

Restoration of tidal flats in the Scheldt estuary: monitoring results from Baalhoek and Knuitershoek intervention areas



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Introduction

Tidal flats and salt marshes are disappearing at alarming rates. The Dutch government has initiated a project to reverse this trend in the Western Scheldt estuary by interventions that stimulate the development of low-dynamic intertidal zones along its flanks. The construction of new groynes and the enlargement of old ones in the areas of Knuitershoek and Baalhoek are part of this project. This study focuses on the impact that these interventions have on morphology and biodiversity.

Objectives

1. Quantify net sedimentation and evaluate if it corresponds to desired goals.
2. Monitor the biodiversity development on the groynes, partly in relation to their role as foraging and high-water refuge for shorebirds.



Fig 1. Locations of interest on the map.

Methodology

- Periodic measurement of ground elevation along predefined transects with DGPS (2016 - 2022) and spatial-temporal analysis of GIS images.
- Periodic surveys of seaweed cover and sessile fauna on predefined transects on the groynes (2017 – 2021)



Fig 2. Ground elevation measurements at Baalhoek (left) and quadrant survey at Knuitershoek (right).

Indicative results

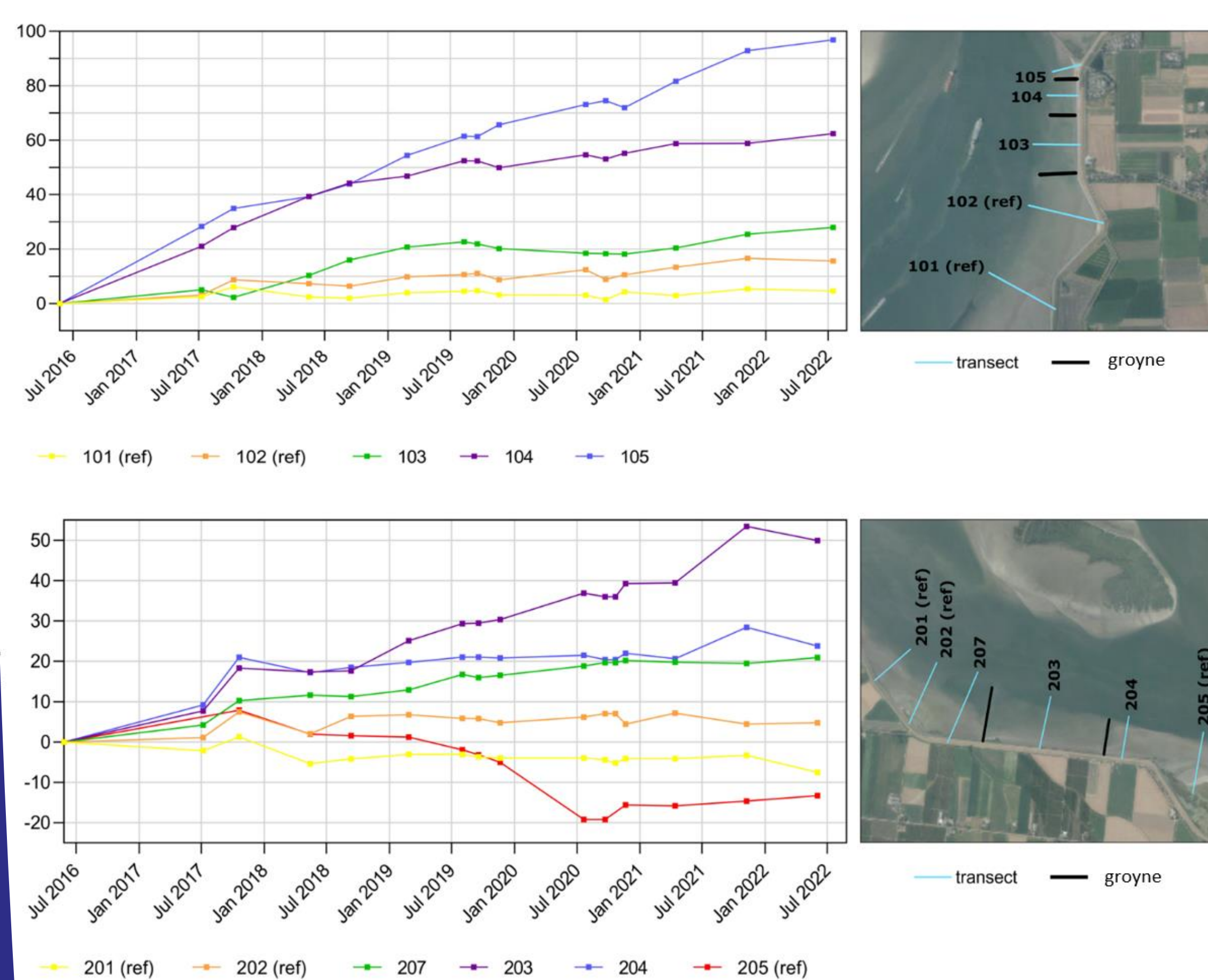


Fig 3. Cumulative ground elevation over time at Knuitershoek (top) and Baalhoek (bottom).



Fig 5. Side views of groyne 105 in Knuitershoek in October 2018, with the northern side being clearly more vegetated.

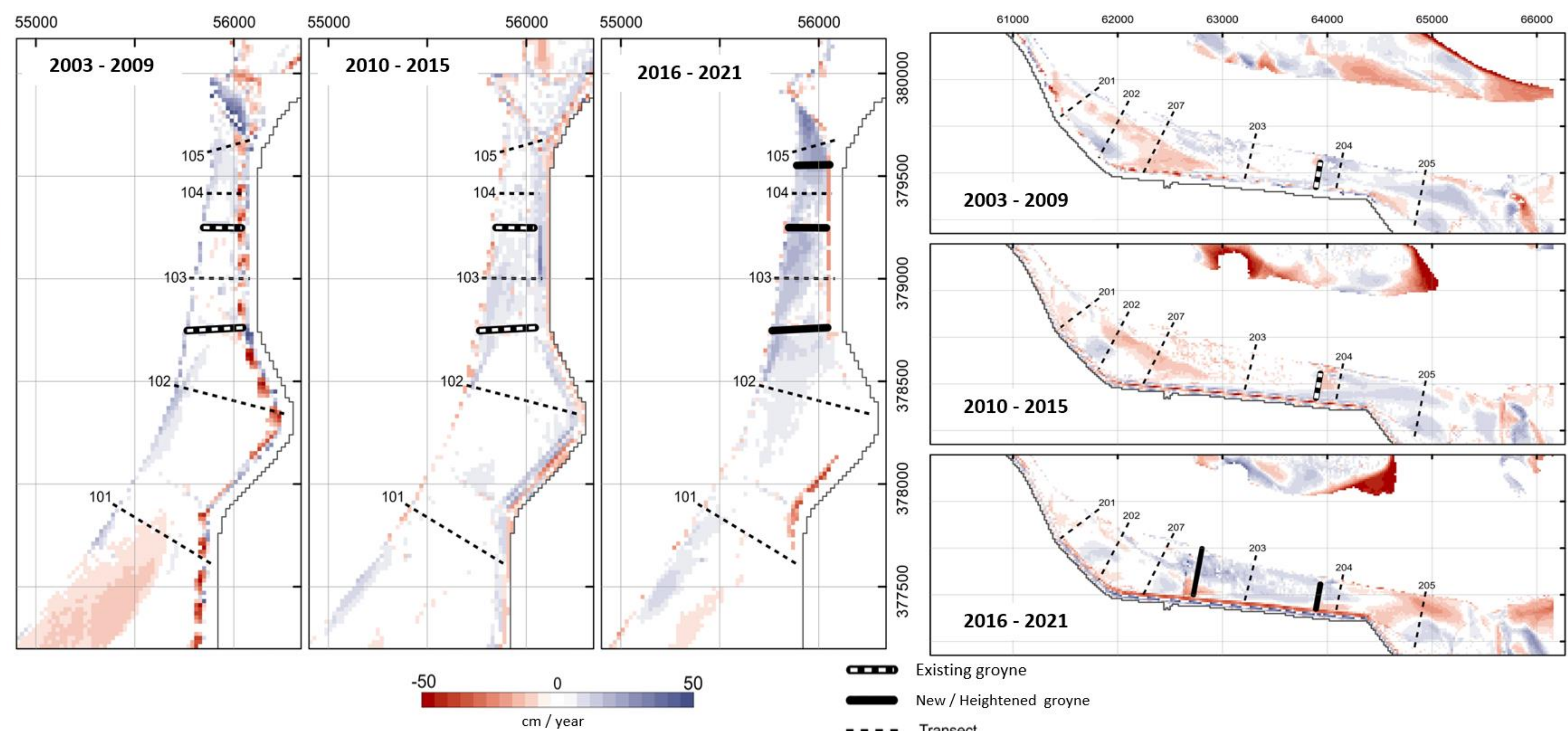


Fig 4. Trends in erosion and sedimentation at Knuitershoek (left) and Baalhoek (right).

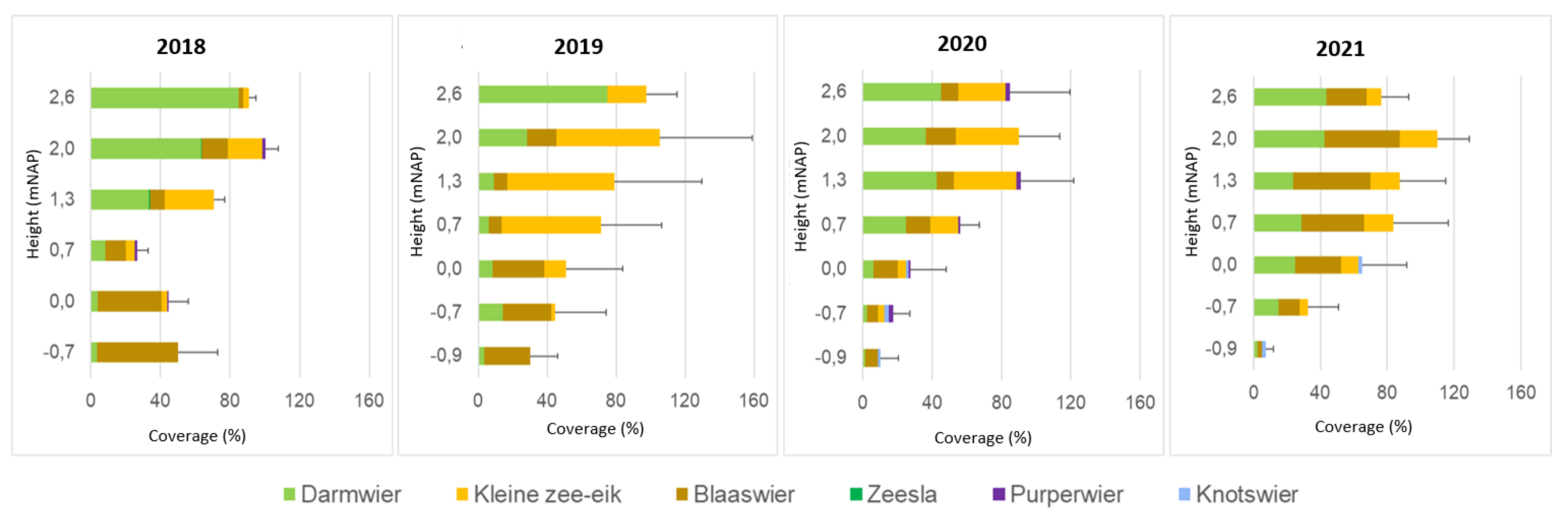


Fig 6. Coverage percentages of different seaweed types on the northern side of the three groynes in Knuitershoek. The error bar indicates the standard deviation among the groynes (n=3).

Key findings for morphology

- Widespread accretion of the tidal flats, typically varying between 20 cm (4cm/year) to 80 cm (16 cm/year) during the monitoring period.
- Stronger sedimentation takes places on transects close to the groynes compared to reference transects further from the groynes.
- Substantial increase of intertidal area with an emersion time of 20% since the groyne intervention.
- It is expected that the elevation of mud will keep increasing in both locations the coming years, but the overall impact of the intervention is considerably smaller than the forecasted one by Dam (2008).

Reference

Dam G (2008) Buitendijks natuurherstel in de Westerschelde, verkenning naar mogelijke gebieden en maatregelen (Nature restoration in the Western Scheldt, research into possible areas and measures). Svasek Hydraulics, Rotterdam, the Netherlands, Report GD/08187/1480/C (in Dutch).

Key findings for biodiversity

- Gradual colonization of the groynes. Dominant species are brown and green algae, periwinkles, amphipod and mussels.
- Variations in sun and wave exposure seem to have led to fluctuations to the presence of certain species on the groynes.
- In the accreted areas between the groynes crabs have been witnessed, which is an invasive species. This may have a significant impact on the local ecosystem development.
- It is recommended to also survey mobile species on the groynes in the future. To this end, the team devised a technique to survey the movement of crabs.