

EGU22-4780

<https://doi.org/10.5194/egusphere-egu22-4780>

EGU General Assembly 2022

© Author(s) 2022. This work is distributed under the Creative Commons Attribution 4.0 License.



Ecological development of a salt marsh restoration site

Joseph Agate¹, Raymond Ward^{1,2}, Christopher Joyce¹, and Niall Burnside¹

¹University of Brighton, Centre for Aquatic Environments, School of Applied Sciences, United Kingdom of Great Britain – England, Scotland, Wales (j.e.agate@brighton.ac.uk)

²Institute of Agriculture and Environmental Sciences, Estonian University of Life Sciences, Kreutzwaldi 5, EE-51006 Tartu, Estonia

Ecological development, through species colonisation and the evolution of community structure, is considered a fundamental indicator of success in salt marsh restoration, and thus has been studied extensively. However, previous studies have reported mixed success, suggesting restoration techniques are not always effective. As such, it is essential further research is carried out to inform the design of future projects. This requirement is compounded by commitments to increase the number of realignment projects to mitigate losses of salt marsh due to sea level rise, as well as improve the provision of ecosystem services. This study assesses the ecological development of a restoration site in the UK in the first three years following its creation.

The Adur estuary is a macrotidal estuary in West Sussex, UK and contains a regionally rare and significant area of salt marsh, which is protected by national legislation. The restored site sits landward of the established marsh at a higher elevation than the adjacent mid marsh plant community. Ecological surveys were carried out biannually in 2019, 2020 and 2021 using 33 quadrats along 11 transects, with each transect passing from new marsh into established upper and low marsh communities. In each quadrat, the presence and percentage cover of each plant species was recorded. Additionally, drone flights were carried out to provide 10 cm resolution imagery of the new and established marsh in both 2020 and 2021. Species composition of the new and established communities in each year were compared to determine ecological development. Additionally, the drone imagery was used to calculate the Normalised Difference Vegetation Index to provide an indicator of vegetation cover across areas not covered by quadrat surveys.

Quadrat surveys indicate significant initial development of the restoration site, with mean cover of bare ground decreasing from 72% in 2019 to 34% in 2021. Additionally, the number of species has increased, from 6 in 2019 to 9 in 2021. However, conditions still differ from the established marsh, with the dominance of *Halimione portulacoides* not yet present. Additionally, vegetation cover is lower in the new marsh, which was also detected in the drone imagery.

The results of this study demonstrate that the restoration site has developed over three years, as is evidenced by the decrease in bare ground and increase in halophytic species, thus suggesting restoration design has been effective. However, the current lack of dominant *Halimione portulacoides* cover shows a disparity with the adjacent established upper community, although

the species has increased in the new marsh over the study period. Further study will reveal whether this development continues towards comparable conditions.

Monitoring of the site will be continued with further ecological surveys in 2022, 2023 and 2024. Additionally, an automated approach to community mapping will be developed using machine learning algorithms combined with the drone imagery, which will also be carried on until 2024. This automated approach to community mapping has the potential to provide rapid ecological assessments for restoration sites whilst also increasing the reliability of surveys.