



COASTAL HABITAT RESTORATION IN THE THAMES

2022 Workshop Report

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Executive Summary

The Zoological Society of London (ZSL) and Thames Estuary Partnership hosted a workshop titled '**Coastal Habitat Restoration in the Thames**' on 15 March 2022 under the Coastal Partnerships Network's 3Cs project (CPN 3C's). The workshop brought together stakeholders from across London, Kent and Essex including NGOs, policy makers, statutory nature conservation regulators and academics. This was the first workshop of its kind in the Thames and planned to discuss and review existing coastal habitat restoration projects, obstacles and opportunities for restoration and interrogate national habitat opportunity maps using local expertise. This workshop aimed to link interested local stakeholders in the Thames land and seascape to catalyse and facilitate coastal restoration at an ecosystem scale.

The workshop was held online with approximately forty participants from across the Thames seascape. The workshop began with introductory presentations about the two projects driving the workshop, the **Coastal Partnerships Network's 3Cs** project and ZSL's **Integrated Habitat Restoration in the Thames** project. We then heard from the Blue Marine Foundation who introduced their work on the **Solent Seascape Restoration project**, a project started approximately a year ago that we hope to learn from here in the Thames.

Workshop participants were then introduced to the geographical limits considered the Thames Seascape during this workshop, which ran from the lower Tidal Thames, from Tilbury and Gravesend, through the Greater Thames Estuary, with Felixstowe in the north and Margate in the south. Participants were separated into three smaller break-out groups and asked to examine the national habitat opportunity maps developed by the Environment Agency's Restoring Meadow, Marsh and Reef (ReMeMaRe) project. The groups created a data layer which mapped areas which were unfeasible to restore due to local obstacles or restrictions. They were also asked to see if there were specific areas which might have potential for restoration or extension of existing projects.

An [interactive map](#) was produced which displays both current /planned coastal habitat restoration projects in the Thames Seascape and specific adaptations to the ReMeMaRe habitat potential maps for seagrass, saltmarsh and native oysters. It was agreed that although useful in giving practitioners ideas of where habitat restoration could occur, the current ReMeMaRe habitat restoration potential maps still need interrogating to be truly useful to practitioners at a local level. *More development at a regional scale* would help reduce much the time costs spent by individual projects ground truthing their areas.

Key obstacles which participants would like to see accounted for in the habitat potential maps consisted of areas of *capital dredging, trawl or dredge fisheries, historic landfills* and *plans for flood defences / flood storage sites* (some of these datasets have now been included). Inclusion of *management plans*, such as Shoreline Management Plans (SMPs), Nature Recovery Network plans and Flood and Coastal Risk Management (RCRM) plans could help build partnerships across policy and conservation to catalyse restoration projects with multiple ecosystem benefits. Additionally, it was recommended that although the maps were created using hydrological models, the inclusion of *sediment movement models* would be very useful as this is key factor when planning coastal habitat restoration for all three habitat types. Furthermore, *mapping of existing habitats*, such as existing seagrass beds and modelling which beds could usefully be extended would be valuable addition to the maps and help facilitate restoration in the Thames.

After a short break two restoration projects being conducted in the Thames seascape, with very different drivers, were presented. The **Southend-on-Sea Catchment to Coast** project which has a primary driver of flood resilience and reducing erosion at landfill sites and the **Essex Native Oyster Restoration Initiative** (ENORI) which was created to boost biodiversity, sustainable fisheries and coastal livelihoods were presented.

The participants were then divided once again into break-out groups to discuss the **Obstacles to Scaling-Up** restoration projects in the Thames seascape. Multiple obstacles were highlighted including the presence of *historic landfill sites*, the potential conflict of restoring habitat in *designated sites* when other habitats such as mudflats are protected features, the presence of *freshwater marsh*, a similarly important habitat, and the trade-off between key habitats in many areas where saltmarsh restoration has potential, the *lack of baseline and historic* datasets and the *availability locally of broodstock* for native oysters or *seed availability* for seagrass restoration. Further discussions were had around *landowner and community buy in*, the issues with *water quality* at sites, the potential conflict with *flood protection schemes*, particularly in the lower tidal Thames, and *site access and safe working* in these often-muddy coastal environments. There was also much discussion around the time and cost of *licenses* being prohibitive to restoration attempts and the largest obstacle was always the impending impacts of *climate change*. Climate change obstacles discussed included issues with *coastal squeeze*, and the lack of space for habitats to progress landward, the *changing environment*, such as sea temperature, and how long these locations will be suitable for these habitats, and the potential for *rising sea levels* flooding restoration attempts in the future, rendering them a waste of funding, time and effort.

The morning was completed with a plenary discussion about the **Potential for Collaboration and Partnership across the Thames Seascape**, what benefits could be gained from working together and how to facilitate more restoration projects and at a larger scale. It was discussed that several *management plans*, such as SMPs, NRNs and FCRM have conducted much of the planning and baseline work but *need partnerships* and *varied funding paths* to put the plans into actionable projects. Additionally *stacking funding* options, such as from habitat offsetting, charitable donations and flood planning, could allow larger restoration projects to be developed to provide multiple ecosystem services. It was discussed that *universal monitoring metrics* across restoration projects would allow comparison across the seascape to make it easier to understand the successes and failures of restoration techniques, and furthermore, sharing and developing *green skills* across organisations and projects would benefit all. Having *communal seed or nursery facilities* in the Thames Estuary which multiple projects could utilise would reduce project costs meaning remaining funds could be used to scale up projects further. *Easy access* to multiple *existing datasets* for the Thames in one location was considered useful, as was trying to develop existing mapping projects such as the ReMeMaRe habitat potential maps to make them more *regionally applicable*. Finally, it was agreed that a *coastal habitat restoration plan* at a *system scale*, co-created and collaborated on could be a great asset to the Thames seascape and help facilitate coastal habitat restoration in a more strategic and integrated way.

ZSL and TEP will now work with the outputs of the workshop to help scope opportunities through partnership and collaboration to try and catalyse and facilitate strategic habitat restoration at a seascape scale across the Thames.

Introduction

Over the last few centuries, Britain's seascapes have been altered dramatically and people have become increasingly disconnected from nature. Nearly 80% of UK estuaries and 56% of UK coastal waterbodies have been assessed as not reaching good environmental status¹. We have lost 85% of saltmarsh habitat since the 1800's², up to 92% of our seagrass⁶, and 95% of our native oyster beds³ since historical records began. The primary pressures on these habitats include physical modification, poor water quality, and erosion due to sea level rise and increased storm events. Seagrass and oyster bed habitats are also at risk from loss through seabed trawling, boat mooring and anchoring. With their loss, we lose the ecosystem benefits these interlinked habitats provide including flood attenuation, reduction in storm surges, reduced coastal erosion, removal of nutrients and water turbidity, carbon sequestration and nursery, feeding and overwintering habitat for many fish and bird species. These services also have socio-economic benefits enabling more climate resilient communities and supporting coastal economies through, for example, livelihoods, tourism and health and wellbeing. As an example, current saltmarsh extent in the UK provides £1 billion worth of flood protection⁴, protecting homes and enhancing existing coastal defences. Saltmarsh can sequester 5 t carbon ha⁻¹ yr⁻¹ mitigating climate change, and 0.8 tonnes nitrogen ha⁻¹, reducing the risk of eutrophication⁴.



The Greater Thames Estuary, where the North Sea meets the River Thames is a major international shipping route, has two large shipping ports, commercial fishing grounds and is bordered by homes for over 6 million people. It is also a rich tapestry of habitats including saltmarsh, seagrass, mudflat, native oyster beds and sand banks and is an essential fish nursery, overwintering bird territory and seal feeding and pupping area. Sadly, many of these habitats are in a highly degraded and fragmented state and have been declining both in

size and quality. The Thames is estimated to have lost 43% of saltmarsh habitat (in the last 130 years)⁵ and 87% of seagrass habitat historically⁶.

Coastal habitat restoration is increasingly being seen as an important and essential management tool in inshore areas both in the UK (as evidenced by the inclusion of wide scale habitat recovery in the Government's 25-year Environment Plan) and globally (2021-2030 has been marked as the UN Decade for Restoration and the UN Decade for Ocean Science). Previous efforts of habitat restoration in the UK have tended to focus on one habitat however there is increasing evidence that an integrated

¹ Environment Agency Water Body Summary Table: www.gov.uk/guidance/water-framework-directive-assessment-estuarine-and-coastal-waters

² Risk and Policy Analysts, 2020. The value of restored UK seas, Final Report for WWF, July 2020, Norfolk.

³ Preston J., Gamble, C., Debney, A., Helmer, L., Hancock, B. and zu Ermgassen, P.S.E. (eds) (2020). European Native Oyster Habitat Restoration Handbook. The Zoological Society of London, UK., London, UK.

⁴ Hudson, R., Kenworthy, J. and Best, M. (eds) (2021). Saltmarsh Restoration Handbook: UK and Ireland. Environment Agency, Bristol, UK.

⁵ Using data from Ordinance Survey Maps from National Library of Scotland 188 to 1913 and Environment Agency maps from 2012-2018. This calculation excludes restored saltmarsh areas.

⁶ Data analysed from Green, A., Unsworth, R.K., Chadwick, M.A. and Jones, P.J.S., Chadwick, M.A., Jones, P.J., 2021. Historical analysis exposes catastrophic seagrass loss for the United Kingdom. *Front.Plant.Sci.* 2021. doi.org/10.3389/fpls.2021.629962

approach at an ecosystem scale, such as across the Thames Estuary, can demonstrate much greater ecological and economic benefits as well as better restoration success.

The Zoological Society of London (ZSL) with the Coastal Partnerships Network's 3Cs project (CPN 3C's) which was led by the local Coastal Partnership, Thames Estuary Partnership (TEP), held a workshop titled, '**Coastal Habitat Restoration in the Thames**' on 15 March 2022. The workshop brought together stakeholders from across London, Kent and Essex including NGOs, policy makers and academics. This was the first workshop of its kind in the Thames and planned to discuss and review existing restoration projects, obstacles and opportunities for restoration and interrogate national habitat opportunity maps using local expertise. This workshop aimed to link interested local stakeholders in the Thames land and seascape to catalyse and facilitate coastal restoration at an ecosystem scale.

Participants

Forty six participants attended the conference from a range of organisations including AJS Flood Risk Consultants, Blue Marine Foundation, Environment Agency, Essex County Council, Essex Native Oyster Restoration Initiative, Essex Wildlife Trust, Havant Council, Kent Wildlife Trust, Lower Medway Internal Drainage Board, Medway Swale Estuary Partnership, Mott MacDonald, National Trust, Natural England, Port of London Authority, RSPB, South East Coastal Group, Southend-on-Sea Borough Council, Swale Borough Council, Thames 21, Thames Estuary Partnership, Thames River Trust, Thanet Coast Project (and NKEMPS), Thurrock Council and Zoological Society of London.

Introductory Presentations:

After welcoming participants, Amy Pryor, Thames Estuary Partnership, and Anna Cucknell, Zoological Society of London, gave short presentations summarising the two projects driving the production of this workshop. Summaries of both projects can be found in [Appendix 1](#).

Geographical limits: The Thames Seascape

The geographical area that was to be used for this workshop was presented as the lower Tidal Thames, from Tilbury and Gravesend, to the Thames Estuary, marked as Felixstowe in the north and Margate in the south (see Figure below). This area was described as The Thames Seascape throughout the workshop.

This geographic limit aligns approximately with the Southeast Marine Plan and has been chosen to describe the approximate biological limits to the Thames estuarine environment.



The geographic area described as the Thames Seascape throughout the workshop

Mapping Current / Planned Restoration Projects in the Thames Seascape

In advance of the workshop, participants were asked to log their restoration projects; past, present or planned, into a survey which produced a GIS layer to be used in the workshop. For details of information collected on each project please see [Appendix 2](#).

Eleven restoration projects, some of which included of several sites across the Thames Estuary, were submitted with 19 organisations partnering on them. These projects are shown on the [interactive map](#).

Seascape scale habitat restoration

The workshop continued with a short presentation about the seascape scale habitat restoration in the Solent, where stakeholders throughout the area have been starting to work together, form partnerships, apply for joint funding applications and strategically plan restoration across the seascape. This presentation aimed to inspire restoration practitioners about the potential for seascape scale habitat restoration and collaborations in the Thames. A summary of the presentation can be found in [Appendix 3](#).

Assessing national habitat opportunity maps using local [expertise](#)

Workshop participants were separated into three smaller break-out groups and asked to examine the national habitat opportunity maps developed by the Environment Agency's Restoring Meadow, Marsh and Reef (ReMeMaRe) project. The ReMeMaRe project "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 (*Ostrea edulis*) reefs" (maps available to download [here](#)). The restoration potential maps have been produced based on factors such as biogeographic ranges and the environmental preferences of each habitat at a national scale, but without local or regional refinement or landowner permissions.

Geographic Information system (GIS) maps were presented in each group with the following layers:

-
- [the restoration potential maps for saltmarsh, seagrass and native oyster](#) (EA),
 - current restoration projects (submitted prior to the workshop, details above),
 - [all managed realignments](#) (APBmer and OMReg)
 - [saltmarsh extent and zonation](#) (EA)
 - [saltmarsh change](#) (EA)

The groups were asked to discuss and map areas which were unfeasible to restore due to local obstacles or restrictions. They were also asked to see if there were specific areas which might have potential for restoration projects or extensions of existing projects. For ease, each group discussed the seascape in three areas: the Essex/ lower Suffolk coastline (Shoeburyness to Felixstowe), the lower tidal Thames (Tilbury and Gravesend to Shoeburyness and Sheerness) and the Kent coastline (Sheerness to Margate).

The information discussed about each area has been included on the [interactive map](#) in the 'local knowledge edits to EA habitat potential maps' layers.

Additional datasets for inclusion

Across the many discussions, several additional datasets were highlighted as being important to include when mapping restoration potential across the Thames Seascape. These layers include:

- Designated sites
- Historic Landfill sites
- Flood barrier / water storage
- Navigation routes
- Fisheries: especially trawl fisheries, cockle dredging and oyster cultivation
- Areas of dredging
- TE2100 flood storage sites and the Thames barrier location
- Shoreline management plans
- MEASS plan
- FCERM plans

Case studies of local restoration projects

Following the initial breakout groups, the workshop continued with two short case study presentations of current / planned restoration projects in the Thames Estuary. Each of these projects had very different drivers for restoration: Catchment to Coast restoration is driven by flood resilience and the Essex Native Oyster Restoration Initiative by biodiversity and sustainable fisheries. Presentation summaries can be found in [Appendix 4](#).

Obstacles to scaling up restoration in the Thames Seascape

Participants were randomly split into three breakout rooms to discuss obstacles to coastal habitat restoration. The leader of each group presented the conversation in plenary after the discussion.

Multiple obstacles were raised by the breakout groups and these have been summarised below. It is important to know that these barriers were raised in discussion without evidence and so may not be applicable across all sites. The list, whilst comprehensive, is unlikely to be exhaustive.

Barrier	Potential Mitigation	Location or extent of barriers
<i>Natural and historic coastline:</i> <ul style="list-style-type: none">- It is important to consider what the natural coast would look like now and in the future with climate change, before deciding what and where habitat restoration should occur.- Large scale coastal retreat will be needed to account for sea level rise and increased storm surges.	<ul style="list-style-type: none">- Models of flood risk are available for the Thames and should be consulted when planning restoration projects.	Across the Thames Seascape
<i>Landowner and local community buy in</i> <ul style="list-style-type: none">- It is very difficult for projects to be successful without landowner and local community buy in.	<ul style="list-style-type: none">- It is essential to be cognisant of the emotional elements to landowner decisions, as the land has often been within families for generations.- Involving the community from the start, before even scoping begins, can help communities feel like they have more ownership of the project.- Small scale restoration trials can be an ideal way of inspiring people on the many benefits of habitat restoration.- Extending existing restoration projects might remove some of the barriers as landowners as the community can visit the previously created habitat(s).- Communication about the social impacts of climate change and value-based behaviour change is needed at a national scale to allow large scale coastal habitat restoration.	Across the Thames Seascape

<p>Flood Protection:</p> <ul style="list-style-type: none"> - Some sites which have been proposed as potential saltmarsh habitat are also areas which are essential for flood protection. - Where tributaries are present there may be a risk of bypassing a flood barrier which could cause major issues. 	<ul style="list-style-type: none"> - Thames Estuary 2100 and SMPs should be consulted while planning restoration projects. - Collaboration between all agencies and restoration practitioners is essential, allowing restoration plans to be sense checked to make the Thames Seascape more resilient to flooding and not the reverse. 	<p>Across the Thames Seascape, but especially at the mouth to the tidal Thames</p>
<p>Landfill sites:</p> <ul style="list-style-type: none"> - The presence of historic landfill sites can pose an obstacle to coastal habitat restoration in those areas. - There is a risk with the increased erosion caused by rising sea level and storm surges historic landfill sites might breach. - Most sites have no gas management so spontaneous combustion can occur and at around 50% of the sites it is unknown when they began operating or their contents. 	<ul style="list-style-type: none"> - The Historic Landfill Sites layer created by the Environment Agency should be consulted. This has been added to the Thames Restoration map. - It is often too expensive to remediate historical landfill for saltmarsh and lower the land, but it is possible to convert them to different higher habitats and create nature reserves e.g. at Stanford Wharf at Mucking. 	<p>There are approximately 345* historic landfill sites neighbouring the coastal / estuarine areas of the Thames Seascape.</p>
<p>Designated sites:</p> <ul style="list-style-type: none"> - Many of the areas suggested for potential habitat restoration lie within European marine sites, especially in the outer estuary. - The area is widely designated for environmental features, but designations also include Historic England Protected sites. - Many of the environmental designations include the sediment habitats as features of the site, making habitat restoration or creation, especially for native oysters, more challenging. - New byelaws to protect newly restored sites could be considered necessary. 	<ul style="list-style-type: none"> - Looking for sites where there is a potential for habitat creation / restoration outside of designated sites might make the licensing for the restoration process easier. However, it was noted that land outside of designated sites can be deteriorating ecologically and has development potential, therefore potentially making restoration more costly and difficult to achieve. - Restoring the “right habitat in the right place” is essential and habitats like mud flats can be equally important to saltmarsh, seagrass or native oyster. 	<p>The number of designated sites in the coastal areas of the Thames Seascape:</p> <p>MCZ – 7* SSSI – 60* SPA – 14* RAMSAR – 12* SAC – 7*</p>
<p>Freshwater Marsh:</p>		

<ul style="list-style-type: none"> - Freshwater Marsh is a non-tidal, non-forested marsh wetland that contains fresh water and is continuously or frequently flooded. These marshes are often found in open areas near rivers and lakes and are important for many species of birds, invertebrates and small mammals. - There are several areas designated for freshwater marsh across the Thames which are presently overlaid by saltmarsh potential in the ReMeMaRe habitat restoration potential maps. - If saltmarsh is restored in areas presently covered with freshwater marsh, compensation habitat would be required. This could be challenging, as creating freshwater marsh in other areas can be difficult due to lack of water, water quality issues and surrounding land use including land ownership. - These areas of freshwater marsh are behind sea walls, which are low lying. If these were to be realigned, the water currently held in the freshwater marsh would be drained into the estuary, potentially increasing the tidal prism and the amount of water. 	<ul style="list-style-type: none"> - The need for freshwater marsh habitat, which is essential for rare freshwater species and birds needs to be included in Seascape scale coastal habitat restoration planning. - Including the potential influx of freshwater to the tidal prism if freshwater marsh was to be realigned, should be included when modelling the impacts of potential realignments. 	Consult RSPB for Freshwater Marsh locations
<p>Dredging:</p> <ul style="list-style-type: none"> - The Thames Estuary is the busiest waterway in the UK, and as such there are several areas which are regularly dredged to allow large vessels to pass. Coastal habitat restoration in these areas is unlikely to be feasible unless the dredging work was curtailed. 	<ul style="list-style-type: none"> - The Port of London Authority (PLA) has a GIS layer showing the areas of the Thames which are regularly dredging. Other ports may have similar maps. These maps should be consulted when planning coastal habitat restoration. - Dredged material could offer a potential substrate for habitat restoration and creation through a process called Beneficial Use of Dredged Sediment (BUDS), however historic contamination of these substrate can limit its use. - The distance between the dredge sites and area potentially receiving the sediment needs to be considered. 	See PLA Dredging map and other port authority maps.
<p>Broodstock populations / Seed availability:</p>		

<p>The absence of broodstock or seed availability close to the restoration site can make restoration attempts more challenging.</p> <ul style="list-style-type: none"> - Where natural seedbanks do not occur on site it is important to assess the availability, genetics, disease risk, spread of invasive non-native species and feasibility of getting seed to site. - The historic presence of habitat extents is important when considering where to restore but these datasets can be difficult to find. - Although certain environments may be suitable for particular coastal habitats it does not mean these habitats existed there, and so it may be a question of creation rather than restoration. 	<ul style="list-style-type: none"> - Natural seedbanks may occur to aid restoration attempts but considering why those historic habitats are either not there anymore or are not thriving is key to understanding future restoration. - Nursery ponds or hatcheries can be used to reduce the limitation of broodstock / seed. - Community groups and fishers are excellent sources of knowledge about historic habitat presence and pressures, and so should be consulted while in the baseline mapping and feasibility stage of any project. 	<p>Varied depending on location of restoration attempts/ type of restoration.</p>
<p>Water quality and contaminated sediments:</p> <ul style="list-style-type: none"> - Water quality from, for example, agricultural run-off, houseboat pollution overflows and outfalls, can limit the feasibility of coastal habitat restoration. - Poor water quality can either directly limit growth or survival of species and can also promote macroalgal bloom which can smother intertidal habitats. - Contaminated soils and sediment can also directly limit habitat regeneration and as mentioned above, contamination in dredged sediment can limit its potential for beneficial use due to the legislation surrounding waste products. 	<ul style="list-style-type: none"> - Working directly with farmers, water companies and other potential polluters to minimise nutrient and chemical escape into the waterways is essential to stop release at the source. - Intertidal habitats are excellent at bioextraction of nitrogen and phosphate, especially native oyster habitat, so if they can be established, these habitats can aid the water quality in the area. - Furthermore, seagrass and saltmarsh habitat are believed to remove contamination from the soil. 	<p>-All coastal waterways in the Thames Seascape were classed as having Moderate Ecological Status in 2019**.</p> <p>-However every waterway in the Thames Estuary was classed as failing Chemical Status in 2019.**</p>
<p>Sedimentation rates:</p> <ul style="list-style-type: none"> - Depending on the type of habitat restoration planned, high sedimentation rates can present an opportunity, as with saltmarsh creation, or a limitation to success, as with seagrass and native oyster restoration. 	<ul style="list-style-type: none"> - It is essential baseline and feasibility studies are conducted before restoration attempts are made to maximise the chance of success - the right habitat in the right place. 	<p>Across all projects</p>

	<ul style="list-style-type: none"> - Hydrology and sedimentation models exist for the Thames and several of the surrounding tributaries. 	
<i>Licensing and permissions:</i> <ul style="list-style-type: none"> - The costs and time associated with securing consents was discussed at length within the workshop. - Costs of licensing are often prohibitive to restoration by non-governmental organisations and some funders will not cover these expenses. - It was noted that it is often difficult to know who the key contacts are in the regulators / authorities due to the high turnover of staff. 	<ul style="list-style-type: none"> - It was discussed that the present licensing system needed to be updated in relation to habitat restoration. - A regularly updated database of relevant personnel within regulators and authorities would help practitioners liaise with licensing organisations throughout their restoration attempt. 	Across the UK
<i>Costs:</i> <ul style="list-style-type: none"> - Unsurprisingly a major obstacle to restoration projects is cost. - Presently there is very little government funding available to support restoration and more clarity is needed around potential funding streams. - The majority of restoration attempts presently are funded through private donors or stacked funding, however the requirement of long-term stewardship and monitoring at restoration sites can make the financing of restoration difficult. - Cost is considered the biggest factor to scaling up restoration in the Thames seascape. 	<ul style="list-style-type: none"> - Payment for ecosystem services, such as blue carbon, biodiversity or habitat credits, or nitrate / phosphate removal, may provide suitable funding for restoration attempts, however the science and systems behind these funding models are presently not developed enough for intertidal habitats. - Many of these potential funding models will not provide enough funding for most restoration work, however stacking these fundings may provide more suitable levels of funds. 	Across most restoration projects
<i>Recreational pressures:</i> <ul style="list-style-type: none"> - The Thames Estuary is a busy environment and coastal habitats have many pressures on them. It is difficult to find locations for restoration which do not already have multiple potential damaging practices present, ranging from fishing, dredging, mooring and anchoring, dog walking and paddling. - The process of limiting these activities to aid restoration attempts can be difficult and the social impact of 	<ul style="list-style-type: none"> - Restoration can have positive social benefits for local stakeholders through increased tourism, fish abundance, more public space and increased wellbeing of being surrounded by nature. By introducing and developing plans for the restoration project to stakeholders from the start, many areas of conflict can be dealt with and mitigated early on. 	Across the Thames Seascape

restricting these activities needs to be considered before planning habitat restoration in the area.	- Developing community engagement plans to include advice on limiting impact on intertidal habitats can allow many recreational activities to continue with minimal detrimental effects.	
Infrastructure and lack of space: <ul style="list-style-type: none"> - There is already much pressure on our coastlines due to lack of available land and pressures to build more houses, their associated services (such as schools, hospitals etc.) and industry. Coupling this with future sea level rises coastal squeeze will most certainly be felt. 'Finding space' for coastal restoration habitat can be difficult and the presence of nearby infrastructure and key utility assets may further restrict habitat creation opportunities. 	<ul style="list-style-type: none"> - To account for loss of biodiversity or habitat due to development, the Environment Act 2021 requires significant building development to achieve a biodiversity net gain of 10 percent. Although this doesn't account for lack of space in the coastal zone for restoration, these credits may help fund, in part, restoration attempts. 	Across the Thames Seascape
Invasive Species: <ul style="list-style-type: none"> - The increase of invasive species and the competition or disease they may promote, may limit restoration success in some areas. - Rising water temperatures caused by climate change may exacerbate this further. 	<ul style="list-style-type: none"> - Clean, Dry, Check should be used when moving any equipment between sites - Biosecurity plans should be prepared to assess the risk of introducing diseases or invasive non-native species. These biosecurity plans should be agreed with the relevant authority. 	<ul style="list-style-type: none"> - Across all projects - Especially should be considered when translocating seed, plants or animals.

*these figures are approximate as will depend on the area considered to be the Thames Estuary and distance to the coast

**<https://environment.data.gov.uk/catchment-planning/>

Potential for collaboration and partnership across the Thames Seascape

The workshop was completed with a plenary discussion about the opportunities for collaboration and partnership across the Thames Seascape, what benefits could be gained from working together and how to facilitate more restoration projects and at a larger scale. Items raised included:

Opportunity	Benefits	Actions needed
Partnership working	<ul style="list-style-type: none"> - It was widely agreed that partnership working is what will drive successful restoration projects across the Thames Seascape, and those partnerships need to include the landowners. - Partnerships and new restoration projects currently seem to develop through word of mouth, however further work to bring practitioners across the estuary together to share plans and methods may help facilitate restoration projects and partnerships in the future. 	<ul style="list-style-type: none"> - Continue to build opportunities to bring together people and organisations interested in restoration to help promote partnership development and extend restoration potential.
Government funding/ stewardship schemes	<ul style="list-style-type: none"> - The inclusion of Environmental Land Management Scheme (ELMS) stewardship payments could be a potential source of income for landowners when changing land use from agriculture to habitat restoration. These schemes may also provide potential for longer term stewardship of restoration sites by the organisations restoring the land. - Similarly, the creation of a Blue Carbon codes (including those in development for saltmarsh and seagrass), habitat and land banking, biodiversity credits, Nitrate / Phosphate offsets may create an opportunity, if managed correctly, to scale up and promote coastal habitat restoration 	<ul style="list-style-type: none"> - Encourage stakeholders to feed into future consultations on the ELMS and other government schemes to include intertidal areas in these programmes.
Stacking Finance	<ul style="list-style-type: none"> - Although many restoration, flood and shoreline management and nature recovery plans are developed on paper, they cannot be achieved due to lack of funding. - The opportunity of stacking funds from multiple organisations and donors, for example from private benefactors, government schemes, biodiversity / habitat offsetting, carbon offsetting etc. was seen as a way to make restoration projects feasible and to scale up projects which are already planned / being carried out. 	
Standardised methodologies	<ul style="list-style-type: none"> - Creation of standardised methodologies and universal monitoring metrics for all restoration projects across the Thames Seascape or even nationally was proposed. - If methodologies for baseline and condition assessments for all sites were standardised, it was argued that data would be comparable, and successes or failures of restoration attempts understood and shared more easily. 	<ul style="list-style-type: none"> - Create a working group for current restoration practitioners and researchers who are interested in developing standardised methodologies or universal

	<ul style="list-style-type: none"> - An evolving toolkit for successful habitat restoration methods, if developed, would allow more and larger restoration projects to be fulfilled through more efficient use of future funding and effort. 	<p>monitoring metrics for restoration projects across the Thames Seascape.</p> <ul style="list-style-type: none"> - Develop a place to host (either on a new or existing platform) these methodologies as a live document that can easily and regularly be updated.
<i>Building on existing data:</i>	<ul style="list-style-type: none"> - As baseline habitat and feasibility studies should be conducted before restoration projects are conducted, easy access to multiple existing datasets for the Thames, brought together in one place and accessible to all, was considered useful. - Developing existing mapping projects such as the ReMeMaRe habitat potential maps to make them more regionally applicable. 	<ul style="list-style-type: none"> - Develop a place to host (either on a new or existing platform) the multiple existing datasets. - Encourage stakeholders to feed into the ReMeMaRe workshops / consultations to encourage development of existing habitat potential maps.
<i>Shared facilities and skills</i>	<ul style="list-style-type: none"> - Shared facilities for seed development / nursery ponds would help cut costs of individual native oyster or seagrass restoration initiatives. - Sharing green skills across projects and training people from other schemes in survey skills or monitoring may benefit all projects. Similar initiatives are already being run further upriver in the Thames Catchment with Thames Estuary Partnership and RSPB. 	<ul style="list-style-type: none"> - Scope the demand for shared facilities for seed development or nursery ponds across the Thames Seascape. - Scope the interest in creating a green skills programme across the Thames Seascape.
<i>Coastal restoration planning at a system scale</i>	<ul style="list-style-type: none"> - The development of a coastal restoration plan for the Thames Seascape at a system scale, co-created and collaborated on, was suggested. - This plan would aim to restore the mosaic of habitats in an integrated way across the seascape. It was agreed the scale of the system should align with the Marine Plan area and flood and risk management plans. - If created, this restoration plan would feed into and coordinate with other management plans including flood and coastal erosion risk management plans, shoreline management plans, Local plans, nature recovery networks and the coastal partnership. 	<ul style="list-style-type: none"> - Raise funds to explore the development of a system scale coastal restoration plan for the Thames Seascape - Once funding is confirmed, bring together a steering group for this project - Run stakeholder engagement workshops to gain feedback on plan
<i>Sharing licenses and consents</i>	<ul style="list-style-type: none"> - The potential for cutting costs and administration by sharing licenses and consents across projects was discussed. However, it was considered to carry too much risk to be a feasible opportunity. 	None

Final summary

ZSL and TEP are assessing the outputs of the workshop and will continue to develop plans to encourage partnership and collaboration to catalyse and facilitate strategic habitat restoration at a seascape scale in the Thames. ZSL and TEP are keen to collaborate with all interested stakeholders to scope, fund and conduct these next steps which may include:

Next step	Action needed
Keep developing the coastal restoration habitat potential map for the Thames	<ul style="list-style-type: none"> - Keep adding to the interactive map with data layers which would help shape restoration projects in the Thames Seascape.
Source funding to continue promoting scaling up of coastal habitat restoration in the Thames	<ul style="list-style-type: none"> - Calculate funding needs and approach suitable funders.
Build opportunities to bring together people and organisations interested in coastal habitat restoration in the Thames Seascape	Develop a plan for future meetings / workshops which could include (but are not limited to): <ul style="list-style-type: none"> - A conference to include presentations and talk about restoration projects along the Thames from the upper freshwater to the outer estuary. This would promote knowledge and methodology transfer, networking and could promote the creation of partnerships across the Thames Seascape. - A working group to develop universal monitoring metrics / standardised methodologies for restoration projects across the Thames Seascape
Create Greater Thames Data portal (either new or using existing platform):	<ul style="list-style-type: none"> - Scope out existing platforms to see if there is a suitable hosting platform or if one needs to be created. - Consult on information which should be included in a Thames Seascape Portal, to include: <ul style="list-style-type: none"> - A regularly updated database of relevant personnel within regulators and authorities listing their speciality and geographical responsibilities. - Evolving toolkit for successful habitat restoration methods and universal monitoring metrics - Multiple existing datasets existing across the Thames Seascape
Develop a coastal restoration plan for the Thames Estuary at a system scale	<ul style="list-style-type: none"> - Further scope stakeholder interest in developing a coastal habitat plan for the Thames Estuary at a system scale. - Scope funding options to create a Thames Seascape Restoration plan. - Set up steering group for development of a plan. - Consult stakeholders as to what should be included in the plan and adapt the plan to suit. - The plan should be a live document which can be adapted in relation to the changing environment, developments, legislation etc.
Encourage practitioners to feed into national / local consultations	<ul style="list-style-type: none"> - Scope interest in a communication platform (most likely email group) to share important meetings or consultations which would benefit from restoration practitioner / scientist input.

which could promote / fund coastal habitat restoration	
Scope the demand for sharing facilities / skills	<ul style="list-style-type: none">- Scope the demand for shared facilities for seed development or nursery ponds across the Thames Seascape.- Scope the interest in creating a green skills programme linked to habitat restoration skills.
Develop a community engagement / Social impact scheme	<ul style="list-style-type: none">- Develop a plan to conduct Thames Estuary-wide or support project specific communication about the social impacts of climate change and the value-based behaviour change is needed to allow large scale coastal habitat restoration.- Scope the development of community engagement plans to include provision of advice on how to limit impact on intertidal habitats which will allow many recreational activities to continue with minimal detrimental effects.

We would like to thank the participants for attending and contributing to the workshop. This workshop report will be shared with all workshop participants and the Environment Agency as an output of the Championing Coastal Coordination project.

APPENDIX 1 Introductory Presentations:

Championing Coastal Coordination (3Cs) Amy Pryor, Thames Estuary Partnership

The Championing Coastal Coordination (3Cs) fund is an Environment Agency initiative with support from Natural England, the Marine Management Organisation and the Association of Inshore Fisheries and Conservation Authorities. It is a cross-sector collaboration seeking to explore how to enhance and progress coordination for coastal sustainability and resilience in England.



This is in recognition of the major challenges that we face in our coastal and estuarine environments. The coast consists of many highly interconnected landscapes and seascapes, with a diverse mix of ownership and governance arrangements. The management of the coast comprises a set of complex challenges unlike those inland. The number and diversity of public and private sector interests is often highest at the coast, with a proportionate increase in the complexity of planning and management in this highly interconnected space.

The funding, administered through the EA's Water Environment Improvement Fund, is to support the testing and trialling of approaches that will inform how to enhance and expand current arrangements for:

- Coordinated planning and delivery of locally owned plans and place-based initiatives through governance frameworks to: better connect decision-makers in places; facilitate collaborative restoration planning and delivery; incorporate data from all different sectors of the community; strengthen policies and provide a direct link from national governance to local communities.
- Coastal champions to strengthen capacity and capability in local stewardship by: incorporating environmental, social and economic processes that span land and sea; including all willing to be involved in goal setting, planning and delivery; creating a network of action with regular feedback on impact; engaging at a range of levels to exchange knowledge, share and acknowledge what is valuable, understand multiple perspectives and gain a high degree of support for delivery; strengthening engagement, facilitation and outreach incorporating environmental data into decisions at a local business level.
- Restoration and recovery of natural habitats to: strategically protect and manage coastal natural capital from coastal change such as erosion and damage by climate related storms and sea level rise; improve community resilience to natural hazards, reduce impacts of biodiversity loss and; improve water quality for wildlife to thrive and provide 'blue carbon' and recreational opportunities through public access. 13 pilots have been funded including 11 local place-based initiatives and two national projects. The deadline for delivery is 31st March 2022

ZSL Thames Integrated Habitat Restoration Project, Anna Cucknell, Zoological Society of London

The Goal: To restore coastal habitat in the Greater Thames Estuary to create cleaner water, sequester and store carbon, increase biodiversity and reconnect communities with their local blue spaces.



The Project: ZSL will work with organisations, stakeholders and the community to help facilitate and catalyse coastal habitat restoration across the Thames Estuary. This project will promote a strategic approach to restoration at a seascape scale. It will build partnerships with restoration practitioners, government agencies and industry to overcome obstacles and realise the opportunities to scale up existing restoration projects and scope new restoration potential. This workshop is the first stage of the strategic part of this project.

Additionally, this project has a practical element in which ZSL plan to scope and conduct habitat restoration in an integrated and holistic way. To begin this work, we have selected part of the Medway estuary, a tributary to the Greater Thames Estuary, in which to pilot our restoration work. We plan to conduct baseline and feasibility surveys in 2022, which will inform our integrated restoration plans in 2023. We aim for this Medway site to be the catalyst to our restoration journey in the Greater Thames Estuary, with learnings from this pilot being applied to other locations in subsequent years.

ZSL is keen to create partnership and share learnings from this project and would encourage anyone interested in getting involved to get in touch.

APPENDIX 2: Mapping Current / Planned Restoration Projects in the Thames Seascape

In advance of the workshop, participants were asked to log their restoration projects; past, present or planned, into a survey which produced a GIS layer to be used in the workshop. For each project participants were asked to include:

- Name of lead organisation and partners
- Name of the main contact
- Email address of the main contact
- The coordinates of the restoration project
- Type of habitats being restored:
 - Intertidal seagrass
 - Coastal saltmarsh
 - Grazing marsh
 - Oyster bed
 - Mudflat
 - Other
- Type of Restoration e.g. removal of pressures, managed realignment, seed dispersal, oyster nursery, estuary edge
- Purpose of the Restoration e.g. flood resilience, carbon sequestration, biodiversity needs
- Policy driving the restoration project
 - 25-year environment plan
 - Nature conservation – habitats and species regulations
 - Nature Recovery Network
 - Flood Risk Management Plan
 - Shoreline Management Plan
 - River Basin Management Plan
 - N/A
 - Other
- Timescale of delivery e.g. has it happened? when is it happening? do you need anything from anyone else to get it done?
- Do you consider your restoration project supports any of the following socio-economic drivers?
 - Achieving net zero
 - Levelling up agenda
 - Green Recovery (jobs, training and skills)
 - Health and wellbeing
 - Blue Growth Agenda
 - N/A
 - Other
- Are you evaluating or measuring the socio-economic benefits in any way?
- Are you exploring natural capital within your project?

APPENDIX 3: Seascape Restoration

Solent Seascape Restoration Project, Jenny Murray, BLUE

Since 2015, BLUE has been working to restore the Solent native oyster fishery back to self-sustaining levels. With our partners, BLUE has now restored almost 100,000 oysters using innovative nursery systems and creating oyster reefs. The nurseries have provided a home for over 130 different species including European eels, bass and seahorses. In 2021, the first native oyster reef was created in Langstone Harbour and is home to 36,000 native oysters. We are now preparing for the creation of the second reef in the River Hamble. As the benefits of integrated approaches to marine habitat restoration are becoming more widely recognised, BLUE is now beginning to develop a seascape project that aims to protect, restore and reconnect fragmented oyster, saltmarsh and seagrass habitats collectively in the Solent and quantify the combined ecosystem benefits including carbon sequestration, nitrate removal, and biodiversity. To date, BLUE and ZSL hosted a workshop to identify the opportunities and challenges for integrated restoration approaches and have begun working with the University of Portsmouth and the Environment Agency to trial integrated saltmarsh and oyster restoration in the River Hamble.



APPENDIX 4: Thames Restoration Projects

Catchment to Coast – Tom Palmer, Southend-on-Sea

The Catchment to Coast project is part of the DEFRA Flood and Coastal Resilience Innovation Project (FCRIP) which seeks to improve resilience to flooding and reduce coastal erosion through the use innovative measures. The project is a partnership of 10 organisations being led by Southend-on-Sea City Council and Thurrock Council and focuses on two main aspects: Then first is the reduction of surface water flooding and increased drought resilience through the use of catchment-wide measures, such as regenerative agriculture, water storage and re-use, retrofit SuDS and more traditional NFM. The second focuses on the reduction of coastal erosion at historic landfill sites through saltmarsh regeneration, coir matting and other more natural defence measures. The project has an emphasis on innovation and learning, with monitoring a key aspect to ensure understanding of the impacts and benefits of measures to both flood and coastal erosion risk reduction as well as quantifying wider socio-economic and environmental improvements.



Essex Native Oyster Restoration Initiative (ENORI), Alison Debney, Chair of ENORI, ZSL

Established in 2011, the Essex Native Oyster Restoration Initiative (ENORI) is an exciting collaboration between oystermen, nature conservation organisations, academia and UK Government, it is the largest marine restoration project by area in the UK. The collaboration focuses on recovering native oysters in the Blackwater, Crouch, Roach and Colne Estuaries. Native oyster fishing and cultivation has long been at the heart of coastal communities in Essex. The Romans popularised the oyster in Essex, notably in Mersea, where a strong culture of native oyster cultivation has been taking place in the Blackwater since 1377 and which continues today. Native oyster numbers have decreased by over 95% and native oyster beds are one of the most threaten marine habitats in Europe. The Blackwater, Crouch, Roach and Colne Marine Conservation Zone (MCZ) is unique as the only MCZ designated as a protected area for oyster beds and for the habitat they provide. ENORI aims to repopulate the Essex MCZ and restore the natural habitat to allow the oysters to recruit successfully and for their numbers to grow back to historic levels. The overall goal of this project is that native oyster populations and beds in the Essex MCZ are self-sustaining and provide biodiversity, ecosystem services, sustainable fisheries and cultural benefits.

