
@NativeOysterNet
NATIVE OYSTER NETWORK
UK & IRELAND
If you are not yet a member of the Network, please contact NativeOyster@zsl.org to be added
The Native Oyster Network – UK & Ireland Conference
Galway City, Ireland
Tuesday 1st & Wednesday 2nd April 2025
© Dr Jose M. Fariñas-Franco
Arna chomhchistiú ag an Aontas Eorpach
Co-Funded by the European Union
Rialtas na hÉireann
Government of Ireland
Foras na Mara
Marine Institute
BIM
Ireland's Seafood Development Agency
UNIVERSITY OF PORTSMOUTH
ZSL
THE UNIVERSITY of EDINBURGH
CuanBeo

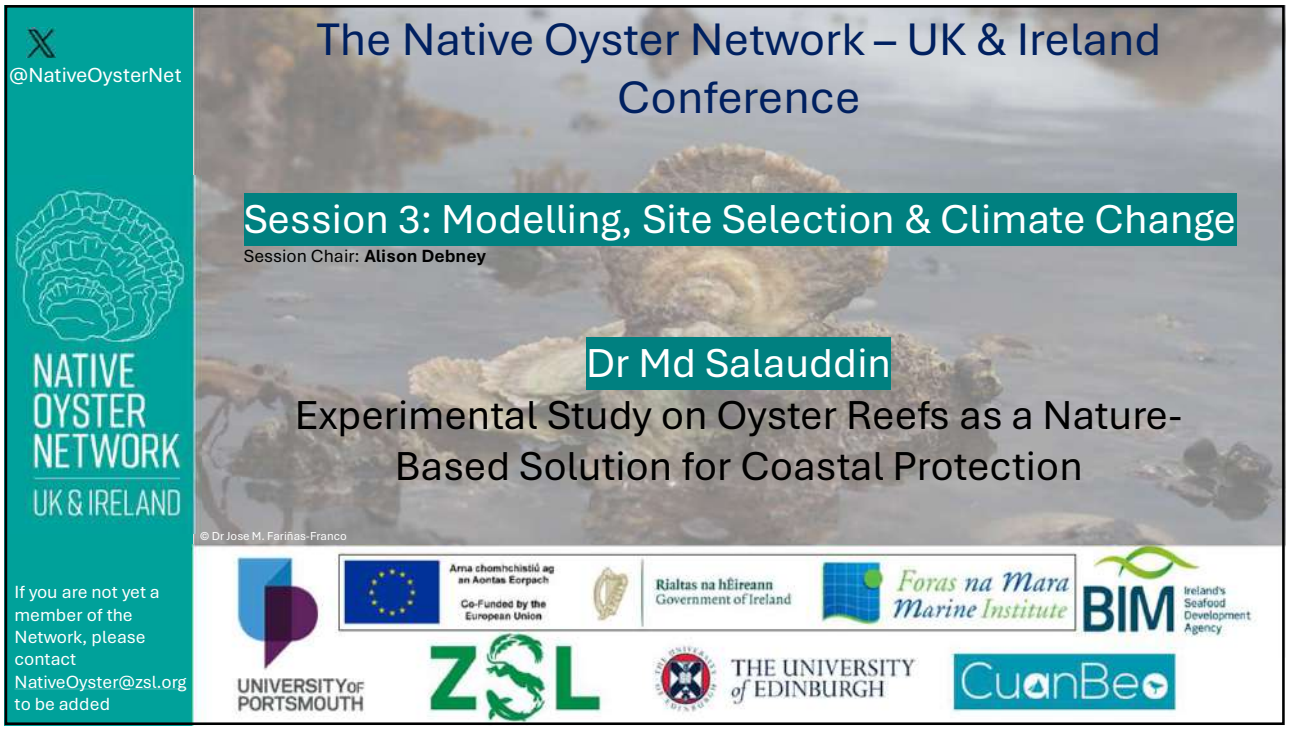
1


@NativeOysterNet
NATIVE OYSTER NETWORK
UK & IRELAND
If you are not yet a member of the Network, please contact NativeOyster@zsl.org to be added
The Native Oyster Network – UK & Ireland Conference
Day 2 welcome from Alison Debney
© Dr Jose M. Fariñas-Franco
Arna chomhchistiú ag an Aontas Eorpach
Co-Funded by the European Union
Rialtas na hÉireann
Government of Ireland
Foras na Mara
Marine Institute
BIM
Ireland's Seafood Development Agency
UNIVERSITY OF PORTSMOUTH
ZSL
THE UNIVERSITY of EDINBURGH
CuanBeo

2


ZSL
UNIVERSITY OF PORTSMOUTH
THE UNIVERSITY of EDINBURGH
Seascape Symposium II:
Reconnecting the Seascape
Wednesday 4th & Thursday 5th June 2025
Hosted in person
Zoological Society of London
Visit https://www.zsl.org/seascape-symposium-ii to book your tickets.
© Lewis Jefferies

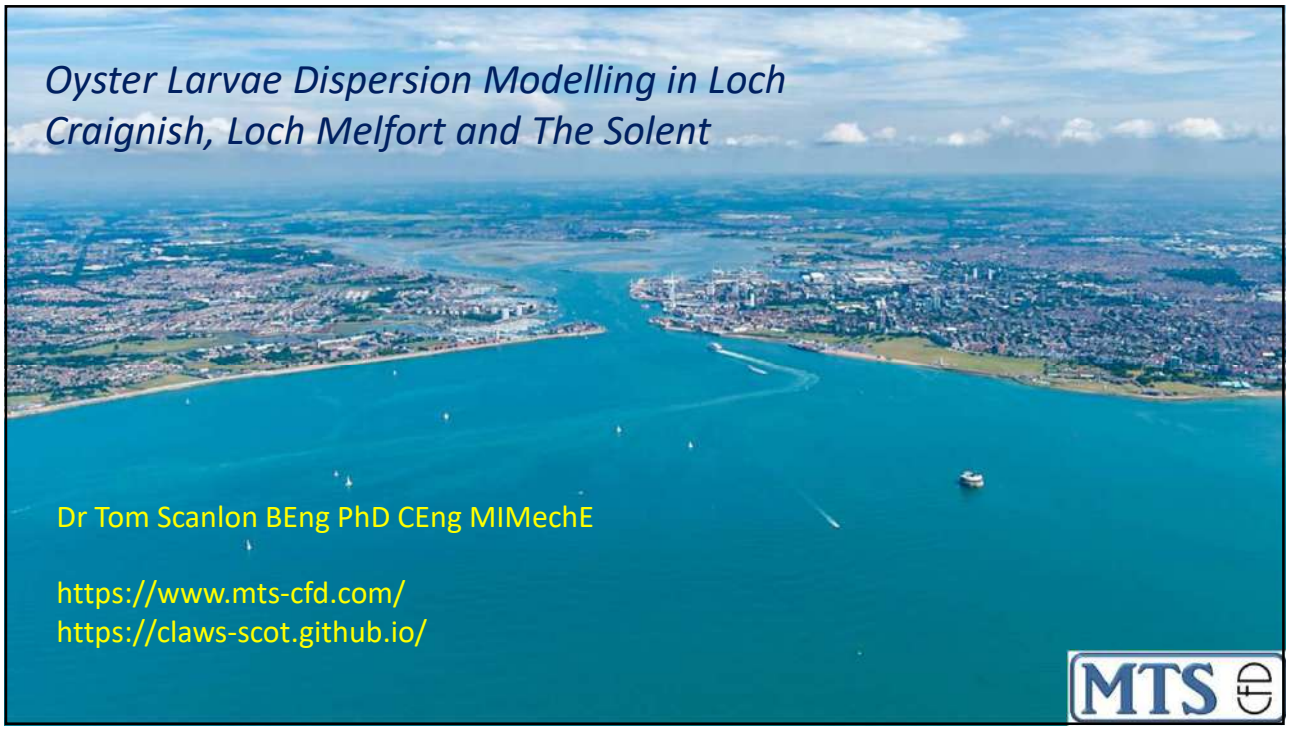
3


@NativeOysterNet
NATIVE OYSTER NETWORK
UK & IRELAND
If you are not yet a member of the Network, please contact NativeOyster@zsl.org to be added
The Native Oyster Network – UK & Ireland Conference
Session 3: Modelling, Site Selection & Climate Change
Session Chair: Alison Debney
Dr Md Salauddin
Experimental Study on Oyster Reefs as a Nature-Based Solution for Coastal Protection
© Dr Jose M. Fariñas-Franco
UNIVERSITY OF PORTSMOUTH
Co-Funded by the European Union
Rialtas na hÉireann Government of Ireland
Foras na Mara Marine Institute
BIM Ireland's Seafood Development Agency
ZSL
THE UNIVERSITY of EDINBURGH
CuanBeo

4


@NativeOysterNet
NATIVE OYSTER NETWORK
UK & IRELAND
If you are not yet a member of the Network, please contact NativeOyster@zsl.org to be added
The Native Oyster Network – UK & Ireland Conference
Session 3: Modelling, Site Selection & Climate Change
Session Chair: Alison Debney
Tom Scanlon
Oyster Larvae Dispersion Modelling in Loch Craignish, Loch Melfort and The Solent
Pre-recorded presentation
© Dr Jose M. Fariñas-Franco
UNIVERSITY OF PORTSMOUTH
ZSL
THE UNIVERSITY of EDINBURGH
CuanBeo
Rialtas na hÉireann Government of Ireland
Foras na Mara Marine Institute
BIM
Ireland's Seafood Development Agency

5


Oyster Larvae Dispersion Modelling in Loch Craignish, Loch Melfort and The Solent
Dr Tom Scanlon BEng PhD CEng MIMechE
https://www.mts-cfd.com/
https://claws-scot.github.io/
MTS CFD

6

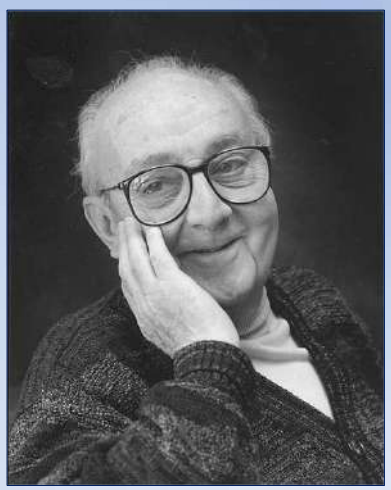
- CLAWS – Chemicals for Lice and Waste from Salmon Farms.
- Motivation – give coastal communities and individual citizens access to state-of-the-science marine environmental computer models.
- Similar data to that produced by industry/SEPA/DEFRA environmental modelling.
- Allow communities to challenge developments/assumptions based on sound science.
- New suite of open-source, particle-based software tools to model:

1. Chemical treatments (Pesticides for sea lice - Compare with SEPA standards).
2. Nutrients (Flushing time, capacity to absorb organic load P, N – Langstone Harbour)
3. Solid waste - Deposition footprint of salmon farm waste - feed/faeces – impact on benthic flora/fauna. Can be any solid particulate waste.
4. **Oyster larvae** – The distribution in estuaries for rewilding efforts – Solent Oyster Restoration.
5. Salmon Lice – State-of-the-science biological model based on most recent scientific trends (Norwegians).
6. Plastics/Litter – Arrochar litter sink, UK coastline, includes beaching model.
7. E.coli – Sewage spills from combined sewer overflows, runoff, Fife, Edinburgh, S@S.
8. Hydrodynamics – interrogate our data to directly compare flow currents, direction, sea level etc. with industry-standard calibration and validation criteria.

7

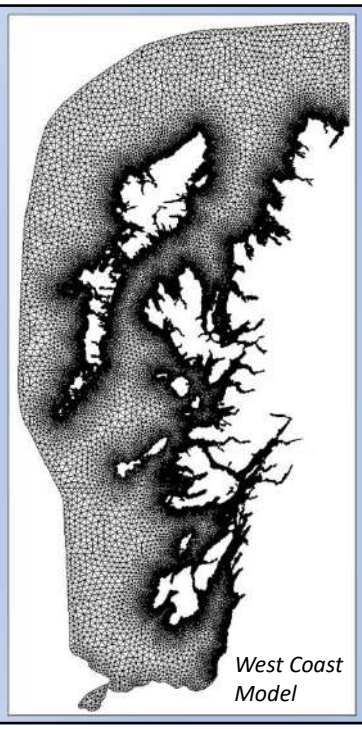
Computer Modelling – Is it realistic?

- George Box – *"All models are **wrong**, but some are **useful**."*
- ***Wrong**? – Based on certain underlying assumptions – we cannot model every single atom deterministically.*
- ***Useful**? – Does it provide a **reasonable** interpretation of what happens in physical reality?*
- ***Reasonable**? Has your model been **validated** against physical observation?*
- *Who sets the **validation** criteria? In our case statutory bodies – SEPA.*
- *If your model produces results that lie within a range of acceptable tolerances then it may be considered as a **validated** model. If not, then it is open to challenge – not taken seriously.*
- *All of our models in CLAWS use hydrodynamics (current speeds, sea levels) that are validated against SEPA criteria.*
- *ALWAYS ask how any model has been validated and against what criteria.*
- *Take care with the adjective "accurate" – "reasonable" is better.*
- *Take care with "verification" against "validation".*



George Box, British Statistician 1919-2013

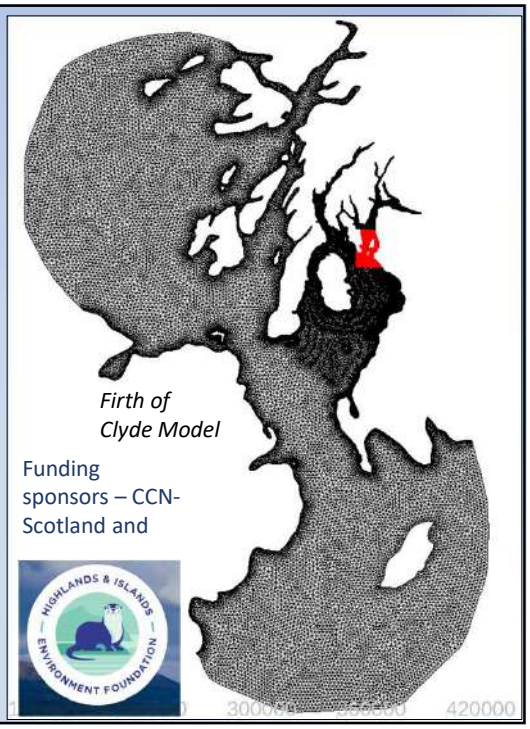
8



West Coast Model

1. *Hydrodynamics*

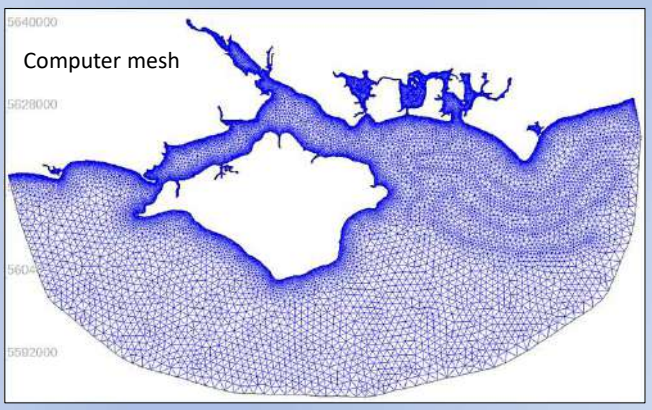
- 3 main HD models – *West Coast, Firth of Clyde and Northern Isles*.
- Open source Telemac software used in 3D and 2D.
- Computational mesh – solve equations of motion at each node.
- 10 terrain-following vertical layers in 3D study.
- Water currents driven by tides, wind, Earth spin, salinity and temperature.
- 139 Freshwater inlets in West Coast model.
- Meteo wind data from ERA5.
- Models validated against SEPA calibration/validation criteria.
- Models used to drive PT code for bath treatments, nutrients, solid waste, sea lice and oyster larvae.
- HD model takes around 1-week to run on large computer (32-cores).

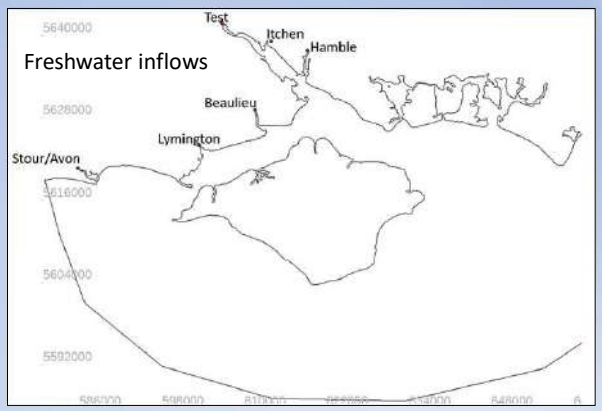


Firth of Clyde Model

Funding sponsors – CCN-Scotland and

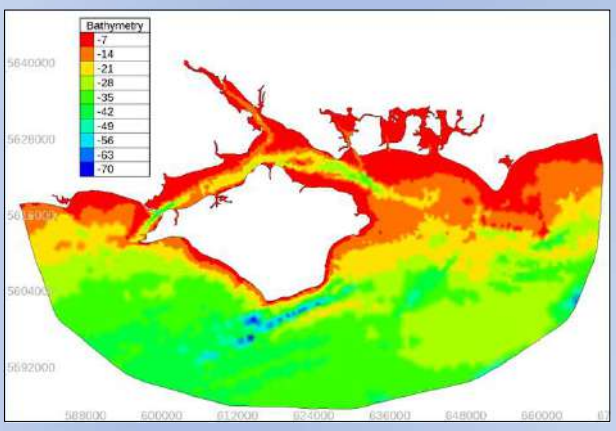
2. *Solent Model Development*



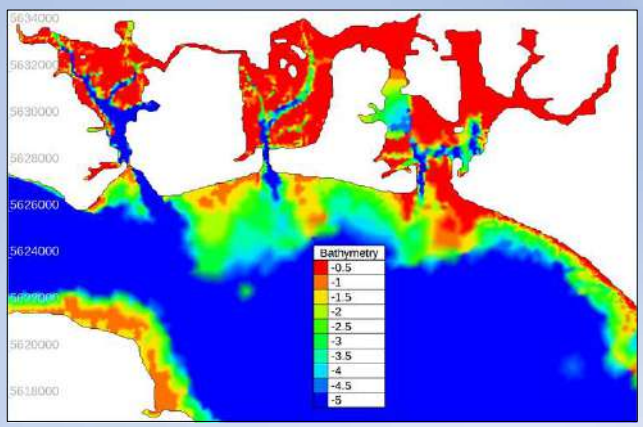


- Model extends from beyond Selsey Bill in the East, approaching Bournemouth in the West.
- Freshwater inflow data from UK National River Flow Archive (NRFA).
- Main drivers for flow currents are tides, winds, Earth spin and salinity/temperature differences.
- Model has depth (3D) with 10 terrain-following vertical layers down to sea bed.
- Sea bed bathymetry (depth) from publicly-available data sets (GEBCO, UKHO) and digitized Admiralty charts.

2. *Solent Model Development*



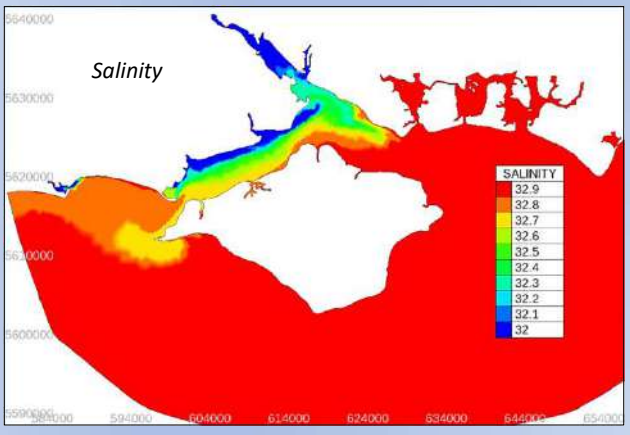
Sea bed depth (m) across The Solent model area



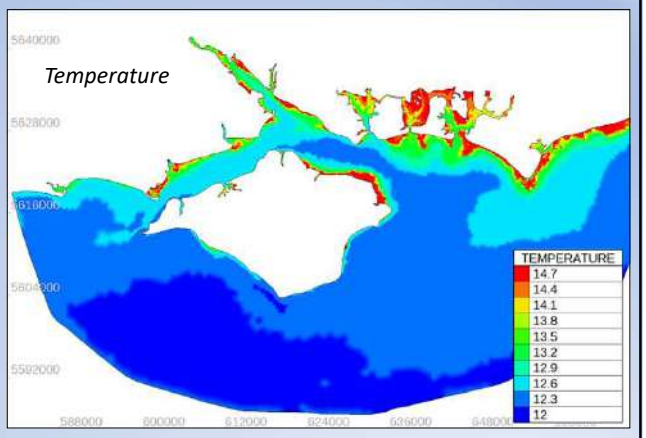
Sea bed depth (m) focused on Portsmouth, Langstone and Chichester harbours.

11

2. *Solent Model Development*



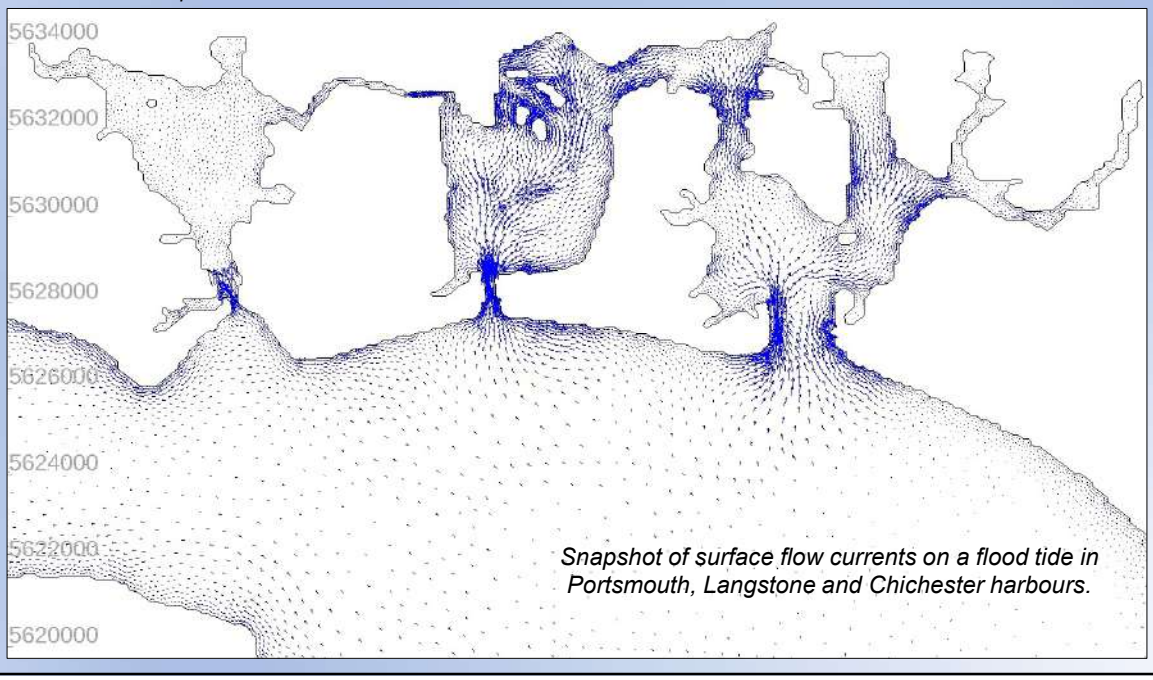
*Snapshot of near-surface **salinity** (PSU) on the 3rd June 2023 at 7 a.m.*



*Snapshot of near-surface **temperature** (°C) on the 3rd June 2023 at 7 a.m*

12

2. *Solent Model Development*



Snapshot of surface flow currents on a flood tide in Portsmouth, Langstone and Chichester harbours.

13

3. *Solent Model Validation*

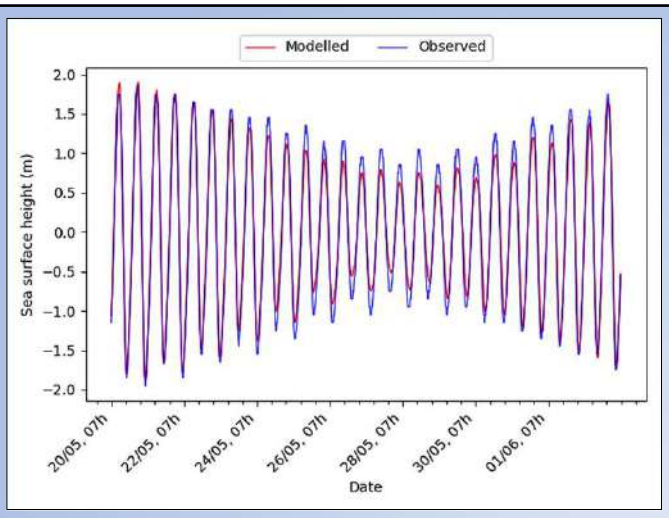
- *Is your model a reasonable interpretation of reality?*
- *Sample output of model predictions versus physical observation.*
- *Models validated successfully against SEPA validation criteria.*

Site locations 1-8 for validation of the hydrodynamic model (red circles). Observed data from UK Admiralty Total Tide (ATT) package.

14

3. *Solent Model Validation*

- *Is your model a reasonable interpretation of reality?*
- *Sample output of model predictions versus physical observation.*
- *Models validated successfully against SEPA validation criteria.*



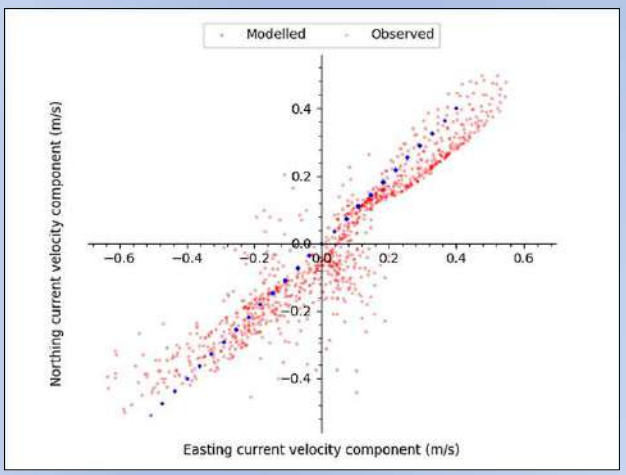
Comparison between observed and modelled sea surface level (m) at the measurement location Site 2, Chichester harbour, between 20th May and 3rd June 2023. Model skill d2 = 0.99.

	SEPA Standard	Telemac3D	Result
SSH	+/- 10 % of Spring range (m)	4.2 %	✓
SSH	+/- 15 % of Neap range (m)	8.8 %	✓

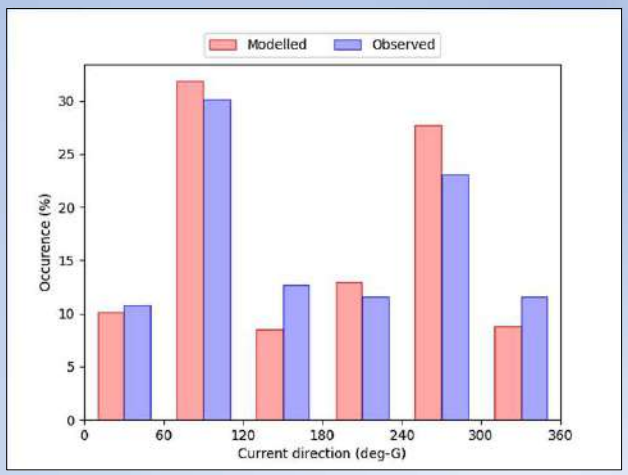
Model performance against SEPA standards for sea surface height (SSH) at the measurement location Site 2, Chichester harbour, between 20th May and 3rd June 2023.

15

3. *Solent Model Validation*



Scatter plot of observed and modelled velocity at the measurement location Site 4, Langstone harbour, between 20th May and 3rd June 2023.



Histogram of observed and modelled current direction at the measurement location Site 7, east of Isle of Wight, between 20th May and 3rd June 2023. Model skill d2 = 0.97.

16

3. *Solent Oyster Model – Collaboration with Prof. Joanne Preston of University of Portsmouth*

- *Virtual oyster "larva" particles are released into the marine environment from the 5 release sites (cultches). Each particle represents a single larva. 20 particles per hour released over 14-days, 30,000 particles in system.*
- *Multi-stage biology included in the model:*

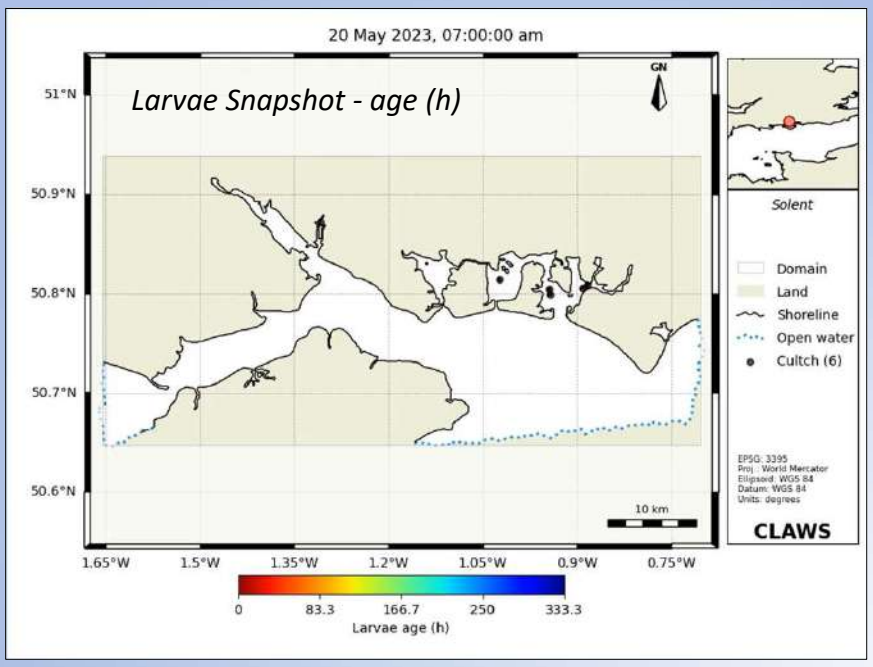
Biological stage	Parameter name	Parameter value	Comments
Trochophore	Maturation time to veliger	1 day	Time for passive trochophore stage to mature into upward-swimming veligers
Veliger	Maturation time to pediveliger	3 days	Time for upward-swimming veligers to mature into downward swimming or sinking pediveligers
Veliger	Upward swimming speed	3 mm/s	Based on the paper of [North_2008] but is relevant for oyster species (*Crassostrea virginica*)
Veliger	maximum number of swimming days allowed	3 days	Set to be equivalent to the maturation time to pediveliger
Pediveliger	mortality after day	13 days	Pediveligers expire after 13 days of the 14-day calculation
Pediveliger	Downward swimming or sinking speed	3 mm/s	Based on the paper of [North_2008] but is relevant for oyster species (*Crassostrea virginica*)
Pediveliger	downward swimming after day	6 days	Pediveligers can begin their downward descent to search for a suitable habitat e.g. hard substrata
Pediveliger	sinking after day	7 days	Equivalent to downward swimming but included for completeness
Pediveliger	deposited particles attached permanently after day	10 days	Successfully-deposited particles can no longer resuspend and are permanently attached

Multi-stage swimming behaviour

17

4. *Solent Model Applications –* ***Oyster Larvae***

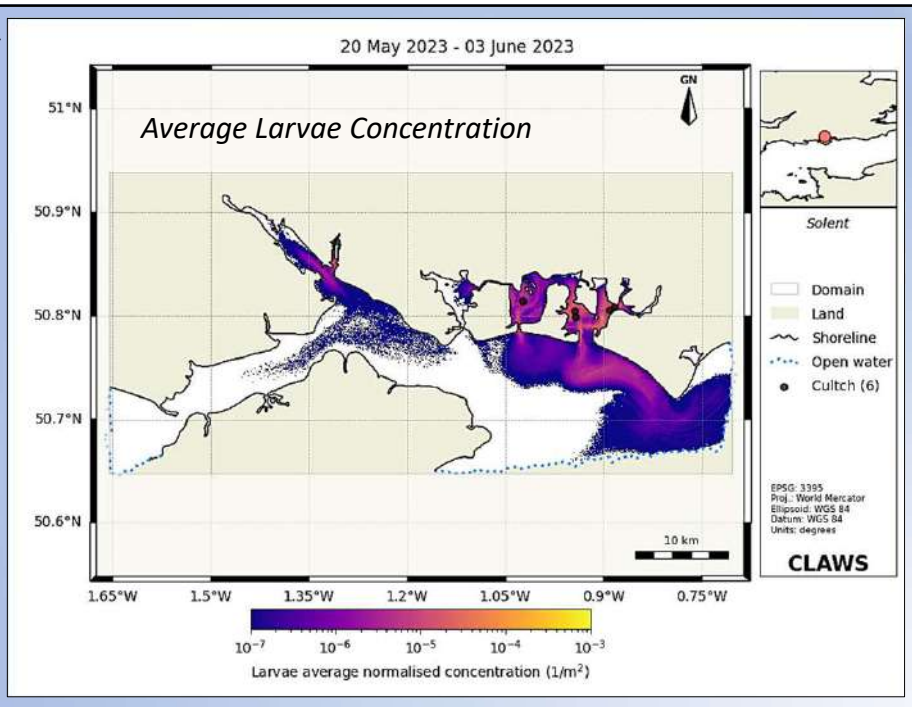
- *Solent Oyster Restoration Project.*
- *Understand larvae distribution.*
- *Larvae swimming and deposition behaviour included.*



18

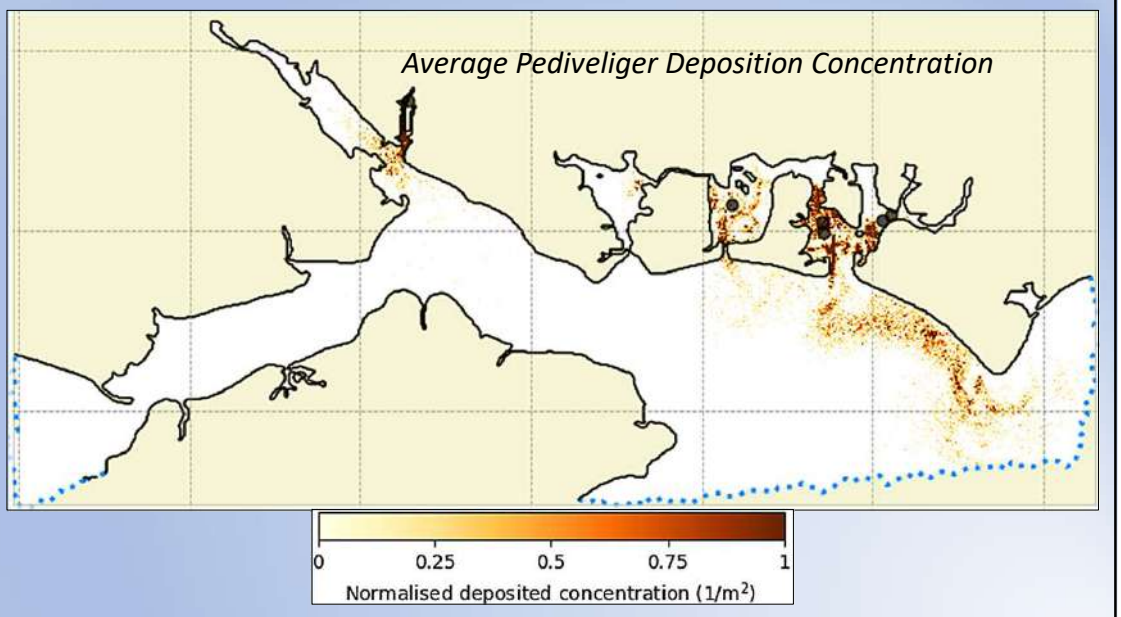
4. *Solent Model Applications –* ***Oyster Larvae***

- *Solent Oyster Restoration Project.*
- *Understand larvae distribution.*
- *Larvae swimming and deposition behaviour included.*



19

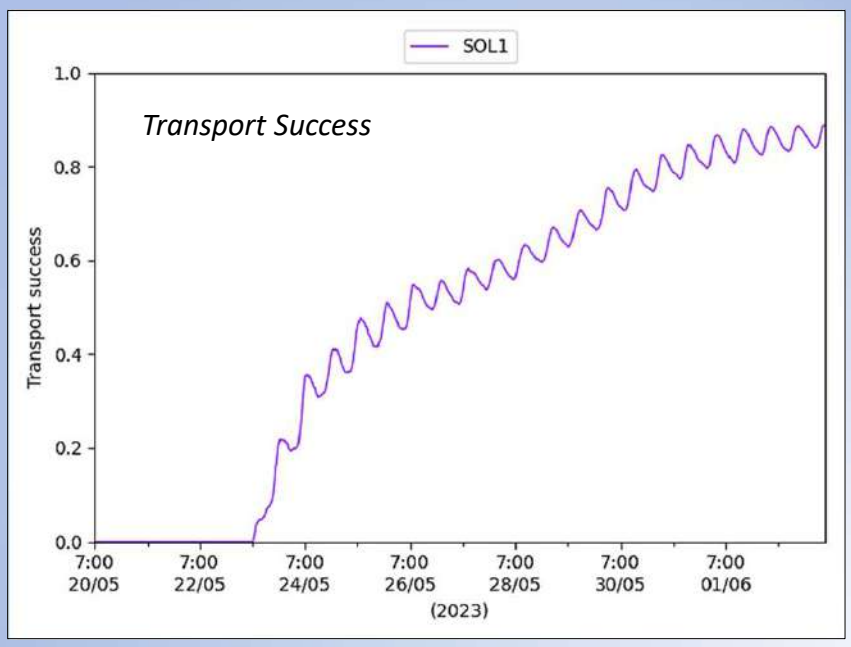
4. *Solent Model Applications –* ***Oyster Larvae***



20

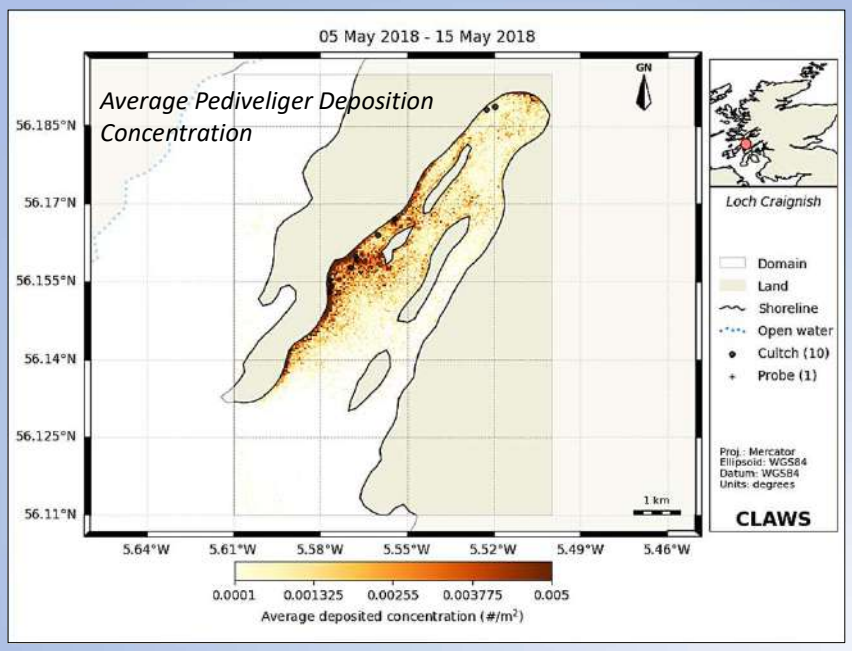
4. *Solent Model Applications –* ***Oyster Larvae***

- *Solent Oyster Restoration Project.*
- *Transport Success - %'age of released particles that successfully deposit.*



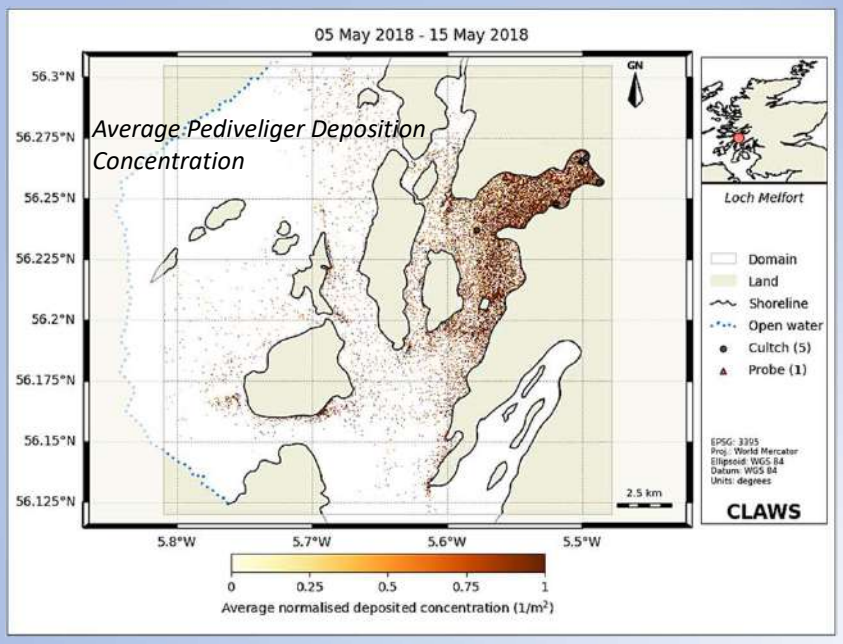
21

4. *Model Applications –* ***Oyster Larvae – Loch Craignish***

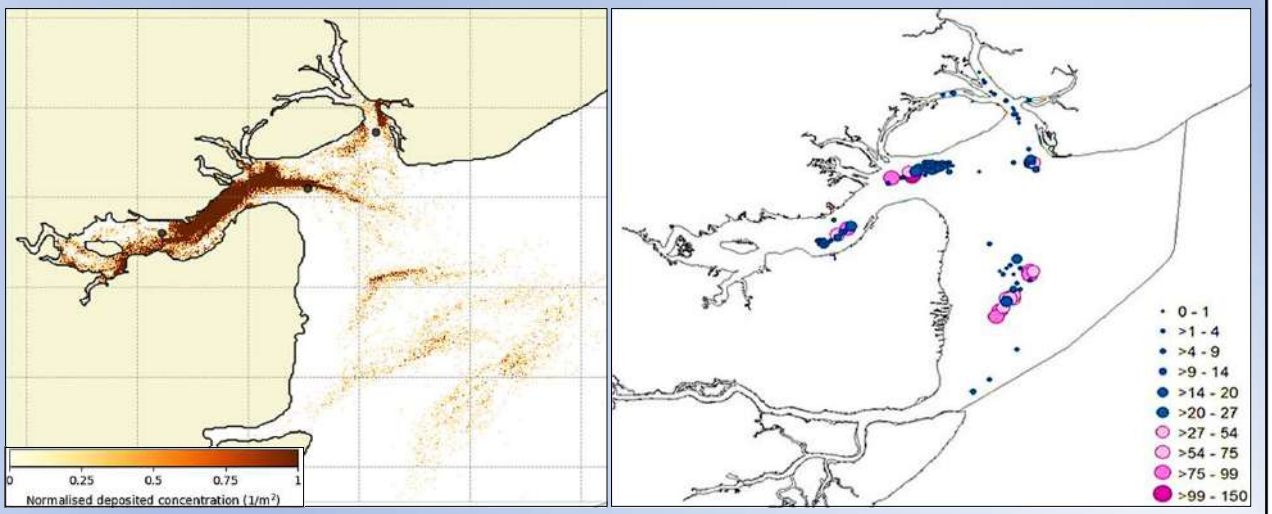


22

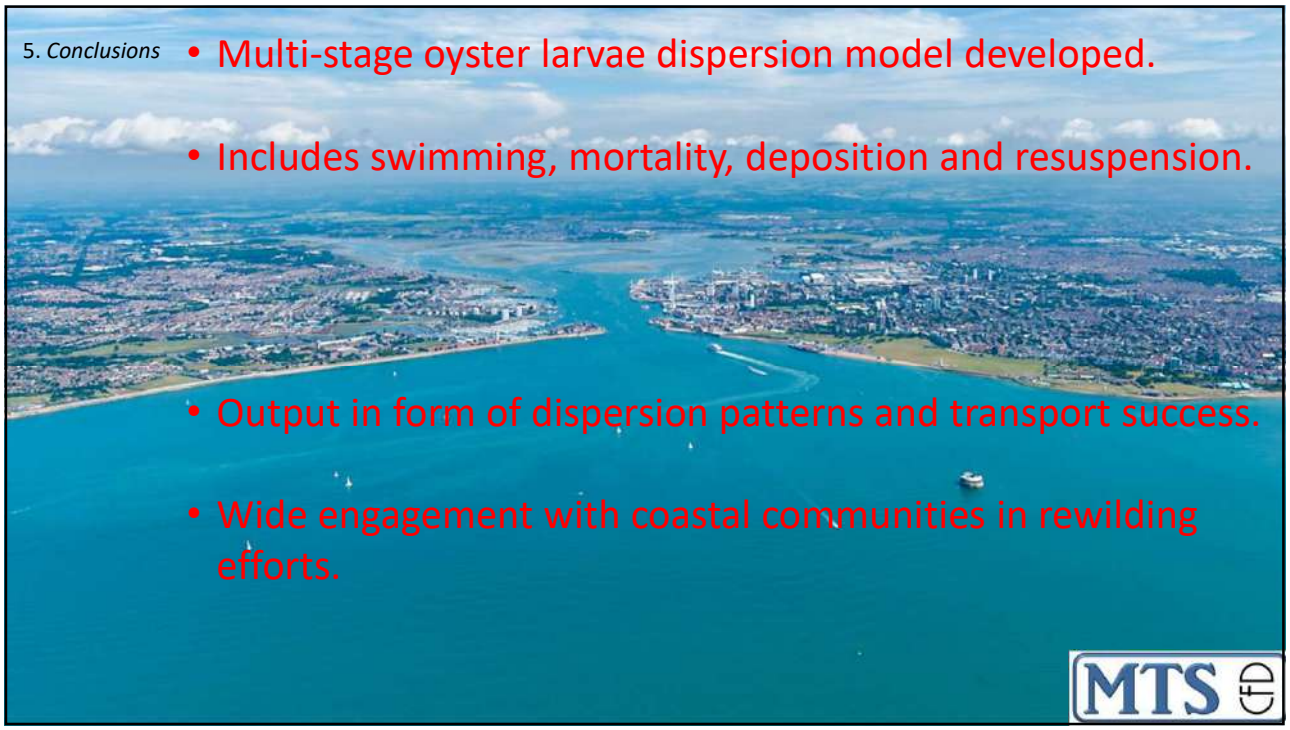
4. *Model Applications* – ***Oyster Larvae – Loch Melfort***



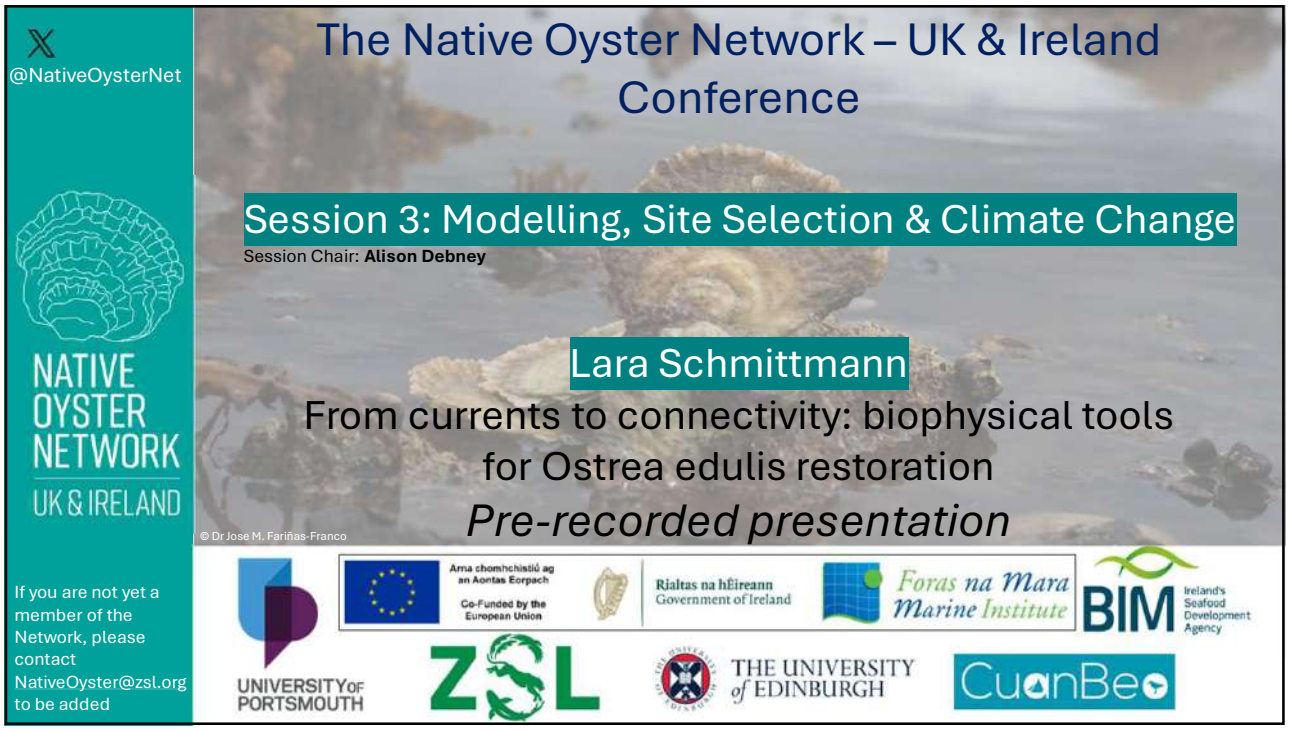
4. *Solent Model Applications* – ***Oyster Larvae, Essex MCZ, Colne-Blackwater Estuaries***



Average Pediveliger Deposition Concentration


5. Conclusions
• Multi-stage oyster larvae dispersion model developed.
• Includes swimming, mortality, deposition and resuspension.
• Output in form of dispersion patterns and transport success.
• Wide engagement with coastal communities in rewilding efforts.
MTS CFD

25


@NativeOysterNet
The Native Oyster Network – UK & Ireland Conference
Session 3: Modelling, Site Selection & Climate Change
Session Chair: Alison Debney
Lara Schmittmann
From currents to connectivity: biophysical tools for Ostrea edulis restoration
Pre-recorded presentation
© Dr Jose M. Fariñas-Franco
NATIVE OYSTER NETWORK
UK & IRELAND
If you are not yet a member of the Network, please contact NativeOyster@zsl.org to be added
UNIVERSITY OF PORTSMOUTH
Arna chomhchistiú ag an Aontas Eorpach
Co-Funded by the European Union
Rialtas na hÉireann
Government of Ireland
Foras na Mara
Marine Institute
BIM
Ireland's Seafood Development Agency
ZSL
THE UNIVERSITY of EDINBURGH
CuanBeo

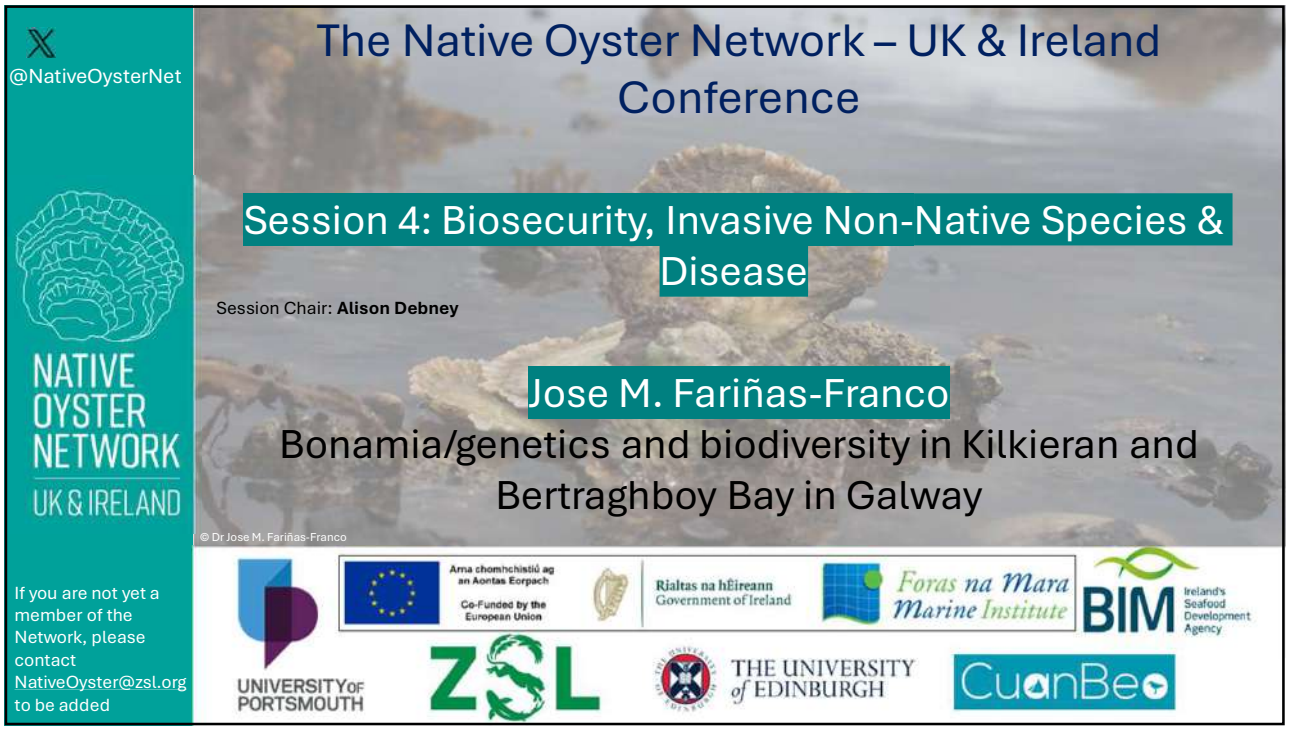
26


@NativeOysterNet
The Native Oyster Network – UK & Ireland Conference
Session 3: Modelling, Site Selection & Climate Change
Session Chair: Alison Debney
Stefano Carboni
Future proofing Native Oyster restoration initiatives in mediterranean shallow coastal lagoons: ShellfishBoost Project
© Dr Jose M. Fariñas-Franco
NATIVE OYSTER NETWORK UK & IRELAND
If you are not yet a member of the Network, please contact NativeOyster@zsl.org to be added
UNIVERSITY OF PORTSMOUTH
Arna chomhchistiú ag an Aontas Eorpach
Co-Funded by the European Union
Rialtas na hÉireann
Government of Ireland
Foras na Mara
Marine Institute
BIM
Ireland's Seafood Development Agency
ZSL
THE UNIVERSITY of EDINBURGH
CuanBeo

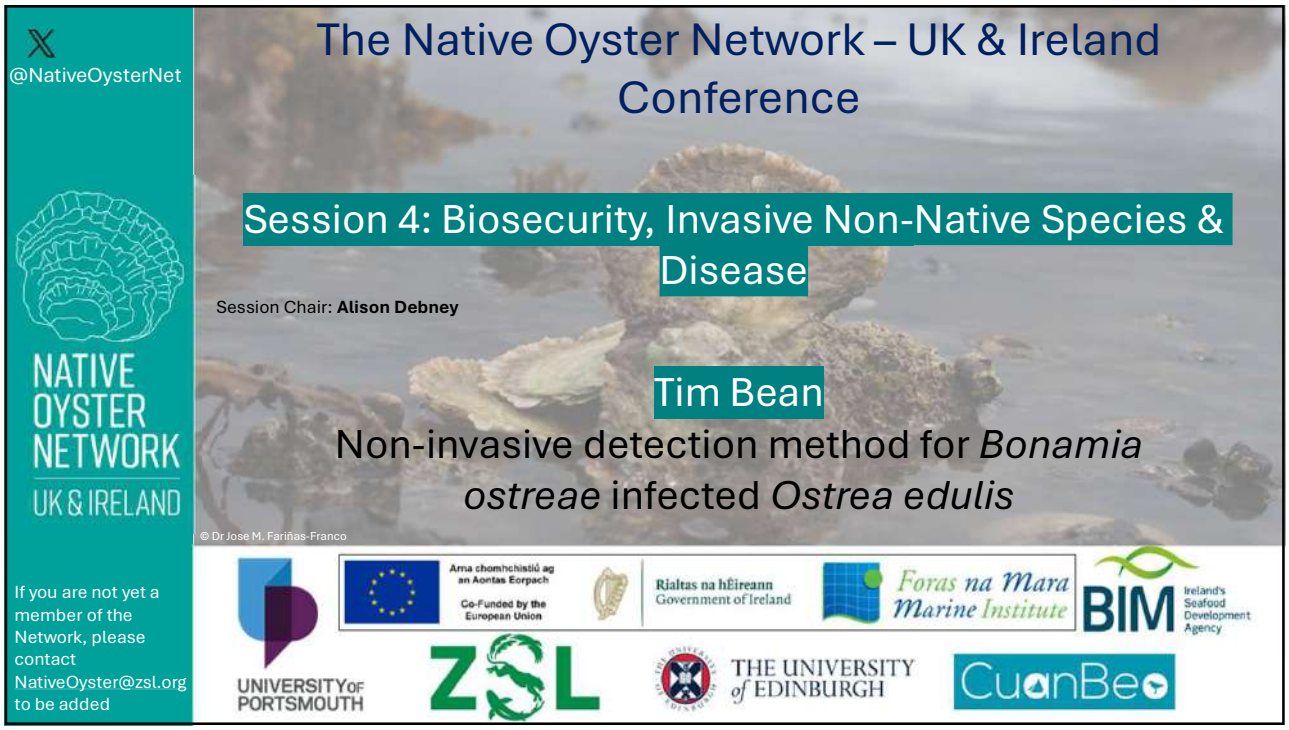
27


@NativeOysterNet
The Native Oyster Network – UK & Ireland Conference
Session 4: Biosecurity, Invasive Non-Native Species & Disease
Session Chair: Alison Debney
1. Jose M. Fariñas-Franco, Bonamia/genetics and biodiversity in Kilkieran and Bertraghboy Bay in Galway
2. Tim Bean, Non-invasive detection method for Bonamia ostreae infected Ostrea edulis
3. Gurjameer Ramday, Monitoring Success in Biosecurity
© Dr Jose M. Fariñas-Franco
NATIVE OYSTER NETWORK UK & IRELAND
If you are not yet a member of the Network, please contact NativeOyster@zsl.org to be added
UNIVERSITY OF PORTSMOUTH
Arna chomhchistiú ag an Aontas Eorpach
Co-Funded by the European Union
Rialtas na hÉireann
Government of Ireland
Foras na Mara
Marine Institute
BIM
Ireland's Seafood Development Agency
ZSL
THE UNIVERSITY of EDINBURGH
CuanBeo

28


@NativeOysterNet
NATIVE OYSTER NETWORK
UK & IRELAND
If you are not yet a member of the Network, please contact NativeOyster@zsl.org to be added
The Native Oyster Network – UK & Ireland Conference
Session 4: Biosecurity, Invasive Non-Native Species & Disease
Session Chair: Alison Debney
Jose M. Fariñas-Franco
Bonamia/genetics and biodiversity in Kilkieran and Bertraghboy Bay in Galway
© Dr Jose M. Fariñas-Franco
UNIVERSITY OF PORTSMOUTH
Arna chomhchistiú ag an Aontas Eorpach
Co-Funded by the European Union
Rialtas na hÉireann
Government of Ireland
Foras na Mara
Marine Institute
BIM
Ireland's Seafood Development Agency
ZSL
THE UNIVERSITY of EDINBURGH
CuanBeo

29


@NativeOysterNet
NATIVE OYSTER NETWORK
UK & IRELAND
If you are not yet a member of the Network, please contact NativeOyster@zsl.org to be added
The Native Oyster Network – UK & Ireland Conference
Session 4: Biosecurity, Invasive Non-Native Species & Disease
Session Chair: Alison Debney
Tim Bean
Non-invasive detection method for Bonamia ostreae infected Ostrea edulis
© Dr Jose M. Fariñas-Franco
UNIVERSITY OF PORTSMOUTH
Arna chomhchistiú ag an Aontas Eorpach
Co-Funded by the European Union
Rialtas na hÉireann
Government of Ireland
Foras na Mara
Marine Institute
BIM
Ireland's Seafood Development Agency
ZSL
THE UNIVERSITY of EDINBURGH
CuanBeo

30

@NativeOysterNet

NATIVE OYSTER NETWORK UK & IRELAND

If you are not yet a member of the Network, please contact NativeOyster@zsl.org to be added

The Native Oyster Network – UK & Ireland Conference

Session 4: Biosecurity, Invasive Non-Native Species & Disease

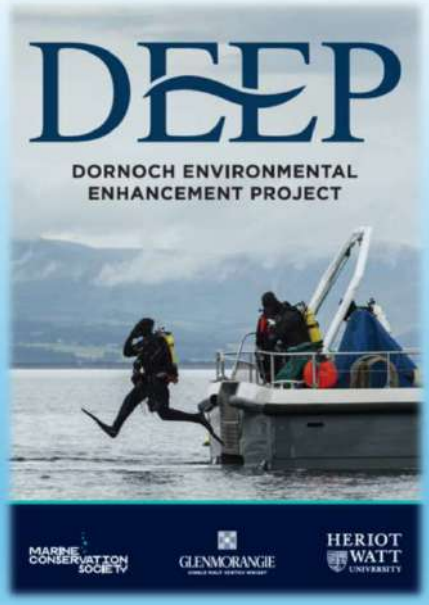
Session Chair: **Alison Debney**

Gurjameer Ramday

Monitoring Success in Biosecurity

UNIVERSITY OF PORTSMOUTH · Arna chomhchistiú ag an Aontas Eorpach Co-Funded by the European Union · Rialtas na hÉireann Government of Ireland · Foras na Mara Marine Institute · BIM Ireland's Seafood Development Agency · ZSL · THE UNIVERSITY of EDINBURGH · CuanBeo

31



NATIVE OYSTER NETWORK UK & IRELAND

Success of Biosecurity in the Translocation of Oysters (*Ostrea Edulis*) For Restoration

Gurjameer Ramday[1], Naomi Kennon[1], Tahirah Jafaar[2], Mark G. J. Hartl[1], Rebecca MacPherson[1], Colin Moore[1], Callum Mcdevitt[1] & William Sanderson[1]

[1]*EGIS, School of Energy, Geoscience, Infrastructure and Society, Heriot-Watt University, UK.*

[2]*University Malaysia Terengganu, Malaysia*

32

The Project

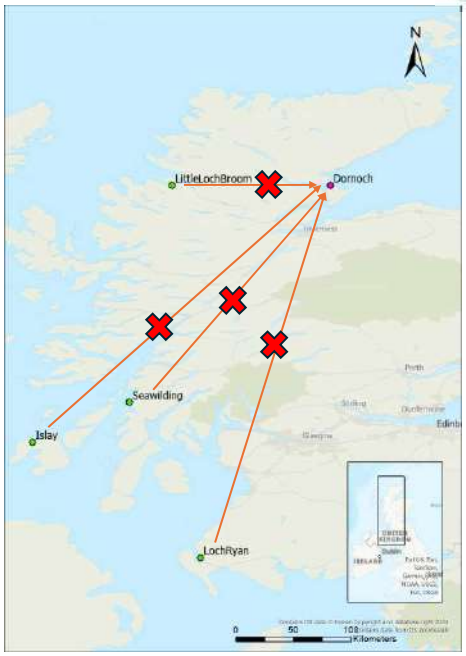
- Glenmorangie, Heriot-Watt University & Marine Conservation Society
- Aim: To establish a self-sustainable oyster reef by 2030
- Total deployed: 112,583

33

Supply Chain

- The Loch Ryan Oyster Fishery Company Ltd, the last remaining wild fishery for native oysters in Scotland, in operation since 1701.
- Maorach Baeg in Little Loch Broom
- Seawilding in Loch Craigneish
- Islay Oysters in Loch Gruinart

Not a straightforward translocation,
BIOSECURITY!!



34

Biosecurity

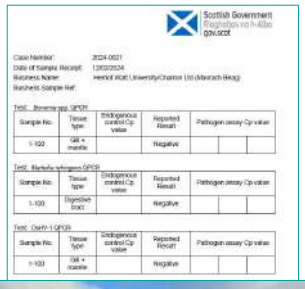
- Prevents spread of Invasive Non-Native Species (INNS)
  - Threaten biodiversity and/or cause economic damage
  - Annual cost of ~£39.8 million
- Prevents spread of disease
  - Can cause up to 80% mortality!

35

Biosecurity Process

Developed by DEEP:

1. Pre-movement site inspection (HWU)
- Site inventory (invasive non-native species)
- Disease testing (qPCR of samples)



36

Biosecurity Process

1. **Pre-movement site inspection (HWU)**
   - Site inventory (invasive non-native species)
   - Disease testing (qPCR of samples)

Aquaculture / fishery supplier

2. Translocate to closed biosecurity facilities

37

Biosecurity Process

1. **Pre-movement site inspection (HWU)**
   - Site inventory (invasive non-native species)
   - Disease testing (qPCR of samples)

Aquaculture / fishery supplier

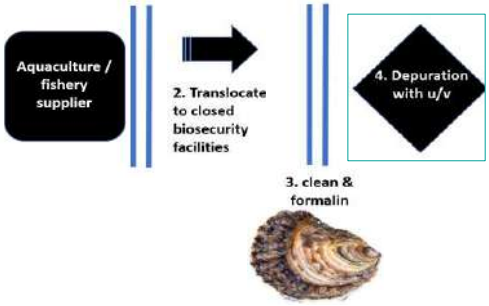
2. Translocate to closed biosecurity facilities

3. clean & formalin

38

Biosecurity Process

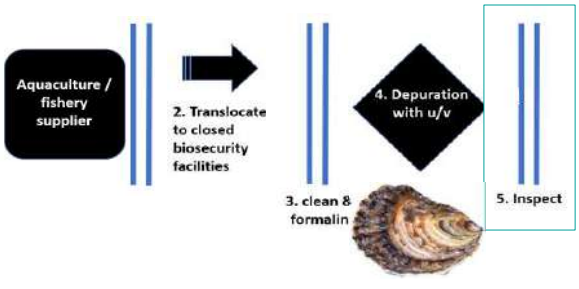
1. Pre-movement site inspection (HWU)
   - Site inventory (invasive non-native species)
   - Disease testing (qPCR of samples)



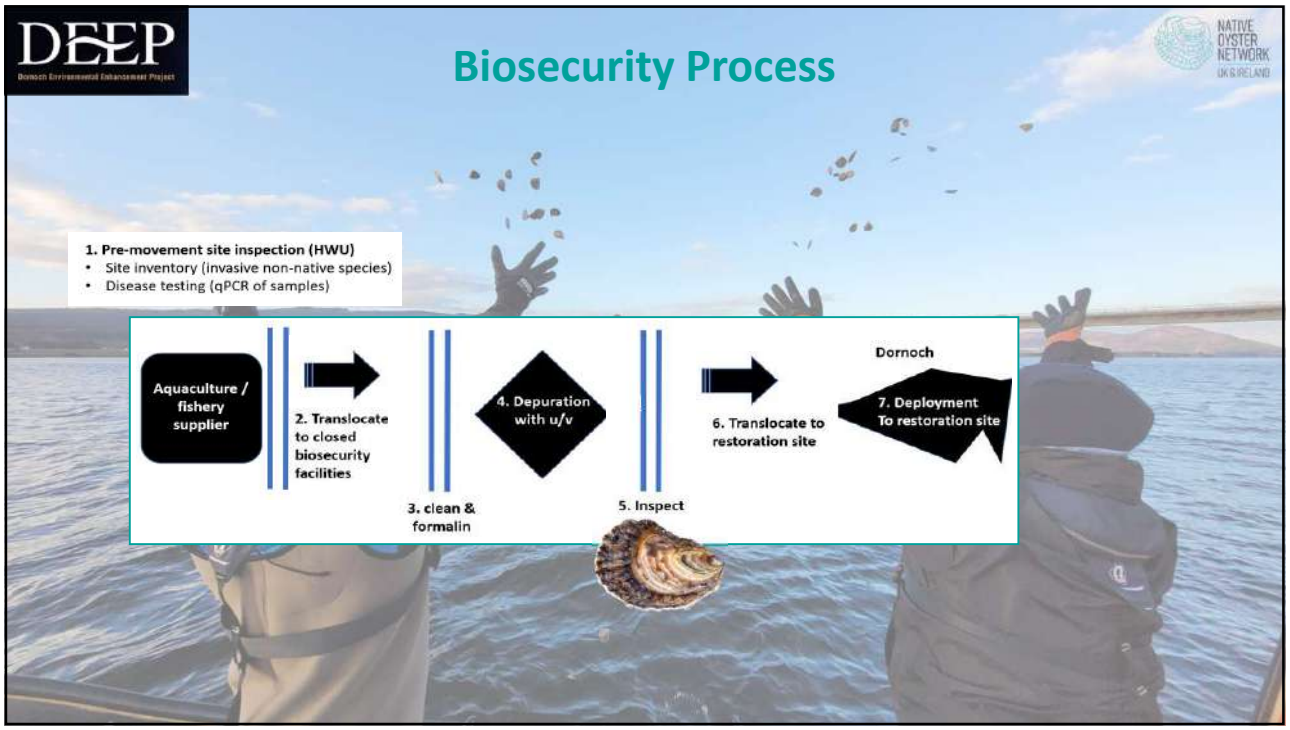
39

Biosecurity Process

1. Pre-movement site inspection (HWU)
   - Site inventory (invasive non-native species)
   - Disease testing (qPCR of samples)



40

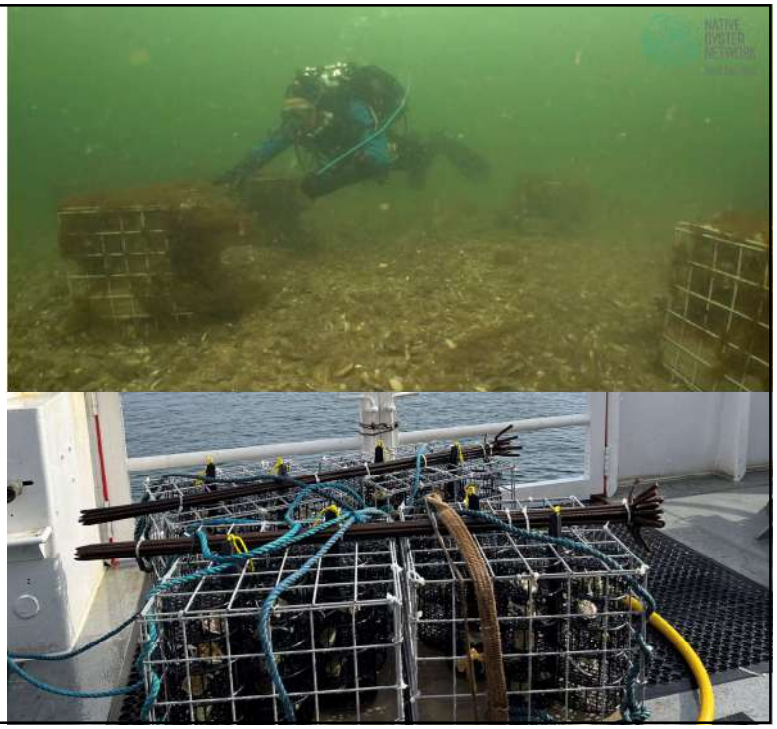


41

DEEP
Dornoch Environmental Enhancement Project

Evaluating Success: Epibiota on Shell

- 300 oysters translocated from Loch Ryan to Dornoch
- 30 oysters sampled from both sites 2 years later and measured for:
  - Growth Since Deployment
  - Epibiota on shell to species level
- Particular attention given to INNS

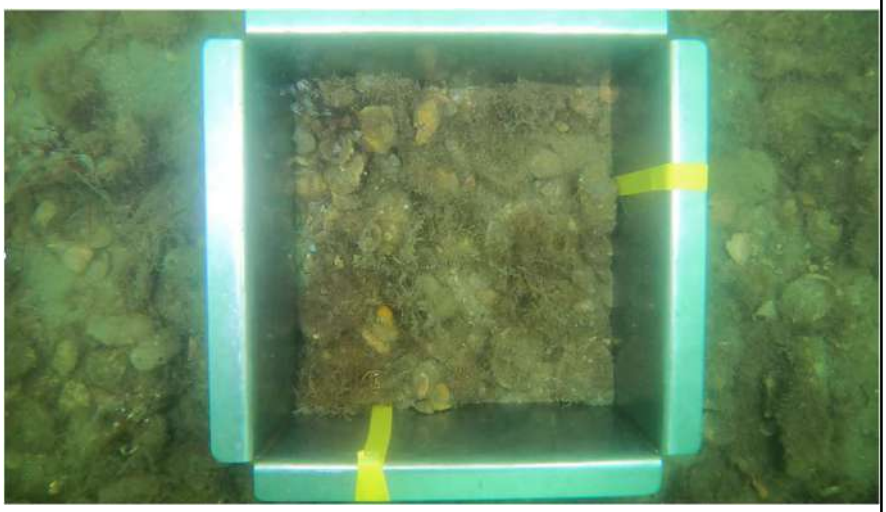


42

Evaluating Success: Epifauna Box Core

Box Cores

- 25cmx25cm box cores
- Top shell sediment collected & identified in lab by experienced taxonomists
- Surface layer identified in-situ (with video to support)



43

Evaluating Success: Epifauna UVC

Underwater Visual Census (UVC)

- 2m wide swath over 25m Transect
- Quality assurance is key
- Loch Ryan sites planned for best spatial coverage across habitats
- Dornoch sites directed toward potential oyster habitat similar to Loch Ryan
- If biosecurity was unsuccessful this is where INNS would be expected to colonise

44

Results: INNS in Loch Ryan

Sargassum muticum

Monocorophium sextonae

Austrominius modestus

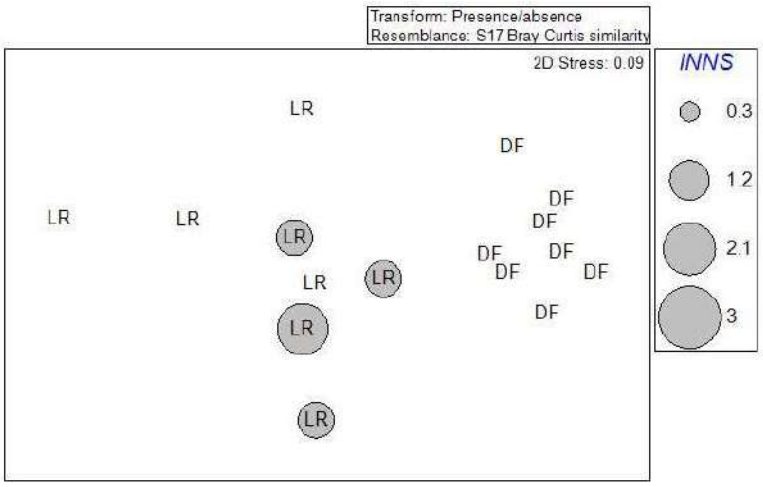
Styela clava

Antithamnionella spirographidis

Dasysiphonia japonica

45

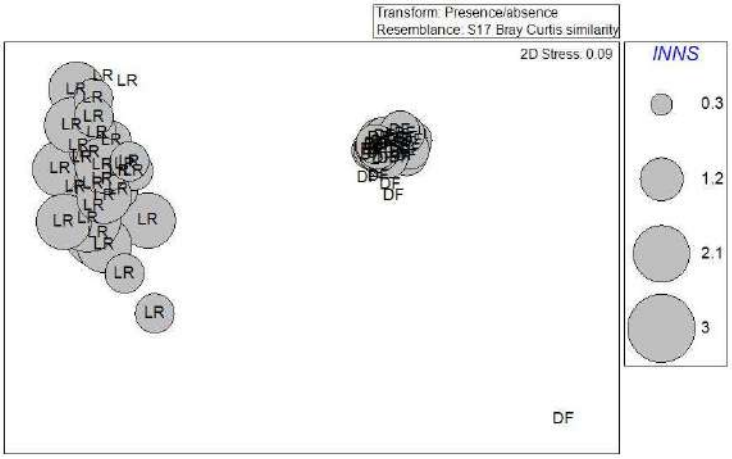
Results: Shell Epibiota



MDS Bubble plot of P/A data from epibiota on oyster shells originating from Loch Ryan and 2 years after deployment at Dornoch restoration site. Bubbles illustrate number of INNS.

46

Results: Box Cores



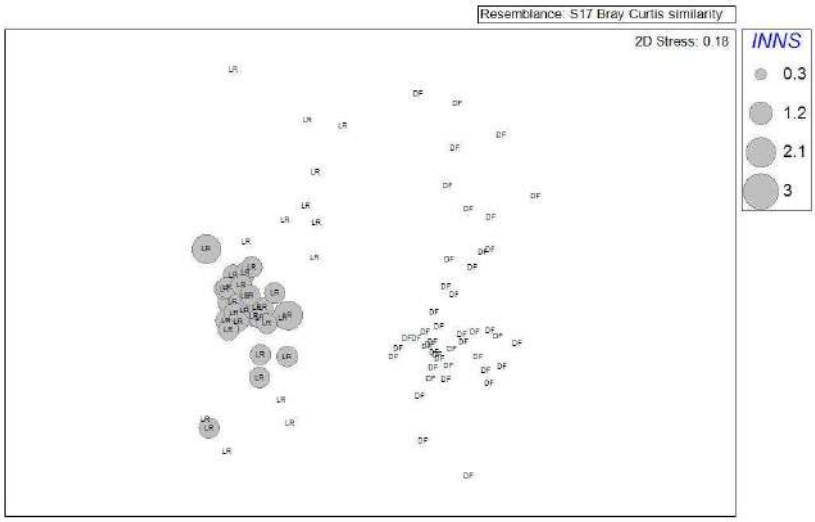
MDS Bubble plot of P/A data from epifauna within a 25x25cm box core originating from Loch Ryan and Dornoch restoration site. Bubbles illustrate number of INNS.

Austrominius modestus

NBN Atlas, Map data © OpenStreetMap, imagery © CartoDB

47

Results: UVC

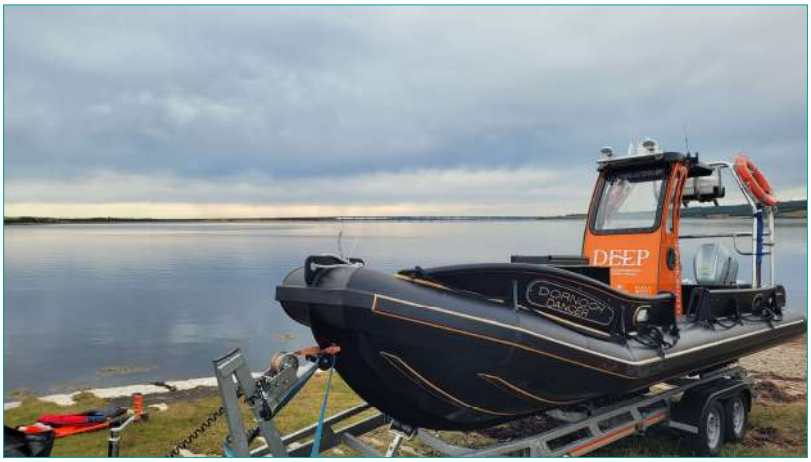


MDS Bubble plot of P/A data from epifauna within 25x2m UVC transects from Loch Ryan and Dornoch restoration site. Bubbles illustrate number of INNS.

48

Conclusions

- Scalability of restoration possible w/o compromising biosecurity
- >100k oysters translocated with no transfer of INNS
- Monitoring is a key component of any restoration project



49

Other DEEP updates:

Settlement Experiment

- 10 Gabions Deployed 14/07/24
- Mix of cultch & live oysters
- Built so that divers can check trays for spat
- Always on the lookout!

50

Other DEEP updates:

New Strings

- Replaced 29/08/24
- 4 strings with 30 “umbilicals”
- Each umbilical has a single oyster and a clump of 3
- We are testing if clumping enhances survival

51

Thanks!

52


@NativeOysterNet
NATIVE OYSTER NETWORK
UK & IRELAND
If you are not yet a member of the Network, please contact NativeOyster@zsl.org to be added
The Native Oyster Network – UK & Ireland Conference
Galway City, Ireland
Tuesday 1st & Wednesday 2nd April 2025
© Dr Jose M. Fariñas-Franco
UNIVERSITY OF PORTSMOUTH
Arna chomhchistiú ag an Aontas Eorpach
Co-Funded by the European Union
Rialtas na hÉireann
Government of Ireland
Foras na Mara
Marine Institute
BIM
Ireland's Seafood Development Agency
ZSL
THE UNIVERSITY of EDINBURGH
CuanBeo

53


@NativeOysterNet
NATIVE OYSTER NETWORK
UK & IRELAND
If you are not yet a member of the Network, please contact NativeOyster@zsl.org to be added
The Native Oyster Network – UK & Ireland Conference
Workshop 1: How can policy makers help to facilitate oyster restoration?
Workshop Chair: Oliver Tully
With presentations from:
1. Cass Bromley
2. Roger Proudfoot
3. Sorcha Ní Longphuirt
© Dr Jose M. Fariñas-Franco
UNIVERSITY OF PORTSMOUTH
Arna chomhchistiú ag an Aontas Eorpach
Co-Funded by the European Union
Rialtas na hÉireann
Government of Ireland
Foras na Mara
Marine Institute
BIM
Ireland's Seafood Development Agency
ZSL
THE UNIVERSITY of EDINBURGH
CuanBeo

54

Evolving policy for Marine & Coastal Enhancement in Scottish waters

Cass Bromley
NatureScot: Marine Ecosystems
Native Oyster Network Conference, Galway, 2nd April 2025

NatureScot
Scotland's Nature Agency
Buidheann Nàdair na h-Alba

55

Developing Trends

- Enhancement, including native oyster restoration = still evolving field
- Increasing profile of enhancement in international and national policies
- People/ organisations interested and involved – community groups, NGOs/ non-profits, academia, industry, developers, consultants, credit markets.
- Funding evolving:
  - Scottish Marine Environmental Enhancement Fund (SMEEF)
  - Nature Restoration Fund (NRF)
  - Facility for Investment Ready Nature (FIRNS)

NatureScot
Scotland's Nature Agency
Buidheann Nàdair na h-Alba

Scottish Marine Environmental Enhancement Fund

56

Developing Trends

- Increasing interest in seascape, whole catchment, Source-to-Sea

- Last few years = learning process for restorers and policy makers

  - lessons to be learned from pioneer projects
  - some challenges to address as drive for restoration at scale gains momentum
  - policy makers trying to learn, listen, adapt

NatureScot
Scotland's Nature Agency
Buidheann Nàdair na h-Alba

57

How can policy makers help to facilitate oyster restoration?

- Policy and legislation developments
- Discussion ongoing around adaptations to possibly streamline e.g. licensing processes
- Changes to funding streams
- Guidance

NB: Policies will generally be more broad ranging than applying to a single species/ habitat

NatureScot
Scotland's Nature Agency
Buidheann Nàdair na h-Alba

58

Evolving policies for Scotland

Policies including enhancement/ restoration:-

- Natural Environment (Scotland) Bill
- Scottish Biodiversity Strategy
- The Environment Strategy for Scotland
- National Marine Plan 2
- National Planning Framework 4
- Blue Economy Vision

  - Marine Directorate of the Scottish Government leads on marine and coastal work related to these
  - Currently developing a Marine & Coastal Restoration Plan (more details in next slides)
  - Nature positive (akin to Marine Net Gain) developing within NMP2
  - Compensation/ Mitigation - Catalogue of Measures

- Crown Estate Scotland reviewing approaches to marine enhancement
- Research e.g. Habitat opportunities mapping, genetics, renewables, catalogue of measures – to feed into policies

NatureScot
Scotland's Nature Agency
Buidheann Nàdair na h-Alba

59

Marine & Coastal Restoration Plan

- **The Scottish Biodiversity Strategy (SBS):** vision to restore and regenerate biodiversity by 2045
- **The SBS delivery plan:** we will "publish a plan for marine and coastal ecosystem restoration by 2025".

  - includes identifying actions to help prioritise habitats and locations suitable for restoration

  - reflects clear asks from stakeholders for a more strategic approach, to help direct where restoration can best take place in Scotland to guide activity in a way that maximises ecological and socio-economic benefits.

Plan Development:

- Workshops
- Consultation on draft plan
- Publication by end of 2025

NatureScot
Scotland's Nature Agency
Buidheann Nàdair na h-Alba

60

Restoration Plan Development – Draft Themes

- Theme 1: Opportunity mapping, prioritisation and evidence/monitoring
- Theme 2: Funding and finance
- Theme 3: Regulatory environment

  Broad topics include:

  - Providing support on/ demystifying current regulatory process for projects and regulators
  - Regulatory reform/ amendments
  - Exploring protection mechanisms for habitats and species undergoing restoration

- Theme 4 - Supply chain, enabling drivers and supporting communities

NatureScot
Scotland's Nature Agency
Buidheann Nàdair na h-Alba

61

Food for thought…

- Change the language: e.g. instead of barriers, maybe challenges…
- Change, especially legislative, takes time
- Role for restoration practitioners in this process:-
  - engage in consultations, working groups, etc.
  - use guidance and talk as early as possible in a project's development with regulators
  - collaborate – are other organisations doing similar studies e.g. around challenges for restoration?
- Important to acknowledge some regulation is needed:-

  - Governments and their agencies have national and international legal obligations to uphold
  - Laws have prescribed processes which must be followed and satisfied
  - Activities still need to be appropriate and necessary

- Working together helps ensure projects are the best they can be.

NatureScot
Scotland's Nature Agency
Buidheann Nàdair na h-Alba

62

Food for thought…

- Enthusiasm for active restoration and targets is great *but* natural recovery/ removal of pressures are key measures in the enhancement toolbox
- Suggest approaching setting targets for a particular species/ habitats with caution
  e.g. geographical variability may influence
- Stock Supply: Theme in the Restoration Plan development and in the next workshop
- Significant challenge = skills/ capacity. Currently few practitioners and potentially many demands as sector grows.

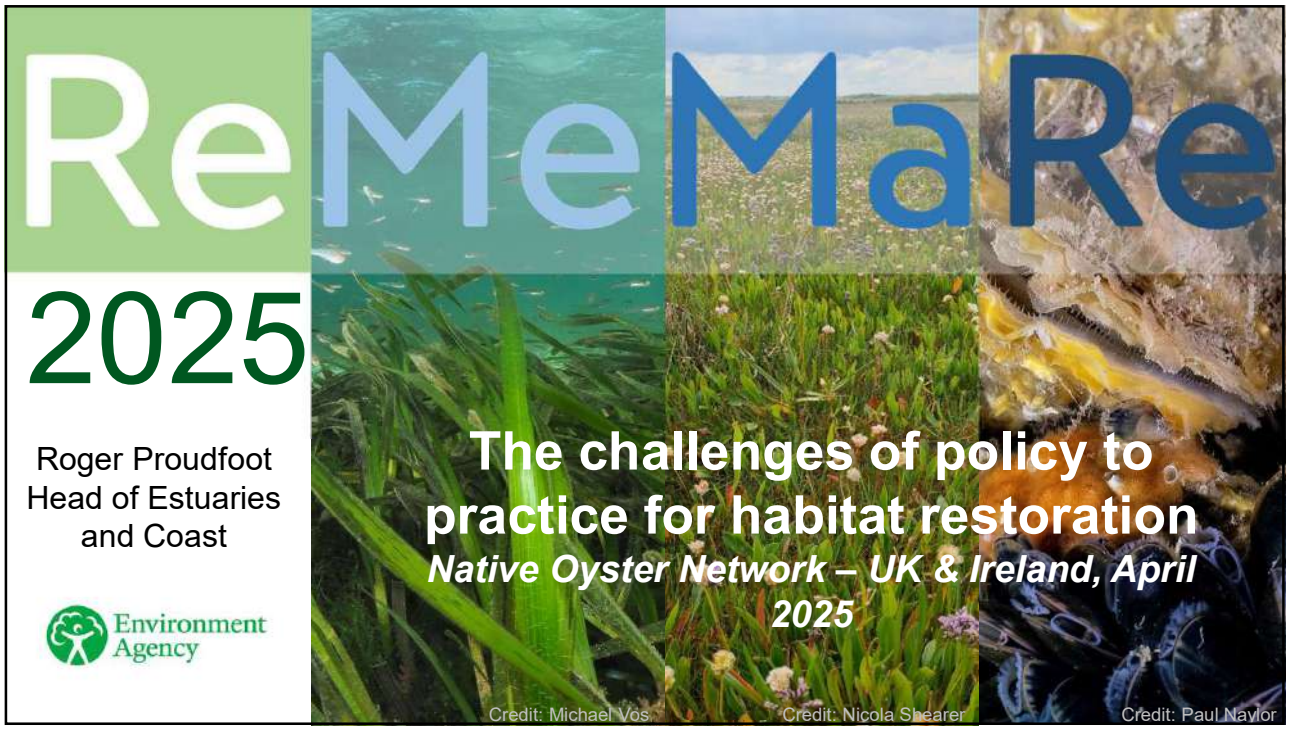
NatureScot
Scotland's Nature Agency
Buidheann Nàdair na h-Alba

63

64


@NativeOysterNet
NATIVE OYSTER NETWORK
UK & IRELAND
If you are not yet a member of the Network, please contact NativeOyster@zsl.org to be added
The Native Oyster Network – UK & Ireland Conference
Workshop 1: How can policy makers help to facilitate oyster restoration?
Workshop Chair: Oliver Tully
With presentations from:
1. Cass Bromley
2. Roger Proudfoot
3. Sorcha Ní Longphuirt
© Dr Jose M. Fariñas-Franco
UNIVERSITY OF PORTSMOUTH
Arna chomhchistiú ag an Aontas Eorpach
Co-Funded by the European Union
Rialtas na hÉireann
Government of Ireland
Foras na Mara
Marine Institute
BIM
Ireland's Seafood Development Agency
ZSL
THE UNIVERSITY of EDINBURGH
CuanBeo

65


ReMeMaRe
2025
Roger Proudfoot
Head of Estuaries and Coast
Environment Agency
The challenges of policy to practice for habitat restoration
Native Oyster Network – UK & Ireland, April 2025
Credit: Michael Vos
Credit: Nicola Shearer
Credit: Paul Naylor

66


ReMeMaRe
Vision
Restored estuarine & coastal habitats that benefit people & nature
Mission
Restore *at least* 15% of our priority habitats along the English coast by 2043

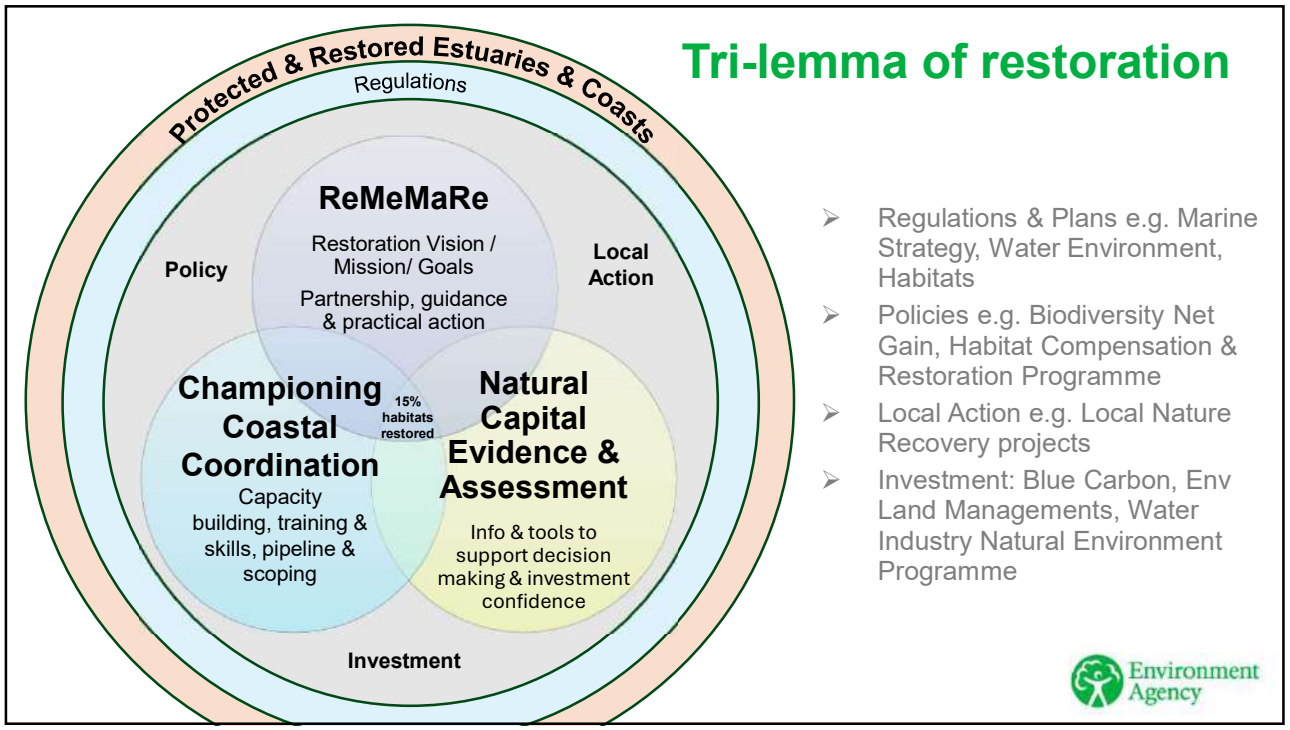
67


ReMeMaRe Partnership (so far…)
Coastal Partnerships Network
MARINE CONSERVATION SOCIETY
THE CROWN ESTATE
Cyfoeth Naturiol Cymru Natural Resources Wales
Association of IFCA
PROJECT SEAGRASS
Cefas
ECSA
National Trust
WWT
University of Essex
NATURAL ENGLAND
SAMS Scottish Association for Marine Science
LGA COASTAL SIG
rspb
NatureScot NàdarAlba
UK Centre for Ecology & Hydrology
Historic England
The Wildlife Trusts
Department for Environment Food & Rural Affairs
ABP mer
ZSL LET'S WORK FOR WILDLIFE
PML Plymouth Marine Laboratory
Wildlife and Countryside LINK
Seabed User & Developer Group
ifm Institute of Fisheries Management
Swansea University Prifysgol Abertawe
PRIFYSGOL BANGOR UNIVERSITY
Ørsted
Newcastle University
JACOBS
BLUE MARINE FOUNDATION
Environment Agency
UNIVERSITY OF PORTSMOUTH
Marine Management Organisation
WWF
NEW ECONOMICS FOUNDATION
JNCC

68

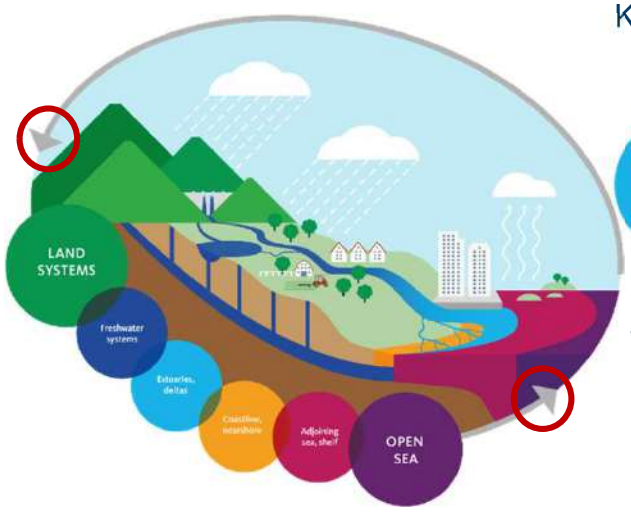

Our learning
People
Go big
Restored habitats
Be patient
Promote benefits

69


Tri-lemma of restoration
Protected & Restored Estuaries & Coasts
Regulations
ReMeMaRe
Restoration Vision / Mission/ Goals
Partnership, guidance & practical action
Policy
Local Action
Championing Coastal Coordination
Capacity building, training & skills, pipeline & scoping
15% habitats restored
Natural Capital Evidence & Assessment
Info & tools to support decision making & investment confidence
Investment
Regulations & Plans e.g. Marine Strategy, Water Environment, Habitats
Policies e.g. Biodiversity Net Gain, Habitat Compensation & Restoration Programme
Local Action e.g. Local Nature Recovery projects
Investment: Blue Carbon, Env Land Managements, Water Industry Natural Environment Programme
Environment Agency

70

Source-to-sea – system thinking



Key flows connect the source-to-sea system from land to open ocean.

Water Biota Sediment + Pollutants Materials → Ecosystem services

Source-to-sea management considers the entire aquatic system and addresses source-to-sea challenges

Environment Agency

Credit: Stockholm International Water Institute (SIWI)

71

A natural capital approach: Saltmarsh

Natural Capital Approach NCEA Natural Capital and Ecosystem Assessment

Non-monetary value is also important

Natural Asset	Ecosystem Services	Benefits	Value
• Quantity • Quality • Location • Ecosystem processes and functions	• Carbon uptake • Storm buffer • Sediment trap • Fish nursery area • Habitat for waterbirds • Recreation	• Climate regulation • Flood prevention • Water quality • Physical and mental health	• Carbon trading • Avoided costs of flooding • Cost of water treatment • NHS savings

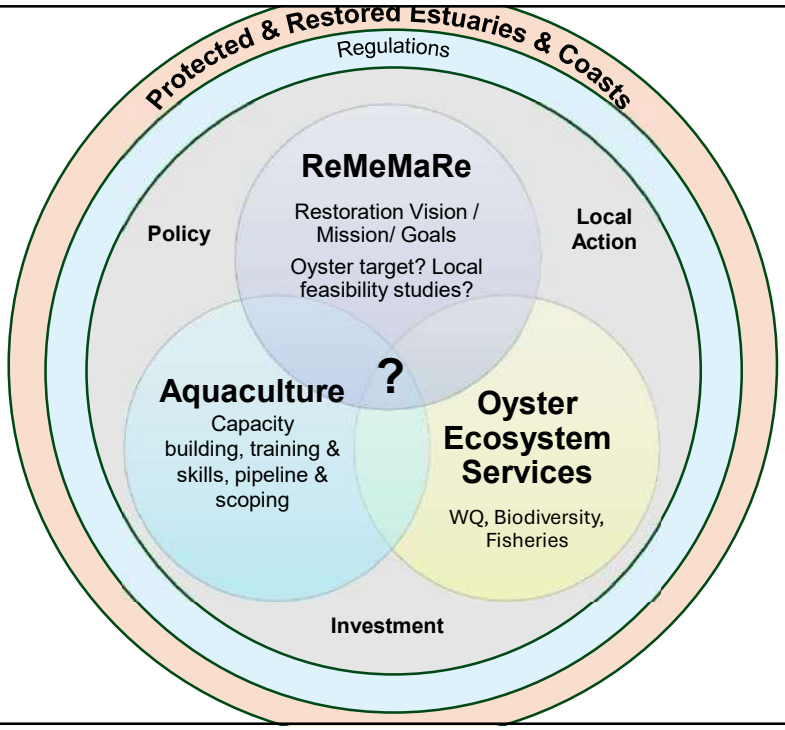
Environmental data | Social data | Economic data

72

Seascape restoration – thinking big

Environment Agency

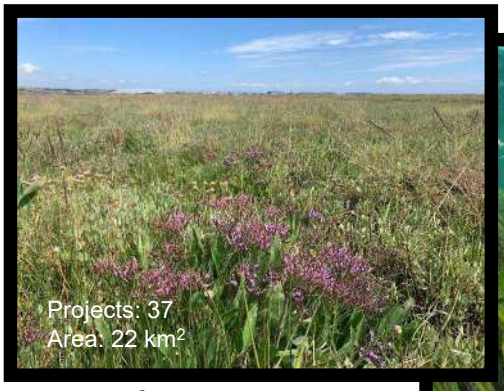
73



Environment Agency

74

Project Pipeline (Feb 2025)



77 projects
Estimated funding: ~£18M over next 3yrs
>£50M into the future!

ReMeMaRe

Environment Agency

75

76


Restoration action gives results!
rememare@environment-agency.gov.uk
ReMeMaRe
Mersea Harbour Protection Trust and Harwich Haven Authority project on beneficial use of sediment at Cobmarsh Island, Blackwater estuary
courtesy Jim Pullen surveys

77


@NativeOysterNet
NATIVE OYSTER NETWORK
UK & IRELAND
If you are not yet a member of the Network, please contact NativeOyster@zsl.org to be added
The Native Oyster Network – UK & Ireland Conference
Workshop 1: How can policy makers help to facilitate oyster restoration?
Workshop Chair: Oliver Tully
With presentations from:
1. Cass Bromley
2. Roger Proudfoot
3. Sorcha Ní Longphuirt
© Dr Jose M. Fariñas-Franco
UNIVERSITY OF PORTSMOUTH
Arna chomhchistiú ag an Aontas Eorpach
Co-Funded by the European Union
Rialtas na hÉireann
Government of Ireland
Foras na Mara
Marine Institute
BIM
Ireland's Seafood Development Agency
ZSL
THE UNIVERSITY of EDINBURGH
CuanBeo

78

@NativeOysterNet

NATIVE OYSTER NETWORK UK & IRELAND

If you are not yet a member of the Network, please contact NativeOyster@zsl.org to be added

The Native Oyster Network – UK & Ireland Conference

Workshop 2: Oyster production & Seed supply

Workshop Chair: Philine zu Ermgassen

UNIVERSITY OF PORTSMOUTH · ZSL · THE UNIVERSITY of EDINBURGH · CuanBeo · Arna chomhchistiú ag an Aontas Eorpach Co-Funded by the European Union · Rialtas na hÉireann Government of Ireland · Foras na Mara Marine Institute · BIM Ireland's Seafood Development Agency

79

ZSL · THE UNIVERSITY of EDINBURGH · UNIVERSITY OF PORTSMOUTH · BLUE MARINE FOUNDATION

Scoping the provision for the European flat oyster, *Ostrea edulis*, to support large scale restoration.

Project Team:

Philine zu Ermgassen, Joanne Preston, Alison Debney, Celine Gamble, Morwenna Grigg, Matt Uttley

ENDANGERED LANDSCAPES & SEASCAPES PROGRAMME · Cambridge Conservation Initiative

80

Project overview

The Problem

Restoration projects frequently state that they have problems securing a supply of oysters.

Project Aim:

To understand existing challenges with European flat oyster seed production for restoration projects.

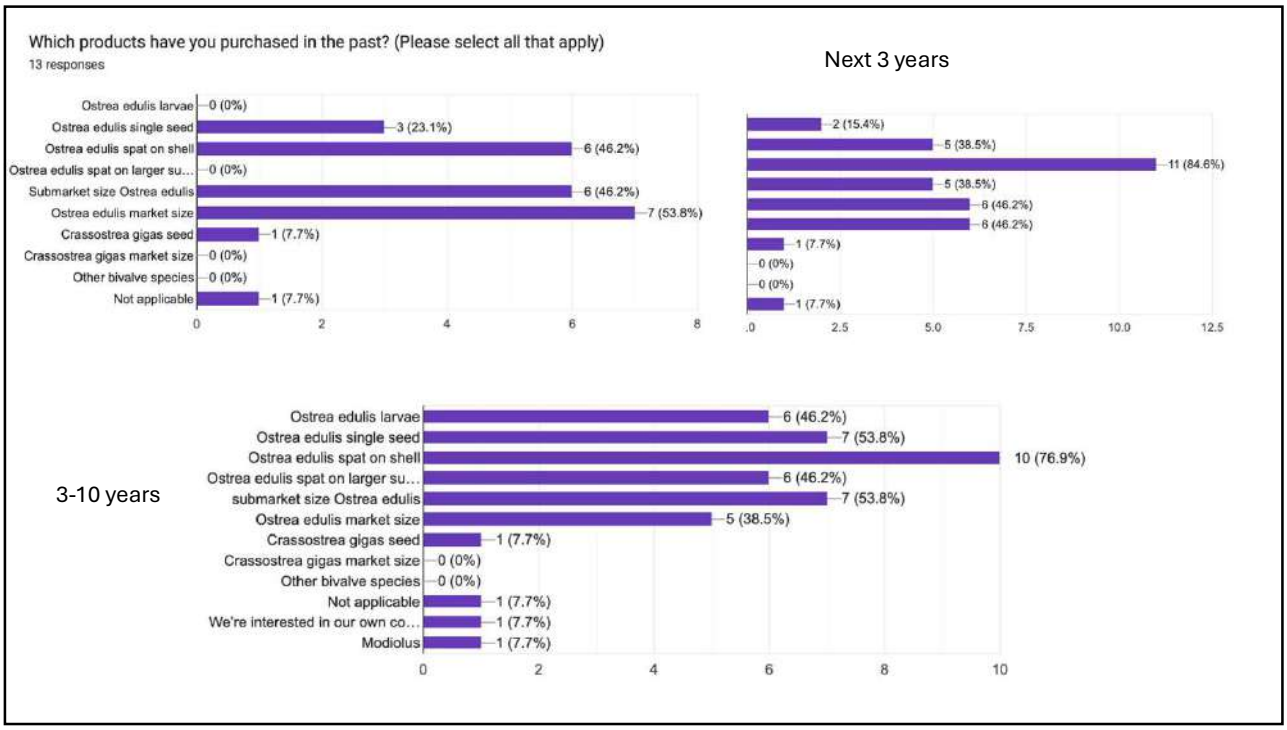
To develop a strategic roadmap to scaling up oyster supply from hatcheries to meet the increasing demand and specific requirements for native oyster restoration projects.

81

Workshop Agenda

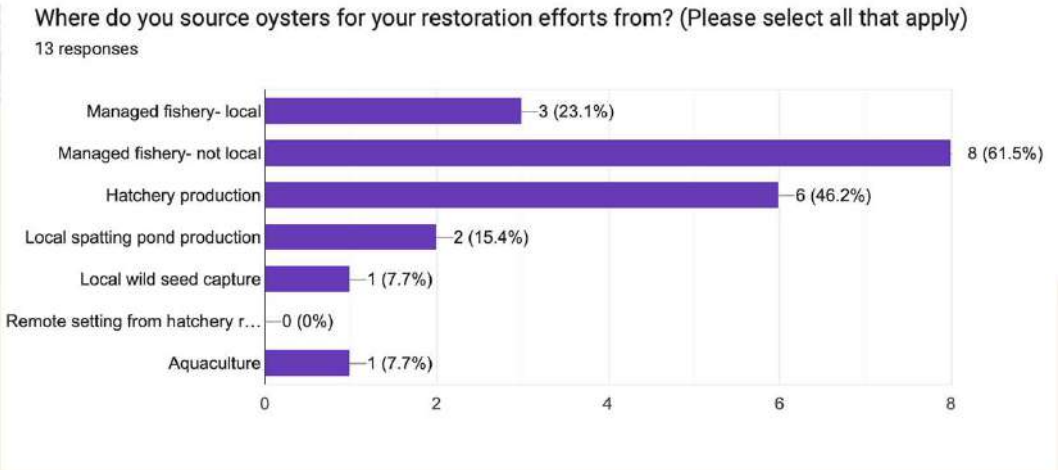
1. **Personal perspectives**
2. **Questionnaire preliminary results**
3. **Small Group Worksheet**
4. **Larger Breakout Groups**
5. **Plenary Feedback and Discussion**

82



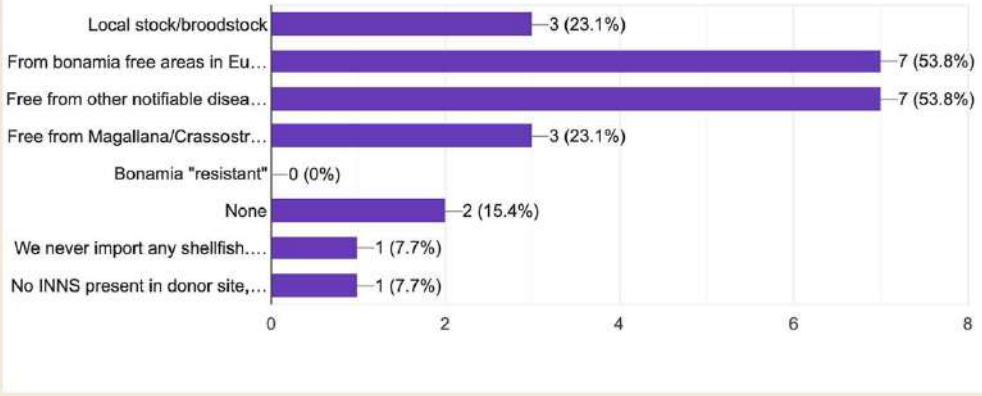
83

Questionnaire preliminary results

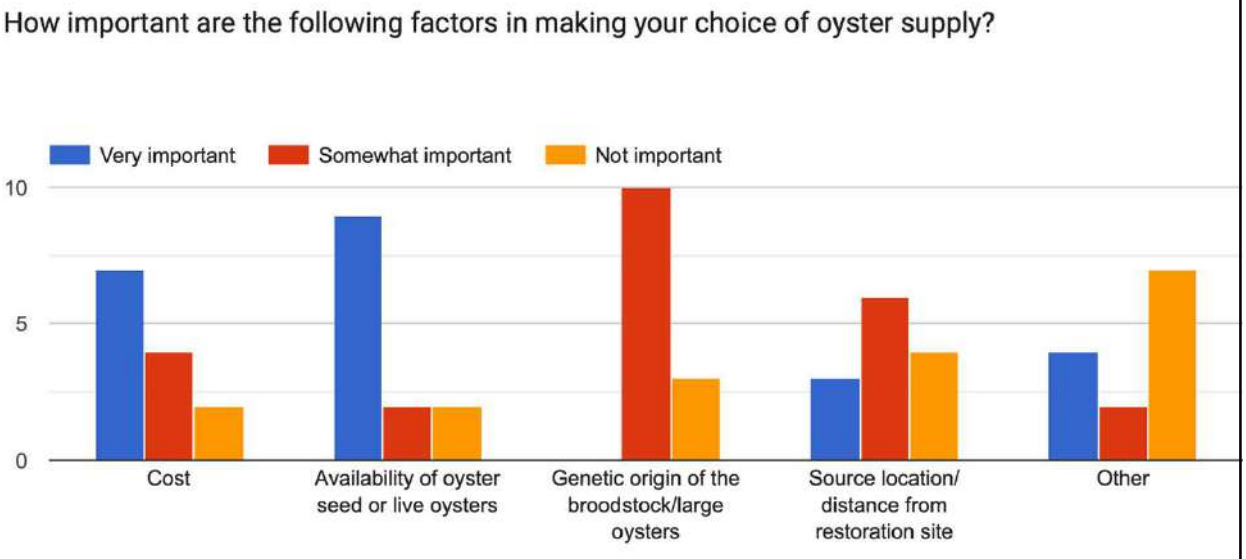


84

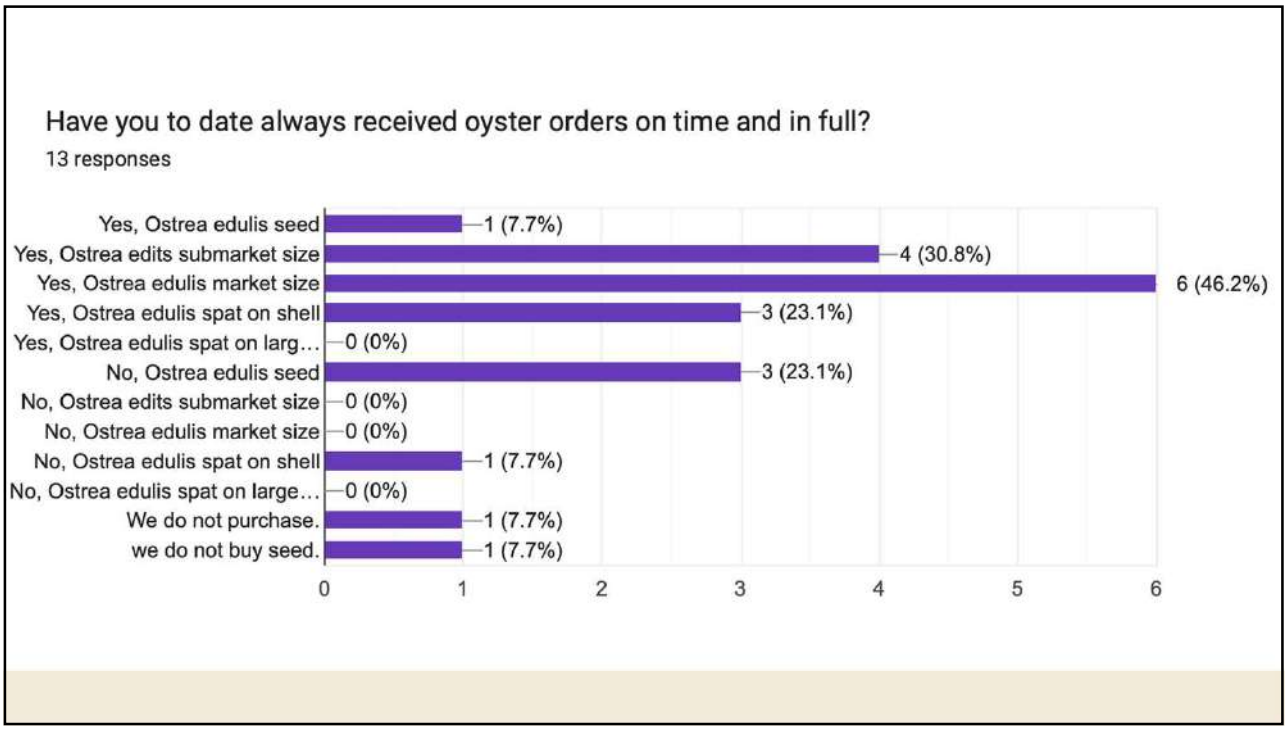
Questionnaire preliminary results



85

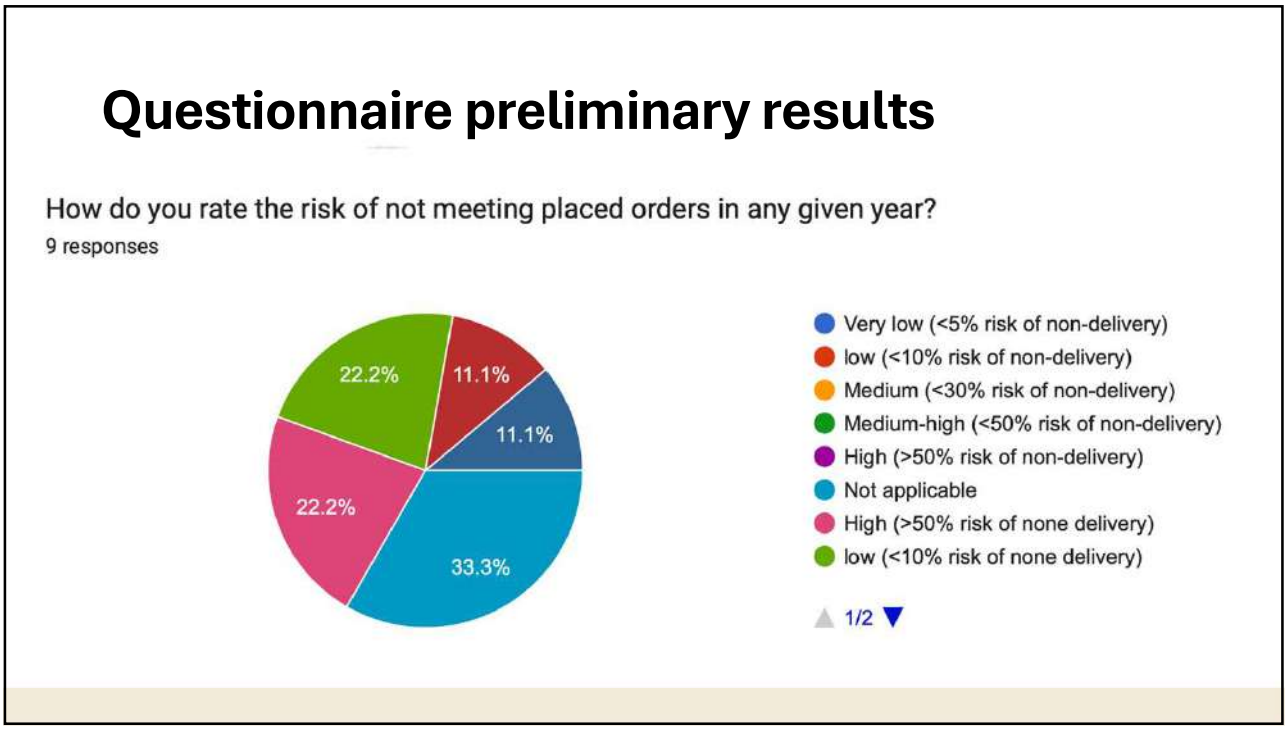


86



87

Questionnaire preliminary results

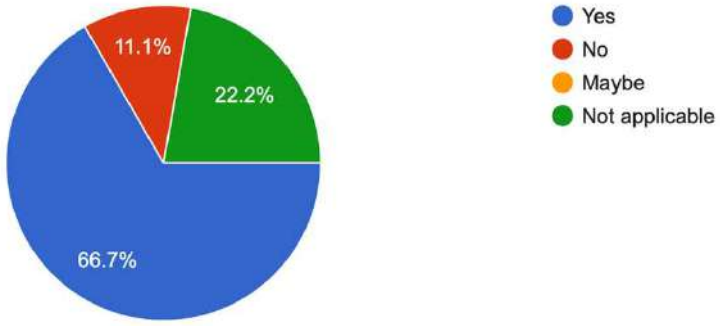


88

Questionnaire preliminary results

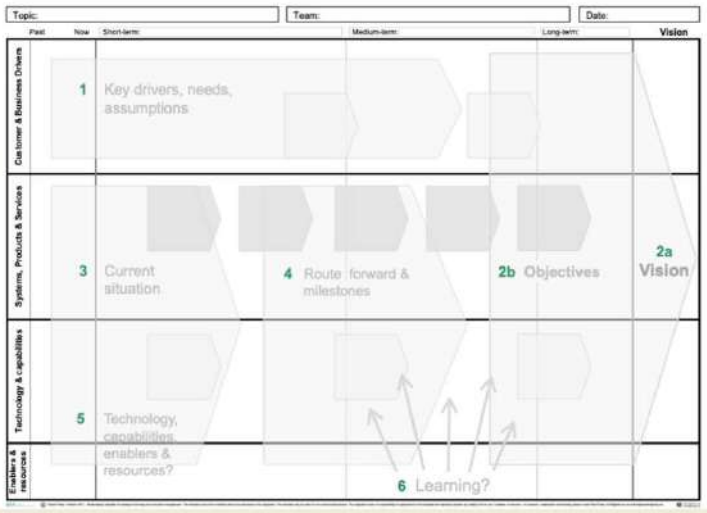
Are you planning on scaling up production of native oyster seed over the next 5 years?

9 responses



89

Small group work



- Chat with your nearest neighbours (groups of c. 3-4)
- Which issues/solutions/important stakeholders immediately come to mind? Annotate your sheet.
- What timeframe is reasonable for the roadmap?
- You can choose to continue to work on your sheet, or join a larger break out group after 10 minutes.

90

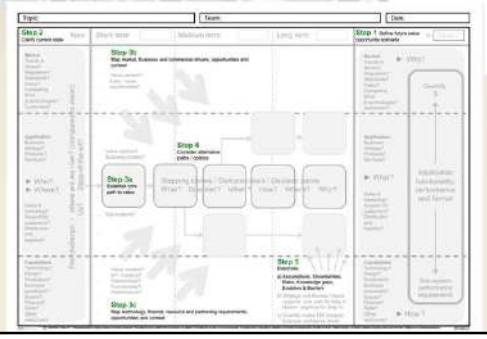
Large break out group instructions

Working on the A0 posters with sticky notes. Please do not write directly onto the posters.

4 Groups: Two groups of **Restoration practitioners** (to stay in this room). One group of **oyster producers and relevant academic experience**. One **"Other"**

Add sticky notes, with focus in the first 10 minutes on vision for the future and next 15 minutes on the current situation.

On sticky notes:
-Include your name.
-Include what time frame your point refers to.
-If you agree that a sticky note is important, please add a sticky dot to it.



91

Break out group timing

16.15 Small group work

16.25 Break out into 4 groups. Focus on "Where we want to be"

16.35 Focus on "Where we are now"

16.50 Feedback to plenary (5 min per group)

92

Relevant themes might include:

- Market
- Product requirements
- Technology
- Regulations
- Policy
- Skills
- Finance

93

Final questions

What are the key issues that need to be overcome to increase seed supply?

Who are the key stakeholders in overcoming seed supply?

Do you see opportunities in closer collaboration with commercial (non-restoration) aquaculture/hatcheries?

Is there a greater possible role for the wild fishery?

Is there are role for restorative aquaculture?

94

Project timeline

- Project launched at the Native Oyster Network Meeting, November 2024
- NORA Production Working Group, March 2025
- Workshop at the Native Oyster Network Meeting, Galway, Ireland, April 2024
- Road mapping workshop (October 2025)
- Draft Road Map launched for consultation (NORA 6, November 2025)
- Strategic roadmap to upscaling oyster seed production for European native oyster restoration launched (early 2026)

95

ZSL THE UNIVERSITY of EDINBURGH UNIVERSITY OF PORTSMOUTH BLUE MARINE FOUNDATION

Scoping the provision for the European flat oyster, *Ostrea edulis*, to support large scale restoration.

Thank you on behalf of the Project Team:

Philine zu Ermgassen, Joanne Preston, Alison Debney, Celine Gamble, Morwenna Grigg, Matt Uttley

ENDANGERED LANDSCAPES & SEASCAPES PROGRAMME | Cambridge Conservation Initiative

96

Please complete the questionnaire relevant to you/your business/your project

Oyster supply questionnaire for oyster producers

https://forms.gle/Da1QJ5M34smgPx3k8

Oyster supply questionnaire for restoration practitioners

https://forms.gle/X5eu8reTfBQUgmBV9

Please complete this questionnaire today for the data to be used to inform the native oyster seed supply workshop tomorrow (April 2nd).
Results submitted after that time will still be vitally important for informing the development of the roadmap

97

@NativeOysterNet

NATIVE OYSTER NETWORK UK & IRELAND

If you are not yet a member of the Network, please contact NativeOyster@zsl.org to be added

UNIVERSITY OF PORTSMOUTH · ZSL · THE UNIVERSITY of EDINBURGH · CuanBeo

Arna chomhchistiú ag an Aontas Eorpach Co-Funded by the European Union · Rialtas na hÉireann Government of Ireland · Foras na Mara Marine Institute · BIM Ireland's Seafood Development Agency

98