

Dynamic Dunescapes Dune Management Case Study Template

Sand dune system	Sefton Coast
Case Study Subject	Notch creation and dune slack rejuvenation 2022-2023
The Management Intervention	

Site background information

Ainsdale Sand Dunes National Nature Reserve (Ainsdale NNR) is one of the most important wildlife sites in England. The site was established in 1965 to protect the finest example of lime-rich sand dunes on the north west coast. Today, Ainsdale NNR allows many rare species to flourish whilst providing a place for visitors to get close to nature and enjoy the magnificent scenery of dunes, golden sands and pinewoods. It occupies the central part of the Sefton Coast Site of Special Scientific Interest (SSSI) and Special Area of Conservation (SAC), a 20km long unspoilt sand dune system which stretches from Liverpool to Southport.

Coastal sand dune habitats are a sanctuary for special plants, insects, birds, reptiles and amphibians. The Sefton Coast is home to one of the UK's largest populations of natterjack toads which breed in the dune slack pools found here and it is one of the last UK strongholds for sand lizard, a rare reptile confined to sandy habitats.

To support our dune specialist species and provide them with the habitats they need, sand dunes need to be free to move. Areas of naturally shifting, mobile sand are essential, but many of our sand dunes have become too stable and overgrown with dense vegetation. Sand dunes are now one of the most threatened habitat types for biodiversity loss in Europe.

What was the issue/change you hoped to make? (Ecological, physical, user behaviour, mix)

Research suggests we have lost over 80% of our bare sand across the Sefton Coast dune system since the 1940s, together with much of our natural dynamic processes that would have helped to create and maintain bare sandy areas and dune slacks. With very little natural dynamic sand movement together with rapid vegetation succession, the site has become over-stabilised with limited bare sand and early successional habitats. This is one of the main reasons causing a decline in our rare dune species such as natterjack toad and sand lizard which need these habitats to complete their lifecycles.

We hoped to begin to restore natural dynamic processes in our frontal dunes at Ainsdale NNR, increasing wind-blown sand movement into the inland dune system. This would improve habitat connectivity between the beach and the fixed dunes, link natterjack toad and sand lizard subpopulations along the Sefton Coast, help create bare sand and provide opportunities for pioneer plants and invertebrates. It could also help rejuvenate dune slacks behind the frontal dunes. We also hoped the processes would become more self-sustaining, reducing the need for as much management in the future.

What was the suggested intervention?

To use mechanical processes to excavate notches into the frontal dunes, mimicking the natural scours/blow-outs elsewhere on the coast and allowing more bare sand to travel through the rest of the dune system behind.

For the dune slacks, remove the dense vegetation and humic layers down to bare sand and the water table by mechanical means to create early successional dune slack communities and restore scrapes for natterjack toads.

What did you do?

We collated baseline data for the proposed intervention area. This included undertaking plant surveys prior to any work taking place. We have well-established annual reptile and amphibian monitoring programmes for the Sefton Coast. We used the data from these to map sand lizard populations on the frontal dunes and to demonstrate that the overgrown slacks immediately behind the intervention area had not been successfully used by natterjack toads for breeding for several years.

We then commissioned a geomorphological assessment to establish whether the project was feasible and if so, help identify the best locations for the notches. The initial assessment concluded that the frontal dunes along the central part of site provided a suitable area for physical intervention for the following reasons:

- This section of coast has relatively high exposure to wind energy and the creation of notches in the cliffed frontal dunes would increase the flow of wind and sand from the beach into the dune system.
- Our frontal dunes lie in a transition zone from erosion to the south and accretion to the north with a positive dune sediment budget so there was an available source of sand for transport into the hind-dune area.
- The creation of notches in the frontal dunes will improve the connectivity between the beach and the hind dune-area, and in an alongshore direction, for the benefit of natterjack toad and breeding populations of other species.

The assessment identified several topographical low points in the frontal dunes where it would be possible to create notches. We then compared these to our sand lizard data and took advice from local reptile experts. This resulted in a proposal to create four notches, broadly V-shaped in cross-section, in locations that avoided existing sand lizard populations. The seaward end of the notches would extend almost down to the beach with a base around 3-4m wide. Side slopes would have a maximum angle of 1 in 1 resulting in a width of around 20-25m at the top of the excavation, with the base of the notch rising landward and narrowing slightly. Sand excavated from the notch would be deposited in a lobe immediately behind each notch. The notch should then accelerate the wind in a landward direction, passing sand over the deposition lobe which should be self-sustaining and continue to move into the fixed dune system.

How did you do it?

To deter sand lizards from moving in prior to the work, our sand lizard experts recommended making the habitat less suitable by mowing the marram grass in the proposed notch areas in winter and removing the resulting thatch. We were also advised to carry out the notching work in a window around the middle of April to the end of May when sand lizards would be active but not yet egg-laying. Ainsdale NNR staff and volunteers started the mowing work over winter in 2019 with the notches proposed for 2020 but due to Covid delays, we ended up repeating the mowing exercise for three winter seasons.

We also required planning permission for the notches and this was granted in May 2022.

To create the notches, contractors used two bulldozers and an excavator which were tracked in via the beach. The work took approximately three weeks to complete.

The two dune slacks behind the notch intervention area were mown in autumn 2022 and scraped out in January 2023 to the water table, outside of nesting bird season and when natterjack toads would be hibernating, using an excavator and a tracked dumper operated by Ainsdale NNR staff. The resulting plant material was buried on site and capped with sand from the excavation.

How was the site / intervention monitored?

Natural England staff regularly visited the work area when the contractors were undertaking the notches. Photographs were taken before, during and after the works to monitor and record the changes made. Topographical surveys were carried out and a pre- and post-works survey report produced.

Sand lizard monitoring is ongoing annually across the frontal dunes and this will hopefully pick up any movement/expansion of the existing sand lizard populations into the intervention areas. Natterjack toad monitoring of the newly scraped slacks is also continuing as part of our coast-wide annual monitoring.

What modifications, if any, did you make to your initial plan and why?

No significant changes were made.

Highlight any issues/obstacles & how you overcame them?

The Covid situation and some internal procurement issues made completing some of this work very challenging. Delaying the notching work meant having to mow the notch areas for three winter seasons instead of one which added significantly to the workload of the NNR staff. The rapidly rising water table during the works also made excavating and burying material from the dune slack scrapes difficult at times.

How much did the intervention cost?

Notches: £90k

Scrapes: £5k

Engagement Measures

How were the public and others engaged?

Social media posts were shared on Dynamic Dunescapes social media channels prior to any works commencing and these were then shared by our partners across the coast. An article was also published on the Dynamic Dunescapes website.

Posters were created and displayed on the site before and during the notches work so that visitors could find out both what was happening and why this intervention was important to the health of the Sefton Coast.

Is the intervention working?

Please describe how. What has changed?

Within days of the notches being completed, we found roe deer tracks going from the beach through one of the notches and into the nature reserve. And in 2023, Ainsdale NNR staff reported finding natterjack tracks through the notches, demonstrating the notches acting as a wildlife corridor between the beach and the inner dunes, improving habitat connectivity which was being restricted by the cliffed frontal dunes.

Three of the notch interventions are showing good signs of working so far. Sand has been mobilised by storms and windy weather, pushing the sand lobes further inland, and the dynamic processes from initial observations, are currently self-sustaining. The southern-most notch has moved the least and marram grass is colonising the sand lobe, suggesting some modification is needed to the notch angle and dimensions to increase the flow of wind movement.

Further surveys over time will provide more evidence of the scale of success of the intervention.



Photo 1: Frontal dunes at Ainsdale NNR with fixed dune system behind with no bare sand



Photo 2: Existing natural notch



Photo 3: Mowing the proposed notch area



Photo 4: Volunteers raking mown marram from proposed notch area



Photo 5: Mown notch area



Photo 6: Proposed notch area from the beach



Photo 7: Notch work underway in May 2022



Photo 8: View through a notch post-completion



Photo 9: Notches a year on



Photo 10: Notches a year on



Photo 11: Slack rejuvenation – removing the overgrown vegetation and humic layer, down to bare sand



Photo 12: Completed dune slack scrape in February 2023



Photo 13: Dune slack scrape in April 2024 with the sand from the notches in the background