

Sands of LIFE

**A project to restore and rejuvenate
sand dune habitats across Wales**

Layman's report



[naturalresources.wales/
SandsofLIFE](https://naturalresources.wales/SandsofLIFE)



Co-funded by
the European Union



Noddir gan
Lywodraeth Cymru
Sponsored by
Welsh Government



Co-funded by the European Union. Views and opinions expressed are however those of the author(s) only and do not necessarily reflect those of the European Union or CINEA. Neither the European Union nor the granting authority can be held responsible for them.

Contents

Foreword	4
Introduction	5-7
What is special about sand dunes?	
Havens for wildlife	
Why restore sand dunes?	
Threats to dunes	
Sands of LIFE project sites and features	8/9
Sands of LIFE project sites	
Sands of LIFE project features	
Practical restoration work	10-13
Reprofiling dunes	
Scraping dune slacks	
Removing invasive scrub	
Removing invasive Alien Species	
Felling conifers	
Promoting sustainable grazing by livestock	
Clearing unexploded ordnance	
Mowing	
Promoting rabbits	
Total achievement	
Survey and monitoring	14
Landscape-scale restoration case studies	15
Morfa Harlech	
Merthyr Mawr	
Putting a spotlight on sand dunes	16
Engagement	
Publications	
Well-being goals	
The future for sand dune restoration in Wales	17
Accomplishments of the Sands of LIFE project	18/19
Restoration	
Evidence and learning	
Communication and engagement	

Foreword



Sands of LIFE was a major conservation project to restore sand dunes across Wales. Collaborating with landowners and site managers, the project recreated natural movement in the dunes and rejuvenated habitats which support some of the rarest wildlife in Wales. The Sands of LIFE project has received funding from the LIFE Programme of the European Union and was part-funded by the Welsh Government.

Project Data

Reference: SoLIFE LIFE17 NAT/UK/000023

Start Date: 01/09/2018

End Date: 30/06/2024

Coordinator: Natural Resources Wales (NRW)

Sands of LIFE Team: Kathryn Hewitt, Laura Davies, Kate Linck, Diane Farmery, Jake Burton, Lucy Smith, Gabriel Hibberd, Danny Griffith, Leigh Denyer, Isabelle Spall, Nick Thomas and Julie Creer.

Sands of LIFE has worked closely with many farmers, landowners, contractors, partner organisations and NRW colleagues throughout the project. We would like to sincerely thank them for their support and advice, enthusiasm and hard work, which was essential to making the project a success. Diolch.

Introduction

What is special about sand dunes?

The coastal sand dunes of Wales are captivating, iconic landscapes and one of the country's most natural and species-rich habitats. They are biodiversity hotspots where vibrant carpets of flowers thrive alongside song birds, and a wide array of endangered insects.

As well as being rich in biodiversity, sand dunes help safeguard our wider environment. They act as natural sea defences against flooding and erosion, maintain the quality and flow of fresh water, and boost populations of bees and other vital pollinators for our food crops.

The unique character of the dunes is valued by local people and visitors alike, as they provide a dramatic backdrop to a day on the beach, a place for play, exercise or relaxation. Beaches and dunes are some of the most popular tourist locations in Wales, boosting the local economy.



Sand dunes are a vital part of the natural wealth of Wales, but they require active conservation management if they are to remain as healthy ecosystems. Working with site managers, the Sands of LIFE project has brought new funds and opportunities to deliver urgently required, large-scale restoration and rejuvenation action.

Havens for wildlife

Sand dunes support an exceptional variety of rare and highly specialised plant and animal species, many of which are classified as threatened or vulnerable. Dunes are particularly important for rare flowering plants, mosses, liverworts, fungi and invertebrates. They encompass a range of distinctive but interdependent habitats, including bare shifting sand, majestic dune ridges, flower-rich dune grassland and marshy slacks with expanses of orchids.

The diversity of the dune landscape creates an intricate, ever-changing mosaic of microhabitats. The challenging conditions (salt, shifting sand, drought and flooding) mean that only very specialised and well adapted species can survive. This, together with the fact that many dunes have escaped agricultural intensification, means that sand dunes are one of the most natural and biodiverse ecosystems remaining in Wales, and one of the few places in the lowlands where visitors can still experience a sense of wilderness and an abundance of wildlife close at hand.



Typical dune species

Marram grass

Sea holly

Dune pansy

Marsh helleborine

Southern marsh orchid

Bryum thread-moss

Vernal mining bee

Dune tiger beetle

Skylark

Why restore sand dunes?

Over the last century around 30% of the original extent of dune ecosystems have been lost to development, agriculture and erosion.

Today there are only 8,100 hectares (31 square miles) of sand dune in Wales – which amounts to just 0.3% of the country's land surface. Welsh sand dunes represent 11% of the sand dune resource in the UK.

There are 87 significant sand dune sites along the Welsh coastline, many being designated as Sites of Special Scientific Interest. The largest and most significant are classified as Special Areas of Conservation, highlighting their international importance for biodiversity and their integral role within Europe's network of protected areas.



Threats to dunes

Naturally, dunes have large areas of mobile, bare sand. However, over the past 80 years or so, grassland and scrub have encroached, 'fixing' the once moving dunes and resulting in a loss of 90% of open sand and pioneer habitat crucial for rare dune wildlife.

As a result dynamic dunes systems with naturally blowing sand have virtually disappeared in Wales. This has resulted in populations of many rare and specialist species decreasing, and the condition of habitats deteriorating.

Species such as Fen orchid, Petalwort, Crucifix ground beetle, Shril carder bee and Sand lizard are now threatened with extinction.

The 'unfavourable condition' of the dunes is due to the combined impact of air pollution, invasive alien species, climate change and lower levels of grazing by livestock and rabbits. Historic efforts to stabilise the dunes by fencing and planting marram grass, have also played a part.

Sands of LIFE project sites and features

Sands of LIFE project sites

The project has worked on 10 sand dune sites, across four Special Areas of Conservation, with a total area of 5,300 hectares. Six of the sites are also National Nature Reserves.

Special Area of Conservation	SoLIFE project site	Area (ha)
Abermenai to Aberffraw Dunes	Tywyn Aberffraw	337 ha
	Newborough	1289 ha
	Morfa Dinlle	245 ha
Morfa Harlech and Morfa Dyffryn	Morfa Harlech	578 ha
	Morfa Dyffryn	484 ha
Carmarthen Bay Dunes	Laugharne - Pendine Burrows	796 ha
	Pembrey Coast	288 ha
	Whiteford Burrows	122 ha
Kenfig	Kenfig	716 ha
	Merthyr Mawr	474 ha

Habitats	Species
Shifting dunes	Petalwort
Shifting dunes with marram	Shore dock
Dune grassland	Fen orchid
Dunes with creeping willow	
Humid dune slacks	



Sands of LIFE project features

The project has focused on five Habitats Directive Annex I habitats (covering 2,400 hectares) and three Annex II species - features which are considered rare and threatened across Europe.



Practical restoration work

By working closely with the site managers and contractors, the 7-strong Sands of LIFE team have delivered an ambitious and innovative programme of practical action. The aim is to make significant progress to bring the features into favourable condition on the project sites. The practical actions included:

Reprofiling dunes

Creating notches (gaps) in the frontal dunes to allow sand to blow inland. Removing turf from dry dunes to increase sand movement and rejuvenate habitat.

Achieved 9 notches, and 14 hectares of turf stripping.



Scraping dune slacks

Lowering the surface of dried-out and overgrown slacks (hollows in the dunes) to rejuvenate dune wetland. Creation of pools for wildlife and for livestock to drink from.

Achieved 16 hectares, including 12 pools.



Removing invasive scrub

Clearing native scrub, such as birch, willow and gorse which can dominate the dunes, stabilise the sand and smother species-rich grassland.

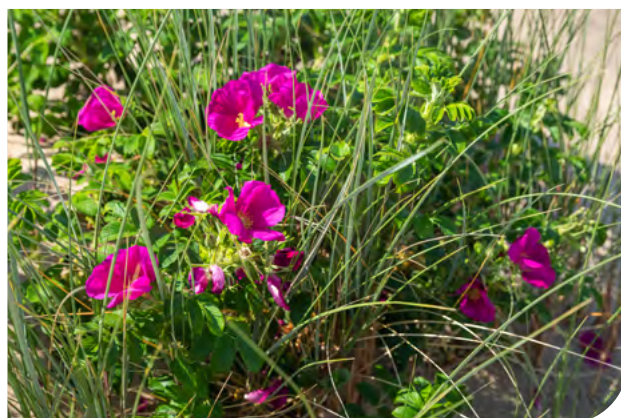
Achieved over 70 hectares.



Removing Invasive Alien Species

Controlling highly invasive non-native species which can over-run the dunes and smother native plants. Species included Sea buckthorn, Japanese Rose, Montbretia and Cotoneaster.

Achieved 76 hectares.



Felling conifers

Removing blocks of mature commercial conifers planted in inappropriate locations in past decades. Removing conifer seedlings onto the dunes and areas of dead timber and brash.

Achieved 22 hectares of conifer removal.



Promoting sustainable grazing by livestock

Constructing of new and replacement fencing to allow grazing by cattle, ponies and sheep to maintain a low flower-rich sward and prevent overgrowth of coarse vegetation and scrub.

Achieved 29 kilometres of fencing with 105 gates and pens.



Mowing

Mowing dune grassland to favour low-growing plants and encourage rabbit grazing.

Achieved 104 hectares.



Clearing unexploded ordnance

Scanning for and removing buried ordnance from historic military training, to allow works to be carried out safely.

Scanned or surveyed 90 hectares and disarmed 4 live items.



Promoting rabbits

Create artificial warrens to encourage rabbits which are a keystone species on the dunes. They create a low species-rich turf by grazing and micro habitats by digging.

Achieved 27 warrens.



Total achievement

In total, 440 hectares of practical works have been delivered by Sands of LIFE on 9 sites. However, some restoration efforts required several interventions in the same area, such as scrub clearance, mowing, then scraping. So, collectively these actions have directly restored 199 hectares of sand dune, including the creation of 31 hectares of bare sand.

A total of 781 hectares of dune have been secured for livestock grazing in the future as a result of the 27 kilometers of fencing work delivered by Sands of LIFE. This includes 251 hectares of dune which has been newly enclosed, allowing grazing for the first time in many years.

Overall Sands of LIFE has positively impacted 926 hectares of sand dune.



Survey and monitoring

The project established a robust evidence base to support its work and measure conservation outcomes. For the first time since the early 1990s, a National Vegetation Classification (NVC) survey was conducted across 9 project sites covering nearly 4,000 hectares. This produced detailed, updated maps of Annex I habitats and other dune communities.

Rare and protected species were surveyed on 6 sites before work began to prevent harm to populations and inform licencing or mitigation requirements. Surveys included:

- **Petalwort**
- **Sand lizards**
- **Great crested newts**

To assess restoration outcomes, particularly for slack scraping, a monitoring program was implemented across 7 sites covering:

- **Botany**
- **Invertebrates**
- **Soils**
- **Hydrology**
- **Geomorphology (LiDAR/drone)**

The survey results varied significantly between sites based on factors such as location, seasonal weather differences, size and depth of excavations, distance from the shoreline and time since completion.

However, the studies showed that project interventions successfully created 31 hectares of bare sand, which had low organic matter, low nutrient content and higher pH, as intended. Surface levels were lowered in scraped slacks as planned, producing higher water levels, although not all met predicted targets. At Tywyn Aberffraw and Merthyr Mawr the notches significantly increased sand movement at 50m inland, although the same result was not seen at Kenfig where sand supply is more limited.

In most cases, it was too early for the desirable early-successional stage plant communities to have developed, however, on average, 7 indicator species were found in each of the surveyed slack plots, with the most successful supporting 12 species. Invertebrate surveys also showed an increase in species, with eight new dune slack specialists recorded post-intervention, compared to only two previously.



Landscape-scale restoration case studies



Morfa Harlech

In the 1970s, around 20 hectares of the Morfa Harlech dunes were planted with a commercial Corsican pines as part of Harlech Forest. The growing trees adversely affected the dune habitat, lowered water levels and supported invasive non-native species.

Sands of LIFE and NRW restored the area by felling the over-mature plantation, selling the timber to market. Stumps and brash were removed and infestations of Broom and Tree lupin were controlled.

Three hectares of dry dune were also scraped back to bare sand ready to be colonised by rare dune species such as the Vernal mining bee, and two hectares of slack were rejuvenated to create wetland habitat and open water.

Alongside the works, an important World War II archaeological feature, the Gunnery Range Railway, was made accessible and recorded in detail for the first time. Finally the whole area was fenced to allow grazing by ponies to maintain the restored habitats in this transformed landscape.



Merthyr Mawr

Sands of LIFE collaborated with the Merthyr Mawr Estate to continue fore-dune remobilisation works first started in 2012. A v-shaped notch was dug into the steep frontal dune ridge with parallel 'arms' mounded up to funnel wind and sand into the dunes. The notch also allows better access for the public to and from the beach. Behind the notch were disused gravel workings where the dunes had been heavily modified. Here the sand was reprofiled to re-create the original slack formation.

Further inland small scrapes were made to encourage rare bryophytes and overgrown ridge-top 'blow-outs' were stripped of turf to rejuvenate them to facilitate localised 'sand rain'. In total 4.6 hectares of dune were reprofiled and rejuvenated.

Putting a spotlight on sand dunes

Engagement

Sands of LIFE engaged with nearly 1,500 members of the local community and visitors through a total of 91 events. These included guided wildlife walks and educational field trips for students and teachers, as well as meetings with local residents and landowners. Sands of LIFE attended shows and festivals, as well as hosting events ranging from litter picking to yoga on the beach.

Sharing knowledge and expertise on sand dune management with other practitioners was a key objective for the project. Sands of LIFE hosted an international workshop, a series of online webinars and stakeholder meetings and a final conference attended by over 100 delegates. By also contributing to 60 other networking events in Wales, UK and northern Europe, the project engaged with over 1000 colleagues in total.



Publications

Sands of LIFE has produced a series of publications for the public and technical audiences.

- 33 monitoring reports
- 13 reports on practical restoration actions
- A set of education materials for schools
- Sand Dunes in Wales booklet
- Leaflets on sand dune sites

Well-being goals

The project has contributed to Wales' well-being goals by:

- Supporting traditional farming practice
- Creating economic opportunities for Welsh businesses
- Training and developing a new generation of environmental managers
- Enabling more people to use and enjoy the dunes which in turn promotes health and well-being and economic growth through tourism in Wales

The future for sand dune restoration in Wales

The Sands of LIFE project has achieved a fantastic range of sand dune restoration measures across four Special Areas of Conservation in Wales, moving these sites forward towards a much healthier condition and ensuring all the ecosystem service benefits of sand dunes are realised.

However, the work doesn't stop there – all these sites will require ongoing restoration and maintenance to ensure negative factors don't start to impact the habitat again.

Monitoring will be required to understand the long-term impact of restorative actions, and continuing the

conversation with local communities, landowners and stakeholders' groups will be required to keep raising awareness of the importance of these valuable ecosystems.

We have created a Sand Dune Strategy for Wales which sets out our vision for sand dunes for the next 5 years, and an AfterLIFE plan which provides detail on actions required on each site.

Visit the webpage to find out more
Natural Resources Wales / Sands of LIFE



Achievements of the Sands of LIFE project

Restoration

- 926 ha of Annex I sand dune habitats restored to better condition.
- 9 frontal dune notches (target 10)
- 14 ha of reprofiling/dry sand scrapes (target 12 ha)
- 16 ha of slack scrapes (target 13 ha)
- 104 ha of mowing (target 93 ha)
- 73 ha of scrub control (target 44 ha)
- 9 ha of native species management (target 19 ha)
- 76 ha of invasive alien species control (target 58 ha)
- 22 ha of conifer removal (target 9 ha)
- 35 ha of dead tree and brash removal (target 15 ha)
- 29 km of fencing (target 24 km)
- 90 ha of land scanned for unexploded ordnance, with 4 live items disarmed safely (target 28 ha)
- 105 pedestrian and farm gates and livestock pens installed (target 43)
- 27 artificial rabbit burrows created (target 28)



Evidence and learning

- 238 plots surveyed across 7 project sites
- 11 data sources monitored between 2019 and 2023
- 10 dipwells installed to monitor water levels
- Nearly 600 different species of invertebrate identified
- Rabbit surveys completed
- Socio-economic study carried out involving 4 questionnaires
- A series of 33 monitoring reports published
-

Communication and engagement

- Sand Dunes in Wales booklet
- 8 site leaflets
- Pack of educational resources (10 activities and information sheets)
- 4 other leaflets and booklets
- 12 issues of the project newsletter
- 11 permanent interpretation panels
- 44 articles in newspapers and magazines
- 11 TV and radio broadcasts
- 42 blogs shared online
- 225 social media posts on 4 platforms, including 42 short videos
- International workshop (40 delegates)
- Series of 8 practitioner webinars and meetings
- Final conference (110 delegates)
- 22 community events
- 26 landowner meetings
- 13 best practice sharing visits
- 47 other networking meetings
- After-LIFE plans for each site
- Sand Dune Roadmap (strategy)





Morfa Harlech