PML | Plymouth Marine Laboratory

TAMAR ESTUARIES CONSULTATIVE FORUM
OUR COMMON ASSET

Plymouth Sound National Marine Park

Research Impact Spotlight Event
Plymouth Sound & the Tamar Catchment

Thursday 18 July 2024

Event report and next steps

A joint event by Plymouth Marine Laboratory (PML), Tamar Estuary Consultative Forum (TECF) and Plymouth Sound National Marine Park (PSNMP)

PML | Publishing

About the event

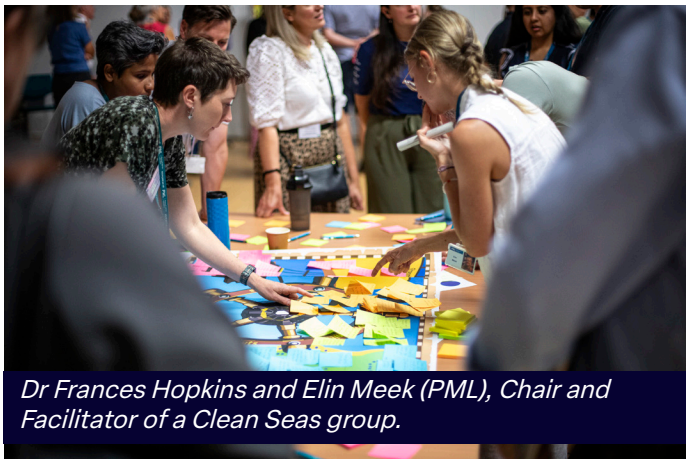
Held at Plymouth Marine Laboratory (PML) on 18th July 2024, the landmark event brought together over 110 participants from 30 organisations to tackle critical research needs for Plymouth Sound and the Tamar Catchment. The event marked a significant step towards collaborative marine research and management in the region.

The event, organised in partnership with the Tamar Estuary Consultative Forum (TECF) and Plymouth Sound National Marine Park (PSNMP), aimed to foster open discussions on key environmental challenges and evidence gaps. Participants included representatives from statutory bodies, harbour authorities, community groups, and local water users, reflecting the diverse range of people involved in marine management and research.

Professor Steve Widdicombe, Director of Science at PML, opened the event by highlighting Plymouth's unique position in marine research. "Plymouth boasts one of the UK's largest concentrations of marine researchers, alongside dedicated management of the Marine Protected Area in TECF and the first UK national marine park," he said. "It's remarkable to have all this in one city. Working together for our environment and communities is crucial."

Prof Steve Widdicombe's (PML) opening remarks.

The event centred around group discussions on key issues relevant to marine area management in Plymouth Sound and the Tamar Catchment. These topics, identified by TECF as crucial to the future of the site, align with PML's global research areas. For instance, participants explored ways to improve water quality monitoring in the estuary and coast, a critical issue for both environmental health and the various communities that rely on these waters.



Dr Frances Hopkins and Elin Meek (PML), Chair and Facilitator of a Clean Seas group.

They also discussed strategies for implementing effective local actions to mitigate the effects of climate change, recognising the unique challenges faced by coastal areas like Plymouth.

Professor Widdicombe emphasized the importance of these discussions: "The topics addressed are not just local concerns. They represent global challenges that many coastal communities face. By focusing on Plymouth Sound and the Tamar Catchment, we're developing solutions that could have far-reaching impacts."

Participants engaged in two rounds of breakout sessions, generating a wealth of ideas and potential solutions, as a starting point for ongoing collaborations. The framework used for this task, which was created by PML, is described in Appendix 2 on page 30. This format encouraged active participation and idea generation.

PML has analysed and digitised all of the information collected at the event in order to fully explore next steps and collate this report. The report details the outcome of each topic per session and explores the next steps to take these concepts forward. We encourage all participants to join us in planning and sharing how we may work together to build on these concepts.

Clean Seas working group.

Lead coordinator, Jen Lockett, Head of Integrated Research, Impact and Support Services at PML shared, "At PML, our mission is to conduct science with purpose. To achieve this, we actively collaborate with diverse organisations and community groups, valuing their unique perspectives, insights, expertise, and experiences. We firmly believe that only through such inclusive partnerships can we produce research that drives meaningful and enduring change in our world."

Dr Claire Szostek & Dr Thomas Mansfield (PML), Chair & Facilitator of Restoring Biodiversity group.

Amelia Sturgeon (TECF), highlighted the importance of collaboration: "The event exemplified the power of bringing together diverse stakeholders. By combining the scientific expertise of PML with the local knowledge and management experience of TECF, we're creating a robust foundation for addressing the complex challenges facing Plymouth Sound and the Tamar Catchment.

Peter Holt (Sonardyne International Ltd. and The SHIPS Project CIC) , Aquilla Erskine (PML), Councillor Briars-Delve (Plymouth City Council) and Prof Mark Fitzsimons (Plymouth University).

Tors Froud from Plymouth Sound National Marine Park added, "This event has not only generated valuable ideas but has also strengthened the connections between research, management, and community. It's a significant step towards realizing our vision for a thriving, sustainable marine park that benefits both nature and people."

Thank you to everyone who participated and contributed their thoughts and ideas in such a collaborative and positive way!

Contents

Appendix Contents

Clean Seas

How can water quality monitoring be improved in the Estuary and coast to provide accurate information for the people who use the waters? How best can we engage citizens in monitoring the health of the Estuary and coast?

Summary

This topic proved highly popular with participants when completing the pre-event registration form so two parallel groups were delivered, each over two sessions, ensuring a wide variety of participants were able to engage with the topic.

Overall, three of the four groups focused on a very similar issue and solution, highlighting the collective perspective that this is highly important to the local area and community. This involved a combination of increased and improved sampling, including use of autonomous technology, apps/online platforms for instant water quality data updates, citizen science for water sampling, live signage in key places around Plymouth with water quality updates and improved education. Below, the report explores the outcomes of these three workshops as a collective under the heading 'water quality monitoring and data availability'.

The other concept discussed was the development of standardised water quality sampling and analysis protocols (e.g. Best Practice Guide for Monitoring Water Quality), using expertise of key players (academics, EA, SWW, NGOs, community groups etc.) that relevant authorities can use for coordinated and more effective data collection. Developed for Plymouth Sound, but could be rolled out regionally/nationally to ensure data and evidence are interpreted in an agreed way.

Water quality monitoring and data availability

Three of the sessions chose to focus on improving water quality monitoring in the estuary and coastal areas, with an emphasis on engaging citizens in monitoring the health of these environments. The primary goal was to explore standardized methods and best practices to provide accurate information for water users and increase public involvement in environmental monitoring.

Dr Liz Atwood, Chair of a Clean Seas group.

The workshop outcomes highlighted the importance of integrating technology, education, and community engagement to enhance water quality monitoring and promote environmental stewardship.

The overarching vision is to make near real-time water quality data widely accessible through live reports at sites and integration into media and weather reports. There is a strong emphasis on citizen science, public engagement, and improved spatial and temporal monitoring, ensuring that comprehensive water monitoring technology is accessible to all.

The key activities proposed involve obtaining funding for technological improvements, creating an overview of current data collection methods, and increasing sampling frequency. The sessions identified several strengths and inputs, including existing water quality monitoring programmes, a passion for environmental protection, local knowledge, and technological resources like apps (e.g., Surfers Against Sewage and WaterFIT). Plymouth's scientific expertise, a large community of water users, and organisations with a focus on environmental monitoring also contribute.

Session 1. Clean Seas group A – Data sampling methods

Inputs / Strengths	Activities	Outputs / products/ tools	Vision
▪ Water quality monitoring at designated beaches in Plymouth Sound occurs weekly May-Sep. MF ▪ Passion to do something positive and long lasting for the environment. ▪ Knowledge base within the South West is strong and can support. High tech development techniques. ▪ Collectively we (probably) have the expertise to create a positive change. ▪ Weekly WCO transits in Plymouth Sound- potential for underway sampling? MF ▪ Engagement from partners across Plymouth with common good. MC ▪ There is a significant number of sea swimmers in Plymouth Sound all year round. MF ▪ Number of places or beaches monitored. TB	**Obtain funding for technological improvements, utilising existing sampling platforms including remote sensing, increased frequency of sampling including additional parameters, utilise existing remote sensing models.** • Understand biodiversity baseline. • Sponsored partner development between different investment streams and organisations. MA • Partners with ability and access to lobby for funds/attention to ocean health. MC • Engagement with parliament. MP • Joint applications to stakeholders. MS • Knowledge dissemination. MS • Demonstration of dipstick test to stakeholders (e.g. swimmers). MF • More collaboration events between management groups and researchers (like today). • More engagement for young people to get into science and research roles. • Engagement events like this to bring together expertise and identify priorities. MC • Monitor now. • Is the NMP having an impact on economy. biodiversity ect. • Formal education programmes including resources, funding. • Media. • Apply for funding. • Education programmes. • Develop evaluation framework for projects. • Engaging and identifying partners. • Legal changes?	**Engaged and passionate community, water quality available at key sites (digital-website or app), web-alert/SMS system, new satellite algorithms, optical tracers for pollutants.** • Baseline data. • Development of new novel satellite algorithms for water quality parameters. GT • Optical tracers for pollutants and toxins. GT • And educated aware community. Passionate marine citizens. • Web alert system that visualises multi data sets. GT • Water quality indicators at all bathing sites (digital updated).	**Improved spatial and temporal frequency of water quality monitoring and public access to data.** • Daily sampling of WWTW discharging into the estuary to quantify pharmaceutical inputs via effluent. MF • Autonomous PH, conductivity, temp, O2 arrays to detect changes/variability in inputs. MF • Real time multi-site data on water quality parameters and quality, hazardous bacteria/organisms TB visualised in the meta verse. • Twice daily sampling at designated beach all year round for biological testing. MF • Regular monitoring not just monitoring during bathing seasons. MS
	Engagements / **who needs to be involved** **Funders, research institutes, farming communities (upstream water quality), water users, TECF** • Local politicians. • Government local regional and national. MC • Commercial bodies, companies and unions. • Politicians media. • Key stakeholders NMP and TECF. • Marine Managers. • Private companies, SW water. • Media. MF • Farming communities, those farming conventionally alongside organic/regenerative farmers. MF • Funders (Philanthropic, NGOs, UKRI, Horizon, EU). MC • Young generation of Plymouth and surroundings. Children, families, education, communities. • Cross cutting research disciplines.		

Example Theory of Change devised from post-it notes at one of the sessions. All ToC are available in Appendix 3.

Clean Seas group discussing water quality needs.

Planned Outputs Include:

- A centralized water quality monitoring platform /app with local forecasts and real-time water quality data displays that is accessible to water users
- Educational programmes
- A federated data set - a collection of datasets that are maintained across multiple, separate organizations, but are combined and accessed as if they are a single, unified dataset.
- New satellite algorithms (advanced mathematical models) and optical tracers for pollutants. This would enable specific pollutants to be detected, quantified and differentiated making it possible to track pollutants more accurately.

Engagement Strategy

Overall Goal: To foster a collaborative and inclusive approach to water quality monitoring and management, involving a diverse range of stakeholders.

Core working groups: To agree on standardized monitoring and develop best practices.
Media engagement: Utilizing various media types to reach a wider audience.

Community involvement: Working with landowners upstream, involving schools in learning about safe swimming locations, and fostering citizen science initiatives and what they can do to help improve water quality.

Educational programmes: Creating programmes, using immersive technologies, and developing a centralized app for improved accessibility.
Local partnerships: Engaging the public through local expertise and voluntary participation.
Social media: Utilizing daily updates to keep the public informed about water quality issues.

Key Stakeholders Identified

A wide range of groups were identified including TECF, Scientific communities, Water companies, Citizen scientists, Water users, NGOs (such as Surfers Against Sewage), educators, monitoring agencies, schools and local organisations.

Barriers and Opportunities

Several barriers were identified, including limited resources, lack of real-time data, expensive monitoring technologies, inefficient enforcement, fragmented information, and communication gaps between data holders. Legislative barriers and issues around funding further complicate progress.

However, several opportunities also emerged. These include leveraging existing expertise in and around Plymouth, particularly through university students and local organisations, as well as fostering collaborations across the city. The first UK Marine Park presents a valuable platform for showcasing innovative ideas and best practices. Additionally, engaging young people and under-represented groups in monitoring efforts, developing accessible apps, and disseminating information about bathing areas were highlighted as important initiatives. Leveraging fines from water companies and building partnerships between different organisations were also seen as ways to enhance progress and overcome barriers.

Prof Steve Widdicombe contributing to clean seas discussions.

Gaps and Alternative Visions

Several gaps in the current approach were identified, including limited monitoring during non-bathing seasons, lack of affordable sensors, complex data collection methods, and insufficient long-term funding for forecasting models. Additionally, public awareness of water quality apps is low, and there are issues with accessibility and fragmented information on water quality.

Alternative visions propose an increased focus on citizen science initiatives, such as paid citizen monitoring programmes, free training on scientific methods, and activities like bio-diver and plastic litter monitoring. Enhancing engagement through education, interactive science communication, and expanded citizen science programmes is also emphasized. Proposals include improving monitoring systems by increasing the number of monitoring officers, adopting satellite-based and automated monitoring technologies, and expanding the frequency and spatial distribution of water quality sampling. The development of "resort quality" waters to encourage swimming, along with an online platform for better mapping and accessibility of water quality data, are seen as key opportunities for addressing these gaps.

Inputs / Strengths	Activities	Outputs / products/ tools	Vision
• WFD is still the best regulatory framework around. • Data rich. • Enthusiastic groups and organisations, all want to improve situation and work to be impactful. • Multiple agencies involved and located closely. • Expertise to solve or improve is available. • There is a mood of stakeholders and government to improve water quality. • Tamar is well studied and lots of data available. • The UK is a world leader in monitoring the water environment. • Satellite based capabilities. Near shore observations are challenging. • Amazing scientific minds in the region to keep	**Create working group to develop standardised methods and best practice guidelines. Develop catchment monitoring strategies** • Core working group to agree standardised monitoring. • Let scientists help, we are super interested in methods and data. GK • Develop catchment monitoring strategies. • Sharing information. • Method development research community. • Citizen scientists. • Working group for best practice development and key stakeholders.	**Standardised methods, best practice guide, tools to visualise and access data in simple ways.** • Improved display method for pollution indices and reporting. • Risk maps for water users. • Standardised methods. • Tools to visualise and access data in simple ways. • Agreed monitoring standard rolled out across CSI groups. • Best practice guide.	**Developing standardised methods and best practice guidelines for water quality monitoring.** • Simplified equipment for monitoring water quality. • Create a best practice guidelines for the monitoring of water quality. DK • Standardise a measure that all authorities will take seriously and act upon. • Standardised method. • Data and evidence interpreted in an agreed way. • Data collected according to collaborative monitoring strategy. • Simple effective monitoring to empower communities to monitor but also inform research and policy.
	Engagements / who needs to be involved **TECF and beyond. Scientific communities, water companies, citizen scientists, water users, NGOs (SAS).** • Citizen scientists. • River lovers. • Local river groups. • Scientific community. • Catchment partnerships. • Water companies. • TECF members. • NGOs surfers against sewage. • Get the key players together academics, EA, SWW to agree on standards.		

Theory of Change devised from post-it notes at Clean Seas session.

Standardised methods

The fourth group, under the Clean Seas topic, explored the need to develop standardised water quality sampling and analysis protocols (e.g. Best Practice Guide for Monitoring Water Quality), drawing on the expertise of key players, that all authorities will take seriously and act upon.

This could be developed for Plymouth Sound, and then rolled out regionally/nationally. It would enable data and evidence to be collected and interpreted in an agreed way.

The vision outlined focuses on developing standardised methods and best practice guidelines for water quality monitoring. This includes creating simplified equipment for monitoring, standardising measures that authorities can follow, and empowering communities to monitor and inform research and policy. It also emphasizes the importance of visualising data in accessible and simple ways.

The session identified several strengths and inputs, including existing regulatory frameworks (e.g. Water Framework Directive), rich data resources, and enthusiastic groups and organisations.

Planned Outputs Include:

- Improved display methods for pollution indices.
- Risk maps for water users.
- Tools to visualise and access data in simple ways.

Engagement Strategy

Creating core working groups to agree on standardised monitoring and involving various stakeholders in method development and best practice guidelines.

Key Stakeholders Identified

- Environment Agency
- Scientific community
- Citizen scientists
- River lovers and local river groups
- Tamar Catchment partnerships
- West Country Rivers Trust
- TECF
- Water companies, e.g. SWW
- NGOs e.g. Surfers Against Sewage

Barriers and Opportunities

Opportunities include UK expertise in monitoring the water environment, satellite-based capabilities, and transdisciplinary expertise. Potential barriers might include challenges with near-shore observations and the need to coordinate multiple agencies and stakeholders.

Gaps and Alternative Visions

The current approach aims to address gaps in standardised methods and citizen engagement in water quality monitoring. Alternative visions propose a focus on simplified, effective monitoring to empower communities, and data collection according to collaborative monitoring strategies.

Next Steps

Water quality monitoring and data availability

- Explore funding opportunities.
- Consider signage opportunities as part of development of Plymouth Sound National Marine Park displays.
- Explore cross-over with other existing water quality apps.
- Discuss development of concept with Tamar Catchment Partnership.

Standardised methods

- Explore funding opportunities to support a working group (e.g. time to attend meetings) to create a standardised methodology paper.
- Discuss with EA how plausible is it that agencies would use a standardised protocol and their interest in being involved.

Climate Change

How can we design and implement effective local action to mitigate the effects of climate change?

Summary

This topic focused on designing and implementing effective local action to mitigate the effects of climate change in the Tamar estuaries area.

Three sessions were delivered, the first focussed in on ocean literacy, as a driving force for climate action. The second two, run in parallel, both focussed on nature-based solutions to mitigate and adapt to climate change.

Below, the report explores the outcomes of the ocean literacy group and combines the nature-based solutions outcomes as a collective concept.

Climate change working group.

Ocean Literacy

The vision for this initiative is to create an ocean-literate community that actively drives climate action, with Plymouth at the forefront of this movement. It focuses on education and engagement as key to fostering a deep connection with the marine environment, particularly Plymouth Sound. By promoting awareness from an early age, the goal is to empower the community—especially young people—to take meaningful steps toward reducing their carbon footprints and embracing sustainable lifestyles. The community would become synonymous with climate-conscious practices, where an understanding of the ocean and its ecosystems is deeply ingrained.

Climate change working group.

Planned Outputs Include

- Plymouth Climate Change Hub: A central platform (e.g., website) providing information on reducing carbon footprints and enhancing local ecosystem services.
- Training resources: for teachers and tools for sustainable education.
- Water Safety App: Providing live weather, tides, and water safety data for safe swimming.
- School Curriculums: Ocean-related topics and sustainable transport awareness to be incorporated into all school curriculums.
- Research Initiatives: Focused research on marine citizenship and behaviour change, including identifying key actions to reduce climate impacts.

Engagement Strategy

The engagement strategy focuses on a broad range of stakeholders, ensuring that the message reaches across different sectors of society. Schools and educational institutions are critical, with curriculums being adapted to include topics related to the ocean and sustainability. Research institutes, local councils, and organisations such as Plymouth Sound National Marine Park (PSNMP) will play an essential role in driving both the academic

Inputs / Strengths	Activities	Outputs / products/ tools	Vision
▪ Fostering connection, increased motivation to protect/act. ▪ We have lots of organisations (OCT, Wildlife Trust, etc.) working on this. ▪ Children can influence adults. ▪ Swim safe for local young people. ▪ Increased investment, funding availability, recognition that money is needed. ▪ Awareness, interest, desire, action. ▪ Ocean curriculum ▪ GCSE Natural History, plus Marine Science. ▪ Children very aware, informed at high level i.e. they know climate change is a problem. ▪ A lot of information available. ▪ Everyone is now aware of climate change and "most" people agree that it's real. ▪ The National Marine Aquarium is a fantastic place to learn about marine environment. ▪ The HOE foreshore is a spectacular venue for swimming and outreach. ▪ Education but jobs/bills (£) change behaviour.	**Research into marine citizenship and behaviour change, improve access to marine areas, identify top ten actions can take to reduce impact on the climate, training, networking, community forum events, citizen engagement campaigns, support for teachers, ocean literacy included in all school curriculums, encourage sustainable transport** • More research projects on marine citizenship behaviour change. • Focused research on social change/behaviour change strategies –need paradigm shift. • Find out what prevents behaviour. • Improve access to Plymouth Sound – boats, Drakes, etc. • Model forecast of climate change impacts. • Identify top 10 actions we can take to reduce impacts on climate change. • Training, networking, support for education. • Training for teachers. • Teach the carbon footprint of modes of transport. Kids know the bus is better but how much? The realisation may bring action. • Youth advertisement campaign in local media and in the city - what 'Plymouth ocean city' means.	**Plymouth climate change hub: a one-stop shop (website) with information on how to reduce your carbon footprint and local ecosystem services, training resources for teachers, water use app: safe areas, tides, weather** • Swimming safety forecast integrating live water data, tides, currents, rips. Lifeguards on every beach in the surrounding areas. • Ocean topics in all schools • Local developments such as renewables benefit local population. • Citizen engagement campaigns regularly organised. • Water use app – safe areas, combined with tide/weather forecasts etc. so it's all in one place. • Training resources for teachers. • Plymouth Climate Change hub – as line info. • A one-stop-shop (e.g. website) with info on how to reduce your carbon footprint + local ecosystem services.	**An ocean-literate community driving climate action** **Education and Engagement** • Educate young people about Plymouth Sound • Reliable easily accessible information explaining water safety impacts. • Promoting connectivity for the environment • Effective academic and industry communication • Water resources need to be available for swimming • Climate Conscious educations in school. • Ocean city synonymous with climate conscious approach. **Nature Based Solutions -** Positive Net Sink for Plymouth Sound. • Large areas of seagrass, kelp forests and salt marshes. • Rewilding options, seagrass, seaweeds (Needs proof of concept) • Maintenance of soil health – Water and carbon regulation. • Enhanced nature to help us • Intertidal zone for Net GHG reduction. • Extending flooding areas • Reclaimed land to forest plan
	Engagements / **who needs to be involved** **Schools, research institutes, local organisations, councils, PSNMP,** • Connect Academy Trust • Plymouth College • Hyde Park Primary • Engage with local businesses to support/fund engagement and education activities. • Schools • Council • Universities and Research Institutes • Engagement of local organizations (like today) and school educational orgs. • Social champions – Football players, sport celebrities, community leaders. • Community forum events. • Specialist groups; NGOs; SMES; Civil Society; already connected and delivering.		

Theory of Change devised from post-it notes at climate change session - ocean literacy.

Climate change working group.

and practical aspects of the initiative, supporting activities from funding to direct engagement.

Local businesses, too, are encouraged to support educational programmes and outreach activities, while community leaders, including sports celebrities, will help drive public campaigns and increase visibility. The engagement extends into community forums and local events, ensuring that citizens are not only informed but also actively involved.

Key Stakeholders Identified

A wide range of stakeholders were identified, including educational institutions, local businesses, community organisations, Plymouth Net Zero Partnership and government bodies. The plan suggests creating partnerships between these groups to support engagement and education activities, with a particular focus on involving schools and youth organisations.

Barriers and Opportunities

Several barriers were identified, including a lack of understanding about climate change impacts, finite resources for addressing the issue, and difficulties in reaching disengaged populations. Opportunities include leveraging existing local knowledge and expertise, integrating climate education into school curricula, and creating incentives for low-income communities to participate in climate action.

Gaps and Alternative Visions

Gaps in the current approach include a lack of clear, actionable information for individuals and insufficient support for translating awareness into behaviour change. Alternative visions propose focusing on specific areas such as transport, energy, and industry changes, as well as emphasising the co-benefits of climate action for health, safety, and economic development.

Climate change working group board.

Nature-based Solutions

The vision outlined focuses on nature-based solutions to restore and improve biodiversity, enhance water quality, and create healthy native ecosystems.

Key activities proposed include seagrass meadow restoration and monitoring, quantifying and mapping blue carbon areas, assessing carbon sink potential, mapping current habitats, implementing citizen science projects like Beaver-cam, and organising restoration events. These efforts aim to position Plymouth Sound and Estuaries as a positive net sink for carbon, driving sustainable practices both locally and nationally.

The session identified several strengths and inputs, including a substantial knowledge base in the city, excellent biodiversity, citizen science initiatives, the Net Zero Action Plan, government interest, and diverse habitats within the catchment.

Planned Outputs Include:

Interactive maps showing blue carbon areas, expanded awareness programmes, best practice guides for infrastructure design, local good news stories, and monitoring protocols.

Engagement Strategy

The plan is to foster collaboration and knowledge sharing by organising regular meetings between key groups. Additionally, it proposes engaging marine citizens as ambassadors for the marine environment, involving divers and recreational users in monitoring efforts, and collaborating with industry on issues such as antifouling.

Key Stakeholders Identified

Key stakeholders identified include recreational user groups, the Ocean Conservation Trust (OCT), Wembury Marine Centre, various environmental and conservation organisations, NGOs, the marine research community, Plymouth Net Zero Partnership and Plymouth Sound National Marine Park (PSNMP).

Nature-based solutions session.

Barriers and Opportunities

Several barriers were identified, including contrasting uses of marine space, the agency of individual organisations, lack of communication about ongoing projects, lack of political will, public feelings of helplessness, and funding constraints. Additionally, the increase in hard surfaces in urban areas has led to more flooding and lower water quality. While many nature-based solutions have not yet been proven in terms of their effectiveness for carbon sequestration they are well regarded for their positive impact on biodiversity.

Opportunities include leveraging volunteers, securing potential research and restoration funding from development mitigation, coordinating scientific research on habitats and water quality, and benefiting from ongoing research initiatives. The Plymouth Sound National Marine Park 'Gateways' and the high public interest in environmental issues were highlighted as opportunities to connect people with the sea and promote engagement.

Gaps and Alternative Visions

Gaps in the current approach include low awareness of soil value for flood management and carbon capture, lack of funding for the Net Zero Action Plan, limited understanding of habitat reformation impacts on green-house gas (GHG) fluxes, insufficient habitat species data, and a lack of integrated policy between terrestrial and marine management.

Alternative visions propose improving stewardship policies by involving local communities, ensuring holistic source-to-sea coordination, and focusing on reducing commercial impacts on sensitive areas to support biodiversity and sustainable development.

Inputs / Strengths	Activities	Outputs / products/ tools	Vision
▪ Excellent biodiversity. ▪ Citizen Science – utilization of existing passionate and willing citizens to facilitate initiatives. ▪ Government interest. ▪ We have diverse habitats within the Tamar/Plym catchment so scope for lots of diversity. ▪ Existing knowledge & expertise from academics, industry and users, lecoal community. ▪ Knowledge on what is needed to restore certain species under certain conditions. ▪ Protected sites already exist – potential to expand or create new ones. ▪ Plymouth excellence in marin research – TECF group where we come together with in depth knowledge of Plymouth Sound ▪ Multiple ecosystem services associated improvement as well as water quality. ▪ Making working partnerships within the area. ▪ Fair baseline for biodiversity. ▪ Government will. Water Quality is no. 1 priority for DEFRA. ▪ Tremendous expertise across organisations. ▪ Plethora of organisations with capability to deliver.	**Mapping current habitats, model land-ocean use scenario, citizen science initiatives: Beaver-cam; sponsor a seagrass bed; spring-watch style events, research on C-storage/value/efficacy etc** • Influencers. • Increased understanding through public/stakeholder programmes. • Citizenship & EDU. • Projects – physical/artificial interventions. • Data gathering scientific research. • Artificial habitats (living seawalls, artificial reefs, coastal defences) • Communication. • Influencers. • Local Authority Planning. • MMO Management Planning.	**Interactive map showing blue carbon areas & their value** **Document: best practice guide for infrastructure design** **Podcasts** **Good news stories (local)** **Publish annual C storage budgets for Plymouth habitats** • Spatial mapping of areas where habitat restoration or enhancement are the priority. • Policy briefs to help new government to immediately understand where issue is and the next steps to address issue. • Funding proposals for projects to address habitat restoration. • Coordinated forums or group to consider proposals (inter-organizational group – new or existing) • Marine license applications – could have requirements to enhance habitats where developments are occurring.	**To have functioning and active nature-based solutions in and around Plymouth Sound** Restoring/Improving Biodiversity: - enhancement-design structures to attract suspension feeders (e.g. mussels) - More NFM (restore wetlands/salt marshes/more beavers) - Redirected run-off - Improved biodiversity and habitat stability. - Increase mussle beds protection will improve WQ (indicator SPP of WQ yet are impacted by poor WQ). - Prioritisation of NBS that improve Water Quality - Ensure that habitat restoration has a net positive effect (e.g. .does it serve the purpose it was intended to?) - Healthy native oyster reefs & mussel beds and shellfish populations. - Removal of all invasive species. - Increase in native biodiversity. **Priority Targets & Knowledge Gaps** - Trial restoration of native oysters (gains for WQ and biodiversity) but difficult to manage pacific oysters – full removal not viable. With mussels the management plan needs to include protection - We restore to historic levels and do not accept poor baseline assessments. - First need to identify the habitats for restoration, why? Where? Is it possible and achievable?
	Engagements / **who needs to be involved**		
	Recreational user groups, Ocean conservation trust, NMP, Wembury Marine Centre. **Make sure to have regular meetings between these people to keep to task.** • Environmental & Conservation organization groups and initiatives. • Communities, ownership and knowledge sharing. • Targetted stakeholder analysis. • Cross-organization coordination (TECF) • Users (anglers, recreational, farmers etc) • Land management (farmers, duchy, crown estate, pirates)		

Theory of Change devised from post-it notes at climate change session.

Next Steps

Ocean Literacy

- Build on current activities to develop curriculum materials, e.g.:
  - PML are working closely with Plymouth College on a marine science curriculum aimed at year 9 students (13-14 year olds) and have contributed to curriculum material for Connect Academy Trust (primary level);
  - PML are partners in an EU project, ProBleu, which is creating free resources for schools across Europe;
  - PSNMP are delivering a range of educational activities across the city including creating curriculum materials and collating these on a portal for easy access.

  These groups will continue to work together to ensure a joined up and effective approach and explore opportunities to seek additional funding to build on and consolidate these efforts.
- PML are exploring opportunities to coordinate a workshop, facilitated by a leading Ocean Literacy specialist, to bring together all key organisations to create a joint local plan for OL.
- Investigate utilisation of the Climate connections website to create a climate change hub on how an individual / family can reduce their climate footprint.

Nature-based Solutions

- Explore opportunities to create a carbon budget for Plymouth Sound and estuary by liaising with Plymouth City Council and the Plymouth Net Zero Partnership on how this could be added to the emission budget and used as a benchmark for future improvement.
- Review funding opportunities for wide scale habitat creation e.g. Endangered Landscapes call
- Explore opportunities to create local restoration opportunity maps - what solution where, to inform future strategic planning, investment and targeted development mitigation e.g. Biodiversity Net Gain. TECF and PML will explore opportunities for a small working group to explore this further as well as other examples of Spatial Management Plans.
- Discuss with Plymouth City Council how to improve marine aspects of joint Local Plan and Plymouth Marine Policy in relation to these objectives.
- Support restoration handbook projects to ensure informed by latest scientific research, e.g. reach out to the Restoring Meadow, Marsh and Reef (ReMeMaRe) project.

Habitat Management

How can we manage and restore habitats in a way to improve water quality?

Summary

This topic focused on addressing habitat management and restoration issues in the local marine environment. The goal was to explore strategies for improving water quality through effective habitat management.

Two sessions were delivered, both focusing on a similar desired vision - to enhance biodiversity. The outputs of both groups have been combined below.

Habitat Management working group

Enhance Biodiversity

The vision outlined focuses on achieving excellent biodiversity through nature-based solutions, including the restoration of blue carbon habitats, bivalves, seagrasses, and wading birds. It promotes 'acceptable' change in marine ecosystems, catchment reforestation, and the use of nature-based solutions across the city and hinterlands to improve water quality in rivers and seas, ultimately leading to cleaner waters and enhanced habitat restoration.

The session identified several strengths and inputs, including alignment with the popular approach to re-wild and restore, Plymouth's suitability for research and implementing solutions, expertise in carbon cycling and ecosystem valuation, numerous ongoing research projects, and strong existing partnerships.

Habitat management working group.

The proposed main activities include citizen science projects, stakeholder mapping, public engagement, education, physical interventions, and scientific research.

Planned Outputs Include:

- Coordinated projects with clear goals
- Focus group for habitat restoration proposals
- Marine licence applications with habitat enhancement requirements
- Tools for mapping and monitoring carbon storage in marine habitats
- Effective leadership, and communication of results to a broad audience, including educators.

Engagement Strategy

The plan suggests engaging with local planners to design better infrastructure, giving people opportunities to visualise positive change, connecting with various marine and environmental organisations, engaging with wider groups including schools, local organisations, and government bodies.

Activities such as Spring Watch in the Tamar Valley and continued discussions under the 'Restoring the Tamar' umbrella are proposed to foster engagement. The session highlighted the importance of balancing various stakeholder needs, leveraging Plymouth's unique position for marine research and conservation, and adopting a holistic approach to habitat management that considers both ecological and social factors.

Key Stakeholders Identified

TECF, campaigners, industry, and wider Plymouth communities environmental and conservation groups, land managers, local authorities, marine planners, and water users.

Gaps and Alternative Visions

Gaps in the current approach include a lack of agile long-term funding, regular monitoring of water quality, understanding of licensing issues, insufficient maps of local carbon sinks, lack of evidence for nature-based solutions' impact on climate, and understanding of the maximum carbon storage capacity of habitats.

Alternative visions propose a focus on water quality for recreation, education about the Plymouth Sound and estuaries Marine Protected Area, no-take areas to benefit water quality and biodiversity, protecting blue carbon areas, creating 'wet fringes' of no development around estuaries, and developing a climate and ocean acidification action plan for Plymouth as well as a pollutants/ plastics action plan.

Barriers and Opportunities

Several barriers were identified, including the need to get all water users on board, planning and licensing, understanding carbon uptake and emission of nature-based solutions, access to restoration sites, short-term funding, lack of local nature recovery strategy, and public buy-in.

Opportunities include broad stakeholder coordination, the potential for increased biodiversity through habitat restoration, and Plymouth's unique position as a pilot for marine conservation initiatives, potential increased focus on biodiversity from the new government, and local cultivation of native oyster spat.

Inputs / Strengths	Activities	Outputs / products/ tools	Vision
▪ Plymouth is the right place for doing the research and implementing solutions (TS) ▪ Expertise in carbon cycling, science and carbon sequestration / storage ▪ Great partnerships across the city – cohort of the willing ▪ partnerships across Plymouth and region ▪ Expertise in carbon financing and ecosystem valuation ▪ Blue meadows (previously Remedious) seagrass restoration ▪ Beaver baby ▪ C budget of rewilding wetland (Calstock) ▪ Seagrass PhD research projects ▪ Really good understanding of our habitats and places	**Public engagement, increased citizenship and education, physical interventions, more critical evaluation, data gathering and scientific research** • Build a system model to show the connection of all actions on land and effects to marine and air • Modelling multiple land / ocean use scenarios. To achieve a net-zero catchment • Develop carbon credit schemes based on Plymouth blue carbon habitats • Seagrass mapping • Citizen science initiatives / collaboration • Map current C storage and highlight areas that can be turned into better C storage sites • Return Victoria Park to the sea • Ban commercial fishing in Plymouth Sound to create fish nursery • Beaver cam • Collect data on the C storage potential of restored habitats • Activities for engagement • Sponsor a seagrass bed scheme.	**Coordinated focus group to consider proposals and apply for funding for habitat restoration, marine license applications with requirements to enhance habitats, policy briefs, spatial mapping of areas where habitat restoration and enhancement are a priority.** • Publish an annual carbon storage budget for Plymouth marine habitats (SW) • A map showing blue carbon areas and their value • Interactive seagrass maps • Document of ideal and best practice for infrastructure design (TS) • Publish 'good news' of things changing	**Excellent biodiversity** Nature-based solutions • 'Acceptable' change in marine ecosystems clearly defined. Who is welcome? • Restore local blue carbon habitats (SW) • Catchment reforestation plan • Wetlands nature-based solutions • Nature-based solutions delivered across city and hinterlands • More beavers
	Engagements / who needs to be involved **TECF, environmental and conservation groups, land manager, Duchy, farmers, Crown Estate, anglers, local authorities, influencers, MMO marine planning, water users** • Engage with local planners to design infrastructure better • Need to give people the opportunity to visualise how positive change could be • Ocean conservation trust • Wembury marine centre • NMP • Recreational boat users • Connect with Prof. Bob Brown at University of Plymouth – cojoining city land and sea symposium / initiative • MOD • Stakeholder meetings with those how may use the blue carbon environments to ensure they do not damage it e.g. meetings with boat users to stop them anchoring on seagrass • Water management orgs. SWW, River Trust etc. • Listen to RSA's Regeneration Rising podcasts – promote awareness		

Theory of Change devised from post-it notes at Habitat Management session 2

Next Steps

Enhance Biodiversity

- Explore opportunities for large scale catchment funding for habitat restoration.
- Consider housing development concerns and the impact on hydrogen and nitrogen budgets for the Estuary.
- Bring together existing knowledge, projects and partnerships to learn from successful nature based solutions to feed into any funding proposal.
- Explore opportunities to create a pollutants/ plastics action plan for Plymouth Sound and estuaries.
- Review successful projects of a similar nature in other comparable areas.
- Analysis of interventions (benefits and risks).
- Coordinate, monitor and report on projects through TECF's Plymouth Sound and Estuaries Management Plan.

Light Pollution

How can we reduce artificial light at night around the estuary and coast to reduce the impact on marine life?

Summary

This topic focused on a more specific, emerging threat to the marine environment - Artificial Light at Night (ALAN). Novel research from Plymouth Marine Laboratory and Plymouth University has demonstrated that ALAN is having a significant impact on marine life, particularly since the move to more energy efficient bulbs (i.e. LEDs) that omit a brighter, whiter light. While the impacts on birds, bats, insects and human health are now better understood, awareness of impact on the marine environment is much further behind.

Only one session was delivered on ALAN, which chose to focus on awareness raising of this issue.

ALAN working group

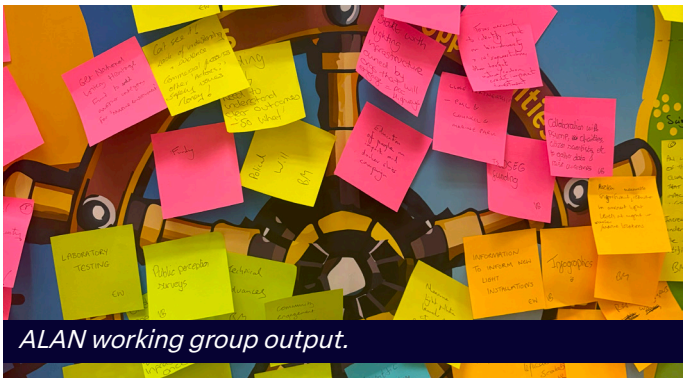
If you'd like to find out more about ALAN please visit www.pml.ac.uk/alan or scan the QR code

Understanding ALAN

The vision outlined focuses on increasing understanding of artificial light's effects on the marine environment. This includes recognising ALAN as an environmental pollutant, implementing stricter regulations, and inspiring behavioural change to reduce light impacts around Plymouth.

The session identified several strengths and inputs, including existing partnerships (TECF), management options, and scientific expertise in lighting technology and marine biodiversity.

The main activity proposed is developing coastal lighting zoning, which involves designating zones, regulating light intensity and colour, controlling light direction and timing, and promoting awareness and compliance.



ALAN working group output.

Planned Outputs Include:

- Community engagement events
- Guidelines for new light installations
- Policy guidance to inform legislation
- infographics, reports and papers
- Citizen science applications for reporting problem areas

Engagement Strategy

Engaging key groups through education, community events, and linking efforts to carbon reduction plans.

Key Stakeholders Identified

International Dark Sky movement, governments, local communities, statutory authorities, port authorities, scientific communities, and industry.

Barriers and Opportunities

Several barriers were identified, including lack of visibility of the issue, data collection and sharing challenges, commercial pressures, and funding limitations.

Opportunities include new government initiatives, trial and test pilots, collaborations with various organisations, and potential funding.

Gaps and Alternative Visions

Gaps in the current approach include policy limitations, under-represented impact assessments of light pollution in marine environments, and knowledge gaps on how changes in photoperiod affect marine behaviour and biology.

Alternative visions propose tech solutions such as using light sources that don't alter biological functions, smart lighting systems, and learning from terrestrial light pollution mitigation strategies. Measures of success include achieving dark skies at night, enabling organisms to detect full moonlight cycles, and increased populations of light-sensitive species.

ALAN working group output.

Inputs / Strengths	Activities	Outputs / products/ tools	Vision
▪ Coastal partnership (TECF) ▪ Strong partnership around the marine environment. ▪ A variety of management options. ▪ Terrestrial case studies showing wide range of impacts to promote targeted questions for marine. ▪ Designed technology ▪ Lighting technology ▪ Habitat and biodiversity knowledge. ▪ Lots of scientists in the city ▪ Knowledge of current assets. ▪ Current marine species which are present in artificially lit areas. ▪ Ongoing research into the issue that can support the design of ALAN uses going forward. ▪ The potential to mobilise people/community behind the problem. ▪ Central management systems ▪ LED lighting that can be dimmed and colour changed. ▪ State of the art lab facilities that can quantify the effectiveness of management solutions.	**Develop coastal lighting zoning** • **Designating Zones** • **Regulating Light Intensity and Colour** • **Controlling Light Direction and Timing** • **Promoting Awareness and Compliance** ▪ Research to identify impact on biodiversity and CO2 sequestration then target nature carbon credit impact investments ▪ Start with lighting infrastructure owned by organisations that will engage (e.g. Highways, PCC). ▪ Education of people an impact and darker skies campaign. ▪ Dark skies zones might attract support from astronomy visitors. ▪ Laboratory testing ▪ Public perception surveys ▪ Technical advances ▪ Community engagement workshops ▪ Electrification energy transitions -> link the agendas -> change infrastructure once. ▪ Educating/relevant events/talks especially those in the involved industries. ▪ Dark sky by the ocean events ▪ Community engagement days ▪ Links to international dark sky movement ▪ Research plan/scientific paper/data collection = the evidence of measures. ▪ Research into moonlight as possible contaminating variable. ▪ Offsetting - natural capital investment ▪ Current conflict with other needs – VWAG, Commercial outcomes. ▪ NZAP – link this with carbon reduction plans/projects ▪ Win heart and mind of communities leads to political support.	**Community engagement events, public perception surveys, research into improved technologies,** **Guidelines to inform new light installations, infographics, reports and papers, citizen science applications for reporting problem areas, improved legislation** ▪ Measurable significant reduction in ambient light levels at night in waterfront marine locations. ▪ Legislation ▪ Infographics ▪ Information to inform new light installations. ▪ Reports ▪ White papers ▪ Guidance ▪ Scientific publications ▪ Measurable difference ▪ Replicable ▪ Scalable solutions ▪ Something like virtual MPA but virtual city for people to see how things change; info about what changes what. ▪ Citizen science application where individuals can input areas, they've recognized the issue to report it in a way so researchers can study those areas. ▪ Obvious impact results info for the whole system.	**Increase in understanding of the effects of artificial light on the marine environment** **SCIENTIFIC UNDERSTANDING** ▪ An understanding of the type, quantity of light that negatively impacts on marine life ▪ Increase in understanding of the effects of artificial light. **HUMAN DIMENSION** ▪ Inspire behavioural change to reduce light impacts. ▪ ALAN is recognised as an environmental pollutant in binding UK legislation. ▪ Stricter regulations for industries/companies/individuals causing ALAN issues, and mitigation strategies to help. ▪ Action Plan to increase awareness ▪ Education to reduce, remove artificial lights from high impact areas to mitigate overall pollution.
	Engagements / **who needs to be involved** **International Dark Sky movement, local communities, statutory authorities, governments, port authorities, scientific communities, Net Zero Action Plan (link to carbon reduction), industry** ▪ Scientific Community ▪ Port Authority ▪ A board that oversees the issue with creating mitigation strategies. ▪ Government ▪ Statutory authorities ▪ Communities who live by the sea.		

Theory of Change devised from post-it notes at ALAN session

Next Steps

Understanding ALAN

- PML and Plymouth University are actively engaged in awareness raising campaigns on a national and global scale and will explore further opportunities for local opportunities.
- The scientific leads are regularly presenting their findings to a wide range of groups including Dark Skies International members.
- We are in discussions with Blue Flag International about developing new criteria for Blue Flag certified sites to encourage reduced light pollution. We hope to work with PSNMP and TECF to use Plymouth as a potential test case depending on suitability of case study sites.
- The concept of coastal zoning is of interest and something we can explore with our collaborators at Plymouth City Council to consider how this may work.

Restoring Biodiversity

How can scientific expertise in ecology, AI, big data and autonomy help in developing methods and tools to make monitoring faster, more efficient and/or cheaper while maintaining or improving data quality?

Summary

This topic focused on addressing biodiversity restoration issues in the local marine environment. The goal was to explore how scientific expertise and technological advancements could improve monitoring methods and tools.

Two sessions were delivered, both of which chose to focus on improving access to existing data. This would ensure data held by various organisations could be explored and applied more widely and there would be much better awareness of what is already available. By improving awareness of existing data and bringing it together in a shared hub, gap analysis can then be used to identify what is missing that could be acquired with the use of new technology. The session outputs have been grouped below.

Restoring biodiversity working group

Data Accessibility

The vision outlined focuses on achieving a better understanding of baseline biodiversity and species health. This includes linking data with projects and sharing it through a central portal, developing simplified data sets, and fostering collaboration between individual projects and wider initiatives. The vision also emphasises open access data that the public can engage with and the potential use of AI to help extract and map data. The portal would serve as a hub for information sharing and community engagement.

The session identified several strengths and inputs, including a high concentration of marine scientists, local research vessels, well-studied areas, extensive historical data (e.g. EMODNET), and existing standardised metrics.

Restoring biodiversity working group

The main activities proposed involve creating a user-friendly data platform, ideally map-based, to highlight data gaps and facilitate data collection and sharing. Alongside this is developing data confidence and quality metrics, as well as funding bids and agreements to work together.

Planned Outputs Include:

- An open-access central repository of data
- A public-facing website
- Improved baseline datasets
- Stakeholder communications to share data
- Clear guidance on data quality and robustness to instil confidence

Engagement Strategy

The plan suggests creating forums for stakeholders to develop shared definitions, implementing data collection programmes, and improving dialogue to incorporate local knowledge. Furthermore, broader engagement with decision makers to ensure data influences policy effectively. It also emphasises the importance of local organisations in data collection and dissemination.

Key Stakeholders Identified:

Data owners, government partners, technology providers, data users, TECF, policy makers, local organisations, and the scientific community.

Barriers and Opportunities

Several barriers were identified, including data ownership issues, lack of shared definitions, differing methodologies, the complexity of bringing together historic data, funding limitations, and the challenges of underwater monitoring.

However, numerous opportunities were highlighted, such as utilizing the PSNMP, engaging in citizen science projects like iNaturalist, improving communication of research activities, fostering shared or collaborative working, and developing a network of in-water sensors for real-time data collection. The potential for AI techniques in collaboration with other regions was also noted. A unified vision and a detailed overarching plan, including a full biodiversity monitoring programme, were emphasized as crucial steps.

Gaps and Alternative Visions

Gaps in the current approach include insufficient ground truthing, difficulties in translating terrestrial biodiversity metrics to marine environments, the risk of data misrepresentation, missing basic data (e.g., temperature, salinity), inconsistency in data collection, and temporal and spatial gaps.

Alternative visions propose creating a shared roadmap for biodiversity restoration, developing a professional community for data advice and metrics, establishing a better understanding of the current state of ecological health in both protected and less-studied marine areas, and focusing on establishing baseline states.

Further suggestions include developing quantifiable benchmarks for 'success,' creating an integrated system to understand what has damaged wildlife before addressing pressures, and emphasizing people, shared ownership, and communication. There is strong support for to citizen science initiatives and to promote work within Plymouth communities.

Inputs / Strengths	Activities	Outputs / products/ tools	Vision
▪ To be able to do research without collection assets / vessels ▪ Well studied area ▪ Historic data (EMODNET) ▪ We don't waste money ▪ Data trust - central data peer-reviewed ▪ Defined area	**Data confidence/quality metrics, funding bids, agreement to work together, buy in/financial appraisal.** • Data confidence / data qualits • Agree to start project • Assess the landscape • Document ad hoc record/ observations • Funding bid / or financial commitment through financial appraisal • Public engagement	**An open-access central repository record of all data collected with public access where appropriate. Public-facing website, measuring impact through utilisation of success stories, coherent and trustable data, effective delivery of TECF plan.** • Repository for who to contact for the data you want • Measuring impact through utilization of data and success stories • Success stories • Effective delivery of Tamar plan • Biodiversity Net Gain • Independent data resources • Public facing website • Data 'trip Adviser' • Coherent, trusted database	**Sharing of data. Central repository with access to all. (22 votes)** • A central accessible depository of historic data easily interpretable to monitor change • Shared data systems, organisations, local nature recovery strategies • Use of all data capture methods to contribute to biodiversity improvement • FAIR data • Accessible data (in central space) which provides information on state of environment (gov. targets? GES) repeatable and recognised by agencies • Discovery information – ask a wise old elf (before they die) • Measuring impact through utilisation of data and success stories • Evaluation / impact • Central ownership of unclassified data to inform other restoration projects • An open access, interchangeable database with all information about Plymouth Sound
	Engagements / **who needs to be involved**		
	Data owners, government partners, technology providers, data users, TECF, policy makers. Anyone who needs data (or uses) Policy makers TECF Government partners (thinking beyond PIs) NMP Technology providers		

Theory of Change devised from post-it notes at Restoring Biodiversity session.

Next Steps

Restoring biodiversity

- TECF have conducted a survey to explore research data perceptions and needs locally. The results, which align with the outcomes of this workshop, can be viewed in Appendix 3 (page 31). As a result, TECF will investigate the options for producing a public platform to share and signpost relevant local research and data, working with PML to align with the outputs of the biodiversity group.
- Improve signposting to research projects and data through key websites, such as TECF, PSNMP and PML.
- Explore opportunities to support local groups to access and interpret data and research to build capacity and capability.
- Explore links to data sharing platforms, such as MEDIN and Data Plymouth, and past sharing exercises that have been conducted.

Fisheries and Aquaculture

What are the cultural values of traditional hand gathering and recreational fishing, such as spear fishing and bait digging, the ecological impacts as well as the impacts of statutory restrictions such as MPA and no take zones on these fisheries?

Summary

This session focused on addressing fisheries and aquaculture issues in the local marine environment. The goal was to explore cultural values, ecological impacts, and regulatory effects on traditional and recreational fishing practices.

The first session focussed on fostering shared values and understanding across user groups and the second on enhanced enforcement of non-commercial fishing activities and zoning, balancing recreational and environmental needs.

Fisheries working group 1.

Shared Values

The vision outlined focuses on fostering shared values and understanding across user groups. This includes recognizing the diversity of recreational users, understanding cultural and local drivers of activities, and promoting open dialogue between stakeholders. The vision also emphasizes the importance of balancing recreational and commercial fishing interests.

The session identified several strengths and inputs, including existing organisations (TECF, PPMLC), local knowledge from angler's clubs, and citizen science projects.

Fisheries working group 1.

The main activity proposed is co-designing workshops to improve dialogue and knowledge exchange between marine users and policymakers.

Planned Outputs Include:

A central communication point, possibly using the MPA and/or PSNMP website, which would serve as a hub for information sharing and community engagement.

Engagement Strategy

The plan suggests creating forums for stakeholders to develop shared values, implementing educational programmes, and improving dialogue with anglers to incorporate local knowledge.

Key Stakeholders Identified

Water users, fishing organisations, and scientists are identified as key stakeholders.

Barriers and Opportunities

Several barriers were identified, including disparate information, resource limitations, distrust in information sharing, and conflicting needs among different groups.

Inputs / Strengths	Activities	Outputs / products/ tools	Vision
• TECF • PPMLC as a meeting ground • Local knowledge (angler's clubs) • New understanding of recreational use of MPA as of 2024 • Citizen science projects run by different organisations but lack of joined up recording	**Co-design workshops to improve dialogue and knowledge exchange** • Develop lines of communication between marine users and policy makers • Seek funding opportunities • Understand the differences between resident and visitor perspectives • Develop GIS map system of habitats	**Central communication point, possibly utilising the NMP website** • GIS map system of habitats, maybe incorporate into Google docs • Central communication point • Layering of information – central database, translated for the general public, signage, personal communications Education: Involvement of greater community • Central database for events and letting people know what is happening where and when	**Shared values and understanding across user groups** • Understand cultural values and shared needs • Responsive and agile approach to investment • Recreational users are diverse in their nature. Important culturally – public right to fish. As with all activities they should be undertaken within legislative and environmental boundaries. • Share values: dealing with trade-off between activities in a collaborative manner. • Consideration of integration with broader area. • Understanding of cultural and local drivers of activities. • Zoning could support thriving fish/shellfish Effective control of commercial fishing – education of recreational stakeholders towards shared values. • Free from commercial fishing practices • Important to look at links between recreation and commercial fisheries – they don't always exist in isolation. Crab tiling is recreational/commercial but peeler crab used in recreational fisheries. • Understanding both sides of recreational and commercial fishing. • Open dialogue and sharing of knowledge between stakeholders • Shared values among stakeholders
	Engagements / **who needs to be involved** **Water users, fishing organisations, scientists** • Create forum for stakeholders to develop shared values How can we understand each other – we need a platform or other way to communicate • Educational programmes funded, including engagement from various activities to encourage youth • Better dialogue with anglers, embrace local knowledge – see Lundy example • Co-design resources • Connecting with the right people/groups		

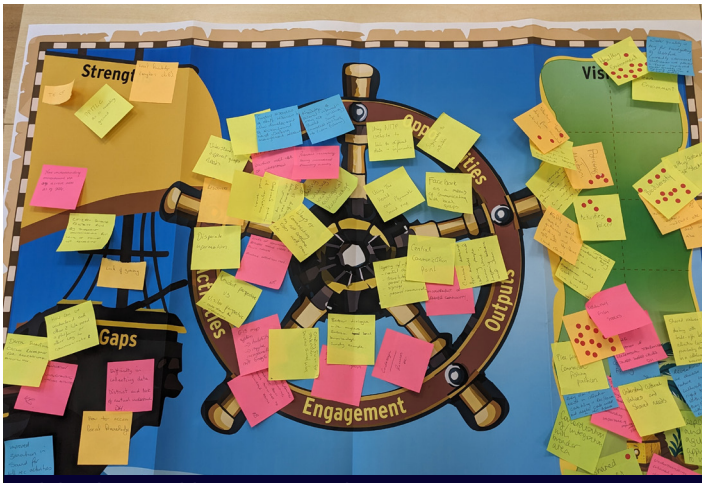
Theory of Change devised from post-it notes at Fisheries and Aquaculture session - Shared Values.

Opportunities include using the MPA and/or PSNMP website to link different data sources, using social media for communication, and leveraging existing platforms.

Gaps and Alternative Visions

Gaps in the current approach include a lack of appropriate, or awareness of, zoning for different recreational activities, poor data sharing, and difficulties in accessing local knowledge.

Alternative visions propose a focus on maintaining a healthy environment, improved monitoring of recreational activities, and promoting biodiversity.



Fisheries working group task output.

Enhanced Enforcement

The vision focuses on enhanced enforcement of non-commercial fishing activities and zoning, balancing recreational and environmental needs.

The session identified key strengths including established Marine Conservation Zones, stakeholder engagement in the Marine Protected Area (MPA) and partnerships like TECF and the Port of Plymouth Marine Liaison Committee (PPMLC).

Proposed activities involve stakeholder engagement, outreach, education, and research into technical solutions, including the introduction of no-take zones.

Planned Outputs Include:

Improved policies and regulations respected by all users, resulting in healthier seas and better-informed seafood choices.

Engagement Strategy

The plan suggests creating reporting incentives for fishermen, more engagement with on-the-ground fishers, empowering people in the decision-making process, and involving knowledgeable people.

Key Stakeholders Identified

Water users, fishers, fishing organisations, and NGOs.

Barriers and Opportunities

Barriers include perceived inconsistency in enforcement, funding constraints, lack of education about marine citizenship, and industry buy-in challenges.

Opportunities encompass increased biodiversity through better regulation, spill-over effects from no-take zones, and potential for more effective enforcement.

Gaps and Alternative Visions

Gaps identified include insufficient trust between stakeholders, limited political will, lack of comprehensive monitoring, and inadequate public understanding of regulations.

Alternative visions propose implementing no-take zones, fostering better public engagement in decision-making, and improving monitoring systems. These include suggestions for sectioned activity areas, banning commercial fishing in Plymouth Sound, and regular assessment of recreational impacts. The overarching aim is to create a more sustainable, well-managed, and inclusive approach to local fisheries management.

Fisheries working group 2

Inputs / Strengths	Activities	Outputs / products/ tools	Vision
• Establishment of MCZs – followed by an effort for scale up at pace • Stakeholder engagement with other organisations in Plymouth Sound • TECF/PPMC partnerships • Water users guide (needs updating) • Tight local community • Dockyard Port Order 2020	**Engagement with stakeholders, outreach, and education, research into technical solutions** • Education • Introduce no take zones • Research • Create consortiums for policy change, based on best practice	**Improved policies, zoning and regulations that are understood and respected by all users** • No take zones • Healthier seas – more wildlife – happier people • Better understanding of people's actions when selecting seafood • People understand and support enforcement and regulations	**Better enforcement and regulation of fishing activity (non-commercial) and zoning (no-take zones)** ▪ Balanced approach to recreation and environmental pressures ▪ Equal access to recreation ▪ Consistency between treatment of recreational and commercial fishers ▪ Good regulation/enforcement supported by "self-policing" ▪ Only practice hand on individual fishing and gathering practices
	Engagements / **who needs to be involved** **Water users, fishers, fishing organisations, NGOs,** • Reporting incentives for fishermen. Bonus for appropriate reporting to encourage less illegal catch. • More engagement with on the ground fishers • Empower people in decision making process • Knowledgeable people		

Theory of Change devised from post-it notes at Fisheries and Aquaculture session - Enhanced enforcement.

Next Steps

Shared Values

- List and review the data available within the different user groups.
- Identify the most efficient method for storing/sharing the data.
- Identify potentially sensitive data that should be protected from unauthorized access (e.g. only be request or similar method).
- Map data to location, activity and legislation to identify gaps and overlaps in shared impacts and priority area.
- Identify priority goal and values to start communication between user groups.

Enhanced Enforcement

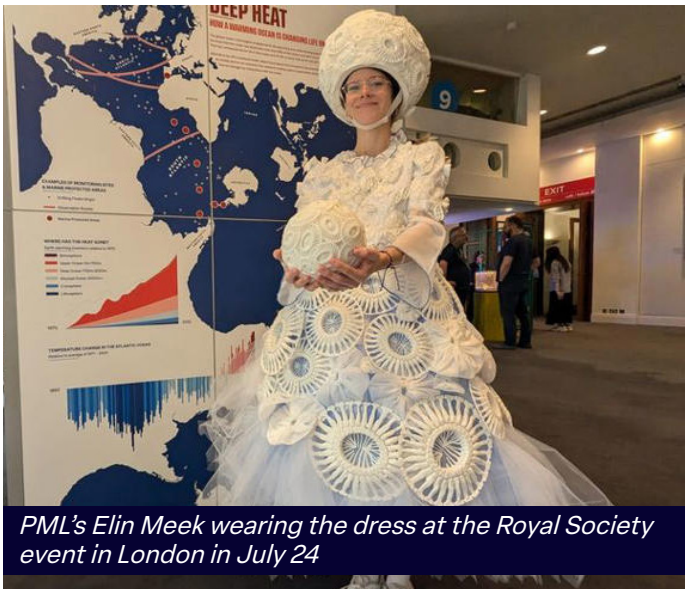
- Identify the gaps in marine citizenship and marine literacy that causes lack of buy-in into regulation (existing or future).
- Create communication material to inform users on the identified gaps.
- Improve knowledge sharing between user groups (see shared values).
- Workshops/road-shows for exploring new/ existing regulation.
- Foster forums where different users can meet and exchange viewpoints.
- Encourage co-design of legislation.

From left to right: Jen Lockett (PML), Robyn Edgecombe (Plymouth Active Leisure - PAL) and Emily Angell (OCT), Aquilla Erskine (PML), Tors Froud (NMP) and Sarah Marden (Curator of The Box)

Local Collaboration in Action

Participants to the Impact event hopefully spotted PML's Aquilla Erskine dressed in an amazing outfit inspired by plankton. The dress was created as a collaboration between Arts University Plymouth and Plymouth Marine Laboratory (PML) for the Royal Society Summer Science Exhibition in London this year where PML had a presence.

The one-of-a-kind dress is now exhibiting in The Box, Plymouth's award-winning museum, art gallery and archive, as part of the 'Planet Ocean' exhibition, which highlights the ground-breaking marine and climate research taking place in Britain's 'Ocean City'.



PML's Elin Meek wearing the dress at the Royal Society event in London in July 24

The dress, pictured with the team responsible for its creation, is on display at The Box until April 25.

The design for the dress was inspired by coccolithophores, microscopic, single-celled marine plankton that plays a vital role in the carbon cycle. The various 3D printed shapes were made by the university's Fab Lab using recycled polymer and represent coccoliths, the scales of the Coccolithophores. These liths are the main component of chalk and their remains are what the White Cliffs of Dover consist of.

The costume team spent six days assembling one hundred pieces by hand in order to make the bespoke dress in time to display initially at the Royal Society Summer Science Exhibition. PML is continuing to work with the Arts University Plymouth where students are applying research and design to help raise awareness of the ocean's health; watch this space!

Event Summary

Overarching messages

- The event emphasized the importance of collaboration between different groups — scientists, government agencies, community groups, and water users etc.. A key theme was how collective action is necessary for addressing environmental challenges in Plymouth Sound and the Tamar Catchment. Overarching coordination and leadership is required to guide this.
- Improving access to and visibility of research information and data was seen as key to enhancing collaboration and increasing local capacity and capability as well as identifying gaps in current monitoring protocols.
- Improving water quality monitoring was a major focus, with participants proposing the use of autonomous technology, citizen science, and real-time data sharing through apps and live signage. Standardized protocols for monitoring water quality were suggested to enhance local efforts and inform policy.
- Raising awareness of climate issues and increasing ocean literacy were highlighted as key to driving local climate action. Education, particularly for younger generations, and community engagement were seen as critical tools for empowering individuals to adopt sustainable practices.
- Nature-based solutions, such as seagrass restoration, were advocated for enhancing biodiversity and improving water quality. The focus is to use natural processes to address environmental problems and restore habitats, while acknowledging that longer-term studies are needed to quantify the impact on carbon sequestration.
- The event recognized the growing concern around artificial light at night (ALAN) and its impact on marine life. A call was made for stricter regulations, zoning for lighting, and public awareness campaigns to mitigate light pollution in marine environments.

Looking ahead

The organising committee are exploring opportunities to take all of these points forward and have detailed, as much as possible, our current thinking and position in this report. However, we fully appreciate that a significant number of local organisations were engaged in the event and we would love to hear from them as to whether there are ideas in this report, generated in the workshop, that cross-over with existing or planned projects / opportunities they are aware of as well or to build on this report in any way.

As there were many cross-cutting themes, the organising committee will not just look at the ideas reported here as stand alone projects but whether links can be made under one holistic project. This would require a significant level of funding and we are exploring opportunities.

There are clear opportunities for early delivery of some objectives through existing partnerships, such as Tamar Estuary Consultative Forum (TECF), Plymouth Sound National Marine Park (PSNMP) and Tamar Catchment Partnership who have several of these issues in their remit to address.

PML, and other research organisations in the region, are keen to apply scientific knowledge and expertise to help overcome local research needs and gaps and will continue to work alongside local partners to support delivery wherever possible.

Summary Next Steps

- The overall shared vision is to create a more sustainable, well-managed marine environment, leveraging local expertise and global research to address both immediate and long-term challenges
- It is clear that many of the actions needed require funding and therefore a key activity will be to explore large scale funding opportunities, for a catchment wide project, as well as smaller scale opportunities.
  PML have a dedicated funding team who will explore opportunities and share them with local partners to support coordination of a co-developed joint bid.
- Coordination and collaboration is key so the organising committee will continue to work together, and with a wide range of local partners, to coordinate efforts in a collaborative way, explore shared goals and activities, and respond to funding opportunities.
- TECF are due to publish the 4th, Plymouth Sound and Estuaries Management Plan, and are seeking to align the actions through this event with the strategic management actions for the site to ensure coordinated and effective management of the Marine Protected Area.
- There is an appetite for attending follow-on collaborative events in the future and to hold them regularly, possibly every year. PML will aim to coordinate and host these and will explore follow-up opportunities, although the frequency will need to be balanced against resource demand. We will strive to host events with a clear objective for further collaboration and local impact toward our shared vision.
- There are many great partnerships, networks and projects already active across the region, such as TECF and PSNMP, who will use their membership to discuss the outcomes of the workshop and explore delivery opportunities with its partners.
- There are many existing educational programmes in place at a local and EU scale. We will continue to work together to maximise the value of these for local schools and to deliver the identified objectives from the workshop.
  PML are exploring opportunities to coordinate a workshop, facilitated by a leading Ocean Literacy specialist and bring together all key organisations, to create a joint local plan for OL.
- There is a clear desire to ensure research and data that has a local focus is more visible and accessible to all groups and the general public. TECF will lead on exploring opportunities for a central platform / signposting facility and all organising partners will aim to make this more visible through their respective websites.

Lessons Learned

Participant Feedback

General comments received at the event were very positive with many saying they had found it useful and well organised, for example, Rob Price, Tamar Management Catchment Coordinator for the Environment Agency, commented: "It was a really well-organized and productive workshop. I'm looking forward to seeing the outputs."

A web-based event survey form was circulated after the event to gather more in-depth feedback to help improve future delivery. 39 responses were received, representing just over a third of participants. All responders rated the overall organisation and planning of the event as good (38%) or excellent (62%), as shown in table 1.

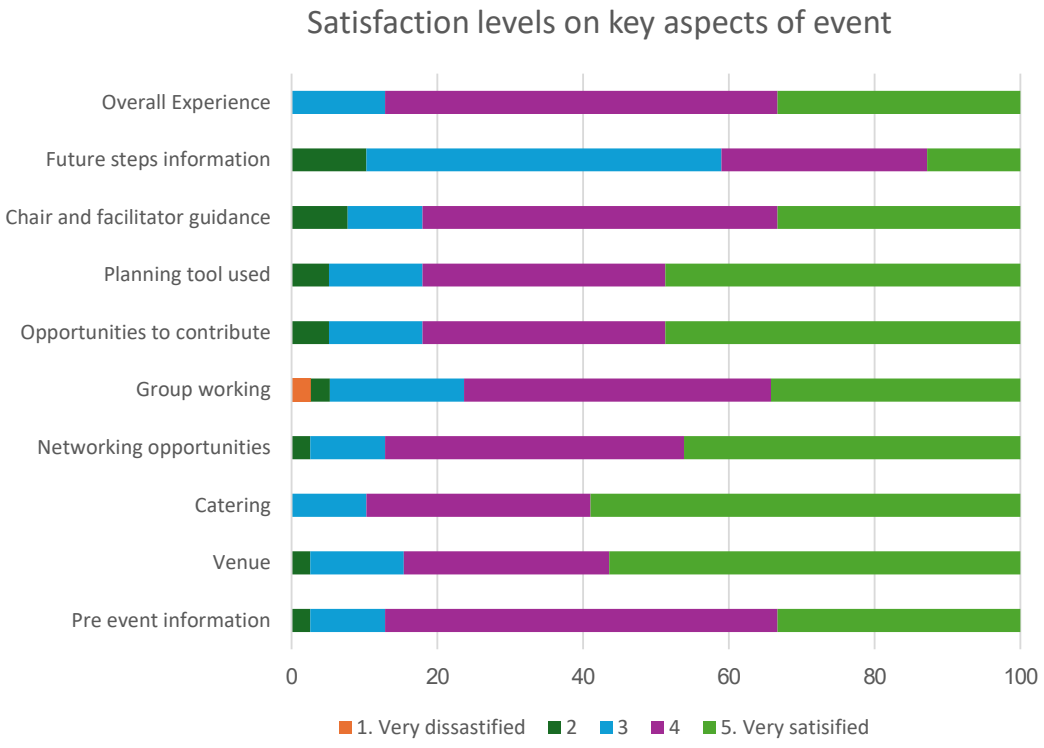
When asked about the different elements of the event the responders were generally positive (see table 2). When asked specifically about the pre event information 76% were satisfied to very satisfied; more than 84% were satisfied or above with the venue and catering; 87% were satisfied with the networking opportunities and 76% were satisfied with the group working; >80% were satisfied or above with the opportunities to contribute and chair and facilitator guidance as well as the overall experience.

Table 1. How would you rate the overall organization and planning of the event?

Answer Choices		Response Percent
1	Excellent	38.46%
2	Good	61.54%
3	Average	0.00%
4	Below Average	0.00%
5	Poor	0.00%
skipped		answered
0		

Responders were less positive about the planning tool used (67% satisfied or very satisfied) and the future steps information (41% satisfied).

While we appreciate the planning tool may have been new to many and felt restrictive in its approach, we hope that its design and purpose is now clearer from this report. A key objective of the event was to create project concepts that would solve key local challenges and the tool has enabled us to do so. We have been able to directly populate multiple Theory of Change (ToC) diagrams to represent the project concepts created on the day. PML, and many organisations, use the ToC approach for this very purpose.



Likewise, we appreciate information related to future steps may have appeared unsubstantiated on the day of the event but hope that this report has made it clearer. The workshop was just a starting point for a longer term process to support local management of the Tamar catchment. We aim to build on the event to improve the application of research to these issues, as detailed in each 'next steps' section.

Quotes

A wide range of comments and suggestions were also received, such as:

- Very useful meeting, we need more like this so we can find out who is doing what in the area. It was well organised and effective. The only complaints were there was far too much standing and the summary at the end was too long, while also standing.
- Overall it was an interesting and engaging event, great for networking!
- Was really pleased to be invited to this event. A very good opportunity to share ideas and network with others in the industry.
- It was difficult in the time-frame to be aware of all the post it contributions and how they were collated by facilitators. Not quite enough time to reflect!
- I Just wanted to say thank you for a great day. Although I had to leave a bit earlier, I left with a lot of ideas to expand knowledge for our swim school.
- Some of the solutions went a bit macro - designing big systems to solve global problems. Would love it if this became a regular network.
- I enjoyed the afternoon and the constrained and free discussions which ensued. The way that the topics were tackled was innovative and conducive to novel thinking and suggestions alongside more commonly rehearsed suggestions. The topic tasks were focused but with adequate time for consideration and suggestions for each section. There was clearly lots of energy and enthusiasm in the room during the first task.

Future events

When asked about future events, 87% of responders answered 'Yes', they would like to attend more events like this in the future, and 63% felt they should be an annual occurrence.

The organising committee have taken this on-board and will explore opportunities to coordinate future networking events, particularly to build on the outcomes of this one.

General conclusion

While the organisers were of course keen to deliver an event that was useful and positive for all attendees it would have been extremely difficult to cater to everyone's expectations, particularly with such a diverse range of attendees from a wide range of organisations. Hence, we see this feedback as very positive and the event as a success. However, we do of course take note of the key areas for improvement and have summarised these as 'key lessons learned' in terms of delivering future events.

Overall, we are really pleased to have achieved our key objective of developing multiple project concept ideas that could benefit the Tamar Estuary and Plymouth Sound. Taking these forward will not be an easy or quick process but the organising committee, and we hope all of the participants of the event, are dedicated to making these project ideas a reality.

Key Lessons Learned

- Allow more time for each workshop to develop more detailed, in-depth discussions.
- Stronger facilitation of dominant participants to ensure equity of contributions.
- Provide more opportunities to work at tables rather than on boards.
- Continue use of post it notes so everyone has an opportunity to contribute but combine with use of technology, such as voting apps, to cover more topics / collate more information.
- More structure and feedback between sessions to build on each others' ideas.
- Ensure the space is suitable for attendee numbers and group working so not too noisy.
- Make sure all participants are requested to write their initials legibly on the post it notes so ideas can be attributed and followed up on as this encourages information sharing.
- Make sure there are more chairs placed around the room, particularly for the plenary.
- Stronger representation from wider marine research community.
- Encourage greater participation from under represented groups such as anglers.

Appendix 1

Towards the end of the event, each group fed back in plenary the key elements of their discussion. Sharing the vision for the concept, the planned activity, the key groups to be engaged and the outputs which would be produced. The table below was created during the session to capture these key components, representing a high level summary of each group's ideas.

PML impact event 2024 feedback session summary

Group / topic	Impact Goal (Vision) **What will the project aim to achieve in a real-world context?**	Activity (what?) **Key elements of project e.g. research, monitoring, data gathering, development**
Clean Seas A Session 1	Improved spatial and temporal frequency of water quality monitoring and public access to data.	Obtain funding for technological improvements, utilising existing sampling platforms including remote sensing, increased frequency of sampling including additional parameters, utilise existing remote sensing models.
Clean Seas A Session 2	Developing standardised methods and best practice guidelines for water quality monitoring.	Create working group to develop standardised methods and best practice guidelines. Develop catchment monitoring strategies.
Clean Seas B Session 1	Comprehensive water monitoring technology accessible to all	Feed information from water monitoring into a central platform
Clean Seas B Session 2	Near real-time data on water quality widely accessible	Comprehensive overview of current data collected and collection of additional parameters, provide data in a wide variety of formats, education on how to use the data
Fisheries Session 1	Shared values and understanding across user groups	Co-design workshops to improve dialogue and knowledge exchange
Fisheries Session 2	Better enforcement and regulation of fishing activity (non-commercial) and zoning (no-take zones)	Engagement with stakeholders, outreach, and education, research into technical solutions,
Habitat manage-ment Session 1	Restoration of biodiversity – bivalves, seagrasses, wading birds. Nature-based solutions for cleaner waters	Citizen science projects, stakeholder mapping, funding horizon scanning, reviews of current research/knowledge, scoping gaps, communication planning (website, newsletter, in person)
Habitat manage-ment Session 2	Excellent biodiversity	Public engagement, increased citizenship and education, physical interventions, more critical evaluation, data gathering and scientific research

Appendix 1

Engagement (who?) **Key people / groups / orgs that would need to be involved**	**Output (products)** **What would be provided / produced e.g. data, App, network**
Funders, research institutes, farming communities (upstream water quality), water users, TECF	Engaged and passionate community, water quality available at key sites (digital-website or app), web-alert/SMS system, new satellite algorithms, optical tracers for pollutants.
TECF and beyond. Scientific communities, water companies, citizen scientists, water users, NGOs (SAS).	Standardised methods, best practice guide, tools to visualise and access data in simple ways.
Education, water users	Water quality app. User friendly interactive tool
Researchers, educators, water users, monitoring agencies	App and/or website as and educational and informative platform
Water users, fishing organisations, scientists	Central communication point, possibly utilising the NMP website
Water users, fishers, fishing organisations, NGOs,	Improved policies, zoning and regulations that are understood and respected by all users
TECF, MRP, campaigners, industry, engagement with wider Plymouth communities, recreational users, schools	Coordinated funded project with clear project goals and effective leadership. Communication of results to a broad audience including educators. Aim to engage Springwatch in the Tamar valley
TECF, environmental and conservation groups, land manager, Duchy, farmers, Crown Estate, anglers, local authorities, influencers, MMO marine planning, water users	Coordinated focus group to consider proposals and apply for funding for habitat restoration, marine license applications with requirements to enhance habitats, policy briefs, spatial mapping of areas where habitat restoration and enhancement are a priority.

Appendix 1

PML impact event 2024 feedback session summary continued

Group / topic	Impact Goal (Vision) **What will the project aim to achieve in a real-world context?**	Activity (what?) **Key elements of project e.g. research, monitoring, data gathering, development**
Light pollution	Increase in understanding of the effects of artificial light on the marine environment	Community engagement events, public perception surveys, research into improved technologies,
Restoring biodiver-sity Session 1	Sharing of data. Central repository with access to all.	Data confidence/quality metrics, funding bids, agreement to work together, buy in/financial appraisal.
Restoring biodiver-sity Session 2	Better understanding of the baseline and health of species/features.	Data collection, citizen science, identifying data gaps, improved communication between organisations collecting data, confidence in data quality, workshops like MRP.
Climate change A Session 1	An ocean-literate community driving climate action	Research into marine citizenship and behaviour change, improve access to marine areas, identify top ten actions can take to reduce impact on the climate, training, networking, community forum events, citizen engagement campaigns, support for teachers, ocean literacy included in all school curriculums, encourage sustainable transport
Climate change A Session 2	Positive net carbon sink for Plymouth Sound using nature-based solutions	Active restoration and monitoring of seagrass beds, assessment of the potential as a carbon sink. Recreational users involved in monitoring. Lobbying MPs for political support. Actively seeking funding for nature-based solutions
Climate change B	To have functioning and active nature-based solutions in and around Plymouth Sound	Mapping current habitats, model land-ocean use scenario, citizen science initiatives: Beaver-cam; sponsor a seagrass bed; spring-watch style events, research on C-storage/value/efficacy etc

Appendix 1

Engagement (who?) **Key people / groups / orgs that would need to be involved**	**Output (products)** **What would be provided / produced e.g. data, App, network**
International Dark Sky movement, local communities, statutory authorities, governments, port authorities, scientific communities, Net Zero Action Plan (link to carbon reduction), industry	Coastal lighting zoning Designating Zones Regulating Light Intensity and Colour Controlling Light Direction and Timing Promoting Awareness and Compliance Guidelines to inform new light installations, infographics, reports and papers, citizen science applications for reporting problem areas, improved legislation
Data owners, government partners, technology providers, data users, TECF, policy makers.	An open-access central repository record of all data collected with public access where appropriate. Public-facing website, measuring impact through utilisation of success stories, coherent and trustable data, effective delivery of TECF plan.
Compelling engagement with policy/decision makers to make an impact. Local organisations.	Map of data and a user-friendly platform.
Schools, research institutes, local organisations, councils, PSNMP,	Plymouth climate change hub: a one-stop shop (website) with information on how to reduce your carbon footprint and local ecosystem services, training resources for teachers, water use app: safe areas, tides, weather
Water users, industry, PSNMP, NGOs, University of Plymouth, divers	More seagrass beds and re-wilding, expanded awareness, good news stories, change in industry approach, evaluation programme to measure impact, protocols for restoration of seagrass beds, strong community support
Recreational user groups, Ocean conservation trust, NMP, Wembury Marine Centre. Make sure to have regular meetings between these people to keep to task.	Interactive map showing blue carbon areas & their value Document: best practice guide for infrastructure design Podcasts Good news stories (local) Publish annual C storage budgets for Plymouth habitats

Appendix 2

Task Description

Each working group were tasked with developing a solution-led project concept to address a local issue, as identified by the Tamar Estuary and Plymouth Sound Management Plan (delivered by TECF).

The groups used a framework for this designed as a pirate ship sailing to a 'utopia' desert island (see image on right). The framework was created by Jen Lockett and Dawn Ashby of Plymouth Marine Laboratory. It brings together a combination of appreciative inquiry (which starts by visualising an ideal scenario - our vision), elements of SWOT analysis (strengths, gaps, opportunities and barriers) and components of a Theory of Change (activities, engagement and outputs).

Participants added to the poster using post-it notes supported by the group Chair and Facilitator, to ensure everyone's ideas were captured. Discussion was encouraged within the groups to share perspectives and insights. Participants were invited to add initials to post-it notes they contributed for future follow-up.

The first step was for the group to visualise their ideal scenario for their given issue, how would they like things to be in an ideal world. These were added on post-it notes on the island (right-side of poster) so that everyone had the same opportunity to contribute. The group then prioritised these visions to agree the most significant in terms of improving the current situation, depending which topic their group was focussed on (e.g. clean seas, restoring biodiversity).

Once the vision had been agreed, the group considered the current strengths and gaps (the ship part of the poster) in terms of where we are now in relation to that vision. Strengths included current activities, such as water quality monitoring, as well as research expertise and collaboration. Gaps included a lack of information on certain subjects, funding and awareness of pressures or data availability.

Moving on to the centre of the poster (the ship's wheel) the group first considered the barriers and opportunities to reaching our vision from where we are now. Opportunities included access to students, citizen science, legislative requirements and existing funding, while barriers included resources, political will and data gaps.

The lower half of the wheel explored the activities, engagements and outputs needed to get from where we are now to where we want to be.

After the event, all of the post-it notes were transcribed to create a digital version, presented as a Theory of Change (ToC) diagram for each session. The ToC captures the key elements of the pathway needed to achieve the vision. This includes the inputs / strengths, activities, engagements, outputs and impact goals. The remaining information was collated on an additional table to aid visualisation (barriers, gaps, opportunities and alternative visions.

The ToC and tables have been used to create the summaries and plan the next steps as presented throughout this report.

All of the ToC are included in the report for transparency and we welcome further input on how we can best build on these to deliver meaningful action.

If anyone would like access to the additional tables please email impact@pml.ac.uk specifying which information you would like.

Appendix 3

Theory of Change tables

The information generated by each group is presented in this appendix as a series of Theory of Change (ToC) diagrams (one per session, per group).

The text in bold on each table is copied from the summary feedback table (appendix 1) for that session.

Participants initials have been included next to the text to which they contributed where possible. However, not all contributors added their initials and in some circumstances the initials were illegible so could not be captured.

Larger versions of these ToC tables and accompanying information from the sessions can be requested from impact@pml.ac.uk

Session 1. Clean Seas group A – Data sampling methods

Inputs / Strengths	Activities	Outputs / products/ tools	Vision
▪ Water quality monitoring at designated beaches in Plymouth Sound occurs weekly May-Sep. MF ▪ Passion to do something positive and long lasting for the environment. ▪ Knowledge base within the South West is strong and can support. High tech development techniques. ▪ Collectively we (probably) have the expertise to create a positive change. ▪ Weekly WCO transits in Plymouth Sound- potential for underway sampling? MF ▪ Engagement from partners across Plymouth with common good. MC ▪ There is a significant number of sea swimmers in Plymouth Sound all year round. MF ▪ Number of places or beaches monitored. TB	**Obtain funding for technological improvements, utilising existing sampling platforms including remote sensing, increased frequency of sampling including additional parameters, utilise existing remote sensing models.** • Understand biodiversity baseline. • Sponsored partner development between different investment streams and organisations. MA • Partners with ability and access to lobby for funds/attention to ocean health. MC • Engagement with parliament. MP • Joint applications to stakeholders. MS • Knowledge dissemination. MS • Demonstration of dipstick test to stakeholders (e.g. swimmers). MF • More collaboration events between management groups and researchers (like today). • More engagement for young people to get into science and research roles. • Engagement events like this to bring together expertise and identify priorities. MC • Monitor now • Is the NMP having an impact on economy. biodiversity ect. • Formal education programmes including resources, funding. • Apply for funding. • Education programmes. • Develop evaluation framework for projects. • Engaging and identifying partners. • Legal changes?	**Engaged and passionate community, water quality available at key sites (digital-website or app), web-alert/SMS system, new satellite algorithms, optical tracers for pollutants.** • Baseline data. • Development of new novel satellite algorithms for water quality parameters. GT • Optical tracers for pollutants and toxins. GT • And educated aware community. Passionate marine citizens. • Web alert system that visualises multi data sets. GT • Water quality indicators at all bathing sites (digital updated).	**Improved spatial and temporal frequency of water quality monitoring and public access to data.** • Daily sampling of WWTW discharging into the estuary to quantify pharmaceutical inputs via effluent. MF • Autonomous PH, conductivity, temp, O2 arrays to detect changes/variability in inputs. MF • Real time multi-site data on water quality parameters and quality, hazardous bacteria/organisms TB visualised in the meta verse. • Twice daily sampling at designated beach all year round for biological testing. MF • Regular monitoring not just monitoring during bathing seasons. MS
	Engagements / **who needs to be involved** **Funders, research institutes, farming communities (upstream water quality), water users, TECF** • Local politicians. • Government local regional and national. MC • Commercial bodies, companies and unions. • Politicians media. • Key stakeholders NMP and TECF. • Marine Managers. • Private companies, SW water. • Media. MF • Farming communities, those farming conventionally alongside organic/regenerative farmers. MF • Funders (Philanthropic, NGOs, UKRI, Horizon, EU). MC • Young generation of Plymouth and surroundings. Children, families, education, communities. • Cross cutting research disciplines. • National/ international (not just Plymouth problem). • Locally – all communities and ages.		

Session 2. Clean seas group A – Standardised methods

Inputs / Strengths	Activities	Outputs / products/ tools	Vision
• WFD is still the best regulatory framework around. • Data rich. • Enthusiastic groups and organisations, all want to improve situation and work to be impactful. • Multiple agencies involved and located closely. • Expertise to solve or improve is available. • There is a mood of stakeholders and government to improve water quality. • Tamar is well studied and lots of data available. • The UK is a world leader in monitoring the water environment. • Satellite based capabilities. Near shore observations are challenging. • Amazing scientific minds in the region to keep effective changes.	**Create working group to develop standardised methods and best practice guidelines. Develop catchment monitoring strategies** • Core working group to agree standardised monitoring. • Let scientists help, we are super interested in methods and data. GK • Develop catchment monitoring strategies. • Sharing information. • Method development research community. • Citizen scientists. • Working group for best practice development and key stakeholders.	**Standardised methods, best practice guide, tools to visualise and access data in simple ways.** • Improved display method for pollution indices and reporting. • Risk maps for water users. • Standardised methods. • Tools to visualise and access data in simple ways. • Agreed monitoring standard rolled out across CSI groups. • Best practice guide.	**Developing standardised methods and best practice guidelines for water quality monitoring.** • Simplified equipment for monitoring water quality. • Create a best practice guidelines for the monitoring of water quality. DK • Standardise a measure that all authorities will take seriously and act upon. • Standardised method. • Data and evidence interpreted in an agreed way. • Data collected according to collaborative monitoring strategy. • Simple effective monitoring to empower communities to monitor but also inform research and policy.
	Engagements / who needs to be involved **TECF and beyond. Scientific communities, water companies, citizen scientists, water users, NGOs (SAS).** • Citizen scientists. • River lovers. • Local river groups. • Scientific community. • Catchment partnerships. • Water companies. • TECF members. • NGOs surfers against sewage. • Get the key players together academics, EA, SWW to agree on standards.		

Clean Seas B session 1

Inputs / Strengths

- Increasing national government awareness and acceptance of the water quality problem (SW)
- Centralised area of technology and resources, if you engage with networks (MRH)
- Organisation such as real ideas immersive technology – for community engagement purposes (SS)
- Skills – sensors, water chemistry, satellite data, data portal building, citizen science project, image analysis
- We already have community buy-in
- WaterFIT App not common in water companies
- A growing public interest in water quality
- Expertise in water quality monitoring, web/app development etc. (JL)
- We are an ocean city surrounded by wonderful habitats, which opens itself to exploration and monitoring (ST)
- Lots of expertise (AL)
- Real time data from E1, L4 and APICS (SW)
- Good networks
- Strong skills in collecting data, visualising and interpreting data but not done locally (Lack of money not interest) (SW)
- Plymouth sound operational model (SW)
- Helping to get networks together working in some fields (MHR)

Activities

Feed information from water monitoring into a central platform

- Summit if ideas for the (Inevitable) digital platforms and digital twins (all encompassing not just water quality)
- Build a water quality data porta and visualization tool (SW)
- Technology development

Outputs / products/ tools

Water quality app. User friendly interactive tool

- A federated data set and data portal
- Being able to work with many organisations. Being invited here (MRH)
- Mobile phone app for citizen science input and real time data viewing so participants can see their input

Engagements / who needs to be involved

Education, water users

- Schools, social groups, water users
- Market hall immersive dome (SS)
- National Marine Aquarium
- The Box
- Ships project (MRH)
- Using local expertise develop a centralised app to improve accessibility to key information and news. Features can include logging in voluntary hours into a reward system (SS)
- Digital platforms
- Increased public awareness and involvement
- Plymouth waterfront and public spaces

Vision

Comprehensive water monitoring technology accessible to all (22 votes)

- Use PML tools developed in India for citizen science monitoring fr water quality (SW)
- Can we develop simple water quality kits and a repository for the data? For use by groups/ schools (SS)
- To understand what people can do that shows impact. Lack of impact = feeling of not being able to help (MRH)
- Really nice public facing web platform with love and interpreted data on WQ (AC)
- Greater instrumentation in the sound and Tamar using sensors and autonomous platforms. Make more use of smartsound + NCCA (SW)
- Improved and progressive technology (ST)
- More accessible and visually engaging graphics for WQ using e.g storm overflows (TBD)

Clean Seas B session 2

Inputs / Strengths

- Surfers against sewage app (EGT)
- Large numbers of local water users
- Lots of scientists studying the issue around Plymouth. I, Research is improving which gives the data needed
- Existing marine forecasting models for Plymouth region
- EA catchment data map for water quality status (EW)
- Educating people about water quality
- Large concentration of skills in Plymouth (KF)
- Plymouth has lots of water quality scientists
- NMP as a focus & lever for funding (KF)
- SAS app but needs to be broadcast
- WaterFIT by SWW (EW)

Activities

Comprehensive overview of current data collected and collection of additional parameters, provide data in a wide variety of formats, education on how to use the data

- Flag safety system (EW)
- Monitor water quality with open source satellites (free training)
- Free swim safe sessions for all families and young people
- Beach clean up
- Start education on pollution and impacts at school ages
- Blue flag for swim safe

Outputs / products/ tools

App and/or website as and educational and informative platform

- Info portals with local forecasts
- Infographic boards
- Live notifications
- App with screens around the city for live data for public to see
- Near real time water quality data
- Convince people that they can make a difference (DCH)

Engagements / who needs to be involved

Researchers, educators, water users, monitoring agencies

- Engage with media (all types)
- Get David Braine to champion this!!Work with landowners upstream
- App (EW)
- Citizen science recordings engage people with the water
- Schools learning about safe swimming locations (river quarries, lakes, sea)
- Share daily data on all local social media

Vision

Near real-time data on water quality widely accessible (18 votes)

- Live reports in-situ at sites (EW)
- Make data available
- Water quality reports on weather report etc. TV. Radio

Session 1. Climate Change – Ocean Literacy

Inputs / Strengths

- Fostering connection, increased motivation to protect/act.
- We have lots of organisations (OCT, Wildlife Trust, etc.) working on this.
- Children can influence adults.
- Swim safe for local young people.
- Increased investment, funding availability, recognition that money is needed.
- Awareness, interest, desire, action.
- Ocean curriculum
- GCSE Natural History, plus Marine Science.
- Children very aware, informed at high level i.e. they know climate change is a problem.
- A lot of information available.
- Everyone is now aware of climate change and "most" people agree that it's real.
- The National Marine Aquarium is a fantastic place to learn about marine environment.
- The HOE foreshore is a spectacular venue for swimming and outreach.
- Education but jobs/bills (£) change behaviour.

Activities

Research into marine citizenship and behaviour change, improve access to marine areas, identify top ten actions can take to reduce impact on the climate, training, networking, community forum events, citizen engagement campaigns, support for teachers, ocean literacy included in all school curriculums, encourage sustainable transport

- More research projects on marine citizenship behaviour change.
- Focused research on social change/behaviour change strategies –need paradigm shift.
- Find out what prevents behaviour.
- Improve access to Plymouth Sound – boats, Drakes, etc.
- Model forecast of climate change impacts.
- Identify top 10 actions we can take to reduce impacts on climate change.
- Training, networking, support for education.
- Training for teachers.
- Teach the carbon footprint of modes of transport. Kids know the bus is better but how much? The realisation may bring action.
- Youth advertisement campaign in local media and in the city - what 'Plymouth ocean city' means.

Outputs / products/ tools

Plymouth climate change hub: a one-stop shop (website) with information on how to reduce your carbon footprint and local ecosystem services, training resources for teachers, water use app: safe areas, tides, weather

- Swimming safety forecast integrating live water data, tides, currents, rips. Lifeguards on every beach in the surrounding areas.
- Ocean topics in all schools
- Local developments such as renewables benefit local population.
- Citizen engagement campaigns regularly organised.
- Water use app – safe areas, combined with tide/weather forecasts etc. so it's all in one place.
- Training resources for teachers.
- Plymouth Climate Change hub – as line info.
- A one-stop-shop (e.g. website) with info on how to reduce your carbon footprint + local ecosystem services.

Engagements / who needs to be involved

Schools, research institutes, local organisations, councils, PSNMP,

- Connect Academy Trust
- Plymouth College
- Hyde Park Primary
- Engage with local businesses to support/fund engagement and education activities.
- Schools
- Council
- Universities and Research Institutes
- Engagement of local organizations (like today) and school educational orgs.
- Social champions – Football players, sport celebrities, community leaders.
- Community forum events.
- Specialist groups; NGOs; SMES; Civil Society; already connected and delivering.

Vision

An ocean-literate community driving climate action

Education and Engagement

- Educate young people about Plymouth Sound
- Reliable easily accessible information explaining water safety impacts.
- Promoting connectivity for the environment
- Effective academic and industry communication
- Water resources need to be available for swimming
- Climate Conscious educations in school.
- Ocean city synonymous with climate conscious approach.

Nature Based Solutions - Positive Net Sink for Plymouth Sound.

- Large areas of seagrass, kelp forests and salt marshes.
- Rewilding options, seagrass, seaweeds (Needs proof of concept)
- Maintenance of soil health – Water and carbon regulation.
- Enhanced nature to help us
- Intertidal zone for Net GHG reduction.
- Extending flooding areas
- Reclaimed land to forest plan

Session 2. Climate Change – Nature based solutions

Inputs / Strengths	Activities	Outputs / products/ tools	Vision
▪ Huge knowledge based in the city; Central area of both education and research; Researchers and knowledge. ▪ Net Zero Action Plan - (Needs funding to become net zero by 2030) ▪ Availability of publicly owned (council owned) coastal land + National Trust. ▪ Seagrass active restoration ▪ Multi-stakeholder forums/partnerships (e.g. TECF). ▪ Strong community engagement and proposed seaweed aquaculture sites.	**Active restoration and monitoring of seagrass beds, assessment of the potential as a carbon sink. Recreational users involved in monitoring. Lobbying MPs for political support. Actively seeking funding for nature-based solutions** • Seagrass meadow restoration and monitoring by OCT (Ongoing and expanding). • Assessing potential carbon sink. • Lobbying MPs for national support, national funding for water nature-based solutions. • What have other UK link groups done?	**More seagrass beds and rewilding, expanded awareness, good news stories, change in industry approach, evaluation programme to measure impact, protocols for restoration of seagrass beds, strong community support** • Change industry approach • Films/media reporting on progress – good news stories. • More seagrass, more rewilding • Monitoring programs • Evaluation framework to mitigate impact • Protocol for restoration • Expanded awareness: Program for explore and participate, discover and learn, connect and act.	**Positive net carbon sink for Plymouth Sound using nature-based solutions** **Nature Based Solutions -** Positive Net Sink for Plymouth Sound. (This was chosen from the previous group options). • Large areas of seagrass, kelp forests and salt marshes. • Rewilding options, seagrass, seaweeds (Needs proof of concept) • Maintenance of soil health – Water and carbon regulation. • Enhanced nature to help us • Intertidal zone for Net GHG reduction. • Extending flooding areas • Reclaimed land to forest plan
	Engagements / **who needs to be involved**		
	Water users, industry, PSNMP, NGOs, University of Plymouth, divers NGO/OCT PML/MRP University of Plymouth SNMP – Engage marine citizens as ambassadors for the marine environment. Divers Recreational users for monitoring Engaging industry – antifouling.		

Session 2. Climate Change - Nature-based solutions

Inputs / Strengths	Activities	Outputs / products/ tools	Vision
▪ Excellent biodiversity. ▪ Citizen Science – utilization of existing passionate and willing citizens to facilitate initiatives. ▪ Government interest. ▪ We have diverse habitats within the Tamar/Plym catchment so scope for lots of diversity. ▪ Existing knowledge & expertise from academics, industry and users, local community. ▪ Knowledge on what is needed to restore certain species under certain conditions. ▪ Protected sites already exist – potential to expand or create new ones. ▪ Plymouth excellence in marine research – TECF group where we come together with in depth knowledge of Plymouth Sound ▪ Multiple ecosystem services associated improvement as well as water quality. ▪ Making working partnerships within the area. ▪ Fair baseline for biodiversity. ▪ Government will. Water Quality is no. 1 priority for DEFRA. ▪ Tremendous expertise across organisations. ▪ Plethora of organisations with capability to deliver.	**Mapping current habitats, model land-ocean use scenario, citizen science initiatives: Beaver-cam; sponsor a seagrass bed; spring-watch style events, research on C-storage/value/efficacy etc** • Influencers. • Increased understanding through public/stakeholder programmes. • Citizenship & EDU. • Projects – physical/artificial interventions. • Data gathering scientific research. • Artificial habitats (living seawalls, artificial reefs, coastal defences) • Communication. • Influencers. • Local Authority Planning. • MMO Management Planning.	**Interactive map showing blue carbon areas & their value** **Document: best practice guide for infrastructure design** **Podcasts** **Good news stories (local)** **Publish annual C storage budgets for Plymouth habitats** • Spatial mapping of areas where habitat restoration or enhancement are the priority. • Policy briefs to help new government to immediately understand where issue is and the next steps to address issue. • Funding proposals for projects to address habitat restoration. • Coordinated forums or group to consider proposals (inter-organizational group – new or existing) • Marine license applications – could have requirements to enhance habitats where developments are occurring.	**To have functioning and active nature-based solutions in and around Plymouth Sound** Restoring/Improving Biodiversity: - enhancement-design structures to attract suspension feeders (e.g. mussels) - More NFM (restore wetlands/salt marshes/more beavers) - Redirected run-off - Improved biodiversity and habitat stability. - Increase mussel beds protection will improve WQ (indicator SPP of WQ yet are impacted by poor WQ). - Prioritisation of NBS that improve Water Quality - Ensure that habitat restoration has a net positive effect (e.g. .does it serve the purpose it was intended to?) - Healthy native oyster reefs & mussel beds and shellfish populations. - Removal of all invasive species. - Increase in native biodiversity.
	Engagements / **who needs to be involved**		
	Recreational user groups, Ocean conservation trust, NMP, Wembury Marine Centre. **Make sure to have regular meetings between these people to keep to task.** • Environmental & Conservation organization groups and initiatives. • Communities, ownership and knowledge sharing. • Targeted stakeholder analysis. • Cross-organization coordination (TECF) • Users (anglers, recreational, farmers etc) • Land management (farmers, duchy, crown estate, pirates)		

Session 1. Restoring Biodiversity

Inputs / Strengths	Activities	Outputs / products/ tools	Vision
▪ To be able to do research without collection assets / vessels ▪ Well studied area ▪ Historic data (EMODNET) ▪ We don't waste money ▪ Data trust - central data peer-reviewed ▪ Defined area	**Data confidence/quality metrics, funding bids, agreement to work together, buy in/financial appraisal.** • Data confidence / data qualits • Agree to start project • Assess the landscape • Document ad hoc record/ observations • Funding bid / or financial commitment through financial appraisal • Public engagement	**An open-access central repository record of all data collected with public access where appropriate. Public-facing website, measuring impact through utilisation of success stories, coherent and trustable data, effective delivery of TECF plan.** • Repository for who to contact for the data you want • Measuring impact through utilization of data and success stories • Success stories • Effective delivery of Tamar plan • Biodiversity Net Gain • Independent data resources • Public facing website • Data 'trip Adviser' • Coherent, trusted database	**Sharing of data. Central repository with access to all. (22 votes)** • A central accessible depository of historic data easily interpretable to monitor change • Shared data systems, organisations, local nature recovery strategies • Use of all data capture methods to contribute to biodiversity improvement • FAIR data • Accessible data (in central space) which provides information on state of environment (gov. targets? GES) repeatable and recognised by agencies • Discovery information – ask a wise old elf (before they die) • Measuring impact through utilisation of data and success stories • Evaluation / impact • Central ownership of unclassified data to inform other restoration projects • An open access, interchangeable database with all information about Plymouth Sound
	Engagements / **who needs to be involved**		
	Data owners, government partners, technology providers, data users, TECF, policy makers. Anyone who needs data (or uses) Policy makers TECF Government partners (thinking beyond PIs) NMP Technology providers		

Session 2. Restoring Biodiversity

Inputs / Strengths

Expertise
- High concentration of marine scientists

Data
- Area allows low cost / easy data collection
- Huge amounts of historic data
- Industrial support gives access to high quality data
- Lots of data already exists for Plymouth
- Standardized metric available
- Good data on habitats linked to designations and priority habitats
- Working in a local environment we can develop good baseline knowledge without huge cost.

Systems
- Natural England Biodiversity Net Gain (BNG)
- BNG metric helps to prove success

Locality
- Plymouth's potential as a case study location
- Presence of an established community
- Active restoration activities (e.g. OCT - seagrass and MBA - kelp) around which efforts by science community can focus/build

Activities

Data collection, citizen science, identifying data gaps, improved communication between organisations collecting data, confidence in data quality, workshops like MRP.

- User-friendly platform to search
  - Ideally a map
  - Highlights gaps
- Create 'map' of current data
- Time to communicate
- Use of citizen science to fill data gaps
- Collect data in gaps e.g. community involvement

Outputs / products/ tools

Map of data and a user-friendly platform.

- An idea of how it will inform descion maker
- Global baseline datasets
- Communicate data limitations
- An understanding of the data we need
- Better stakeholder communications
- Confidence in the resilience and robustness of the data
- Confidence in data quality

Engagements / who needs to be involved

Compelling engagement with policy/decision makers to make an impact. Local organisations.

- Thinking about how data will influence decision makers and policy
- Compelling engagement

Vision

Better understanding of the baseline and health of species/features.

- Linking data with projects
  - Central portal
  - Simplified data sets
  - Collaborate with individual projects and link to wider projects
- Lets have a shared database for the whole area / MPA with free access
- Open access data that the public can use / engage with
- Improved info on the limitations of data
- Excellent metadata
- In an ideal world free data on a user-friendly platform. AI might help extract/map data as our capacity (time / GIS data handling) limited.
- Useful data produced from variety of sources – the knowledge of how to integrate and/or extract data that we need to know regardless of type (e.g. traditional, DNA, imaging)

Session 1. Habitat Management

Inputs / Strengths

- Alignment with 'zeitgeist' – impetus to re-wild, restore, create
- Lots of orgs doing engagement (rock pool project, OCT, OWT etc)
- Huge numbers of research projects in one area.
- Sonardyne is mapping Tamar Waterway in detail to identify habitats/litter/heritage.
- Ships 1000 tyres project is removing tons of marine litter
- Excellent management in TECF/KHM Allows innovative work.
- Stakeholder Engagement (TECF).
- Large partnership/stakeholder ambition
- Existing partnership groups that can support project ideas.
- Data on SSSI features and data on bird counts
- MPA is established & the focus of lots of improvement work.
- Collaboration in water quality via TECF
- The number of highly interested organisations working in the area that are all active (DWT/NT/NE/PML/Up/Community.
- Availability of historic data.
- Habitat restoration not only supports better water quality but also supports species and consequently helps economy.
- Increasing collaboration
- Shared vision and considerable knowledge base
- Very good partnerships around the Plymouth Area
- SWW Catchment Management above our abstraction panels to approve WQ.
- Lots of restoration works for biodiversity on reservoir.

Activities

Citizen science projects, stakeholder mapping, funding horizon scanning, reviews of current research/knowledge, scoping gaps, communication planning (website, newsletter, in person)
- Change in legislation & policy
- Ramp up engagement
- More money into research
- Natural flood management to resolve agri run-off
- Identify project ideas & partners to support funding bids
- Representative of our collaborative community to advocate for positive change and engage wider community and government.
- Local communities through citizen science.
- Regular monitoring of water quality.
- Partnership bids
- Develop a shared overarching vision and then shared workstreams to deliver
- Form a leadership group to prioritise plans & actions
- Create a structure for communications with all groups and their members
- Dairy Farm resolution (silage clamps, roofing, CS alternatives)
- Countryside Stewardship

Outputs / products/ tools

Coordinated funded project with clear project goals and effective leadership. Communication of results to a broad audience including educators. Aim to engage Springwatch in the Tamar valley
- An analysis of potential interventions benefits and risks.
- Bring all stakeholders & existing knowledge together into a formalized report & vision for the restoration on the Tamar.
- Long term strategic project.
- Creation of leadership group.
- Social media.
- In person events to engage local communities (universities. schools etc)

Engagements / who needs to be involved

TECF, MRP, campaigners, industry, engagement with wider Plymouth communities, recreational users, schools
- Spring watch in the Tamar Valley
- Government Engagement
- Local Organisations
- Communities
- Researchers
- Wider Plymouth
- The Box
- Schools / Activities in schools.
- Continued engagement discussions & collaborations under the 'Restoring the Tamar' umbrella
- Plan communicated to all key groups
- Surfers Against Sewage (high visibility, very good media presence, experts in the field)
- Forum for stakeholders to share ideas and information about projects (e.g. website/ newsletter/other media/webcams)

Vision

Restoration of biodiversity – bivalves, seagrasses, wading birds. Nature-based solutions for cleaner waters
- Bivalve (oyster, mussel, other) restoration to reduce pathogens in the water
- Excellent water quality rivers & seas with increased biodiversity for all organisms, more than meeting govt & EU targets set
- Nature Based Solutions are used to improve water quality including habitat restoration
- We understand where the seagrass is, if it is spreading what limits growth and why did it die in 1930's?
- RAMSAR site for wading birds (improved water quality KHCDCC)
- Active restoration of native oyster: seeking funding & support for technical feasibility assessment

Alternative Visions:
Moorings – seabed friendly moorings being mandatory in the SAC
Marine Litter Management: We have removed all the marine litter from the sea and rivers.

Robust Scientific Evidence:
- We better understand what is on the seabed.
- Scientifically backed: Habitat assessments with financially backed improvement plans
- Have information & data about habitat quality available in an accessible format to encourage public engagement with projects (e.g. interactive mapping)

Water Flow Management:
- Collaborative approach managing runoff (agri & surface water) that is climate proofed to support habitat recovery.
- Slowing water flow from farm to basin to allow nature to reduce sediment & nutrients before they reach the basin.
- The riparian corridors – rivers/streams/floodplains are reconnected and reserved for wildlife/nature.
- Keep water in the landscape: NFM (tree planting, upgrading sgriculture, wetlands, catchment management)
- Encourage greening of garden and public spaces to reduce storm water inputs and associated pollution
- Slowing water flow in the basin to allow nature to improve water quality.

Session 2. Habitat Management

Inputs / Strengths

- Plymouth is the right place for doing the research and implementing solutions (TS)
- Expertise in carbon cycling, science and carbon sequestration / storage
- Great partnerships across the city – cohort of the willing
- partnerships across Plymouth and region
- Expertise in carbon financing and ecosystem valuation
- Blue meadows (previously Remedious) seagrass restoration
- Beaver baby
- C budget of rewilding wetland (Calstock)
- Seagrass PhD research projects
- Really good understanding of our habitats and places

Activities

Public engagement, increased citizenship and education, physical interventions, more critical evaluation, data gathering and scientific research
- Build a system model to show the connection of actions on land and effects to marine and air
- Modelling multiple land / ocean use scenarios. To achieve a net-zero catchment
- Develop carbon credit schemes based on Plymouth blue carbon habitats
- Seagrass mapping
- Citizen science initiatives / collaboration
- Map current C storage and highlight areas that can be turned into better C storage sites
- Return Victoria Park to the sea
- Ban commercial fishing in Plymouth Sound to create fish nursery
- Beaver cam
- Collect data on the C storage potential of restored habitats
- Sponsor a seagrass bed scheme.

Outputs / products/ tools

Coordinated focus group to consider proposals and apply for funding for habitat restoration, marine license applications with requirements to enhance habitats, policy briefs, spatial mapping of areas where habitat restoration and enhancement are a priority.
- Publish an annual carbon storage budget for Plymouth marine habitats (SW)
- A map showing blue carbon areas and their value
- Interactive seagrass maps
- Document of ideal and best practice for infrastructure design (TS)
- Publish 'good news' of things changing

Engagements / who needs to be involved

TECF, environmental and conservation groups, land manager, Duchy, farmers, Crown Estate, anglers, local authorities, influencers, MMO marine planning, water users
- Engage with local planners to design infrastructure better
- Need to give people the opportunity to visualise how positive change could be
- Ocean conservation trust
- Wembury marine centre
- NMP
- Recreational boat users
- Connect with Prof. Bob Brown at University of Plymouth – cojoining city land and sea symposium / initiative
- MOD
- Stakeholder meetings with those who use blue carbon environments to ensure they do not damage it e.g.with boat users to stop them anchoring on seagrass
- Water management orgs. SWW, River Trust etc.
- Listen to RSA's Regeneration Rising podcasts – promote awareness

Vision

Excellent biodiversity

Nature-based solutions
- 'Acceptable' change in marine ecosystems clearly defined. Who is welcome?
- Restore local blue carbon habitats (SW)
- Catchment reforestation plan
- Wetlands nature-based solutions
- Nature-based solutions delivered across city and hinterlands
- More beavers

Session 1. Light Pollution

Inputs / Strengths

- Coastal partnership (TECF)
- Strong partnership around the marine environment.
- A variety of management options.
- Terrestrial case studies showing wide range of impacts to promote targeted questions for marine.
- Designed technology
- Lighting technology
- Habitat and biodiversity knowledge.
- Lots of scientists in the city
- Knowledge of current assets.
- Current marine species which are present in artificially lit areas.
- Ongoing research into the issue that can support the design of ALAN uses going forward.
- The potential to mobilise people/community behind the problem.
- Central management systems
- LED lighting that can be dimmed and colour changed.
- State of the art lab facilities that can quantify the effectiveness of management solutions.

Activities

Develop coastal lighting zoning

- **Designating Zones**
- **Regulating Light Intensity and Colour**
- **Controlling Light Direction and Timing**
- **Promoting Awareness and Compliance**

- Research to identify impact on biodiversity and CO2 sequestration then target nature carbon credit impact investments
- Start with lighting infrastructure owned by organisations that will engage (e.g. Highways, PCC).
- Education of people an impact and darker skies campaign.
- Dark skies zones might attract support from astronomy visitors.
- Laboratory testing
- Public perception surveys
- Technical advances
- Community engagement workshops
- Electrification energy transitions -> link the agendas -> change infrastructure once.
- Educating/relevant events/talks especially those in the involved industries.
- Dark sky by the ocean events
- Community engagement days
- Links to international dark sky movement
- Research plan/scientific paper/data collection = the evidence of measures.
- Research into moonlight as possible contaminating variable.
- Offsetting - natural capital investment
- Current conflict with other needs – VWAG, Commercial outcomes.
- NZAP – link this with carbon reduction plans/projects
- Win heart and mind of communities leads to political support.

Outputs / products/ tools

Community engagement events, public perception surveys, research into improved technologies,
Guidelines to inform new light installations, infographics, reports and papers, citizen science applications for reporting problem areas, improved legislation

- Measurable significant reduction in ambient light levels at night in waterfront marine locations.
- Legislation
- Infographics
- Information to inform new light installations.
- Reports
- White papers
- Guidance
- Scientific publications
- Measurable difference
- Replicable
- Scalable solutions
- Something like virtual MPA but virtual city for people to see how things change; info about what changes what.
- Citizen science application where individuals can input areas, they've recognized the issue to report it in a way so researchers can study those areas.
- Obvious impact results info for the whole system.

Engagements / who needs to be involved

International Dark Sky movement, local communities, statutory authorities, governments, port authorities, scientific communities, Net Zero Action Plan (link to carbon reduction), industry

- Scientific Community
- Port Authority
- A board that oversees the issue with creating mitigation strategies.
- Government
- Statutory authorities
- Communities who live by the sea.

Vision

Increase in understanding of the effects of artificial light on the marine environment

SCIENTIFIC UNDERSTANDING

- An understanding of the type, quantity of light that negatively impacts on marine life
- Increase in understanding of the effects of artificial light.

HUMAN DIMENSION

- Inspire behavioural change to reduce light impacts.
- ALAN is recognised as an environmental pollutant in binding UK legislation.
- Stricter regulations for industries/companies/individuals causing ALAN issues, and mitigation strategies to help.
- Action Plan to increase awareness
- Education to reduce, remove artificial lights from high impact areas to mitigate overall pollution.

Session 1. Fisheries

Inputs / Strengths

- TECF
- PPMLC as a meeting ground
- Local knowledge (angler's clubs)
- New understanding of recreational use of MPA as of 2024
- Citizen science projects run by different organisations but lack of joined up recording

Activities

Co-design workshops to improve dialogue and knowledge exchange

- Develop lines of communication between marine users and policy makers
- Seek funding opportunities
- Understand the differences between resident and visitor perspectives
- Develop GIS map system of habitats

Outputs / products/ tools

Central communication point, possibly utilising the NMP website

- GIS map system of habitats, maybe incorporate into Google docs
- Central communication point
- Layering of information – central database, translated for the general public, signage, personal communications Education: Involvement of greater community
- Central database for events and letting people know what is happening where and when

Engagements / who needs to be involved

Water users, fishing organisations, scientists

- Create forum for stakeholders to develop shared values
  How can we understand each other – we need a platform or other way to communicate
- Educational programmes funded, including engagement from various activities to encourage youth
- Better dialogue with anglers, embrace local knowledge – see Lundy example
- Co-design resources
- Connecting with the right people/groups

Vision

Shared values and understanding across user groups

- Understand cultural values and shared needs
- Responsive and agile approach to investment
- Recreational users are diverse in their nature. Important culturally – public right to fish. As with all activities they should be undertaken within legislative and environmental boundaries.
- Share values: dealing with trade-off between activities in a collaborative manner.
- Consideration of integration with broader area.
- Understanding of cultural and local drivers of activities.
- Zoning could support thriving fish/shellfish
  Effective control of commercial fishing – education of recreational stakeholders towards shared values.
- Free from commercial fishing practices
- Important to look at links between recreation and commercial fisheries – they don't always exist in isolation. Crab tiling is recreational/commercial but peeler crab used in recreational fisheries.
- Understanding both sides of recreational and commercial fishing.
- Open dialogue and sharing of knowledge between stakeholders
- Shared values among stakeholders

Session 2. Fisheries

Inputs / Strengths

- Establishment of MCZs – followed by an effort for scale up at pace
- Stakeholder engagement with other organisations in Plymouth Sound
- TECF/PPMC partnerships
- Water users guide (needs updating)
- Tight local community
- Dockyard Port Order 2020

Activities

Engagement with stakeholders, outreach, and education, research into technical solutions

- Education
- Introduce no take zones
- Research
- Create consortiums for policy change, based on best practice

Outputs / products/ tools

Improved policies, zoning and regulations that are understood and respected by all users

- No take zones
- Healthier seas – more wildlife – happier people
- Better understanding of people's actions when selecting seafood
- People understand and support enforcement and regulations

Engagements / who needs to be involved

Water users, fishers, fishing organisations, NGOs,

- Reporting incentives for fishermen. Bonus for appropriate reporting to encourage less illegal catch.
- More engagement with on the ground fishers
- Empower people in decision making process
- Knowledgeable people

Vision

Better enforcement and regulation of fishing activity (non-commercial) and zoning (no-take zones)

- Balanced approach to recreation and environmental pressures
- Equal access to recreation
- Consistency between treatment of recreational and commercial fishers
- Good regulation/enforcement supported by "self-policing"
- Only practice hand on individual fishing and gathering practices

Appendix 4

TECF Survey Results

Overview

In conjunction with the impact event, and in response to issues raised by the water user group, Tamar Estuary Consultative Forum (TECF) delivered a survey of local groups to explore opinions around research data. They received 58 responses, representing different professional sectors and the general public and water users. The key results, as presented below, support the project concept and 'next steps' developed from one of the Restoring Biodiversity sessions at the impact event (page 21).

As a result, TECF plan to investigate the options for producing a public platform to share and signpost relevant local research and data, working with PML to align with the outputs of the biodiversity group.

Survey results

When asked about research in the Plymouth Sound and Estuaries:

- Results showed there were a range of reasons why people are interested in research mostly collaborating, using or participating in research, or just learning more and reducing their impact.
- Respondents who identified as 'water users', or 'the general public' said they wanted to participate in research and/or reduce their environmental impact.
- The majority of respondents searched the internet for research, but asking someone directly, using organisation's websites and academic publications are also important. Social media was comparatively less used.
- Respondents have mixed success rates of finding what they are looking for but generally did want to know more about research projects.
- Respondents overwhelmingly said yes they would use a local research register of research but when asked what the most useful resource would be, results suggested a Research Directory on a web page signposting would be the best method, complimented by direct communication through a newsletter or meeting, possibly a research register and/or annual conference.

When asked more specifically about marine data:

- Majority of respondents did say they use marine data.
- Again, most people searched the internet to find their data, but direct communication, research organisations websites and national data services were all important methods too. Local data and international data services were less used comparatively.
- Most people used data to increase their understanding of the marine environment, but also important uses were identifying patterns, testing hypothesis, supporting communication, supporting decision making, and informing recreational activities.
- The knowledge of whether data exists is the biggest barrier to finding data, access was also identified a common barrier.

Appendix 4

Summary of additional comments that are of note:

- Generally, a positive response to the spirit of the survey, respondents were passionate about engaging in research in the place they work and live.
- General public/water users want to know more about where they live.
- One recreational water user response highlighted they would like information on their smartphone to learn more about the MPA and help to protect it.
- The ability to search by location would be helpful
- Refer to and link in with other data hubs like MEDIN and Destination Plymouth's Data hub for Devon and Somerset
- Sharing of research at the design phase would be helpful for collaboration.

The results suggest the following conclusions:

1. A new resource to help people find research and data relevant to the Plymouth Sound and Estuaries would be beneficial to improve:
    - Improve collaboration
    - Improve evidence-based management or conservation projects
    - Improve research participation
    - Improve knowledge and awareness and education of the site
    - Support behaviour change towards 'environmentally friendly' actions
    - Support people to find what their looking for.

2. An online research directory would be the most effective resource, and could possibly be supported by direct communications, meetings and events and social media.

3. Such a resource should be designed to be used by both professionals and the general public.

4. Such a resource should help research and data to be found easily on internet searches, and should align well with organisations websites and existing data platforms.

5. Direct contact through partnership meetings remains important for finding out about research.

TECF will be sharing and discussing the survey results through the water users group and TECF steering group. For further information please contact Amelia Sturgeon Amelia.Sturgeon@plymouth.gov.uk

Appendix 5

PML Session Lead Profiles

Clean Seas: Chaired by Frankie Hopkins and Liz Atwood

Dr Frankie Hopkins
Coordinates the "**Clean Seas**" impact area at PML. She fosters collaboration and strategic engagement with internal and external stakeholders, overseeing PML's contributions to this global challenge.

Frankie's research focuses on marine trace gases like dimethyl sulfide (DMS) and halocarbons, along with exploring human health effects from sea air exposure. She has presented her research at the Exeter Soapbox Science event and was featured on two BBC World Service radio programs.

Dr Elizabeth C. Atwood
Research Scientist working on a variety of projects dealing with coastal water quality monitoring and marine plastics detection.

Liz is interested in coastal water quality algorithm development, hyperspectral remote sensing development, riverine plastic modelling & monitoring, and UAV-based data collection methods for validation of satellite data as well as within river detection purposes.

Climate Change: Chaired by Yuri Artioli and Helen Finlay

Dr Yuri Artioli
Coordinates the "**Understanding and mitigating climate change**" impact area at PML. Since September 2020, he has coordinated efforts to translate research into actionable solutions.

Yuri specializes in modelling the impacts of global stressors like climate change, and human activities such as nutrient pollution, fisheries, and aquaculture on marine ecosystems. He studies the interactions among these factors and their implications for addressing societal challenges like climate change and food security.

Prof. Helen Finlay
Member of the Global Ocean Acidification Observing Network's Executive Council and lead coordinator for its North East Atlantic hub, Helen fosters global monitoring of ocean acidification, knowledge sharing, and capacity building for effective solutions.

Helen is interested in understanding the effects of climate change and ocean acidification on marine ecosystems, with a particular focus on the Arctic. Helen also contributes to raising public awareness of ocean health through school educational programmes, such as Encounter Edu's 'Arctic Live'.

Appendix 5

PML Session Lead Profiles

Restoring Biodiversity: Chaired by Claire Szostek

Dr Claire Szostek
Coordinates the **"Biodiversity"** impact area at PML. Through this role Claire facilitates internal activities and discussion to maximise our impact on this key global challenge.

Claire has over ten years of research in marine fisheries ecology, with recent work centred on interdisciplinary projects looking at the environmental and social outcomes of offshore energy developments. She collaborates closely with the UK fishing industry and government, facilitating connections between science and policy. Claire also develops tools and processes to apply Ecosystem Service approaches to marine renewable energy challenges.

Habitat Management: Chaired by Pennie Lindeque & Andy Rees

Prof. Pennie Lindeque
Head of Marine Ecology and Biodiversity at PML, winner of the prestigious Blue Planet Prize and Group winner of the Volvo Environment Prize 2022

Pennie spearheads pioneering research on microplastics and anthropogenic particles. Her work has influenced global policy, including the UK ban on microbeads in cosmetics. Pennie is committed to public engagement, contributing to popular science articles and documentaries like "Plastic Warriors" and "Eating our way to extinction." She has been recognized as one of the 'World's Most Highly Cited Researchers' in Environment and Ecology for five consecutive years.

Prof. Andy Rees
Principle research scientist and PML lead in the UK AgZero+ project, a multidisciplinary programme which is working with farmers in the UK's transition towards domestic food production that is sustainable, carbon-neutral and has a positive effect on nature.

Andy is a biogeochemist coordinating research projects and oceanographic expeditions on a global scale. His research delves into biogeochemical cycling from river catchments to the open ocean where he is investigating the impact of environmental change and anthropogenic activities on ecosystem health and function.

Appendix 5

PML Session Lead Profiles

Light Pollution: Chaired by Tim Smyth and Tom Davies

Prof. Tim Smyth
Head of Science for Marine Biogeochemistry and Observations at PML, his team works across a range of disciplines from air-sea gas exchange to nutrient cycling.

Tim leads the team that developed the first global atlas of Artificial Light at Night (ALAN), informing decisions on addressing oceanic light pollution which acts as a disruptor of natural wildlife patterns. With a background in data analysis and algorithm development, his interests span theoretical and experimental atmospheric and in-water optics. He's particularly passionate about innovating technologies for automated marine measurements.

Dr Tom Davies
Lecturer in Marine Conservation at the **University of Plymouth.** He is module lead of the Managing Marine Ecosystems, and Managing Human Impacts in the Marine Environment courses.

Tom is an interdisciplinary conservation ecologist working at the interface between environment and society. His research seeks to understand the impacts of human change on ecosystems and human-environment interrelationships. He has a strong interest in Artificial Light at Night (ALAN), and is a principle investigator of the NERC funded "Artificial Light Impacts on Coastal Ecosystems (ALICE)" project.

Fisheries and Aquaculture: Chaired by Sevrine Sailley

Dr Sevrine Sailley
Coordinates the "**Fisheries and Aquaculture**" impact area at PML. Through this role Sevrine facilitates activities to optimise PML's impact on this global challenge.

Sevrine specialises in zooplankton and higher trophic level modelling, including the impact of food web dynamics on biogeochemical cycles, the higher trophic levels and ecosystem services. She is experienced with a variety of modelling approaches (e.g. biogeochemical ecosystem models, inverse models, species distribution models), allowing her to address a wide range of scientific questions and societal needs. She is proficient in handling large amounts of data from long term time-series as well as laboratory experiments.

Appendix 5

PML Session Lead Profiles

Organiser and facilitator profiles

Jen Lockett

Head of Integrated Research, Impact & Support Services. Jen has specialist knowledge and expertise in generating and demonstrating research impact, translating scientific outputs into real-world change. She continues to lead the development of PML's impact approach, including initiatives to enhance collaboration between researchers, practitioners and communities.

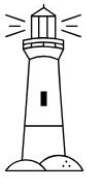
Dawn Ashby

Senior Communications Officer. Dawn has over 15 years' experience of delivering communications products for research projects. And aids in the coordination of impact management and analysis at PML.

Dr Gennadi Lessin

Coordinates the "**Ocean Literacy**" impact area at PML. Through this role Gennadi promotes and facilitates activities that link scientists, educators and wider community towards the society that understands, values and cares for the ocean. He is involved in several projects advancing Ocean Literacy at both local and international level.

Gennadi is a senior marine systems modeller with 20 years of experience developing and applying advanced modelling tools that improve our understanding of biogeochemical and ecological dynamics of marine systems and their response to natural and anthropogenic disturbance at scales from shelf seas to the global ocean and provide scientific support to marine management and policy.



Dr Stefanie Broszeit

Coordinates the **"Place-based"** impact area at PML. Through this role Stef oversees activities towards delivering local impact, ensuring PML's science can inform and support local marine management and research activities.

Stefanie is a senior marine ecosystem services scientist. Her research focusses on linking marine ecology to societal needs through the concept of ecosystem services These can be defined as the benefits human populations derive, directly or indirectly, from ecosystems, their processes and functions. She also leads the Marine Social and Natural Laboratory, a new way to address interdisciplinary research questions around nature and human wellbeing in Plymouth Sound and beyond.

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Appendix 5

PML Session Lead Profiles

Quillie Erskine

Research and Impact Services Officer. Quillie is a project manager. She has a MSc in Marine Environmental Management and worked on the community and events teams Surfers Against Sewage.

Jess Heard

Research and Impact Services Manager. Research and Impact Services Manager with over 15 years' experience in the project management, communication and impact delivery of large EU and UKRI projects.

Amy Kenworthy

Ocean Acidification Research for Sustainability (OARS) Project Manager. Amy is a project manager and science communicator with experience in managing international projects addressing pressures on the marine environment.

Dr Tom Mansfield

Data Systems Architect. Tom has a passion for all things data; from requirements elicitation and architecture design to the development of data-enabled technology and human-oriented applications.

Elin Meek

Research and Impact Services Officer. Elin has a background in Marine Biology, and has volunteered with multiple marine NGOs, helping to manage and coordinate their research and outreach projects.

Jane Netting

Research Systems Engineer. Jane works within the Digital Innovation and Marine Autonomy group at PML

Luz Rodriguez-Vargas

Research and Impact Services Officer. Luz is a Project Manager. She has an MSc in Marine Science and experience in environmental multilateral agreements (EMAs), marine conservation and marine management.

All of the facilitators have been trained in stakeholder participation techniques. They will work alongside the topic chairs to ensure everyone within the group has an opportunity to contribute, all inputs are captured and the session runs smoothly.

Appendix 6

TECF Profiles

Amelia Sturgeon, TECF Coordinator
Amelia manages and works to further the objectives of TECF, which is the strategic management partnership for the Plymouth Sound and Estuaries. She supports members and coordinates projects and management actions, promoting collaboration and information sharing. Amelia is responsible for updating, monitoring, and coordinating the implementation of the Tamar Estuaries Management Plan. After studying Marine Sciences Amelia worked planning and policy before TECF. She is hosted by Plymouth City Council so works closely alongside the PSNMP team.
Amelia.Sturgeon@plymouth.gov.uk

Rob Giles, Kings Harbour Master (KHM) & TECF Chair
Rob's primary role is to preserve and prioritise the port for military use, as a Statutory MOD Harbour Authority. Plymouth however is an extremely diverse port with environmental, commercial and leisure use. These are all managed alongside military movements to and from the dockyard to create a balance of activity. Rob was a Warfare Officer in the Royal Navy for 18 years in a multitude of seagoing appointments. After leaving the Royal Navy in 2007 he held a number of public sector appointments in a local authority and the Devon and Cornwall Police followed by Harbour Master/ CEO of the Dart Harbour and Navigation Authority before coming to Plymouth.
plymouth@khm.mod.uk

Andy Jones, Deputy Kings Harbour Master (DKHM)
Andy oversees the Port Conservancy, Safety and Events departments for KHM he advises on port matters to members of TECF. Andrew has been working with TECF for many years and has built up many trusted connections that brings out the best in collaborative working. An Oceanographer by background Andrew spent many years at sea in the Oil and Gas and Renewable Energy industry advising on marine science impacts on the installation, demolition and monitoring of sites worldwide. Andrew moved ashore in 2015 to take on the newly established Port Conservancy department for KHM before qualifying with distinction as a Harbour Master and promoting into the role of DKHM.
plymouth@khm.mod.uk

Ben Mitchell, Port Conservancy Officer
Ben's role is to oversee port conservancy and environmental protection within the Dockyard Port of Plymouth ensuring the port is fit for use as a port and that the harbour is in a fit condition for a vessel to utilise it safely. Ben has worked in the maritime industry for the last 14 years and holds a Maritime and Coastguard agency (MCA)officer of the watch unlimited certificate of competency.
plymouth@khm.mod.uk

Kate Duncan, Marine Recreation Impacts Officer, Plymouth City Council
Kate's area of work focuses on Marine Projects, principally the delivery of the Plymouth Sound and Estuaries MPA (EMS) Recreational Mitigation and Management Scheme (MRMMS) with the involvement of other partners around the MPA. This aims to share guidance, knowledge, and best practice to help reduce pressures on the protected features from recreational activities and helping to enhance and restore them. She has a background in marine biology including an MSc in Aquatic Ecosystem Management. After working in a different field returned to the marine sector Kate obtained a MSc in Marine Conservation from the University of Plymouth.
Kate.Duncan@plymouth.gov.uk

Appendix 6

TECF Core Members

Kings Harbour Master (TECF Chair) are responsible for ensuring safe and orderly passage and activity for vessels within the Dockyard Port of Plymouth, as well as the protection of the port, the Royal Navy and its vessels and other government assets. Their responsibilities also include environmental issues, oil pollution contingency and response and conservation to the management of the water space for all users.

PCC (TECF Host) is one of the five Local Authorities that border the MPA, PCC have a legal responsibility to protect and restore the MPA. They are a significant landowner of the surrounding land and own some of the seabed. They are the planning authority down to low water and regulate land use. They are also a Lead local Flood Authority.

ABP is the organisation responsible for Millbay Docks which includes the ferry terminal which has vessels leaving regularly to France and Spain.

CHC are the harbour authority for the Cattewater. They maintain order and safe navigation for craft by surveying and dredging the channels, maintaining navigation marks and lights, providing pilotage services and traffic regulation within the Cattewater and pilotage services to the remainder of the civil port.

DIO supports our armed forces by building, maintaining and servicing the infrastructure needed to support defence.

CC is one of the five Local Authorities that border the MPA, CC have a legal responsibility to protect and restore the MPA. They are a significant landowner of the surrounding land and own some of the seabed. They are the planning authority down to low water and regulate land use. They are also a Lead local Flood Authority.

DCC is one of the five Local Authorities that border the MPA. They are the District Council which South Hams District and West Devon borough Council sit under. DCC have a legal responsibility to protect and restore the MPA. They are also a Lead local Flood Authority

DoC is a majority owner of the fundus (seabed) throughout the MPA and supports conservation projects that help to protect the marine environment. The Duchy also have a role in planning consents in their areas of ownership

NE advises the Government on the natural environment. Its remit is to set conservation objectives and provide supplementary guidance for the site and assess and monitor the condition protected features.

SHDC is one of the five Local Authorities that border the MPA. SHDC have a legal responsibility to protect and restore the MPA. They are the planning authority down to low water and regulate land use.

SH has responsibility for the operation of the Sutton Harbour which includes the Fish Market and the and the lock gates.

WDBC is one of the five Local Authorities that border the MPA. WDBC have a legal responsibility to protect and restore the MPA. They are the planning authority down to low water and regulate land use.

Appendix 6

TECF Constituent and Guest Members

The EA is a Government Arms Length Body, its remit includes regulating major industry and waste, flood risk and coastal management, managing water quality and resources, fisheries in inland rivers, and conservation and ecological management.03708 506506

CIFCA
The Inshore Fisheries and Conservation Authorities (IFCAs) have a legal responsibility to manage inshore fisheries. which includes the introduction and enforcement of permitting and byelaws. They manage the waters on the Cornwall half of the MPA.

DSIFCA
The Inshore Fisheries and Conservation Authorities (IFCAs) have a legal responsibility to manage inshore fisheries. which includes the introduction and enforcement of permitting and byelaws. They manage the waters on the Devon half of the MPA.

The MMO is a Government Arms Length Body, it's remit is to license, regulate and plan marine activities (England). They are the licencing authority for development in the water, up to Mean High Water. They also are responsible for managing non-licensable activities (e.g. recreation).

SDNL is one of the three Landscape Partnerships surrounding the site, covering Jennycliffe Bay to the Yealm Estuary. The team works to enhance the special landscape qualities for which the landscape with designated, which includes its coastlines and seascapes. the estuaries.

TVNL is one of the three Landscape Partnerships surrounding the site, covering the land surrounding the River Lynher, Tamar and Tavey. The team works to enhance the special landscape qualities for which the landscape with designated, which include is estuaries and heritage.

Regular guest attendees;

The Plymouth Sound National Marine Park;

The University of Plymouth;

Devon Wildlife Trust.

Appendix 7

Plymouth Sound National Marine Park Profiles

Elaine Hayes, Chief Executive of the PSNMP Leading on the development and delivery of the UK's first National Marine Park. Since establishing the PSNMP, she has worked to develop not just the governance models but the delivery structure for the PSNMP. In addition to being part of the team that secured £11.8m from National Lottery Heritage Fund, Elaine is working with partners to develop a number of projects and the opportunity to collaborate with PML is very welcome. Elaine is a keen sea swimmer.

Elaine.hayes@plymouth.gov.uk

Kat Deeney, Programme Director PSNMP Kat has worked within the environment field for 20 years. Currently her portfolio includes strategic leadership for environmental planning, green and blue space enhancement and responding to the climate emergency within Plymouth City Council. This includes, transformation of the Council's Green Estate, including nature-based solution delivery, solar farm development and activating spaces for people. Development of the UK's first National Marine Park, delivery of a new Community Forest and the development of innovative environmental funding models. Kat is also a Director on Ocean City Biodiversity and Chelson Meadows Community Solar. In all work there is a fundamental focus on how people and nature can work together to achieve benefits for all. Kat is an avid horse rider, as well as runner and enjoys the water.

Kat.deeney@plymouth.gov.uk

Tors Froud, Partnerships & Inclusion Manager, PSNMP
Tors line manages the wonderful Coastal Ranger Service, as well as has accountability of the activity plan and evaluation, whilst embedding a model of behavioural change, in synergy with education, economic opportunities whilst honouring the PSNMP ethos of environmental conservation and a successful legacy for National Marine Parks. Tors is a proud Cornish mermaid, partaking in a variety of water sports, who's natural habitat means rocking flipflops and salty hair.

Tors.froud@plymouth.gov.uk

Sarah Lloyd, Marketing Manager on PSNMP, PCC
Sarah joined Plymouth City Council's Marketing and Events team as Marketing Manager in January 2023 bringing with her over 15 years of place marketing experience. Sarah began her marketing career at St Katharine Docks in London before moving on to British Land head office then to Greystar Europe, where she established their student accommodation brand, Chapter. Since relocating to Plymouth Sarah has completed a degree in Creative and Professional Writing at the University of Plymouth.

Sarah.lloyd@plymouth.gov.uk

Sam Balderson, Head Ranger, PSNMP
Sam has spent many years living and working on small remote islands. This included 7 years in the Seychelles as a: Research assistant, Scientific diver, Conservation Officer, and Activity Centre Manager. As well as the tropics, Sam has spent time on the opposite side of the world living and working in the Falkland Islands and South Georgia. Having completed a Conservation MSc at UCL, Sam has a passion for nature and particularly the marine environment that he loves to explore when SCUBA diving and he is a keen wildlife photographer both above and below the waves.

Sam.balderson@plymouth.gov.uk

Patrick Knight, Economy, Partnerships & Regeneration Manager, PCC
Patrick led on development of capital improvements to the PSNMP Gateways, at Tinside Lido, Mount Batten Centre and Mount Edgcumbe. He is currently focussed on delivery of the c.£3.5m Tinside Lido renewal project. A manager with 25+ years' experience of developing and delivering a diverse range of partnerships, policies, programmes, and projects to drive productive, inclusive and regenerative outcomes.

Patrick.knight@plymouth.gov.uk

Appendix 7

Plymouth Sound National Marine Park Profiles

Patrick Bowes, Economic Development Manager- Projects, PCC
Patrick joined the PSNMP team in 2021 contributing to the development phase of the capital gateway projects and is now involved in the delivery of the Tinside Renewal project. A town planner by training, Patrick brings nearly 40 years' experience working in planning, building conservation and economic development using his project management skills in delivering heritage, public realm and community led regeneration projects working closely with a wide range of stakeholders. Patrick enjoys working in a multi-disciplinary team and likes to champion what urban design and the built environment has to offer to the city in challenging times.

Patrick.bowes@plymouth.gov.uk

Nick Helm, PSNMP Ranger & Volunteer Coordinator
Nick has built his burgeoning career on engaging people with the marine environment, fostering a deep appreciation for blue and green spaces in communities with the biggest disconnection to the water. With a passion for connecting communities to the natural world, Nick has developed educational materials and led initiatives that highlight the importance of marine conservation and sustainable practices. As the coordinator of our volunteer program, he has successfully mobilized and managed a dedicated team of volunteers and developed volunteer opportunities across the park for people to enhance their skills and experience as well as form a deeper connection with the blue and green. His expertise and dedication have inspired many to actively participate in preserving our oceans and coastal ecosystems. Nick's innovative approach and unwavering commitment make him a vital advocate for environmental stewardship and a valued member of our team. Surfer, swimmer, rugby player and social secretary, amongst other things!

Nick.helm@plymouth.gov.uk

Brett Lockwood – Digital Marketing Officer on PSNMP
Since graduating in fine art photography, Brett has freelanced for local initiatives championing mental health, disadvantaged communities, and the natural environment. Noticing the growing need for industry standard photography on social media channels. Since 2022, Brett redirected his craft towards social media and digital marketing. He's been creating engaging content and has been having a blast ever since.

Brett.lockwood@plymouth.gov.uk

Liz Cole, Natural Infrastructure Officer, PCC
Liz is a project manager coordinating several green and blue infrastructure projects across the city with focus on nature recovery, community engagement and health and wellbeing. She has a particular role in the statutory delivery of Marine Recreation Mitigation & Management.

Liz.cole@plymouth.gov.uk

Kate Duncan, Marine Recreation Officer, PCC
Kate's area of work focuses on Marine Projects, principally the delivery of the Plymouth Sound and Estuaries MPA (EMS) Recreational Mitigation and Management Scheme with the involvement of other partners around the MPA network. This aims to share guidance, knowledge, and best practice to help reduce pressures and negative impacts on the protected features from recreational activities and helping to enhance and restore them. She has a background in marine biology including an MSc in Aquatic Ecosystem Management. After working in a different field returned to the marine sector obtaining a MSc in Marine Conservation from the University of Plymouth.

Kate.duncan@plymouth.gov.uk

Appendix 7

Plymouth Sound National Marine Park Profiles

Emily Angell, PSNMP Engagement Co-ordinator at the Ocean Conservation Trust (OCT).
Emily leads on the community engagement project Meet the Marine Park (MTMP), which acts as a roving welcome centre for PSNMP by visiting community events. Emily delivers a range of marine science, art, and heritage themed activities at these events to inspire and empower the people of Plymouth to visit and engage with their local blue space.

Emily.angell@oceanconservationtrust.org

Elspeth Shears, PSNMP Schools Project Lead hosted by the Ocean Conservation Trust.
Elspeth coordinates and delivers the PSNMP 'Sea in Our School' (SIOS) educational programme, offering outreach and engagement activities to primary schools across Plymouth.
With a background in education, community engagement and communications, Elspeth's role is dedicated to inspiring the next generation of marine citizens. She has experience working closely with coastal communities, stakeholders and partners in the marine sector and is looking forward to collaborating with the wider PSNMP community to support these educational initiatives.

Elspeth.shears@oceanconservationtrust.org

Sam Towers, PAL Learn to Swim Manager, Plymouth Active Leisure (PAL)
Before her role as manager, Sam had been a swim Teacher/Coach, with over 20 years' experience. She is delighted to be part of PSNMP and help develop the indoor and outdoor safe swimming programme. Sam is still passionate about swim teaching, especially children with physical and sensory disabilities. She is Head Coach for the PLC Disability Hub Cub, and has had lots of swimmers who are now, classified and on the Paralympic pathway. She wants to make swimming accessible to every child/adult regardless of their background or ability. Looking at how to remove obstacles that prevent them from doing this, is something she really wants to prioritise and push forward.

Sam.towers@plymouthactive.co.uk

Amelia Groom, PSNMP Assistant Ranger
After recently graduating from Plymouth University with a degree in Environmental Management and Sustainability, Amelia will be working as an Assistant Ranger, working closely with Ranger Nick with the volunteers, amongst other things. Amelia's passion for marine protection led her to relocate to Plymouth where she can also enjoy one of her favourite activities, sea swimming.

Plymouth Sound
National Marine Park

Thank you for every contribution to the event and this report, we look forward to continuing to work together for the benefit of the Plymouth Sound and Tamar Catchment

The Research Impact Spotlight: Plymouth Sound and the Tamar Catchment event 2024 was brought to you by Plymouth Marine Laboratory (PML), Tamar Estuary Consultative Forum (TECF) and Plymouth Sound National Marine Park (PSNMP).

PML | Plymouth Marine Laboratory

PML is a charity, undertaking innovative, cutting-edge marine research, allowing society to benefit from clean, productive, biologically diverse seas, now and for future generations.

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TECF is a partnership of organisations and local authorities with statutory responsibility towards the management of the Plymouth Sound & Tamar Estuaries Marine Protected Area (MPA). TECF and its advisory groups provide an effective and collaborative framework for managing the MPA whilst recognising the commercial, defence and recreational importance of the site.

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TAMAR ESTUARIES CONSULTATIVE FORUM
OUR COMMON ASSET

Plymouth Sound National Marine Park

Plymouth Sound National Marine Park: Connecting with people in, on, under and around the UK's first National Marine Park

PSNMP c/o Plymouth City Council, Ballard House, West Hoe Rd, Plymouth, PL1 3BJ
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