# Natural Environment Group (NEG) Project Bidding Pro Forma

**Please complete all sections and read the eligibility criteria and timescale at http://www.solentems.org.uk/natural_environment_group/NEG_Projects/.**

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| Project Title: | INTERTIDAL SEAGRASS RESTORATION IN THE SOLENT: First steps with the dwarf seagrass *Zostera noltei.* |
| Project Sponsor/Lead (and full contact details): | Rayner Piper – Fathom Ecology Limited<br>www.fathom-ecology.com<br>email: rayner@fathom-ecology.com<br>Mob: +44(0)7546510008<br>Tel: 01243 276817 |
| Project Description and Objectives: | The dwarf seagrass *Zostera noltei* is an ecological engineer providing a wealth of ecosystem services including:<br>• Providing food and nursery grounds to ecologically and commercially important fish species.<br>• Supporting rare and protected bird species notably Dark Bellied Brent Geese *Branta bernicula*, a feature of the Solent SPA.<br>• Stabilising sediments, preventing erosion and playing an important role in coastal protection.<br>• Improving water quality by removing excess nutrients; and<br>• Sequestering carbon thus helping to combat the climate emergency.<br>Despite providing physical, biological, economic, and social benefits, the dwarf seagrass has suffered worldwide declines because of habitat loss and eutrophication (Valle et al, 2011). In the Solent dwarf seagrass habitat continues to be lost and fragmented (Marsden & Chesworth 2014, Fathom Ecology Limited 2020).<br>As seagrasses decline, their importance is being increasingly recognised by conservationists and restoration efforts are being attempted worldwide. To date restorations in the UK have focused on eelgrass; *Zostera marina*, a closely related larger species of seagrass that typically grows beneath the low tide mark.<br>This project aims to take the first steps in the restoration of the Solent's dwarf seagrass, by identifying locations within Chichester harbour where restoration could be attempted, and the species thrive.<br>According to literature, optimal survival of |

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| | transplants mainly depends on sediment type and the transplant site selection (Renton et al 2011, Valle et al 2011, Valle et al 2015). Suitable locations will be identified using topographical, sedimentological and hydrographical variables which are known to influence the distribution of dwarf seagrass. Sheltered locations are considered essential for the long-term survival of transplanted seagrass (van Katwijk et al., 2009, Valle et al 2015), as such efforts will be focused upon the east coast of Hayling Island. The east coast of Hayling is both sheltered from the prevailing winter storms and from the worst affects of eutrophication, being located some distance from each of the three Wastewater Treatment Works (Appledram, Bosham & Thornham), that discharge effluent into the harbour.<br>A total of twelve sites will be sampled and at each site a core sample will be taken to measure particle size distribution (PSD) and organic content. Redox potential of the sediment and slope will also be measured at low tide. Locations that will be considered suitable for a translocation effort must score within the preferred tolerances of dwarf seagrass, those being sediments of between 1.47 to 5.9 phi, organic material of 1-10%, a redox potential of 185-331 mV and a mudflat between 0.5 and 1.5 CD, large enough to support a restoration trial (>120 $m^2$) (Valle et al 2011).<br>If a suitable location is identified, then this project intends to trail 3 different restoration techniques to understand which is best suited for dwarf seagrass.<br>Three 10x10$m^2$ plots adjacent to one another will be marked out at the suitable location. Each plot will trial a different planting technique to test the success and efficiency of each:<br>a. Seeds of the dwarf seagrass collected during the summer 2021 will be placed in small hessian bags filled with sand. The bags will be staked to the seabed using coir roles and hazel stakes.<br>b. Plugs of 7.5 cm diameter will be collected from seagrass bed at Mill Rythe. The plugs will contain shoots, roots, rhizomes and associated sediments. The plugs will be extracted from Mill Rithe at low tide and transported to their new location for planting.<br>c. Rhizomes will be removed from intertidal mudflats at Mill Rythe, placed in hessian sacks filled with inert sand. These bags will be placed upon the surface sediments of plot 3. |

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| | Each of the above methods has been used, with varying degrees of success, for the restoration of other seagrass species. Each plot will be monitored for survival, shoot density and epiphyte abundance at monthly intervals.<br>The donor site at Mill Rithe, will also be monitored using field photographs for a period of 12 months.<br>Based on results at the restoration site, a subset of areas will be chosen for medium and large-scale test transplants, partnering with the HIWWT, to create ongoing monitoring and restoration efforts at further sites throughout the Solent. |
| What is the value of the project to the Solent European Marine Sites (SEMS), other designated sites or areas of conservation interest? | The east coast of Hayling island lies within the Solent Maritime SAC, Solent & Southampton Water SPA and Ramsar site. Seagrass beds (*Zostera* biotopes) have been recognised by the European Union as a 'subfeature' within Special Areas of Conservation (SACs) under the EU Habitats Directive, 1992 (Council Directive 92/43/EEC). The Habitats Directive states that habitats, e.g., **estuaries**, lagoons, and reefs, must be maintained in their present state, **or where possible, restored to a more favourable state.** Dwarf seagrass are further included as sites of Community importance in the in the Habitats Directive.<br>Dwarf seagrass are also of high relevance in the Water Framework Directive, as one of the five biological quality elements (phytoplankton, macroalgae, **angiosperms**, benthos, and fishes) to be included in the ecological quality assessment of estuarine waters. Dwarf seagrass are listed on the Vascular Plant Red Data List (Leach 2019). |
| Project Outputs: | Baseline mapping, prioritised initial site, field trials for restoration efforts and follow up monitoring surveys at months 3, 6, 9 and 12.<br>If the restoration proves successful, then subject to available funding, the methods could be expanded to include intertidal habitats within Langstone, Portsmouth, Newtown, and Beaulieu harbours where *Z. noltei* has been recorded previously (Marsden & Scott, 2015). |
| Project Timescale and Milestones: | 1 year period, survey, monitoring, management and field report.<br>• March / April 2022 – baseline survey for restoration site location(s);<br>• April 2022 – data analysis, trial site selection;<br>• April / May 2022 – initial placement of Seagrass seeds, plugs and sods.<br>• Ongoing monitoring for algal smothering and retention of structural integrity, initial monthly checks to extend as appropriate; |

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| | • Monthly collection of plant growth data and visual assessment of morphological change;<br>• 1 year end project report and feasibility consideration for dwarf seagrass restoration within Chichester harbour and the wider Solent. |
| Overall Project Cost (£):<br>*Please detail other funding sources secured/sought.* | The total cost of the project is estimated at >£5000. Match funding will be in the form of time and effort from Fathom researchers, boat time and fuel and a cash contribution of £1000 from the Chichester Harbour Conservancy and Friends of Chichester Harbour. Further contributions are currently being sort from the Solent Protection Society and other local groups. |
| Funding contribution sought from NEG (£):<br>*The amount requested should be match funded.* | £2,980 |
| Will the project still go ahead without NEG funding? | Yes but it may be delayed for a year or more as funding streams are sourced. |
| Geographical coverage of the project:<br>*The project must cover some aspect of the coastal or marine environment of the Solent.* | Chichester Harbour (part of the Solent Maritime SAC) |
| Please list any project partners: | Chichester Harbour Conservancy |
| Additional information to support the Bid: | HIWWT are keen to trial seagrass restoration for the ReMEDIES project with which they are involved. This trial would benefit any future restoration attempts throughout the Solent and is supported by the Trust. |

## Submission date:

**Please email completed forms to info@solentforum.org by the 28 February.**

## References


Leach, S.J. 2019 The Vascular Plant Red Data List for Great Britain: a summary of amendments in years 12 and 13 (2017-2018) of the annual amendments process. BSBI News 141.

Leschen, A.s., Ford, K.H. and Evans, T.N (2010) Successful Eelgrass (Zostera marina) Restoration in a Formerly Eutropic Estuary (Boston Harbour) Supports the Use of a Multifaceted Watershed Approach to Mitigating Eelgrass Loss. Estuaries and Coasts DOI 10.1007/s12237-010-9272-7.

Marsden, A. L. and Chesworth, J. C. (2014). Inventory of eelgrass beds in Hampshire and the Isle of Wight 2014, Section One: Report. Version 6: May 2014. Hampshire and Isle of Wight Wildlife Trust, Hampshire.

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Renton, M., Airey, M., Cambridge, M.L., Kendrick, G.A., 2011. Modelling seagrass growth and development to evaluate transplanting strategies for restoration. Ann. Bot. 108, 1213–1223.

Valle, M., Borja, A., Chust, G., Galpasoro, I., & Garmendia, J.M, (2011) Modelling suitable estuarine habitats for Zostera noltei, using Ecological Niche Factor Analysis and Bathymetric LiDAR. Estuarine, Coastal and Shelf Science 94, 144-154.

Valle, M., Garmendia, J.M., Chust, G., Franco, J., & Borja, A (2015) Increasing the chance of a successful restoration of Zostera noltei meadows. Aquatic Botany 127 12-19.

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