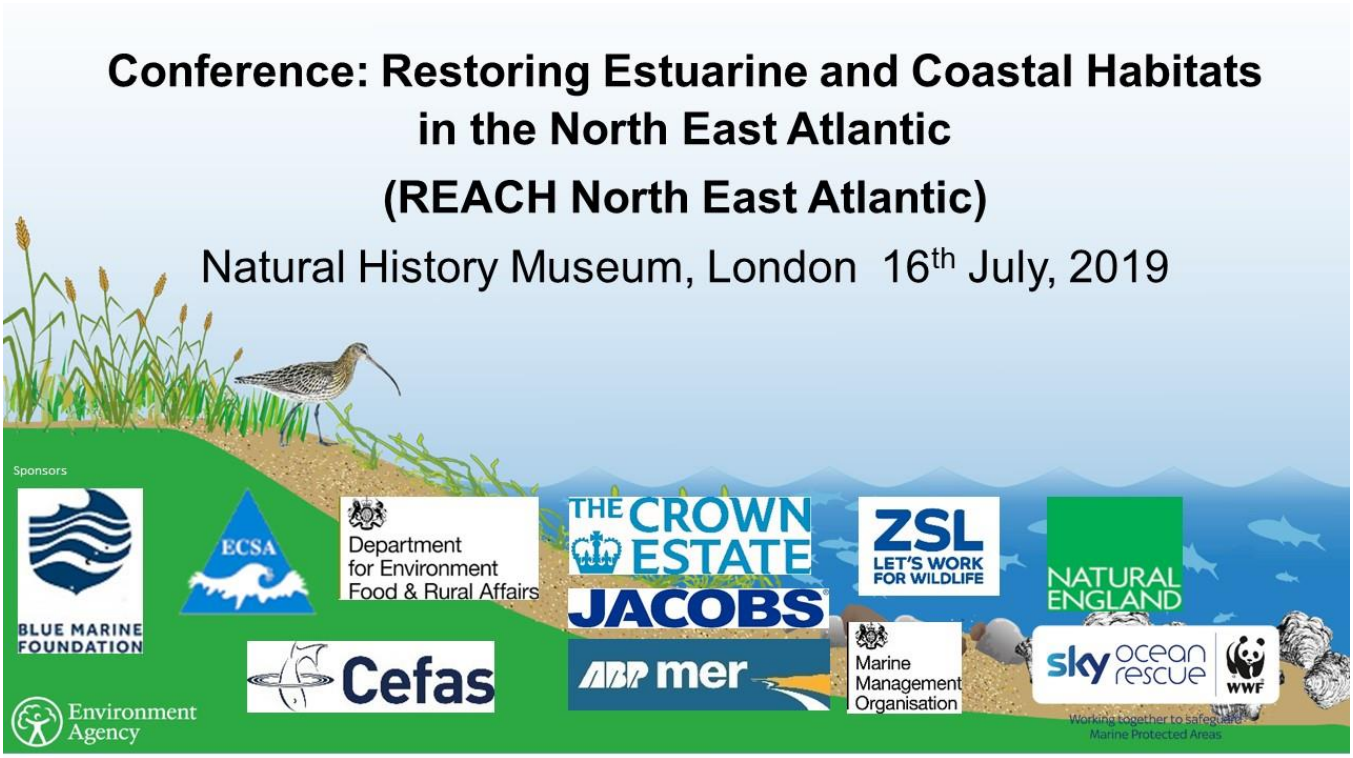

With thanks to our sponsors

DELEGATE NOTES

Our near shore seas and estuaries in the North East Atlantic have been transformed by human activity with significant losses of key habitats and the services they once provided. We have the capability to reverse some of these changes and there is growing interest in, and examples of, habitat restoration.

The REACH North East Atlantic conference brings together experts from academia, government, NGOs and industry to recognise what we have lost, develop an understanding of what we can do and inspire the restoration of estuarine and coastal habitats.

The conference will consider the following:

Past: Where have we come from? What estuarine and coastal habitats did we have? What benefits did they provide?

Present: Where are we now? What do our estuarine and coastal seas look like today? What are we doing now to restore them? What best practice and lessons learned can we share?

Future: Where are we going? What are the challenges for restoration in the nearshore environment and what habitats are suitable for practical restoration? What could our estuaries and coastal seas look like? What opportunities do we have to restore them? What happens if we don't? What innovative financial mechanisms are there to fund restoration and what are the regulatory challenges going forward?

Welcome to the conference

This information gives the answers to some of the most frequently raised questions that arise at the conferences we organise.

Slido: We know that our programme will generate much interest and questions and we may not get the opportunity to capture all of that at the conference so on the day we will be using Slido to capture all the questions from the audience with a view to following them up with the speakers post conference and including their responses in the proceedings. So if you think you might like to do that please download Slido onto your smartphone and access the conference via the web page https://www.sli.do/. **Event name - REACH Conference 2019 Code - #S550**

Wi-Fi: The code to access the open network is **NHM-Free-wifi**.

Twitter: If you're tweeting please use **#RestoringEstuariesandCoasts**.

Questions – Bookings – Receipts – In house information: If you have any questions during the event about bookings, finances, or logistics please see Diana or Jayne at the registration desk; they will be pleased to help.

Timing: We will try to ensure that the conference runs on time to allow the allocated time for speakers. An announcement will be made 5 minutes before the start of sessions.

Refreshment Breaks: There are two main refreshment breaks during the day that enable us to split the sessions and breaks more evenly; a sandwich buffet is available in the first break and sweet course during the second.

Food: There is always ample food at the events and you can come back for more. Once you have collected your food ***could you move away*** from the serving table. Catering staff are on hand if you need anything, including extra drinks.

Delegate List: A list of the delegates to 5th July is at the end of the delegate notes.

Feedback Forms: There is an evaluation form at the end of these delegate notes and your views will help us improve future events and the feedback to you after this. Please leave these at the registration desk along with your badge when you leave.

Sponsors' leaflets: To make this event more sustainable, instead of having leaflets in the delegate packs, the sponsors' leaflets have been uploaded to the conference web-page.

Conference Outputs: The Power Point presentations will be available shortly after the event. We will notify you by email when these have been uploaded to the conference web-page.

Valuables: The cloakroom area isn't supervised so if you have anything you value, keep it with you.

Before you leave: Check you haven't left anything in the conference hall.

Introduction to the Conference: Restoring Estuarine and Coastal Habitats in the NE Atlantic (REACH NE Atlantic)

Welcome to the REACH conference. England's 25 Year Environment Plan sets out a challenging ambition to restore marine biodiversity and our conference is the first step in responding to this challenge. We want to share this ambition across the UK and with our NE Atlantic partners to understand the benefits that we have lost and learn from the great work that is already underway helping to restore marine habitats. Our collective ambition is to bring together, and inspire, a community of restoration practitioners to see what more we can achieve to benefit people and wildlife.

We have grouped our speakers, as far as possible, into understanding the past, present and future. The aim of the conference is to expose our audience to a wide range of views and practical projects and to inspire further networking and discussion, both on the day and beyond. Outputs from the conference will include a report on the sessions and key points from our speakers.

We hope the momentum generated will lead to further discussions to develop future activity that pools our collective expertise and capacity to achieve much greater restorative activity, greater than the sum of the parts.

Conference programme

09.00 Doors open for refreshments and delegate registration

Introductions

09.30 - 09.35 Introduction. ***Roger Proudfoot**, Environment Agency (host)*

09.35 - 09.45 ***Emma Howard Boyd***, *Chair of the Environment Agency*

09.45 - 10.00 ***Tony Juniper***, *Chair of Natural England*

10.00 - 10.15 Defra 25 Year Environment Plan - linking our plan to objectives and driving change. ***Sara MacLennan**, Defra*

10.15 - 10.30 A joined up approach. ***Professor Peter Fox**, Environment Agency, Head of Water, Land and Biodiversity*

Session 1 – The Past – Chair: Matt Frost, Marine Biological Association

10.30 - 10.45 Conservation must overcome shifted environmental baselines to address 21st century problems. ***Professor Callum Roberts**, York University*

10:45 – 11.00 Saltmarsh, past present and future. ***Dr Mike Best**, Environment Agency*

11:00 – 11.15 A Framework for evaluating carbon sequestration – the earth tech approach starting with cetaceans. ***Ralph Chami**, International Monetary Fund*

11.15 – 11.30 Restoring the coast – what are we trying to conserve? ***Tim Collins**, Natural England*

11.30 - 11.45 Q & A

11.45 - 12.30 Break 1 - Sandwiches

Session 2 – The Present – Chair: Dr Julia Sigwart, Queens University

12.30 - 12.45 Flood and Coastal Risk Management – what role for habitats? ***Rachael Hill**, Environment Agency*

12.45 – 13.00 Restoring saltmarshes with dredge sediment – recent advances in the Solent, the UK and globally. ***Colin Scott**, Associated British Ports Marine Environmental Research*

13.00 - 13.15 Dornoch Environmental Enhancement Project (DEEP): Successes and Challenges. ***Dr Bill Sanderson**, Heriot-Watt University*

13.15 - 13.30 Sowing the seeds of recovery for our British coasts – a story of hope. ***Dr Richard Unsworth**, Swansea University*

13.30 – 13.45 Fish in intertidal habitats. ***Steve Colclough**, Institute of Fisheries Management*

13.45 – 14.05 Q & A

14.05 - 14.25 6 x 3 min presentations:

Open coast seagrass restoration in Portugal. Large scale seagrass transplants. ***Alexandra Cunha**, Joint Nature Conservation Committee/Centro de Ciencias do Mar*

Restoring native oysters in the Essex estuaries. ***Alison Debney**, Zoological Society of London*

Solent Oyster Restoration Project; restoring oyster populations in a crowded marine environment. ***Jacob Kean-Hammerson**, Blue Marine Foundation*

Sussex kelp forest restoration: enhancing fish habitats and biodiversity. ***Sean Ashworth**, Sussex Inshore Fisheries Conservation Authority*

Design of our Tyne – funding through innovation. ***Zahra Ravenscroft**, Environment Agency*

MARINEFF coastal enhancement project. ***Dr Ken Collins**, University of Southampton*

14.25 - 15.10 Break 2 - cake

Session 3 – The Future – Chair: Professor Colin Moffat, Scottish Government

15.10 - 15.25 Marine Pioneer: Using a natural capital approach for saltmarsh Restoration. ***Aisling Lannin**, Marine Management Organisation*

15.25 - 15.40 Improving the science-base: design and evolution of creek networks in restored saltmarshes. ***Clementine Chirol**, Queen Mary University London*

15.40 - 15.55 The past, present, and potential future of estuarine and coastal habitats in the East Coast of England. ***Tiziana Luisetti**, Centre for Environment, Fisheries and Aquaculture Science*

15:55 – 16:10 Sustainable finance for marine management. ***Penny Nelson**, World Wildlife Fund*

16.10 - 16.30 Q & A

16.30 - 16.40 Next steps and close

Biographies

Key speakers:

Emma Howard Boyd
Chair of the Environment Agency

Emma Howard Boyd is the Chair of the Environment Agency, an Ex officio board member of the Department for Environment, Food & Rural Affairs, and has recently been appointed as the UK Commissioner to the Global Commission on Adaptation.

Emma serves on a number of boards and advisory committees which include ShareAction, Menhaden Capital PLC, The Prince's Accounting for Sustainability Project and the Green Finance Institute.

She has worked in financial services for over 25 years, in corporate finance and fund management. As Director of Stewardship at Jupiter Asset Management until July 2014, Emma was integral to the development of their expertise in the corporate governance and sustainability fields.

Her previous board and advisory roles include: Vice Chair of Future Cities Catapult, a director of the Aldersgate Group and Triodos Renewables PLC, Chair of UKSIF (the UK Sustainable Investment and Finance Association), and a member of the Commission on Environmental Markets and Economic Performance and the Green Finance Taskforce.

Tony Juniper CBE
Chair of Natural England

Tony Juniper CBE is Chair of the official nature conservation agency Natural England. Before taking up this role in April 2019 he was the Executive Director for Advocacy and Campaigns at WWF-UK, a Fellow with the University of Cambridge Institute for Sustainability Leadership and President of the Wildlife Trusts. Until January 2018 he was an independent sustainability and environment advisor, including as Special Advisor with The Prince of Wales's International Sustainability Unit.

Juniper speaks and writes widely on conservation and sustainability themes and is the author of many books, including the multi-award winning bestseller 'What has Nature ever done for us?' published in 2013. Tony began his career as an ornithologist, working with Birdlife International. From 1990 he worked at Friends of the Earth, initially leading the campaign for the tropical rainforests, and from 2003–2008 was the organisation's executive director. From 2000–2008 was Vice Chair of Friends of the Earth International.

He was the first recipient of the Charles and Miriam Rothschild medal (2009) and was awarded honorary Doctor of Science degrees from the Universities of Bristol and Plymouth (2013). The Ladybird guide to climate change, co-authored with HRH The Prince of Wales and Emily Shuckburgh, was published in January 2017. His latest book, 'Rainforest', was published in April 2018. In 2017 he was appointed a Commander of the British Empire (CBE).

Host:

Roger Proudfoot
Environment Agency

Roger is the Environment Agency's Estuary and Coast Planning manager and Chair of the UK Healthy Biologically Diverse Seas Evidence Group. He has nearly 30 years' experience in marine environmental monitoring, assessment and management. Most recently he has overseen the reporting of the state of biodiversity in UK Seas for the Marine Strategy. He was instrumental in the implementation of the Water Framework Directive in estuarine and coastal waters in England and Wales and continues to lead and shape the Environment Agency's approach to the management of England's near-shore seas and estuaries and more widely, UK seas.

Session Chairs:

Dr Matthew Frost
Marine Biological Association

Dr Matthew Frost is Deputy Director of the Marine Biological Association where he also holds the position of Head of Policy and Knowledge Exchange, with particular responsibility for the Association as a national and international Membership organisation. Matt has a degree and PhD in marine benthic ecology with his research focusing on seabed ecology, large-scale patterns, long-term monitoring and on impacts on the marine environment, particularly those related to climate change.

Currently Matt focuses more on working at the science-policy interface and in ensuring the Association provides a clear independent voice to governments and stakeholders on a wide range of issues related to marine biology and the marine environment. In addition to publishing on science-policy issues, he also provides training courses; lectures on postgraduate courses; chairs science-policy committees; and represents the Association in marine policy advice including responding to government consultations and engaging with parliament and other governmental bodies. He has published over 70 journal papers, reports and book chapters as well as writing articles and giving talks aimed at a broader audience. Matt is President of the European Network of Marine Research Institutes and Stations (MARS) and Chair of the Marine Climate Change Impacts Partnership

Dr Julia Sigwart
Queens University

Julia is currently Associate Director at Queen's University Belfast and is returning to the role of Director of the Marine Laboratory in 2020, previously holding the position from 2009-2015. Julia is advisor on science policy to the government for Northern Ireland with a particular focus on the conservation and restoration of Modiolus reefs in Strangford Lough. Julia has been on sabbatical from 2015-2018 to the University of California funded by a Marie Sklodowska-Curie Global Fellowship award from the European Commission (2015-2018).

Julia's research focusses on the evolution of marine biodiversity; understanding evolutionary radiations, survivorship, and the way animals respond to environmental change. Julia's research group crosses genetics, morphology, anatomy, neurobiology, physiology, computational modelling, and

experimental approaches, to understand the drivers for species diversity. Some of these topics are discussed in her recent book, "What Species Mean: A User's Guide to the Units of Biodiversity", published by CRC/Taylor & Francis in early 2018.

Professor Colin Moffat
Scottish Government

Colin is Chief Scientific Advisor Marine, Scottish Government. Initially studying chemistry, he completed a PhD in heparin biochemistry, including links to tumour angiogenesis, before joining Torry Research Station where he investigated the structure of fish lipids and their nutritional benefits. He subsequently investigated organic contaminants in the marine and terrestrial environments, pathological samples, food producing animals and food products with a specific interest in their biological effects on marine biota.

Colin has specialised in methodology associated with determining the state of marine ecosystems. He led on the production of assessments of the North-East Atlantic, including the Intermediate Assessment 2017 which utilised new indicators and targets, providing an assessment of progress towards achieving a clean, healthy and biologically diverse North-East Atlantic. Colin continues to study the movement of contaminants through trophic levels and is part of the writing team for the contaminants section of the United Nations World Ocean Assessment 2.

Our Speakers:

Sara MacLennan
Defra

Sara MacLennan is an Economic Advisor for the Marine and Fisheries Directorate in Defra, the Department of the Environment, Food and Rural Affairs.

Previously, she was the Head of Evidence for the What Works Centre for Wellbeing, part of the UK movement seeking to improve understanding of programme effectiveness to inform better policy decisions.

In the environmental sphere she has worked on a range of themes spanning terrestrial and marine and cycled across continents investigating the effectiveness of small-scale projects.

Professor Peter Fox
Environment Agency

Pete has worked in the Environment Agency and predecessors for over 20 years in a wide range of regulatory, technical and leadership roles including climate change, waste regulation, biodiversity and flood risk management. Previous to this he worked in the voluntary sector, in wildlife conservation. Now in a senior leadership position, Director Water, Land and Biodiversity, he is responsible for leading on the Environment Agency's work on water quality, water quantity, farming, contaminated land, wildlife and fisheries. He also acts as the Environment Agency's business lead for estuaries and coast as the Head of Community of Practice. He is also a member of Defra's Marine Outcome System Committee.

Professor Callum Roberts

York University

Callum Roberts is Professor of Marine Conservation at the University of York in the UK. His research focuses on threats to marine ecosystems and species, and on finding the means to protect them. His main research interests include documenting the impacts of fishing on marine life, both historic and modern, and exploring the theory and practical effectiveness of marine protected areas for conservation and fisheries management. For the last 28 years he has used his science background to make the case for stronger protection for marine life at both national and international levels. His research team designed half a million square kilometres of marine protection in the North Atlantic that was established by OSPAR in 2010. His team also provided the scientific underpinning for a new ocean protection target – 30% by 2030 – which is gaining widespread support as a follow on to the UN 10% by 2020 target. Recently, with a group of leading scientists, he showed how expanded ocean protection can help mitigate climate change.

Callum Roberts' award-winning book, The Unnatural History of the Sea, charts the effects of 1000 years of exploitation on ocean life. His second book, Ocean of life: how our seas are changing, shows that the oceans are changing faster and in more ways than at any time in human history, setting out a series of reforms that could lead to a more sustainable future. His latest book, Reef Life, is on the past and future of the world's richest marine ecosystem, coral reefs, and will be published by Profile Books in 2019.

Callum Roberts was chief scientific advisor for the BBC television's flagship series Blue Planet II. He is currently working with the UN Ocean Sanctuary Alliance and 10 x 20 initiative to encourage nations to meet their commitments to establish at least 10% of their seas as marine protected areas by 2020, and with Greenpeace and other organisations to promote adoption of a more ambitious protection target of 30% of the sea by 2030. As well as being a WWF UK Ambassador, he is on the Board of Blue Marine Foundation, the Nekton Deep Ocean Research Institute, and is advisor to the Pew Bertarelli Global Ocean Legacy Program. He has been a Pew Fellow in Marine Conservation since 2000 and was a visiting Professor at Harvard University in 2001.

Dr Mike Best

Senior Marine Advisor, Estuarine and Coastal Monitoring and Assessment Service, Environment Agency

Mike is responsible for the development of marine plant (phytoplankton, macroalgae, seagrass & saltmarsh), microbial, and eutrophication tools and indicators for various assessments in coastal and estuarine environments and their associated monitoring programs. Additionally his team has developed screening tools to assess human impacts from developments.

Mike led the UK Marine Plants Task team for developing marine tools for water framework directive (WFD); and led the North East Atlantic marine plants intercalibration group and NEA Phytoplankton group. He is a member of the UK Pelagic Habitats Expert Group. He is a technical advisor for the impact of Nitrate Vulnerable Zones (NVZs) on marine waters, and for designating Sensitive and Polluted areas under the Urban Waste Water Treatment (UWWTD) and Nitrates (ND). Mike's team develops tools to help objectively weigh the conflicting evidence from these different sources of information.

Over the years Mike has produced numerous internal & external publications, reports and educational materials on a wide range of subjects from the physiology and ecology of feeding in intertidal marine

bryozoan, seabird feeding behaviour, bathing and shellfish waters health, wildlife of the Humber estuary, eutrophication and nutrient studies; UK phytoplankton, rocky shore macroalgae, soft shore nuisance green algae, seagrass and saltmarsh; assessments of power stations and Sewage treatment works, and toxic chemicals loads to sea.

Ralph Chami

International Monetary Fund

Ralph Chami is currently Assistant Director in the Institute for Capacity Development (ICD), International Monetary Fund, where he oversaw the development and implementation of the internal economics training program for all IMF economists as well as the revamping of the Institute's external training program for officials from member countries. Most recently, he was Assistant Director and Division Chief in the Middle East and Central Asia Department where he oversaw surveillance and program work on fragile states: Egypt, Libya, Somalia, Sudan, South Sudan, and Yemen, and was Mission Chief for Libya and Somalia. He is the recipient of the *2014 IMF Operational Excellence Award* for his work on Libya.

Previously, he was the Chief of the Regional Studies Division, where he oversaw regional surveillance of 32 countries in the Middle East, North Africa and Central Asia regions, and the production of the *Regional Economic Outlook*. Prior to that, he was the Chief of the Middle Eastern Division of the IMF Institute where he oversaw capacity development in that region. He joined the IMF in 1999. From 1991 till 1999, he was on the faculty of Finance in the Department of Finance, University of Notre Dame in Indiana. He also served as a consultant to the World Bank, and to the private sector in the US.

Ralph Chami has a BS from the American University of Beirut, an MBA in Finance and Statistics from the University of Kansas, and a Ph.D. in Economics from the Johns Hopkins University. His areas of specialization are: banking regulation and supervision, financial markets, and remittances. His hobbies include music and yoga. Ralph was a semi-professional guitarist for over 40 years https://www.youtube.com/user/MusicRC99.

Tim Collins

Natural England

Tim works as the principal specialist for coasts and flood management in Natural England's Government Advice Team. He leads the organisation's strategic work on flood and coastal erosion risk management including natural flood management. He works closely with Defra, Environment Agency, coastal local authorities and the NGO community to help secure better approaches that embrace the needs of the natural environment and help manage flood and erosion risks. He has a particular interest in the management of barrier beach systems because of their rapid response to sea-level rise and changes in sediment supply.

Before the creation of Natural England Tim was Head of Coastal Conservation for English Nature for nine years. He has worked for two coastal local authorities in Yorkshire including a spell as Spurn Heritage Coast Officer, while there he led innovative work that secured a more sustainable and natural approach to the management of the 5km long, and highly dynamic, sand and gravel spit of Spurn Head at the mouth of the Humber.

Rachael Hill MBE

Flood & Coastal Risk Manager, Environment Agency

Rachael has worked in water management for 28 years and now leads the national FCRM Coast and Countryside team. Her focus is the Environment Agency's strategic overview role on the coast and working with partners delivering flood and water level management in rural areas. She is the project executive of the Shoreline Management Plan Refresh Project and represents the EA on the strategic board for the Network of Regional Coastal Monitoring Programmes. Rachael works closely with local operational staff, Defra policy leads, coastal authorities, coastal groups, internal drainage boards, farmers and land managers to support them in reducing flood risk and adapting to coastal change.

Rachael spent the first 10 years of her career as a conservation officer and has provided ecological and flood resilience advice on numerous river restoration projects and riverside developments, particularly on the Thames and tributaries in London. She moved into FCRM in 2000 and since then has worked on the Thames Estuary 2100 project developing a long term flood management plan for London and the Thames Estuary, development and flood risk planning policy, and a number of post flood action plans following major flood events in Somerset (2012 & 2013/14) and Cumbria and Yorkshire (2015/16).

Rachael was awarded an MBE as part of the Queen's New Year Honours in 2018 for services to flood risk management and flood recovery.

Colin Scott

Associated British Ports Marine Environmental Research

Colin is an Associate Consultant at ABPmer. He has 25 years' experience of coastal ecology and environmental impact assessment work. He specialises in advising on the design and implementation of coastal habitat restoration initiatives and places a strong emphasis on disseminating the lessons learned from such projects.

Dr Bill Sanderson

Heriot-Watt University

Bill joined Heriot-Watt University (HWU) in 2010 as part of a research pooling exercise and is a MASTS Reader / Associate Professor. His work concentrates on the marine biodiversity research needed to support sensitive management and sustainable development. Within the modern policy context this means he has experience and ongoing research interests in Marine Environmental Enhancement, Marine Protected Areas, Maritime Spatial Planning and Marine Built Structures. He is the Research Director for the Dornoch Environmental Enhancement Project and since 2016 a Research Director at St Abbs Marine Station. Since joining HWU he has developed programmes focused on shellfish ecosystem services, restoration, MPA designation, indicator development and the biodiversity, mitigation and enhancement of structures in the marine environment.

Historically he has worked in government agencies as a marine ecologist and then as a monitoring specialist. His strategic marine research concentrated on species and habitats of high nature conservation importance such as biogenic reefs, lagoons and habitats that support higher predators. Biogenic reefs formed by shellfish have been a strong focus of his study for more than 20 years; involving hydroacoustic mapping, remote cameras and *in situ* SCUBA. His work has underpinned MPA designation, the formation of bylaws, proactive management, assessment and enforcement.

Bill has contributed to the national state of the environment assessment, Charting Progress 2, and the developing Marine Strategy Framework Directive indicators through work on the Healthy and

Biologically Diverse Seas Evidence Group. He has served on the OSPAR Benthic Specialist Group, the Interagency Marine Monitoring Group and the UK Technical Advisory Group, on methods and strategy development under the Marine Strategy Framework Directive, the Habitats Directive and the Water Framework Directive.

Dr Richard Unsworth

Swansea University

Richard K. F. Unsworth is a Lecturer in Marine Biology at Swansea University UK. He is also a founding director of conservation charity Project.

Seagrass. His research focuses on the conservation ecology of seagrass ecosystems, this includes recent research into the restoration of seagrass in Wales.

Steve Colclough

Institute of Fisheries Management

Steve is a Fellow of the IFM and a chartered environmentalist. Steve worked as Pollution Control Officer with Severn Trent Water Authority before moving to Thames WA as a Senior Fisheries Bailiff, where he was promoted to Fisheries Inspector in 1980 and Senior Fisheries Manager in South London in 1985. During this time Steve worked in both freshwater and marine fisheries management and took over local sea fisheries powers in the Thames estuary in 1995 where he led the development of a novel multimethod fish survey in the estuary which became a role model for Water Framework Directive.

In 2002, Steve transferred to Head Office in the EA as the lead national technical officer for estuarine fish and fisheries where he led a small team that delivered the WFD transitional waters fish classification scheme and sampling protocols for England and Wales. Steve was heavily involved in supporting Area colleagues with marine development challenges and involved in several government working groups formed to support the Marine Bill process from 2006-2011. During the 00s he became recognised as a European expert on fish ecology and management in estuaries and other intertidal habitats.

At the request of the IFM, Steve set up a new section focusing on estuarine and marine fisheries. Steve chairs a team that promotes information exchange, responds to government consultations and provides training and technical support to the EA, Inshore Fisheries and Conservation Authorities, consultants and other marine workers.

Steve still runs his own consultancy Colclough and Coates SC2, which he set up in 2011.

Alexandra Cunha

Joint Nature conservation Committee/Centro de Ciencias do Mar

Alexandra Cunha is a Marine Protected Areas Conservation Adviser at the Joint Nature Conservation Committee (JNCC). Before working for JNCC she worked as a seagrass ecologist at the Centre for Marine Sciences (CCMAR) in Faro for 12 years. During that period she was the executive coordinator of the European LIFE Natura Biomares project which aimed at managing and restoring habitats at the Arrábida Marine Park, Portugal. She gained a fair amount of experience in seagrass restoration during the 5 year project and authored 7 papers on the subject. She holds a B.S. in Biology a M.S. degree in Coastal Management from the Algarve University, and a PhD in Wildlife management from Auburn University, USA.

Alison Debney

Zoological Society of London

Alison is the Senior Programme Manager for UK and Europe Conservation at the Zoological Society of London (ZSL). Alison has 25 years' experience in delivering marine and freshwater conservation projects around the world focussing on the sustainable management of natural resources with beneficial outcomes for both wildlife and people.

Jacob Kean-Hammerson

Blue Marine Foundation

Jacob Kean-Hammerson is a restoration practitioner working for the Blue Marine Foundation. Jacob has been developing and coordinating BLUE's Solent Oyster Restoration Project for the last two years. Jacob's previous experience has been on projects in Zimbabwe and Ecuador, focussing on behavioural ecology and conservation. Jacob has always maintained his passion for preserving the natural environment here in Britain and on the south coast in particular.

Sean Ashworth

Sussex Inshore Fisheries Conservation Authority

Sean Ashworth researched the ecology of the European eel and its parasites for a PhD at Exeter in the 90's. He went on to work in the water industry before moving to the Environment Agency in 2001. There he focussed on managing fisheries and biodiversity together with environmental planning and the marine environment. After fourteen years at the environment agency he moved to become the Deputy Chief at Sussex Inshore Fisheries and Conservation Authority. There he has worked on implementing fisheries management in Marine Protected Areas. Sean is the Chairman of the Sussex Wildlife Trust and the Deputy Chair of The Living Coast Biosphere Reserve in Sussex.

Zahra Ravenscroft

Environment Agency

Zahra works as Senior Marine Officer for the Environment Agency covering estuary and coastal activities from Berwick to the Humber. Zahra works with coastal stakeholders to drive environmental improvements in these waterbodies through ambitious project delivery. Through existing and new coastal partnerships over £4 million of project delivery is pipelined, delivering environmental, economic, social, cultural and health benefits to the region.

Dr Ken Collins

Senior Research Fellow and Diving Officer, University of Southampton
Research interests in artificial habitats, seagrass and Galapagos marine invasive species.

Aisling Lannin

Marine Pioneer Programme Lead**,** Marine Management Organisation

Aisling Lannin completed a PhD in hake fisheries biology and management, with extensive time at sea on fishing vessels with fishermen and research vessels with scientists as well as time working in Spanish, French, English and Irish fisheries laboratories. She then moved to the North East of England to be the project officer for a Marine Protected Area in Berwickshire and Northumberland where she co-wrote an innovative stakeholder led management plan, joining land and sea designations (Area of Outstanding Natural Beauty and European Marine Site) that was hailed as a UK exemplar.

Following this she worked in Natural England provided scientific support for stakeholder identification of marine conservation zones, national coordination of MPA management, technical scientific advice on MPA management and licensing activities and advice on evidence standards.

Before recently taking the role of Marine Pioneer Programme Lead at MMO Aisling co-designed the MMO evidence gathering system and co-wrote the Evidence Strategy. Aisling also provided technical advice and scientific evidence for marine decision making.

Clementine Chirol

Queen Mary University, London

Clementine Chirol is a postdoctoral researcher at Queen Mary University, London. Geomorphologist and geodata analyst, she is particularly interested in coastal processes and coastal wetland restoration. During her PhD at the University of Southampton, she analysed the morphological evolution of managed realignment schemes across the UK to provide design recommendations for future schemes. She has developed innovative methods to semi-automatically interpret the evolution of complex features such as creek networks within saltmarshes using lidar data. Her current project focuses on the visualisation and interpretation of the 3D belowground structure of saltmarshes.

Tiziana Luisetti

Centre for Environment, Fisheries and Aquaculture Science

Tiziana Luisetti is a senior environmental economist specialising in coastal and marine ecosystem services valuation and management with over ten-year experience. She joined Cefas in 2012 as principal environmental economist where she leads the environmental and ecological economics area. Tiziana is honorary lecturer at the University of East Anglia, and CSERGE research fellow, where she co-supervises PhD students and had taught undergraduate and post-graduate students. Her experience has been built working in a number of interdisciplinary projects in the UK (e.g. UK National Ecosystem Assessment; Shelf Sea Biogeochemistry Program), and across Europe (e.g. FP7 and Interreg projects).

Penny Nelson

World Wildlife Fund

Penny works on the UK SEAS project at WWF UK. The UK SEAS project is working to develop the right protection and management for our seas, to secure a future for important industries, communities and nature. UK SEAS is using case study areas in North Devon and the Outer Hebrides to test new approaches to MPA management, and sharing successes and learnings across the UK and beyond.

Penny provides national and international policy input into developing and implementing UK SEAS activities, as well as feeding back recommendations and experiences from UK SEAS to the wider policy arena. Previous to working on the UK SEAS project, Penny was involved with WWF's Celtic Seas Partnership, bringing stakeholders together to create innovative and cross-sectoral solutions to implementing the MSFD. Previous to working for WWF, Penny has worked both in the public and private sectors assessing the impact of human activities on marine habitats and species.

Currently she has a particular interest in the management of MPAs and the assessment of how that management is performing, as well as exploring innovative approaches and solutions which help to connect people to the sea.

DELEGATE NOTES:

Restoration and the 25 Year Environment Plan – linking to outcomes and driving change

Sara MacLennan
Economic Advisor, Marine and Fisheries Directorate, Defra
T: 0208 225 7800 E: Sara.MacLennan@Defra.gov.uk

How best do we demonstrate the benefits of restoration, to drive the change which is required?

Marine restoration comes with trade-offs. How else would the seabed, or coastline have been used? What else could be developed on the same space?

Often, the costs and the opportunity costs associated with restoration can be more easily quantified than the benefits. Investments in physical infrastructure, with quantified financial returns, may be relatively easier to fund.

Can we demonstrate the benefits of restoration, to enable these trade-offs to be made? What evidence do we have linking restoration to well-being and sustainable growth - and the outcomes which the UK has set out in the 25 Year Environment Plan? Do we understand enough about the financial and social returns of restoration, in order to attract investment?

This interactive session will draw together the evidence and narrative linking restoration activities through to our 25 Year Environment Plan outcomes. Come prepared to participate!

Conservation must overcome shifted environmental baselines to address 21st century problems

Callum Roberts
Professor of Marine Conservation, Department of Environment and Geography,
University of York, York, YO10 5DD
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In this presentation, I will show how the phenomenon of shifting environmental baselines permeates conservation thinking in Europe, from the description of habitats, to the setting of conservation goals and assessment of good environmental status. Failure to recognise shifted baselines has led to inappropriate conservation goals for marine protected areas, insufficient protection, and a near absence of action to reverse historical losses. Overcoming this intergenerational blindspot will be essential if we are to mount a meaningful response to problems of species decline, habitat loss and degradation in a fast changing world.

Saltmarsh, past present and future

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Saltmarshes provide us with a variety of important services and are partially protected and monitored under a variety of legal processes (eg Biodiversity Action Plans, Habitats Directive, and Water Framework Directive).

Our understanding of saltmarsh change and resilience depends on how well we can perceive and resolve spatial and temporal scales. Saltmarsh development around Britain has been, and is, driven by many processes ranging from daily and fortnightly tidal cycles to the millennial glacial retreats.

National stock assessments of Saltmarsh have considerably improved over the last decade in terms of coverage, accuracy and consistency with the most recent inventory estimating extent to be in the region of 36,000ha in England. While historic estimates suggest we are losing up to 100 ha pa, our more recent assessments suggest this may not be the case.

Developing a tool for the health of saltmarshes provided an opportunity to integrate spatial, temporal and quality considerations in a new way. The main ecological health tool we now use includes past historic extent changes, recent extent change, zonation, and diversity elements. Results can be related to recent, current and historic pressures and can suggest routes to improvement through actions and measures. Historic loss is particularly noticeable as are changes in zonation for some of our major estuaries.

Many factors need to be considered when trying to achieve successful restoration improvements. While flood defence restoration targets have only considered extent of marsh rather than quality, more conversations are now taking place on the value of saltmarsh composition, and how restoration can happen in a more integrated way from multiple drivers.

Web links:
https://environment.data.gov.uk/searchresults;query=Saltmarsh;page=1;pagesize=20;orderby=Relevancy

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A Framework for Evaluating Carbon Sequestration: The earth tech approach starting with cetaceans

Ralph Chami, Thomas Cosimano, Connel Fullenkamp and Sena Oztosun
International Money Fund

"C*limate Change is the great existential challenge of our times." Christine Lagarde*

We have developed a framework for valuing the contribution of cetaceans to carbon sequestration. In particular, we have focused upon valuing the role of whales in carbon sequestration, directly through the carbon a whale carries on its body, and, indirectly, through its role in fertilizing phytoplankton. The latter is known to be responsible for capturing 40% of all CO_2 and for producing 50% of all Oxygen—that is, every other breath we

take. This is also equivalent to CO_2 captured by 1.7 trillion trees per year, 4 Amazon forests per year, or 70 Redwood State parks of the USA per year.

We, first, estimated that a whale, on average, contributes the capture equivalent of CO_2 to 27 thousand trees, or 18 acres of forest, per year. The pre-whaling population contribution to carbon sequestration turns out to be equivalent to CO_2 captured by over 79 billion trees or 17 thousand square miles of forest, per year.

Using financial economics tools, we developed a financial valuation framework that allows us to price the whale across its various contributions to carbon sequestration, eco-tourism and to fisheries. By viewing the whale as an asset that yields value across its lifetime, we are now able to develop a first-ever estimate of the value of the whale at $2 million dollars, on average.

Recently, the IMF highlighted how carbon prices could be used to meet Paris CO_2 mitigation pledges, and discussed the impact on CO_2 emissions of $35 and $70 per ton carbon prices. At a price of $70 per ton, the value of a whale would be over $6 million dollars, pricing out the demand for whale meat in countries, where the market value of whale could reach less than ninety thousand dollars.
Moreover, with whale migration covering the globe, a whale could and should be viewed as an "international public good," and as such warrants the coordination of all nations to help protect these cetaceans from ship strikes, whaling, entanglements and overfishing.

The framework we have developed, however, can be used not only to price and value cetacean contributions to carbon but also marine habitats, as well as other entities or phenomena. By doing so, this allows the scientific evidence on the importance and fragile state of our environment to be recast in the public policy space, where policymakers can now estimate the cost-benefit of saving our marine or terrestrial environment, and then devise mitigation measures to help deal with the present danger of climate change that threatens the worlds' economies.

Restoring the Coast – what are we trying to conserve?

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The coastline of England is very varied supporting a wide range of habitat types, landscapes and a great diversity and abundance of wildlife. While in many places coastal habitats are still free to respond to the forces of wind, wave and tide, in others they have been heavily constrained by human intervention. Climate change, and in particular rising sea-levels, poses challenges for both the constrained and unconstrained areas.

This presentation will explore these challenges, in particular it will look at what it is that we should (or should not) be trying to conserve in the face of climate change. It is all too easy to simply want to 'protect' our best wildlife sites in their current form, we value what we already have and understandably don't want to lose it. In many locations however this preservationist approach is ***not*** an option, over the next century many of our soft, low lying coasts are going to change radically. Barrier beaches will break down or move landwards, cliff erosion will accelerate, saltmarshes will erode and there will be large scale changes in sediment availability.

The presentation will make the case that coastal conservation should focus not on what we currently have but should think more strategically about how our coasts are going to change and on that basis should target conservation efforts at the habitats the evolving coastline can best support. To do this we

need a good understanding of likely geomorphological changes and a willingness to embrace coastal change and the opportunities that it presents.

Flood and Coastal Risk Management – what role for habitats?

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The Environment Agency has a strategic overview of the management of all sources of flooding and coastal change, and is the lead authority for managing the risk of flooding from estuaries and the sea. The 9,000km of English coastline is at risk from sea flooding, erosion and landslips. Large scale coastal flooding has the potential to have a significant impact on the UK. In England, about 1.8 million homes are at risk of coastal flooding and erosion. England has some of the fastest eroding coastline in Europe, for example along the Norfolk and Yorkshire Coasts.

Our coast is continuing to change and the risks from sea-level rise, coastal change and storms are increasing. This brings significant challenges for people, property, infrastructure and habitat on the coast, but also an opportunity for us to work more with natural processes and be at the forefront of efforts to make the country resilient to climate change risks. Saltmarsh increases the resilience of the coastline to flooding, yet we have already lost 85% of this habitat. Between now and 2100 we expect to lose over 3,000 hectares of internationally protected inter-tidal habitat due to coastal squeeze.

Our duty to further nature conservation is embedded within all of the work we do in Flood and Coastal Risk Management. A key component of this is to ensure that our coastal management incorporates natural processes. We must also ensure that we meet our legal obligation to not only create new coastal habitat but also compensate for losses as a result of us 'holding the line' leading to coastal squeeze due to rising tides. We do this through our habitat compensation programme, which is led by our operational staff, in close co-operation with Natural England and a range of organisations interested in being part of their delivery. The Programmes operate to discrete geographical areas that best reflect both our administrative structure and sensible ecological units. For example, the South Wessex programme focusses upon the Poole and Wareham Strategy area, and the Severn, Thames and Humber each have a discrete Programme to match their respective FCRM Strategies. Other Programmes are driven by the requirements set out in the Habitats Regulations Assessments of Shoreline Management Plans (SMPs) - from which most of our current habitat compensation needs originally arose. All of our coastal habitat management is underpinned by strong evidence, much of which is provided through the EA funded Network of Regional Coastal Monitoring Programmes. All of this evidence is available free of charge via the channel coastal observatory.

We are currently achieving - and in some places temporarily exceeding - our ambition to maintain habitat area in the face of ongoing losses in most parts of the country. However current evidence suggests we will generally need to maintain or increase the pace of habitat compensation in the next ten years or so.

Our vision is for a nation ready for, and resilient to, flooding and coastal change – today, tomorrow and to the year 2100. Resilience includes accepting that in some places we can't eliminate all flooding and coastal change, and so we need to be better at adapting to living with the consequences. Working with natural processes, restoring and creating new habitats will be a big part of this. So is there a role for habitats in Flood and Coastal Risk Management? The short answer is – YES.

Web links:
https://www.gov.uk/government/publications/shoreline-management-plans-smps/shoreline-management-plans-smps
https://www.channelcoast.org/
www.escp.org.uk/regional-habitat-compensation-programme

Restoring saltmarshes with dredge sediment – recent advances in the Solent, the UK and globally

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Every year in the UK, around 20 to 30 million m^3 of sediment are dredged and then disposed of at sea to maintain safe navigation and keep ports and harbours functioning. This is a vital socio-economic activity and one that is, necessarily, accompanied by a range of environmental, legal, policy and consenting requirements. Firmly embedded within this consenting landscape is a 'desire' to see dredge arisings re-used beneficially for environmental or socio-economic activities. This need to seek re-use opportunities is implicitly or explicitly recognised within: the 1996 London Protocol; OSPAR and HELCOM guidance; marine licensing processes, marine planning policies, the Waste Framework Directive (which enforces the waste management hierarchy) and the 2012 National Planning Policy Framework (which reinforces mitigation hierarchy principles). It is also a potentially useful mechanism for delivering marine Environmental Net Gain as set out in the 2018 Defra 25-year plan.

Motivated by this policy context, and the logic of the argument, several studies have been carried out over many years to review how 'dredgings' can be beneficially re-used. These often advocate that dredged sediment should be seen as a valuable resource (not a 'problematic' waste) for restoring habitats alongside other functions. These past reviews often cite a contemporaneous groundswell of support behind the idea of beneficial use, but are followed by slight, if any, forward momentum towards marsh or island restoration. This is because of the many actual and perceived challenges that exist such as: extra cost, technical difficulty, environmental concern and lack of strategic direction.

This situation is even truer today and the need to achieve more beneficial use projects is seen as an increasing challenge globally. In the UK, it is still the case that only a tiny amount of the dredging resource (a fraction of 1%) is directly used for marsh restoration. This is despite the fact that several successful, albeit small-scale, projects have been implemented. Several national and international groups are therefore now investigating (often re-investigating) how dredged sediments can be used for habitat restoration, flood protection and climate change adaptation.

One valuable recent advancement in this field is the Solent Forum's 'Beneficial Use of Dredging in the Solent' (BUDS) initiative. Through the BUDS project, possible sites were identified in the Solent where large-scale marsh restoration could be carried out. The eroding marshes between Keyhaven and Lymington emerged as a prime candidate site and one where sediment deposition could achieve multiple benefits. Helpfully, this is also a location where a few small-scale practical recharge projects have recently been undertaken (e.g. by the Lymington Harbour Commission).

To realise more projects In the future, it will be necessary to continue actively confronting the many major hurdles that exist. To do this, it this will be necessary to have more 'top-down' strategic pressure (akin to the BUDS project at a local level but also supported at a national level) in tandem with many

more practical projects providing 'bottom–up' real-world lessons to inform local stakeholders. One key, and long-recognised, goal will be to establish many new registered intertidal receptor sites where it is possible to actively deliver sediment for marsh restoration. It will also be necessary to better understand how this approach integrates with the broader mix of other marsh restoration approaches and, as part of this process, to improve understanding, and ideally seek consensus, regarding the motives, successes, limitations, costs and benefits of all available restoration techniques.

Web links:
www.abpmer.co.uk/services/habitat-creation-restoration/4
https://www.lymingtonharbour.co.uk/harbour-protection
www.omreg.net
www.rspb.org.uk/globalassets/downloads/documents/conservation-projects/seabuds-report.pdf
www.solentforum.org/services/Current_Projects/buds/

Dornoch Environmental Enhancement Project (DEEP): Successes and Challenges

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Anthropogenic pressures on the marine environment have escalated and shellfish habitats have declined substantially around the world. Recently, Marine Protected Areas (MPAs) have rapidly increased in number, but management baselines rarely account for historical conditions. Marine examples of habitat restoration are therefore unusual.

An interdisciplinary review of management baselines was undertaken for the Dornoch Firth protected area (NE Scotland) as well as three adjacent inlets and 50 km of open coastline. The protected area has low levels of industrial development, is sparsely populated, and previously achieved management objectives.

Systematic searches were undertaken for evidence of historical native oyster (*Ostrea edulis*) beds, a habitat now rare and of conservation importance throughout Atlantic Europe. Archaeological records, navigational charts, historical maps, museum collections, land-use records, fisheries records, public online databases and naturalists' records were searched. Intertidal and subtidal surveys were conducted and sample oyster shells radiocarbon dated.

The combined interdiciplinary sources showed that *O. edulis* occurred in the inlets and open coast areas of NE Scotland, and specifically in the protected area: Probably since the end of the last glaciation to the late 1800s when they were likely over-fished. Present environmental conditions are also suitable for oyster restoration.

Habitat restoration in protected areas is an emerging global theme. However, European oyster restoration effort is currently confined to remnant populations with a clear history of exploitation or dwindling associated fisheries. An interdisciplinary review of baselines will probably show scope for *O. edulis* restoration in many other European MPAs.
Web links:
https://researchportal.hw.ac.uk/en/persons/william-sanderson
http://www.theglenmorangiecompany.com/about-us/deep/
http://marinestation.co.uk

Seagrass Ocean Rescue: Sowing the seeds of recovery for our British coasts – a story of hope

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Seagrass loss in the UK has been extensive and recovery mostly poor. Although some localised recovery of intertidal Zostera noltii meadows has occurred, recovery of the intertidal and subtidal Zostera marina meadows has been limited. Historical distributions and observations of seagrass throughout the UK are more extensive than those known to currently exist and our recent estimates indicate that potentially 90% of seagrass has been lost in the UK. As a result of the historic decimation of our UK seagrass and its continued degradation in many locations restoration is urgently needed in places where conditions are now appropriate.

At Swansea University we have been conducting extensive methodological trials and preparatory work into seagrass restoration since 2012. This has involved laboratory and field-based experiments using both transplant and seed-based techniques. It currently includes an experiment on the interactions between seagrass germination and plant development and the microbiome.

Based on habitat suitability modelling and a range of in situ experiments at the site, Dale in West Wales was chosen as the location to create the UKs first major restoration project. Although projects have previously taken place these have only been at the scale of a few square meters. The project in Dale plans to plant 2ha of seagrass during 2019 as a demonstration project for what is possible in order to expand this to further sites around the UK.

Web links:
www.projectseagrass.org
www.seagrassspotter.org
www.seagrass.org.uk

Twitter: @zosterar

Fish in Intertidal Habitats

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Intertidal habitats provide some of the most productive aquatic ecosystems available. These habitats are actively promoted and protected for the important ecosystem services they provide. Compared to North American and Australasian experiences in the field extending back over 70 years, that recognition and protection came relatively recently to Western Europe. Modern drivers such as the Water Framework Directive (WFD) promoted more study, often for the first time. Over the period 2001-2007, the author led the Environment Agency team that developed the fish component of the classification scheme for transitional waters under WFD, based upon a multi-method fish survey in the Thames estuary, later described as European Best Practice. The author has engaged in estuarine fish

sampling programmes across Great Britain, Ireland, France and Belgium and today is recognised as one of the prime workers in this field. Through his career he has been able to positively influence more sustainable management regimes in a number of English estuaries, based upon this knowledge base.

A similar perception pattern had existed about saltmarshes, with detailed understanding of the importance of these habitats in North America, but no similar recognition in Europe. In early managed realignment (MR) treatments in the UK, fish were not considered to be an important component of site functioning. The phrase "make a breach and the fish will come", would describe the situation well. The author began to sample fish in saltmarshes and MR sites in 2003. Early published work by the author and colleagues confirmed then recent French studies that saltmarshes probably represent the optimal nursery grounds for the early life stages of species such as bass, *Dicentrachus labrax.* These observations have important implications for future marine fisheries management, given the historic loss of such habitats across Europe over the past 200 years.

Since 2003, the author has engaged in fish sampling in 18 major and minor intertidal habitat creation schemes, 1 saltmarsh restoration scheme, 1 natural breach and 3 areas of mature saltmarsh. Over that time period, the author has had some influence in the design of MR treatments, to improve fish utilisation.

The author is currently working on a collaboration with the University of Brighton (Heidi Burgess) and Sussex IFCA (Kathryn Nelson) to examine and publish work on long term site evolution and how this influences fish utilisation at Medmerry MR. He is an active member of the Suffolk Marine Pioneer project, bringing fish utilisation of saltmarsh habitats into the Natural Capital approach to marine management. Further proof of fish utilisation might well lever in complimentary funding streams to site creation, together with those for other ecosystem services provision such as carbon sequestration. Through the IFM, the author is currently engaged in a number of projects to stimulate collaborative new fish sampling regimes in estuaries, saltmarshes and MR schemes, including citizen science initiatives.

The presentation will cover:

- The paper provides a brief overview of how fish utilise saltmarshes based up on a number of studies and observations, some of which have never been published.
- Some broad recommendations are provided on design and management elements for MR treatments.

Some references referred to in the presentation:

Colclough S.R., Gray G., Bark A., & Knights B. (2002) Fish and fisheries of the tidal Thames: management of the modern resource, research aims and future pressures. J.Fish. Biol. 61 (supp.A), 64-73

Colclough S.R, Coates S., Dutton C., Cousins T. & Astley T. (2003). Potential for fisheries enhancement associated with managed realignment. In: L. Ledoux (ed.) Wetland Valuation: State of the Art and Opportunities for Further Development. Proceedings of a workshop by Environmental Futures Ltd and CSERGE. Bristol: Environment Agency, pp. 50–65.

Colclough, S., Fonseca, L & Astley T. FISH UTILISATION OF MANAGED REALIGNMENTS (2004). Wetland Valuation; A Multiple - Method Fish Survey in High-Intertidal Restored Saltmarsh; Pre-Breach Assessments & Management Applications for Compensatory Habitat; & Habitat Design Guidance. Environment Agency, Thames Region.

Colclough S., Fonseca L., Astley T., Thomas K., & Watts W. (2005). Fish utilisation of managed realignments. Fisheries Management and Ecology, 2005, 12, 1-10.

Dixon. M., Morris, R.K.A., Scott, C.R., Birchenough, A. and Colclough, S. 2007. Managed coastal realignment: lessons from Wallasea, UK. Proceedings of the Institute of Civil Engineers. Maritime Engineering 000 Issue MAO. Pgs 1-11.

S. Colclough, L. Fonseca, W. Watts and M. Dixon, 2010. High tidal flats, saltmarshes and managed realignments as habitats for fish. Wadden Sea Ecosystem No. 26. 2010

Fonseca L., Colclough S. & Hughes R.G. (2011). Variations in the feeding of 0-group bass. Dicentrachus labrax (L.) in managed realignment areas and saltmarshes in S.E England. Hydrobiologia 2011. DOI 10.1007/5 10750 -011-0753-x.

S. Colclough. 2016. A Fish Survey of Hazlewood Marshes, Alde Estuary. Suffolk Wildlife Trust.

S. Colclough, & A. Cucknell. Estuary Edges Fish Survey Programme 2017. Environment Agency & Thames Estuary Partnership. 36pp.

Challenges and Lessons Learnt from Seagrass Restoration on Open Ocean

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The challenges:

- 4 years to restore 10ha of seagrass meadows
- Finding the best donor population and species
- Setting the right design and planting method
- Operations needing scuba diving
- Overcoming unpredicted storms
- The fight with herbivores
- 5 years down the line seagrass survival was close to 0%

Lessons learned:

- Understand well the local environment conditions before you start is essential;
- Traditional Ecological Knowledge can give fundamental insights about the area;
- Manage your team and project funders expectations: it may take more than 5–10 years for a restoration project to start becoming successful;
- Incorporate plans for long-term monitoring (i.e. > 5–10 years);
- Transplants were successful in the short term (1 year) but only the largest (11 m^2) plot persisted – large planting units seems to be essential for a successful shift to a vegetated state and necessary to overpass a minimum critical size;
- Most reported cases of successful seagrass restoration correspond to projects with limited monitoring. From the meta-analysis of seagrass restoration trials (1786 trials) published in

2015, most projects reporting success are flawed by the fact that most of them have had short monitoring periods (<1 year).
- The literature available is skewed by "successful" projects as researchers and editors have the tendency to avoid publishing failed projects.

For details of the project please look at:
Open coast seagrass restoration. Can we do it?
https://sapientia.ualg.pt/bitstream/10400.1/12463/1/fmars-06-00052.pdf
Global analysis of seagrass restoration: The importance of large-scale planting:
https://besjournals.onlinelibrary.wiley.com/doi/full/10.1111/1365-2664.12562
Changing Paradigms in Seagrass Restoration
https://onlinelibrary.wiley.com/doi/abs/10.1111/j.1526-100X.2012.00878.x

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Restoring Native Oysters in the Essex Estuaries

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The Essex Native Oyster Restoration Initiative is a collaboration between oystermen, scientists, government and conservationists working to restore the native oyster *Ostrea edulis* in the Blackwater, Crouch, Roach and Colne Estuaries Marine Conservation Zone. Designated in 2013 on evidence submitted by the oystermen and Essex Wildlife Trust, this is the only protected site in England with the conservation objectives to recover both native oysters (population) and native oyster beds (the habitat). The goal is for self-sustaining populations of native oysters that provide ecosystem services, increased biodiversity and ultimately a sustainable fishery. To deliver this we are using science-based decision making in addition to oystermen's knowledge. We are piloting approaches to address the substrate and reproductive deficiency which is preventing their natural recruitment and recovery. Restoration activities commenced May 2019.

Web-links and/or references:
Essex Native Oyster Restoration Initiative website: https://essexnativeoyster.com/
Native Oyster Network – UK & Ireland: https://nativeoysternetwork.org/
Native Oyster Restoration Alliance – Europe: https://noraeurope.eu/
ZSL project website: https://www.zsl.org/regions/uk-europe/thames-conservation/native-oyster-restoration

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Solent Oyster Restoration Project: Restoring oyster populations in a crowded marine environment

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Overexploitation of oysters as a resource and associated habitat loss have been well documented both in the US and in Europe over the past 150 years. In the UK native oysters (Ostrea edulis) are classified as a priority species in the national Biodiversity Action Plan because of a population loss of 50 per cent over 25 years. The same is true at European and global levels with an estimated 85 per cent of oyster

beds and reef habitats lost. A consequence of oyster declines has been a reduction in the ecosystem structure and function, and with these, the provision of ecosystem services.

Since 2015 BLUE has been working with multiple partners, creating a working group, to restore native oysters in the Solent. Restoration methods such as broodstock cages and seabed reseeding alongside research into disease resistance are being implemented to address the various issues affecting this species. Restoration is not without its challenges. The Solent is one of the UK's busiest waterways, with international shipping and naval ports, commercial fishing and recreational yachting. While marine licencing legislation and conservation designations are meant to protect the Solent's natural environment from these pressures, much of this legislation further complicates the restoration process.

Web link:
http://www.bluemarinefoundation.com

Digital Data to Digitata: Kelp Forests of Sussex

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Kelp forest provides a range of benefits including: carbon sequestration and the production of oxygen, the support of biodiversity, the support of commercial and non-commercial marine species (essential fish habitats), cultural heritage and as a harvestable resource.

Kelp distribution in the coastal waters of West Sussex used to be much more extensive and at a greater density just a few decades ago. Fishers from Worthing tell of how they had to row out nearly two nautical miles before they could start their outboard motor without the propeller becoming tangled in the dense kelp. These dense forest no longer exist.

Restoration of this historic area of kelp would bring a range of benefits back to Sussex waters. Sussex IFCA's planned review on inshore trawling activity presents an ideal opportunity to progress this restoration ambition based on a natural capital approach.

Web links:
https://www.sussex-ifca.gov.uk/
http://www.ukmarinesac.org.uk/infralittorial-reefs.htm

Design of our Tyne: Funding through innovation

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The Iconic Tyne estuary is in a period of rapid change. Since the shipbuilding, coal export and other heavy industries closed, the river has slowly become the focal point for development.

The river which carries many opportunities for environmental, economic, and social development had until recently remained outside of the well-established catchment partnerships in the region.
In 2018 with support from partners, the Environment Agency commissioned a detailed environmental and landownership feasibility study of the estuary, with ICES Hull University, and Groundwork North East and Cumbria.
Over 70 opportunities for habitat restoration and enhancement were identified.

The challenge we face is funding this restoration work.

In April 2019 the Environment Agency launched a design challenge for the Newcastle Quayside with the EU funded innovation initiative the 'WaterHub'.

The challenge was to create designs and 3D illustrations of the quayside as a green hub connecting communities with business and nature.

This work has raised the profile of the Tyne Estuary Partnership and supports NE1's business improvement company proposal for 2019-2024, to create a 1km linear park taking inspiration from Copenhagen, Melbourne and New York's 'High Line'. NE1 want to demonstrate the commercial gains of this approach, and are excited to work with the Environment Agency to ensure that any proposals support environmental enhancement options, and multi ecosystem service benefits.

Web links:
https://www.groundwork.org.uk/Sites/northeast/news/tyne-estuary-partnership-nec
https://www.thewaterhub.org.uk/

MARINEFF coastal enhancement project

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MARINEFF is a €5million project, 2018-2022 to enhance and protect coastal and transitional water ecosystems in cross-border Channel regions. The MARINEFF project was selected under the European cross-border cooperation Programme INTERREG VA France (Channel) – England co-funded by the ERDF and involves 9 French and British partners. Today, marine infrastructures (MI: dykes, quays, piers, groynes and moorings) ubiquitous on our coasts, but rarely incorporate ecosystem enhancement in their design and construction. In fact, MIs are almost invariably replacing rich coastal ecosystems with

artificial zones of poor biodiversity. These artificial areas create barriers to the larvae and juveniles of numerous species that use coastal ecosystems as shelters and nurseries before mature adults move to the open seas. To avoid these negative effects and create MIs that enhance the ecological status of coasts, it is necessary to support project owners, managers and engineers using new MI design methods. Starting with an environmental analysis, the designer tailors strategy according to the needs of the site: the protection of a local threatened species or the global improvement of a site with common ecological characteristics. The project aims to realise new biomimetic marine infrastructures to improve the ecological status of coastal and transitional Channel waters, as well as to involve professionals and stakeholders in the project. Specifically Southampton will be supporting the current Solent oyster restoration project with specially designed oyster settlement structures, which are planned to be deployed in the Solent summer 2020. Bournemouth are leading the installation of artificial intertidal rockpools "Vertipools" on groynes and seawalls around the Solent and Isle of Wight.

Web links:

MARINEFF http://marineff-project.eu/en/marineff-2/
https://www.researchgate.net/project/MARine-INfrastructures-EFFects-Marineff

Solent Oyster project https://www.bluemarinefoundation.com/project/solent/

Vertipools http://www.artecology.space/
To be kept informed/join the MARINEFF professional network please contact: Roger Herbert (above) or Jessica Bone jbone@bournemouth.ac.uk

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Using a natural capital approach for saltmarsh restoration

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The Marine Pioneer is testing ways to deliver the vision, goals, policies and ways of working described in A Green Future: our 25 year plan to improve the Environment (25YEP). As part of the Pioneer two partnerships have been exploring the opportunities and risks of using a natural capital approach to understand, plan and deliver improved outcomes for the marine environment. One in the Deben estuary in Suffolk and one in the marine area of the North Devon UNESCO Biosphere Reserve. This has involved identifying the flow of benefits from the marine ecosystem, the risks to their continued delivery and potential ways to improve the health of the environment.

This talk will focus on the saltmarsh projects that are part of the Marine Pioneer programme of work in both North Devon and Suffolk. The Natural Capital asset and risk registers and valuation studies that have been produced and collated to support the application of a natural capital approach to saltmarsh management will be introduced. It will also highlight the sustainable funding mechanisms that WWF, the Biosphere and Coastal Partnerships East are exploring through the Pioneer that might support future work to restore and improve saltmarsh habitat around the coast of England. Finally the Marine Pioneer is developing a local delivery framework for place based integrated planning for delivery of the 25YEP vision to restore and improve the environment. The work to date on this framework will be highlighted to start a discussion about the efficacy of integrating coastal habitat management with management of other marine resources and people's impact on these.

Web links:
http://www.northdevonbiosphere.org.uk/marinepioneer.html
http://www.suffolkcoastandheaths.org/
https://ukseasproject.org.uk/

Improving the science-base: design and evolution of creek networks in restored saltmarshes

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Coastal wetlands are being degraded at a rapid pace worldwide, resulting in the loss of critical ecosystem benefits including biodiversity, flood protection and carbon storage. Managed Realignment (MR) schemes aim to mitigate for these losses by opening agricultural lands to tidal influence to create new coastal wetland habitats. However, the design of these schemes requires further scientific guidance, especially for complex features like creek networks, which play a crucial role in the distribution of water, sediment, nutrients and seeds through the marsh.

This presentation explores whether the creek networks of MR schemes implemented in England since 1995 have evolved to adopt similar morphologies to those found in natural, mature coastal wetlands. Using lidar elevation maps and newly-developed creek mapping algorithms, we compare creek evolution within 10 schemes in the UK with the natural range of creek characteristics found in 13 natural mature coastal wetlands. This session will address the following aspects of MR design:

- Do creeks in MR schemes evolve significantly from their initial excavated template?
- Do they develop similar morphological characteristics to that found in natural systems, and over what timescales?
- Which design choices encourage or impede this evolution?
- What other factors (topography, belowground properties) affect creek evolution?
- What is the expected impact of managed realignment's morphological template (microtopography, creeks, belowground properties) on marsh biodiversity?
- What recommendations can we infer for future schemes?

Web-links and/or references:
Link to full PhD thesis: https://eprints.soton.ac.uk/425511/
RESIST(UK) project website: https://www.nerc-resist.uk/

The past, present, and potential future of estuarine and coastal habitats in the East Coast of England

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The coasts of England suffered major land reclamation of wetlands over the last 2000 years mostly for agriculture and urban development. Today, the challenges the present generation is faced with, which include climate change and sea level rise on top of anthropogenic activities, urge us to analyse trade-offs and find compromises between benefits, for example between food security and climate regulation.

This talk will provide an overview of the benefits provided by the coastal and marine habitats in the UK, in particular on the East Coast of England, and their economic value. We have investigated these benefits (e.g. recreation and nature watching, climate regulation, and fish nurseries) and their economic values both for the present generation and, using scenario analysis, also for the future generations. Three research projects focused specifically on estuarine habitats and the re-creation of saltmarshes in the Blackwater estuary (Essex), the Humber estuary (North East of England), and the Deben estuary (Suffolk).

One recent research project investigated the potential welfare damages that anthropogenic activities taking place in the UK coastal and marine habitats may inflict to present and future generations, but also the value of managing saltmarshes through conservation and restoration.

Websites or references: Cefas - Socio-economics
UEA Honorary Lecturer: https://www.uea.ac.uk/environmental-sciences/people/profile/tiziana-luisetti#overviewTab
https://www.uea.ac.uk/ccsus

Sustainable finance for marine management

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Successful restoration projects need long term finance but this is difficult to achieve with current limited resources and short-term grants. By developing innovative long-term finance mechanisms, we can tap into alternative sources of finance. This can be invested into improving our environmental assets and thus provide environmental, financial and social benefits.

Through our partnership with Sky Ocean Rescue, WWF are leading work to develop innovative finance mechanisms for marine management, based on work in our North Devon case study area as part of the Marine Pioneer. Our vision is to develop a proven model for sustainable financing of MPA management systems which is made available to MPAs throughout the UK and globally, ensuring the long-term viability and success of protected marine ecosystems, and encouraging the uptake of MPA designation. We will present some of the challenges and successes of our work so far, including developing plans for the creation of a Blue Impact fund.

Web link:
https://ukseasproject.org.uk/

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EVALUATION FORM: Restoring Estuarine and Coastal Habitats in the North East Atlantic (REACH North East Atlantic)

16th July 2019, Natural History Museum, London

1. Name: _____ **Phone No:** _____
(Both optional)

2. How valuable did you find the event? (circle)

Not valuable			**Very valuable**	
1	**2**	**3**	**4**	**5**

3. What did you 'like' about the event? _____

_____

_____

4. Which session (1, 2 or 3) did you find most valuable and why? _____

_____

_____

5. Could you suggest one thing that would have improved the event? _____

_____

_____

6. What topics do you see as important in the coming year? _____

_____

_____

7. Where did you hear about the event? (please tick)

CMS emails ☐
ECSA website ☐
Roger Proudfoot email ☐
External website ☐
CMS Marine / Water News ☐
Speaker/supporting organisation ☐
Word of mouth ☐
Other ☐ (please specify) _____ **(PTO)**

8. What was your primary reason for attending? (You can tick more than one)

Content and learning ☐ Networking ☐ Discussion and debate ☐

Professional & personal development ☐

Specific speakers (if so, who?) _____

Other: ☐ (please specify) _____

9. Do you think we should have an annual estuarine and coastal habitats and species restoration conference in the UK? Yes or No (please circle)

If yes would you be interested in sponsoring the next one or providing a venue? Please provide details: _____

10. Do you agree with the following statements?

	Agree	Partly Agree	Disagree	N/A
Easy to book?				
Informative & interesting presentations?				
Viewing & hearing easy?				
Discussions insightful & useful?				
Able to contribute to discussion?				
Adequate time allocated to presentations?				
Adequate time allocated to discussions?				
Delegate notes informative?				
Met professional development needs?				
Catering quality high?				
Venue comfortable?				
Staff helpful?				
Good value for money?				
Pleased attended the event?				
Would attend future events?				
Location - Would you attend in future if it was outside London?				

Thanks for taking the time to complete this form
Please leave at reception desk OR email ConServe2016@gmail.com