

# Atmospheric nitrogen and its effects on sand dunes

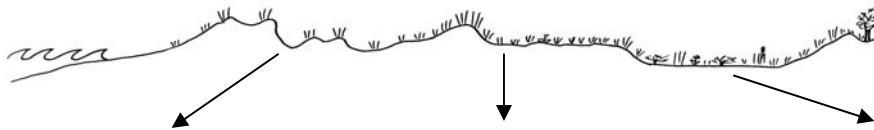
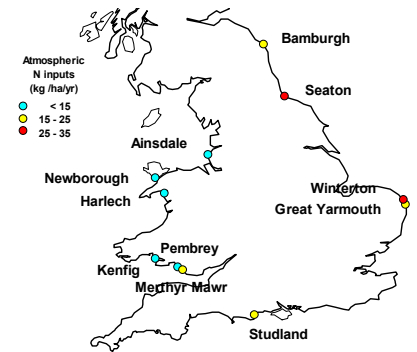
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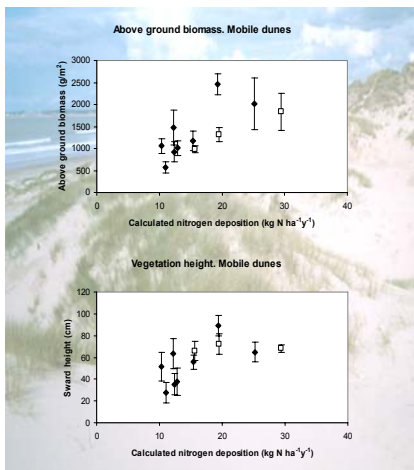
## Background

Atmospheric nitrogen (N) has been increasing in the UK since the 1960s. While UK emissions stabilised in 1990 and are now declining, the residual soil and vegetation N pools accumulated over time may lead to long-term consequences for oligotrophic ecosystems. N deposition is already implicated in the degradation of *Racomitrium* moss-heaths and Dutch heathlands, and may be one factor causing over-stabilisation of sand dunes in England and Wales.

## A sand dune survey to detect signals of atmospheric N deposition

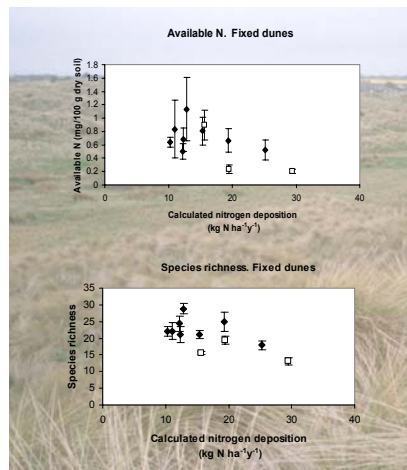


### Mobile and semi-fixed dunes



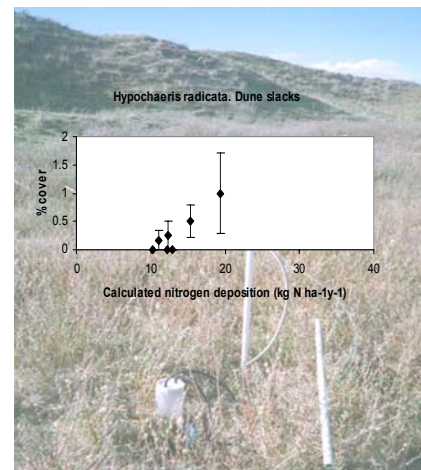
- Biomass increasing, largely due to:
- Increase in height of *Ammophila arenaria*
- Increase in %cover of *A. arenaria*

### Fixed dunes and dune grasslands



- Biomass increasing
- Soil available N decreases.
- Decline in species richness.

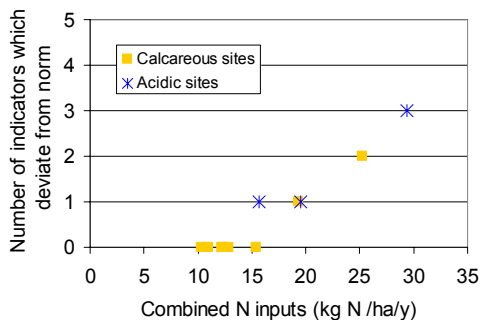
### Dune slacks



- Increase in cover of *Hypochaeris radicata*
- Increase in cover of *Carex arenaria*

## Critical Loads\*

On the basis of the observed relationships at N deposition of 15 kg N ha<sup>-1</sup>y<sup>-1</sup> and above, and taking a precautionary approach, we suggest a critical load range of 10 – 20 kg N ha<sup>-1</sup>y<sup>-1</sup> for shifting dunes and dune grassland.



## Management options for N removal in sand dunes



## Ongoing work

A new experiment comparing interactions between rabbit and pony grazing and the effects of nitrogen additions

