts in one area as part of a mini trial. One section was mowed with a single-cut, the other with two-cuts spread over a 48-hour period. The trial found that the single-cut proved to be more successful in reducing the amount of thatch produced, whereas the two-cut experiment resulted in the arisings being gathered together into mounds which were very slow to disperse over the remaining summer.

The final report of the season identified that nearly all species of flower had turned to seed. Honey bees were visible in close proximity to a queen buff-tail bumblebee who was searching for a suitable nesting site in one area.

The ‘no-mow, bee aware’ experiment was an exercise that was only too achievable. Almost 20% of Westdown Camp was turned over to the no-mow experiment, which not only resulted in the growth of on site habitats and wildlife, but also decreased noise pollution, emissions and fuel-use from ground maintenance by approximately 15%.

Kenny Fullerton
Regional Support Manager
Landmarc Support Services



One of the ‘no mow’ areas of grassland at Westdown Camp and a common carder bumblebee on red clover (inset) © Crown



Small tortoiseshell butterfly © Crown

UK Climate Projections



RAF Chinook carrying bags of aggregate for the Toddbrook Reservoir, Whaley Bridge © Crown

The UK Government and Met Office are at the forefront of climate modelling. Since climate projections were first published for the UK in 1998, the Met Office has improved their process and developed more robust projections, which show how the UK climate may change over the course of the century.

Climate change is increasing extreme weather events in the UK, which impacts on older infrastructure. In August 2019 the RAF helped civilian authorities to deal with the emergency situation at Toddbrook Reservoir, Whaley Bridge. The RAF Chinook Mk6a helicopter dropped bags of aggregate into the dam to shore it up and into surrounding watercourses to stem the flow of water into the reservoir.

The Defence Estates Sustainable Policy team (now part of the Defence Infrastructure Organisation (DIO)) were involved in the development of the UK Climate Projections 2009 (UKCP09) and peer reviewed the science process behind them. Since then, DIO has incorporated these projections into the Ministry of Defence (MOD) Climate Impacts Risk Assessment Methodology (CIRAM) and use them to analyse climatic risks to MOD establishments. DIO has also incorporated the UKCP09 within MOD Sustainability and DREAM processes so that future works consider and incorporate climate resilience. In

addition, mapping has been created of the UK MOD estate against some of the projections for temperature and precipitation changes. However, more work is needed so that these clearly show the change across regions and tell more of a story about potential impacts.

The UKCP09 were updated into the UK Climate Projections 2018 (UKCP18) in November 2018 and Begonia Pedreira-Regueira, DIO's Senior Climate Resilience Manager within the Technical Services Sustainability team, supported the Met Office and wider Government in this update on behalf of MOD. Begonia has contributed to the UKCP18 Government Group and UKCP18 User Panel group. She has provided support to defining UKCP18 products e.g. identifying data needs such as developing projections for heavy rainfall events in the summer, and bringing together the climate projections data with observational data and trends (previously provided by two different tools).

Begonia has also been taking an active role in the ongoing testing of UKCP18 products as new climate data becomes available. The Met Office has been keen to utilise her experience of using UKCP09 and her knowledge of the support needed by others in the MOD, to input into the development of UKCP18. This has included testing the

website and data interface prototypes and reviewing case studies. The new data interface is easier to use, the guidance clearer and the efficiency and options for data download has improved. For instance, Begonia tested some new data in July 2018 – the UK land projections at 60km² resolution. She then reviewed in July 2019 the guidance for UKCP Local Projections at 2.2km² resolution and for cold snaps.

Since UKCP18 has been published, the DIO Climate Resilience team have updated the MOD's CIRAM to incorporate the upgraded set of climate projections. The use of the climate projections continues to help the MOD understand what global climate change may mean for the estate and locally for establishments. The team will also strategically analyse the UKCP18 data and determine how best to use it to map climate risks against the estate both in the UK and overseas.

It is the MOD's priority to adapt and prepare Defence activities, infrastructure and equipment to become more resilient in the short and long term. The climate projections help the MOD anticipate risks and take better informed decisions. For instance, in the short term by increasing the ability to cope with disruption due to current weather patterns and in the long term by increasing the capacity for adaptation, learning and transformation to future climatic changes.

The Climate Resilience team, as an everyday user of the new UKCP18 interface, are well placed to identify issues and improvements to the system. The close working relationship with the Met Office is beneficial to both organisations as the Met Office can ensure that their tool is robust, and the MOD can have an input into future developments. The Met Office will look to continually update the UK Climate Projections as new data becomes available, which will then be incorporated into CIRAM where appropriate.

Begonia Pedreira-Regueira
Senior Climate Resilience Manager
Defence Infrastructure Organisation

Unlocking a deeper understanding of our oceans



UKHO surveyors collecting marine geospatial data in St Lucia © UKHO

The world's oceans and seas are an important part of day-to-day life – relied on for trade, food and energy. In the UK alone it is estimated that they provide jobs for over 500,000 people, contribute more than £47 billion to the economy, and are the means through which 95% of physical goods reach our shores. But as this reliance on the world's oceans grows, so too does the need to protect them and use the marine environment in a responsible way.

Maintaining safe shipping routes, managing the use of resources and monitoring changes in the marine environment are some of the actions that can be taken to support this aim. Whilst this range of activities is vast, there is one common element that underpins them all, a need for marine geospatial information. Data detailing the shape of the seafloor, direction of the tides, the temperature of the water and more – this is crucial to helping people benefit from and protect oceans.

Working with partners across Government and beyond, the UK Hydrographic Office (UKHO) source, process and provide access to this marine geospatial data to help others make the best use of the world's

oceans. As an executive agency of the Ministry of Defence, this starts with helping ships to navigate safely in UK waters, as well as helping Defence to support national security and minimise the environmental impact of military activity. Commercial shipping also benefits from this work; in fact, over 90% of ships trading internationally today use the UKHO's ADMIRALTY Maritime Data Solutions to travel safely. Now the UKHO are using this data and expertise to help coastal communities around the world develop their marine economies in a responsible way.

The Commonwealth Marine Economies Programme

Just like the UK, all coastal communities around the world depend directly on the marine environment for food security, safety and trade. So, it is vital that they have the information and insight to not only benefit from their marine resources but protect them for years to come.

Working alongside Government partners, the UKHO are helping communities to meet these challenges through the Commonwealth Marine Economies (CME) Programme. This aims to help Commonwealth Small Island Developing States to create sustainable and resilient

marine economies. It is being delivered by the UKHO and partners on behalf of the Foreign and Commonwealth Office; funded through the National Security Committee's (NSC) Conflict Stability and Security Fund (CSSF).

Through this programme, the UKHO have led the collection of marine geospatial data in over 6,500km² of water. This data is now being used to monitor the marine environment, improve disaster resilience, support tourism and enable global trade in a responsible way.

Supporting responsible and safe trade in Guyana

One country that is expected to benefit significantly from the CME Programme is Guyana. Like many coastal communities, maritime trade makes up a large part of Guyana's economy. However, they face a particularly unique challenge.

Situated on the north coast of South America, the country has three large rivers stemming from the north Amazon Basin that deposit silt along the adjacent coastlines. As a result its seabed is extremely shallow and constantly moving. This navigational uncertainty can increase the likelihood of groundings that have the potential to cause significant damage to the marine environment, which Guyana is dependent on for fish and shrimp supplies. In addition to this, ships are forced to restrict the size of their cargo loads when transiting the area, reducing the efficiency of trade and increasing the greenhouse gas emissions emitted by shipping.

Working together with local authorities, the UKHO commissioned two boats to survey key areas affected by these deposits including navigational channels in Guyana's main port, Georgetown. This important work used multibeam echo sounders to collect a wide range of data, including seafloor features and depths, as well as detailed descriptions of navigational aids such as lights and buoys. Further

capacity building work, involving the presentation of equipment and training, was also carried out to help Guyana continue data collection as the environment changes.

This data is now being used to create an accurate picture of the seafloor – something that is crucial to helping Guyana use its marine environment responsibly. Firstly, the production of new, accurate nautical charts will help to improve mariners' knowledge of navigational hazards and the wider environment, reducing the likelihood of groundings that could damage Guyana's marine ecosystem. Being able to navigate with confidence will also help ships to increase cargo carrying capacity and improve the efficiency of trade.

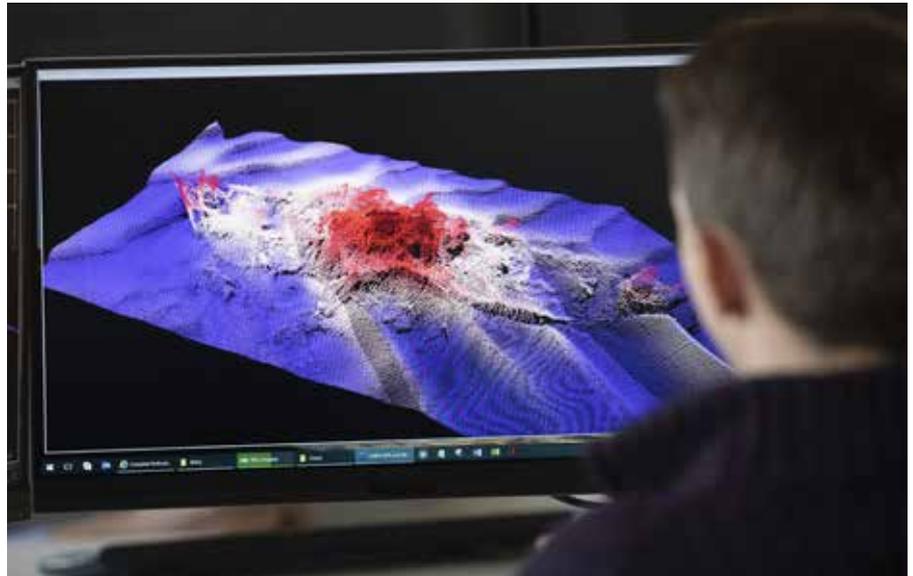
In addition to this, new surveying capability will help Guyana to improve their knowledge of natural seabed resources in the local area. By combining seabed mapping data and scientific research, authorities will be able to monitor the health and biodiversity of these ecosystems as they develop their marine economy further.

Helping Grenada to protect vital marine environments

Alongside trade, many coastal communities depend heavily on their marine environments for food security and livelihoods. In Grenada, a country with waters 75 times larger than its land mass, this is particularly true. The coral reefs that line the coastline are home to a rich range of marine life, provide food for communities, and act as a breakwater in extreme weather events or natural disasters.



A UKHO bathymetric co-ordinator checking survey data collected © UKHO



Seabed mapping data collected in Grenada depicting a hazardous wreck © UKHO

Along with many islands in the Caribbean, Grenada has made a commitment to protect these marine environments, requesting marine geospatial data to help map and monitor these areas. To assist, the UKHO commissioned an aircraft-mounted Light Detection and Ranging (LiDAR) survey. These surveys are carried out by a specifically modified light aircraft fitted with state-of-the-art sensors that are able to capture high resolution seabed mapping data of coastal features to a depth of 40m.

This data was then used to support a number of activities. Firstly, the National Oceanography Centre and Centre for Environment, Fisheries and Aquaculture Science (Cefas) used these data sets to support the production of seabed habitat maps, containing detailed analysis of the marine life. The maps will help Grenada to assess the health of its

coastal habitats, such as coral reefs and seagrass beds, and sustainably manage the use of its marine resources.

In addition to this, depths captured by the UKHO have also been used to create data models that can help to predict the impact of sea level rise and storm surges in the event of extreme weather events. Grenada has felt the effects of previous hurricanes and this vital information will help the Government to create strategies and plans that can protect communities and marine environments into the future.

Looking to the future

Guyana and Grenada are just a few of the Commonwealth states in scope for the programme, which includes 15 others across the Pacific and Caribbean. Since the programme's launch in 2017, the UKHO have also made changes to reduce their own footprint, such as introducing the use of new airborne LiDAR sensors that will help to reduce the number of survey flights and the impact this has on the environment. With its repository of data, combined with the tools, expertise and global relationships to use it, the UKHO will continue to support the responsible use of the marine environment and the sustainable growth of the blue economy into the future.

Ian Davies

International Hydrographic Programme
Manager
UK Hydrographic Office

Boost for rare invertebrates at Ash Ranges



The team undertaking surveys © Pete Boardman

Ash Ranges in north-west Surrey is an important and busy part of the Defence Training Estate, with firing ranges located around an extensive Danger Area and peripheral areas used for dry training. The site, on the Barton, Bracklesham and Bagshot beds, forms one of the largest areas of heathland remaining in the London basin, featuring areas of dry and damp heath, bog, scrub and woodland across a diverse topography. The ranges and Danger Area (over 1,100ha) form the bulk of the Ash to Brookwood Heaths Site of Special Scientific Interest (SSSI), and is also part of the Thursley, Ash, Pirbright and Chobham Special Area of Conservation, and the Thames Basin Heaths Special Protection Area.

To support much needed habitat restoration of the site, Defence Infrastructure Organisation (DIO) enabled Surrey Wildlife Trust (SWT) to enter a Higher Level Stewardship agreement, which ran from 2007-2017. The funding enabled a number of projects, with tree and scrub removal to restore open heath one of the primary objectives. Another goal was the introduction of grazing by belted Galloway cattle to control coarse grasses and provide 'short sward' habitats. Regular meetings between

DIO, Landmarc Support Services, SWT and Natural England helped to identify priorities for management.

The interest features of the SSSI include nationally important assemblages of invertebrates associated with scrub-heath, open short swards and bare sand. These comprise species from a variety of taxa including; *diptera* (true flies), *aculeate hymenoptera* (solitary wasps), *hemiptera* (bugs), *lepidoptera* (butterflies and moths), *coleoptera* (beetles) and *araneae* (spiders).

Previously much of the heather in the Range Danger Area had become mature and even aged, and there was a lack of short vegetation other than on the mown range floors and firebreaks. It was agreed that more should be done to provide habitat for the specialist invertebrates. Natural England also recognised that there was very little recent data available to inform the condition of the assemblages.

Following the necessary unexploded ordnance clearances, in 2015 SWT arranged for contractors to create bare sand habitat. Two excavators worked for two days creating a significant number of patches and strips by scraping off surface vegetation to

expose sand. Areas were selected where there was 'low diversity' mature heather on south facing slopes. The scrapes helped to diversify the habitat structure and provide bare ground in sunny locations. The spoil was placed on the upper side of the scrape, forming low banks providing additional microhabitats. Another series of over 80 scrapes were created in 2016, on both dry and damp heath.

It was important to determine if this work was achieving positive results. Invertebrate data was also required to help with the SSSI condition assessment, so in 2017 DIO granted access permission for a team of five entomologists from Natural England's Field Unit. The target invertebrates require surveying in warm weather, but frustratingly on three of the four survey days the weather was poor, so the team had to adapt to the conditions. A little additional survey work was carried out in 2018.

The team used standard sweeping, ground and targeted searching and a D-Vac vacuum sampler during the fieldwork. Where necessary specimens were also collected for later identification.

Despite imperfect weather conditions, a total of 450 records were made

comprising of 238 species, which included a number of rare insects and spiders. The data was analysed using Pantheon (www.brc.ac.uk/pantheon), which identifies species of high association with particular habitats and assemblage types. The outputs from Pantheon showed that the specialist assemblage associated with scrub-heath was at favourable status, and the assemblages associated with bare sand and short swards both had a high likelihood of being considered favourable with sufficient targeted survey work in suitable weather.

Aculeate hymenoptera (solitary wasps) comprise a large proportion of the bare sand assemblage. The weather particularly hampered the assessment of this group of insects because they are more active in sunshine. However, plenty of suitable habitat was encountered, and scarce species of *Aculeate hymenoptera* were recorded. Expert judgement by one of the entomologists suggested the available habitat should produce many more *Aculeate* species given suitable survey conditions. The open short sward assemblage contains a lot of beetles for which pitfall trapping is necessary. This was not possible during the survey.

The sphagnum bog moss wetland assemblage, although not a noted feature at this SSSI, was important with the Pantheon score being just one species short of favourable status. The results confirmed the site is still of national importance for communities of habitat specialist invertebrates.

A number of important species in terms of rarity were found during the survey. The spider assemblage was



Lynx spider, one of the Nationally Rare species found
© Pete Boardman



An excavator in action at Ash creating bare ground habitat © Surrey Wildlife Trust

particularly rich with two Nationally Rare species and 15 Nationally Scarce species, making Ash Ranges one of the foremost sites in the country and nationally important for its spider fauna alone. The most uncommon species recorded were probably lynx spider *Oxyopes heterophthalmus* which has a very limited distribution and is restricted in the UK to only a few of the Surrey heaths, and *Uloborus walckenaerius*, a cribullate orbweb spider that is restricted to a few sites in central and southern England. These two spiders are understood to require warm, dry habitats possibly with some bare areas. Lynx spiders are known to spend time climbing in taller vegetation including shrubs and taller grasses. Mature, dense ling *Calluna vulgaris* was found to be the primary supporting vegetation of this species indicating structure is important. Amongst the Nationally Scarce species both raft spider *Dolomedes fimbriatus* and green huntsman *Micrommata virescens* are associated with wet habitats, *Evarcha arctuata* and *Thomisus onustus* are associated with heathland, the latter with mature, and wetter heathland habitat.

The grass bug *Myrmecoris gracilis* is a rare ant-mimic of sandy heathland and only occurs sparingly in southern England and south Wales. *Phytocoris (Ktenocoris) insignis* is a very scarce species of bug confined to dry southern heathland. Some of the species were found on the recently created scrapes. Some Scarce invertebrates were noted on the bare ground scrapes, and several *hymenoptera* were using the more

friable spoil that had been piled to the sides. The sand wasp *Ammophila pubescens* and green tiger beetle *Cincidela campestris* were amongst the species recorded from these habitats. The scrapes and spoil banks were assessed as being very important for *Aculeate hymenoptera* as well as other species. By breaking up the uniformity of the heather structure and providing bare ground, the management has greatly improved the habitat to support the invertebrate communities.

The conclusion, even from such a limited survey, was that the work had been a success and should be continued as an ongoing project. Some warm south-facing sandy banks by tracksides were also found to be important features, where several species of *Aculeate hymenoptera* were found as well as the Nationally Scarce bug *Alydus calcaratus*. Additionally, a brief walk over of some of the firing range floors revealed many holes amongst the short diverse sward, indicating significant usage of these areas by specialist burrowing insects.

The habitat management and survey work have helped towards moving more of this important Training Area SSSI towards favourable condition, a great achievement for the military, SWT and entomologists involved.

Des Sussex & Pete Boardman
Natural England

Ben Habgood
Surrey Wildlife Trust

Kirkcudbright Training Area and D-Day



Polish tank crewmen of the 10th Mounted Rifle Regiment pose for the camera at Kirkcudbright Range in 1944 © Janusz Jarzembowski, Armoured Hussars Archive

Kirkcudbright Training Area is situated on the western coast of Scotland, on the northern edge of the Solway Firth. The area now owned by the Ministry of Defence covers some 2,000ha and is used for live training. Various tank training structures are dotted across the range, including tank roads, battle runs and practise targets which provide a clue to the range's origins. The development of the range was a direct result of the need to train armoured units in the build up to Operation Overlord during World War Two (WW2).

After Britain entered WW2 in 1939 there was a dire need to raise and train new armoured units. However, the areas for training were strictly limited and the 1st Polish Corps based in Fife were told that there was no room to train gunnery and battle tactics. The formation of the 1st Polish Armoured Division in February 1942 added to this issue. Also increasing the pressure was Operation Bolero (the build-up of US Armed Forces in the UK), which earmarked the Training Areas in southern and western Command for American training. In early 1942 these factors led to the wholesale purchasing of four plots of land by the War Office

specifically for training armoured units. The four ranges were Minehead, Warcop, Aldborough (Cowden) and Kirkcudbright.

In early August the first notifications of land requisition by the War Office were produced for Kirkcudbright. The local County Council of the Stewartry of Kirkcudbrightshire was notified of the intention to close seven miles of local roads where the range was to be sited and that heavy traffic should be expected. The Council considered the proposals, raised no objections and replied to the War Office on the 31st of August. The War Office then sanctioned the land purchase with the estimated cost of developing the land at approximately £150,000 (almost £5m in today's money).

Several farms occupied the land that was to be developed into a new range and notices were sent out to requisition these parcels of land, 19 in total. Eight farms were completely requisitioned and a further seven partially requisitioned. The Secretary of State for Scotland raised arguments against the wholesale purchase of the valuable dairy land due to it being requisitioned only for war time purposes. It was not known what

the post-war needs would be, and this factor pushed the War Office to purchase the land outright and move the farmers off as soon as possible. However, there was a caveat added that none of the farmers would be moved until it was "*demonstrably necessary*." The majority of land was purchased by November of 1942 and construction work began, but some negotiations continued until September of 1943 and Balmae House was finally bought as the last plot in November of 1943.

One of the first tasks was the harvesting of the crop of turnips grown as winter feed for the cattle. Much of this crop was dumped, despite the wartime food shortages, but some enterprising individuals obtained sufficient amounts to make turnip jam! Other works included construction of the necessary structures for training, largely built by hand. Kirkcudbright was also competing with the three other tank ranges being built at the same time for labour, materials and equipment. This, combined with poor weather, meant considerable delays in getting the range ready for opening. Despite the difficulties, by April of 1943 the range

was opened for Battle Practise. Such was the need for training that by June of 1943 ten armoured units had already passed through the Kirkcudbright Range.

The immediate need for training meant the original blockhouses and structures were built of wood and earth and the more permanent concrete buildings and roads were still being constructed when the range was open for business. Accommodation for the range staff, Pioneer Corps, Artisan Companies and attendees of gunnery courses was initially in the pre-existing cottages and farm buildings within the boundary of the range. Non-Commissioned Officers and other ranks were housed in converted farm sheds and Officers had the luxury of Balmae House. Later, a new camp was built at Townhead Camp to facilitate the units whilst training. This proved to be a bonus for the local population as the canteen hut could be used as a cinema and local children were often collected from the area by an Army bus to watch the films.

The tanks that trained on the range had to be unloaded from their rail transports in Kirkcudbright town and driven the rest of the way to the range. This meant that the roads had to be reinforced where tracks would damage the surface. Granite blocks and reinforced concrete were used for this and some remain visible in the surrounding areas today.

The first unit to train on the new range was the 10th Polish Mounted Rifles, of the 1st Polish Armoured Division. They travelled to the range from Fife and a



A Polish Stuart Mk V of the 10th Mounted Rifle Regiment on manoeuvres at Kirkcudbright Range
© Janusz Jarzembowski, Armoured Hussars Archive

ceremony took place to open the range, including local dignitaries and the unit commanders, on the 21st of April 1943. All the other units of the 1st Polish Armoured Division also trained at Kirkcudbright before they moved south in May of 1943 to convert to Cromwell tanks. Many believe that the range was built specifically for the Polish units and the Polish crest is included in the badge of the Kirkcudbright Training Area. Although, no specific unit was considered for training at Kirkcudbright, it shows the impact that the arrival of Polish 'tankies' had on the area.

The cosmopolitan nature of the range did not end with the Polish units heading south, as Canadian troops of the 11th Armoured (Ontario) Regiment and the 12th Armoured (Three Rivers) Regiment arrived soon after. These units were involved in the invasion of Sicily, Operation Husky, and were training

on their new Sherman M4 tanks. The Canadians were using the range for almost three weeks in May 1943. When the Canadians left several other units also passed through Kirkcudbright. Not all of these units were newly raised, for example, the 3rd County of London Yeomanry had fought in Italy until January 1944 when they were withdrawn to be transferred to a new theatre. They trained at Kirkcudbright ready for the D-Day landings.

The volume of units moving through and training at the range remained high right up until the June 1944 Operation Overlord, more popularly known as D-Day. After the invasion, training decreased gradually, but this gave an opportunity for Lt Col Dunn to examine the lessons learned during the periods of intense activity and create new battle simulation devices that would improve future training. The conference hosted by Dunn also led to the War Office deciding to use Kirkcudbright for trial and experimental work that would affect the running of other training ranges. With this outcome, Kirkcudbright's future as a training range was assured and it continues to be used today as an active range which had its origins in preparations for D-Day.

This information was sourced from archaeological work at Kirkcudbright by Roger J. C. Thomas and images kindly provided by Janusz Jarzembowski of the Armoured Hussars Archive.

Alex Sotheran
Archaeology Advisor
Defence Infrastructure Organisation



A long barrel rod is used by Polish tank crewmen to clean the gun barrel, preventing the build-up of dirt
© Janusz Jarzembowski, Armoured Hussars Archive

Multi-user routes around Aldershot – the Safe Ways Strategy



The multi-user routes will provide for disabled ramblers such as these using Tramper vehicles on Salisbury Plain Training Area © Crown

The Defence Infrastructure Organisation (DIO) Access and Recreation team, along with the UK Defence Training Estate South East have been working very hard over the past 12 months to develop several multi-user routes across parts of the Home Counties. The team have worked closely with a range of stakeholders including the Ramblers, British Horse Society (BHS) and Cycling UK to develop several strategic routes across parts of the training estate that offer both a recreational and utilitarian resource.

When considering access and recreation opportunities the team must ensure the balance is right between the primary purpose of the estate, to provide military training, and offering people access to sites. To maintain this balance, the team have been looking at opportunities where there is minimal interference to any training while providing a high quality experience for the public.

The regionally named Safe Ways Strategy has focused on engaging with local communities, councils and

recreational user groups to establish support and to help identify access opportunities that can provide local benefit for users that are compatible with the primary military purpose. Factors include health and safety, reducing the use of busy roads or dangerous junctions, the creation of circular and strategic linear routes and the formal upgrade of footpaths and bridleways where appropriate. Two key routes have been identified for delivery in 2019.

The Pirbright circular route (The Great Loop)

This circular route follows the perimeter of the Pirbright Range where possible. It is in remembrance to the soldiers who fought in World War One and commemorates the role that Pirbright Range and the nearby Training Areas played in training these young men. Most of the circular route follows existing public rights of way made up of footpaths and bridleway. Where there are footpaths within the Ministry of Defence (MOD) estate, the team hope to dedicate these as bridleways,

thereby encouraging use by as many non-vehicular users as possible. In total this circular route will be in the region of 10 miles long and mainly off road.

The team are also looking at diverting a small section of footpath that currently runs through a very sensitive Site of Special Scientific Interest (SSSI) known as Folly Bog. Not only is it a very ecologically sensitive area, but as the name suggests it is almost unusable for about five months of the year due to it being waterlogged. The diversion will help protect this sensitive environment and put the path on a more sustainable line for use in all weathers.

Part of the circular route goes outside of the MOD estate and as such the team have worked closely with the rights of way team at Surrey County Council to seek their support in the delivery of the project. It has been agreed that the waymarking for the route can cover both organisations' areas of responsibility to ensure clarity and certainty for the public who will be using it.

The team are looking at making the route available for walkers, cyclists and equestrians where possible, however there is a section of the route that follows the Basingstoke Canal towpath where access is limited to walkers and cyclists only. It is hoped that an alternative route for horse riders can be investigated soon.

Odiham Road link

This route is very different from The Great Loop in that it is a linear path linking up two existing bridleways outside of the Training Area. The creation of this permissive route is primarily based on the health and safety benefits to the public. Currently they are forced to use a very busy road, with a roundabout half way along that needs to be negotiated. There is no safe crossing point and the road verges are not wide enough to accommodate a pavement.

The BHS approached DIO and asked if the team could investigate the possibility of a link between the two bridleways, thereby creating an off-road, safe environment that would be of huge benefit not only to local horse riders but also to cyclists and walkers. During the initial investigation the team decided that the buffer zone on the edge of the training estate would be the perfect



The improvements make paths like this wider and more user friendly for all © Thames Basin Heaths Partnership

location for such a route. This proposal had no impact on the military training carried out on the area and with a few tweaks avoided some important archaeological features on the ground.

As part of the implementation the team have the opportunity to upgrade the existing access furniture, bringing it up to British Standard where possible. It has also enabled the reconfiguration of the current access points onto the estate and helped direct the public away from a more sensitive landscape that was showing signs of deterioration.

The whole route will be designated as a permissive bridleway giving access to walkers, equestrians and cyclists whilst ensuring that DIO has the flexibility to adapt and alter the route accordingly if training requirements across this part of the estate change in future.

Into the future

Across the rest of the Home Counties Training Area the team have identified other areas where small improvements to the existing public rights of way network, or a small section of permissive path, could help better manage access. This would make it easier for the public to access the site whilst minimising disturbance to troops' training. These improvements vary from simple things such as upgrading an existing footpath to a bridleway within a wider network of bridleways or creating a permissive bridleway along tracks that are already heavily used by the public. This would mean public access becomes easier to manage, as well as making it clearer for the troops as to what they may expect on site.

At the start of the process the team were looking to identify small 'quick wins' that could be easily implemented and managed across the Home Counties. However, it was obvious during our conversations within the Safe Ways Strategy group that there are wider opportunities that will benefit both troops' training on the ground and the public wishing to access the estate.

Most of the improvements recognised as part of this process will be funded via the MOD's Conservation Stewardship Fund, but as relationships build with wider audiences, including local Councils,



Improving the surface where necessary will encourage responsible use © Thames Basin Heaths Partnership

there is potential to access wider funding streams that could fund surface improvements, waymarking or drainage.

Throughout the process the team have maintained the mantra of 'Certainty, Clarity and Consistency';

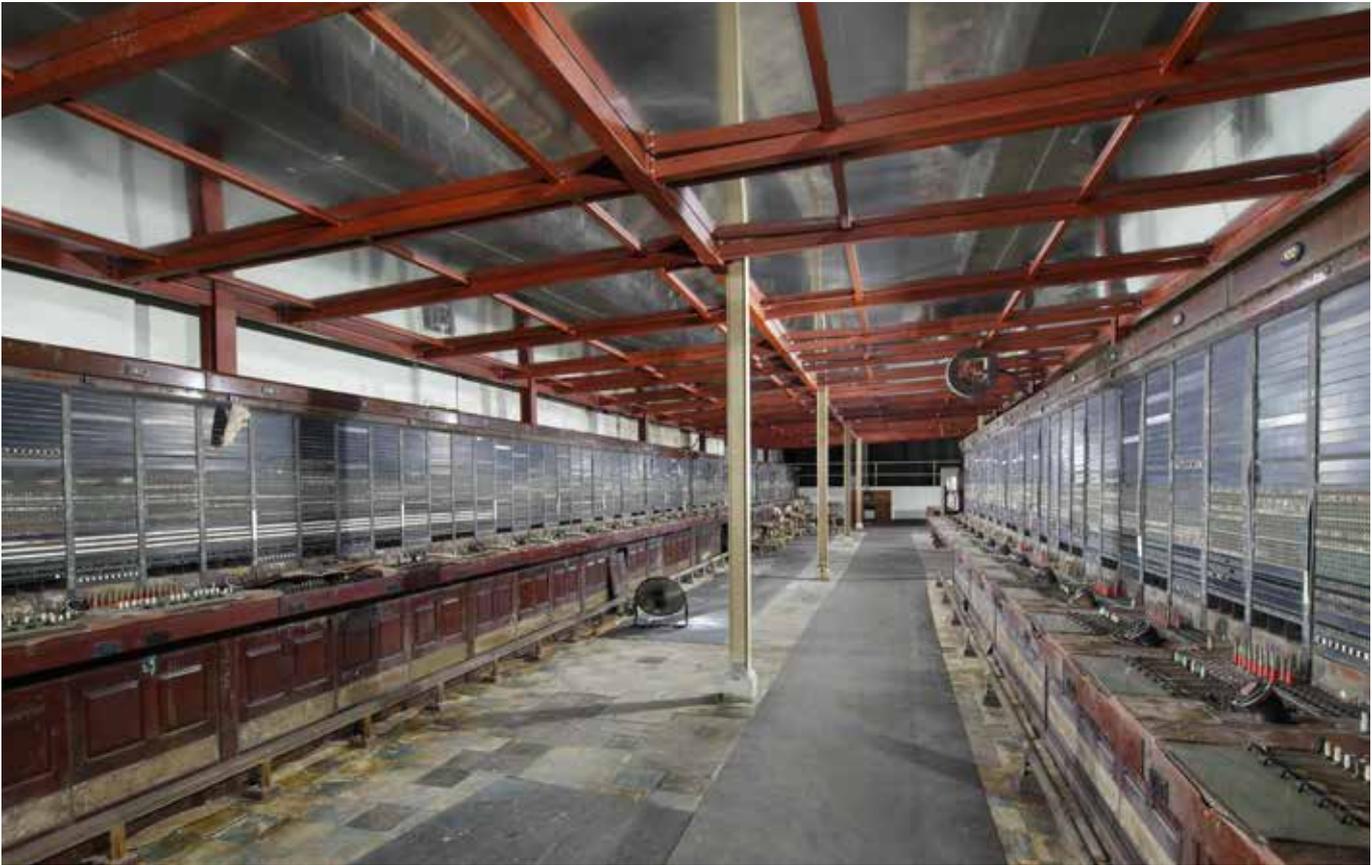
- Certainty – ensuring access is an integral part of MOD estate management, giving the public certainty as to where they are allowed whilst also ensuring the military are aware of where and when the public are likely to be on the estate
- Clarity – to make it clear where access is acceptable
- Consistency – recognising that the public enjoy access across the estate and not just in one part of it. Delivery and information are as consistent as possible across the whole of the estate.

The MOD and DIO will continue to work with all the stakeholders and local Councils to investigate and deliver strategic links across the estate. It is hoped that this ongoing collaborative success will continue to deliver the Safe Ways Strategy across the Home Counties and will be used as an example of best practice to implement similar strategies across the rest of the MOD estate.

Mark Sumner

Access & Recreation Advisor
Defence Infrastructure Organisation

Saving Corsham's War Headquarters GPO telephone exchange



Completed new roof structure © D. Hawkins

Ministry of Defence (MOD) Corsham, Wiltshire is home to the Corsham Mines, which began as a quarrying location for Bath Stone in the Roman times. The subterranean site covers over 285 acres. The MOD first acquired the site in the 1930s and during World War Two (WW2) it was used for a variety of purposes including an aircraft factory and ammunition depot.

After the war the aircraft factory was modified to create the Central Government War Headquarters (CGWHQ). This was a command centre deep underground for selected members of the Government from which the UK could be governed in the event of nuclear attack. The secrecy surrounding the tunnels was extreme, especially during the 1950s and 1960s. The code name – always in capital letters – for the underground site was regularly changed every few years. Today the best known code name is BURLINGTON (1961-1963),

but others include STOCKWELL (1959-1961) and CHANTICLEER (1970-1987). The CGWHQ's location and details were classified as 'Top Secret – Acid': the highest possible level, with knowledge about the site kept to the absolute minimum number possible. The departmental planners did not know of its location and none were allowed to visit, though they were making decisions about how it should be used. Even though the BBC complained that they needed to know the location so they could make plans for broadcasts during times of war, there is no evidence to suggest they were informed. During the 1960s even Government Ministers were not allowed to visit. Eventually 'one senior officer from each service in civilian dress' was allowed to visit the site, but "*they must be careful what they say because most of the workers there do not know what it is for*". It was only on Christmas Eve 2004 that the site was declassified. The declassification was announced

to the world on the MOD's website: "*A formerly secret Government underground site near Corsham in Wiltshire, which was a potential relocation site for the Government in the event of a nuclear attack was declassified at the end of 2004*".

The telephone exchange (also known as 'Woodlands') was an integral part of the CGWHQ. General Post Office (GPO) staff started installing the telephone exchange at Corsham in late 1957 and completion was in late 1961. The exchange was linked to a number of hardened shelters throughout the country known as Regional Seats of Government (RSGs).

The exchange provided effective communication with the RSGs and with the outside world. It comprises large manual switch boards and automatic telegraph and telephone switching with comprehensive transmission facilities. Suite 1 has 40 positions with 15 cord circuits each, whilst Suite 101 has

14 positions and 8 circuits each. This suite had the facility to communicate overseas with Commonwealth and allied Governments, NATO centres and British Embassies.

Around 2010 all non-critical underground electrical installations were turned off. The exchange began to suffer (heaters in the consoles no longer worked) the plasterboard ceiling began to fall, and water ingress was escalating some of it directly onto the consoles. The Information Systems and Services (ISS) Mine Management Team (MMT) made best efforts to cover the consoles.

Rapid deterioration followed with a wooden inspection hatch falling from the roof causing even more water ingress. In 2012 English Heritage (EH) began the process of making the exchange a Scheduled Monument this was confirmed in 2013, thus recognising the exchange console is of national importance.

In 2015 Heritage England (HE) considered the continual ingress of water to be above benign neglect and placed the exchange on the Heritage at Risk Register (High risk). Later in 2015 ISS Head of Establishment (HoE) granted limited funding for the provision of and fitting of dehumidifiers and fans. The MMT managed the procurement and fitting, and deterioration stopped. Liaison began between HE and Peter Ralph (ISS MM) on the creation of a Heritage Protection Agreement (HPA), interim meetings were held.

In February 2017 senior members of ISS, DIO, English Heritage and Wiltshire County Council (WCC) signed the agreed document, which was the first in MOD. After consideration of the improvements to the exchange the risk was lowered to vulnerable and removed from the HE at risk register in 2017.

After the 2017 HPA annual meeting HE arranged for a structural engineer to attend and provide a report on the potential to create a false ceiling above the exchange. The 2018 HPA annual meeting attended by the MMT, WCC, DIO (Historic Buildings) and Historic England (HE) discussed the report, it was decided to go out for tenders using the structural engineers' guidance as a



Prior to the roof structure completion © D. Hawkins

template. Finance was confirmed from DIO (Historic Buildings) (Conservation Stewardship Fund) and HoE ISS.

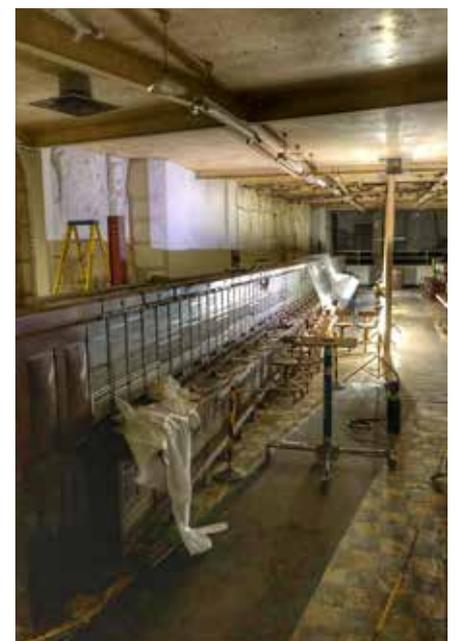
The MMT of Peter Ralph and Gary Bray secured the scheduled monument clearance certification from HE and co-ordinated viewing/tendering for the task via various contractors. The chosen contractor as agreed by the HPA committee was a local firm, Racetec Fabrications Ltd. Work on the new roof commenced in late January 2019. The MMT assisted daily in movement of materials and supervision of the contractors, the task being completed to an exceptionally high standard by mid-April.

The 2019 HPA meeting confirmed further funding has been made available from the original sources for lighting and cleaning of the consoles. The format of the lighting has been agreed and will be fitted mid-summer, whilst tendering for the cleaning task has commenced.

The can-do attitude from all sides in the most difficult of environments has

been exceptional. Hopefully current and future work will protect this monument for decades to come

Peter Ralph
Mine Manager
Information Systems and Services



Prior to the roof structure installation © D. Hawkins

The Brecks pingo ponds – helping to protect a national freshwater treasure



Pingos are amongst Britain's very highest quality freshwater habitats © Pete Case

Stanford Training Area (STANTA) lies at the heart of one of Britain's most exceptional landscapes for freshwater wildlife, the Brecks. This can come as a surprise – the area is in one of the driest parts of Britain and is dominated by a mixture of dry sandy heaths and free-draining chalky soils. What makes the Brecks special for freshwater biodiversity is the mixture of pingo ponds, valley fens, naturally formed small lakes (known locally as meres) and the chalky rivers. But of these habitats, it is the remarkable pingo ponds that are the area's biological gems, and Defence Infrastructure Organisation (DIO) plays a vital role in protecting these very special places.

Pingos are naturally created ponds formed some 6,000 years ago by freezing and thawing of upwelling groundwater when East Anglia was still tundra. Due to their ancient origins, and where they still remain clean and unpolluted, they are home to uniquely rich communities of freshwater plants and animals. Pingos are scattered across the northern half of the Brecks, typically in the alluvial valleys where peat accumulates. On STANTA they are found particularly along the valley of the Thompson Stream, one

of Britain's most exceptional areas for freshwater wildlife. As well as pingos, STANTA is also home to several of the equally remarkable fluctuating meres, including Fowl Mere and Home Mere. More recently created ponds, by-products of digging for sand, gravel and marl, also support special freshwater wildlife, taking on the character of the ancient ponds and lakes. All of these habitats are helped by the low levels of nutrients and pesticides on STANTA compared to the surrounding countryside, where commercial farming, sewage and road runoff impact the majority of ponds, streams and rivers.

Protecting pingos requires detailed knowledge of what makes them special. Freshwater Habitats Trust (FHT) has been working closely with DIO to describe the exceptional diversity of freshwater life the



The mud pond snail only lives in the highest quality ponds © Jeremy Biggs

pingos support, especially the wetland plants and the smaller aquatic animals, like water snails, water beetles and water boatmen, which make the ponds so special. STANTA is also well-known for great crested newts, found in about 30% of all the ponds (Gibbons, 2012).

Most recently, in spring 2018 surveyors Martin Hammond, Martin Collier and Garth and Susan Foster assessed the wetland plant and invertebrate communities of six ponds in STANTA's Waterhouse Plantation on behalf of the FHT and DIO. This work was made possible by the National Lottery Heritage Fund backed 'People, Ponds and Water' project. The STANTA pingos share two features common to all of the best groups of ponds. Firstly, they include permanent and seasonal ponds and secondly they are largely protected from the all-pervasive pollution impacts that affect most countryside ponds and streams. It can come as a surprise that drying out is often good for freshwater wildlife, but for freshwaters generally, and especially ponds, drying out creates habitats with fewer or no predators, especially fish. Indeed, roughly half of all freshwater plants and animals need or tolerate periods of drying out. Great

crested newts are a classic example of this, as it protects the vulnerable larvae from fish predation. The second special feature of the STANTA pingos is their high water quality. Without clean water most of what makes them special would all too quickly disappear, even if the ponds themselves persisted. Surrounded by one of the largest areas of non-intensively farmed land in lowland England, and largely isolated from the polluted streams and ditches of the surrounding countryside, their clean water is vital.

The surveys undertaken in 2018 revealed a rich assemblage of plants and animals including around 30 nationally uncommon species. This is an exceptional total, and as is typical of the pingos, the water beetle community was particularly diverse. Uncommon animals also included the pond mud snail, which belies its name in needing the highest quality ponds! Rather better named is the shining ram's-horn snail, another indicator of the highest quality freshwater habitats in Britain. The STANTA pingos are unusual in being the only place in Britain where these two species have been found together. Normally, the pond mud snail lives in mildly acidic sites and the shining ram's-horn in alkaline calcium rich water. In very few places in Britain do these two types of freshwater habitat occur close together and STANTA is perhaps unique in this respect.

Also in the pingos was Britain's largest water beetle, the great silver water beetle. Now mostly restricted to clean freshwater drainage ditches of marshes around

the south and east coast of England, STANTA and other Breckland pingos are amongst the few inland sites where this spectacular creature is still found. Like much else of what makes STANTA special it probably depends on the clean water. The adults are herbivorous, but the larvae feed mainly on pond snails, of which they require an abundance.

Much the rarest of the animals found at STANTA in 2018 was the wonderfully named miry sloth weevil, a small long-nosed beetle which lives on water plants in the genus *Potamogeton*, which are commonly called 'pondweeds.' It was first recorded in Britain close to STANTA at Wretham Heath in the early 20th century and most recently has been found in the Devil's Punchbowl, also on STANTA. It is rare all over Europe.

Amongst the water plants, the STANTA pingos support a good variety of the most sensitive species typical of the Brecks. This includes water-violet, which has declined all over England and is now Red Data Book listed. Water-violet should be a fairly common plant in lowland Britain but because it needs clean calcium rich water it has declined widely. This is because agricultural fertilisers and sewage now affect virtually all of our naturally calcium-rich waters. STANTA also has a population of tubular water-dropwort, another once widespread water plant that is now both Red Data Book listed and a Priority Species under the NERC Act 2006. Once widespread, the plant has undergone an enormous decline as clean water



Water-violet: a Red Data Book plant of the STANTA pingos © Jeremy Biggs

and old wet meadows have been swept away and ponds polluted. Also characteristic of long-established clean freshwaters is fen pondweed, a plant only found in high quality calcium rich ponds and ditches, never occurring in the ordinary polluted countryside where water quality is much poorer.

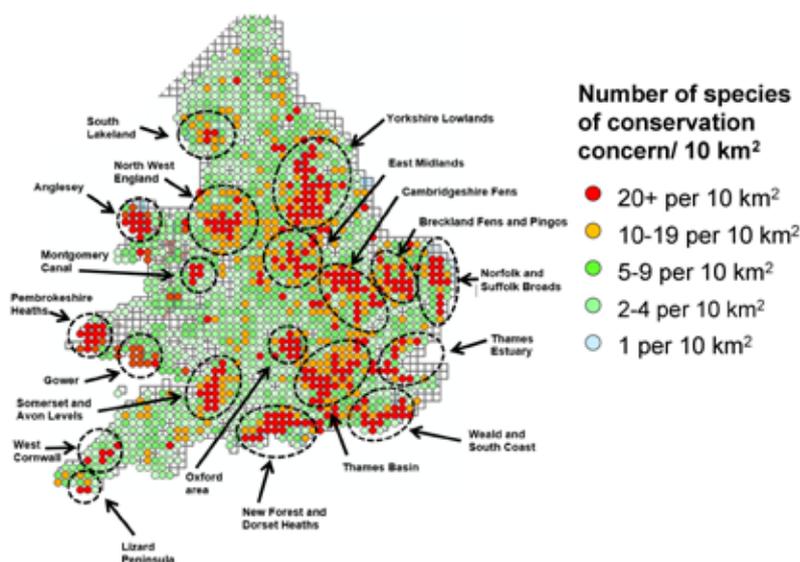
All in all, the Waterhouse Plantation ponds make a wonderful contribution to Britain's freshwater biodiversity and are a vital part of the network of high quality freshwaters that are a feature of the Brecks. With the new data available it will be possible for the local DIO team to continue helping to protect this exceptional site for freshwater wildlife for the long term. Like many Ministry of Defence sites, it is a critical part of our national Freshwater Network and a vital refuge for Britain's freshwater biodiversity.

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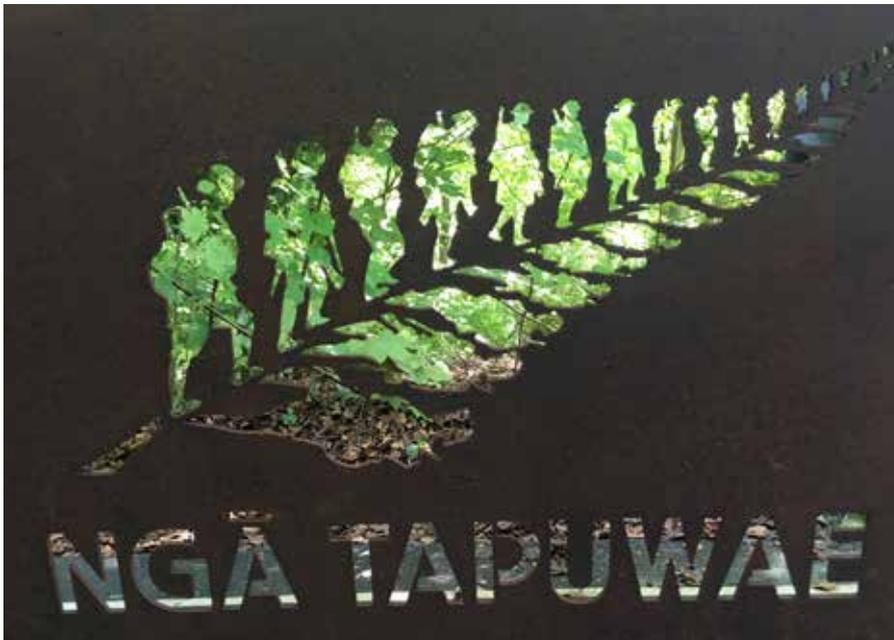
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Dr Jeremy Biggs
Director
Freshwater Habitats Trust



A map showing the Brecks as one of Britain's important freshwater areas © Jeremy Biggs

In their footsteps – celebrating the Kiwi's 100th birthday



The fern motif of the Ngā Tapuwae sign – the silhouette of WW1 soldiers can be seen in each of the fronds
© Hugh Beamish of Historic England

What connects Gallipoli, Messines, Wellington, Brockenhurst, Passchendaele and now Bulford? The answer is that all have a 'Ngā Tapuwae' sign. These beautifully designed display boards and stands commemorate sites that are of great importance to the ethos of the armed forces of New Zealand and, in particular, their contribution to the allied efforts of World War One (WW1). The Bulford sign relates, of course, to the Bulford Chalk Kiwi.

As seen in Sanctuary 47 (2018), the 130m long Bulford Kiwi is an imposing monument and one which is very clearly an indicator of the presence of New Zealand soldiers. This year saw the Centenary of the construction of the hill figure which overlooks the site of Sling Camp, the home for over 4,500 soldiers. Just below it, the traces of the huts used by the soldiers can be seen whenever the fields are ploughed and there are also the remains of their 'backdoor' training elements, with trench systems still zigzagging across Beacon Hill. The hill is however now covered in the juniper bushes and rich chalk grassland flora that makes this such an important area from a natural environment perspective.

The Kiwi is the most recent scheduled monument on the Salisbury Plain Training Area and thus is afforded Government protection. Beyond this however is the importance that as wide a group of people as possible are enabled to view this hill figure – in similar fashion to visitors to other hill carvings like the Uffington White Horse and the Cerne Abbas Giant. To this end, the New Zealand High Commission put into action their long-standing plan to install a Ngā Tapuwae commemorative sign on the Plain. The aim of the sign is to explain the significance of the monument to passers-by and also to act as a focal point within a digital trail that can be downloaded by those who decide to follow in the footsteps of the New Zealand soldiers of WW1.

On discussions with the Defence Infrastructure Organisation (DIO), Tidworth and Bulford Garrison, 3rd (UK) Division Signals and other important stakeholders in a bespoke working group, an accessible location for the sign within the footprint of the old Sling Camp was chosen. This was augmented with another sign on the Training Area near the Sheepbridge,

close to Old Carter Barracks, with the Kiwi as a fitting backdrop. Visitors are guided to both of these by some of the most unusual and eye-catching signs on the Training Area (against stiff competition!); a black kiwi on a white background hopefully ensuring that anyone looking for the figure will find it easily. The sign itself comprises a display board which highlights the role of Sling Camp and the methods employed to design, construct and now conserve the Kiwi. The latter now being a duty for the DIO.

Perhaps the most striking component of the whole display board is in fact the stand on which it is placed; an element which is the recurring motif for all the boards in this programme. At first glance the visitor is greeted by a cut-out of the silver fern; a familiar image associated with New Zealand, be it the All Blacks or the one dollar New Zealand coin (itself with a depiction of a kiwi). On close scrutiny however, one can see that in fact the fronds are composed from the silhouettes of WW1 infantrymen and their shadows, advancing off into the distance, and into memory. Many of these soldiers never made it home to New Zealand from the Western Front, Gallipoli or indeed Sling Camp and thus the



Kiwi road sign on Salisbury Plain © Crown

military cemeteries at nearby Codford and Tidworth are the final resting place for several of these men.

In addition to the Ngā Tapuwāe sign and the board by the Sheepbridge, a third board was placed at the head of the Kiwi itself. This sign pays tribute to those responsible for the Kiwi's design and construction, from Sgt Maj Percy Blenkarne, an Army Education Officer who brought a Kiwi sketch for the design, to Sgt Maj Victor Low, who surveyed the figure from 'YMCA corner'. Capt Harry Clark, who directed the troops to cut the Kiwi, is also commemorated and is quoted on the board *"The designing was made considerably more difficult owing to the various shapes of the hill, there being no one plain slope of even grade sufficiently large for the design. Owing to receding higher slopes it was necessary to distort the outline in order to obtain the proper perspective from the cross roads at the centre of the camp."* This third board is unusual in not actually depicting the Kiwi itself but rather the view from the bird; looking out over the fields of Salisbury Plain and depicting the military Camp as it stood in 1919, where now a farmer's fields and Garrison housing are located.

Celebrations for the Centenary of the construction of the Kiwi took place in June 2019 at an event which unveiled the various commemorative signs. Amongst those present was the current New Zealand High Commissioner, Sir Jerry Mateparae. In his speech, Sir



An old postcard c. 1919 showing New Zealand Camp with the Kiwi hill figure in the distance

Jerry confirmed that *"The Kiwi was built initially as something to occupy the troops. Later, it became more of an imperative as the men became restless about not being able to go home. The memorial stands as a memorial to all those New Zealand soldiers who served here. Because the Kiwi is difficult to find, the New Zealand Government decided to add this site to our WW1 heritage trail, this Ngā Tapuwāe (which means 'in their footsteps') sign will help to tell what happened here."*

Having owned parts of Salisbury Plain since 1897, the military presence here is leaving its own footprint, its own archaeological legacy. Amongst the Roman villages, the Bronze Age round barrows, the Iron Age hillforts, the Medieval field systems you can now see the traces of WW1 practice trenches, of hut camps and, of course, monuments

such as the Kiwi commemorating the presence of various armies. Sir Jerry said *"The relationship between Bulford and New Zealand is important and over the years with the people, particularly 249 Signal Squadron, who have repaired the Kiwi. I would like to quote a Maori saying 'People may be lost from sight, but the land remains to remind us.'"*

There is now a website for the Ngā Tapuwāe trails hosted by the Government of New Zealand. The site states that *"with these trails you can follow in the footsteps of New Zealand soldiers, explore famous battle sites, imagine the scenes that unfolded there, and enhance your understanding of New Zealand's contribution to the First World War. You can listen to captivating audio about the battles and the soldiers' experiences, read articles written by leading New Zealand First World War historians and view fascinating historical images."* The website address is: <https://ngatapuwa.govt.nz/>

The boards will help to explain the presence of the Kiwi, the soldiers from a land thousands of miles away and the many stories connected to them. When volunteers embark upon the annual cleaning and re-chalking of the figure, they too are contributing to this commemoration and adding to the very rich history. The land will indeed remind us.

Richard Osgood
Senior Archaeologist
Defence Infrastructure Organisation



An old postcard depicting New Zealand soldiers at Sling Camp during WW1 preparing to leave for France

Walking underwater and breeding under bridges at Otterburn



A dipper feeding on aquatic invertebrates © Peter Fawcett

The Otterburn Training Area is situated in north-west Northumberland and consists of 23,472ha. It is the largest Artillery impact area in the UK and comprises mainly upland moorland habitat, with live firing training carried out on, and to the south of the ridge of the Cheviot Hills between Redesdale and Coquetdale. There are Dry Training Areas (non-live) in the Upper Coquet valley stretching up onto the England/Scotland border ridge.

In addition to several important historical and archaeological sites the Training Area is home to typical assemblages of upland plant and animal species including several species of national and international importance. The Ministry of Defence has had a long and mutually beneficial relationship with members of the Northumbria Bird Ringing Group who have carried out long-term studies of several species within the Training Area. A study of breeding dippers *Cinclus cinclus*, has been running for the past 26 years.

The dipper is an iconic species of upland waterways in northern Britain. It is Britain's only aquatic songbird and the only European representative of the

family Cinclidae. Slightly smaller than a blackbird, they are found alongside fast flowing, stony-bedded watercourses predominantly in upland areas of Britain. They are one of the most iconic species on upland waterways and are famed for their ability to swim underwater and walk along stream beds whilst feeding. Dippers nest in dome shaped moss nests on stream sides or under bridges. They build the nest entrance above flowing water

to carry away the droppings of the young, thereby reducing the chances of detection by predators.

Dippers are amber listed as of moderate concern in the UK by the Royal Society for the Protection of Birds (RSPB), due to a 16% population decline since 1995. The iconic nature of the species and its status as the only truly aquatic songbird, was captured by the Scottish poet and nature writer Kathleen Jamie in her poem 'The Dipper'

It isn't mine to give
I can't coax this bird to my hand
That knows the depth of the river
Yet sings of it on land.

The study area lies in the catchment area of the River Coquet, west of the village of Alwinton in north-west Northumberland. It includes the River Coquet from Alwinton to Chew Green (22km), the River Alwin and its tributary burns; Yoke, White and Allerhope (total 12km), the Usway Burn from Shilmmor to Davidson's Linn (10km) and the Riddlees Burn (6km). There are 50km of waterways suitable for dippers.

Since the late 1970s John Richardson and other members of the Northumbria Bird Ringing Group had visited the area of the Upper Coquet to ring



Accessing dipper nest under bridge on Usway Burn © Neil Anderson

many species opportunistically under the auspices of the British Trust for Ornithology (BTO). This included the ringing of dippers and resulted in a deep knowledge of the traditional nest sites used by the species in the study area. In 1993, John and the late A.M. (Sandy) Bankier decided to discover more about the population biology of the Coquet's dippers and subsequently registered a colour-ringing study with the BTO. Neil Anderson joined the team in 1995, whilst working on a thesis as part of a course of study for a MSc in Environmental Toxicology at the University of Central Lancashire.

Dippers are highly territorial and hold linear territories along waterways. By walking alongside waterways it is possible to establish the end of a territory. This is because adult dippers will change flight direction when they reach their territory extent, rather than entering the adjacent pair's territory. Once a territory is mapped, it is then a matter of finding the nest site, usually through a combination of previous knowledge, adapting the advice of Berndt Heinrich for ravens and learning to 'think like' a dipper seeking out potential nest sites.

In territories which included bridges that crossed the river, the team sometimes requested permission to provide dippers with a helping hand, by installing a nest box under the bridge. This was of benefit to both the dippers and researchers, as it provided a safe nesting site which could be easily located by the team. Careful box placement ensured that members of the team who are trained and licenced bird ringers could access the nest box to monitor clutch size and ring the young.

The first study outcome resulted in the successful completion of a MSc with distinction by Neil in 1995. By this time, both authors were fitter from walking 50km of riversides and had become smitten with both dippers and the beautiful Northumbrian landscape in which they live!

The dipper population has fluctuated in the 26 years since the research began, with both good and bad years, however the dipper continues to walk under water and breed under bridges in the Coquet valley and elsewhere on the Otterburn

Training Area. Between 1993-1998 there was a steady increase in the number of breeding pairs, from 11 to 35. Pairs declined to the mid-teens until the mid-2000s before a rise to 19 pairs took place in 2012. The figure has once again fallen to around 10 pairs.

The team were aware of the need to look for concerning population declines and of the importance of looking for explanations. None were immediately obvious and over the years the team have come to realise that many of the sites used in the peak years were sub-optimal as dipper nest sites. The team therefore tried to determine why numbers were first so high. The rise coincided with the recolonisation of the river systems by otters and the subsequent displacement of mink, a major predator of dipper nests. The decline in dippers is not a local issue but has been seen across the UK.

Since 1993 the team have ringed 1,924 young dippers, which represents over 5% of the total number of dippers ringed in the UK during that period. This has revealed that dippers move over the watersheds to the north and west of the study area. Interestingly, male young dippers disperse further than females, an adaptation which prevents the in-breeding found in many animal populations.



Ringing a dipper chick © Neil Anderson

Both authors are getting older. Neil survived a severe stroke in 2013, which has restricted movement. Neil has therefore surrendered his ringing licence. The team however have no plans to stop studying dippers – they are such appealing little birds!

Neil Anderson & John Richardson
Bird Ringers
Northumbria Bird Ringing Group



River Coquet near Shilmoor © Neil Anderson

Under the surface – UXO at the MOD Access Forum



An assortment of artillery and mortars © Crown

On Wednesday 8th May 2019 the 6th annual Ministry of Defence (MOD) Access Forum was held at Altcar Training Camp, near Formby on Merseyside. This follows on from previous forums that have been held at locations such as Horseguards in London, Longmoor in the Home Counties, Salisbury Plain in Wiltshire, Castlemartin Ranges in Wales and Okehampton Camp on Dartmoor.

The MOD Access Forum is coordinated by the Access and Recreation team within the Defence Infrastructure Organisation (DIO). It brings together relevant MOD staff and external stakeholders from both statutory bodies and recreational user groups to discuss access and recreation on the MOD estate. This year, the forum was attended by representatives from; Natural England, British Horse Society, The Ramblers, Cycling UK, British Mountaineering Council, Forestry England, Disabled Ramblers, Campaign for National Parks, National Parks Access Officers' Working Group, Sustrans and Motorsport UK.

The primary focus of the forum is to enable discussion between attendees about any relevant internal or external

access and recreation policy changes that may have developed throughout the year, specific issues that the MOD, or the external stakeholders may have regarding access and public safety on the MOD estate and exploring more collaborative ways of working. This year some of the topics on the agenda included:

- MOD Byelaws
- The potential impact of ash dieback disease on the MOD estate
- The work of the DIO Access and Recreation team
- Access and recreation projects enabled by the MOD Conservation Stewardship Fund over the last 5 years
- Potential collaborative work on media and communications between DIO and external attendees.

Lt Col Gordon Black, the Commandant of Altcar Training Centre, gave the forum an introduction to the site and to the work of the Reserve Forces and Cadets Association, who own and manage Altcar. The event was also fortunate enough to have Col Phil Cook from Defence Training Estate Headquarters in attendance to give the forum a presentation on the work of his team, and the focus on public safety across the whole of the Defence Training Estate.

Whilst DIO maintains year round contact with external partners and are always available to discuss specific queries that individual user groups may have, the forum is a great vehicle for promoting wider discussion, and getting input from the wider cross-section of recreational bodies. As well as the more formal meeting there is also a site visit which enables the team to introduce external stakeholders to elements of military activity that may impact on safe public access. This in turn leads to the team taking further steps to improve public safety.

Keith Swarbrick, from the DIO Environmental and Ordnance Liability Management (EOLM) team was invited to the 2019 forum to talk to attendees about the work of the Explosive Ordnance Clearance (EOC) element of the EOLM team. Keith explained how unexploded ordnance (UXO) may manifest itself in areas where the public can access and provided a demonstration of some of the equipment that his team use to scan for and to identify UXO.

The forum attendees donned their boots and waterproofs and braved a very wet and miserable Merseyside morning to

visit the beach within Altcar Training Camp, overlooking the Crosby Channel. Keith had kindly prepared a wide array of equipment on site to show the group. Keith explained about the role of his team and the work they carry out, the work of the EOC teams from the three branches of the Armed Forces and where their respective remits lie and potentially overlap. This work can be both National and International, so the demand for these limited resources is always very high and the EOLM team have a very busy schedule. This made Keith's attendance all the more appreciated.

Keith highlighted numerous items of kit, beginning with the hand-held scanners that are used in various scenarios for looking for different types of UXO. It was explained how each scanner made different tones when working over an area which revealed the length, orientation, approximate depth and magnetic polarity of each anomaly buried under the surface. These noises help the EOLM team to identify whether the item is UXO and the type of UXO, thereby enabling the development of the best plan for removal.

Demonstrations were also given of pieces of equipment that may be used when covering wider areas of ground. These included a hand-operated 'cart' that has a number of sensors on it as well as high specification GPS equipment that plots every anomaly straight into a plan. This means the EOLM team can either deal with the UXO immediately or build up a more detailed picture of the UXO contamination over a large expanse of ground. The biggest piece of equipment is made up of a number of sensors mounted onto a trailer that can be towed by a 4x4 vehicle. Again, this



Demonstrating how a hand-held scanner works © Crown

equipment uses very high specification GPS equipment to plot more expansive areas of ground, building up a detailed picture of the levels of contamination across a whole site.

After Keith had demonstrated all the kit and fielded many questions, the group tried out the hand-held detectors to search for anomalies (not UXO!) that had been cunningly hidden in the sand by Keith prior to our arrival. This enabled the group members to see how difficult it is to correctly identify the difference between UXO and general metallic waste items buried underground.

The EOLM team do not only work on the MOD estate. As so much of the UK land mass has at some point in history been utilised by the military for training, UXO continues to appear in a wide range of publicly accessible locations. The expertise of Keith and his team, as well as the respective Royal Navy, British

Army and Royal Air Force EOC teams is then called upon.

During lunchtime discussions it was widely agreed that the safety messages and signage displayed across the MOD estate regarding UXO remains as important as ever. The DIO team strive to ensure that safety is of the upmost importance when managing access and recreation on the MOD estate.

Post-forum communication and feedback from attendees once again showed that the MOD Access Forum is recognised as an extremely useful vehicle for maintaining strong relationships between the MOD and external colleagues. The team will continue to strengthen these relationships through collaborative working, communications, and future forums.

Scott Ashworth
Access & Recreation Advisor
Defence Infrastructure Organisation



Access Forum course attendees using the scanner © Crown



Suspect chemical projectiles recovered to Porton Down for disposal © Crown

Grand designs at Bourlon Barracks – renovating a Grade II listed building



Main entrance with Clock Tower, sash and arched windows © WYG Ltd

The creative re-use and adaptation of the listed Sandhurst Block forms part of the £1.8 billion Army Basing Programme (ABP). The programme is providing the facilities to enable nearly 100 British Army units to relocate, reconfigure, disband or re-role, this includes bringing units back from Germany – 20,000 service personnel and their dependants. In many cases this requires entirely new, purpose-built facilities, but there are also opportunities to repurpose existing buildings.

A review of living and technical accommodation nationwide was carried out to determine the requirements of the soldiers moving under the ABP. Bourlon Barracks in Catterick Garrison was going to be home to personnel and equipment from three Army units returning from Germany, as well as a further two units relocating

from elsewhere in the UK. The review identified the Sandhurst Block, which had stood empty since 2009, as a candidate to contribute to the facilities needed at Catterick Garrison. This landmark building is a leading example of 1930s barrack architecture and the work needed to consider both the unique difficulties and opportunities that this would provide. Plans were quickly developed for a sensitive refurbishment to bring the Grade II listed building back into use, providing offices, stores and specialist briefing rooms.

Originally used as an accommodation block, the modern uses required refurbishment and reconfiguration of the internal layout of the building. Following a period of inoccupation, the building condition had suffered some deterioration, particularly to the external

envelope. The challenging project needed a large team to undertake the conversion and this included the Defence Infrastructure Organisation (DIO), the principal support provider WYG, the principal contractor Galliford Try, mechanical and electrical engineering specialists Lorne Stewart, and specialist restoration and joinery contractor, IWP Dansk.

The main objectives were to preserve the key aspects of architectural and historic significance of the Grade II listed building, while sensitively modernising the internal areas to meet the needs of the soldiers who would be using Sandhurst Block. The team had to strike a balance between compliance with statutory building requirements and meeting the needs of diverse and specialist military users. It was important that the team kept the soldiers and civilians, the end-users, central to the planning process and building design, thereby ensuring it would meet their needs.

Both internal and external features required specialist refurbishment with a creative and inspired approach to address the various constraints. For instance, bats had taken residence in the empty building and mitigation measures included the installation of bespoke bat boxes within the building's soffits to provide a safe and compliant habitat.

The existing cast iron and lead downpipes were in a poor state of repair, which prevented removal and repair off site. An innovative modern technique was used which involved the installation of a resin-reinforced fibreglass sleeve lining inside the existing pipes and hoppers. The method strengthened the guttering and pipes by sealing existing cracks. This was a composite solution of old and new – the original features and their aesthetically pleasing imperfections were preserved, longevity increased, and the character and appearance of the building maintained.

Around 750 historic timber sash windows also had to be refurbished on site. This included the repair of moveable sashes to their original specification using traditional woodworking methods. Decayed timber components were directly replaced, and moulded beading faithfully replicated and installed. Existing sash counterweights, rollers, ropes and mechanisms were repaired and refurbished using traditional carpentry skills, preserving historic features and reinstating the windows to their original design. Modern interventions were also made to sensitively incorporate hidden draughtproofing strips to improve the thermal efficiency of the windows and reduce heat loss.

Specialist restoration and joinery contractor, IWP Dansk, conserved and restored both metal and timber window frames. The original arched-top steel windows were built into the masonry preventing their removal for off site refurbishment. The solution was to strip the windows back to bare metal, safely removing existing lead-based paints. Resins were used to rebuild any distortion or decay, followed by the application of special paint to provide ongoing protection. This approach limited disturbance to the historic building fabric and preserved the aesthetic significance of the striking and intrinsic architectural features. In addition to being restored to their original condition, the windows also required additional work to ensure they met Defence protection and security requirements. Traditional fabrication techniques and skills were also used to replace missing or defective ironmongery, ensuring a historically accurate match to the original.

Internally, a minimum intervention approach was taken to change as little as possible. This meant limiting any disturbance to the historic plan-form, re-using existing spaces and organising the allocated spaces for the new occupants to best meet their needs. Designs for the dining hall included low-level walls and linear light fittings to minimise interference with significant architectural features.

The original internal staircase survived intact. The staircase, a feature of special

interest, had to be retained in its original condition and therefore the assistance of specialist contractors was required. The metal of the bannisters was rubbed down and painted before a new protective covering was installed to the handrails. The bold simplicity of the interior and clean lines created by the elegant stairs and simple decoration of the coffered ceiling have all been preserved, and where possible, better revealed through this minimal intervention strategy.

The energy usage of the Sandhurst Block has been offset by the introduction of a large area of solar panels located on an adjacent building. This will provide 15% of the building's energy requirements without impacting on its external appearance.

This £20 million project co-locates several units into a nationally recognised Grade II listed Garrison Headquarters building. The team impressively and effectively completed this large refurbishment project, comprising over 500 rooms of mixed use over three floors, on time, within budget and to the highest of standards. If the building had remained unused, the Ministry of Defence estate would continue to incur costs for maintenance works to keep it wind and weather tight and ensure statutory compliance, but without the beneficial usage. The re-use of the Sandhurst Block contributes to the enhanced operational effectiveness and more efficient running costs at the site. These modern work facilities will enhance standards of living and are a great example of sympathetic refurbishment of a historic building.



Refurbished downpipes and hoppers with embossed crown and year © Crown

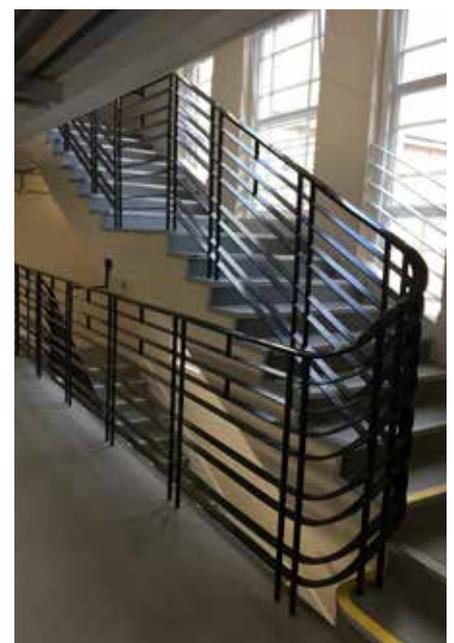
The whole team were delighted that their hard work was recognised in the 'Constructing Excellence Yorkshire and Humber Awards', where the project was 'Highly Commended in the Preservation and Rejuvenation category', as well as winning the 'Sanctuary 2019 Heritage Project Award'.

Lt Col Richard Hill RE said of the completed project: *"Inside, the building conveys a pleasing aura of historical significance preserving a legacy appealing both to the user – the Army, itself imbued with history and tradition – and the visitor. For the four discrete user groups that now enjoy their own modern office spaces, thanks to discrete internal demolition works and clever modifications, the building has been successfully adapted to make it compatible with its new use and difficult to believe it was once used as living accommodation."*

The bats, which are the only vestige of the years of neglect, now safely reside on site in bat boxes.

From the outset, by providing an efficient project solution, the potential of the building has clearly been realised and once again it stands proud on the edge of the parade square."

Richard Asbery
Project Manager
Defence Infrastructure Organisation



Refurbished internal staircase with original steel windows in the background © Crown

Restoring dune slacks at Magilligan Training Centre



Dune slack excavation work underway © Adam Mantell

The dunes at Magilligan Strand in Northern Ireland have been exploited by people for different reasons over many centuries. There are historic records of the importance of the site as a rabbit warren from the middle ages onwards, and parts of the dunes were once farmed for both crops and livestock. Military training has been taking place at Magilligan for over 120 years, and the site is used by both the British Army and the Police for a range of vital operational training.

Like most dunes Magilligan Strand is also very important for wildlife and is designated as an Area of Special Scientific Interest (ASSI) and a Special Area of Conservation (SAC), the highest levels of UK and international designation. The Ministry of Defence (MOD) control approximately 70% of the SAC (nearly 700ha) for training.

Magilligan Training Centre has hundreds of hectares of species-rich fixed dune grassland which is maintained by cattle and sheep grazing and by mechanical scrub removal. The coastal strip changes frequently with regular cycles of erosion by winter storms and deposition of sand in calmer summer weather along

the 5km of beach, that ensures that the earliest stage of dune formation is well represented along the shoreline.

One of the most important features that support much of the biological diversity at Magilligan Strand are the slacks. Slacks are low-lying permanently damp areas that are found in some but not all dune systems. Slacks are wet because they are close to the groundwater table and often flood in the winter. This, alongside seasonal flooding, allows a unique assemblage of rare plants and invertebrates to thrive by forcing out highly competitive plants that flourish in drier areas. The most extensive and best quality dune slack habitat in Northern Ireland is found at Magilligan Strand.

Monitoring has however shown a problem. The SAC designation includes the earliest stage of slack development called embryonic slacks. Embryonic slacks start with only bare sand and are slowly colonised by a selection of bacterial mats, rare plants, mosses and liverworts. As time has passed the plant communities at Magilligan have developed beyond this early stage and so the unique habitat has been lost.

The MOD have been working closely with the Northern Ireland Environment Agency to find solutions to this problem, and in March 2019 an experimental trial was undertaken to create new slacks. The area of grassland adjacent to an existing slack was dug out using an excavator. Levels were taken from a nearby slack using survey equipment and the ground level was lowered until the new surface was just a few inches above the water table. This area will be monitored as the vegetation alters and if the trial proves successful in recreating new embryonic slack habitat, other new slack habitat will be developed elsewhere on the site.



Ordnance discovered © Adam Mantell

It is thought that this is the only site in Northern Ireland where this technique has been used and it is likely to be repeated elsewhere if successful.

Before starting work the team needed to check for and clear unexploded ordnance from the two identified locations. One of the unexpected problems encountered is often experienced on sites with a history of military use; an abundance of iron-rich material. The team had originally hoped to excavate two locations, but it quickly became apparent that the amount of metal debris in the ground would make clearing unexploded ordnance very difficult indeed, so efforts were instead focused on one site.

The project also presented an opportunity to conserve a rare liverwort called petalwort *Petalophyllum ralfsii*. This tiny plant is a SAC feature and Magilligan is the last location in Northern Ireland for this species. As the sand has become more and more stabilised by vegetation, the right conditions for this species have declined. The team had monitored petalwort annually and it is only present in one location. A single thallus was found in the spring of 2019, whilst none were found in the two previous years. It is likely that viable spores and gemmae (liverwort 'seeds') which are very long-lived are still in the soil waiting for suitable conditions. In order to allow these to germinate and thrive the team plan to lift a thin section of turf adjacent to this colony and transfer it to the excavation in the slacks. Once the spores and gemmae are in damp sand with less competition from more vigorous plants, it is hoped that they will grow and bolster the population.

Since the end of World War Two (WW2) most dunes in Europe have become progressively more stabilised by rank vegetation. Bare sand is important because it heats up rapidly in the sun and supports specialised plants and invertebrates that are not found elsewhere. Bare sand is an important habitat across all dune sites and there is a target to have at least 5% of this habitat at Magilligan, however it currently covers less than 1% of the site. Building on a report commissioned from a coastal geomorphologist, the team are exploring options to allow more sand to be blown

about again by the wind. This is called dune rejuvenation and the aim is to reinstate more dynamic processes in the dunes where bare sand was previously created by sand mining, rabbits, livestock or other farming practices.

This year the team plan to remove vegetation from the tops of the dune ridges in several locations to expose sand to wind scour. This will allow monitoring of the effects at a small scale before potentially starting larger projects in the future if the works are successful. One species that may benefit is the small but very attractive scarce crimson and gold moth. Scarce crimson and gold is extinct in Britain due to inappropriate management of dune systems and dune stabilisation. In Northern Ireland it is found in a few dune systems along the north coast of Antrim and Londonderry and in Ireland it is found in a few areas of limestone pavement in Counties Clare and Galway. It requires very sparsely vegetated ground with thyme in order to complete its life cycle so is found in areas where the succession is not yet advanced. It is known that the habitat required by this species has been declining since WW2 and the habitat is quite patchy. The team are however confident that creating more areas of open sand in the longer term will benefit this species.

Magilligan Strand is a hugely important site for wildlife in both an Irish and British context. Like many dune sites



Scarce crimson and gold moth at Magilligan
© Adam Mantell

it has become too stabilised. The work being undertaken is going some way towards restoring a more dynamic dune system that supports all stages of dune vegetation and increases the amount of bare sand habitat. This is essential for the site to thrive and continue to support an array of special wildlife alongside essential military training.

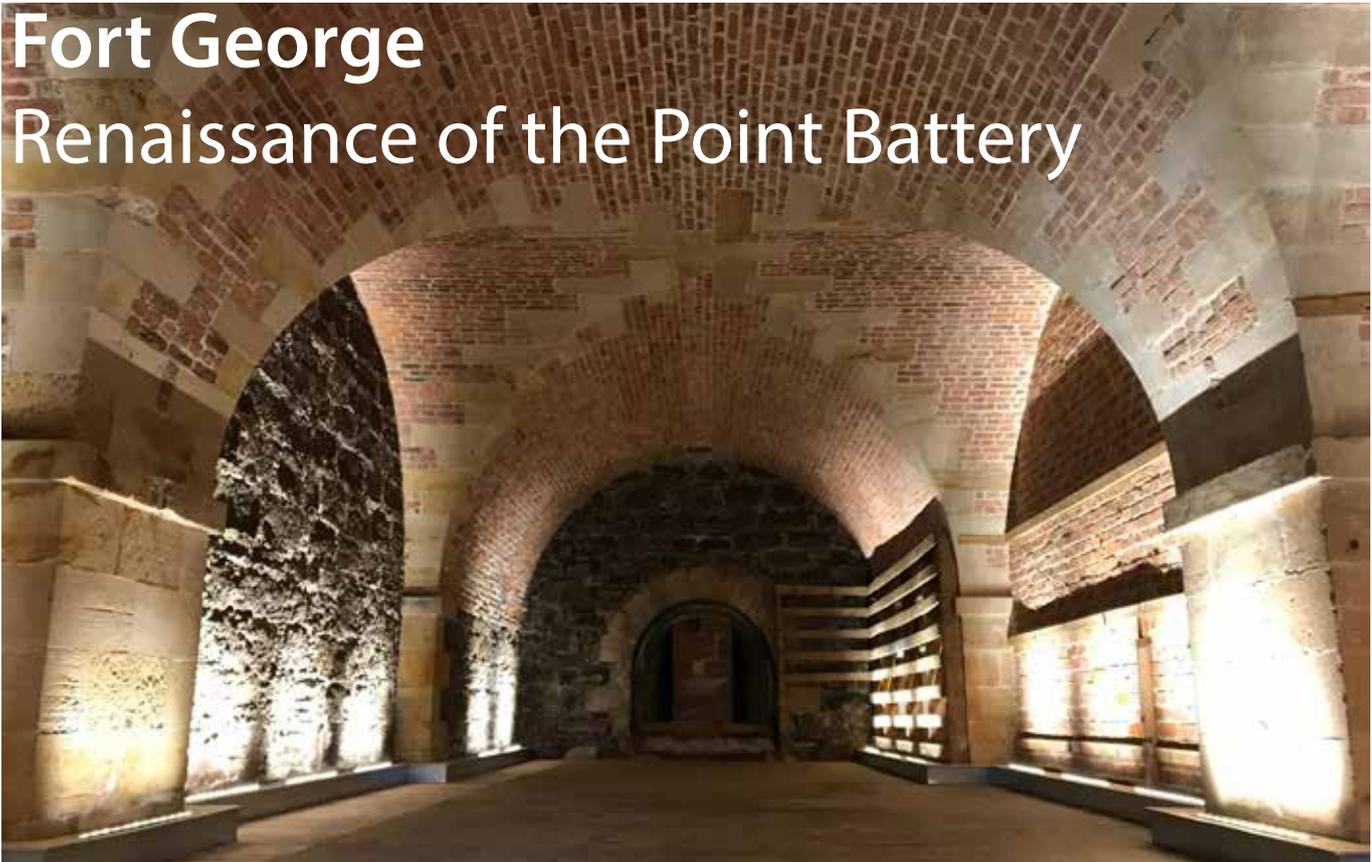
Adam Mantell
Conservation Officer
Ulster Wildlife



Marsh orchids at Magilligan Training Centre with the Binevenagh cliffs in the background © Adam Mantell

Fort George

Renaissance of the Point Battery



Reopened Point Battery with new lighting scheme © Crown

Situated in the north-east of Scotland 13 miles from Inverness, Fort George is built on a shingle peninsula jutting into the Moray Firth allowing the sea to protect the fort on three sides. Fort George is one of the most outstanding and best-preserved 18th century fortifications in Europe. A vast complex of artillery fortifications and Garrison buildings, it was built in the wake of the 1745-1746 Jacobite Rising as part of a concerted effort by King George II's Government to ensure that the Highland clans would never again rise in support of the exiled Stuart dynasty. Planned as an impregnable army base, the fort was designed and built to the highest standards of artillery fortification. Within its sophisticated defences were buildings providing all that was necessary for its Garrison of almost 2,000 men.

The engineer who designed Fort George, Lt Gen William Skinner, adopted design principles formulated in Italy in the 16th century and subsequently honed by generations of military engineers across Europe. As gun technology had improved, builders of fortifications had to produce new defensive solutions. As gun powered artillery mostly fired low and direct, they came up with an angle-bastioned

defence called 'Trace Italienne'. Angle-bastioned defences involved banked-up earthen ramparts, which dissipated energy from the cannonball much more effectively than masonry walls.

The building contract for the fort was won by the renowned architect William Adam, who had previously carried out work at Edinburgh and other royal castles. Before the first sod was cut at the site in June 1748, William was dead and his eldest son John took over. For the next 20 years Fort George dominated the family business and involved John's other brothers, including Robert, who subsequently became one of Britain's most famous architects.

However, by the time Fort George was completed in 1769, the Highlands were peaceful. The regiments despatched to the fort immediately after 1769 served as its Garrison and provided patrols out-stationed throughout the straths and glens. Once the Hanoverian Government perceived that the Jacobite threat was over, it established a new use for the fort, as a training base. The fort continued in use as a training base for regiments recruited in Scotland, especially the Highlands. From 1881

until 1964 it was the home depot of the Seaforth Highlanders (amalgamated with the Cameron Highlanders in 1961).

Today, Fort George is owned by the Ministry of Defence and continues to serve the needs of the modern British Army. In addition to performing its role as a fully functioning British Army base, the fort is under the care of Historic Environment Scotland (HES) as it is a designated scheduled monument. Other than the buildings in Army use, the fort is open to the public, with visitor facilities provided by HES and attracts approximately 75,000 visitors each year.

One of the finest constructed elements of Fort George, the Point Battery, sits within the ramparts at the western seaward point of the fort. It is part of the elaborate defences designed by Skinner and contains a number of historic cannon battery casemates and magazines. The four casemated embrasures (now infilled), once commanded the narrows between Fort George and Chanonry Point on the Black Isle.

The battery and the adjacent demi-bastions (Frederick William's and Duke of Marlborough's) were built

between 1751 and 1761, as part of the big construction programme for the fort's main rampart. Unlike the rest of the fort rampart, the Point Battery and flanking demi-bastions were altered significantly during construction. In 1757-1758, gunports were fitted through the rampart wall below the cordon, and a brick-vaulted powder magazine under the terreplein behind. The date MDCCLVII (1757) is incised over the main door into the magazine. It is just possible that some of the 22 gun emplacements were infilled around the same time. The concern in both cases was the growing threat from a French naval assault. In 1762, the Point Battery, demi-bastions and casemated gunports received their armament.

In 1860-1861, during the national emergency following the French invasion threat of 1859, the Point Battery and demi-bastions, along with the rest of the fort's sea-facing rampart, were refortified and rearmed. The remaining gun embrasures were blocked.

In the event, the coastal defence battery was not called into action, and when the fort became the depot of the Seaforth Highlanders in 1881, the guns along with the rest of the fort's firepower, were removed. Following the fort's transfer to the Ministry of Public Buildings and Works (Ancient Monuments) in 1964, some of the blocked gun embrasures were reopened.

In 2004, contractors working on behalf of HES in the courtyard of the Point Battery uncovered a collection of unused, pre-World War Two ammunition and a number of smoke grenades. They noticed that there were signs of more unused ammunition spread just below the gravel surface. The resident regiment, the 1st Battalion the Royal Irish Regiment, arranged for the ammunition to be removed and destroyed by the Bomb Disposal Unit. The Royal Engineers were drafted in to clear the wider area. This left the interiors of the Point Battery casemates, which had been historically converted for use as powder magazines. At this time timber floors were constructed over the original stone flags and ammunition was visible at the perimeter of the floor. The Defence Infrastructure Organisation's (DIO)



Point Battery entrance © HES

Environmental and Ordnance Liability Management (EOLM) team completed the difficult task of retrieving it.

The Point Battery had been closed to the public for many years, however in 2017 the DIO's EOLM team verified that the casemates were clear of ammunition allowing this rich and fascinating area of the fort to be publicly accessible once more. HES set about doing the necessary work to allow this to happen.

A key area requiring improvement was the lighting, as the spaces were poorly lit. HES designed a scheme that would highlight the wonderful interior architectural features. To achieve this, it was decided to site the new lighting at floor level so it illuminated the wall, highlighting the very fine brick and sandstone vaulted interiors. In line with standard conservation principles, the work had to be carried out under the approach of minimum intervention and reversibility. It was imperative that historic features in the Point Battery were not impacted. This included the historic timber floors. To achieve this the HES architect decided to use loose laid trunking which would sit on top of the historic timber floor, this would mean that no fixings were required to go into the historic floor. The trunking housed the new light fittings along with the associated wiring and because the trunking sits on top of the timber floor there was no need to drill holes in the floor for the cables.

The installation created a dramatic lighting scheme that highlights the rich architectural features within the casemates using low energy fittings. The works are completely reversible and have no impact on the historic fabric. Once the lighting was in place HES realised that the light illuminating the walls had the added benefit that it highlighted the historic graffiti incised into the stonework.

The newly opened spaces have already been used to house temporary exhibitions. The intention is to develop the interpretation of the interiors to demonstrate the different ways in which the casemates at the Point have been used since their completion in 1761.

Ruth Vaughan
District Architect
Historic Environment Scotland



69 Grenade found during the ammunition clearance © HES

Tackling waste from all directions



Posters used in support of the plastics removal programme © Sodexo

Sodexo UK and Ireland delivers a full range of soft and hard facilities management services to over 35 Government agencies across the UK, Cyprus and the Falkland Islands, including the Ministry of Defence. The diverse range of sites vary from small scale to complex, Defence Infrastructure Organisation (DIO) contracts servicing over 20,000 customers across multiple military sites.

One thing that is consistent across all contracts is Sodexo's quest to drive sustainability and waste reduction. As a corporate citizen with a history of over 50 years, Sodexo has responsibility for conducting a business that brings positive impact to the world, drives progress and respects the resources on which the future depends.

As part of Sodexo's 'Better Tomorrow' plan, there are a number of initiatives that underpins activities as an employer, a service provider and a corporate citizen to drive more sustainable behaviour, more sustainable sourcing and more collaborative ways to reduce waste;

- As an employer, 100% of Sodexo employees will be trained on sustainable practices by 2025
- As a service provider, there will be a 34% reduction in carbon emissions by 2025

- As a corporate citizen, Sodexo plan to halve food waste at retail and consumer levels and reduce food losses along production and supply chains by 2030.

Plastic pledge

Under the Allenby and Connaught PFI a pledge was put in place to remove single use plastics across ABC Tidworth and this is now being expanded across all contract sites. All single use consumable items such as straws, plastic stirrers and cutlery have been phased out and replaced with an alternative that can either be recycled or is compostable.

A single use coffee cup initiative was implemented, initially starting at the ABC Tidworth, where single-use disposable coffee cups were withdrawn from the coffee bar and customers were

encouraged to either buy drinks in a mug or bring their own re-useable keep cup. Over a six-week period, nearly 3,000 disposable cups were diverted from disposal. The plan is to now roll this out across all customer facing units including Junior Ranks Diners and hubs. This has the potential to save another 250,000 disposable cups each year.

Sodexo has also removed non-recyclable plastic bags from all defence retail units in the UK and encourages the re-use of an existing bag or provides an alternative in the form of a fully recyclable or a biodegradable paper bag. Since launching this initiative, nearly 100,000 single use bags have been saved.

The on site Sodexo Services Manager, Michelle Ball says "we are proud to have launched and support this initiative within our key client site and feedback has been really positive from our customers. It is a great number of cups saved and exciting that we are raising awareness and changing behaviours around reducing the purchase of single use items."

Wasteful to tasteful

In October 2018, Sodexo launched 'Wasteful to Tasteful' to help reduce the volume of fruit and vegetables being thrown away or left to rot. Each week, boxes of rescued, high quality, seasonal fruit and vegetables are delivered in recycling boxes to catering teams across the country (these have included interesting items such as pumpkins, golden beetroot and kale). Sodexo chefs then create delicious



Cardboard being sorted before bailing © Sodexo

and inspiring dishes using wonky vegetables and encourage customers to do the same at home. Using these items has meant that over 50 tonnes of food waste has been diverted from disposal. Head Chef of Sodexo's contract at ABC Tidworth Gary Kimber says "it is so nice to work with a differing range of fresh, in season ingredients that give us the ability to work on and create new vegetable based dishes and sides."

Segregating waste to prevent landfill

Since the 1982 Falklands conflict, waste management across the Mount Pleasant Complex (MPC) in the Falklands has involved sending about 95% of waste to a managed landfill site at Gemma's Gulch near MPC. As part of the SFM 2018 Waste Management Strategy commissioned by DIO and British Forces South Atlantic Islands (BFSAI), DIO in partnership with BFSAI has recently built the Material Recycling Facility Falkland Islands (MRFFI). Sodexo has been contracted to run the facility whilst Interserve maintain the plant. As part of the proof of concept before the facility is commissioned, Sodexo has in July 2019, in partnership with DIO produced three half ton bales of cardboard and one bale of mixed metals. This has not only prevented this waste from being sent to landfill but has also enabled training of Sodexo operatives in the new facility and its equipment and processes. The ultimate aim is to divert all the waste streams away from the landfill site at Gemma's Gulch.

In addition, targeted separation of glass, clear plastic, PET and general mixed waste is being rolled out in stages across



The facility equipment © Sodexo

the MPC and adopting a robust front-end segregation process has been key to the success of this project.

Lastly, in a partnered initiative with the DIO and by introducing food dehydrators into all kitchens on MPC, 100% of food waste can now be recycled, which will be used as fertilizer on a number of tussock grass regeneration sites across the Falkland Islands. This will enable the recovery of traditional environmental landscape and renewed provision of habitat for a number of species that populate the islands such as sea lions, seals and birds.

Wasteless Week

Wasteless Week is an annual five-day campaign for Sodexo teams to focus on reducing waste at client sites around the world. Innovative and creative ideas come from all teams across the business. In 2018, the team in both the Western Sovereign Base Area and

Eastern Sovereign Base Area, Cyprus focused on banning the use of plastic straws within retail and leisure outfits, phasing out single use plastic carrier bags and polystyrene foam items such as cups, lids, cutlery, plates and food containers, and working closely with suppliers to source alternatives. This has had significant results – over 100,000 straws, 4,000 salad bowls, 50,000 plastic knives, forks and spoons and over 1 million plastic carrier bags have been saved from landfill.

As part of Wasteless Week activities, employees at Episkopi Station, Cyprus worked closely with the Eco Warriors from Akrotiri Primary School to come up with creative ways to reduce waste. Ideas implemented include composting from food waste, plastic recycling and a garden makeover using recyclable materials.

Craig Cunningham

Head of HSE
Sodexo



Cardboard after bailing © Sodexo



Compressed aluminium cans © Sodexo

Skylarks soar alongside the Banshee unmanned target



Banshee Whirlwind target parachute recovery phase – a time delayed image © QinetiQ Ltd



Skylark © Ian Grier

MOD Aberporth, on the west coast of Wales, is a Test and Evaluation Range operated by QinetiQ on behalf of the Ministry of Defence (MOD) under a Long Term Partnering Agreement (LTPA). The majority of trial activities take place in Cardigan Bay and the Range Danger Area is 6500km². The site itself is situated on a coastal headland and covers approximately 550 acres.

The LTPA requires that QinetiQ complies to MOD environmental policies and to achieve this objective a newly formed Conservation Group has been assembled to work in conjunction with dedicated environmental advisors. The Conservation Group manages land and sea conservation and covers many aspects such as marine mammal monitoring, botany, birds, butterflies, reptiles and bat surveys. The site has an environmental management plan which includes grass cutting regimes. This area is within the Aberarth – Carreg Wylan Site of Special Scientific Interest (SSSI).

Historically, QinetiQ fired Sighter Rockets for range instrumentation accuracy and verification checks, however they contain propellant and pyrotechnic components. QinetiQ's aspiration was to integrate the smaller Banshee Unmanned Aerial Vehicle (UAV) Target into service. The Banshee UAV T can be used over land and sea as a target for a variety of gun and missile air target systems. Unlike

Sighter Rockets, the Banshee UAV T does not contain propellant and pyrotechnic components. It was therefore identified as having an environmental benefit, as well as providing a lower cost target for customers. The Banshee UAV T requires land recovery by means of a parachute.

Site conservation policy demands the management of large areas of grassland to encourage ground nesting birds. QinetiQ identified that these grassland areas would be suitable locations for Banshee UAV T recovery, but it was first necessary to establish if this activity would impact wildlife. A skylark breeding survey was undertaken in association with a respected nature and wildlife warden to establish bird density and distribution. Based on information gained from five visits between late April to late June 2018, 35 breeding territories were identified located throughout the lower and Rangehead areas of the site. During these surveys, indications were that MOD Aberporth is considered a stronghold within the county of Ceredigion, with numbers of skylark having fallen nationally by 59% over the past 10 years. It was agreed that the grassed areas at these locations would be suitable recovery areas and would be managed appropriately, it was calculated that the risks to nesting skylarks was less than that posed by other threats such as natural predation. The target recovery team were also briefed of nest locations, access

routes and the requirement to be vigilant so as to ensure minimal nest disturbance.

A Banshee UAV T was launched on the 10th July 2018, and recovered to the designated area by means of a parachute recovery system at the Aberporth Rangehead. The recovery team manually recovered the target without any impact to the skylark population. To prove the concept of the Banshee UAV T operation another three flights were successfully conducted. Upon completion of the Banshee campaign a process review was conducted and it was confirmed that by careful management of the operating areas there was no undue environmental impact to the resident skylark population. The Banshee UAV T could therefore be integrated into range operational service using the procedures that were developed during the proving flights.

The above success demonstrates QinetiQ's on-going commitment to the environment and proves that with careful planning and consideration, trial activities can be conducted with minimal impact to the environment. Due to this careful management Aberporth has become an important conservation site. The future for the Aberporth skylarks looks bright and that is worth singing about!

Howard Williams
Range Controller
QinetiQ Ltd

Grazing on Fort Grange and Fort Rowner, HMS Sultan



Fort Rowner © Crown

HMS Sultan is the home of Defence School of Marine Engineering (DSMarE) and the Royal Naval Air Engineering and Survival School (RNAESS). The primary function for HMS Sultan is to supply the Fleet with engineering officers and ratings of the highest standard.

The original development can be traced back to 1857, when land was acquired by the War Office to construct four additional forts to protect Portsmouth Harbour; Forts Grange, Rowner, Brockhurst and Elson. Work commenced on Fort Grange on 31st March 1858. The forts took four years to build, concluding officially on 20th December 1862. The forts were designed by the Royal Engineers, with Fort Rowner estimated to cost £52,994 and Fort Grange £60,676. The contractor who won the contract was a Mr Piper, but unfortunately during construction faults were discovered which resulted in cracking. The Government's Inspector of Works condemned Rowner as faulty and the contractor was fired in 1862. The Royal Engineers took over the work and, using a military personnel corrected the faults at a cost of £1,615.

A key feature of all the forts is the circular keep, upon which the sheep graze, surrounded by a moat. The keep

as a feature was first used in the Middle Ages by the Normans as a strong-hold of last resort. There was some discussion in Victorian military circles as to whether a keep was still necessary but it was decided that they should be included as further protection against a forceful enemy. The design of the forts resulted in very steep banks, on top of sheer drops, in some cases into deep, cold and dirty water filled moats.

Starting in 2017, both Amey and Tivoli jointly assessed the grass cutting requirements on these areas. This was undertaken using a risk based approach, with the safety of operatives being the primary concern. Several different methods were trialled resulting in grazing being considered the most suitable option. Both Defence Infrastructure Organisation (DIO) and the establishment supported the use of sheep to maintain these areas of open grassland and reduce scrub encroachment.

Working with the Hampshire and Isle of Wight Wildlife Trust (HIWWT), pedigree Shetland sheep were identified as the most suitable. Jack Norris, the Grazing and Farm Manager confirmed "they are relatively small/nimble and more able to cope with the coarser grass than 'regular' commercial breeds".

In 2019 the forts were designated as a 'Site of Nature Conservation Interest' (SNCI). Simply put the designation of a site as a SNCI helps raise awareness of its importance for wildlife and makes it a focus for nature conservation.

Hanna Etherington, the DIO ecologist for this site has confirmed "The areas of Fort Rowner where grazing has been re-introduced contains swathes of semi-improved grassland with a wide range of wildflowers including autumn hawkbit, salad burnet, common knapweed, meadow vetchling and common bird's-foot trefoil. The grazing will help to maintain an open sward where wildflowers can flourish."

Grazing will be monitored over the winter 2019-20 to assess the impacts of the current stocking levels on the grassland interest and will be adapted if required. Securing grazing for this site should maintain and enhance the semi-improved grassland interest of the SNCI into the future.

Andrew Tregunna
Grounds Manager
Amey

Celebrating one of the world's oldest ornithological societies



Magnificent frigatebird and Nazca boobies in the Galapagos © Martin Alabaster

At 73 years old, the Royal Naval Bird-watching Society (RNBWS) is one of the world's oldest ornithological societies. It was launched by Admiralty Fleet Order in 1946 after application by a group of enthusiasts, including Lt Cdr Peter Scott and since then has had members worldwide amongst naval personnel, merchant mariners and interested civilians. Today it continues to pursue its original aims of raising awareness, supporting scientific research and the conservation of seabirds.

History

Peter Scott was only two years old when his father, Capt Robert Falcon Scott, died whilst returning from the South Pole in 1912. In a last letter to his widow, Peter's father advised her to "make the boy interested in natural history if you can; it is better than games." It clearly worked as soon after his wartime service in the Royal Naval Volunteer Reserve (RNVR), he established the Severn Wildfowl Trust, which later became the Wildfowl and Wetlands Trust, at Slimbridge and the RNBWS was established in the same year. He subsequently became a celebrated conservationist, a founder of the World Wide Fund for Nature (WWF) and even designed its panda logo. He may well have designed the RNBWS logo too!

The Society's annual journal, 'Sea Swallow,' of which a complete archive is available online, reveals an interesting insight into attitudes in the naval service of the time. Early articles include advice on photography; "shutter speeds as high as 1/200s might be needed," a piece on manufacturing a hide from an old golf umbrella and an illustrated contribution by Peter Scott on the study of wildfowl in which he suggests that "members of the RNBWS might be able to help by bringing back live ducks, geese or swans from overseas." Even then, this would have been a challenge for most Royal Navy personnel.

As well as Scott, another celebrated member, and the main driving force for the new Society, was Capt Gerald Tuck who was chairman for 30 years and the author, in 1978, of the definitive guide to Seabirds of the World. The book, dedicated to the RNBWS, was reprinted many times and can still be purchased online today. It is fascinating to imagine how much of the research for the book was conducted from the bridges of Her Majesty's warships.

Science

Gerald Tuck was not alone in studying birds from warships. Since the 1940s, the recording of seabirds from ships has been encouraged by the Royal Navy and the Society's role has been the collation, moderation, analysis and management of these records, along with those submitted from merchant ships and individuals. With over 70 years of records on our database, and all available for researchers to access online, this is now an important resource. By their nature, warships frequently pass through waters away from normal shipping routes and this geographical spread makes the dataset distinctive. The unusually long timeline also makes the database valuable to those examining evidence of climate change. The Society still seeks and receives records from ships,



The RAFOS/RNBWS survey team in Shetland © Stephen Chapman

however this has reduced in the past few years due to the pressure of operational activities.

As well as the continuous work to manage the records database, the Society also supports scientific research by making grants to individuals and organisations. In recent years these have included studies on albatross feeding patterns in the South Atlantic, the tagging and tracking of Balearic shearwaters in the Mediterranean and a survey of white-billed divers in Scotland. The Society also enjoyed an extended relationship with Diego Garcia, conducting the first definitive survey of the birds of the Chagos Archipelago and significant conservation activities. As a result, the RNBWS logo can still be seen on some of the territory's stamps.

Conservation

In the field of seabirds, science and conservation often overlap and the Society is proud to have supported a number of significant projects. Recently the Society have provided both funding and manpower to the rat eradication programme in Ascension Island and to ambitious projects relocating petrels and albatrosses in the Chatham Islands (New Zealand). In this case, the populations are at risk as they only nest in one place and the project aims to spread the nest sites over several islands to increase the species' resilience.

A long-term commitment for the Society is to support the conservation effort for one of the world's rarest seabirds. Breeding only on the island of Madeira,



Ringling a rare Zino's petrel in Madeira © Francis Zino

Zino's petrel has suffered dramatically from the impact of man and predation by cats and rats with the result that it has been pushed into nesting solely on cliffs at the very summit of the island, at an altitude of 1800m. For many years, Frank Zino, son of the naturalist who gave his name to the species and an RNBWS member, has worked every summer to count, net, ring and measure birds in order to drive a conservation programme with the Portuguese Government. For the past four years, the Society has supplied equipment and volunteers to help with this effort. It is challenging but rewarding work on narrow cliff paths at high altitude and in the dark, as the birds spend all day feeding out at sea. With fewer than 100 pairs in the world, it is our best attempt to save the species

This year's RNBWS team returned from Madeira in July 2019 and report that for a second year in a row, unusually bad weather has prevented them from ringing. Furthermore, the total number of birds caught last year is well down on previous records and heightens concern that the species may soon disappear completely.

A second significant piece of fieldwork this year has been to supply RNBWS volunteers to assist with the RAF Ornithological Society (RAFOS) expedition to Shetland. This is the third year that RAFOS has supported the Joint Nature Conservation Committee's national seabird census of the UK and Ireland by supplying survey teams to some of the more remote parts of the UK. The census takes place every 20 years or so and is fundamental as a baseline for much conservation in this field. The RAFOS and RNBWS team have just returned from a challenging 11 days in which they surveyed about 150 km² of beaches, cliff-tops and moorland. Thousands of breeding seabirds were recorded, including gulls, terns, skuas, puffins and more, providing valuable data for climate change and other scientists.

After 73 years, the RNBWS continues to pursue the founders' aims of awareness, science and conservation and in wider society, work like ours is more mainstream than ever before. A challenge is to make the link in



Oystercatcher in Shetland © Stephen Chapman

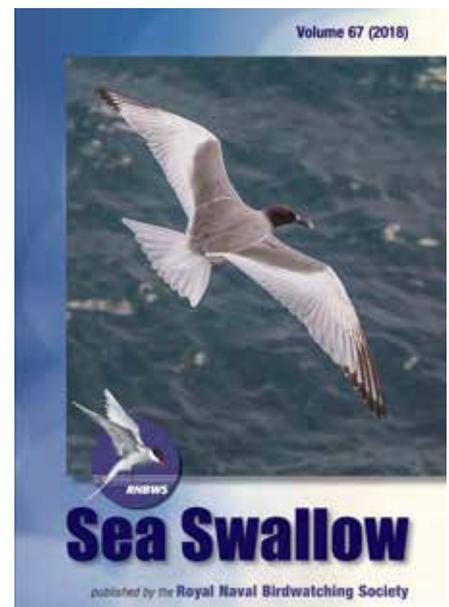
people's minds about how the 'citizens' science' of observation and record gathering is an essential element of the conservation of the earth's biodiversity. Our part is to do this in the maritime sphere and to counteract the prejudice that sees bird-watching, for example from the bridge of a warship, as just a geeky hobby!

The RNBWS is open to anyone with a genuine interest in seabirds. Please visit our website, Facebook page or Flickr gallery to find out more and perhaps join us on a field trip!

Martin Alabaster

Chairman

Royal Naval Bird-watching Society



Last year's 'Sea Swallow' © RNBWS

Waste away – HMS Drake diverts 100% of waste from landfill



The team sorting waste © Simon Cowls

HMS Drake forms the Fleet Accommodation Centre sitting within HMNB Devonport, Devon and is the largest naval base in western Europe. HMS Drake's Waste Centre, covered by the Armada PFI, is the first of its kind across the naval estate.

Waste management at HMS Drake used to be sub-contracted and the establishment was failing to meet the Ministry of Defence (MOD) recycling targets. In 2013 approximately 400 tonnes (65-70%) of waste produced by HMS Drake was sent to landfill due to contamination. This improved with the introduction of Dry Mixed Recycling waste receptacles and raising awareness through training and media, however there remained an unacceptable figure of 240 tonnes (53%) of waste being sent to landfill.

A project team of key stakeholders, consisting of Royal Navy, Defence Infrastructure Organisation, Interserve and ESS staff was established to combat the problem and improve recycling across the site. The team aimed "to maximise recycling capability through reduction in landfill and make recycling

a byword of what we do." Whilst Armada PFI had an obligation to recycle and endeavour to meet the MOD's targets, a historical 'one liner' in the contract was no longer appropriate in an era where sustainability and high recycling targets had rightly gained momentum and increased in importance.

It became apparent to the team that recycling rates would improve significantly if the waste was segregated and recycled at the source. Expert advice was sought from two local companies and within the MOD (particularly at Westdown Camp, see Sanctuary 47, p56). Undaunted by the scale of the task the project team pressed forward, conducting site visits and liaising closely with the Environment Agency and Plymouth City Council to clearly define and establish what was required.

The opening of HMS Drake's Waste Centre resulted in a significant reduction in waste sent to landfill and the project team is proud to report that from February 2018, 100% of waste has been diverted from landfill. Since opening the Waste Centre has segregated and recycled;

- 568 tonnes of general waste
- 433 tonnes of dry mixed waste
- 134 tonnes of cardboard
- 70 tonnes of glass
- 33 tonnes of plastic
- 10 tonnes of clothing

Any financial gain from the sale of recycling is used to increase the Waste Centre's capabilities.

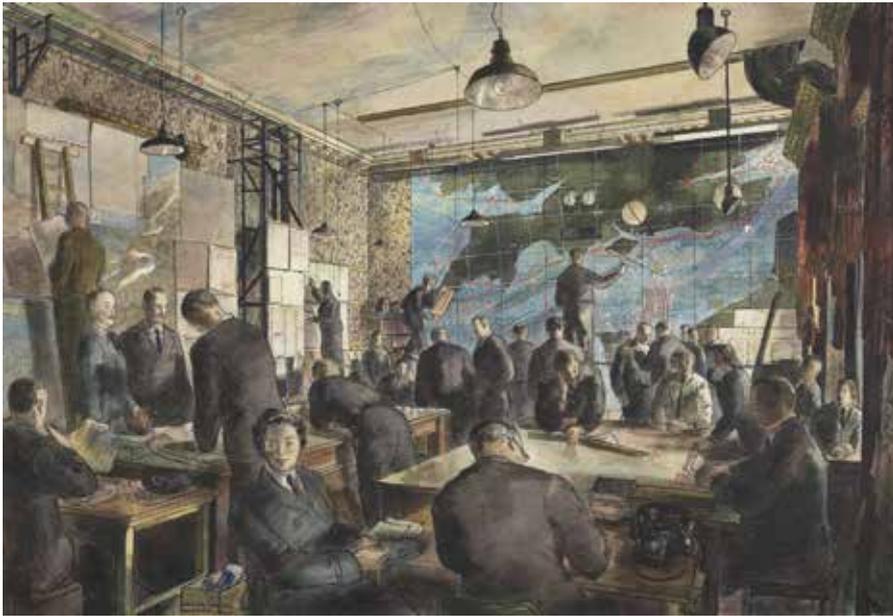
The residual general waste from the Waste Centre is now compacted and transported to the Waste to Energy plant which is operated on behalf of Plymouth City Council and is only 400m from HMS Drake, thereby reducing the previous carbon footprint. The energy provided from this plant is also partially used to provide electricity and steam to HMS Drake.

The project team have continued to be innovative in the pursuit of maximising recycling outputs. Rather than pass on material to tier two recycling companies, the team have sourced charities who 'upcycle' certain materials. For example, clothing is passed on to the Salvation Army for homeless charities, bedding to a local cats and dogs' home, furniture to a charity that supports refugees, single parents and homeless people. Abandoned bicycles on the base are now collected and provided to a charity who undertake refurbishment before sending them to disadvantaged children in Kosovo. Galley food waste that was previously sent to landfill is now collected for a bio-digestion plant that provides electricity for the city of Plymouth.

It is hoped that the environmental, sustainability, recycling and up-cycling behaviours of HMS Drake are inspiring military personnel who pass through the establishment to utilise the great work that has been achieved here at other MOD sites, and at sea, to protect the oceans for the future.

Shaun Drake
Armada PFI Service Delivery Manager
Defence Infrastructure Organisation

Southwick Park's magnificent D-Day map



A view of the interior of the busy Headquarters Room in Southwick Park, Portsmouth during preparations for the D-Day landings. There is a huge map of southern England, the English Channel and northern France mounted on the far wall, with various annotations being added by a man in naval uniform standing on a step ladder. Another man is busy doing the same thing on a map on the wall to the left. Throughout the room, personnel are busy working, some standing and others sitting at desks poring over maps and plans. Most of the personnel are men of the Royal Navy but there are also a few women of the Women's Royal Naval Service © Imperial War Museum (Art.IWM ART LD 4638)

On the 6th June 2019 the 75th anniversary of the D-Day landings were commemorated at Southsea Common. The televised event was attended by the then Prime Minister Teresa May, American President Donald Trump and the French President Emmanuel Macron. The Ministry of Defence site Southwick Park was frequently mentioned and the BBC presented the breakfast weather forecast standing in-front of the Southwick Park D-Day map. But why was this site so significant to D-Day?

Southwick House is situated on the cliffs overlooking Portsmouth and in 1944 was the Headquarters of the Supreme Headquarters Allied Expeditionary Force, which included General Eisenhower of the US Army, General Montgomery of the British Army and Admiral Ramsey of the Royal Navy. Southwick Park was Admiral Ramsey's Headquarters and as Naval Commander-in-Chief it was there that he organised the logistics of D-Day. His skill was such that a historian described the process as a "*never surpassed masterpiece of planning.*" In the run up to D-Day the other forces' preparations had taken place in London, but in early June the Commanders all moved to Southwick Park to be on the south coast near to

the main forces of the D-Day invasion. It was at Southwick Park that General Eisenhower made the key decision to launch the invasion, but it is one of the enduring mysteries of the moment that there was no agreement as to what Eisenhower actually said when he gave the fateful command.

There were two major operations; Operation Neptune, which involved the combined forces crossing the Channel and landing on the beaches during D-Day and Operation Overlord, which was the larger operation to capture Normandy. The logistics of Operation Neptune were staggering. In the initial stages of the first assaults there was an armada of 4,300 ships, manned by 150,000 seamen who transported 20,000 vehicles and 130,000 men across the Channel to the five beaches. In addition, 22,000 airborne troops deployed behind enemy lines. They were either parachuted into enemy territory or travelled in gliders which silently landed at key sites.

There were various criteria which had to be satisfied in order for the invasion to be launched; there had to be reasonable weather with low wind speed so that the waves did not make the landing

craft capsizes, an in-coming tide and a clear night to enable accurate bombing of the targets. The three possible dates for the tides were the 5th, 6th and 7th June 1944. If these were not possible then the next suitable tides were two weeks later. Given the huge number of troops, ships and planes ready to attack Normandy the pressure to give the order to launch the invasion was immense as any postponement would have given the Germans more time to discover the Allies' invasion plans. However, the weather was the complicating factor. The German meteorologists in Paris predicted several weeks of intense storms and therefore many of the senior officers were given leave. Even the German Commander, Field Marshall Rommel, returned to Germany for his wife's birthday. At Southwick Park the American meteorologist also argued for bad weather, but it was the British meteorologist, Gp Capt James Stagg, who saw a very brief window of calmer weather approaching on the 6th June. Eisenhower initially wanted to invade on the 5th June, but Stagg presented his findings at Southwick House and Eisenhower postponed for a day, before giving the orders to launch the invasion on 6th June. With superb British understatement General Montgomery recorded the world's largest seaborne invasion in his diary as "Invaded Normandy; left Portsmouth 10:30hrs."

One of the main planning tools for the invasion was the magnificent D-Day map which can still be seen in Southwick House. Standing from floor to ceiling it shows the coastline of Normandy. The map was actually part of a much larger map which featured the coastline from the Pyrenees to



The D-Day Map room today © Crown

1342 X

BIG DRUM

C. DE LA HA

1170X

91X

C. BARFLEUR

NORT

BARFLEUR

CHERBOURG

FORCE "A"

FORCE "C"

ST VAAST

DIELETTE

FORCE "A"	FORCE "C"
<ul style="list-style-type: none"> U.S.S. Black Prince U.S.S. Explorer U.S.S. Eagle U.S.S. Hancock U.S.S. Nelson U.S.S. Quincy U.S.S. Tanager (LST) 	<ul style="list-style-type: none"> U.S.S. Albatross U.S.S. Bullfinch U.S.S. Cowbird U.S.S. Grackle U.S.S. Kingfisher U.S.S. Oriole U.S.S. Towhee

QUINEVILLE

I. ST MAR

FORCE

UTAH

U

CARTERET

PORTBAIL

A E

ST GERMAIN

BLAINVILLE

Norway and was commissioned from the jigsaw maker Chad Valley. The whole map was made and brought to Southwick House, whereupon only the Normandy section was chosen. Such was the secrecy surrounding the location of the invasion that, not only were the other sections of the map burnt, but the installer of the map was not allowed to leave until after the invasion had started! It turned out that he was not the only one, as a General Post Office engineer came to fix a connection in the map room and was subsequently also not allowed to leave. Both were stuck at Southwick House until, if the stories are correct, at least September. If their wives expected them home for their tea they had a very long wait!

The map shows the coastline from Calais to the Pyrenees, with the five Normandy D-Day beaches; Utah, Omaha, Gold, June and Sword, at the centre and Portsmouth at the top. Across the centre of the English Channel lies a grey strip which indicates the German naval minefields. Running from the English south coast to the Normandy beaches are the red sea lanes for the invasion vessels. The sea lanes run right through the minefields, which had to be cleared in the initial stages of D-Day. A red dotted circle just below Portsmouth shows 'Area Z'



Commandos of HQ 4th Special Service Brigade, coming ashore from LCI(S) landing craft on Nan Red beach, Juno area, at St Aubin-sur-Mer, 6 June 1944 © Imperial War Museum (B 5218)

or 'Area Zulu,' which was an assembly point for ships and because of the sheer numbers of vessels became known as Piccadilly Circus.

The map was a key planning tool and was in use for 37 days afterwards, though the current map has been set to show the configuration D-Day itself. Individual ships had different labels, as did the individual beaches, convoys, personnel ships, Mulberry Harbours and German vessels. Each could be precisely placed on the map, either as a

planning visualisation, or for the actual D-Day events themselves.

There is currently a major project by the University of Portsmouth to assess the use of the map using cameras with high resolution lenses and hyperspectral imagery, whereby each pixel of an image is split into a wider number of spectra than can be seen by the human eye. These techniques will reveal layers and markings which are currently invisible. The 100,000 pin pricks will also be mapped to work out where vessels were concentrated and the routes that vessels took to the beaches. It is an unfortunate consequence of the pin-pricks that they have weakened the structure and allowed moisture to get behind the map. One of the outcomes of the project will be how to preserve this magnificent map for the future.



The scene on Omaha assault area after the initial landings on 6th June 1944, showing naval vessels massed offshore. In the foreground Landing Ship Tanks which have grounded on the beach, are unloading directly onto the shore © Imperial War Museum (EA 26941)

After World War Two Southwick House remained the Royal Navy's Maritime Warfare School and today it is the home of the The Defence School of Policing and Guarding which combines the Royal Navy Police, Royal Military Police and Royal Air Force Police at one location. However, for a few weeks in June 1944 Southwick House was at the epicentre of world events from where the order to launch the biggest seaborne invasion in world history was given.

Chris Daniell
Senior Historic Building Advisor
Defence Infrastructure Organisation

Water treatment works upgrade for Okehampton Camp



The water treatment works surrounded by the newly planted trees © Ancala Water Services

Ancala Water Services recently upgraded the water treatment works at Okehampton Camp, a military training range on Dartmoor in Devon. The project was completed in March 2019 and not only secured high quality water for the camp, but also provided environmental benefits for the area. The refurbishment works were completed through the Aquatrine Project, a 25-year Public Private Initiative (PFI) aimed at improving the condition of private water and sewerage assets across the UK Ministry of Defence (MOD) estate and managed by the Defence Infrastructure Organisation (DIO) on behalf of the MOD. The Aquatrine PFI consists of three packages, with Ancala Water Services responsible for Wales and south-west England under Package A.

Water Quality is one of five Key User Requirements under the Aquatrine Project and all three Aquatrine Industry Partners (Service Providers) take this obligation very seriously, delivering high standards in line with Water Regulation and statutory compliance. This project is a great example of industry expertise enabling the delivery of better service, better estate and better value to the customer than was delivered pre PFI.

The source of water to Okehampton Camp comes from Dartmoor and is taken from groundwater below farmland containing livestock. Due to this it is generally considered poor quality. This

meant that the old ultra-violet water treatment system struggled to deliver the high-quality drinking water which Ancala Water Services strives to provide for the MOD.

The investment Ancala Water Services has made means water supplied to the camp first goes through numerous granular activated carbon filters and micron filters, as well as ultra-violet screening, prior to entering the distribution system. These help the works deal with the poor raw quality water and deliver a wholesome supply of water to the site.

Whilst replacing the pipe network from the service reservoir to the new water treatment works, Ancala Water Services took the opportunity to re-route the water treatment works power supply and install it underground. This not only helps to provide some security to the power supply but also removes many unsightly overhead power poles from the moorland.

Additionally, Ancala Water Services planted 200 new trees consisting of 100 oak and 100 mixed holly, alder, hawthorn and ash, re-providing a wind break for the area which had been removed some time ago.

The new treatment plant was formally opened on the 30th April 2019 with representatives from MOD, DIO, Landmarc Support Services,

Chemdose and Ancala Water Services in attendance. The Managing Director of Ancala Water Services, David Godfrey said *“This is a fantastic example of how the expertise within Ancala Water Services has, and continues to provide, excellent value for money for our client, the MOD whilst the environmental impact of our works will also ensure that visitors to Dartmoor have uninterrupted views of the moorlands. We have, through our Water Industry and Asset Management knowledge, provided a solution which will ensure the MOD can treat the poor-quality water source from Dartmoor and provide the Camp with a wholesome water supply long into the future.”*

James Stoney
Business Development Director
Ancala Water Services



Internal View of Treatment Works (No. 129)
© Ancala Water Services

The beauty of bunkers at Otterburn



Observation post at Otterburn © Phil Abramson

Prehistoric hillforts, Roman forts and Medieval castles are stark reminders of conflict through the ages, but not all archaeological sites are of monumental proportions nor do they need to be particularly ancient. Of all the sites and monuments which survive on the various Training Areas in the UK there is one type which has a particular relevance to almost every soldier who has trained on the Ministry of Defence (MOD) estate. Military concrete is not perhaps everyone's idea of the most attractive of building materials, nor is the squat, boxy outline of a bunker or blockhouse likely to win first prize in the prettiest monument of the year competition, but the maxim "form follows function" could have been invented with 20th century military remains in mind. The terms bunker, blockhouse and vedette are often used interchangeably, but the major difference between a modern blockhouse and a bunker is that a bunker is constructed mostly below ground level while a blockhouse is constructed mostly above ground level.

In the Pantheon of great archaeological sites such as Stonehenge, Avebury or Skara Brae, it is probably fair to say that the humble military bunker will not appear near the top of the list. In fact, there are plenty of people out there who do not think they are archaeological sites at all! But on the Otterburn Training Area (OTA), 11 of

the bunkers are designated scheduled monuments, which means they are now recognised as being archaeological features of national importance.

Nowadays, OTA is used intensively for military training for some 300 days per year and is the largest Artillery impact area in the UK. Back in 1911, when 20,000 acres of rugged moorland in Redesdale were purchased by the War Office, artillery firing fitted in with local sheep farming practices. However training intensified during World War One (WW1) to prepare both artillery and infantry units for war and during World War Two (WW2) a further 20,000 acres of land was requisitioned and subsequently purchased to create a second Artillery Range and a permanent camp at Otterburn.

Over 100 years of military training has left its mark on the landscape. Take, for instance, the Observation Post at Ridlees Cairn. The monument includes the standing and buried remains of a redundant concrete blockhouse situated in a commanding position next to a Bronze Age funerary cairn. The structure was built to prevent access to the range during live firing and also to provide security and good vision for range personnel. The exact date of its construction is unknown, but graffiti discovered on the walls indicates its existence by at least the late 1920s, with a most likely construction date in the aftermath of WW1. However, even thick concrete walls designed to withstand explosives and bullets gradually succumb to the tireless onslaught of the Northumberland weather. Subsequently the Ridlees bunker, along with all the others at Otterburn, have been given a light makeover courtesy of the MOD Conservation Stewardship Fund. The Ridlees bunker has been patched up with epoxy cement to prevent further deterioration of its fabric. Curiously, the blockhouse and Bronze Age cairn stand only metres apart from each other and yet are separated in time by 4,000 years. It is surely no coincidence that they are both positioned on a prominent point of high ground offering long panoramic views of the landscape.

A second nearby observation post was constructed in the 1920s during a major phase of artillery training between the World Wars on the ranges. This particular



Nitrate plant bunkers at Edingham – passage grave lookalikes © Phil Abramson

bunker was intended to provide shelter during training for parties of 16 Forward Observation Officers guiding artillery fire into the impact area from mobile guns placed outside. This is an extremely rare survival in the history of military training in England with the only parallels being single examples at Salisbury Plain and Okehampton Training Areas.

Not all bunkers are for military use. The blockhouse at Featherwood Farm at Otterburn has been placed in the narrow valley bottom of the Sills Burn immediately opposite Featherwood Farm. It is clearly of military design and shares similar constructional techniques with other blockhouses on the range, but rather than protecting soldiers it served as an early blast shelter for the protection of the family during periods of live firing at the Redesdale Range. One of the farm tenants has recalled that, as a child in the early 1950s, he could remember the Army setting up their 20-25 pounders and firing nearly non-stop from 09:00-17:00hrs. He and his family would go into the bunker when the shells were landing too close to the farmhouse to be safe! It was superseded by the construction of a second brick blast shelter attached to the rear of Featherwood Farm. The Featherwood bunker represents an early effort by the War Department to meet its obligations to its farming tenants during periods of live firing and represents an important feature of early range safety.

At the onset of WW2 there was a clear and urgent need to increase the production of explosives for shells,



Bunker on the beach at La Rochelle © Harvey Mills Photography

guns and rifle cartridges. Instead of concentrating production in a single huge site, as was done for example at Eastriggs near Gretna during WW1, production was spread around a number of Government-run sites and six new factories were established in southern Scotland. Sites had to meet several criteria; a water supply for the staff and the production process, good communications by road and rail to bring in raw materials and send out the finished goods and, most importantly, remoteness. With such a high risk process, the bunkers at Edingham near Dalbeattie in south-west Scotland represent yet another variant – rather than protecting soldiers from artillery, these were nitrating plants used in the manufacture of ordnance during WW2. Four brick and concrete structures were built within massive earthen banks, accessed by brick and concrete tunnels. Their resemblance to circular

prehistoric passage graves, built some 5,000 years earlier, is uncanny!

Paul Virilio, a political theorist and art critic has studied bunkers in some detail and coined the term “*the frightening beauty of bunkers*”. Virilio was a young man growing up in northern France during WW2 and would have been well aware of the Atlantic Wall – the 1,500 or so bunkers and gun emplacements along the French north coast intended to prevent an allied invasion. These defences exacted a heavy toll but were eventually overwhelmed. Today, the bunkers are in various states of disrepair. The remarkable example at the Isle D’Oleron (La Rochelle), perfectly demonstrates our attitude to these features, to some people they are significant structures, revered as monumental reminders of dark and tempestuous times whilst to others they serve as a canvass for graffiti!



Ridlees bunker with prehistoric cairn in the background © Phil Abramson

The bunkers at Otterburn are much smaller in size and do not exhibit the frightening beauty of the bunkers along the Normandy coastline, but it is fitting that they are protected for the nation as a reminder of military training at Otterburn during the two World Wars. Their design, location and fabric reflect, to some degree, the developments in ordnance and fire power and it is comforting to see that these unsung heroes of military archaeology are finally receiving the recognition they deserve.

Phil Abramson
Archaeology Advisor
Defence Infrastructure Organisation

Holmestone's globally unique holly wood



Holmestone at the heart of Lydd ranges © Simon Leatherdale

Holmestone is a holly wood set amidst the vast expanse of shingle ridges of the Lydd Ranges, which form part of the Ministry of Defence (MOD) Cinque Ports Training Area on the coastal border of the counties of Kent and Sussex.

There are few other countries, principally Japan and New Zealand (Doody & Randall, 2003) that have any significant examples of large shingle beaches, making Holmestone a surprisingly rare land form. The UK has the lion's share, with extensive sites such as Chesil Beach in Dorset, Slapton in Devon, Orfordness in Suffolk, Culbin on the Moray Firth and at Dungeness.

Formed over millennia, Holmestone is a strange and beautiful place to encounter; the wind is ever present and the sea close at hand. Baked in summer and frozen in winter, the area has virtually no soil for higher plants to draw sustenance from. Yet at Holmestone (Holme is a Saxon word meaning holly) there are ancient holly trees *Ilex aquafolium*, albeit in semi dwarf form, that stand sentinel over the ethereal maritime woodland landscape.

What nutrients there are occur due to detritus being captured from the wind in the lee of the holly clumps and from the guano deposited by roosting birds and the occasional rabbit. Of concern

is the amount of nutrient in the form of nitrogen which arrives on site as airborne pollution – a recent change that may have long term and negative effects.

Water is drawn by long tap roots from deep below the shingle (more than three metres down). This is one of the potentially limiting factors to the regeneration of young trees, as a germinated seed must send a rootlet down deep enough to reach water amidst the hostile conditions. The success is truly remarkable, although the failure rate must be huge.

The trees only attain a maximum height of around four metres and appear to be of coppice origin, but whether this is by human hand or not is open to question. At maximum height, the hollies tend to be broken by the wind and subsequently only grow sideways. The hollies' curious profile is also a feature of wind pruning (with a small contribution from browsing rabbits on the lower edges). The result is a 'fin' shape with the steep edge to leeward. It looks, for all the world, as if a gardener has tried his hand at topiary – with varying degrees of success. There is a distinct 'skirt' around the lower edge of many clumps which is the result of rabbit browsing.

Although most clumps look impenetrable, the inside is quite open

and remarkably sheltered. The poles are all comparatively small (the maximum diameter at chest height is 22cm) and likely to be no more than a century or so old. However, the gnarled stools from which they arise are considerably older.

Other species do occur with the holly, but only amount to very minor components of the habitat. Two yew trees *Taxus baccata* are present along with some elder *Sambucus nigra*, bramble *Rubus fruticosus* agg., broom *Sarothamus scoparius*, gorse *Ulex europaeus* and honeysuckle *Lonicera periclymenum*. The yew can compete with the holly as it is very tolerant of shade, so it may increase within the holly clumps. The other species are less shade tolerant, so tend to occur on the periphery of the holly and are unlikely to establish and persist within the heart of the clumps.

The fortunes of the hollies have waxed and waned over the centuries (a thorough account is given by Peterken & Hubbard, 1972). The War Office purchased the area in 1885 and since then the hollies have been through phases of expansion and contraction. The current core of the holly clumps (224 of them) occur in an area of 37ha. Few exist beyond this.

In the distant past the hollies were valued (and hence survived) as a source of food (birds), fuel, animal

fodder (cattle and goats find holly quite palatable if the spines are crushed), festive greenery and as a hiding place from the revenue men. In the present day, they are once again valued – now for the contribution to biodiversity. In order for this to continue it is crucial that an understanding of their unique character is known and appreciated more widely.

The MOD, as custodians of this unique place, have taken the right steps to safeguard it. Vehicles are no longer permitted to disturb the shingle in this part of the Training Area and a stop was put on any future gravel extraction activities. The incidence of spot fires has now all but been eliminated. The wood now seems to be in a stable phase once more, though new recruits are few and far between (the youngest seen on a recent visit was more than 12 years old). It is now part of a Site of Special Scientific Interest so comes under the aegis of Natural England and is managed by the Defence Infrastructure Organisation. The trees are flowering well and berries are being produced in profusion, but young trees are always going to struggle to establish in such a hostile environment, which is ultimately what makes it such a special place.

Potential threats are varied; browsing pressure (too much or too little), airborne pollution (mostly of agricultural origin), climate change, fire, changes in avian behaviour, pathogens and the most devastating threat of all – apathy. Holmestone needs its remoteness and lack of disturbance, but equally it is paramount that it receives the

recognition it deserves as the only place on the planet where this habitat exists.

The future fortunes of this remarkable place are very much in this generation's hands. Research that is needed to inform appropriate management would include monitoring of avian use of the site. This has significant impact on the nutrient (guano) arriving on the site and the digesting of and spreading of seed. Browsing pressure (from rabbit, hare and possibly muntjac deer) has an affect on the existing trees, but most importantly on any seedlings that manage to battle the odds against survival. There are 'exclosure plots' in place which will need to be monitored and new ones added to assess current and future browsing pressure.

Air quality (apart from the nitrogen issue) is likely to be of less concern although carbon dioxide levels may yet be crucial to habitats so finely balanced. Climate change could have wide ranging affects with summer drought being of most concern. Water table levels and salinity may prove to be a determining factor in longevity and new recruitment. Pathogens such as *Phytophthora sp.* are increasingly complex in their ability to enter new habitats and hybridise and/or mutate. Holly is already susceptible (usually not fatally) to one species of *Phytophthora* (*P. ilicis*), but whether this is present yet on this site is not known. It may be prudent to introduce bio-security measures (such as disinfecting footwear) if this becomes an issue. Sea level rise will be a very serious issue (both from inundation and increasing ground water salinity)



Young holly recruit – more than 12 years old
© Simon Leatherdale

looking further into the future, but not one with a local solution.

Literally and metaphorically Holmestone stands alone. It is without parallel.

Simon Leatherdale
Independent researcher

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Ancient holly stool © Simon Leatherdale



Fin shaped holly clump due to wind pruning © Simon Leatherdale

Replacement of drinking water pipeline in Natura area, Cyprus



The 532m HDPE pipeline prior to insertion in the tunnel © Infrastructure Service Provider Cyprus

Kissousa spring is the main drinking water source for the Western Sovereign Base Area (WSBA), which comprises of Episkopi Garrison and RAF Akrotiri, in Cyprus. It is regulated for use by the British Military Bases, under the 'Treaty of Establishment'. Kissousa spring is capable of producing circa 600,000m³/annum of water during an average rainfall year. The average daily water consumption of the WSBA is circa 2,500m³/day. During the winter months, excess water is impounded into the Symvoulos reservoir at Episkopi for use during the summer months; Symvoulos is the only Ministry of Defence (MOD) owned reservoir worldwide.

Freshwater is conveyed from Kissousa spring to the Episkopi Garrison Area water storage tanks, via the Kissousa pipeline. A party of sappers from 42 Field Squadron Royal Engineers and a group of local labourers installed the first pipeline in the 1950s. It is a 200mm diameter steel pipe that passes through a rudimentary tunnel under Anogyra village that is 500m in length, 60cm wide, 80cm high and is 35m at its deepest point. The tunnel was excavated by hand!

Problems and Challenges

The existing 200cm bore pipe had far exceeded its expected life and was

prone to leaks. Indeed, the section within the tunnel ruptured on a frequent basis, the result of which was recurrent water loss that impacted significantly on the critical provision of potable water to consumers in the WSBA.

In February 2016 a significant pipeline failure within the tunnel section was experienced. This resulted in water loss of approximately 4,500m³/day. The operation to inspect the ruptured pipe was complex, dangerous and therefore was assessed as a high-risk activity in a confined space. It required meticulous planning by numerous stakeholders to ensure the safety of the civilian contract operatives who had to be lowered 32m below ground in a purpose made 150cm diameter shaft. Alongside the contractors, all the necessary safety equipment, which included breathing apparatus and devices to monitor for toxic gasses, had to be lowered.

The inspection revealed that the old pipe was beyond economical repair and a recommendation was made to replace it as soon as possible to prevent further water loss. Specialist engineers moved quickly to assess the options. Having completed an evaluation and calculations, the engineers specified the old pipe be replaced with a new functional 315mm diameter high-density polyethylene (HDPE) gravity-fed pipe that would be capable of sustaining a water pressure up to 15 bars.

The recommendation and specification presented three main challenges. Firstly, the existing pipeline had to remain functional at all times to ensure effective provision of sufficient potable water to WSBA consumers. Secondly, working conditions within the existing tunnel were extremely hazardous; therefore, specialists employed under the Infrastructure Support Provider contract had to act to minimise risk to life during what would be a complex project. Lastly, the mountainous region, where the pipe was to be installed, is classified as a

Special Protection Area and Special Area of Conservation under Natura 2000, which is a network of sites selected to ensure the long-term survival of Europe's most valuable and threatened species and habitats. Therefore sustaining the environment of the region was of paramount importance.

Innovative engineering solution

Considering these problems and challenges, engineers specified Horizontal Directional Drilling (HDD) as an innovative engineering solution to preserve the environmentally sensitive area, avoid disruption to the flora and fauna, and replace the most vulnerable section of the pipeline.

This methodology was untested in Cyprus for freshwater supply and had to be developed collaboratively by the Defence Infrastructure Organisation, the Cyprus Environmental Agency and the Cyprus Water Development Department.

The project was considered of common interest for both the Republic of Cyprus and the MOD; hence a large number of key stakeholders were involved in the successful design and implementation. The contract was subsequently awarded to the Infrastructure Service Provider, Interserve and their sub-contractor, the Cyprus Services Provider Joint Venture (CSP JV). The specialist renowned worldwide sub-contractor, Holland Drilling, undertook the HDD.

After careful consideration of the project design, enabling works were carried out by local contractors. This then allowed Holland Drilling to conduct HDD operations as efficiently and effectively as possible. The 532m pipeline replacement took place over the period from October to November 2018, to avoid the bird breeding season, under Natura 2000. This was considered the period of least disruption, where local and migratory birds would not be affected by the intense vibration and noise caused by the HDD process.

The HDD process was conducted in four main stages. Firstly, a horizontal pilot hole of approximately 250mm in diameter was bored through a section of the Anogyra mountains. During the drilling process, a gyroscope

was deployed to control the precise drill position, in both horizontal and vertical alignment at all times to ensure the drill head navigated accurately the designated route. The drilling process lasted 10 days with 'punch-out' being achieved on 23rd October 2018. The second stage, which took five days to complete, involved widening the horizontal pilot to 450mm in diameter. The third stage involved cleaning of the borehole. This process had to be repeated three times over three days to mitigate against the pipe being damaged by debris during insertion (the 'pullback' process). The last stage of the HDD was the pullback. This non-stop pullback operation needed careful orchestration with the HDPE pipe being drawn slowly through the entire length of the borehole over a six hour period on 1st November 2018 to avoid excessive force being applied to the pipe.

On completion of laying the new pipeline in position, air, pressure and flow tests were undertaken to ensure the new pipe was capable of reaching high pressure levels without failure or leakage. These tests provided the necessary evidence that the HDD process was a success and was demonstrable that the HDPE pipe could sustain a working pressure of 13.5 bars.

Finally, the new pipeline was connected into the existing water distribution system, by-passing the old tunnel, via an additional ductile iron new pipe of 200m in total length.

Success despite the challenges

In conclusion, the HDD project was challenging to complete, due to a number of factors. For example, special custom made drilling heads had to be manufactured in the United States for drilling in hard limestone geological conditions. Engaging the state of the art gyroscope safeguarded a uniform horizontal flat pipe gradient due to the low difference in elevation between the entry and exit point being less than 2.4m.

To quote the project manager, Socrates Metaxas of CSP JV, *"walking on the floor is possible due to gravity. The difficulty of HDD is compared to having to walk up a wall; this is the difference between vertical and horizontal drilling"*.

The Holland Drilling director, Ronald Van Krieken, quoted *"this project is evidence of how a positive and constructive cooperation between both the main contractor and the drilling contractor results in a successful drilling project."*

The provision of required funding by the MOD made the innovative solution of HDD feasible. This project took very seriously the protection of the regional environment, whilst sustaining water availability for British Forces Cyprus WSBA consumers in a safe and efficient manner for future generations to enjoy!

Alan Ardron & Mark Wootten

Interserve Support Services

Socrates Metaxas

Cyprus Services Provider Joint Venture



The construction site © Infrastructure Service Provider Cyprus

The return of the Monuments' 'Men'



Helicopter flies over Uruk archaeological site at Warka in Iraq © Crown

During World War Two (WW2) Allied military units had very specialist roles concerning the protection of monuments, fine arts and archives. In cases where damage or looting had occurred, the units were tasked with the preservation of the remains and the recovery of looted artefacts.

The first unit was the Monuments, Fine Arts and Archives sections. It included 50 British officers working alongside American and other comrades to ensure that the military protected cultural property, that damaged structures were protected from further harm and that the looted items were returned to countries of origin after the war.

The second unit, comprising just 10 US military staff, was the Art Looting Investigation Unit established in the Office of Strategic Services, the forerunner of the Central Intelligence Agency. The roles of this unit were to understand the individuals, groups and networks of people responsible for the systematic looting and trading in cultural property during the war. The aim was to bring these groups to justice, preventing the enemy accessing funds

generated by the sale of looted items and the restitution of the recovered looted items back to owners.

Shortly after the war the Hague Convention for the Protection of Cultural Property in the Event of Armed Conflict (1954) was signed in the Netherlands. The Convention became the most significant piece of international humanitarian law relating to the protection of cultural property during armed conflict.

In early 2014 Army HQ established the Military Cultural Property Protection (CPP) Working Group to scope the issues relating to the protection of cultural property. This brought together contributing stakeholders from the police, Non-Governmental Organisations, custodians of cultural heritage, Allies, other Government Departments and officers from across the Services. In parallel, a paper was written by the Concepts Branch of Army HQ which set out the background, benefits to mission success and the options that could be adopted to enhance the protection of cultural property during military operations.

This paper reached the top of Army HQ just as the Secretary of State for Digital, Culture, Media and Sport announced that a Bill would be put to Parliament to ratify the Convention. Fortuitous timing!

On 12th December 2017, having been ratified by Parliament via the Cultural Property (Armed Conflicts) Act 2017 and approved by UNESCO, the UK became a party to the Hague Convention (1954) and its two Protocols. A significant number of the Convention's obligations apply to the Armed Forces.

Defence has been following a number of lines of activity to deliver a military cultural property protection capability. At Defence level a CPP Policy has been written which will now be rolled into the Human Security Joint Service Publication (1325), following the announcement that Defence will form a Human Security Centre of Excellence, which will include CPP. The Defence Concepts and Doctrine Centre's Law of Armed Conflict Customer Engagement Board is reviewing UK Defence doctrine, education and training in order to ensure that these activities reflect the military obligations of the Convention.

The most fundamental precondition to protecting cultural property during armed conflict is to identify what and where the cultural property to be protected is, and to communicate this information effectively to those engaged in the planning and execution of military operations. The Defence Geographic Centre, part of the Joint Forces Intelligence Group, has been reviewing how this aspect can be delivered. NATO have developed a 30-point schema of data fields relating to cultural property structures or sites, and the United States Defense Intelligence Agency holds a significant data set of cultural property locations.

The final development is the establishment of the Cultural Property Protection Unit (CPPU) on 1st September 2018 as a unit within 77th Brigade with 15 Reserve officer posts. Before the Bill to ratify the Convention entered Parliament, the Secretary of State for Defence announced that, as part of the ratification process, Defence would establish a unit of military cultural property protection specialists in line with Article 7 (Military Measures) of the Convention. Defence tasked the Army to deliver the unit and Army HQ subsequently tasked the Directorate of Information to plan the establishment of the unit.

The roles of the unit came from announcements made by the Secretary of State in Parliament, from lessons identified from WW2 experience of the Monuments Fine Arts and Archives sections and the Art Looting Investigation Unit, from the Convention and from the experience of Allies with military cultural property protection capabilities. These include support to; individual, collective and mission support training, liaison, Humanitarian Aid and Disaster Relief operations, resilience and, from the strategic to tactical levels, targeting, operational planning processes, investigating, recording and reporting cultural property issues from any area of operations, cooperation with the civilian authorities responsible for safeguarding cultural property and securing respect for cultural property from Service personnel.

Soon after the CPPU came into being in 77th Brigade, the unit started recruiting individuals with relevant academic



Students on a military cultural property protection course in Austria © Tim Purbrick

qualifications and practical knowledge and skills to deliver a cultural property protection capability to Defence. The first recruits are all serving Reserves and include a Royal Navy Reserve navigator and historic building surveyor with Historic Environment Scotland, a Royal Artillery targeting specialist and UAV archaeologist, a Royal Auxiliary Air Force Intelligence Officer and Professor of Archaeology, an Intelligence Corps cultural heritage advisor, and an Air Trooper conservator with English Heritage. The first civilian has also been recruited. She is a senior collections care manager with the National Trust who will now start the recruitment and selection process to become a Specialist Reserve Officer. Further candidates to be assessed for the CPPU are coming from the Wallace Collection, the Museum of London, the British Museum, Historic England, the Imperial War Museum, Cadw, Oxford University, as well as an archaeologist and an artist.

The pilot Cultural Property Protection Specialist to Arms course, to train CPPU officers to deliver a military cultural property protection capability to Defence, will be run later this year at the Defence School of Policing and Guarding at Southwick Park. In addition to the CPPU officers, officers from the Netherlands, US, France, Austria and

Italy, with UNESCO, Carabinieri, Interpol and Metropolitan Police will also be taking part in the course.

Further information is available on the Army Knowledge Exchange and tasking for the CPPU should be done through the Army Directorate of Operations and Contingencies at Army HQ.

Lt Col Tim Purbrick
Commander Cultural Property Protection Unit
Cultural Property Protection Unit



The Hague Convention Blue Shield © Tim Purbrick

Professional Development Schemes Outreach Initiative



Coffee and crafts morning with Sally and Leyla © Michele Wareham

Defence Equipment & Support (DE&S) are an arm's length body of the Ministry of Defence (MOD) which manages a vast range of complex projects to buy and support all the equipment and services that the Royal Navy, British Army and Royal Air Force need to operate effectively. DE&S Project Professional Graduates, Apprentices and Interns are half way through a four month long Corporate and Social Responsibility (C&SR) initiative which sends small groups of first year Project Professionals to Bristol's Leonard Cheshire Disability (LCD) Care home, Cossham Gardens. Leonard Cheshire is an organisation that supports individuals to live, learn and work as independently as they choose, whatever their ability. LCD Cossham Gardens' residents have (in the main) Huntington's, Acquired Brain Injuries or other neurological conditions.

Leonard Cheshire was born in 1917 and fought in World War Two as a RAF pilot. In 1948, Cheshire brought a dying man to his home and nursed him. Cheshire had no money, but this one act of kindness saw others who required help coming to Cheshire and chipping in. Following Cheshire's efforts, people

from different parts of the UK rallied in response to the local need for similar homes and the charity now known as Leonard Cheshire began. This inspiring story, Cheshire's connection to the MOD and the vital work that LCD homes complete is why Cossham Gardens was chosen to be the C&SR partner.

Following initial discussions with the Volunteering Coordinator at Cossham Gardens, the team quickly realised that this opportunity would be invaluable; it gives the volunteers a critical and deeper awareness on aspects of day-to-day life otherwise taken for granted. In the volunteers' morning induction, topics such as accessibility, privacy, dignity and the Social Model of Disability are covered and linked to personal experiences. A pertinent topic of discussion is accessibility on MOD sites and what this looks like when considering a wide range of disabilities, not just physical. Additionally, the volunteers are stretched to share more information about themselves than they are comfortable with, in a candid activity on the topic of privacy and dignity; "when was your last bowel movement and what did it look like on

this chart?" This, in a single example, shows the volunteers a slither of what life is like as a nurse or a resident in an LCD home.

A typical day at Cossham Gardens will vary but after the induction volunteers will take part in a coffee and crafts morning with the residents, a game of boccia and jobs around the home in the afternoon. These jobs range from putting up seasonal decorations to gardening. Alongside the day placements, the Project Professionals have been inspired to get involved in Cossham Gardens further by regularly supporting them in events and fundraising throughout last year. Regularly having new faces and personalities in the home has brought life to the staff and residents of Cossham Gardens.

Alongside this incredible work, this year DE&S has seen the creation of The Volunteer's Network which promotes the opportunities available to DE&S staff and encourages others to get involved in community initiatives. DE&S is embracing the Social Pillar of Sustainability; understanding that treating employees fairly and allowing them flexible scheduling will allow for more people to complete outreach activities. This in return has positive effects on staff retention, organisational reputation and employees' development of transferable skills that are brought back to the office, to name a few. Moreover, hours that volunteers complete doing gardening activities, for example, similarly to the work the Project Professionals complete at Cossham Gardens, does not just benefit the charity and contribute to the national Year of Green Action, but is proven to have positive affects on mental health. Work such as this will ensure that DE&S will be an even greater place for staff to work and continues to be a valued neighbour and community member.

Lucy Heywood
Project Professional Graduate
Defence Equipment & Support

Leading change – how Air Mobility have delivered innovative Fuel Efficiencies



A smooth landing from the A400M © Crown

The Fuel Efficiencies and Emissions Reduction project, in delivery by the Air Mobility Force, RAF Brize Norton, is at the vanguard of delivering efficiencies in a military environment, adopting Airline Industry Best Practice and tailoring initiatives to the Air Mobility. The project, part of the Air Mobility Transformation Programme, is led by Air Commodore Stamp, under Air Officer Commanding 2 Group.

The project seeks to embed sustainable behavioural change to reduce fuel usage and carbon emissions by 2 Group aircraft. Significant saving opportunities have been identified across mission planning, policy, in-flight fuel management, engineering, logistics, and contractual arrangements with a focus on reducing the delta between the funded position, planned and actual usage. The project looks at the way 2 Group fly, how they are tasked, how their aircraft perform, how much fuel they carry, what they pay for fuel, how they are contracted and invoiced, and how they reduce their carbon footprint. Implementing over 60 efficiency initiatives on four aircraft types, with varying mindsets, barriers, support solutions and data acquisition capabilities, has been no mean feat; Industry advise that no other Air Force has delivered such benefit with such rapidity. Fuel initiatives have realised £24.9 million in benefit to date.

Transformational and behavioural change is notoriously challenging. Air

Mobility are continuously adopting and tailoring Fuel Efficiencies initiatives from Airline Best Practice to the Air Mobility Force. Almost always working outside of their comfort zone, the team engage with a plethora of internal and external stakeholders including crews, mission planners, and Airline Fuel Efficiency managers, to research the benefit and feasibility of implementing the latest innovative efficiency measures at 2 Group. The project has a holistic and broad understanding across logistics, operations, engineering, flying operations and mission planning with a great commitment to understanding, and importantly minimising, any impact of fuel saving initiatives on Defence output.

It is the first time that fuel data of this type and magnitude has been collated, and that a dedicated Air Mobility team has been established. The team provide Subject Matter Expert advice, not only to 2 Group, but to Headquarters Air, Defence Equipment and Support and Permanent Joint Headquarters, challenging and driving fuel-related efficiencies. Air Mobility are procuring a new Fuel Management Information System in order to deliver at pace, which will allow rapid analysis of 1,000s of fuel-related data parameters and determine the success of initiatives on the A400M, C17, C130J and Voyager. By tracking and measuring performance against identified initiatives and exploiting trends to financial advantage, the System can drill down to specific tail numbers to

investigate why a certain aircraft, route leg or airfield is performing well or poorly in terms of fuel usage. By communicating quick-win successes such as Fuel Tankering this way, Air Mobility ensure buy-in for the next initiatives and sustain cost-conscious, fuel-efficient behaviour.

Fuel efficiencies is an enormously collaborative effort with Defence-wide dependencies, implications and constraints; however, the project owes its success to the support and buy-in of its Military and Industry stakeholders. Air Mobility have collaborated with wider Defence fuel-related projects to share data, drive value for money fuel contracting, drive tasking into alternative cheaper airfields, promote more fuel-efficient mission planning and to brief crews on Best Practice. Future initiatives include reduced aircraft drag, light weight aircraft retrofits and Electronic Flight Bags. All these reduce fuel burn and carbon emissions, contributing towards EU Emissions Trading Standards reduction and Governmental targets. 2 Group intend to sustain acceleration with future initiatives using data-hungry technology and innovation. Such is Air Mobility's success that end-to-end mission efficiencies are now regularly self-generated by crews and planners; a sign of successful embedded cultural change.

Sqn Ldr Shelley Brind
SO2 Fuel Efficiencies Cell
Air Mobility Force Headquarters
RAF Brize Norton

Going with the flow – flood scheme benefits wildlife at AWE Burghfield



The completed works and reflections of a much improved habitat © Crown

The Burghfield Flood Alleviation Scheme (FAS) was developed after a flooding event in 2007 at AWE Burghfield, Berkshire. AWE determined that the risks associated with down time and damage to key facilities due to flooding, and therefore its ability to support the UK's Continuous At Sea Deterrent (CASD), was unacceptable.

The scheme has been designed to protect the site from future flooding (up to 1 in 200-year six-hour critical storm fluvial event) and comprises a number of key features;

- The Burghfield brook was widened along the length of the south and east boundaries of the site and through adjacent Ministry of Defence land for approximately 1.5km in total, from a single narrow channel to low and high flow channels, substantially increasing capacity
- An Upstream Storage Area (UpSA) of 5.4ha was excavated within an adjacent field to capture overland flow. The modelling of the 2007 flood event showed that the channel flow and overland flow elements of the flood combined at the AWE Burghfield site. The UpSA collects and holds back the

overland element, allowing the peak flow from the upstream catchment to pass before the peak from overland flow enters the brook

- Bunds and berms to contain and direct flood waters to the brook channel
- Raised roadway to prevent the brook returning to its original course across the middle of the AWE Burghfield site
- Tideflex valves installed on each outfall to prevent backflow from the brook into the surface water drainage network, thereby reducing surface water flooding and protecting the sewage treatment works
- Pumping station to pump water from the surface water network and treated sewage into the brook at the downstream end of the brook, just before it leaves the AWE Burghfield site
- Planting and ecological features
- Access steps for easier maintenance and monitoring
- Replacement of car parks removed during the brook widening.

In line with developments of this scale a full suite of ecological surveys were undertaken in advance of works taking place. In order to deliver improved cost

effectiveness this was split between the in-house expertise and external contract support from RPS Group Ltd.

A year of surveying confirmed earlier estimates that there was a medium population of grass snakes *Natrix helvetica* present, this meant every effort would be needed to move as many snakes as possible out of harm's way. This involved designing a suitable translocation plan which was agreed with the Local Planning Authority. The highly constricted nature of the narrow strip of land, squeezed between a nuclear licensed site, an explosives area and the exterior fence line, posed a challenge in terms of translocating the grass snakes!

Initially it was hoped that a suitable receptor site might be found externally but none could be found, even after talking to the local Wildlife Trust. The challenge with relocating species is that it can spread disease to any existing populations. If there are no existing snakes in a suitable habitat then considerable regard should be made as to why not, and whether there are some adverse factors that are not immediately apparent which would reduce the long-term survival of the relocated animals. A creative solution was required whereby two areas were carved out, one at each end of the brook, where the habitat was improved allowing relocated animals to disperse into the wider environment.



Grass snake © Crown



Coir matting, riffles and pools – the works underway © Crown

Habitat improvement took the form of creating log pile refugia and egg laying heaps from grass cuttings. The latter of these in particular are often a limiting factor on grass snake populations.

The translocation effort was spread over two years with repeated visits made in good weather. The entire development site was isolated from the rest of the AWE estate using 4km of reptile fencing and fine mesh barriers were placed in the brook where it entered and left the site. The aim of these measures was to stop snakes re-entering the development after being moved. Each visit involved checking pre-laid refugia (0.5m² sections of roofing felt) and carefully searching bankside vegetation. After sufficient visits during which no snakes were seen it was safe to declare the area reptile free.

Major construction challenges to the principal contractor, Knights Brown, included managing high rainfall and flow events, service diversions, asbestos contaminated soils, spatial constraints, maintaining compliance with permits and licencing and ecological aspects. Stakeholder engagement and collaborative working were essential to the success of this multifaceted project and included West Berkshire Council, the Environment Agency, contractors, local residents and businesses.

This project has successfully demonstrated how works can be undertaken with ecology, sustainability and industry best practice as priorities. The scheme was designed to be passive and where possible maintenance

free, thereby minimising resource use and manpower during operation and maintenance. Where possible components made from recycled materials were utilised, including steel reinforcing, Truckpave, dura curb and type 1 aggregate. All topsoil was recovered and reused within the development, with 30,000m³ of subsoil being reused on site within the scheme to construct the berms and bunds, 24,500m³ of soils used in two West Berkshire Council managed flood alleviation schemes (one in Thatcham and one in Winterbourne) and a further 16,000m³ reused in a Cotswolds restoration project. To further reduce site waste the project utilised modular construction methods whereby components and systems manufactured off site were brought to site 'just in time', including; pipes, culvert and bridge sections, Redirock wall units and headwalls.

Works within the brook were undertaken offline, i.e. the water was flumed or over pumped, rather than flowing in the stream bed. These methods were chosen both to minimise the health and safety risks of working alongside a water body and to minimise the mobilisation of sediment within the brook.

Ecological management during the construction period highlighted how conservation can sometimes seem contradictory. Duck mussels *Anodonta anatina* (although not specifically legally protected) were moved to safe areas at either end of the brook, but crayfish (previously surveyed and identified as non-native signal crayfish *Pacifastacus*

leniusculus) could not legally be released back into the environment. Support for this with the contractor was achieved through extensive engagement, answering questions, placing identification posters in their mess room and encouraging their enthusiasm. This approach paid dividends in the UpSA where, whilst a detention basin was being excavated and large volumes of soil moved, lapwings decided to nest. This was spotted by one of the excavator drivers and the construction team took them to heart, keeping an eye on them and even warding off crows from the vulnerable young at one point!

Post construction, the habitat within the scheme should be substantially better for a range of species. Replacing the canalised watercourse with more natural riffles and meanders, the inclusion of some of the felled tree stumps along parts of the bank, kingfisher nesting tubes and otter passes are some of the beneficial features. An opportunity was provided by the UpSA where topsoil was removed, thereby turning the previously nutrient rich arable field into a site with real potential as a wildflower meadow. This site also offers the exciting opportunity to act as a receiving site for any replacement habitat offset from other developments at AWE under the forthcoming Biodiversity Net Gain requirements (something which AWE is aiming to extend beyond projects requiring planning permission to include all sizes of development works).

Piran Borlase-Hendry & Rachel Beck
Atomic Weapons Establishment (AWE)

The Army Basing Programme

Tidworth Garrison – old and new



Aliwal Officers' Mess, built in 1904 © Helen Knowles

Tidworth started its Garrison life when the War Office bought Tedworth House in 1897, and some land to the east of it. The Tidworth Camp was officially established in 1905 and the eight barracks were named for the British Army as Aliwal, Assaye, Bhurtpore, Candahar, Delhi, Jellalabad, Lucknow, and Mooltan, evoking memories of battles in India and Afghanistan. Each of the barracks had a smart new building which the Army have since used continuously. As a listed building Jellalabad Officers' Mess, one of the eight, is Grade II listed, along with classic barrack blocks, and guard house.

Much of the Garrison has been rebuilt over time but these eight areas of the Garrison are how the buildings are still identified, and a unit will belong to one of these barracks. The camp has an interesting history and is the oldest of those on Salisbury Plain. The Tidworth Military Hospital was established in 1907, in the Candahar Barracks, and was part of the camp until 1977. This year sees the return of Armoured Medical Regiments to Tidworth from Germany and Aldershot. In 1909 a Garrison Theatre was constructed, and this was a hub for entertainment for soldiers and

families on Tidworth Camp – old posters show Dick Emery and Max Bygraves performing in the 1950s. By 1914 the Garrison was therefore substantial, with many houses for soldiers and their families, when a Royal Ordnance depot was also established.

Housing was within the confines of the existing camp, whereas later and more recently housing has moved 'outside the wire.' By World War Two (WW2) the United States Army Armoured Divisions (8th and 9th) also moved in and troops were entertained by many well-known names including Bob Hope and James Cagney. Winston Churchill and General Eisenhower visited Tidworth and addressed the troops in 1944 at the theatre. It is also rumoured that doughnuts and hamburgers were first introduced to the UK at Tedworth House, which was the Red Cross Club, run by Mrs Theodore Roosevelt Jr.

Tidworth continued to be a busy camp that saw many units come and go, with huge numbers of troops spending some of their Army career there and buildings changing all the time. By 2000, with the need to upgrade the Army's infrastructure, Tidworth

required extensive improvements. In 2006 Project Allenby Connaught (PAC) was established and Aspire Defence Ltd commenced work, under a Private Finance Initiative (PFI) contract. Tidworth was transformed, with new accommodation, a new gym and replacement theatre. Whilst designing a new layout for the Single Living Accommodation (SLA) village, the old plans of the camp were used and the buildings roughly follow the positions of the original housing, in a modern modular block style.

PAC also manage the other Garrisons on Salisbury Plain and Aldershot. In 2016, with the impending closure of units in Germany and the Defence Infrastructure Organisation (DIO) Army Basing Programme (ABP) managing the return of troops, the PFI contract was extended to deliver more infrastructure, particularly at Larkhill, home of the Royal Artillery on Salisbury Plain. Tidworth has been expanding again to accommodate the increase in people and equipment. Building various new accommodation has made a very hectic camp, from SLA and technical assets, such as new garages and workshops for the armoured units' military hardware. As Tidworth is home to armoured regiments, there is



Heritage Officers' Mess dining room at Tidworth © Helen Knowles

direct access onto the Salisbury Plain Training Area. Community assets such as upgrading the existing Medical and Dental centre, and a new Early Years School are also included.

English Heritage state “our built heritage represents an important echo of our past” and the Ministry of Defence (MOD) term components of the historic environment ‘heritage assets.’ At Tidworth there are listed buildings, but this does not mean that these have to be preserved exactly as they were. The aim is to ensure that change processes are managed, with buildings adapting to new uses and circumstances that ensure that the heritage value is intact. Nationally, the MOD values its heritage assets and they matter to communities, forming part of their identity. This is the case at Tidworth, where successful renovation of the older buildings gives an indirect enhanced value to the new adjacent buildings, which exist in harmony with the heritage assets. Recent refurbishments completed at some of the 1905 buildings, allow today’s regiments to continue living with the cherished yet updated infrastructure that Tidworth enjoys.

The Bhurtpore and the Assaye Messes (built in 1905) are currently undergoing extensions to provide a large new dining room, kitchen and renovated public rooms in each building, retaining the large front public rooms. The front of the buildings are as smart as when first constructed and the modern extensions to the rear have tried to be in keeping



Aliwal Barracks New Mess in 2018 © Helen Knowles

with the red brick and period style windows. The side of the extensions confirm the date with a 2019 stone roundel. Some Officers will stay in rooms within the house itself, others in a brand-new SLA block adjacent, built by Aspire through the ABP.

In contrast, Aliwal Barracks has the first of the new ABP purpose-built Messes. This is a smart modern building, with a flexible layout giving the Army new dining and living facilities, with an adjacent accommodation block. This has been built to accommodate Warrant Officers and Sergeants from Queen’s Royal Hussars (QRH), moving back to UK from Germany. This regiment, originally a cavalry regiment tracing their history back to 1685 and also known as Churchill’s Own, have an association

with Tidworth from 1958 when their predecessors were established as Queen’s Own Hussars. QRH officers will move to the Aliwal Heritage Mess (1904).

ABP are building a new type of Mess, referred to as paired Mess where a central catering facility can be shared in one building, but more than one regiment can still retain their own dining and social areas. Moving troops back from Germany and other UK establishments has allowed the Army to move from older and less efficient infrastructure into brand new energy efficient buildings and make a huge reduction in troop movement costs.

DIO can measure the success for aspects of sustainability integrated into their assets using an Environmental Assessment Methodology, and provides a score based on the affect it has on the environment. For all the new builds, DIO make sure an ‘Excellent’ score is achieved. One Mess refurbished this year is all-electric, saving reliance on gas. The camp has ensured that there are extra bike racks with the accommodation to encourage less use of cars. The new builds also have energy management systems incorporated. The team planning 2019 Tidworth worked hard to meet the changing community’s needs. DIO is committed to setting a good example in the care of its assets, relating to both the historic estate and planning of new infrastructure.



A new lounge and patio extension for additional Mess members arriving from Germany © Helen Knowles

Helen Knowles
Delivery Manager DIO ABP
Defence Infrastructure Organisation

Breathing new LIFE into Welsh sand dunes



Castlemartin rejuvenation works © Crown

Sands of LIFE (SoLIFE) is a major conservation project to revitalise sand dunes across Wales which runs until December 2022. It will recreate natural movement in the dunes and rejuvenate habitats which are home to some of our rarest wildlife.

The £4 million project is led by Natural Resources Wales (NRW) and funded by the EU LIFE Programme and the Welsh Government. It will restore over 25,000ha of sand dunes across four internationally important Special Areas of Conservation, including Ministry of Defence (MOD) land at Pendine Burrows.

Sand dunes are listed as the habitat most at risk in Europe. Over the last 80 years, nearly 90% of the open sand has disappeared and the dunes are being smothered by a tide of invasive scrub and coarse grasses. This means that the dunes have become stable and fixed, and rare wildlife has disappeared. The change has been caused by factors such as the spread of non-native plants, a lack of traditional grazing, a declining rabbit population and air pollution.

The SoLIFE project aims to re-establish the natural movement within dunes and create open sand and flower-rich dune grassland, that some of the UK's rarest wildlife relies upon.

When this project was announced as successful by the European Union, Clare

Pillman, NRW's Chief Executive, said *"We're really excited about this fantastic project to save our dunes and rare species which live there. The work will also give more people, especially those that live and work on or near the dunes, the opportunity to learn about our fascinating wildlife. This injection of EU LIFE funding means we can improve their condition and demonstrate our contribution to help deliver the Welsh Government's Nature Recovery Action Plan."*

Why healthy sand dunes are important

Sand dunes are wild, iconic landscapes. They are biodiversity hotspots where carpets of orchids still survive alongside song birds, butterflies and a wide array of endangered insects. However, as well as being reservoirs of biodiversity, sand dunes help safeguard the wider environment by providing a natural solution to flood defence and coastal erosion as well as maintaining water flows and supporting bees and other vital pollinators. Some dunes are also working landscapes, particularly for the



Petalwort © NRW

military, as they have ideal conditions for testing and training.

Actions being taken

SoLIFE will be working on 10 sites in north and south Wales. Actions will differ on each site, but will include;

- re-profiling dunes and creating bare sand to allow sand to move again
- lowering the surface of dried-out dune slacks (hollows) to re-create pools and wet habitat
- promoting sustainable grazing by livestock and rabbits
- removing scrub and invasive non-native species which are smothering and stabilising the dunes
- before and after monitoring to track the progress.

About Pendine Burrows

One key site for the project is the MOD Range at Pendine, an important facility for test, evaluation and training support activities. Between 1938-1940 Pendine was chosen as a suitable alternative location for the Small Arms Experimental Establishment and in 1945 the site became a permanent establishment for testing and evaluation of a wide range of weapons. Between 1951-1956 the 1.5km test track was built to accommodate the testing of dynamic missiles. The range is still active today and is managed by QinetiQ, and both the MOD and QinetiQ are committed to conserving the unique habitats and the wildlife found there.

The range is part of the Laugharne-Pendine Burrows Site of Special Scientific Interest (the largest spit and sand dune system in west Wales) and part of the Carmarthen Bay Dunes Special Area of Conservation. It is of outstanding importance for its rare coastal plants and extensive dune slacks. At least 350 species of flowering plants have been recorded.

The vast dune system is characterised by tall dunes of up to 20m in height divided by deep and damp hollows, which are exceptionally rich in wonderful, and sometimes rare, plants. Laugharne Burrows is one of only six sites in Britain where the dune gentian grows, and until recently it was also home to the very rare fen orchid. However, the dunes are also key for a whole host of invertebrates and fungi.

What work will take place at Pendine?

The work does not start from scratch at Pendine. The SoLIFE actions have been deliberately planned to compliment previous works undertaken by the MOD and will focus on two things; scrub clearance and improving grazing.

Pendine is covered in swathes of dense mature scrub. There is an annual programme of maintenance funded by the MOD which includes clearing the invasive species (especially sea buckthorn) and installing and monitoring dipwells to gain an understanding of the hydrology of the site.

Over the next four years SoLIFE is aiming to clear 15ha of invasive alien species as well as clearing a further 7ha of invasive native scrub around key dune slacks. To ensure that these areas remain free of scrub in the long term, the project will install around 7km of fencing to enable improved grazing. Grazing animals will



Shrill carder bee © NRW

create a patchwork of tall and short vegetation and bare ground which will allow scarce sand dune invertebrates to thrive and reduce coarse grasses which out-compete valued species.

NRW have also worked with Plantlife at Pendine, building on previous works to improve the dune slack habitat, specifically in historical fen orchid sites.

Learning from Castlemartin

Castlemartin Training Area and Ranges is a Defence Training Estate (DTE) site in Pembrokeshire. It is the only UK range normally available for armoured units for direct-fire live gunnery exercises and manoeuvres, with both on-land impact areas and a large offshore safety area. The land was taken over by the War Department in 1938, but after World War Two it was returned to farming until in 1951, when the Korean War saw its reactivation for range use, which continues today.

The MOD have funded works at Castlemartin Range SSSI – excavating areas to create artificial blow outs, cutting notches in the frontal dunes and turf stripping the inner facing slopes. Although the diggers used for some of the work can look heavy-handed, the results soon soften and appear entirely natural. Clearing the grasses allows sand to move about naturally in the wind, helping rare plants like petalwort, and insects such as sand wasps, mining bees and rare beetles.



A carpet of orchids © NRW

Although Castlemartin is not one of the SoLIFE project sites, NRW has worked with the MOD for many years to conserve the dunes, and the lessons learned there have helped inform the SoLIFE work.

NRW's work with communities

NRW works closely with the MOD on all aspects of the projects and the local team includes Marina Pugh (Defence Infrastructure Organisation (DIO), Ecologist), John Jones (DIO, NGEN Capital Work Framework Project Manager), Peter Collins (QinetiQ, Facilities Manager), Laura Bowen (SoLIFE Project and Monitoring Officer South) and Ruth Harding (NRW, Senior Conservation Officer). SoLIFE is also keen to engage with site personnel, interest groups and local people to hear their views, explain what is planned and outline the benefits for nature.

The project is creating links with sand dune managers across Wales and further afield to share knowledge. For example, Oliver Howells (DIO, Senior Ecologist), spoke to an international audience of sand dune experts at SoLIFE's recent 'Sustaining Mobile Sand Dunes' workshop in Bridgend.

Laura Bowen

Sands of LIFE Project & Monitoring Officer South
Natural Resources Wales

Archaeology under pressure below the tracks of Salisbury Plain



Major General Nick Cavanagh, Matt Smith (Breaking Ground Heritage) and Dave Murdie (Wessex Archaeology) excavate a crouched burial at Barrow Clump © Crown

Work in the winter of 2017 at Barrow Clump, on the east of Salisbury Plain (Sanctuary 47) recovered the remains of a number of Saxons with grave goods. What was striking to the team was the presence of a heavily rutted vehicle track that went straight through the area of the burials that the archaeologists had examined. This was alarming – the burials seen in 2017 were very close to the surface of the chalk, with little topsoil covering the tops of the graves. It was almost impossible to imagine that there would be no burials below the track and this raised the very real prospect that years of use by military and agricultural vehicles would have severely damaged these features. Thus, a project funded by the Ministry of Defence (MOD) Conservation Stewardship Fund was established to examine the effects of ground pressure of vehicles on undesignated archaeological deposits. Year one of two was to look below the track at Barrow Clump.

Wessex Archaeology won the contract to lead this work. Their brief was to examine whether the MOD management regime of monuments and tracks was appropriate through gaining empirical data on long

term effects. Further to this, they were to provide opportunities to the veterans on the Operation Nightingale programme to experience some potentially very exciting archaeology. It was predicted that, given the size of the cemetery and the spacing of burials from previous years, there would be between 10-15 burials, the majority of which would be extremely vulnerable to traffic movement. These assumptions were wrong on both counts!

The first stage of the project was to strip the small amount of topsoil from the chalk by machine. Although features cut

into chalk are usually very clear it was soon apparent that the geology here would be a little trickier. The chalk that had been removed from grave holes dug into the ground, and subsequently used to fill the feature afterwards, looked really similar to the surrounding undisturbed geology. The vehicle usage of the area had probably, over the years, obscured the edges of the archaeology but was this a bad omen for what lay below?

Very carefully, the military personnel with the archaeologists trowelled the chalk until the grave cuts were revealed. What is more, five extremely fragile urned cremation burials were seen. These early Saxon pots (still holding cremated human bone) were made of a poorly fired pottery and were fragmentary as a result. Years of ploughing and movement over them, perhaps unsurprisingly, had broken them. And yet, the very fact that they remained at all, so close to the surface of the ground, was phenomenal. These finds have also moved the distribution extent of cremation burials of the 6th century further south-west in Britain than ever before; a wonderful result.

The soil covering the site was only 15cm deep and the wheel ruts cut down onto (and in some areas 50mm into) the chalk itself. Having expected a relatively manageable total of burials, the team might have been excused for feeling fairly fraught that by the end of the three weeks on site 33 burials had been



A 6th century AD adult male burial complete with sword and spear, found at Barrow Clump in 2018 © Crown

found! This did not include the small keyhole investigation of other anomalies that also proved to hold human bone, that was subsequently recorded and then left in situ. There have been around 110 burials now found at the Clump.

The burials were a mixture of adult males (eight individuals), adult females (two individuals) and infants/juveniles. The 2018 excavation saw a higher proportion of burials with artefacts placed in the graves, with the vast majority of the burials having so-called 'grave-goods'. As with previous years, the items tended to be fairly gender specific with males having weaponry and females items of jewellery. The team still waits for our first female burial on this site with spear, shield or sword.

The female burials had brooches and amber beads (and possibly the remains of a purse), but this season saw very important artefacts with two adjacent male burials. One had a spear and a very long seax – a bladed weapon with a single edge like a large knife. The other had a spear, knife, cloak pin, tweezers, probable baldric and a sword. One adult male, buried very close to the two with these blades, was a so-called 'deviant burial'; buried seemingly without much ceremony at all. As a stark contrast to all the other Saxon graves which were neatly arranged in grave cuts, this one lay on his right side with arms crossed and what was left of his legs (most of which had been ploughed away) extending beyond the flint pile that covered him. His remains were only 15cm below ground and may have been slightly later than the usual 6th century burials here.

The project aim in 2018 was however to establish how well any archaeology



Early Bronze Age flint arrowhead from the ring ditch at Barrow Clump (circa 4,000 years old) © Crown



Crouched burial under the barrow mound at Barrow Clump © Crown

survived and the answer was perhaps surprising. The track did indeed cross over several graves. The skull in one fragile child burial was only 50mm below the wheel ruts and yet had suffered no damage and this pattern was repeated in the adult graves. This was a huge relief and, if this picture is extrapolated across the Training Area, should hopefully demonstrate to heritage stakeholders that military regimes on the Plain are not in fact detrimental to the survival of very important archaeological deposits that are not afforded the protection of statutory designation.

The project continued in the summer of 2019 with our final season at Barrow Clump; this time to look at the affects on the prehistoric archaeology. Four trenches were opened over 'ring ditches' that appear in aerial photographs and in geophysical surveys. These circular ditches had once surrounded round barrows, burial mounds of the Early Bronze Age and the so-called Beaker period over 4,000 years ago. When the topsoil was removed in the excavation, the mud-filled ditches stood out beautifully as dark arcs in the chalk. Excavations actually yielded very little; the occasional flint flake and pot sherd. The team could also see that one of the

ditches had already been cut by part of a Medieval field system and that the barrows themselves had been placed in a landscape that had been cleared of trees.

Our final trench, however, proved an exception to the other three of 2019 and a fitting finale to our fieldwork. In the centre of two concentric ring ditches was a shallow scoop. This held an Early Bronze Age crouched burial (in a foetal position) which in turn had disturbed earlier burials; their bones simply scattered to either side of the final inhumation. This burial had been placed in part on a rectangular area of chalk. On excavation of this area the team found a chalk rubble-filled chamber and at the base was a final prehistoric burial surrounded by flint nodules (at the time of writing assumed to be around 4,400 years old). These were all very carefully excavated and now await further assessment. As with 2018 the fieldwork was able to demonstrate that these potentially vulnerable deposits were not badly damaged by any tracks and that landscape use, be it by tank or tractor, can continue.

Richard Osgood
Senior Archaeologist
Defence Infrastructure Organisation

Abbey Wood takes a stand on World Environment Day



The DE&S environment team stand at MOD Abbey Wood Families' Day © Crown

Defence Equipment and Support (DE&S) held a World Environment Day event on 5th June 2019 at Abbey Wood. The event was held to remind people about the importance of environmental protection, the changes being made to the site to improve environmental performance, as well as the wider challenges the organisation faces and the need to adapt to the changing world.

Tim Rowntree, Director Engineering and Safety, opened the event and highlighted the unique challenges for DE&S. These include a reliance on materials such as plastics, electronic components and different chemical substances used both in day to day activities and the specialist applications across the DE&S equipment programme.

There are a range of initiatives in place to ensure DE&S plays its part in improving its environmental performance, reducing its carbon footprint and meeting the Greening Government Commitments (GGCs) including greenhouse gas emissions, waste, energy and use of water. Our interests are not limited to the estate but also resource efficiency in equipment design, manufacture and in-service support. Tackling hazardous materials risks is a key issue as well as working with industry partners to find

alternatives that are less damaging to the environment. The use of Defence Standards and Quality Assurance also has a role to make defence equipment last longer with a smaller inventory of spares.

Other presentations at the event included looking at the need to manage emissions in the surface ships programme by BAE Systems. The Defence Infrastructure Organisation provided an overview of the impact of climate change as well as how the Ministry of Defence manages infrastructure waste on its estate. Finally, the Scott Polar Research Institute provided an insight into the potential impact of climate change on Defence in the Arctic and the UK's role.

As part of our wider work DE&S have continued to refine the environmental guidance in the Acquisition, Safety and Environmental Management System (ASEMS). This is a web hosted resource which includes guidance and policy and is mandated for all DE&S equipment acquisition projects, providing a framework for delivery teams to address safety and environmental risks.

Additionally, there is an increasing focus on the elimination of consumer single use plastics across the Government

estate. At Abbey Wood, one area being addressed is the disposal of takeaway coffee cups. New 'Daisy' bins are being rolled out allowing separation of the cup and its contents and there will be new signage, providing clearer direction on exactly what can and cannot be recycled. The team are continuing to explore further improvements in this area too.

During the first week of June, employees from DE&S and the Submarine Delivery Agency also took part in a range of activities to benefit the local community and the environment as part of Volunteers' Week. Staff at Abbey Wood gave their time to take part in different 'taster' activities which highlighted the variety of opportunities that are available. More than 120 employees took part in different projects including visits to local schools around the Bristol area, charity donations, a litter pick at the site and the creation of a 'bug hotel' made from leaves and other natural materials.

Another environmental awareness initiative during August 2019 was the inclusion of a recycling themed stand at Abbey Wood Families' Day, to highlight how the organisation is tackling the environmental challenges faced. To help attract people to the stand, there were some fun activities to encourage families to think innovatively about recycling and allow children to get creative by making musical instruments from empty plastic drinks bottles and other junk.

David Harrington
Sustainable Procurement Advisor
DE&S



DE&S staff built a bug motel as part of Volunteers' Week © Crown

Ten Tors and the Year of Green Action



Keep going ... one step at a time ... and you will reach your goal © Crown

Ten Tors occurs every year on Dartmoor and is run by the Army's Headquarters South West with support from the Royal Navy and Royal Air Force as well as civilian emergency services and volunteers. The event consists of two challenges. The Ten Tors Challenge is attempted by 2,400 teenagers who work in teams of six over 35, 45 or 55 miles visiting ten nominated check points in under two days. Teams must be self-sufficient, navigating and leading themselves and carrying all that they need. The Jubilee Challenge is a one day event designed for young people aged between 14 and 21 with a range of challenging conditions, who complete one of several routes suited to their abilities accompanied by their own carers or staff and by military volunteers.

For Ten Tors 2019 it was decided to use as the theme the Defra-run Year of Green Action (YoGA – it's not just the MOD who like a snappy abbreviation!). YoGA is a year-long drive to get more people from all backgrounds involved in projects to improve the natural world. It provides a focal point to learn more about environmental impacts and take action to reduce them. With its large youth audience Ten Tors was seen as a particularly good opportunity to spread the YoGA message and Defra were quick to agree to support the event. 2019 therefore saw Ten Tors and YoGA widely publicised both before and during the event. This included generous coverage in local and national media as well as a

great deal of YoGA-related exposure and messaging on the event itself, including having it started by Lord Gardiner of Kimble, the Defra Minister responsible for the campaign.

Beyond YoGA all those involved in Ten Tors are keenly aware of its potential for negative impacts on the Dartmoor environment. To that end we work closely with the Dartmoor National Park Authority (DNPA), Natural England (NE), landowners, farmers, and others to ensure that the event has minimal impact. Measures taken include:

- Briefing all Team Managers on the environmental considerations of training on the moor and the rules in place to protect it. These include limiting training by time, space and group numbers
- Monitoring training to ensure compliance with these rules and to check for any adverse impacts of training

- Identifying rare bird nesting areas in cooperation with the RSPB and placing them out of bounds during training and the event
- Setting the challenge routes to minimise any impact on the landscape
- Issuing electronic trackers for the event which are closely monitored with any infringement of the rules liable to result in disqualification.

Programming this event remains a careful balancing act, falling as it does in late Spring and thus in lambing and nesting season. Environmental considerations are but one of many factors to consider when setting the date: others include the need to maximise safety (for instance by avoiding the worst of the winter weather and times of heightened wildfire risk) and to ensure that the event can be attended by pupils during a busy academic calendar. We also have to factor in a suitable and sufficient training period. Given all of this the current date of the weekend after the May Day Bank Holiday has, after much consideration, been identified as the best compromise.

On balance we believe that, in addition to its many other obvious benefits, Ten Tors hugely benefits Dartmoor by encouraging responsible enjoyment of the moor and raising awareness of its beauty, importance and fragility. Most importantly this is focussed on the young people of the south-west – the future ambassadors for this very special place.

Lt Col Crispin d'Apice
SO1 Ten Tors



Thousands of youngsters on their 35, 45 and 55 mile Ten Tors Challenge © Crown

Assessment of invasive non-native species in Cyprus – the RIS-Ký Project



A scuba diver undertaking a survey with a lion fish as company © Western Sovereign Base Area Sub Aqua Club

In 2017 the Centre for Ecology & Hydrology (CEH), with their project partners, the Joint Services Health Unit (JSHU) and the University of Cyprus, were awarded two-years Darwin Plus funding for the project: 'Assessment of current and future Invasive Alien Species in Cyprus.' Researching Invasive Species Kýpros was aimed at Increasing Invasive Non-Native Species (INNS) knowledge within the UK Sovereign Base Areas (SBAs) of Akrotiri and Dhekelia, Cyprus.

Non-native species are defined as species that have been moved by humans from one region of the world to another where they did not previously occur. A proportion of non-native species establish within the region to which they are introduced and some of these go on to spread and adversely affect biodiversity, economies and societies. These species are termed INNS.

The spread of INNS represents a major threat to native species and human health around the world. The estimated total annual cost of INNS species to the British economy is approximately £1.7 billion and over the last 400 years, INNS have contributed globally to 40% of the animal extinctions that have occurred. The impacts of INNS species on human

health can range from discomfort, nuisance and phobias through to skin irritations, allergies, poisoning, disease and even death.

INNS are spread around the world through many different pathways. For example, people can carry seed mixes or flowering plants when they move to a new location where these plants did not previously exist. The plants or seeds in the new locations can establish and can adversely affect the plants and animals in the new environment if they are invasive (e.g. Japanese knotweed *Fallopia japonica* in the UK). The tiger mosquito *Aedes albopictus*, a mosquito vector of chikungunya, dengue and dirofilariasis spread into Europe from Asia due to trade in used tyres. The female tiger mosquito lays eggs in stagnant water in tyres and other artificial containers and the eggs can desiccate but remain alive even when there is no water at all. When the tyres are transported and placed in a new location and it rains, these eggs can then hatch and adult mosquitoes can establish if the new location is suitable for them. Marine species, such as the predatory lion fish *Pterois miles*, are spreading from the Red Sea into the Mediterranean via the recently widened Suez Canal.

In response to the threats posted by INNS species, the RIS-Ký project was designed to study both species that could arrive and species that are already present on the SBAs in Cyprus. The project work undertaken included horizon scanning for invasive non-native plant and animal species that could arrive on the SBAs of Cyprus and detrimentally impact biodiversity and human health within the next 10 years. This horizon scan involved working with military personnel and researchers from across Europe. During this process, 225 non-native species were reviewed, 100 species were listed as very high, high or medium biodiversity risk and 125 species were low risk. Potential impacts on human health were documented for all 225 species. This paper is now published and can be found at: <https://link.springer.com/article/10.1007/s10530-019-01961-7>.

Alongside this work looking for future threats, the project team also undertook surveys in marine, freshwater/saline and terrestrial environments. Volunteer divers from the SBA, working with the University of Cyprus, used a bespoke methodology to record invasive non-native fish species in the waters of the SBAs. The locations of the native and non-native plants and fish (freshwater and marine) collected throughout the project are published on the Environmental Information Data Centre portal and the team are working with the GIS military staff in the UK to ensure species location information is also shared with the military.

A core aspect of the project is capacity building, and throughout the project workshops have been run on engaging both military and civilians with biological recording on the SBAs. Biological recording is vital for the conservation of plants, animals, and other wildlife, and involves (mostly) volunteers making 'what, where, when' records of the wildlife they find.

Additionally, a workshop on vectors of disease in the Eastern Mediterranean was hosted jointly with the JSHU in April 2018

at the Akrotiri Environmental Education Centre (AEEC). This workshop brought together military, scientists and control practitioners from across Europe to discuss vector management and disease, and collaboratively they are now in the process of drafting a Code of Practice for Mosquito Management in Wetlands.

The good news is that the risk of arrival and establishment of INNS species can be reduced through monitoring, pathway action planning and increased bio-security protocols. JSHU has run a specialised surveillance programme at points of entry (e.g. the port and airport) in the SBAs for the last four years, in order to be able to detect the arrival of, and thus prevent the establishment and spread of, the tiger and other invasive mosquito species.

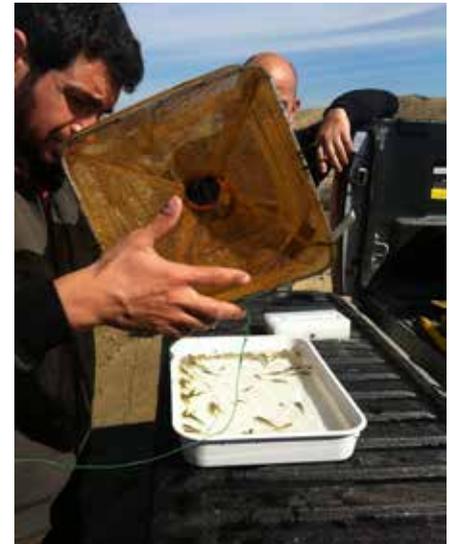
In addition to this long term monitoring undertaken by CEH and JSHU, the AEEC have a new Defra Darwin Initiative Plus Project 'DPLUS088 Addressing drivers of ecological change in Lake Akrotiri SBA, Cyprus.' They are hosting, along with military, SBA and Republic of Cyprus staff, a knowledge exchange workshop where, amongst other activities, pathway action plans will be designed to help reduce the risk of arrival of species into and out of the SBA.

Collaboration with the Ministry of Defence (MOD) has been critical to the success of the RIS-Ký project. The human health expertise that the military personnel brought to the workshops

on horizon scanning and vector management increased confidence in the delivery of the results. The MOD has gained a much better understanding of the impact that INNS can have on public health and this is expected to lead to development of a bespoke guidance document for mosquito control and management in wetland environments, the first to ever be developed in the world. The JSHU have vastly expanded their professional partnerships and have been working with the Republic of Cyprus Government, the Cyprus Institute, Public Health England, Joint Forces Command and other internationally renowned experts on INNS. This project has enabled the MOD to have a better appreciation of how military and civil actions and interactions can impact and influence the arrival or expansion of INNS into the SBAs.

Testament to the success of this project are the many resources that have been developed, as well as co-organising a Bioblitz (a mass wildlife survey) undertaken by civilians from the SBA which was documented by British Forces TV and radio stations.

The authors are grateful to the UK Defra Darwin Initiative Plus for funding this study (reference DarwinPlus056 Assessment of current and future Invasive Alien Species in Cyprus). This work was supported by the Natural Environment Research Council. The authors would also like to thank Maj Glen Bullivant and Staff Sgt Kevin



Fish sampling at Akrotiri © Steffi Schäfer, CEH

Shawcross, the staff of the AEEC and Davy Reynolds (Defence Infrastructure Organisation, Environmental Adviser) for their support of this project.

The project was recently mentioned in the statement for the Certificate of Commendation awarded to JSHU by the Commander Joint Forces Command, General Patrick Sanders. More information can be found at: <https://www.ris-ky.info/home>

J. Peyton & H. Roy
Centre for Ecology and Hydrology

K. Martinou & J. Fawcett
Joint Services Health Unit

M. Demetriou
University of Cyprus



View to Episkopi from the hills west of Akrotiri © Owen Mountford

Charting coastal change at Pembrey – airborne technologies old and new



The dunes looking north from the Range Control Tower © Crown

The Ranges

Pembrey Sands Air Weapons Range is an air-to-ground bombing and strafing practice area. The beach offers an environment for crews to establish Temporary Landing Zones to practise natural surface operations.

Pembrey Sands has been owned by the Ministry of Defence for many years, initially as an RAF station. In the mid 1930s it was the busiest bombing and gunnery school in the UK and by May 1940 it was a Fighter Command station. In World War Two (WW2) it was involved in the defence of industrial areas in Bristol and south Wales. RAF Pembrey itself was closed in 1957 and handed to Carmarthen County Council. Today, the range is surrounded by Pembrey Country Park, a motor circuit and a private airport where the RAF base once was.

The coastal defences at Pembrey formed part of the WW2 Carmarthen Stop Line designed to protect against seaborne invasion. The defences comprised pillboxes, gun emplacements and obstacles buried on the beach. Wartime defences can still be seen amongst the dunes, but subsequent dune growth and movement now obscure interlocking

fields of fire and views of the beach. The shore has moved 200 metres to the west as processes of sand deposition or 'progradation' have raised the height of previously off-shore sandbanks.

The Defence Infrastructure Organisation is now conducting sea buckthorn clearance at Pembrey. The buckthorn was probably planted in the 1960s to stabilise the sand dunes, but modern approaches to coastal management encourage the creation of mobile dune systems which enable a range of ecological niches and habitats. Buckthorn has stiff dense branches and is very thorny. The roots develop rapidly and are distributed widely. Removal involves mechanical grips mounted on a tracked excavator. The buckthorn is gripped by the main stem and pulled vertically, dragging the entire plant and roots from the sand.

The buckthorn itself is so dense that it was difficult to carry out ground assessment for signs of archaeology. The removal is potentially harmful to buried archaeological remains including wartime defences and it was therefore important to understand the wartime landscape and subsequent coastal

change. Areas of dune which were demonstrably not present in 1946 have a far lower risk of disturbance than those which formed the 1946 landscape.

Geographic Information System (GIS)

A landscape analysis was therefore undertaken and a suite of technologies, old and new, were combined in a GIS. This is a digital map-based system which can integrate and analyse data with geographic components, such as location and extent. The GIS offers three-dimensional modelling and sophisticated surface analysis techniques which allow a far greater depth of analysis and insight than simply laying one map, or information source, over another in plan.

Light Detection and Ranging (LiDAR)

LiDAR is an airborne survey technique which uses a laser to make very accurate measurements of elevation at landscape scales. The laser reflections can be processed to create Digital Elevation Models (DEM) which include surface models showing scrub, tree canopies and buildings, and terrain models which show the actual lie of the land. In Wales, Natural Resources Wales has made LiDAR data available via the Lle Geo-Portal for Wales. The dataset is simply a series of spot heights at 0.25m to 0.5m intervals.

LiDAR was used to illustrate Pembrey's present-day coastal landform, including the vegetation and structures. This was combined in a GIS with a 1946 aerial photograph and a 1969 contour survey,



Buckthorn clearance by machine © Crown

as described below, to predict the height change since WW2 and create archaeology sensitivity mapping of the buckthorn clearance areas.

Photogrammetry

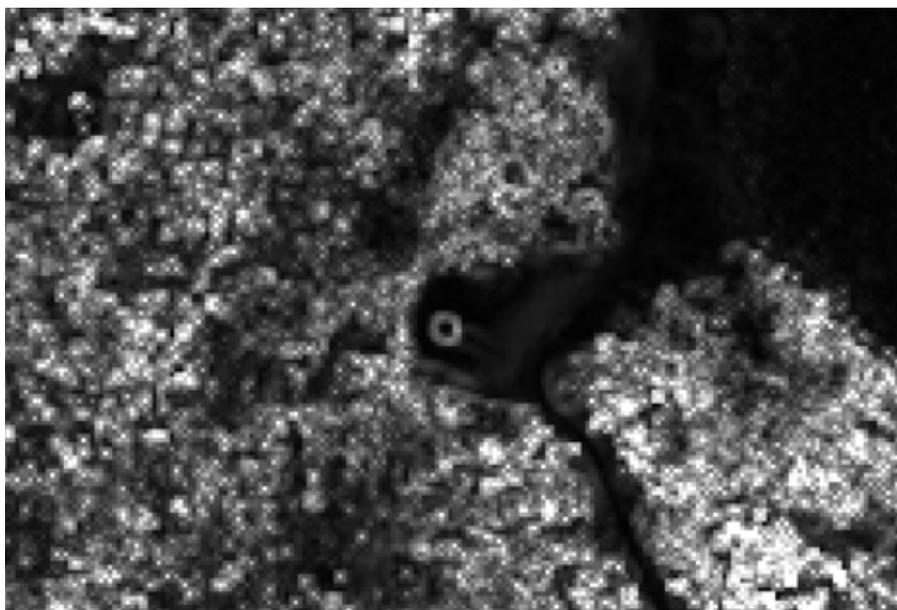
The range archive held a photogrammetric survey flown by Fairey Surveys Ltd in 1969. Fairey took overlapping aerial photographs at set heights and distances which were analysed manually in a huge stereo plotter. Identification of common points on each image allows a line of sight to be constructed from the camera to the object, and triangulation then determines the three-dimensional location of the point. The survey is calibrated against surveyed points on the ground. The survey results comprised a large-scale printed contour map at 1m intervals laid over the Ordnance Survey grid. The paper survey was scanned and 'georeferenced' – this involves telling the GIS the coordinates of known points on the scanned image, so that it becomes an interrogable layer with scale and position.

1946 aerial photograph

An aerial photograph from 1946 shows the extent of the beach and dunes at that time. The aerial photograph was also georeferenced and added as a layer in the GIS. This was much more difficult due to the lack of hard detail, but the salt creeks at Pembrey have been remarkably stable and are present in both the photograph and the LiDAR, making common points of reference available.

Analysis

Simply overlaying the different sources shows the extent of coastal change over the last 70 years. In particular, the pillboxes which once stood at the front



Ruggedness analysis showing pillbox (centre) surrounded by sea buckthorn © Crown

of the dune overlooking the beach are now up to 200 metres inland, and the WW2 beach itself is long buried.

The DEM model was analysed to produce a set of contours at the same interval as the 1969 Fairey survey. This highlighted areas of change including height, but the degree of agreement between the two technologies, in areas of no change, was very impressive.

The pillboxes themselves act as datum points and the GIS produced profiles showing 'lines of sight' between the pillboxes – this provided a good indication of the dune build up since 1946 and confirmed where the original land surface lies, comfortably below the depth of the buckthorn roots.

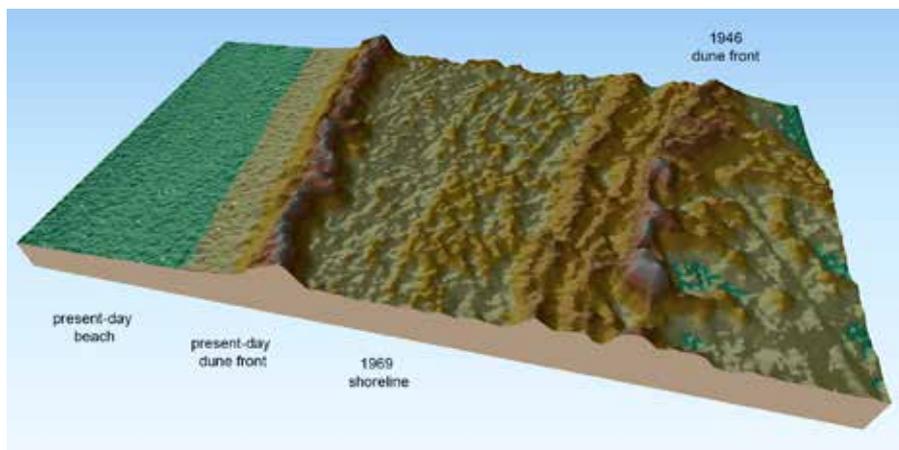
Finally, a 'ruggedness' analysis of the surface model was tested to see whether it is possible to identify

structures buried amongst vegetation. The analysis tests the mean difference in height between a central pixel and its surrounding cells and displays it in greyscale. It was possible to visualise the 'ruggedness' of the buckthorn compared with that of the more geometric pillbox with impressive clarity.

LiDAR has incredible potential for discovering and understanding archaeological landscapes, but it is very expensive to collect and process the initial datasets. The open-source availability of data collected by the statutory bodies is therefore extremely useful. Even better, survey LiDAR flights are regularly undertaken, thus offering the opportunity to monitor landscape change. It will be possible to understand how the Pembrey dunes are reacting to the buckthorn clearance, and use predictive models to anticipate, and react to, the re-appearance of buried archaeology.

The current analysis has concentrated on coastal change since 1946. However, the National Library of Scotland has now made early Ordnance Survey mapping available online <https://maps.nls.uk/> which allows change to be mapped back to the 1870s. Future research will help to provide a longer-term understanding of Pembrey's shifting shores.

Guy Salkeld
Archaeologist
Defence Infrastructure Organisation



Digital Terrain Model visualisation looking north-west, showing dune development from 1946 © Crown

Take the Lead – in support of responsible dog ownership



Take the Lead Discovery Map highlights ideal spots for safe dog walking © We Are Tilt Ltd

The South Downs National Park is England's youngest National Park, having been officially 'opened' on 1st April 2011. The National Park covers an area of 1,627 square kilometres in the south-east of England. Its boundary stretches for 140 kilometres from Winchester in the west to Eastbourne in the east, through the counties of Hampshire, West Sussex and East Sussex. Those feeling energetic can cross the Park via the 100 mile South Downs Way national trail.

As well as being the youngest, the South Downs National Park is the most populated National Park in the UK, with around 110,000 people living within the boundary, as well as many more people living in the surrounding major urban areas. The National Park attracts hundreds of visitors on a daily basis, many of which are accompanied by their four-legged friends. From rolling downland to wooded valleys, crystal clear rivers and patchwork farmland, there is something for every owner and their dog to explore.

Some of the most popular dog walking sites are the stunning heathlands which cover just 1% of the National Park. A recent survey showed that 78% of

people visiting the heathlands in the South Downs are dog walkers. In 2016, in light of the national rapid decline of heathland habitat, 11 organisations led by the South Downs National Park Authority joined forces to recreate, reconnect and restore the existing 1% of heathland left in the National Park. The project is called 'Heathlands Reunited' and aims to re-engage and inspire communities to visit their heathland, learn more about them and to conserve them for future generations.

The Ministry of Defence (MOD) own 60% of the Country's remaining dry heathland, a landscape that is rarer than rainforest. As well as being highly important biodiversity rich areas, the land acts as essential training ground for the military providing fixed Ranges, Driver Training Areas and much more. The MOD has been present for over a hundred years, ensuring these species-rich heathland habitats remain in existence today, protecting them from competing factors such as agriculture and housing development.

The Defence Infrastructure Organisation (DIO) has joined forces with the South Downs National Park led Heathlands

Reunited project to re-launch and support the 'Take the Lead' campaign, which celebrates responsible dog owners. Come rain or shine, dog walkers represent the Defence Training Estate's biggest and most regular user. As a consequence, ensuring visitors act responsibly is an important day-to-day consideration. Unfortunately, soldiers getting covered in dog faeces, dogs giving away soldiers' positions during military training exercises and people entering Danger Areas when live firing is taking place are just some of the challenges the MOD face.

As custodians of globally important and highly sensitive landscapes it is also essential that Defence Infrastructure Organisation (DIO) support partnerships that promote appropriate behaviour for the betterment of the wildlife and the habitat in which it lives. The 'Take The Lead' campaign aims to help keep recreational users of heathland Training Areas safe, enabling everybody to share these spaces responsibly.

Launched in August 2017, the campaign utilises a variety of ways in which to engage with and inform the public. A suite of eye-catching information has been made available online, on site



The 'Take the Lead' Ground Nesting Birds leaflet © South Downs National Park

and via event stands and information centres. Engaging and amusing canine animations and short films have been produced. At events dog owners participate in activities to improve how they engage with their dog. There is also an opportunity to become a 'Take the Lead' Dog Walking Ambassador or to sign the 'I Take the Lead' pledge, receiving a certificate and a place in the online gallery. Dog Walking Ambassadors support the Heathlands Reunited project in educating people and by encouraging responsible dog ownership to help protect and preserve these precious heathland sites. Willing volunteers are given full training and receive ongoing support.

There is also an online interactive 'Discovery Map' which helps dog owners find alternative locations where they can safely walk their animals; find out more at www.southdowns.gov.uk/enjoy/take-the-lead. Training Safety Officers and DIO staff have supported events run by the Heathlands Reunited team to engage directly with dog walkers about the importance of responsible dog ownership. The campaign covers four key messages and uses animation with four light-hearted canine confession videos to address real life MOD issues such as;

- Stay out of military Danger Areas when the red flags are flying – viewers are reminded that, although they may not be able to see or hear that military activities are taking place, it is always important to adhere to the red flag and pay attention to warning signs. If the red flags are flying this means that live training is taking place and neither you nor your animal companion should enter the area



Dylan, one of the important campaign faces
© South Downs National Park



Training Safety Officers are often on hand to give guidance on how best to enjoy the training estate
© Thames Basin Heaths Partnership

- Keep dogs on a lead near livestock
- Bag and bin your dog faeces, any public bin will do! Soldiers can be out on an exercise for up to 10 days. Rolling into cover and getting dog faeces on their uniform on the first day of the exercise can mean they are covered for the duration
- Ensure you and your dog are safe – sticking to the paths, especially between 1st March – 15th September, not only helps protect rare ground nesting birds but could also stop dogs from picking up military debris that may or may not be live.

Alongside these video resources there are four interviews with real owners and their dogs giving practical advice on how visitors to the South Downs can 'Take the Lead'. The confessions star MOD staff with their own dogs.

The partnership project is proving a success and is another example of how important it is for DIO to engage and work with other agencies to achieve collective goals. The Heathlands Reunited team have a wealth of resources and expertise that have complimented and aided DIO in its ongoing management of some of its most sensitive natural environments. Whilst the safety of the public is paramount, it is clearly important to highlight to visitors that they should also consider the wellbeing of their dog and the very troops who rely upon the estate to give them the training they

need to then perform in theatre. As well as raising awareness of the potential impacts dogs can have on the wildlife, the project has cast light on the issues relating to MOD land use in an original and light hearted manner. Despite only running for five years, it is clear to see that the project's impacts will be noticed for many years to come.

James Nevitt
Senior Access & Recreation Advisor
Defence Infrastructure Organisation

Katy Sherman
Heathlands Reunited Activities & Engagement Officer
South Downs National Park Authority



**SOUTH DOWNS
NATIONAL PARK**



Ancient field systems on Thorney Island



1848 map of Thorney Island showing field boundaries surveyed by Captain Sheringham © Mark Seaman

The Chichester and District Archaeology Society (CDAS) have been investigating the archaeology of Thorney Island for some years and have published short articles on the subject in *Sanctuary* in 2013 and 2014. There is good evidence of a Roman settlement on the Island, and clear indications of farming during the medieval and subsequent periods.

In parallel, members of CDAS had participated in a Heritage Lottery funded project to use LiDAR (Light Detection and Ranging) to search for archaeological features in the South Downs. LiDAR is a remote sensing technique that uses a laser scanner, mounted on an aircraft to conduct high-resolution survey of landscapes. Sponsored by the South Downs National Park, this project was entitled 'Secrets of the High Woods' and ran from 2014-2016. One legacy benefit of this project was that members of CDAS acquired the skills to manipulate LiDAR data and integrate it with maps using the free QGIS software. Almost at the same time, the Environment Agency allowed free use of its LiDAR national database. Together these developments have been a step change in the sophistication of the mapping tools available to volunteer archaeological

societies. Given the long standing interest in Thorney Island, it was natural that CDAS used these techniques to explore the undeveloped parts of the Thorney Island base.

The following maps were used;

- Land Registry map of Thorney Island dated 1936 showing the Island prior to the construction of the Airfield
- 1889 6" Ordnance Survey map
- 1848 chart of Emsworth and Chichester Harbours surveyed by Captain Sheringham and other officers
- Yeakell and Gardner Sussex map 1778-1783 2":1 mile.

The Environment Agency's LiDAR data for Thorney Island was downloaded and processed in a Geographical Information System (in this case QGIS), together with a range of historic maps. This allowed for the cross reference of features seen in the LiDAR with those seen on the historic maps. These LiDAR features were then compared with progressively older maps, to identify the earliest map on which each feature is shown.

The results of this analysis illustrated features from a range of time periods and are shown in Figure 1. Although the land at Thorney Island appears relatively flat, particularly around the runway, the LiDAR identified several field boundaries that can be clearly related to earlier maps. The identification of these boundaries has undoubtedly been helped by fact that this land has been in military use since the 1930s. This means it has never been deep ploughed with modern machinery, which is very unusual in this part of Britain. On the South Downs, about 10-20 miles north of Thorney Island, the woodland has preserved the ancient landscape and the extent of this was revealed in the 'Secrets of the High Woods' project. However, on the coastal strip, virtually all the land has either been built on or extensively cultivated (particularly during and after World War Two). However, the building of the airfield on Thorney Island in 1936 preserved the land adjacent to the runways from development and means ancient features can be seen today.

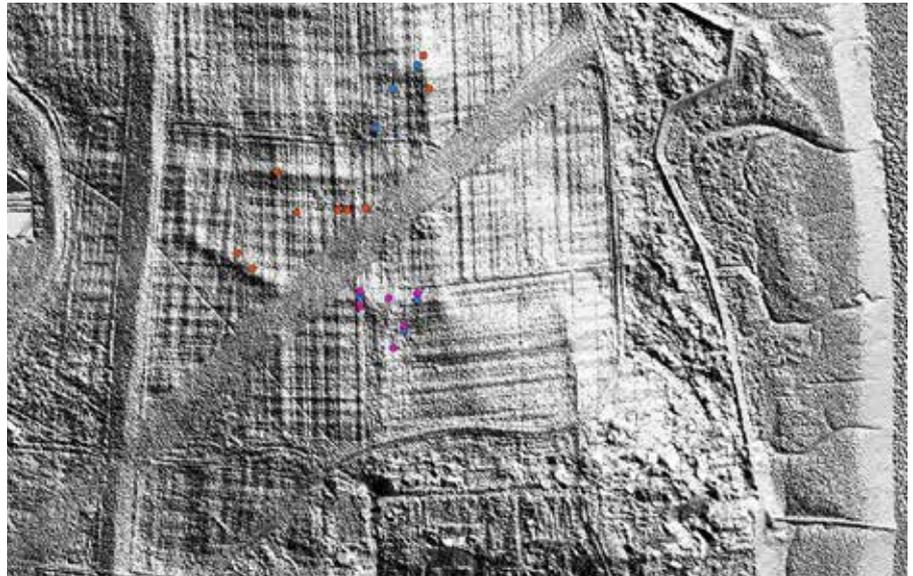


A furrow on the medieval field system south of West Thorney village © Mark Seaman

Just to the south of West Thorney village, there is some evidence of 18th century or earlier ridge and furrow strip farming, which is relatively rare on the Sussex coastal plain (see Figure 1, outlined in green). Between the runways ridges can also be seen which do not appear on any of the maps (see Figure 1, outlined in pink). These are cut into by later features, indicating they are of older origin.

In early March 2018, armed with this analysis, a team from CDAS set out to locate these features on the ground. The target features were the ridges between the runways shown in pink in Figure 1 and the field system to the south of West Thorney in green in Figure 1.

The areas either side of the runway proved to be the most challenging. The ground surface is short, rough grass. This meant that from a distance it was possible to see ridges in the grass, but that as the team moved closer, the features would disappear from view. The most successful method of locating the ridges was for some team members to act as mobile markers, guided into position onto the ridges by other team members who were sighting the features and team from a distance. This technique meant that as the human markers walked away from the team, the spotters could see when the human markers had reached the top of each ridge. The exact location of the human markers were then recorded using handheld GPS and plotted onto the surveys.



GPS locations of the human markers plotted onto the LiDAR © Mark Seaman

The ridges are 0-20cm in height with a width of circa 2m. The shape of the ridges is similar to the prehistoric field boundaries on the South Downs discovered in the 'Secrets of the High Woods' project, and this is believed to be the most likely origin on Thorney Island. The South Downs' field boundaries date from the middle Bronze Age (c. 1500 BC) and were in use through to the late Roman/early medieval period (c. AD 400–600). Thereafter, these were replaced by medieval ridge and furrow systems (typically AD 800–1500). On Thorney, there are possible traces of ridge and furrow systems cutting through the older field boundaries visible on the LiDAR, although this could not be confirmed on the field survey.

The field system to the south of West Thorney was easy to locate on the ground. It consists of a series of ditches about 1m in depth and separated by circa 20m. The Yeakell & Gardner map (1778-1783) identified these features and they do not appear on later maps. These features resemble medieval ridge and furrow systems, which are again rare on the coastal strip. Traces were found during the High Woods project and were also dated as medieval. The earlier furrows were frequently 'S' shaped due to the method of ploughing. The Thorney fields are straighter, which would indicate they are later, possibly late or post medieval (AD 1500-1800).

Thorney Island is a rare example of relatively undisturbed land on the coastal plain. There is evidence for prehistoric or Roman field systems. The Environment Agency LiDAR database is a valuable tool for archaeologists as it provides data that is sometimes difficult to identify in the field.

New techniques for ground proofing LiDAR data must be developed over time. The method described here was developed quickly in the field, and there are almost certainly better ways of achieving the same result.

Trevor Davies, Mike Kallaway & Mark Seaman
Chichester & District Archaeology Society

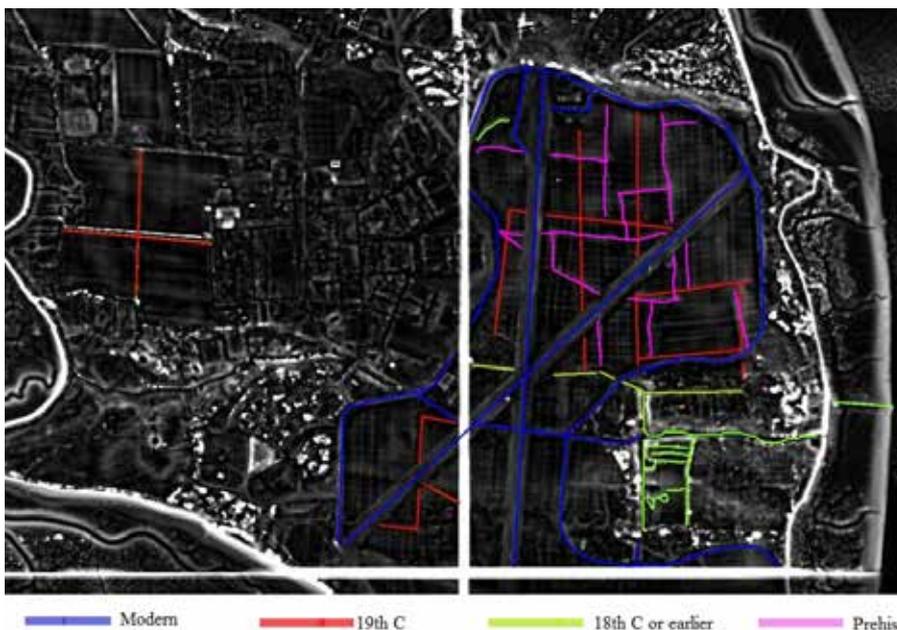


Figure 1. West Thorney LiDAR overlaid with earliest recorded dates of features © Mark Seaman

Obituary – Guardsman Mathew Talbot

1 COLDM GDS



Mathew Talbot © Stephen Talbot (with permission)

Mathew Talbot tragically died following an elephant attack in Liwonde National Park, Malawi, on 5th May 2019. At that time Mathew was serving as a Guardsman with 1st Battalion Coldstream Guards. He was part of a small team that deployed to Malawi in March 2019 to support efforts to counter the illegal wildlife trade. Under this UK government funded initiative, the Army team trained, mentored and partnered African Parks Rangers daily in an effort to interdict poachers, and to protect the rich variety of wildlife in the park.

While on partnered patrol on the morning of 5th May, Mathew's small team happened upon a herd of elephant. Without warning the team was charged by one of the animals. Mathew was unable to escape and died from his injuries later that day.

Mathew was born on 1st July 1996. He grew up in Sutton Coldfield with his parents, Stephen and Michelle, and two twin sisters, Aimee and Isobel. His wonderful family were incredibly close, and he remained utterly devoted to them.

Mathew joined the Coldstream Guards having been trained at the Army Foundation College, Harrogate, and the Infantry Training Centre, Catterick. He was initially posted to Number 7 Company, a public duties sub-unit based in Wellington Barracks, London. While there he was part of numerous state occasions, including Trooping the Colour.

He was posted to 1st Battalion Coldstream Guards in Windsor in 2017. He was much loved in Number 2 Company, and was hugely proud to be part of that team who he referred to as his brothers. He was well known for his infectious and cheeky sense of humour, and his rare ability to raise collective morale in the most trying circumstances.

Mathew was also an enthusiastic and determined infantry soldier. In late 2018 he deployed to Kenya to take part in the demanding Exercise ASKARI STORM. His qualities shone through. His Company Commander reflected that he was *"part of the heart and soul of Number 2 Company"*, adding that *"he was a fantastic young soldier with the heart of a lion"*.

From a young age, Mathew was fascinated with wildlife and

conservation. As a schoolboy he did a project on David Attenborough in which he stated that he would like to save animals one day.

When in late 2018 an opportunity arose to volunteer for a deployment to Malawi to conduct counter-poaching, Mathew was naturally quick to jump at the chance. This role was highly sought after and therefore very competitive. He was picked based on his skill, determination and strength of character. In Malawi he approached his job with enthusiasm and passion. He had a particular ability to connect with the Malawian Park rangers, with whom he formed a close bond, symbolised by his desire to learn their language.

Following his death his body was repatriated to the United Kingdom on 6th June 2019. He was granted full military honours both in Malawi and at home. Indeed, the fact that a full ceremonial contingent from the Malawian Defence Force was in attendance highlights their huge gratitude and the significant impact that his work was having. He arrived home in Brize Norton to an immaculate and most fitting ceremony.

Mathew was a great soldier and wonderful character. A much loved and loving son, brother, boyfriend and Coldstreamer, he is very sorely missed.

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CO 1 COLDM GDS



A joint counter poaching patrol in Majete Wildlife Reserve © Lt Col Tim How

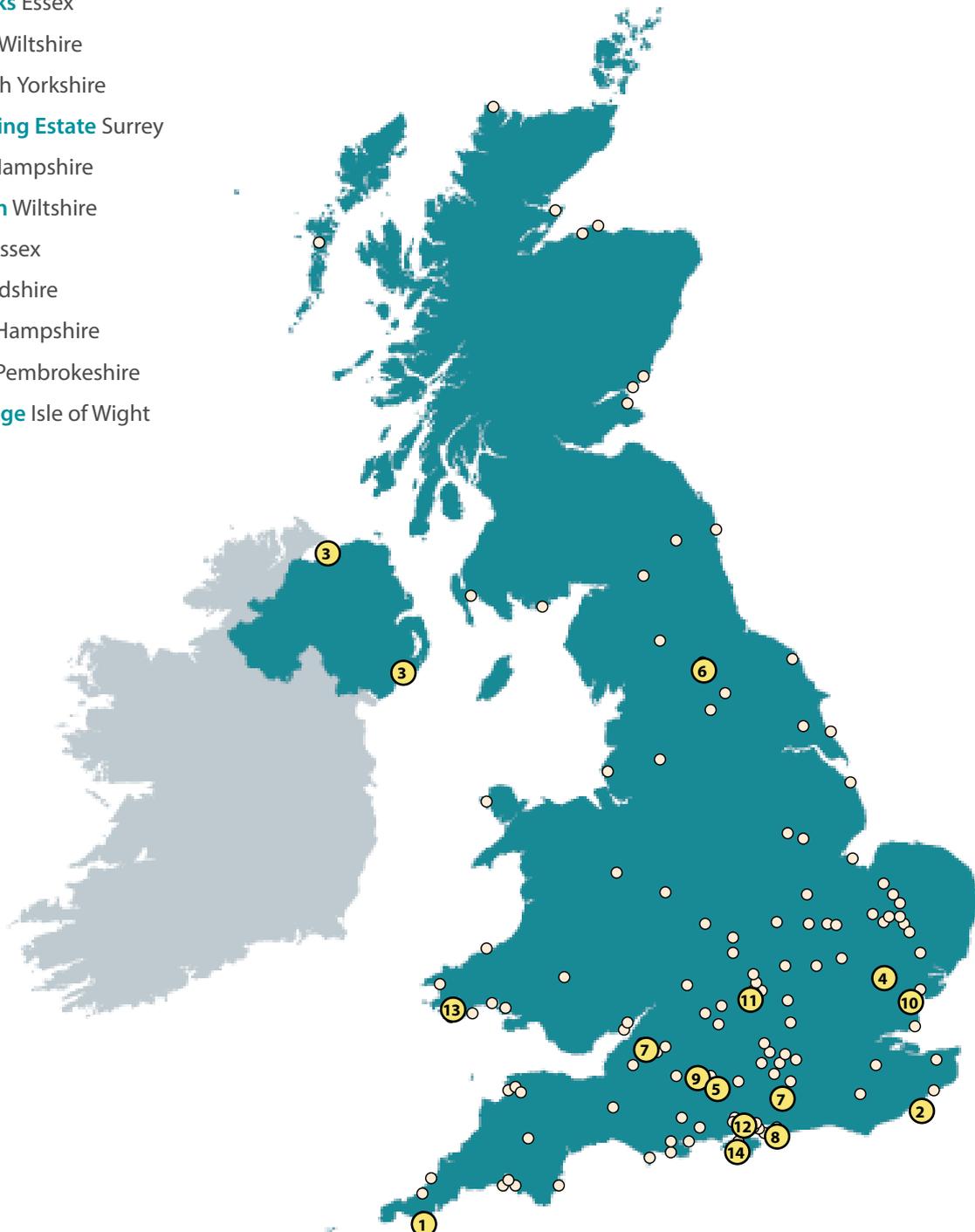
Around the Regions with the Conservation Groups

There are over 125 Conservation Groups operating across the MOD.
The following section provides an update on the dedicated work of some of these groups.

KEY: UK MAP

- 1 Featured Regional Conservation Group
- Other Regional Conservation Group

- 1 **Predannack Airfield** Cornwall
- 2 **Defence Training Estate** South East Kent and East Sussex
- 3 **Defence Training Estate** Northern Ireland
- 4 **Carver Barracks** Essex
- 5 **Porton Down** Wiltshire
- 6 **Catterick** North Yorkshire
- 7 **Defence Training Estate** Surrey
- 8 **DM Gosport** Hampshire
- 9 **Salisbury Plain** Wiltshire
- 10 **Fingringhoe** Essex
- 11 **Bicester** Oxfordshire
- 12 **Whale Island** Hampshire
- 13 **Castlemartin** Pembrokeshire
- 14 **Newtown Range** Isle of Wight



Spotlight on...

Predannack Airfield, Cornwall



Fox cubs on an old WW2 hangar site © Richard Birchett Photography

Predannack Airfield was opened in May 1941 as a satellite airfield to RAF Portreath following the capitulation of France in June 1940. It gave impetus to build more airfields across the south-west of England which were vulnerable to attack by the Luftwaffe; it is situated on the Lizard peninsular in south-west Cornwall. Today it is used extensively to train Royal Naval personnel, including aircrew and the Royal Navy School of Flight Deck Operations (RNSFDO). 700X Naval Air Squadron operates from the airfield testing and developing cutting-edge unmanned flight systems and remotely piloted air systems. There are also a number of other uses which include RAF 626 Volunteer Gliding Squadron, Goonhilly Model Flying Club and RNAS Culdose Sporting Gun Club.

The author, Richard was approached earlier in the year by the BBC's Winterwatch to do a 'passionate person short film,' focusing on his interest in the airfield, its ecology and diversity and daily use as an operational airbase. As a local boy born near Predannack, Richard had spent many hours wandering the vast expanse with his grandfather, who initially inspired his fascination with this

magical place. Richard spent time with the BBC crew showing them various areas of interest and some of the hot spots in anticipation to witness some of the bird species, hoping for a sight of the visiting hen harrier. One part of the airfield contains what appears at first sight to be lots of derelict aircraft; Harriers, Westland Lynx, Sea King, an old English Electric Canberra and a Jetstream T2. These are however used extensively for training personnel to rescue downed aircrew and are key as a training aid for the young men and women of the RNSFDO. When not being used for this purpose the BBC team were keen to see how wildlife adopt these airframes to feed and breed in. Swallows, wrens and robins have all taken advantage of the safety and shelter they provide, and in some cases the insects they hide.

Predannack Airfield is unique in terms of disturbance. There are very few feet on the ground, so any interruption to the wildlife's daily lives are kept to a minimum. Whilst the aircraft and fire trucks all create noise, the nature that use the airfield have become habituated to its daily working routines.

The management of the airfield is key to its success as a wildlife haven and an operational base. Various organisations such as The National Trust, Natural England, and the Cornwall Wildlife Trust work in collaboration with the Ministry of Defence to ensure the land is managed effectively and efficiently for the flora and fauna whilst enabling aircraft and other such military operations to operate safely. Managing an area covering 780 acres is not an easy task, but is carried out with little disruption to the wildlife.

The unique lowland acid grassland/heathland found on the airfield thrives in the warm, dry sandy soils. Some of the best examples are species rich with up to 25 plant species per square metre. In addition to the fine lichens, mosses and grasses, cat's-ear and mouse-ear hawkweeds, herbs such as sheep's sorrel and bird's-foot trefoil, Cornish heath as well as other annual species such as common storks bill, changing forget-me-not and parsley pert can be found. Some of the best examples of this unique habitat are the thousands of green-winged, southern-marsh and heath spotted orchids which literally carpet areas of the airfield.

Spring always excites when the first willow warbler is heard calling from one of its favoured perches on a goat willow; its delicate sound of a repeated soft whistling, resembles that of a falling leaf. The next arrival looks very alike; the chiffchaff with its distinctive song, although repetitive is still a lovely thing to listen to in between helicopter operations. Many other bird species are regular visitors, which include lesser and common whitethroat, the latter being more widespread than the former but still a great bird and in good numbers, with only single figures for lesser.

The cuckoo, a current declining species, is doing extremely well at Predannack. In 2018 seven pairs were recorded and monitored. The airfield provides a great habitat for this bird; rich in insects, especially caterpillars and their parasitic target species, dunnock, meadow pipit and reed warbler.

Throughout spring and into summer many resident mammal species are highly active on the airfield. Many fox families breed around the four corners of the perimeter fence and are a delight to see with cubs in early May. Small numbers of roe deer are active, only appearing at first and last light feeding on the plentiful grasses and young shoots. Another success story is one of the loveliest member of the mustelid families, the stoat which flourishes due to the amount of rabbit prey on offer. The sheer number of rabbits is quite unbelievable, however thankfully the stoats keep numbers under strict control. Numerous rare butterfly and moth species are found and many of them have local high conservation priority. One species is the rare marsh fritillary, a UK Biodiversity Action Plan priority species, which uses the airfield from neighbouring land managed by many of the local conservation bodies.



A badger foraging at sunset
© Richard Birchett Photography

The airfield is known to many as a birder's paradise especially during autumn migration time, mainly due to its vast flat runways providing safety for thousands of wading bird species seeking food and shelter. The geographical layout of the airfield for bird species is probably one of the main factors of its success – being able to sight the approach of any potential mammalian and avian predators gives them a big advantage of an easy escape. Throughout a typical autumn, numbers of golden plover reach their thousands, as do lapwing. It is without doubt one of the finest places to see such numbers in the UK. Other species include dunlin, ringed plover and some rarer birds including American golden plover and semipalmated plover. Having such numbers inevitably draws in avian predators such as peregrine falcon, hen and marsh harriers and a number of merlin, plus the resident birds of prey, all attracted to the bountiful prey on offer. The short-eared owl is always a magical sight, and a regular visitor to the airfield in the autumn and winter. In good years many turn up hunting along the fringes of the perimeter fence; although they do not breed here, they do stay right up to the latest point of returning to their breeding grounds in upland areas.

Throughout the year the author and a local ecologist conduct bird ringing of wheatears which pass through on migration. This data provides vital significant information of their movements, helping us to understand



Short eared owl captured on the perimeter fence
© Richard Birchett Photography



Common whitethroat feeding young in a bramble thicket © Richard Birchett Photography

more about the species. Regular monitoring is also conducted of all birds at Predannack, reporting the data back through Cornwall Bird Watching and Preservation Society and the British Trust for Ornithology's Bird-track.

After completing 22 years in the Royal Navy, Richard is now a reservist and actively involved in conservation on the airfield. It is a privilege to be able to enjoy and conserve such an amazing place.

Richard Birchett
CPO Survival Equipment Technician
Royal Naval Reservist



Grasshopper warbler singing in the early morning from a goat willow © Richard Birchett Photography

Kent and East Sussex

DTE South East



Cinque Ports Training Area's (CPTA) conservation year began with a conservation walk on 22nd May 2018 looking at reptiles that live in Old Park Training Area (OPTA), Canterbury. The walk was led by local herpetologist Martin Wood, who had studied reptiles inhabiting the Training Area as part of his university dissertation.

Conservation Group members saw approximately 20 slow worms, 10 grass snakes, including one specimen that was three feet long and disappeared into a thick bramble bush from where it hissed vehemently during our attempts to photograph it, and numerous common lizards.

The walk made the Conservation Group very aware of the rich ecological diversity of the Training Area. In addition to the large numbers of reptiles and lizards recorded the Group heard nightingales singing, a truly marvellous sound that is increasingly rare across the country, and the distinctive purring of a pair of courting turtle doves, another endangered bird species in England.



Mario's demonstration of the differences between types of fungi © Rick Beven

On 16th June 2018, CPTA hosted a conservation walk for eight trustees and staff from Kent Wildlife Trust (KWT), looking at plants and birds on Lydd Ranges. The walk was designed to strengthen the bonds between KWT and CPTA, which has seen KWT staff lead conservation walks and offer advice on local conservation matters. It was led by Owen Leyshon from the Romney Marsh Countryside Partnership and Sue Buckingham, who is a member of the CPTA Conservation Group.

A total of 10 members of the Crowborough Conservation Group attended a conservation walk on 13th September 2018 looking at fungi in Mereworth Park Training Area near Maidstone. The walk was led by expert mycologist Mario Tortelli and Bob Francis from Crowborough Conservation Group, who helped identify 63 species of fungi, including the deadly poisonous death cap mushroom *Amanita phalloides*.

The conservation year has been overshadowed by ash die back Chalara on the East Kent Training Area. Approximately 30% of the trees on the 400ha of woodland on the Training Area are ash and virtually all have been infected by Chalara. CPTA and Landmarc Support Services (Landmarc) have been at the forefront of the UK's response in dealing with the safety aspects of ash die back. The dying trees become extremely brittle and are a safety hazard to troops and members of the public. In 2018



Fungi collected in Mereworth Woods Training Area © Rick Beven

Landmarc started a programme of felling ash trees and replanting with native species. A total of 5ha of woodland have been felled and replanted so far, but this is only the start of a process that will continue for several years to come.

The south-east Forester, George Peet, has been extremely active in CPTA advising on forestry matters. For the second year approximately one kilometre of new hedgerows have been planted to improve the East Kent Training Area to the obvious benefit of wildlife. New spinney's and parkland trees have also been planted in many areas.

In December 2018 the Environmental Agency submitted its planning application for the new sea defences at Hythe and Lydd Ranges. The building works of the new sea defences at Hythe Ranges and around Jury's Gap, Lydd Ranges, are due to start between February and November 2020.

Conservation projects for the future include the planting of a memorial orchard in the walled garden at Acrise (East Kent Training Area) and planting a memorial wood in memory of soldiers from The Royal East Kent (The Buffs) Regiment. The Commonwealth War Graves Commission has provided CPTA with tree seeds collected on the 100th anniversary of the end of World War One for this project.

Maj Rick Beven
Senior Training Safety Officer
Cinque Ports Training Officer



Death cap mushroom, *Amanita phalloides* © Rick Beven

Northern Ireland

Ballykinler and Magilligan

It has been another busy year for conservation on the Defence Training Estate in Northern Ireland at Ballykinler and Magilligan. Both of these sand dune sites are managed to support a range of military and Police Service training needs.

Magilligan hosted a Queen's University research project investigating how to prevent salt water being drawn into coastal aquifers when water is pumped out. Once an aquifer has been contaminated with salt water (also known as saline intrusion) the well becomes useless for most purposes. A research team led by Dr Raymond Flynn used geophysical tools (fans of television's Time Team will be familiar with geophysics) to 'look' underneath the surface of the ground and run a series of tests.

Each cubic metre of sand holds an amazing 300 litres of water, and the sand aquifer stores a staggering 10,000 Olympic-size swimming pools of water. Little use is made of this water at Magilligan, unlike at most other coastal aquifers. The natural state of the aquifer makes Magilligan a good testing ground because there is no artificial interference with water levels. The aim is to develop new ways of preventing saline intrusion from damaging the water supplies of people living in coastal communities around the world.

The sites are also providing a boost to pollinators by following the All-Ireland Pollinator Plan. At Ballykinler the team worked with a local company to convert an old football field into five acres of traditionally managed hay meadows. An area of disturbed ground around a new driver training circuit was also sown with locally sourced wildflower seeds.

Both projects have been a great success. The parasitic plant yellow rattle has done a great job of reducing the vigour of the amenity grasses

allowing finer plants such as sweet vernal grass, yarrow, bird's-foot trefoil and tufted vetch to appear.

The team had a surprise on the driver training circuit, with some plants from the seed bank already in the soil. They included lesser bugloss, viper's bugloss and corn spurrey. They are arable crop weeds and have a very restricted distribution in Ireland. They are also excellent nectar sources for pollinating insects, and the seed will be harvested for use on other parts of Ballykinler and elsewhere in Northern Ireland.

Colonies of ground-nesting bees quickly established on the new areas of bare sand, taking advantage of the warmth from the sun-baked ground. The site was used by the ashy mining bee, sandpit mining bee and orange-tailed mining bee amongst others. A tiny kleptoparasitic blood-bee was also spotted. They lay eggs in the nests of other bees and then consume the pollen stored for the host's larvae.

An archaeological dig was undertaken at Ballykinler with a team from the Centre for Archaeological Fieldwork

of Queen's University Belfast. The site in question was an old fortified settlement in a defensive position overlooking Dundrum Bay. This area is rich in archaeological remains from prehistoric times through to the 20th century and has links to Irish mythology. It is possible that an old Irish King was buried nearby.

The excavation uncovered a feature called a 'low command redoubt' which was built for training in the First World War. It would have been a structure which held a Garrison of men for extended periods. This is the first of these features to have been excavated in Ireland. The team also dug a ruined house (last occupied over 100 years ago) with local volunteers including 70 school children. Lots of evidence of the past was found including pottery, clay pipes, tea cups and even thatch pins; a tantalising glimpse into earlier life on the Training Area.

Adam Mantell
Conservation Officer
Ulster Wildlife



Yellow rattle with bumble bee © Adam Mantell



Viper's bugloss © Adam Mantell

Essex

Carver Barracks



The Carver Barracks Wimbish (CBW) airfield, also designated as a Back Door Training Area (BDTA), is located three miles south-east of Saffron Walden, Essex and sits in the Parish of Wimbish. Originally arable farmland, it was acquired by the Ministry of Defence (MOD) in 1935 for the RAF. It was named RAF Debden (after the neighbouring village) during World War Two (WW2), instead of RAF Wimbish to avoid confusion with RAF Wisbech during radio transmissions, although there are two 'Debdens' in Essex! The site was transferred to the USAAF for the final years of WW2 and still has seven pillboxes and several scattered, dilapidated buildings.

The British Army took over in 1975 and it became known as Carver Barracks. It is now used for exercises by the three Engineer Units stationed here. The site provides sporting facilities to 20+ clubs including football, rugby, mountain biking, cycle racing, running, model aircraft flying and motor sports. It also hosts school sports days and cross-country events for up to 32 schools on an annual basis.

The community have embraced what the site has to offer and approach the MOD with ideas to enhance the estate. This fantastic asset, used to its full potential, will soon have a new athletics track, flood lighting and a 3G sports pitch delivered in partnership with Uttlesford District Council.



Carrying out small mammal trapping © F.M. Hutchins

The site includes part of an ancient oxlip wood (Peval's Wood), planted copses, calcareous grassland, scrub, some small ponds and amenity land, including an environmental education area which was created in 2017 with the support of the Saffron Walden Round Table. Until recently, this entire area of Essex was a blackhole for wildlife records.

In 2017 the Essex Recorders partnership funded a nest box project for the Upper Cam Ringing Groups project on a Red Data Book species (RDB), the marsh tit *Palustris poecile*.

A few months later Essex Field Club, the oldest wildlife recording group in Essex, visited the site to create a baseline survey of species. New species recorded for this area include;

- The Nationally Scarce species six-belted clearwing moth *Bembecia ichneumoniformis*
- Essex RDB species common rockrose *Helianthemum nummularium*, common green grasshopper *Omocestus viridulus* and beetle *Chalaenius nigricolor*
- A rare species of lichen *Punctelia reddenda*
- A parasitic fly *Clytiomya continua*, the 2nd record for Essex (and probably the 2nd record for the UK)
- A locally distributed tortoise shield bug *Eurygaster testudinaria*, which was a first record in Uttlesford District
- Three UK Biodiversity Action Plan moth and butterfly species.

The Essex Botanical Society found the Nationally Scarce lesser calamint *Clinopodium calamintha*, which will be included in the Atlas of Essex Flora (3rd edition) and the Essex Bat Group found three species of hibernating bats, including a barbastelle *Barbastellus barbastellus*, making this a regionally important site for hibernating bats.

The naturalists of Essex have all been astounded by their finds here. Due to the surveying conducted, many groups have offered funding, equipment and expert advice to help with continued recording,

to conserve the rare species found and to manage the habitats. These volunteers work vigorously to gather information for the future of our environment and the good and benefit of others. Field meetings are announced through the Hive, so serving personnel and their families can attend.

None of this would have been possible without the collaborative working of the military (including Head of Establishment Lt Col M Garcia MBE and Army Force Protection Advisor Capt A Dale MBE), civil servant (Mrs S Farley) and events co-ordinator (Miss F Hutchinson, Secretary of Essex Field Club), all of whom have worked tirelessly to ensure that as many people can use the BDTA as possible without affecting the military's operational capability.

Capt A. Dale
Army Force Protection Advisor
British Army



Dichtophora obliterata © Y. Couch



Pantillus tunicatus © Y. Couch

Wiltshire

Dstl Porton Down



During the past year Dstl Porton Down has been undertaking a rural biodiversity enhancements project.

Biodiversity

Under the category 'Thriving Plants and Wildlife' Defra's new 25 Year Environment Plan aims to;

- Create or restore wildlife-rich habitat outside the protected site network focusing on priority habitats
- Take action to recover threatened, iconic or economically important species of animals, plants and fungi.

The Farmland Bird indicator for 2018 also reported that 19 species of farmland birds were shown to have statistically significant population declines and were of serious concern.

In September 2018 Dstl reviewed one of its Farm Business Tenancies and decided to start the process to take back in-house 131ha of land over two years. In the autumn of 2018 a team of volunteers began ecological monitoring to establish a baseline prior to the enhancements. All of the initiatives will be monitored to record and document the success of the biodiversity enhancements.

This year 72ha was reclaimed and wildlife enhancements commenced. These include nesting plots and a number of scrapes to encourage breeding stone curlew, lapwing and skylarks. The remaining former arable habitat within each field is being managed as a mixture of fallow/set-a-side to encourage arable



Skylark © Ian Grier

plants plus margins sown for the benefit of pollinators, invertebrates and other farmland birds.

Personnel well-being

Well-being is defined in the Cambridge English Dictionary as "*the state of feeling healthy and happy.*" Increasing people's engagement with nature is another important objective of Defra's 25 Year Environment Plan. It is widely recognised that access to nature, where people can experience the joy of wildlife, such as walking through green spaces filled with wildflowers can reduce stress, fatigue, anxiety and depression.

To give personnel opportunities to experience the wonders of nature during the working day 'Terry's Field' has been created by the Dstl Rural Team. The area is used for both recreational purposes and as a space where wildlife is encouraged. This area is also rich in archaeology, with three ancient burial mounds along its boundary. These mounds influenced the shape of the four specially created island beds which have been planted with a mixture of perennial plants, shrubs and trees to encourage and support birds, butterflies, bumblebees and other invertebrates. In time it is intended to introduce annuals and bulbs to these areas. However, the

flush of self-seeded poppies and other arable flowers was so extraordinary this season that it was decided to allow nature to dictate the pace!

Creating a pond is a true wildlife magnet and encourages birds, frogs, toads, newts and invertebrates to use the water as a home, breeding ground, bathing spot, or a watering hole. Therefore, a wildlife friendly pond mirroring the shape of the flower beds has also been built, which includes a boggy margin planted with emergent and aquatic plants. Even during construction swallows and house martins were using the pond for drinking and collecting mud for their own construction projects to build their nests.

The rest of the field has been sown with a mixture of native and non-native flowers proven to benefit wildlife. The planting of a mixed hedge has also begun which in time will act as a screen from the main site, provide protection from the elements and support breeding and feeding birds and invertebrates. Once the plants in the main area reach maturity, pathways will be cut linking a number of seating points.

Terry Jeanes
Dstl FMS Rural Manager
Dstl



The new wildlife pond © Dstl

North Yorkshire Catterick Training Area



Catterick is extremely fortunate to share the knowledge and commitment of our conservation volunteers and their associates; they cover a large area and a diverse range of disciplines. The 8,000ha of varied habitats provide an incredible array of species which these specialists and amateurs cover in some detail as they gravitate to the better known hot spots around the Training Areas.

Rare lichens have been discovered this year by our bryophyte and lichen team in an old alder woodland at Feldom and a new moth, the tissue moth, has been recorded by our moth-ers well north of its range at Foxglove. Our precious prickly sedge continues to flourish and among the thousands of orchids recorded this year has been the bee orchid, not seen at Catterick in recent years. Other new sightings for the region have been little ringed plover, birch sawfly and pineapple galls.

The tawny owl population, which has been monitored for years, did very poorly due to a serious shortage of small mammals, probably the result of the extreme weather last year, and numbers ringed were little more than 25% of the norm. The barn owls, which have expanded somewhat in recent years, fared a little better but the team



Young merlins in the nest © Ian Sleightholm

had 18 casualties handed in over the winter which, although not severe, was dreich and unpleasant. Several have bred in the area in 2019 but clutches are small.

Just as the summer migrants arrived a prolonged period of wet and windy weather was experienced, which affected the recently hatched grouse chicks on the moor and destroyed many of the fragile nests recently completed by the sylvia warblers, willow warblers and chiffchaffs. Many nests were flooded out or destroyed completely and second attempts were necessary and have thankfully been more successful. A merlin nest on the moor was sadly predated by stoats.

Recent warmer weather has encouraged the butterfly and dragonfly enthusiasts who have recorded some remarkable numbers. This followed the earlier successes during brief periods of uncharacteristically warm weather in the late winter, when a brimstone was seen in flight on 15th February and small tortoiseshells on 24th February. A recent butterfly count at Foxglove produced 312 individuals. Damselflies and dragonflies have also benefitted from the warmer weather.

Our 750 or so nest boxes were diligently tackled by our female ringers who did a sterling job. No boxes were missed and some were visited two or three times until completion. Hundreds of young birds were ringed including dippers, pied flycatcher, redstart, nuthatch, wrens and robins – not to mention the abundant great and blue tits.

The team were stretched to ring the moorland birds and greatly value the cooperation received from our local gamekeepers. Many young wader chicks were ringed, some peregrines, merlins, buzzards and kestrels. The site has taken part in the British Trust for Ornithology Constant Effort Bird Ringing Programme for the 28th year and currently no visits have ever been missed.



Female broad-bodied chaser © Elizabeth Dickinson

At Foxglove the key project for the year was the creation of Spigot Mere and the extension of the inter-linked wetlands on the reserve. To achieve the 2,600m² of additional water surface, some 4,680m³ of soil had to be displaced. The result has been very positive with the associated attraction of several new species.

Finally, the team bid farewell to Maj David Oldham who has been a member of the Catterick Conservation Group for 35 years and has made regular contributions to these pages and to the activities of the Group during that time. His encyclopaedic local knowledge will be sorely missed and we wish him and his family well in the future.

Maj (Ret'd) AJ Crease
Deputy Commander
Defence Infrastructure Organisation
Defence Training Estate North

Surrey Hankley Common



A view over Hankley © Gill Pullinger

Hankley Common Training Area came to the notice of herpetologists (those interested in reptiles and amphibians) in the 1960s. The area was known for a very good population of sand lizards *Lacerta agilis* at a time when the species was fast disappearing from the heaths where it once occurred. The reasons for the decline were all too familiar including housing development, afforestation, uncontrolled fires and successional loss to scrub woodland due to a lack of appropriate habitat management.

By the 1980s the UK sand lizard population was estimated to number under 5,000 adults, located in three separate areas of Britain; the sand dunes of Merseyside, plus some heaths in Dorset and Surrey. The animals in these three regions are sufficiently distinct from each other to be recognised as geographical races. The Surrey animals were confined to just Hankley and three nearby sites. Military use, through maintaining some open habitat plus ground disturbance, provided the vital bare sand egg laying sites required by sand lizards and had helped the Hankley animals to hang on.

After an approach to the Ministry of Defence regarding the significance of the Hankley sand lizards, Amphibian and Reptile Conservation (ARC)

commenced managing 79ha of Hankley under licence in 1974. This was arranged in 11 separate areas so that most of the remaining sand lizard habitat patches were included. Over the years ARC embarked on a programme of scrub and bracken control, sympathetic heather management and of creating bare sand scrapes. Defence Training Estate (DTE) too restored some excellent heathland habitat over the years from secondary woodland and scrub. The Training Area has the enviable distinction of being a Site of Special Scientific Interest in favourable condition, with healthy populations of a range of notable heathland species including; silver-studded blue butterflies, Dartford warblers, nightjars, woodlarks and reintroduced smooth snakes.

ARC's early objective of conserving the sand lizards on Hankley had been successful, however this was only the beginning for the survival plan for the Weald race of the UK's sand lizards. Sand lizards were taken under licence from Hankley to form the nucleus of a captive breeding and reintroduction programme. At the height of this programme ARC was breeding more than 250 young Weald race sand lizards per year in a specially built vivarium. These were used to repopulate over 40 sites in the region.

At each of these sites suitable management works to support a breeding population of sand lizards had to be agreed with the owners or management licences established so that ARC's reserves staff could take on the responsibility. Zoos and keen herpetologists have done similar good work with breeding the Merseyside and Dorset races of the species for ARC, such that the sand lizard probably now occupies more tetrads in England, Wales and Scotland than at any time since the early 20th century.

The picture for the UK's sand lizards is now much rosier, however their long term survival is heavily dependent on continued conservation effort. Without near constant scrub cutting open heathland will eventually revert to woodland leading to renewed localised extinctions. With an eye to the future ARC was pleased to recently have been offered 300ha of heathland on Hankley to manage under licence, with a Natural England Countryside Stewardship grant providing funding. ARC is extremely grateful to staff at DTE for their support and is looking forward to the next phase of partnership working. Should you see a sand lizard in the wild on a heath in the south-east today, remember the chances are it can trace its DNA back to Hankley.

Rob Free
Weald Reserves Manager
Amphibian & Reptile Conservation



Sand lizard pair © Chris Dresh, ARC

Hampshire

Defence Munitions Gosport



It has been a busy year at DM Gosport with 24 nest boxes donated from another Ministry of Defence Conservation Group in early 2019 to assist with avian conservation. They will aid a range of species including various tits, sparrows, nuthatches and more.

The site was surveyed prior to installation and the locations selected to ensure an even distribution around all three areas of the site (Frater non-explosive processing and storage, Elson explosive processing and Bedenham explosive storage), paying attention to areas with potential for higher numbers identified during various annual counts. The Conservation Group then spent time erecting the nest boxes and developing a maintenance regime with associated documentation to ensure year-round value. Since the boxes have been established several sightings have been reported of nest box usage, with the hope all 24 boxes will be utilised over the coming years.

Pond maturity

DM Gosport is home to seven seasonal ponds located in the non-explosive section of the site. These were originally established in 2011 as part of the Million Ponds Project. Over the previous eight years these ponds have matured into a valuable ecosystem, providing habitats for frogs, toads, newts as well as supporting various avian species.

The Conservation Group undertook a PondNET survey and have now identified the area as an ancestral mating ground for toads. Sightings included toad spawn



DM Gosport pond © Crown

among frogspawn, tadpoles of both species and even mating common toads *Bufo bufo*, a UK Biodiversity Action Plan (BAP) species. Further investigative work including DNA sampling is being explored to determine whether any traces are present of the great crested newt.

Dyer's greenweed

The Dyer's greenweed *Genista tinctoria* population at DM Gosport was perceived to have been unfortunately lost over time, however during the first butterfly survey of 2019 a healthy patch was identified in the Bedenham area.

Dyer's greenweed is classified International Union for Conservation of Nature (IUCN) vulnerable and a notable species on habitat surveys. The ecological importance of this plant is that it is used by many species, but specifically in this case, the large gold case-bearer moth *Coleophora vibicella*, a UK BAP Priority Species and Species of Principal Importance.

On further investigation several larval casings on the plant were identified which indicates the moth species is present and utilising the plant, creating a valuable habitat that is exciting not just for DM Gosport but southern Hampshire.

Further patches were then identified in other grassland areas within the Bedenham area and additional larval casings were also found. Wooden conservation 'yellow posts' have now been placed around the plants to ensure protection of this valuable species and to safeguard these growing habitats.



Large gold case-bearer moth © Crown

Praise Bee

DM Gosport is working alongside the Praise Bee charity to help conserve indigenous pollinators, specifically the red mason bee *Osmia bicornis*. A solitary bee with a short, five-month life cycle, it is considered to pollinate most plants quicker than many other bees.

Praise Bee provided DM Gosport with two bee nest boxes which have been sighted within the Frater non-explosives section of the site, close to the ponds and a fire break with high levels of insect activity during the spring/summer months.

There are a variety of wildflowers that grow near the location and plans are in place to enhance the area with further nectar rich native wildflowers. Since launching the project one nest box has been identified as being used.

The nests will be monitored across the year to identify if they will continue to populate naturally. If the area does not seem to be attractive enough, bee pupae from other Praise Bee managed nests can be used to kick start the population. The nests will also be monitored for predators and parasites.

Raffaele Turk

Compliance Manager Environment
Defence Munitions Gosport



Praise Bee nest box among the various wildflowers
© Raffaele Turk

Essex

Fingringhoe Ranges



Richard Brooks and Maj (Ret'd) Udai Gurung MBE presenting Richard Hull with a copy of his book 'My Life on the Ranges' with other members of the Colchester Conservation Group © Crown

In March, at the Conservation Group meeting, we congratulated Richard Hull for coming 1st runner-up at the Sanctuary Awards (Individual) where Richard Brooks, Principal Environmental Advisor for Defence Infrastructure Organisation, presented Richard with limited edition copies of his book 'My Life on the Ranges' which combines his passion for ornithology and fine art; 50 years recording the birds of Fingringhoe Ranges and his superb paintings.

Also at the meeting two new projects were introduced at Fingringhoe Ranges, centred around the conservation pond which was created as mitigation and habitat enhancement for the new range development. The first, sea hogs fennel planted for the Fisher's Estaurine moth, to support a local initiative to ensure the future of this rare species and second, the CABBI crassula management project, where mites are introduced to stem the growth and spread of crassula.

The Australian mite, *Aculus crassulae* was released as a biological control agent against *Crassula helmsii*, or Australian swamp stonecrop at Ministry of Defence Fingringhoe this summer.

This release follows extensive research into the safety of the mite and approval by Defra to release the mites into the wild in August 2018. *Aculus crassulae* colonise healthy shoots of *C. helmsii* causing them to enlarge and form galls, reducing the fitness and reproductive capacity of the weed. Mites were first released at Fingringhoe in July 2019 and two more releases took place in August and September. Symptoms of mite infection and spread will also be monitored regularly at the site. Fingringhoe is one of five sites in England and Wales to be trialling this sustainable method of weed control.

To support the Year of Green Action two volunteering days were held by the Environment Agency (EA) in Friday Wood pulling up Himalayan balsam along the Roman River. This was a fantastic success and we hope to widen the scope of



The front cover of Richard Hull's book © Crown

volunteers next year. Many thanks to everyone for their tremendous effort.

Sadly, we said goodbye to Maj (Ret'd) Udai Gurung MBE (Training Safety Officer Colchester & South East Region) in November after 50 years service. Udai was committed to conservation, integrating this with the military training requirement wherever possible, and we are pleased that his last project to restore the natural banks and flow of the Roman River within Friday Wood has been a big success. We wish Udai all the very best for the future. 'Shabash jai Gurkha'!

Iain Perkins
Ecologist
Defence Infrastructure Organisation



Nicola Shearer (EA), one of the many volunteers, pulls this years record for the tallest Himalayan balsam at over 10ft © Crown

Wiltshire Salisbury Plain



Sainfoin bees on a sainfoin flower © Nigel Cope

We would like to welcome the new Senior Training Safety Officer Lt Col Kev Cammack MBE and Chairman of the Salisbury Plain Training Area (SPTA) Conservation Group. Many thanks go to his predecessor, Lt Col Stew Andrews, for all his support to the group and who was instrumental in merging the original three Conservation Groups on SPTA.

It has been a busy year for the entomologists with several events including the annual visit from the Natural History Museum team. Also a bee training day with the Bumblebee Conservation Trust, who also assisted with the two shrill carder bee hunts and although our primary species eluded us we were delighted to find roosting sainfoin bees, which are only found on Salisbury Plain in the UK. Other interesting records were the brown-banded carder and Jenny Elvin found a Barbut's cuckoo-bee *Bombus barbutellus* which was a good record for the Plain.

We continue to re-survey across the Plain for the Duke of Burgundy butterfly and chalkhill blues, their flight periods enable us to get at least two survey periods done. Mike Lockwood (Aspire Defence) continues his research and survey's

for the brown hairstreak butterfly and the habitat management for Duke of Burgundy at Larkhill.

Mervyn Grist continues his constant effort site survey (now in its 14th year) for marsh fritillary larval webs on the East of the Plain, providing continuity and valuable data to both the Centre for Ecology and Hydrology and the Ministry of Defence (MOD). He noted that in mid-July 85 larval webs were counted on the less favoured foodplant small scabious (as opposed to devil's-bit scabious) at the Weather Hill colony which is slightly greater than last year.

On the west of the Plain, Mike Smith and Ken Cservenka have held monthly moth evenings since March; recording 205 species and over 2,000 records. Notable species included scarce forester, oblique striped and six-belted clearwing.

Many thanks to our resident botanists Paul Skelton, Penny Lee and John Moon who have been busy surveying the Plain for the new BSBI Atlas. Paul is monitoring the Critically Endangered Deptford pink *Dianthus armeria*, whilst Penny has been collecting red hemp-nettle *Galeopsis angustifolia* tissue

samples for DNA analysis by Kew as part of the Back from the Brink project.

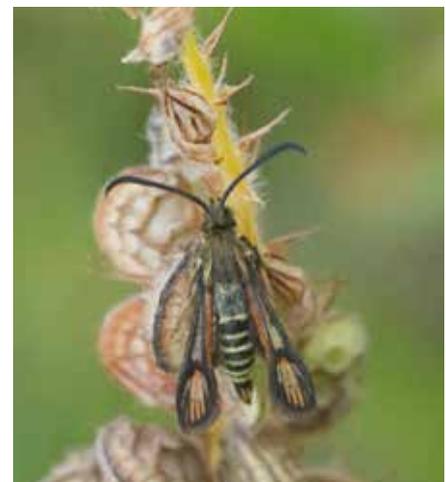
The two Owl & Raptor teams reported that it had been a good year until the wet weather in October, which had a negative effect on the second brood of barn owls. However, kestrels on the Plain appear to be maintaining their numbers as opposed to nationally where they are in decline.

Plans are being made to erect artificial nest boxes to increase swift and house martin colonies across the Plain.

It was a good year for the bird ringers, one site reported 3,251 birds ringed (39 species), highlights were two nightjars and a cuckoo. One interesting observation was the number of migrating reed warblers (136) and sedge warblers (425) caught, as these would normally go undetected if it was not for the ringing.

In October the RSPB reported that the stone curlew has had a really good year so far across Wessex, with 144 pairs and 115 fledged chicks.

The Wiltshire Wildlife Trust Water Team have been working hard along the River Avon at Figheldean and Tank Crossing A to restore and improve the river for wildlife and the local communities who live in its valley. They are always looking for volunteers to help.



Six-belted clearwing © Crown

The MOD hosted the Wiltshire Amphibian and Reptile Group AGM at Westdown Camp which was a great opportunity to network members from across Wiltshire, including the newly formed Warminster Toad Patrollers. This was followed by a short field trip on SPTA to look at the temporary ponds and toad tadpoles. It has been a bad year for the common toad on the Plain and other temporary pond dwelling species due to low rainfall and a long hot summer.

The regular walks by the Bulford members are always popular, in particular the Nine-mile river walk in spring was well attended with 16 naturalists. Many species were recorded on the three hour walk, such as toad and frog tadpoles in the dewponds, an early sighting of grizzled skipper, 13 emperor moths using a lure brought along by Graham Davis, also kites were seen and cuckoos heard, plus a grass snake in the newly restored pond and common lizards nearby. Although water levels were low the ponds were in good condition.

The first SPTA Conservation Group members evening was well supported in August with updates from on-going projects and a presentation from Natural England on their Hen Harrier project on Salisbury Plain. Many thanks to Louise Adams for organising the evening and to everyone who gave an update.

We hosted two team building days with MOD civil servants from Upavon who worked on clearing scrub from the Imber Bank to improve habitat for the flora and fauna, plus cutting back



Tackling the Canadian golden rod © Crown



Nigel Cope giving a historic landscape talk to the Edington and Tinhead Women's Institute © Crown

willow scrub from Ladywell Pond. It was a very successful two days and enjoyed by all who took part.

The Infantry Shoot organised a Canadian golden rod clearing session, which was very successful and they will continue these sessions each year to eradicate this garden pest species.

Thanks also to Nigel Cope for leading the guided visits for the Warminster Sustainability Group and the Edington and Tinhead Women's Institute; it was thoroughly enjoyed by all and highlights included seeing fairy shrimps, lots of butterflies and the fantastic floristic landscape.

In August St Giles Church in Imber was again very busy during the open days, with over 30 London Routemaster buses bringing visitors from the local areas.



A London Routemaster bus on route to Imber © Crown

During the five days 10,000 visitors were recorded. St Giles Church continues to be an important community focal point for events such as Easter, the Service of Remembrance and the Festival of Carols supported by the Bratton Silver Band.

Bratton, a village which nestles on the northern edge of Salisbury Plain, has been the home of Bratton Silver Band for 160 years. They are delighted to have been awarded funding from the Arts Council National Lottery Project Grants Fund and Brass Band England's Norman Jones Trust Fund towards its 160th Anniversary Project and the funding will support the commissioning of a piece of music about Imber Village.

Tilly Gregory SPTA Conservation Group



Two SPTA Conservation Group members helping on the Imber open days and giving visitors assistance and information on the history of the village © Crown

Oxfordshire

MOD Bicester Chiltern Rangers CIC



A nightingale ringed at MOD Bicester Garrison
© Paul Watts

When Paul Watts, Principal Ecologist at Atkins Global, first visited Ministry of Defence (MOD) Bicester Garrison in 2009, he quickly recognised the extraordinary significance for wildlife of this special place. Paul was initially contracted to carry out Breeding Birds surveys on behalf of the MOD and through this came to know the Conservation Officer, Gary Beckett. Working together, Gary and Paul began to document the rich flora and fauna and Paul (an A-licensed bird ringer) began regular voluntary bird ringing sessions at MOD Bicester. In gathering information on the status of breeding birds on site, they were able to provide the MOD with an understanding of the value of the land and management recommendations.

Cue the involvement of a volunteer task force through John Shaw; Managing Director of Chiltern Rangers. An invite from Gary and Paul to visit MOD Bicester to see the myriad of birds and butterflies was an opportunity not to be missed! The list of species ringed at MOD Bicester is remarkable; cuckoo,

turtle dove, grasshopper warbler, lesser whitethroat, common whitethroat, blackcap, chiffchaff, willow warbler, garden warbler, linnets, dunnocks and bullfinch, plus many more species.

The more time Gary, Paul and John spent on site at MOD Bicester, the more they realised that it was not just birds that were bountiful. Over the course of the breeding season, one of the most diverse assemblages of butterflies in the region was revealed. Excited by the prospect of the presence of all five species of hairstreak, John contacted Nick Bowles; Chairman of Butterfly Conservation Upper Thames Branch (BCUTB) who was newly retired and tempted by the possibility of recording some of the rarest butterflies in the BCUTB area. Surveys carried out over the butterfly flight period produced a remarkable set of results, including; black, brown, white-letter and purple hairstreaks (although peculiarly no record, of the more widespread green hairstreak has been recorded yet), purple emperor and dingy and grizzled skippers. So why is MOD Bicester so abundant with some of the region's rarest species? The simplest answer is the habitat.

MOD Bicester is a great place to compare with most other clay soil sites to see the impact of fertilisers and agricultural chemicals. As far as the team know, MOD Bicester has not had any and is therefore far richer botanically than almost every field for miles. A greater variety of plants leads to a greater variety of invertebrates and coupled with a near absence of dog walkers, to the varied bird life.

Although the areas of dense understorey provide ideal habitat for warblers and nightingales, it was also recognised that the scrub was reaching tipping point, with many areas becoming leggy and too tall. What the site needed was a mixed age of old and new scrubby species, especially to continue supporting black and brown hairstreaks, the former preferring mature blackthorn and the latter requiring younger growth. A basic management plan was created to manage the scrub on rotation, to halt the decline of the suitable habitat and prevent the associated loss of species.

The last piece of the puzzle was to find funding to deliver practical scrub management sessions. John approached the Trust for Oxfordshire's Environment (TOE2), who had been tasked with allocating funds drawn down from Grondon Waste Management as part of the Land Tax Credit system. Thankfully, the funders recognised the value of the site and the need to ensure its value remains for the future generations.

To date, the Conservation Group have had the help of 165 individual volunteers, providing support to improve the habitat. We would like to thank all of our volunteers who have given their own time in joining us, with special thanks to the Garrison Commander/Head of Establishment and the Garrison Conservation Officer for allowing access.

Steph Rodgers
Ranger
Chiltern Rangers CIC



Volunteers from High Wycombe RFC, Grondon Waste Management and Chiltern Rangers © Steph Rodgers

Hampshire HMS Excellent



South and South- East in Bloom judging volunteers and guides © Navy Media Comms

The Royal Navy suffered a number of defeats during the American War of 1812, mainly due to their opponents having better trained guns crews. Lessons were learnt and in 1830 Commander George Smith was appointed to command HMS Excellent, which was moored in Portsmouth Harbour and fired her guns across the mud flats towards Portchester.

Today HMS Excellent is a shore establishment on Whale Island, which was reclaimed using the spoils from the expansion of Portsmouth dockyard in the mid-19th century. The work was completed manually by convicts and Prisoners of War. As demand rose and training became more complex, Gunnery training moved onto the island and HMS Excellent became the Naval Gunnery School in 1891. Gunnery training ceased on the island in 1975 but until recently it remained a training establishment. HMS Excellent is now home to the Fleet Headquarters and the Maritime Battle staffs. Considerable developments have included the completion of the Admiral Sir Henry Leach Building in 2004 and continue on the island to support the 1,500 uniformed and civilian Fleet staff, whose main output is to generate sufficient capable Royal Navy and Royal Marine units to fulfil operational and other commitments around the globe.

In 2018 HMS Excellent decided to enter the 'South and South East in Bloom' competition to increase public awareness of the site and enable staff to become further involved with the environment. HMS Excellent achieved a silver award and decided to enter again in 2019, with the aim of bettering the previous silver and going for the ultimate gold award.

The Judges 2018 observations and recommendations were acted upon to improve the points tally. The first was rainwater collection. To achieve this a water butt was connected to a disused greenhouse and linked in tandem to two 1,000 litre redundant international bulk containers using a syphon system. A composting area was also built from broken pallets that would otherwise have gone to waste. In the disused greenhouse seedlings were started off ready for planting out around the site, providing a low cost source of flowers.

It was suggested that the community could be more involved and so the team contacted the on site creche which caters for 30 preschool children. One employee has an allotment and helped the creche to develop a portion of the children's outside play area into a nature friendly garden. This includes a pond with tadpoles and frogs, numerous bug and beetle areas and planting to encourage a diverse range of insects and beetles.

The final judges' recommendation was to enable many of the site's grassed areas to grow, thereby encouraging pollinators to thrive. Firstly, an apiary was created and Portsmouth and District Beekeeping Association provided eight colonies of bees on site. The bee club meets every Wednesday evening at 18:00hrs and is open to all employees, demonstrating bee keeping and promoting bee awareness. The Defence Infrastructure Organisation team were approached and worked with the Tivoli grounds team to ensure areas were left fallow from April/May onwards to promote wild flower growth. To this end numerous new species have been spotted on site including bee orchids, grasshoppers and small skippers.

On the 9th July 2019 the judges appeared with marking sheets in hand to assess the site. They were mightily impressed with the improvements and the work that has been undertaken to deliver a biodiverse community managed mostly by volunteers and lunchtime working.

Many thanks to ESS for the lunch provided for the judges and volunteers and to Brain Witts for growing all of the hanging baskets.

Ian Mackfall
Environmental Protection Advisor
HMS Excellent Conservation Group



The flowers are enjoyed by bees © Ian Mackfall

Pembrokeshire

Castlemartin



Guillemots at Castlemartin © Bob Haycock

Choughs and seabirds

Annual surveillance of the Castlemartin chough population continued. Numbers have declined little since the mid-2000s, but the summer population has remained stable at around 16-17 pairs over the last few years. Despite a cool and occasionally stormy spring, happily 12 pairs managed to rear a minimum of 32 young.

A review of choughs on the Castlemartin peninsula was also completed. This includes an historical perspective going back to the 19th century; examination of population and productivity trends and of dispersal and survival patterns.

Another long term ornithological study concerns breeding seabird populations along the Range coast. These are counted annually each summer for the Joint Nature Conservation Committee's Seabird Monitoring Programme. The Stack Rocks (or Elegug Stacks) area especially, holds many thousands of breeding guillemots and other species. This is one of the guillemots' largest mainland breeding concentrations in south-west Britain. Numbers fluctuate but the long term trend since 1992 is one of an increase. Razorbills too, although much less numerous, are still increasing in places along the coast. Kittiwakes used to be common, but for them the story is dismal! They have not reared young at Stack Rocks for many years.

Numbers have declined at many other UK colonies. Unfortunately, 2019 saw the last surviving adult pair at Castlemartin fail again and they are now functionally extinct as a breeding species there.

Invertebrates

Castlemartin's marsh fritillary population has been regularly monitored over the last two decades. Butterflies have gradually moved westwards to Linney Head from a core area near the Wash. In 2019 numbers on the wing seemed to be very good. Larval web counts will be undertaken along several established transect-routes later in the summer which will show how well the population is prospering.

Occasionally new insect species are added to the site list. This summer Nigel Lee photographed the tiny long-barred yellow conch *Aethes francillana*. This attractive tortrix moth was also new to Pembrokeshire according to Robin Taylor, County Moth Recorder. Until this year, there had been no previous records of it on the limestone at Castlemartin.

Visitors

On the south-east of the range, St Govan's attracts over 20,000 visitors a year. Aware that visits are often quite short Lynne Houlston, Castlemartin Ranger, has sought to encourage a longer and more informed visit by designing and installing an information trail.

The trail consists of eight posts, leading from St. Govans car park, around the headland to St. Govan's Head. Along the trail people learn about the military training, fauna, flora and scheduled monuments. Visitors now have the opportunity for an enhanced visitor experience and a deeper understanding of why St Govan's is such a special place.

Flimston Chapel, Castlemartin

Not far from Stack Rocks car park, Flimston Chapel appears as a quaint single-cell building. The Medieval Grade II listed chapel has been the subject of much past alteration. Its interesting history includes the 1787 conversion to a carpenter's workshop with the former cart-entrance openings still visible today in the east wall. Col and Lady Lambton then restored the Chapel to a place of worship in 1901 in memory of their three sons.

Unfortunately, the Chapel is now showing signs of deterioration and a project funded by the Ministry of Defence Conservation Stewardship Fund is underway to survey the building and inform its future conservation, protecting the building for future generations to enjoy.

Bob Haycock

Castlemartin Seasonal Warden
Pembrokeshire Coast National Park

James Nevitt

Senior Access & Recreation Advisor
Defence Infrastructure Organisation



Lynne Houlston, Castlemartin Ranger, shows off one of the new information signs at St. Govans Head © Crown

Isle of Wight

Newtown Range & Jersey Camp



Clayden's Pond © Dave Maidment

It was a good year for the use of the facility with a Regular Unit booked in February – we are open all year round. A flavour of Units in 2018 have been Royal Navy kayaking, Regular Units conducting exercises and Adventure Training as well as Cadet Units and Combined Cadet Forces from the Island and mainland carrying out range work and field craft.

An Alternative Venues partnership with London RFCA saw confirmed bookings for November 2018. In March 2019 a booking was arranged for the University of Chichester to carry out their studies in film making as part of a degree in the film industry. Ideal users of the facility would be schools and universities who could carry out surveys and field trips, making use of the accommodation and the diverse site that is on offer. Their reports can be logged in our conservation library for further use.

The site is lucky to have a registered Bird Ringing Group who net on the range between May and September as a constant effort site. Nightingales are nationally on the demise and are Red Listed. Only one nightingale was netted in 2017, but this increased to nine in 2018. A total of 278 birds were netted and recorded in 2018. It was decided to help nightingales on the site by improving the habitat for breeding

through scrub clearance, thereby allowing them to remain and thrive on the range. An area has been selected on the range. An area has been selected on Lamsleaze Farm, adjacent to the creek. An application to the Ministry of Defence Conservation Stewardship Fund for a grant to fund the work was accepted and work will begin in the autumn.

Peregrines were successful in nesting on our osprey poles in 2018 and two chicks fledged. It was planned to ring them with the assistance of Scottish & Southern Electricity. Unfortunately, however they had an emergency call out on the planned day and were unable to assist!



Primroses carpet the entrance to Jersey Camp © Dave Maidment

The AGM in November, chaired by the South East RFCA Chief of Staff went well with reports being discussed and goodbyes said. Two of our botanists have retired, Bill Shepard and Sue Blackwell, who were both long standing members.

After last winter's rainfall it was hoped the Camp survived the annual slip of sand in the Range Stop Butts. No chance! A couple of areas moved and were made good by a local contractor. Slightly more concerning is the loss of about one metre of our northern coastline on the Solent through erosion.

I announced I would be retiring in early 2019, following 39 years in the British Army (RASC. RCT. RLC.). My replacement, Wesley Woolcock, was selected in December as the new Range Officer & Training Estate Manager. Wesley has completed 22 years in the Royal Engineers and is the second Royal Engineer to take up the position, with Maj George Creeth being the first between 1912-1920.

Last year was the first time that the site has not held an open day during May since I took up the post in 2004. The reason being that the bookings for Jersey Camp had increased and as such was fully booked for that period.

It has been a quieter year than normal but interesting as always on this beautiful site. I have thoroughly enjoyed my tenure at Newtown Range and Jersey Camp as part of the Conservation Group.

Finally, I would like to thank to the Defence Infrastructure Organisation Environmental Support & Compliance Team for their support over the years and of course to the members of our Conservation Group – all wise ladies and gentlemen and experts in their subject. I am glad I had the privilege to be part of it.

Maj (Ret'd) D. C. Maidment
Range Officer
Newtown Range & Jersey Camp

DIO Safety, Health, Environmental Protection & Sustainability (SHEPS)

The Environmental Support & Compliance (ES&C) Team and the Sustainability & Environmental Planning Team (SEP) sit within the SHEPS area of DIO Technical Services and provides specialist expertise to DIO and the wider MOD. Advice and guidance can be given in the fields of: Access & Recreation, Forestry & Woodland, Historic Environment, Natural Environment, Conservation Groups & Sanctuary.

Environmental Support & Compliance

Building 88
Westdown Camp
Tilshead
Salisbury, SP3 4RS

ES&C Ecology:

DIO-EcologyTeam@mod.gov.uk

ES&C Access & Recreation:

DIOSEE-EPSESCAccess@mod.gov.uk

Environmental Planning:

DIOSEE-EPSPEnvTeamWDC@mod.gov.uk

Sustainable Development Support:

DIOSDEUS-SusDevSpt@mod.gov.uk

For all other ES&C enquiries including forestry, heritage and archaeology, and Scottish Environmental Liaison please contact:

DIO-ConservationGroups@mod.gov.uk

Utilities Team

The Utilities Team is responsible for Energy Delivery & Payment, Energy Management, along with Compliance & Data, which covers Water and Waste policy implementation and Utility Data management across the MOD estate in the UK and Overseas:

DIOSDEUS-PMO@mod.gov.uk

Backpiece – DIO ES&C Principal Advisor

As ever, it has been a pleasure to have been involved with the production of Sanctuary 48 and the 2019 Sanctuary Awards. These both continue to demonstrate the breadth of sustainability and estate stewardship embedded across the MOD estate worldwide. The commitment to the green agenda continues to grow as is clear from the award winners and articles within this publication. I would like to thank you for all of the nominations received for the 2019 Awards and the article suggestions submitted. It has been challenging for the judging and editorial panels to reach their decisions at every stage but unfortunately there is never enough space to recognise or feature everything submitted.

As we reach the calendar end of the “Year of Green Action”, as mentioned in the foreword and policy update, I would like to express ES&Cs thanks to the huge volunteer effort that is readily apparent on the estate. This year I have had the privilege of visiting a number of the MODs Conservation Groups and several volunteer led projects funded by the MODs Conservation Stewardship Fund. What all these visits had in common was the boundless enthusiasm and knowledge of volunteers without whom these groups and projects would simply not occur. Volunteers include serving and veteran service personnel, civil servants, family members and many others who, as individuals or organisations, readily share their passion for ecology, archaeology, recreational pursuits, recycling, and other sustainability projects across the defence estate. Thank you all for your support and commitment.

The Year of Green Action has not just been about volunteers but also about business commitment to green action. Sanctuary 48 includes many examples of such commitment within defence be it from the armed forces, civil service, contractors and suppliers. Environmental awareness continues to grow as sustainability continues to become business as usual. Within my own team we have a number of new recruits in the ecology and forestry teams and it is strangely rewarding to hear their surprise at the size, variety and richness of the estate and MODs sustainability commitment.



Richard Brooks © Crown

The MOD Conservation Stewardship Fund (CSF) has supported many of the activities featured in Sanctuary (48). The CSF, managed by DIO ES&C, supports projects relating to ecology, archaeology, historic buildings, public access & recreation, landscape and sustainable community projects. The specialists in ES&C ensure that the limited funds are targeted at the most deserving projects which, in turn, assist the MOD in fulfilling its environmental policies and maintaining our good reputation for environmental land management whilst ensuring this is integrated with the primary defence requirement.

If you are undertaking environmental or sustainability activity on the MOD estate then please consider the following: Could your ideas or plans be eligible for CSF funding? Does your project warrant an article in Sanctuary Magazine? Should you nominate your project, or any individual effort, for a Sanctuary Award? If the answer to any of these questions is yes then please contact the DIO ES&C team.

Finally, on behalf of the editorial team, I would like to thank all of the contributors, sponsors, DIO and wider MOD staff who have made Sanctuary 48 possible. In particular my thanks go to the DIO ES&C Sanctuary Team supported by Combat Publications – the magazine is a credit to their tenacity and effort.....

Richard Brooks

Principal Environmental Advisor
Environmental Support & Compliance

Policy FMC Update

2019 has seen a significant shift in awareness and attitude towards sustainability in our society and now Government legislation and policy on Net Zero emissions and Climate Change have followed. Focus on sustainability moves in cycles, reaching peaks of senior engagement and Government initiatives and then we forge ahead and make gain ground embedding good practice, driving sustainable procurement and design and behavioural change. It feels as if this is one of those moments and we can make further positive strides forward.

In FMC Infrastructure we are working with MOD colleagues to be ready to respond to the findings of the National Audit Office Sustainability Overview that is currently taking place in great detail with its focus on estate activities. We are also shaping a vision of how MOD can achieve Net Zero greenhouse gas emissions by or before 2050. This means mapping out, across the rural and built estate, a pathway which includes energy targets, innovation and efficiency measures. In addition, a refreshed Sustainable MOD Strategy will be completed early in 2020. Its objectives will bring together the NAO findings, our



work on Net Zero and wider issues from environmental sustainability through to challenging a shift in MOD's sustainable procurement and the Department's understanding of social sustainability.

We have also worked to promote the Year of Green Action in MOD and will continue our efforts into 2020 to capitalise on the enthusiasm of the volunteers that we are so lucky to have on our estate; the staff that work tirelessly to protect and enhance valuable assets across our estate and the policy and project staff that aren't always recognised for their efforts.

Julia Powell

FMC Cap Infra Policy & System DH
FMC Capability Infrastructure

SUBMISSIONS

If you would like to contribute to Sanctuary Magazine or enter future Sanctuary Awards please contact the Sanctuary Team at:

dfo-sanctuary@mod.gov.uk

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Editorial Message

Dear Readers, the Sanctuary Team hope you enjoy this years magazine. We are always interested in your views on how we could improve it.

Please could we ask, with sustainability in mind, that you pass the magazine on for others to enjoy and only recycle as a last resort. Thank you.

Harvey Mills Photography

Harvey Mills is an award-winning photographer based in Winchester, Hampshire. Since 2014 he has volunteered his time and expertise to assist Operation Nightingale – his exquisite images documenting both the process and finds of excavation as well as the human stories of the participants. His work has been crucial to the success of the project with his images and film featured on national television programmes, journals, books and magazines. Without his skill, the output of Operation Nightingale and associated Ministry of Defence publications, such as Sanctuary magazine, would have been much the poorer – Harvey, our sincere thanks. www.harveymills.com

COVER IMAGE: A section of the D-Day map showing the Normandy beaches

BACK COVER: TOP: Recovery of a Battle of Britain Hurricane. Operation Nightingale Exercise Huragan, September 2015. Saddlescombe Farm, Near Brighton

BOTTOM LEFT: Young soldiers-in-training assisting on an archaeological excavation to find traces of a WW1 Horse Hospital, near Larkhill

BOTTOM RIGHT: A personal cross of remembrance at the site of an Allied Dugout. Operation Nightingale Exercise Redcap Recovery, June 2019. Bullecourt, Pas-De-Calais, France

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