

ReMeMaRe Conference 2024 **Restoring Estuarine & Coastal Habitats**

Programme





10 & 11 July 2024 Scarborough Spa, England







ReMeMaRe 2024 Programme

The Environment Agency and Ocean & Coastal Futures have come together again for this year's Estuarine and Coastal Restoration Conference (**Re**storing **Me**adow **Ma**rsh and **Re**ef).

The conference will focus on actioning the restoration agenda for a healthy and resilient estuarine and coastal environment.

The 2024 programme includes five sessions across two days, highlighting current and future opportunities and challenges, illustrating progress and evolving practice and discussing how we achieve our restoration targets.

10 & 11 July 2024 Scarborough Spa, England







With thanks to our 2024 sponsors









ReMeMaRe 2024 Location & Venue

The conference will once again take place next to the waves, overlooking the beach, at the historic Scarborough Spa.

A drinks reception for delegates at the end of day one will allow an opportunity for informal and lively discussions, as well as a chance to meet with old and new colleagues. Throughout the two days, you will also have the chance to meet our sponsors and view the posters on display.

The town is served by regular trains running between London & Edinburgh, changing at York, and lines from Birmingham, Manchester and the South West.

View location here

Delegates will need to access the venue via the 'Linkway Entrance' (around the Sun Court and into the Linkway). This will be signposted from the main entrance.

Venue Wifi: NYC_Events Wifi Password: 9876543210

Scarborough Spa, England 10 & 11 July 2024







Programme

Wednesday 10th July 2024

08:45	Registration	
10:00	Welcome	Roger Proudfoot , Environment Agency: Restoring the health of our estuaries and coastal waters. Our shared journey Restoring Meadow, Marsh and Reef
10:10	ReMeMaRe Programme	Jo Ratcliffe , Environment Agency: A Reminder and Forward look to ReMeMaRe
10:20	Keynote	Duncan Vaughan, Natural England: "Straight forward and no drama" he said! Reflections on two years as Senior Responsible Officer for the Life Recreation ReMEDIES programme
10:40	Session 1	 Investing in Restoration Session Securing funding is one of the main challenges to restoration. To feel confident about putting their money into estuarine and coastal restoration, what do investors need to see? Where have investments paid off, and what made those projects attractive? In this session, we hear from speakers who can help us get some answers to these questions. Chair: David Tudor Henrietta Stock, Aviva: Why we have supported marine projects with conservation partners Laura Robinson and Wave Crookes, Seagrown: How to drive innovation in marine restoration- a perspective from the seaweed aquaculture industry Sarah Brown, SMEEF: Scottish Marine Environmental Enhancement Fund - Facilitating Business Engagement in Nature Restoration Caroline Price, Crown Estate: Unlocking Investment - A Roadmap for High-Integrity Marine Natural Capital Markets in the UK Peter Barham, Strategic Net Gain Task and Finish group and SUDG: How can we ensure that the statutory obligation of delivering Net Gain as part of development can have the best outcome for coastal and marine recovery and restoration?

12:10 Lunch and posters

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Wednesday 10th July 2024

		Policy, Planning and Sustainable Finance Session This session will hear from projects first-hand experience of some of the big challenges facing restoration delivery, whilst also hearing about some shifts in policy and planning that give us hope for change. It will also include some great examples of sustainable finance mechanisms that may offer a solution to support restoration activity over the longer-term. Chair: Eve Leegwater , Environment Agency	
13:20	Session 2	 Grace Leyton-Smith, ERM: Consenting Challenges for Restoration in the UK David Spray, MMO: Facilitating coastal and marine restoration through English Marine Planning Marina Pugh, Natural England: Changing Fortunes at the Coast – introducing Coastal Stewardship options 2024-25 	
		• Nigel Pontee , Jacobs: Modelling the blue carbon finance case for managed realignment projects	
		Rosalie Wright, Blue Marine Foundation: Trialling Sustainable Financing Mechanisms for Seascape-scale Restoration	
15:00	Refreshme	Refreshments	
		Science Session Science is the backbone of good restoration. So, what's the latest research telling us about our focus habitats – Native oyster reefs, seagrass, saltmarshes, and kelp forests? Where are the knowledge gaps that are holding us back from restoring these ecosystems at scale? Chair: Graham Underwood , University of Essex.	
15:30	Session 3	 Mark Parry, Ocean Conservation Trust: The current position of UK seagrass science & conservation taken from the 'UK Seagrass Symposium 2023' Angus Garbutt, CEH: Saltmarshes: advances and future evidence needs for science, delivery and policy Bill Sanderson, Heriot Watt University: Everything, everywhere, all at once: where are we with European oyster restoration, and how can it move to scale? Pippa Moore, Newcastle University: Ecosystem service provision of wild, restored and farmed kelp Jo Preston, University of Portsmouth: Evidence for ecological connectivity across temperate coastal seascapes and implications for coastal ecosystem restoration practice and policy 	

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Programme

Thursday 11th July 2024

08:00	Registration	
09:00	Welcome	Kevin Austin, Environment Agency
09:05	Keynote	Graham Underwood , Chair of the UK Blue Carbon Evidence Partnership and Professor at the University of Essex REWRITE: REWilding and Restoration InterTIdal sediment Ecosystems
		Restoration Through Collaboration Session Let's hear the proof that working together, we can provide much greater benefits to both the environment and people than we can working apart. Whether through working with communities and using citizen science approaches, or between organisations and sharing resources to achieve common goals. Chair: Amy Pryor , Thames Estuary Partnership
09:25	Session 4	 Daryl Burdon, Daryl Burdon Ltd. Marine Research: Supporting Coastal Communities 'Sea the Value' of Marine Restoration Initiatives Emma Magee, Environment Agency: Living Dart: The Saltmarsh Project Giulia Cecchi, Marine Conservation Society: Natur am Byth Môr: restoration through partnership Karen Daglish, South Tyneside Council: Stronger Shores - Collaborating to Innovate Natasha Bradshaw: What makes effective partnerships for marine nature recovery?

11:00 Refreshments

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Thursday 11th July 2024

Restoration in Action Session

The best way to drive progress is to learn from each other's experiences. Our speakers in this session will share their experiences in restoration across the UK. Showcasing action on the ground, helping us learn from the challenges they face developing best practice and propelling us forward in our ambitions for restoration. Chair: Karen Daglish, South Tyneside Council

11:35

Session

5

- Richard Unsworth, Project Seagrass: 10 years of seagrass restoration experiments across the UK
- Amelia Newman, Ocean Conservation Trust: LIFE Recreation ReMEDIES: Restoration of Zostera marina along the UK Southern Coast
- Maria Hayden-Hughes, Bangor University: The Wild Oysters Project: Charting progress through early monitoring results and future scaling
- James Maclean, Land and Water Group: Beneficial reuse of sediments for large scale saltmarsh restoration and the pressing need for support from environmental credits
- Will Manning, Environment Agency: Habitat Compensation Restoration Programme

Lunch and conference close 13:00

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Presented posters

All posters can be viewed during the conference breaks and evening reception

- Joseph Agate, University of Brighton: Drone-based remote sensing to detect short-term succession following coastal wetland restoration
- Edward Bolger, Royal HaskoningDHV: Native Oyster Reintroduction in the Cromer Shoals Chalk Beds MCZ
- Jessica Bone, Natural England: Marine Net Gain
- Niall Burnside, SAMS Enterprise: Remote Sensing and UAV methods for assessing coastal restoration at scale
- Rachel Clarke-Wood, Environment Agency: Shoreline Management Plans: Refresh and Beyond
- Steve Colclough, Institute of Fisheries Management: How fish use vegetated intertidal habitats and how citizen science is helping further inform our advice to habitat creation practitioners
- Thea Cox, ZSL: Transforming the Thames
- Anthony Crook, Environment Agency: Ecology monitoring at Greatham saltmarsh managed realignment schemes
- Jerome Curoy, JBA consulting: Development of a Habitat Suitability Model for Coastal Nature-based Solutions
- Jonathan Dale, University of Reading: Is unmanaged realignment an appropriate coastal management strategy?
- Louise Denning, Natural England: Case Studies from the Dynamic Dunescapes project
- Joseph Earl, Morecambe Bay Partnership: Co-Designing Nature-Based Solutions: Redefining 'Engagement'
- Tim Ferrero, Hampshire & Isle of Wight Wildlife Trust: Seagrass Restoration in the Solent: A Journey towards a Wilder Seascape
- Rodney Forster, University of Hull: Seasonal dynamics in carbon fixation and growth of the dwarf seagrass Zostera noltii in the Humber estuary
- Ben Green, Environment Agency: Identifying Restoration Seascapes

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All posters can be viewed during the conference breaks and evening reception



- Lucinda Green, Environment Agency: Collimer Point Intertidal Habitat Creation Project: Managed realignment, saltmarsh and intertidal mud creation
- Charlotte Johnson, Natural England: MaRePo+ (Marine Restoration Potential + Enhancement) towards restoring threatened and declining subtidal marine habitats and species
- Charlotte Kell, Tees Rivers Trust: Tees River Trust
- Robert Kerry Walsh, Northern Ireland Marine Task Force: Restoration and Management of Blue Carbon Habitats across Northern Ireland
- Kathrine Knight, Seawilding: The Great Seagrass Survey Utilising citizen science to support seagrass mapping
- Andrew Manning, HR Wallingford: Updating the UK Estuaries Database: Making key data and information readily available for everyone involved in estuarine management and monitoring.
- Maria Marabito, University of Edinburgh: Coastal Restoration: Biodiversity Assessment of the Eden Estuary
- **Zoe Morrall**, University of Portsmouth: Assessing juvenile fish populations in the Solent: establishing baselines for effective marine restoration
- Alasdair O'Dell, SAMS Enterprise: Gathering important environmental baselines to measure the success of seagrass restoration
- Rhianna Parry, Bangor University: Pearls of wisdom from the delivery of The Wild Oysters Project education and engagement programme
- Jemina Phillips, ZSL: Restoring the Thamescape
- Catriona Reid, University College Cork: EU Mission Ocean: Best practices report in governance of Atlantic restoration projects and opportunities for scalability
- Max Renton, Adonis Blue Consultants: Restoring Coastal Wetlands in North Kent: A Feasibility Study and Potential Pathways Forward
- Brodie Thomas, NatureScot: Navigating Uncertainty in Native Oyster Restoration within Scottish Marine Protected Areas (MPAs)
- Laura Thomas, JBA Consulting: The Outstrays to Skeffling Managed Realignment Scheme: Delivering Landscape Scale Compensatory Habitat Creation
- Elaine Willett, Natural England: Marine Historic Environment: Considerations and **Opportunities for Nature's Recovery**

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About

ReMeMaRe

Restoring Meadow, Marsh and Reef (ReMeMaRe) (pronounced "re-memory"), is an ambitious habitat restoration initiative, which aims to address baseline shift and reverse centuries of decline of three of our priority estuarine and coastal habitats: seagrass meadows, saltmarshes and European native oyster reefs. By restoring these precious estuarine and coastal ecosystems, we are enhancing society's connection to the natural world, whilst delivering Nature-based Solutions (NbS) that address issues such as climate change, loss of biodiversity, sustainable food, health and well-being, as well as the socio-economic benefits of employment, recreation and tourism that can help to alleviate deprivation in coastal towns.

Environment Agency

The Environment Agency aims to protect and improve our environment. We work with our partners to create a better place for people and wildlife and to support sustainable development. This is why we are proud to champion the work of the ReMeMaRe programme and advocate for the restoration of our estuarine and coastal environments to support coastal communities.

Ocean and Coastal Futures

Ocean and Coastal Futures is the home of CMS News, jobs and conferences, including the long-running Coastal Futures conference, which have been focal points for the UK ocean, coastal and water sectors over three decades. Together with the Environment Agency, we have hosted the annual ocean restoration conference series since 2019.

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Abstracts

Poster abstracts are listed first, followed by the session abstracts in the order they will be presented.

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Day 1 Keynote abstract Day 2 Keynote Abstract Poster abstracts A Reminder and Forward look to ReMeMaRe Investing in Restoration Session abstracts Policy, Planning and Sustainable Finance Session abstracts Science Session abstracts Restoration Through Collaboration Session abstracts Restoration in Action Session abstracts

Day 1 Keynote abstract

<u>"Straight forward and no drama" he said! Reflections on two years as Senior</u> <u>Responsible Officer for the Life Recreation ReMEDIES programme</u>

Duncan Vaughan

Duncan.vaughan@naturalengland.org.uk, Natural England

Abstract

This is a true story. The events depicted in this presentation took place in England in 2022-2024. Names have been changed to protect the innocent.

Five sites, five Special Areas of Conservation, two project managers, an EU funder, lots of partner organisations, multiple seagrass restoration techniques, marine licences and extensions, moorings and marker buoys, working with the public, a covid hiatus, a dynamic and at times grumpy marine environment – what could go wrong?

The 39 Grand Slam tennis champion Billy Jean King often said that *"pressure is a privilege"*. I have the privilege of being the Senior Responsible Officer for the EU funded Life Recreation ReMEDIES project (ReMEDIES stands for Reducing and Mitigating Erosion and Disturbance Impacts affEcting the Seabed). The pressure is on as the project nears to its conclusion after three years of attempting to kick start marine restoration and protection at scale and pace across multiple estuaries with multiple partners. This presentation sets out some of the trials and tribulations that have thrown themselves at the project and the lessons that have been learnt.

This story and the lessons within it are shared so that you don't have to go through what we have. There are seven basic plots to a story 1) overcoming the monster 2) rebirth 3) comedy 4) tragedy 5) rags to riches 6) voyage and return 7) the quest. The end of this one is yet to be written.

<u>Acknowledgements</u>

The project is led by Natural England in partnership with Ocean Conservation Trust, Marine Conservation Society, Royal Yachting Association and Plymouth City Council/Tamar Estuaries Consultative Forum. LIFE Recreation ReMEDIES (LIFE18 NAT/UK/000039) is co-funded by the European Union. Views and opinions expressed are however those of the author(s) only and do not necessarily reflect those of the European Union or CINEA. Neither the European Union nor the granting authority can be held responsible for them.

Day 2 Keynote Abstract

REWRITE: REWilding and Restoration InterTIdal sediment Ecosystems

Graham J.C. Underwood,

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<u>Abstract</u>

Intertidal areas in European coastal zones provide vital ecosystem services and have the potential to address the biodiversity-climate crisis. These seascapes are disappearing, fragmented, and polluted, leading to a decline in their provision of goods and services. The REWRITE project introduces the concept of rewilding as a nature-based solution to reverse this situation and restore the natural balance. Coordinated by the Nantes Université, France, REWRITE brings together a network of ten demonstrators and 25 partners from academic and private sectors, including experts in natural and coastal environments, social sciences, and humanities.

REWRITE focuses on (i) Reducing uncertainty: By understanding the ecological and social functioning of intertidal seascapes, REWRITE can accurately project their future trajectories by 2050. This includes exploring restoration, rewilding, and "do nothing" options in the face of changing conditions. (ii) Assessing cascading effects: REWRITE aims to understand how factors like CO2 increase, temperature rise, sea level rise, extreme events, and biodiversity loss impact these seascapes at both local and global scales. This knowledge will enhance the resilience of our European shoreline. (iii) Engaging society: Identifying social and cultural drivers and barriers is crucial for ensuring local and national engagement and support. REWRITE will work with stakeholders to overcome trade-offs and conflicts, considering both environmental benefits and societal pressures.

By embracing rewilding as a nature-based solution, REWRITE aims to safeguard our natural heritage, promote climate resilience, and contribute to a prosperous, competitive, and climate-neutral economy.

Poster abstracts

Drone-based remote sensing to detect short-term succession following coastal wetland restoration

Joseph Agate

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Abstract

Restoring coastal wetlands is crucial for reversing past losses and developing essential ecosystem services like coastal protection and carbon sequestration. The colonization and successional development of halophytes (salt-tolerant plants) is vital for the natural functioning of these wetlands. However, many restoration sites exhibit poorer ecological conditions compared to natural sites, with uncertainty surrounding the causes. This uncertainty is largely due to a paucity of data, which is hindering our ability to ensure future success. Advances in remote sensing present the opportunity to monitor ecological changes and therefore increase the volume of data available to address this knowledge gap. However, this technology remains under-utilised in the context of coastal wetland restoration.

This study investigated the short-term successional development of a restored UK salt marsh using drone-based remote sensing over the first five years. Drones offer high resolution imagery (around 10 cm), enabling the delineation of fine ecological features, and the ability to collect complementary geomorphological data through photogrammetry, making them advantageous over satellites for site-scale assessments.

Supervised machine learning models (Random Forest) were trained with field vegetation surveys and drone data including vegetation indices, textural and geomorphological features, to detect shifts in species composition over time.

The models accurately represented successional development, revealing shifts from pioneer to perennial species. Textural and geomorphological features proved highly important variables. The models also highlighted varying succession rates across the site, illustrating site-specific influences. This approach can serve as a valuable decision support tool for adaptive management of restoration projects.

Acknowledgements

The author would like to acknowledge the Environment Agency for funding this research.

Native Oyster Reintroduction in the Cromer Shoals Chalk Beds MCZ

Edward Bolger Edward.bolger@rhdhv.com, Royal HaskoningDHV

Abstract

The planned offshore export cable route for the recently consented Sheringham Shoal Offshore Wind Farm Extension Project (SEP) and Dudgeon Offshore Wind Farm Extension Project (DEP) runs through the Cromer Shoals Chalk Beds Marine Conservation Zone (CSCB MCZ), leading to concerns over potential cumulative habitat loss impacts from offshore wind farm and oil and gas cable/pipeline protection within the MCZ. Whilst impacts from cable installation are minimised through mitigation (e.g. cable routeing and micro-siting), Measures of Equivalent Environmental Benefit (MEEB) are proposed to compensate for any remaining significant effects.

To achieve these MEEB, Royal HaskoningDHV has developed a plan, with broad agreement from SNCBs and regulators, for the reintroduction of native oyster *Ostrea edulis* over an area of 10,000m² within the CSCB MCZ. While not an individual designated feature of the MCZ, the scale of the proposed native oyster bed is proposed to create a self-sustaining population in an area where oysters were historically present, contributing to the favourable status of the habitat features of the MCZ.

This poster will present the data-driven site selection approach used for native oyster restoration off the Norfolk coast, explore the potential for industry-associated compensation and marine net gain initiatives to contribute to wider restoration efforts, and set out next steps and opportunities for collaboration on the next phases of the reintroduction plan.

Marine Net Gain

Jessica Bone Jess.bone@naturalengland.org.uk, Natural England

<u>Abstract</u>

Following the Government's response to the <u>consultation</u> on Marine Net Gain (MNG), Natural England's MNG team are leading on evidence projects to support Defra's MNG policy creation development. The principle aim of MNG is to ensure that marine development leaves the marine environment in a measurably better state than before. This requires two fundamental concepts to be agreed: understanding **what** interventions are needed and **how much** of these interventions are required, to deliver an overall 'net gain'.

Our projects include:

- 1. MaRePo+ (Marine Restoration Potential + enhancement) is a collaborative DEFRA/OWEC project, which will improve existing habitat restoration potential models, include mobile species and address links to climate change. The project will also create restoration handbooks.
- 2. The MNG Assessment Frameworks project sets a wide scope, looking at ways to measure and compare marine losses and gains and demonstrate marine recovery overall. We are working with a range of partners and stakeholders to build consensus around MNG concepts.
- 3. The Marine Irreplaceable Habitats project is working collaboratively with the Marine Biological Association and Plymouth Marine Laboratories to map where irreplaceable habitats occur in English waters, which will be presented as a heat map that illustrates the habitat's level of replaceability/irreplaceability. This will be a vital tool to support marine planning and steer MNG deliverables.

4. MNG Pilots Development project will scope out, identify and develop a plan for a suite of "shovel ready" pilots with recommendations on how to be carried out on the ground, and to test the principles delivering gains of MNG.

Remote Sensing and UAV methods for assessing coastal restoration at scale

Niall Burnside

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Abstract

Advances in UAV and satellite Remote Sensing (RS) technologies mean data are now widely available at unprecedented spatial and temporal scales, providing detailed mapping of the extent, character and (spatial) connectedness of our natural environment. These data offer improved photogrammetry, classification, and machine-learning methods and present the potential to monitor, in high detail, physical and biophysical features to record transformations in both pre-existing and restored sites at scale.

A range of RS and UAV methods have successfully been employed to assess the outcomes of restoration efforts. Key to their success: the low altitude operation of UAV mounted sensors; the capture of ultra high-resolution imagery; the use of spectral indices and machine learning; and the high temporal frequency potential of this technology. Recent rapid growth, and increased accessibility, of this (semi) autonomous technology has initiated a step-change in both quantitative and qualitative evaluation of our coastal and near-shore systems.

The versatility and increased affordability of this technology places it 'front-and-centre' as an important tool for restoration at scale. The transferability of survey methods and pre-/post-processing routines means that these systems are adaptable, and the necessary field and research protocols are robust and well-understood. Yet their uptake and practical use remains, in some cases, limited in scope and scale and the barriers to their use are varied. This talk aims to increase understanding of the potential of UAVs in evaluating coastal restoration at scale. Discussing the potential strengths and weaknesses and understanding their effective deployment and operation, and future innovation and development.

Additional Authors

Alasdair O'Dell, and Jonathan Dale - The Scottish Association for Marine Science (SAMS)

Shoreline Management Plans: Refresh and Beyond

Rachel Clarke-Wood

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Abstract

Shoreline Management Plans (SMPs) help to deliver the ambitions of the National Flood and Coastal Erosion Risk Management Strategy. They set out a planned approach to managing flood and coastal erosion risk around the coast of England to 2105. SMPs guide flood and coastal erosion risk

management (FCERM) investment decisions on the coast and are used by local authority planners to designate Coastal Change Management Areas and inform local plans and development decisions. SMPs are not statutory plans.

In the last few years, we have been leading the SMP Refresh (SMP-R) project with Coastal Groups to refresh the 20 English and cross-border SMPs. The aims of this work have been to ensure SMPs are fit for purpose, meet the needs of coastal managers and planners, and can be more easily understood by coastal communities.

As part of the SMP-R project, a new digital tool called Shoreline Management Plan Explorer (SMP Explorer) was launched 30th January 2024. This has made all Shoreline Management Plans easier to understand and access.

We are currently working with our coastal partners (including SMP leads and Coastal Groups) on a number of outcomes of the SMP-R project and scoping and developing the new SMP Next Steps - Refresh into Action Project.

<u>Acknowledgements</u> Coastal Group Network

How fish use vegetated intertidal habitats and how citizen science is helping further inform our advice to habitat creation practitioners

Steve Colclough C.Env, FIFM

srcifm@gmail.com, Institute of Fisheries Management

Abstract

The author oversaw development of WFD TraC fish sampling protocols from 2001, bringing a fresh understanding of fish use of intertidal habitats. From 2003, he began to sample fish in saltmarshes, terrace and realignment treatments. Few had studied these matters in Western Europe before.

The author left the Environment Agency in 2011. He is Chair of an IFM technical section on estuarine and marine matters. Since 2011, he has conducted consultancy work and provided advocacy, training and technical support through the IFM.

Since 2014 the author has conducted fish surveys in over 40 sites in saltmarshes, realignments and terraces using volunteer client labour. From 2022 this workload has received partial funding from Natural England under the mNCEA banner, in recognition of the scientific and social benefits accrual. Steve has helped supervise relevant MSc and PhD programmes.

Early prime drivers behind realignment schemes were flood risk and bird habitat provision. Today a wider suite of benefits is becoming recognised including carbon sequestration, nutrient stripping, fish nursery provision and potentially innovative after uses such as shellfish production. What is lacking in this broadening landscape is a basic understanding of why and how fish utilise intertidal habitats. Some early treatments have limited or frustrated fish utilisation. Steve will present relevant observations on fish behaviour, built up over 20yrs plus of personal experience, which have yet to be

committed to a peer reviewed paper. Behaviours that should be used to optimise design for fish utilisation. Citizen science works will be used for illustration.

Acknowledgements

I wish to thank both the Institute of Fisheries Management and Natural England for their continued support.

Transforming the Thames

Thea Cox

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Abstract

The Greater Thames Estuary is one of Europe's most important places for nature; where 13 SPAs, 52 SSSIs, 5 MCZs, 4 SACs, 12 Ramsar sites, the largest No Take Zone in the UK, the East Atlantic Flyway migratory route and a proposed World Heritage Site are all found. However, due to pressures that come with being one of the densely populated parts of the UK, the estuary consists of small, fragmented, and often degraded habitats. Over the last few decades many organisations across the estuary have been working to protect, repair and restore coastal habitats in the Thames, but to realise the potential of the Greater Thames Estuary, a coordinated and larger scale approach is needed. Transforming the Thames (TtT) is bringing together 12 partners across the Greater Thames Estuary to develop a seascape scale plan of coastal habitat restoration, led by the Zoological Society of London (ZSL). With an 18-month Endangered Landscapes and Seascapes Programme (ELSP) Planning Grant, the TtT Partnership will be formalised under a collective goal and will be working to further foster strong links with coastal stakeholders, convene four Working Groups, create a prioritised plan for coastal habitat restoration and for barrier removal or reduction, and to prepare opportunities for sustainable financing. At the mid-point of the ELSP Planning Grant, steps taken towards creating a seascape scale restoration plan for the Greater Thames Estuary, challenges faced and how these are being overcome, will be presented.

Additional Author

Olwen Belgrove, Zoological Society of London

Acknowledgements

This work is funded by the Endangered Landscapes and Seascapes Programme. Project partners and collaborators include Adonis Blue, Bird Aware, Environment Agency, Essex County Council, Essex Wildlife Trust, Kent and Essex IFCA, Kent County Council, Kent Wildlife Trust, Medway Swale Estuary Partnership, Natural England, Port of London Authority, Project Seagrass, RSPB, Thames Estuary Partnership, The Crown Estate and University of Essex.

Ecology monitoring at Greatham saltmarsh managed realignment schemes

Anthony Crook <u>Anthony.crook@environment-agency.gov.uk,</u> Environment Agency

Abstract

The poster highlights some of the results from the ecology monitoring which has occurred at two managed realignment sites on Greatham Creek, Tees Estuary. The managed realignment scheme created 28ha of new intertidal habitat at Greatham North by breaching flood defences to the north of Greatham Creek in 2014 and restored a further 30ha at Greatham South by breaching flood defences south of Greatham Creek in 2018. The monitoring includes saltmarsh vegetation surveys, both on the ground and using aerial imagery, benthic invertebrate and estuarine fish surveys and has been led by the EA's North East Analysis and Reporting team since 2018.

The results show just how quickly saltmarsh plants can colonise an area given the right conditions and seed availability. Being able to document the fish using the site has been fascinating and every year we learn more and more about how valuable this site is as a nursery ground to juvenile estuarine fish. Post intervention monitoring is vital and the scheme is very fortunate to have received funding from FCRM into the future so we can continue learning about these dynamic sites. Carbon capture although not included on the poster is also being studied on the site working in collaboration with Manchester Metropolitan University.

Development of a Habitat Suitability Model for Coastal Nature-based Solutions

Jerome Curoy

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Abstract

JBA has recently established an impact-driven Marine and Coastal Sciences Research Centre to provide scientific evidence to improve the resilience of marine and coastal environments. Naturebased Solutions (NBS) have been identified as key tools to address the climate and biodiversity emergencies, including for the marine environment where NBS features can enhance biodiversity, store carbon and reduce coastal flooding. The Pevensey Bay to Eastbourne Coastal Management Scheme in southern England is one of the largest coastal flood risk schemes in the country. It seeks to regenerate and create coastal and marine habitat features, such as salt marshes, seagrass meadows, kelp beds or oyster reefs, to achieve biodiversity gains of 20% and carbon net zero by 2030. This project aims to develop a habitat suitability model that can reliably predict which NBS can be restored or created at any coastal location. It will initially be tested in the Pevensey-Eastbourne study area and then extended for national applications. The model will provide information on environmental limitations to implementing NBS, enabling constraints to be addressed or novel solutions to be developed. Scoping studies are identifying the environmental parameters, habitats and species to be included in the model, incorporating historical and contemporary data as well as information from the literature. The performance of several different model systems will be compared to produce the most accurate results and effective methods for users. It is anticipated that initial results will be presented in the poster.



Figure 1: Conceptual Model of the HSM development.

Acknowledgements

The authors would like to acknowledge their funding partners: JBA Group and the Environment Agency (Project PevEb).

Additional Authors

Dr Glenn Langler, Prof Chris Joyce and Dr Lydia Burgess-Gamble - JBA Consulting

Is unmanaged realignment an appropriate coastal management strategy?

Jonathan Dale

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Abstract

Managed realignment has typically been implemented at former intertidal locations that have been reclaimed on the assumption these areas should be able to support intertidal habitats again. Despite this assumption, extensive engineering and landscaping works are often carried out during site construction with the intention of encouraging the development of a range of habitat types. However, it has been demonstrated that managed realignment sites have lower topographic variability than natural saltmarshes, which might restrict drainage, impact the plant communities that can colonise, and prevent widespread sedimentation and seed dispersal. In contrast, unmanaged realignment is the breaching of flood defences without any prior engineering or landscaping works. Unmanaged realignment provides an opportunity to assess the "natural" morphological evolution of restored saltmarsh sites without the influence of extensive site design or landscaping features. However, there remains little analysis of the evolution of 'recent' unmanaged realignment sites, with most studies focusing on historic breaches. This study provides an assessment of the occurrences of unmanaged realignment and the subsequent morphological evolution through an assessment of the creek and drainage network development. Results indicate differences in post-breach morphology in relation to the history and former land use of the sites. Findings are discussed in terms of the benefits of

unmanaged realignment and considered in the context of long-term shoreline management planning, including habitat creation, flood defence and carbon storage. It is recommended that further data are collected on unmanaged realignment sites to understand their development and to enable comparisons with managed realignment sites.

Case Studies from the Dynamic Dunescapes project

Louise Denning

louise.denning@naturalengland.org.uk, Natural England

Abstract

The Dynamic Dunescapes project has delivered large scale restoration of sand dune habitats across England and Wales. It is further strengthening the evidence base for introducing dynamism into sand dunes, which includes reactivating bare sand movement through creating notches, turf stripping, scrub removal, removal of invasive plants and increasing grazing. The project has produced many case studies to help share its learning, such as:

Grazing Cattle with GPS NoFence Collars

The issue: lack of bare and mobile sand. Bare sand cover was reduced to 2% of the site. The suggested solution: To reintroduce cattle grazing and trial using GPS NoFence collars, as part of plans to raise bare sand cover to 10% of the dunes.

UXO, Scrub Clearance and Scrapes

The issue: lack of bare and mobile sand. The suggested solution: To clear scrub and vegetation, including scraping the top layer of turf to create early successional bare sand areas. Remove roots and all remaining vegetation to create a clean 'bed' of sand.

Turf Stripping and Invasive Rosa rugosa Removal

The issue: lack of bare and mobile sand, and an increasing prevalence of invasive Rosa rugosa. The suggested solution: Turf stripping to expose bare sand and the removal of invasive Rosa rugosa.

Notch Creation and Slack Scrapes

The issue: lack of bare and mobile sand. The suggested solution: to use mechanical processes to excavate a notch in the frontal dunes to allow more bare sand to travel through the dune system behind, and to scrape vegetation to reach the water table. The aim was to rejuvenate the dunes by restoring natural dynamic conditions.

<u>Acknowledgements</u>

<u>The Dynamic Dunescapes (DuneLIFE) project</u> (LIFE17 NAT/UK/000570; HG-16-08643) is financially supported by LIFE, a financial instrument of the European Commission, and The National Lottery Heritage Fund. The core partners are: Natural England, Plantlife, National Trust, Natural Resources Wales, Lincolnshire Wildlife Trust, Cornwall Wildlife Trust and Cumbria Wildlife Trust.

<u>Co-Designing Nature Based Solutions: Redefining 'Engagement'</u>

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Abstract

In North West England, an increasing number of coastal localities are facing a transition from defence (e.g. Hold the Line) to non-defence (e.g. Managed Realignment) policies in the second Shoreline Management Plan epoch (starting 2025). It may be argued that we are unprepared for such radical and large-scale change, with the funding and plans required to facilitate this transition yet to be put in place. Nature Based Solutions (NBS), including saltmarsh and sand dune, may present economically and technically feasible solutions to actualise this transition in some coastal locations, whilst contributing towards habitat restoration targets.

The Our Future Coast (OFC) programme, one of 25 DEFRA funded Flood and Coastal Resilience Innovation projects, is seeking to test and trial the feasibility of NBS in non-defence SMP locations. Working across fourteen North West case study sites, OFC is exploring opportunities to plan for, fund and implement saltmarsh and sand dune restoration projects. Undertaking these projects collaboratively with stakeholders, including coastal communities, is fundamental to OFC, and is one of the programme's key innovations.

There is a focus on engaging differently, moving away from traditional top-down consultation-based approaches, to instead engage stakeholders from the start and give people the opportunity to contribute throughout. This includes co-designing NBS and working with landowners and farmers to align NBS with their business plans, essential if NBS are to be scaled across the landscape. The poster will highlight learning from several OFC case studies, and explore challenges and opportunities faced so far.

Acknowledgements

Our Future Coast is funded by DEFRA as part of the £150 million flood and coastal resilience innovation programme.

Additional Author Susannah Bleakley

Seagrass Restoration in the Solent: A Journey towards a Wilder Seascape

Tim Ferrero

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Abstract

The Solent is home to nationally and internationally important seagrass meadows, nearly all of which lie within designated Marine Protected Areas. Despite effective management of some pressures, notably bottom-towed fishing gear, and work to manage recreational impacts, there is little evidence of natural recovery since the "seagrass wasting disease" decimated this vital habitat almost 100 years ago, and the Solent still faces significant anthropogenic challenges, particularly in relation to water

quality.

As a leading wildlife conservation body in the region, Hampshire and Isle of Wight Wildlife Trust has made significant contributions to the mapping and monitoring of the Solent's surviving seagrass meadows and, since 2021, has worked with a network of funders, collaborators and practical partnerships, to develop and implement working methodologies for habitat-scale intertidal seagrass restoration, working with both *Zostera marina* and *Nanozostera noltei*.

This presentation will share our journey and experiences, through our Solent Seagrass Restoration Project and, more recent, partnership in the Solent Seascape project. From our initial field trials using the hessian "seed pod" deployment method to more recent trials using Dispenser Injection Seeding (DIS), laboratory-based germination trials, how our seed processing and storage approaches have developed, and our plans for future deployments.

Our work has supported four MRes studentships, looking at biodiversity, carbon storage, EDNA studies and our current germination trials, and been supported throughout by our growing numbers of volunteer Solent Seagrass Champions, and they are central to our aims for restoring the Solent Seascape and achieving the Trust's WILDER 2030 vision.

Acknowledgements

Solent Seagrass Restoration Project: Boskalis Westminster Ltd, University of Portsmouth, Fatface Foundation, Isle of Wight Distillery, VP Tools.

Solent Seascape Project: Arcadia Fund Endangered Landscapes & Seascapes Programme, BlueMarine Foundation.

Additional Author Ellie Parker

Seasonal dynamics in carbon fixation and growth of the dwarf seagrass Zostera noltii in the Humber estuary

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Abstract

Tidal flats in the outer Humber estuary were once home to large areas of intertidal seagrasses. Midshore meadows, covering 330 hectares, have been completely lost over the past century, and highshore coverage in 2022 was approximately one hectare of *Zostera noltii*. However, the remnant population is now expanding in both area and percentage cover, and is also the donor site for a largescale rewilding project. Classification of Sentinel-2 images was done to assess changes in the area of seagrass over recent years. Field-based studies were done to assess the health, growth rate and carbon sequestration potential of the existing intertidal meadow with respect to environmental factors. Regular site visits during 2022 and 2023 quantified changes in percentage cover across the meadow, and placement of *in situ* loggers enabled changes in irradiance and sediment-level temperature to be measured at high frequency. Maximum temperatures in the surface sediment matrix exceeding 38 °C were recorded on several occasions. Two field-based techniques were used to

estimate the annual carbon assimilation. Short-term (< 1 h) gas-exchange enclosure experiments were conducted at sites with varying percentages of *Zostera noltii* cover. The findings yielded a light-saturated maximum photosynthetic carbon assimilation value of 59 mg C m⁻² h⁻¹. By combining the photosynthetic rate measurements with irradiance measurements, hourly values for carbon fixation and respiratory loss were extrapolated to give monthly and growing season estimates. Fluorescence-based photosynthesis-irradiance analysis gave further estimates of the irradiances at which maximum photosynthetic capacity was achieved. Dark respiration rates measured in the field were low and variable, and for modelling net primary production, a respiratory loss of 10% of the maximum photosynthetic rate was set. An estimate was made for net ecosystem production of 57.5 gC m⁻² over the growth season when seagrass blades were present at the surface. A second non-destructive approach to carbon uptake used a calibration of percentage cover versus carbon standing stock to analyse differences in seagrass carbon between visits. With this method, a lower carbon fixation for the Humber meadow will be discussed with respect to values for non-vegetated sediments (microphytobenthic production) and published values for blue carbon habitats elsewhere.

Identifying Restoration Seascapes

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<u>Abstract</u>

The Environment Agency (EA), as part of the ReMeMaRe initiative, has a long-term ambition to develop a short-medium term restoration program for saltmarsh, seagrass and native oysters. These projects could be delivered by Biodiversity/Marine Net Gain, Environmental Land Management Scheme (ELMS) funding or Carbon/Nutrient trading mechanisms by developers and/or eNGOs.

Saltmarsh, seagrass and native oyster restoration potential maps are available on data.gov.uk. These aimed to provide a national high-level indications of where intertidal & subtidal habitats could potentially be restored / created in England based on key physical attributes, along with sand dune and shingle potential layers provided by Natural England. Through ReMeMaRe, the EA have led a project to prioritise the restoration potential areas across the five habitats in order to develop a national restoration project strategy and a shortlist of sites that could be considered for restoration in the next 10-15 years. This 2-stage review considered both hard constraints (activities/pressures that prevent restoration) and a review by advisors from EA, MMO, NE, IFCAs and the Crown Estate. This aimed to utilise the advisors' local expert knowledge to verify that restoration at each potential site would be possible & beneficial, and to identify any issues that might impede restoration.

The prioritised outputs have been clustered into restoration seascapes, highlighting the potential for multiple habitats to be restored over a local spatial area. This will support the delivery of the ReMeMaRe target to restore 15% of the current extent of habitats in England by 2043.

<u>Acknowledgements</u>

Many thanks to the many experts from across EA, NE, MMO, IFCAs and the Crown Estate who contributed to the review process.

Collimer Point Intertidal Habitat Creation Project: Managed realignment, saltmarsh and intertidal mud creation

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Abstract

The Collimer Point intertidal habitat creation project, in the Orwell Estuary, Suffolk, is part of the Environment Agency's East Anglian Habitat Creation Programme. It will create 50 hectares of intertidal habitat plus grazing marsh and wetland enhancements. This project is providing compensatory N2K intertidal habitat via managed realignment of the sea wall. This is required due to losses of saltmarsh throughout Essex and Suffolk. Saltmarsh habitats provide benefits including flood defence, biodiversity increase, and carbon sequestration.

The 2.5km continuous defence protecting the site is at risk of overtopping, and is in poor condition, with the potential for unmanaged breaches. A managed breach will allow new intertidal habitat to form intentionally, with compensatory habitat provided for lost freshwater marsh.

The site's land height will allow a mix of intertidal mud and saltmarsh to develop with a transition zone to naturally rising ground at the rear. The design will maximise diversity in land level, attracting different bird species and increasing value to marine life. Applications for planning permission and marine licence are imminent with the Environmental Impact Assessment underway.

The site is part of the Orwell Estuary SSSI, and Stour and Orwell SPA. Dark-Bellied Brent Geese are an SPA interest feature, requiring compensatory freshwater grazing. Goose surveys were conducted from November to February 2022/23 and 2023/24. Data gathered from these is to be compared with whole-estuary goose count data from the BTO surveys to determine Collimer Point's importance to the geese as a grazing site, and the size of compensatory habitat required.

Acknowledgements R J & H W Wrinch

<u>MaRePo+ (Marine Restoration Potential + Enhancement) towards restoring</u> <u>threatened and declining subtidal marine habitats and species</u>

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Abstract

MaRePo+ (Marine Restoration Potential plus enhancement) is a 2 year collaborative project with Defra and The Crown Estate through its Offshore Wind Evidence and Change Programme. It will refine the subtidal habitat restoration potential models created by the MaRePo pilot project. These refinements include improving both the confidence of the models and removing areas of constraint where subtidal restoration would not be possible. The project will also look to future proof the areas of potential restoration by

including limitations such as those from climate change. The results from MaRePo+ will be crucial to the wider development of Marine Net Gain (MNG) evidence, demonstrating subtidal areas where MNG might be achieved through remedial action from offshore industries.

The project is also investigating the restoration potential of some of our threatened and declining key marine species too. The work is currently well underway and outputs of year one on the updated restoration mapping, assessment of hard and soft constraints and climate change are being finalised, plus finalising the initial feasibility study on investigating the restoration potential of some of our key marine species. It will also determine the historic extent of English benthic habitats, such as biogenic reefs and boulder fields, and how they have changed since the industrialisation of mobile fishing gear in the early 20th century.

The project will produce restoration guidance for industry to aid in the restoration of declining and threatened marine subtidal habitats. We aim to present progress to date and invite discussion on subtidal restoration potential.

Tees Rivers Trust

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<u>Abstract</u>

The Tees Rivers Trust is a charitable organisation involved in the restoration of the River Tees across its catchment. At the estuary we focus on recreating and restoring coastal estuarine habitats, based at our TERI facility in Hartlepool. Currently our work focuses on two primary areas: seagrass (*Zostera marina*) restoration and native oyster (*Ostrea edulis*) reintroduction.

Our Z. marina project has been ongoing since 2022. In this time, we have conducted 3 rounds of seed collection from our donor site, Lindisfarne, and 2 estuary planting events. Another round of planting is due to take place in July of this year. We are also lucky enough to have a nursery facility at our TERI site enabling us to conduct various growth trials on seagrass shoots whilst maintaining year-round growth.

In 2022 we also placed 638 native oysters in Hartlepool marina, since then we have been monitoring the biodiversity around these cages. Going forward we aim to install 35 cages into the main estuary to help kick-start the reintroduction of these key species into the Tees estuary.

In the future we also hope to look at other species historically found in the estuary, as well as continue stakeholder engagement and environmental education.

Acknowledgements

The Tees Rivers Trust would like to thank the various funding bodies and partners without whom we could not conduct the work we undertake. Funding bodies: Stronger Shores, BP, PD Ports, Natural England, Green Recovery Challenge Fund.

Restoration and Management of Blue Carbon Habitats across Northern Ireland

Robert Kerry Walsh

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Abstract

Northern Ireland Marine Task Force (NIMTF) are a coalition of environmental NGOs in NI dedicated to working on marine environmental policy to ensure healthy, productive, and resilient seas. NIMTF is comprised of 12 organisations including RSPB, Ulster Wildlife, Northern Ireland Environment Link (NIEL), National Trust, Marine Conservation Society, Irish Whale & Dolphin Group (IWDG), Friends of the Earth NI, Keep Northern Ireland Beautiful (KNIB), Wildfowl & Wetlands Trust (WWT), WWF, Surfers Against Sewage and Shark Trust.

NI is home to several blue carbon habitats, including saltmarsh, seagrass, kelp, native oyster reefs and other carbon-storing benthic habitats. Several habitats require full protection, compromising their ability to support healthy marine biodiversity functioning and tackle the climate crisis as a carbon sink. NI's Climate Change Act 2022 states '*Proposals and policies shall as far as is practicable, support nature-based projects that enhance biodiversity, protect and restore ecosystems, and seek to reduce, or increase the removal of, greenhouse gas emissions or support climate resilience*'. NI has made progress through developments of sectoral climate action plans and are leading the way by developing the first Blue Carbon Action Plan, to manage, protect, restore, and create blue carbon habitats. However urgency is required to actively restore and protect vital blue carbon sites.

Projects by NIMTF member organisations such as Ulster Wildlife, RSPB, National Trust, WWT and WWF are playing a key role in conserving these habitats. We will showcase this work and opportunities for blue carbon restoration in NI.

<u>Acknowledgements</u> NIMTF are funded by Esmee Fairbairn

The Great Seagrass Survey – utilising citizen science to support seagrass mapping

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<u>Abstract</u>

Seagrasses are important species within the coastal ecosystems of the United Kingdom. Seagrass distribution has reduced over the last century such that seagrasses are now largely absent from most previously occupied locations¹. Understanding the current population extent is crucial in determining the conservation status of seagrass as well as positive and negative drivers of restoration and

recovery. However, it is well documented that current seagrass distributions are poorly understood^{1, 2,3} with the lack of comprehensive distribution data being a limiting factor for many studies.

With growing public awareness of the climate and biodiversity crisis, there is increasing appetite amongst water users to participate in activities which support ocean conservation. The Great Seagrass Survey is a citizen science initiative in partnership between marine conservation charity, Seawilding, and the British Sub-Aqua Club (BSAC), the governing body for diving in the UK. It brings together presence/absence data, mapping and quadrat surveys into one data portal.

The inaugural year of the Great Seagrass Survey provided education on the location, mapping and surveying of seagrass beds, with a total of 96 verified seagrass beds located from the Outer Hebrides to the Channel Islands, with a total area of 186ha of seagrass mapped. The project demonstrated that citizen science can provide a valuable way to gather ground-truthed data on seagrass distribution while providing an educational and engaging activity that increases ocean literacy.

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<u>Acknowledgements</u> Seawilding, British Sub-Aqua Club

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<u>Updating the UK Estuaries Database: Making key data and information readily</u> <u>available for everyone involved in estuarine management and monitoring.</u>

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Abstract

Over the last year, under the ReMeMaRe programme, the UK Estuaries Database and its online companion the Estuary Guide (<u>http://www.estuary-guide.net</u>) have been reviewed consulted upon and updated. This presentation describes these products and highlights the recent improvements made to them (including a new <u>Estuaries Database Viewer hosted on ArcGIS Online</u>).

The database and guide were first created over 20 years ago under the Estuary Research Programme (led and funded by the Environment Agency and Defra). They were developed by specialists to provide a central location where critical information about the characteristics, morphologies and dynamics of UK estuaries could be collated and readily accessed.

The information they contain has been valuable for managing and monitoring estuaries, but these products were getting old. The last update to the database was in 2015 while the online guide was created in 2004 and has only been supported, not improved, since then.

Following discussions with stakeholders during 2023, it was agreed that these tools should be reviewed and updated to support emerging uses for these information resources. This review was undertaken by ABPmer, HR Wallingford and Prof. Townend (the same core team that built and created the original products). It was informed by discussions with product users including those leading the Environment Agency's Water Environment Regulations (WER) and Habitat Compensation and Restoration Programmes (HCRP).

In addition to describing the content, uses and new updates of these tools, this presentation considers how they can now be developed in the future.

Acknowledgements

This research was prepared for the Environment Agency as part of the Restoring Meadow, Marsh and Reef (ReMeMaRe) initiative and funded under Defra's Natural Capital and Ecosystem Assessment Programme (NCEAP). We are also grateful to the many individuals who provided their advice and their time to inform this review, especially those who were part of the ICGG and WER meetings. The specialist support, positive feedback and input provided by all of them is much appreciated by the project delivery team.

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Coastal Restoration: Biodiversity Assessment of the Eden Estuary

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Abstract

The project focuses on establishing a biodiversity baseline and monitoring methodology in the Eden Estuary near St. Andrews, with a particular emphasis on seagrass habitats. It aims to assess the feasibility of restoring seagrass, akin to ongoing efforts in nearby saltmarsh habitats. By identifying restoration opportunities, the project lays the groundwork for broader conservation initiatives. The resulting methods and recommendations will not only aid future restoration efforts by the University of Edinburgh but also serve as a replicable option for other institutions, particularly in resource-constrained regions.

The Eden Estuary was designated as an SSSI in 1971, and a Local Nature Reserve in 1978. It forms part of the Firth of Tay and Eden Estuary SPA, governing a complex area of estuarine and coastal habitats. Eden Estuary and the Firth of Tay were also designated as a SAC and Ramsar

site of international importance. While the Eden Estuary has been the focus of several environmental studies, few have focused on seagrass.

Background literature underscores the ecological significance of seagrass, their decline due to human activities, and their crucial role in supporting biodiversity and mitigating environmental impacts. Previous surveys have shown varying levels of seagrass coverage in the Eden Estuary, indicating a need for updated data and ongoing monitoring. This research aims to bridge gaps in understanding the Eden Estuary, providing insights into the current state of seagrass habitats and their resilience to anthropogenic pressures, thereby informing future conservation strategies. Innovative techniques like eDNA will be used to produce a biodiversity baseline.

Acknowledgements

This project is a Living Labs collaboration with the Social Responsibility and Sustainability office at the University of Edinburgh.

Assessing juvenile fish populations in the Solent: establishing baselines for effective marine restoration

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Abstract

Long-term monitoring of the marine environment is essential for assessing changes in ecosystem function and condition, providing baseline data for guiding restoration activities. This study analyses juvenile fish data from 14 sites in the Solent, (2007 – 2018) via seine net surveys. This decadal dataset elucidates long-term trends, offering a comprehensive baseline for evaluating fish populations before restoration initiatives.

Large-scale, long-term datasets are vital for measuring the success of restoration projects like the Solent Seascape Project (SSP), which aims to restore habitats and improve ecological connectivity across saltmarshes, seagrass meadows, and O. edulis reefs. This dataset provides insights into species communities, fish populations, and biogeographic patterns of fish habitat utilization. Understanding these trends enables more effective site selections, monitoring of restoration activities and informs management strategies to enhance essential fish habitat and ecosystem resilience.

Our analysis reveals mixed trends in average fish abundance across the Solent. Four sites show statistically significant declines: Swanwick Bend ($\tau = -0.128$, p = 0.003), Itchen Bridge ($\tau = -0.0873$, p = 0.029), Weston Shore ($\tau = -0.167$, p = 0.000), and Copperas ($\tau = -0.156$, p = 0.017). Five sites show positive trends, although none are statistically significant. The overall trend indicates a decrease in fish abundance within the Solent. Findings confirm the necessity of long-term ecological monitoring to inform management and protection strategies. This baseline dataset is crucial for assessing habitat restoration effectiveness in improving fish stocks, enhancing ecological connectivity, and recovering key marine habitats and their species on a seascape scale.

Acknowledgements

We thank the ESLP (Endangered Landscapes and Seascapes Partnership) and East Head Impact for the funding for the Solent Seascape Project.

Gathering important environmental baselines to measure the success of seagrass restoration

Alasdair O'Dell

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Abstract

An important step in the restoration of *Zostera marina* meadows is the gathering of baseline data before restoration progresses. These data include but are not limited to, the extent and condition of existing meadows, community composition and biodiversity, sediment infaunal community composition and the sediment carbon and nitrogen dynamics within and adjacent to the meadows. In 2020, the Scottish Association for Marine Science began working in partnership with the Seawilding organisation to restore *Z. marina* meadows in Loch Craignish, Argyll, with the aim of characterising these parameters prior to restoration.

UAVs were used to produce accurate maps of the seagrass extent, eDNA techniques were used to examine community composition and sediment samples were taken for baseline C, N and infaunal community data. The data were gathered inside and outside (a control area) of existing patches and in the area where restoration is occurring.

UAV images were analysed with photogrammetry methods, supported by satellite imagery and ground truth verified by the Seawilding team. Eukaryote targeting 18S primers were used to analyse communities within and outside of seagrass meadows and infaunal communities were characterised manually.

Using UAV's, knowledge of the extent of seagrass improved from 2.4 ha to 5.6 ha, this extent is verified by team members at Seawilding. Initial results show differences in community composition within and without the meadows in Loch Craignish, in particular within the sediment infaunal communities. These data will act as baseline parameters to monitor the progression and changes that incur due to restoration.

<u>Acknowledgements</u>

SAMS have worked closely with the Seawilding organisation since 2020 and acknowledge the important relationship that is needed between restoration groups and scientific research institutes.

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Pearls of wisdom from the delivery of The Wild Oysters Project education and engagement programme

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Abstract

The Wild Oysters project is a national collaborative project, aiming to restore Britain's seas to health through the restoration of the native oyster. In 2020 we set up restoration hubs in Tyne and Wear in North East England, and Conwy Bay in North Wales. Central to our project is the education and engagement programme, aiming to inspire the next generation of marine stewards.

We have developed an education programme featuring free lesson plans, work sheets and interactive games, designed to link with the national curriculum for England and Wales. The project reached an impressive 30,535 students at various education levels with online materials, in-class sessions and site visits, inspiring a new generation of marine stewards to take forward the legacy of this project. In addition, over 400 citizen scientist volunteers were trained to collect scientific monitoring data contributing 2,996 hours to the project, and over 82,000 people were informed of project ambitions, emphasising why the restoration work was important for the future of our marine environment. These activities helped to empower local communities and the wider public with the knowledge and skills to contribute to similar projects in future.

This poster presentation aims to showcase our outreach and engagement programme objectives, activities and achievements, along with our lessons learnt and next steps. By sharing our progress and future plans, we aim to highlight the importance of collaborative working with stakeholders for effective native oyster restoration. We look forward to sharing our insights and discussing these at the ReMeMaRe conference.

Acknowledgements

The Wild Oysters Project would like to thank our dedicated volunteers, students and interns who have supported the collection of our oyster monitoring data. Thank you to the generous funding raised by players of People's Postcode Lottery and awarded as part of the Dream Fund, which was matched funders Flotilla Foundation, Durham Blue Carbon Fund, and donation from George Cornelius to the Blue Marine Foundation.

The Wild Oysters Project was a PPL funded partnership project led by ZSL, the Blue Marine Foundation, and British Marine, between June 2020 to November 2023. The Wild Oysters Project is now funded by the Nature Networks Fund, delivered by The National Lottery Heritage Fund in partnership with the Welsh Government, and Stronger Shores Partnership led by South Tyneside Council with funding from Defra as part of the Flood and Coastal Innovation Programmes (FCIP).

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Restoring the Thamescape

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Abstract

Restoring the Thamescape is an integrated coastal habitat restoration project that aims to restore intertidal seagrass, native oyster beds, and saltmarsh in the Greater Thames Estuary, to increase biodiversity, create cleaner water, sequester carbon, and reconnect communities with their local blue spaces. Owing to its high habitat potential, the Zoological Society of London (ZSL) started their pilot active restoration in the Medway Swale Estuary in Kent, in the southern portion of the Greater Thames Estuary. In 2023, ZSL undertook the first Zostera noltei and Zostera marina restoration trials in the Medway Swale Estuary with the aim of testing two novel restoration techniques developed by organisations working in the Dutch Wadden Sea – transplants and dispenser injection seeding (DIS). Results of seagrass condition assessments and habitat suitability modelling were used to choose three trial sites within the Medway Swale estuary: Seasalter, Sharfleet and Elmley. Cores of Zostera noltei were planted at each site in a design developed in collaboration with The Fieldwork Company, Project Seagrass and L'Office Francais de la Biodiversite (OFB), who are conducting similar experiments in the Netherlands, England, Scotland, and France, to enable comparison of datasets, increase knowledge, and develop best practice. This poster will present results from initial monitoring. In 2024, transplants will be used on a larger scale at a chosen restoration site, while continuing to investigate optimal planting density and configuration.

Acknowledgements

Restoring the Thamescape is funded by Garfield Weston, Marshall Wace TOPS (ESG) Foundation, Orsted, Rewilding Britain, and The Crown Estate.

Restoring Coastal Wetlands in North Kent: A Feasibility Study and Potential Pathways Forward

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Abstract

Coastal wetland habitats, such as saltmarsh and coastal floodplain grazing marsh, are vital for fostering biodiversity and enhancing climate resilient estuarine ecosystems. However, these habitats in the Greater Thames estuary have experienced significant decline, namely due to coastal squeeze and land reclamation. To address this issue, the Climate Resilient Coasts project, under the Environment Agency's Championing Coastal Coordination (3C's) initiative, aims to restore coastal wetlands in North Kent.

The project is currently at the feasibility stage, focusing on a privately owned 10 ha field parcel adjacent to Conyer Creek in Swale, Kent. Working closely with the private landowner. The project aims to harmonize agricultural production with nature conservation. It explores the suitability of the

land parcel for saltmarsh or coastal floodplain grazing marsh restoration, serving as a pilot study to guide similar endeavours in the region.

By leveraging Nature-based Solution financing mechanisms such as statutory Biodiversity Net Gain and carbon credits, the project aims to demonstrate the long-term economic and environmental benefits of coastal restoration, essential in overcoming financial challenges and crucial for the projects long-term success.

The proposed restoration site falls within various ecological designations, highlighting its importance for conservation efforts but also creating barriers to change. Additionally, the project has logistical barriers to overcome. The purpose of the feasibility stage was to outline the current barriers and explore how to overcome them.

As the feasibility stage concludes, the project moves towards project design, looking to design the chosen restoration scheme based on stakeholders review of the feasibility findings.

Acknowledgements

G H Dean & Co Ltd, University of Essex, Environment Agency, Medway County Council, BirdWise, Swale Borough Council.

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EU Mission Ocean: Best practices report in governance of Atlantic restoration projects and opportunities for scalability

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Abstract

BlueMissionAA is building a coordination hub to support the Mission Ocean implementation in the Atlantic and Arctic sea basin, focusing on preserving and restoring marine and coastal ecosystems and biodiversity for increased climate resilience.

As part of Work Package 1: *Mission governance and implementation in the Atlantic & Artic*, we are collaborating with the Norwegian Institute for Water Research (NIVA) on researching best practice in governance of marine, coastal, and catchment-based restoration projects across the Atlantic and Arctic. We have 4 case studies in the Atlantic and 2 in the Arctic, spanning activities such as ecotourism for kelp restoration, volunteer empowerment in citizen science activities in catchment-based partnerships, industry innovation for reef restoration, and engagement with fishers, citizens, and local government in coral restoration. Our research has investigated and discovered insights into best practices in governance and decision-making of such activities, and opportunities for scalability of these activities in other territories. Many of our key findings relate to partnership-building and relationship-building at a local level, with citizens, local authorities, and stakeholders alike.

<u>Acknowledgements</u>

BlueMissionAA is funded under the EU Horizon Europe Research and Innovation Programme under Grant Agreement No 101093962.

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Navigating Uncertainty in Native Oyster Restoration within Scottish Marine Protected Areas (MPAs)

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<u>Abstract</u>

Scottish firths are poised to become focal points for native oyster restoration in the future. Historically, these firths hosted extensive oyster beds (e.g., Firth of Forth and Dornoch Firth) and continue to offer suitable habitat and environmental conditions for supporting native oyster populations. However, the majority of Scottish firths are heavily designated protected areas, including European sites (Special Protection Areas (SPAs) and Special Areas of Conservation (SACs). The legislation underpinning these sites requires that any proposed plan or project with the potential to cause impacts on a European site undergoes a Habitats Regulations Appraisal (HRA).

This poster will present a case study focused on the Firth of Forth, which holds several SPA designations. Initially, there was considerable uncertainty regarding the potential long-term impacts of native oyster restoration on the benthic prey species (such as mussels and clams) of the seaduck protected feature of the SPA. This uncertainty prompted an examination of the best available evidence through a literature review and focused on various factors, including the likely structure and expansion of native oyster populations, their biodiversity value, and their interaction with sea duck access to prey. This literature review helped to inform the conclusion of the HRA, which determined that there would be no adverse impact on the protected feature (sea ducks), thus supporting native oyster restoration efforts in the Firth of Forth.

While this example focuses on native oysters, its implications may extend to other types of marine habitat restoration occurring in MPAs across the UK.

<u>Acknowledgements</u>

NatureScot colleagues including Area Officers and the Marine Ornithology team; Marine Directorate colleagues.

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<u>The Outstrays to Skeffling Managed Realignment Scheme: Delivering Landscape</u> <u>Scale Compensatory Habitat Creation</u>

Laura Thomas

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<u>Abstract</u>

The Outstrays to Skeffling Managed Realignment Scheme is a large-scale Environment Agency and Associated British Ports (ABP) habitat creation project on the north bank of the Humber. It will create over 150ha of intertidal saltmarsh and mudflat, along with 75ha of supporting freshwater habitat. The project will provide compensatory habitat to offset losses from coastal squeeze, and direct losses from flood risk management and future port developments.

The scheme has been in development for over 10 years, with construction activities commencing in 2020 and culminating in breaching of the embankment in late spring 2024, assuming a number of challenges can be overcome (e.g. remote site, wet weather).

Due to the highly sensitive nature of the site, collaborative working between the engineering and environmental teams has been necessary to ensure ecological constraints were effectively managed. This included restricted working windows and the implementation of mitigation strategies for a number of species including Sea Aster, Mining Bee, Badger and reptiles.

The project has been delivered working collaboratively with a range of stakeholders and partners. Various community engagement events and STEM (science, technology, engineering, and maths) sessions with a local primary school have ensured community support. The project has also engaged with a local college to design bird hides/viewing points.

JBA Bentley has led the detailed design and implementation of this project, and this presentation will focus on:

- Key lessons learnt.
- Managing ecological opportunities and constraints in delivery.
- The importance of stakeholder and community engagement.
- Recommendations for future schemes.

Acknowledgements

We are grateful to the Environment Agency and ABP for allowing us to use their project in this presentation.

Marine Historic Environment: Considerations and Opportunities for Nature's <u>Recovery</u>

Elaine Willett <u>elaine.willett@naturalengland.org.uk</u>, Natural England

<u>Abstract</u>

Elaine Willett (Principal Historic Environment Adviser, Natural England) and Antony Firth (Head of Marine and Coastal Heritage, Historic England) will provide an introduction to the marine historic environment and how it can contribute to Government's nature recovery ambitions. This session will introduce the different types of coastal, inter-tidal and marine heritage assets, explaining why they're important and demonstrating what they can offer nature's recovery. We will briefly touch on the statutory and policy drivers for this work, what our organisations' current priorities are for our marine historic environment and consider where we might go next with this exciting area of work.

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A Reminder and Forward look to ReMeMaRe

Jo Ratcliffe

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Abstract

The ReMeMaRe Partnership has achieved many successes over the past 5 years, becoming an established movement in the restoration of our estuarine and coastal habitats. By providing the tools, guidance and expertise with Partners, we have seen real momentum in ReMeMaRe's mission to restore at least 15% of our lost meadow, marsh and reef habitats around our coasts by 2043.

With the establishment of the ReMeMaRe Programme Office by the Environment Agency this year, we are building on the solid foundational work of the ReMeMaRe Partnership to support our area teams and their local partners to significantly increase the scale and pace of practical estuarine and coastal habitat restoration in England. This year sees a successful £3m additional funding allocation (Water Environment Improvement Fund) and we are now able to deliver several projects restoring saltmarsh with our Partners. The Programme Office has been working on other aspects of delivery to help remove blockers and streamline processes and is now looking at how ReMeMaRe can be incorporated into more strategic plans.

And so, to the next 5 years.

The Programme Office is currently working with the ReMeMaRe Partnership to develop the next 5 year plan. The plan structure will be based on the following 6 themes to guide practical delivery on the ground.

- National estuarine and coastal restoration strategy.
- Communication and Engagement.
- Monitoring, Research and Evidence.
- Policy, Legislation, Regulation and Licensing.
- Funding and Finance.
- Restoration in action.

We recognise that for ReMeMaRe to continue its success, Partners need to work with a broader constituency of stakeholders to deliver projects and maintain the knowledge, guidance and support for habitat restoration.

This paper will describe the work the Programme Office has been delivering this year, our plans for the next 5 years and how partners can get involved with ReMeMaRe.

Investing in Restoration Session abstracts

Aviva - Why we have supported marine projects with conservation partners

Henrietta Stock

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Abstract

Aviva is one of the UK's largest investment, wealth and retirement businesses, serving customers for more than 325 years. However, we know that the changing climate will lead to more extreme weather which presents risks to our customers' homes and businesses, health and lives. We already see some parts of the US becoming uninsurable.

That's why sustainability is a key element of Aviva's strategy.

In 2021 Aviva announced its ambition to be net zero by 2040. To achieve this we have set and had validated science-based targets to reduce our emissions but we know that there will be residual emissions which we will need to offset with good quality carbon removals. This also presents us with the opportunity to tackle the twin crises of nature loss and climate change.

Aviva has donated money to a number of nature partners with the aim of developing the market for investment in nature-based carbon sequestration projects, to help it advance at scale. The projects our partners undertake with our funding will demonstrate the co-benefits of carbon sequestration, nature restoration, flood resilience and social and community benefit. One of these projects is a £21m 250Ha saltmarsh restoration project with WWT.

This talk will outline the key criteria that Aviva is looking for when selecting partners to work with, the process of starting a partnership and the factors that mean projects start from a solid commercial and conservational foundation.

How to drive innovation in marine restoration- a perspective from the seaweed aquaculture industry

Laura Robinson info@seagrown.co.uk, Seagrown

<u>Abstract</u>

The United Nations Environment Programme has identified three planetary crises – climate change, biodiversity loss and pollution. Seaweed aquaculture has the potential to address all three of these – whilst offering additional benefits, such as equitable and diverse job creation in local coastal communities where quality employment is often hard to find. However, there are numerous barriers to the expansion of seaweed aquaculture in the UK – ranging from regulatory challenges through to technical knowledge gaps. These challenges cannot be addressed without collaboration between relevant agencies, or without real investment in technology and at-sea marine operations. However,

to date the vast majority of investment in the seaweed industry has been focussed on end-product development, leaving the at-sea 'farming' component lagging behind.

In this talk we discuss SeaGrown's journey from its inception in 2018 through to current innovations in seaweed aquaculture. These innovations include development and research into using seaweed for marine habitat creation and restoration as well as biodiversity and environmental monitoring. SeaGrown's ocean-health system 'Kelpedo' can stand up to high energy offshore environments, can be deployed in precisely determined positions and is designed for co-location with other marine users. As a result, it has the potential to be deployed in focussed locations - for example in ecologically sensitive areas, or in specific locations where marine habitat restoration is required, such as infrastructure for offshore energy installations.

Using examples from our own experience, we will highlight how investment and partnership working are required to drive scalable, long-term nature-based solutions for ocean health.

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<u>Scottish Marine Environmental Enhancement Fund – Facilitating Business</u> <u>Engagement in Nature Restoration</u>

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Abstract

The Scottish Marine Environmental Enhancement Fund is a ground-breaking nature finance mechanism which encourages all those who use and value Scotland's coasts and seas to contribute to their health and enhancement. The fund was formally launched by Cabinet Secretary Mairi McAllan in May 2022. It has funded more than 55 projects across several funding rounds and is approaching £4m in distributed resource from public and private sources, to marine enhancement in Scotland. SMEEF has just announced the largest ever single donation to marine enhancement in Scotland with a donation of £2.1m from SSEN Distribution for seagrass planting and is negotiating a further significant pot from private sources for work on seabirds. SMEEF has also developed an online restoration toolkit which helps applicants to plan their projects.

Part of the SMEEF development challenge has been to define and enact a robust ethical contributions policy and procedure, establish a smooth and proportionate grant giving process for recipients and, while removing influence from donations, also ensure that donors have useful and timely feedback on the impact of their contributions.

Sarah Brown has managed SMEEF from inception and talks about her experience of donor management and due diligence processes. Balancing the need to move at pace and facilitate private businesses to help tackle the climate and biodiversity crises, whilst keeping colleagues, stakeholders and donors involved, has been challenging, especially with a very small staff team. Sarah will outline the achievements to date and planned next steps for developing the fund.

Acknowledgements

SMEEF is hosted by NatureScot who chair the Steering Group which comprises of NatureScot, Scottish Government's Marine Directorate and Crown Estate Scotland

Unlocking Investment- A Roadmap for High-Integrity Marine Natural Capital Markets in the UK

Caroline Price

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Abstract

The funding gap for nature recovery in the UK is well documented and potentially underestimated for our marine environment. Public and philanthropic funding alone is unlikely to be enough. Private finance, deployed in the right way, has a critical role to play in enabling the restoration and recovery of habitats and species. Unlocking this investment however requires the development of mechanisms that enable equitable, transparent, high-integrity and standardised markets for marine natural capital.

In 2023 leaders spanning academia, industry, finance, government and not-for-profits across the nations of the UK came together to develop a roadmap that charts the actions needed to create this framework. It builds on the significant actions already underway across the devolved nations to protect and restore marine and coastal ecosystems.

In the context of devolution, market development must be tailored to the four nations of the UK. However, through meaningful collaboration, we can achieve shared but locally-appropriate approaches that uphold the highest standards of integrity to deliver scale and real impact.

This talk will provide an overview of how the roadmap came together, and outline the key recommendations and actions identified for progress.

Acknowledgements

The Roadmap for High-Integrity Marine Natural Capital Markets was developed with input from stakeholders across the UK. The work was led by Blue Marine Foundation, The Crown Estate, Finance Earth and Pollination, with additional funding support from Crown Estate Scotland, Esmee Fairburn Foundation and the University of Portsmouth.

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How can we ensure that the statutory obligation of delivering Net Gain as part of development can have the best outcome for coastal and marine recovery and restoration?

Peter Barham <u>peterjbarham@gmail.com</u>, Chair of the Strategic Net Gain Task and Finish group and SUDG

Abstract

The obligation for industry and developers to provide net gain as part of any development at the coast came into force in February 2024 and means that net gain will ensure a nature positive approach by requiring developments to deliver full compensation and a 10% uplift on any impacts that development may have. Preparation for this obligation has been extensive and involved many stakeholders from industry, Defra, its arm length bodies and eNGOs.

To help ensure that the potential outputs from net gain have the maximum value for restoration and recovery of the coastal and marine environments a Task and Finish Group comprising representatives from industry, The Crown Estate, government and eNGOs was established in 2020. This group carried out two important pieces of work with funding from OWEC (Offshore Wind Evidence and Change) which established widely agreed strategic targets for net gain and looked in further detail how these targets could be delivered for maximum benefit.

This paper will describe that work in further detail and the recommendations that arose from the work which should assist in both ensuring that known conservation needs are met and in the development of marine net gain which will be implemented in the coming years.

<u>Acknowledgements</u>

All members of the Task and Finish Group provided their own time as contribution from their respective employers.Offshore Wind Evidence and Change Programme

Policy, Planning and Sustainable Finance Session abstracts

Consenting Challenges for Restoration in the UK

Grace Leyton-Smith

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Abstract

Marine restoration projects are rapidly expanding in the UK, and as such we are seeing more of these initiatives requiring licences and permits. Although not as glamorous as the salty hands-on job of marine restoration and habitat creation itself, consenting is a key part of the process, without which such projects would not be able proceed.

Here, we explore the first-hand challenges and solutions that were experienced during the marine license application process, through our support of the Wild Oysters Project to secure consent for restoration of the native oyster *Ostrea edulis* and its habitat, at sites in both English and Welsh waters. We will journey through the consenting roadmap, from coordination of the initial environmental assessments, submission and consultation, and finally through to determination.

Supporting these projects has given us a unique opportunity to experience differences in achieving consent from different statutory bodies and consultees. Some of the key challenges experienced had included sourcing data, the need for additional discrete statutory environmental assessments, and some surprising responses during consultation. As well as this, we had to navigate issues of securing consent for restoration and monitoring in areas that directly overlap statutory designated sites.

Being able to effectively and efficiently secure consent for native oyster restoration, and other restoration and habitat creation projects will continue to be an important component of the journey towards improving the health of UK seas, and in supporting potential opportunities for marine net gain.

Acknowledgements

The Wild Oysters Project is a national collaboration between the Zoological Society London (ZSL), the Blue Marine Foundation and British Marine, in partnership with Groundwork North East and Cumbria and Bangor University, for which ERM have been providing consent and licencing support services.

Facilitating coastal and marine restoration through English Marine Planning

David Spray

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Abstract

As England's marine manager, the Marine Management Organisation (MMO) protects and develops English seas, coasts, and communities for the benefit of generations to come. One of our seven

strategic goals is to work with partners to restore functioning marine ecosystems introducing increased levels of protection and improvement to our marine environment. Marine planning is one tool to achieve this goal.

Marine plans in England guide users and regulators of the marine area, encouraging sustainable development by taking an integrated and balanced approach across all sectors. It is a legal requirement for decision-makers and marine licence applicants to be in accordance or have regard to marine plans.

England has six marine plans that cover eleven marine plan areas. Each marine plan has a set of plan policies that outline what, where and how activities and developments take place. Plan policies that relate to coastal and marine restoration include biodiversity, marine protected areas, and climate change.

We are developing the second generation of marine plans and have begun the process to replace the East Marine Plan, with ambitions for greater spatial prescription and certainty to address the challenges of an increasingly busy marine area. We are exploring how marine plans can better enable the restoration and protection of priority habitats and species, such as saltmarsh, seagrass beds and native oyster reefs. Future marine plans will also explore the benefits of biodiversity and marine net gain. Stakeholder participation in the marine planning process is encouraged through our issues with supporting evidence engagement.

Acknowledgements

Rachel Brown and Sian McGuinness, MMO Marine Planning Team.

<u>Changing Fortunes at the Coast – introducing Coastal Stewardship options 2024-25</u>

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<u>Abstract</u>

The challenges of nature recovery and climate adaptation demand and benefit from collaboration and commitment through partnership working with government, landowners, land managers, and local communities.

Countryside Stewardship (CS) provides one of the best available tools for recovering habitats at the coast. Higher level stewardship has the potential to deliver the actions required at a landscape scale, providing the connectivity across habitats, to enable adaptation and resilience to the climate and biodiversity challenges ahead.

Historically Agri-Environment Schemes have had limited uptake at the coast due to the complex requirements of these habitats (and species), some require both holistic and micro-scale management and others contrasting approaches within the same habitat.

Natural England are working with partners (e.g.Defra, Environment Agency, Historic England) to improve and develop new CS options. To make these more accessible and easier to deliver on the

ground, with a commitment to habitat restoration at the coast focused around the following key principles:

- supporting the delivery of actions with habitat specific outcomes
- restoration of natural processes and function
- increasing habitat resilience to the impacts of climate driven change
- importance of sediment retention
- reducing existing pressures
- supporting minimal intervention approaches
- incentivising adaptive coastal change e.g. landward migration, erosion, tidal inundation
 - support carbon sequestration

This is an introduction to the new CS options and how they have been designed to support the ambitions for nature recovery and climate resilience at the coast.

Modelling the blue carbon finance case for managed realignment projects

Nigel Pontee

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Abstract

In the UK at the present time there is considerable excitement around the ability of saltmarshes to sequester and store carbon, since carbon credits could provide a new line of funding and thus increase the amount of saltmarsh restoration that takes place.

As various organisations begin to explore saltmarsh restoration there are high levels of interest in the financial models for projects. Two common questions are:

- How much will the schemes cost to implement?
- How much carbon will be stored?

Answering these questions is key to determining the net income for projects and thus the amount of additional funding which might be required to make schemes viable.

This presentation will present a sensitivity analysis of scheme costs and carbon accumulation. The approach is based on using a bespoke model to predict a representative range of carbon accumulation rates at different sites over periods up to 100 years. The performance of the model is compared to measured rates at actual sites throughout the UK. Based on a knowledge of the costs of existing projects, we create a range of credible scenarios for the potential costs of future projects. The presentation will illustrate the potential best- and worst-case business cases for the funding of managed realignments by carbon credits. Finally, the presentation will investigate the effect of delivering projects in future years to take advantage of projected higher carbon prices.

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Trialling Sustainable Financing Mechanisms for Seascape-scale Restoration

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Abstract

The Solent Seascape Project is a collaborative, long-term restoration initiative and the first of its kind in the UK. In partnership with ten organisations, we are actively restoring seagrass, saltmarsh, oyster and seabird habitats at scale in the Solent, a diverse coastal system in the south of England. To ensure project longevity, one of our five key workstreams is to develop sustainable financial mechanisms that upscale support for seascape restoration. We are working with Plan Vivo to trial a non-offsetting, high quality biodiversity credit methodology, PV Nature. Plan Vivo is a verification agent aiming to create standardised, scientifically robust and third-party verified credits that directly benefit local communities. As a trial project, we are testing a custom scientific monitoring programme in a highly populated and degraded coastal and marine region. We will share our experiences of implementing this methodology in the Solent and our pathway to establishing a sustainable finance stream. In addition to biodiversity credits, we are identifying data gaps and key barriers to UK blue carbon habitat restoration and will provide a valuable case study project. In this talk, we will present our approach to facilitating sustainable financing in an urban coastal seascape and the challenges we have faced. Delegates will hear about a pioneering sustainable finance mechanism which could support further restoration across the UK.

Acknowledgements

The Solent Seascape Project is supported by East Head Impact and the Endangered Landscapes & Seascapes Programme.

Science Session abstracts

The current position of UK seagrass science & conservation taken from the 'UK Seagrass Symposium 2023'

Mark Parry

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<u>Abstract</u>

In November 2023, the Ocean Conservation Trust (OCT) hosted the inaugural UK Seagrass Symposium at the National Marine Aquarium in Plymouth. Attended by 200 delegates, grassroots and community groups, industry, NGOs, statutory agencies, and academia discussed the current position of UK seagrass science & conservation. Topics discussed were:

- Seagrass Ecology
- Threats, Protection and Management
- Community & Grassroot Project Delivery
- Mapping, Monitoring (Evidence and Impact)
- Restoration: Subtidal & Intertidal
- Ecosystems Services
- Finance, Putting Environmental Services into Action and Scaling

The OCT will present a synopsis of the symposium, principal outcomes of the event and highlight current and future areas of research delivered around the UK, with the targets set by the seagrass community before the next 'UK Seagrass Symposium 2025' being hosted in Wales.

Salt marshes: advances and future evidence needs for science, delivery and policy

Angus Garbutt

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Abstract

Saltmarsh habitats have been studied and reported on in the scientific literature for over a century. The earliest papers were given over to descriptive studies of plant species zonation and distribution. As the science of ecology developed, experimental studies set out to understand the physical processes that play such an important part in the formation of salt marshes and their interaction with the biota. As the twentieth century progressed, ecological theory developed into its own branch of science and salt marshes, with their strong environmental gradients and relatively low number species richness, became ideal habitats to test the latest concepts. At the same time, there became greater awareness of the effects of estuarine and coastal zone degradation due to centuries of over-exploitation, habitat modification and pollution resulting in loss of biodiversity and habitat extent. Studies on habitat management and the restoration of biodiversity and natural processes began to influence policy makers and land managers. Today, there is a global and active community involved in the descriptive, experimental, applied, theoretical and legislative disciplines of saltmarsh ecology. This interest is reflected in UK where, in May this year, Màiri McAllan, Scottish Cabinet Secretary for

Net Zero and Energy, open the UK Saltmarsh Forum where 137 delegates from UK Agencies, business, academics and NGO's met to share knowledge, exchange ideas and updates on the latest advances in science and evidence. The presentation will review the main themes, messages, and advances in science presented at the Forum and highlight current and future evidence needs.

Acknowledgements

Thank you to the participants of the UK Saltmarsh Forum hosted by the Solway Firth partnership, Crichton campus, Dumfries, May 2024.

Everything, everywhere, all at once: where are we with European oyster restoration, and how can it move to scale?

Bill Sanderson

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Abstract

European oyster reefs were once widespread and extensive, are now collapsed as an ecosystem, and are consequently the focus of increasing restoration efforts in the last decade. There are multiple restoration projects now that are generally small compared to the former extent of the habitat type. However, the potential scale, reflected in international initiatives, emerging European policy, and the rate of take-up by community groups, is far larger and of an 'ecosystem scale'.

In this presentation we consider what is needed to move restoration efforts to an 'ecosystem scale' (measurable in square kilometres rather than metres) and with effects detectable across several habitats or sites, not just at the restoration site). The main barriers to ecosystem scale restoration are: 1. the need to reframe ambition; 2. the need to overcome the practicalities and 3. the need to meet the expense (by quantifying the benefits and reducing risks and costs).

<u>Acknowledgements</u>

The authors gratefully acknowledge the support of funders of multiple projects, during which the present experiences and opinions have been formed. These include, but are not limited to: The Glenmorangie Company, Scottish Enterprise, Nature Scot, The Scottish Blue Carbon Forum, MASTS, Heriot-Watt University, WWF, Moondance Foundation, Scottish Power Foundation, Aviva, Wetlands International, Blue Marine Foundation, Endangered Landscape and Seascapes Programme and NERC.

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Ecosystem service provision of wild, restored and farmed kelp

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<u>Abstract</u>

Kelp forests cover 33% of global coastlines and as foundation habitats support elevated levels of biodiversity. Both kelp and this associated biodiversity provide a range of ecosystem services including fisheries production, nutrient and carbon cycling, coastal protection and cultural services that are valued at >US\$450 billion per year worldwide. At the same time many kelp forests globally are experiencing declines from a range of anthropogenic stressors including climate change, invasive species and over harvesting.

In the UK kelp forests are estimated to occupy >5,700 km² and form the largest marine vegetated habitat. While UK kelp forests are generally considered to be in a good ecological state there has been some reported regional declines. This has stimulated interest in identifying and testing approaches for kelp restoration. At the same time seaweed aquaculture is expanding with much interest in it in terms of food, feed and biorefining as well as the potential for providing ecosystem services. Here I will provide evidence of the ecosystem services provided by natural and farmed kelp before critically assessing the potential role they have in biodiversity netgain and carbon sequestration.

Acknowledgements

This research was part-funded by WWF and the UK government's Flood and Coastal Resilience Innovation Programme (FCRIP). FCRIP is funded by Defra and managed by the Environment Agency.

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Evidence for ecological connectivity across temperate coastal seascapes and implications for coastal ecosystem restoration practice and policy

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Abstract

Humanity's goals to restore planetary resilience via climate mitigation, reversing biodiversity loss and ameliorating negative impacts of pollution, for the well being of people and planet are set out via a suite of international policy frameworks. Namely; the United Nations Framework Convention on Climate Change, Global Biodiversity Framework and the Sustainable Development Goals. Temperate coastal marine ecosystems have undergone severe global loss and degradation. Here we provide evidence for the importance of restoring ecological connectivity across the temperate seascape as a powerful tool to help achieve international policy targets and reverse the loss of habitat and associated biodiversity and ecosystem services. Based on this evidence, we advocate for a seascape approach to restoration, rooted in the understanding that coastal ecosystems are dynamic and heterogeneous mosaics of habitats interconnected by a body of water through which living things, matter and energy flow. Here we demonstrate that delivery of ecological functions and services requires the existence of a healthy mosaic of coastal habitats, maintained by the flows that occur between them. A seascape approach that enhances connectivity and hence restores optimal structure-function relationships is crucial for successful ecosystem restoration, and achieving the international agenda's set by the 2021-30 UN Decades of Ocean Science and Ecosystem Restoration.

Recommendations and practical steps for implementing a seascape approach to achieve restoration at scale are outlined. Acknowledging the interconnected nature of coastal systems also clear implications for policy, we suggest how Nature-based solutions offer an opportunity to integrate policy frameworks across climate and biodiversity agendas.

<u>Acknowledgements</u>

This work was funding by Blue Marine Foundation, Zoological Society of London, Endangered Landscapes and Seascape Foundation, Wetlands International, EU Life and the Native Oyster Restoration Network.

Restoration Through Collaboration Session abstracts

Supporting Coastal Communities 'Sea the Value' of Marine Restoration Initiatives

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Abstract

The Sea the Value project is an interdisciplinary collaboration between three academic institutions, two consultancies, two coastal partnerships and the coastal partnerships network. The 3-year UKRI-funded project aims to (i) Quantify the interlinkages between marine biodiversity, natural capital, and ecosystem services; (ii) Determine the economic and social values associated with the benefits of carbon sequestration and bioremediation of waste; and (iii) Connect the ecological, economic, and social values of biodiversity to decision-making through co-design and supporting of green investment to enhance biodiversity.

This presentation will show the outputs of a series of three participatory mapping workshops, undertaken in collaboration with coastal communities in the Cromarty Firth (Scotland) and the Solent (England). Participatory mapping approaches were designed and applied to identify the relationships between the natural (capital) features, the benefits which these features provide for society, and the beneficiaries who are reliant or dependent on these benefits. Two future restoration scenarios, relating to managed realignment and native oyster restoration, were explored to investigate the potential impacts of management interventions. The relationships between the natural (capital) features, benefits and beneficiaries are illustrated using simplified logic chains to identify the key relationships at each site, and how these relationships may change under future management scenarios. Such participatory engagement resulted in a shared common language around natural capital approaches and actively captures local knowledge and understanding which can be used to support future place-based marine restoration initiatives.

The presentation will conclude by outlining some of the ongoing research activities and initiatives being undertaken within the wider Sea the Value project including: (i) The integration of participatory mapping workshop outputs with other data sources to create asset and risk registers for both case study sites; (ii) linking this information to the effects of habitat quality/biodiversity on nutrient bioremediation and carbon sequestration to quantify ecosystem services; (iii) valuing the quantified ecosystem services and understanding how these values should be used, alongside other data, in economic appraisal and natural capital accounting, and (iv) using project data to outline and test green finance approaches for marine ecosystems.

Acknowledgements

Funding under the UKRI Economics of Biodiversity programme for the Sea the Value project. The Sea the Value project is led by Plymouth Marine Laboratory, in collaboration with University of Aberdeen, University of Portsmouth, Daryl Burdon Ltd., eftec, Moray Firth Coastal Partnership, The Solent Forum and the Coastal Partnerships Network.



Living Dart: The Saltmarsh Project

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Abstract

The Dart estuary is a Ria or "drowned river valley", created as sea levels rose after the last ice age. The long winding estuary and tributaries have steep sided woody banks. Ria saltmarshes are unique to Northwest Europe, and within that, the marshes on the Dart are a unique landscape feature.

In 2022 a collaboration was formed with the aim of enhancing and restoring these saltmarshes. Through engaged and proactive relationships in the estuary we believe we have an exciting model for delivering improvements to saltmarsh extent and condition.

Bringing in academia, local business, the public sector and international expertise to explore the myriad ways that saltmarsh touches on our lives, this project shows how restoration through collaboration delivers multiple benefits and uses the concept of benefit flows both to and from saltmarsh habitats.

- In phase 1 (22/23) we established both the ecological need and reached out into local communities to raise awareness for these largely invisible habitats.
- In phase 2 (23/24) we completed surveys, preliminary design, feasibility and held landowner conversations. We paired the partnership's ecologists with local five local artists, who then were inspired to contribute their experiences and interpretations, reaching new audiences.



Phase 3 (this year) will continue to model this way of working through doing, deliver our first conservation measures on the ground, highlight opportunities for improvements to saltmarsh extent, understand land management impacts in more detail, expand the community of interest and further explore our relationship with these vital habitats in creative ways.

Acknowledgements

This project has been funded by the Championing Coastal Coordination Fund and WEIF from the EA. This work has benefitted from contributions from Dart Harbour and Navigation Authority.

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Natur am Byth Môr: restoration through partnership

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Abstract

Natur am Byth (NaB) is Wales' flagship Green Recovery programme. The partnership, led by Natural Resources Wales (NRW), unites 9 ENGOs promoting 11 place-based projects to save 67 threatened species in Wales from extinction and reconnect people to nature. The Marine Conservation Society is co-leading the marine project, NaB Môr, restoring seagrass, native oysters, pink sea fan and water quality across North Wales and Pembrokeshire.

Partnership is the foundation building the NaB programme and its individual projects. NaB Môr is a joint effort from key delivery partners, including SAC officers from the Pen Llŷn a'r Sarnau and Pembrokeshire Marine Special Areas of Conservation. Their established collaboration with local stakeholders and conservation projects expands the magnitude of NaB Môr outcomes. Additionally, shared learning is supported by joint working with other Marine Conservation Society projects.

Through this collaborative and well-established network, Nab Môr is working to install Advanced Mooring Systems (AMS) preserving seagrass meadows, restoring native oyster beds, facilitating the monitoring and conservation of pink sea fan, and empowering citizens in taking action for water quality. These 4 work streams are associated with citizen science and volunteering schemes, making public engagement the keystone of monitoring and restoration efforts.

The long-term vision is a resilient nature conservation sector that collaborates widely to make a bigger difference: from 4 marine work streams within NaB Môr, up to 67 total species across the whole NaB programme, partnership is what makes conservation amplify, and nature and people thrive.

<u>Acknowledgements</u>

With thanks to the National Lottery Heritage Fund, the Welsh Government, Landfill Disposals Tax Communities Scheme, Arts Council of Wales and Esmée Fairbairn Foundation for supporting this project.

Stronger Shores - Collaborating to Innovate

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Abstract

Stronger Shores is many things to many people, but one consistency running throughout its multifaceted workstreams is collaboration.

Nationally, Stronger Shores is a partnership project funded by Defra as part of the £200 million Flood and Coastal Innovation Programmes which is managed by the Environment Agency. The programmes will drive innovation in flood and coastal resilience and adaptation to a changing climate. We are part of an Innovation Family collaborating to test and trial the latest thinking in Flood and Coastal Erosion Risk Management.

Regionally (North East England), we are a partnership of risk management authorities, academia, restoration practitioners, and private consultants, working together to understand as much as we

can about the hydrodynamic properties and multiple benefits of seagrass meadows, native oysters, and kelp forests. This will be achieved through academic research, practitioner led small-scale interventions, and community engagement activities, that will improve evidence on the costs and benefits of marine nature-based solutions as well as helping to inform future policy approaches to, and investments in, coastal erosion risk management.

Stronger Shores can only do what it needs to do through collaboration. Whilst this brings added layers of complexity and interdependences that could stifle innovation, this is more than compensated for by the collective depth of knowledge, experience, expertise, and creativity that does not exist in one organisation alone.

This presentation will share the 'learning by process' associated with restoration by collaboration, as Stronger Shores passes its mid-point of the six-year journey into this exciting, transformative, partnership.

Acknowledgements

Funded by Defra as part of the £200 million Flood and Coastal Innovation Programmes which is managed by the Environment Agency. The programmes will drive innovation in flood and coastal resilience and adaptation to a changing climate.

Lead Authority: South Tyneside Council.

Delivery Partners: North Sea Wildlife Trusts, Tees Rivers Trust, Newcastle University, Plymouth University, the Wild Oysters Project.

Project support: Arup, APBMer.

What makes effective partnerships for marine nature recovery?

Natasha Bradshaw njb.bradshaw@gmail.com, independent

Abstract

Partnership working is fundamental to organisational delivery of the goals defined in the UK Governments 25 Year Environment Plan (YEP). Partnerships can work with and through a wide range of people to re-build sustainable ecosystems and thereby protect and restore habitats, species and landscapes.

Coastal, Estuary and Marine Partnerships (CEMPs) have been in existence for several decades across parts of the UK. These place-based partnerships support collaborative working by providing coordination amongst local decision-makers and communities. They may have a crucial role to play in marine nature recovery, but there is a need for better understanding of their role, efficacy, challenges and prospects.

Natural England and the Environment Agency are addressing this knowledge gap by advancing understanding of the governance structures of coastal partnerships and how their effectiveness can be monitored and evaluated. Research in 2023-2024 employed a mixed methods approach, combining quantitative and qualitative data from over 40 partnerships, to assess the variety of

governance structures and their association with nature recovery projects. Interviews with 16 CEMPs showed that there are a wide range of governance arrangements, host bodies and financial situations. A workshop explored future investment opportunities which may exist for them to support local coastal and marine nature recovery. This presentation will provide an overview of the findings and recommendations.

<u>Acknowledgements</u>

Natural England commissioned the Coastal Partnerships Network (trading as The Coastal Collaborative Ltd) to undertake this research between August 2023 – April 2024. The Coastal Partnerships Network (via Thames Estuary Partnership) are being supported by the Environment Agency Championing Coastal Coordination programme to develop a monitoring and evaluation framework for CEMPs.

Restoration in Action Session abstracts

10 years of seagrass restoration experiments across the UK

Richard K.F. Unsworth

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Abstract

Seagrass restoration throughout its history has been characterised by a high project failure rate, this is principally because it's a relatively new science. Knowledge gaps are endless. At the year of my birth in 1978, according to Web of Science there had only previously been 3 papers ever published with key words 'Seagrass' AND 'Restoration. Whilst we know of many restoration projects before this date it highlights the lack of knowledge we have in this arena. Since 2014, we've been planting seagrass in different parts of the UK, totalling 18 different experiments. These were inspired by the work of groups in the US, Denmark, Sweden and the Netherlands. Whilst many of these experiments are still on-going, we have clear data and findings from a range of these studies. Our experiments have included studies on transplants, nursery grown plants, washed up fragments, seed injection, seed bags, core transplants and even immediately planted fresh spathes. Whilst we've experienced many failures and setbacks along the way, we've also got many areas around the UK where seagrass has been planted and is either surviving very well or has proliferated and has now extended well beyond its planting area. This talk will examine the main findings from this work and highlight how success isn't necessarily about one silver bullet, but the cumulative actions of many small things. We conclude that seagrass restoration is possible and is happening at increasing scales around the UK, but that success depends on following the science.

<u>Acknowledgements</u>

This talk is the result of the work of many extraordinary people who have gone above and beyond the push seagrass forward in spite of many set-backs, challenges and barriers. We're indebted to them all. Project Seagrass and Swansea University wouldn't be able to make this work possible without strong partnerships with communities, organisations, major stakeholders and supportive donors.

LIFE Recreation ReMEDIES: Restoration of *Zostera marina* along the UK Southern <u>Coast</u>

Amelia Newman

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Ocean Conservation Trust is the lead restoration partner for the LIFE Recreation ReMEDIES project, creating England's largest subtidal seagrass restoration effort to date. This project aims were to restore 8 hectares of subtidal seagrass (*Zostera marina*), through trialing a variety of seeding and transplanting techniques.

We will discuss two seed dispersal methods trialed, the most recent being a novel Hydro Marine Seeding (HMS) device which is used to deploy seeds into the seabed on mass (hectares at a time). The preliminary trials for this device have provided the highest germination rate of large-scale seed dispersal methods in this region. In addition to seed dispersal, we have developed proof of concept for Seed Mat Technology (SMT), allowing plantlets grown in a laboratory environment to be transplanted into the natural environment. Following three rounds of transplanting, we have demonstrated the successful *in situ* growth from the SMT, as they develop into a healthy bed. Here we present 4 years of cultivation and restoration effort which has led to the production of the ReMEDIES Best Practice Guide for restoring *Z. marina*, as well as highlighting a range of challenges for the restoration community to consider.

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The Wild Oysters Project: Charting progress through early monitoring results and future scaling

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Abstract

The Wild Oysters project is a collaborative project, aiming to restore Britain's seas to health through the restoration of the native oyster. Over the past four years, we have partnered with local communities, the marine industry, and delivery partners, to establish restoration sites in North Wales and in Tyne and Wear. Our project activities include housing oyster nursery systems beneath pontoons in collaboration with local marinas, while engaging stakeholders to carry out oyster seabed restoration, and implementing public outreach and education programs.

This presentation aims to share our oyster nursery monitoring results, collected with the support of citizen scientists, including mobile biodiversity and oyster spawning activities. We will share the different challenging phases of the project, from the site selection process to recent fieldwork during the reef deployment and monitoring surveys. Early stage oyster reef monitoring data will also be shared, with results from drop-down camera, baited remote underwater video, and multi-beam surveys.

As the initial funding from the People's Postcode Lottery has concluded, this presentation will aim to share the key outputs of our Wild Oysters Project Impact and Evaluation Report, we aim to highlight the importance of collaborative working with local stakeholders for effective native oyster restoration. Finally, we will share future project plans, including our plans at the Conwy Bay

Restoration Hub, working towards developing a plan for seascape scale recovery of coastal habitats in Conwy Bay and the Menai Strait

<u>Acknowledgements</u>

The Wild Oysters Project would like to thank our dedicated volunteers, students and interns who have supported the collection of our oyster monitoring data. Thank you to the generous funding raised by players of People's Postcode Lottery and awarded as part of the Dream Fund, which was matched funders Flotilla Foundation, Durham Blue Carbon Fund, and donation from George Cornelius to the Blue Marine Foundation.

The Wild Oysters Project was a PPL funded partnership project led by ZSL, the Blue Marine Foundation, and British Marine, between June 2020 to November 2023. The Wild Oysters Project is now funded by the Nature Networks Fund, delivered by The National Lottery Heritage Fund in partnership with the Welsh Government, and Stronger Shores Partnership led by South Tyneside Council with funding from Defra as part of the Flood and Coastal Innovation Programmes (FCIP).

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Beneficial reuse of sediments for large scale saltmarsh restoration and the pressing need for support from environmental credits

James A. Maclean

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Abstract

Land and Water Group have been working with ABP Mer, CEH, Bangor University, Natural England, The Environment Agency and numerous landowners and stakeholders including The Crown Estate, the Chichester Harbour Conservancy, Lymington Harbour Commissioners, and the Blue Marine Foundation to promote a new scalable process for regenerating failed saltmarsh using locally sourced dredged materials. The method seeks to reverse the practice of dumping dredged spoils in our oceans and uses them constructively in habitat creation, coastal defence and contribute to climate change resilience.

James will talk the attendees through the trial, tribulations, learnings and successes of the first fullscale trials at Itchenor (Chichester Harbour SSSI/RAMSA) in 2023 and the impending larger trails at Lymington (2024) which will demonstrate how the criticality between dredging operations and habitat restoration can be de-coupled, bringing scale and economy. James will also look at the work being done to attain credible status for the habitats created to help drive the economic engine and bring scale to the plan and drive down the cost burden of delivery by accessing the widening world of environmental credits.

Habitat Compensation and Restoration Programme

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Abstract

The Habitat Compensation and Restoration Programme (HCRP) is a strategic delivery vehicle for estuarine and coastal habitat creation. Specifically, it creates compensatory habitat for the loss or deterioration of designated intertidal sites, predicted to occur due to the combined effect of Flood and Coastal Risk Management (FCRM) activity at the coast, sea level rise and resultant coastal squeeze.

Shoreline Management Plans (SMPs) support the planning framework for FCRM and consequently, strongly influence the HCRP. Over the course of SMP Epoch 1 (c.2005 – 2025), the HCRP (and its predecessor, the Regional Habitat Creation Programme (RHCP)) has supported the creation of over 1,600 ha of intertidal habitat, plus over 750 ha of additional coastal habitat required as secondary compensation. This delivery includes well known managed realignment schemes, such as Medmerry, Steart Marshes, Wallasea Island, Hesketh Out Marsh, Lower Otter, plus many others.

Following the progress made by the early managed realignments of the 1990's and through the last 20 years of Epoch 1, we are now moving through the next transitionary period. This is not just moving into Epoch 2 (c.2025 – 2055). It is a much wider shift in collective ambition to address challenges such as climate change and biodiversity loss, building on a 'protect-conserve-compensate' mindset, to embed one of active coastal 'recovery-restoration-adaptation'.

This talk will provide an overview of the HCRP and the steps it is taking to navigate this transition, so it may continue to support and enable coastal adaptation for people and nature in this emerging future.





10 & 11 July 2024 Scarborough Spa, England





