



D3 -Dynamic Dunescapes DuneLIFE Ecosystem Service Report



Assessment of contribution to ecosystem functions of the Dynamic Dunescapes project

This sub-report is provided to meet the deliverable ‘D3’ for the EU LIFE Dynamic Dunescapes Project : “Assessment of contribution to ecosystem functions”

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2 Introduction

Coastal sand dunes provide a wide range of ecosystem services, and their management has the potential to either enhance or degrade these services. Key Ecosystem Services provided by Coastal sand dunes, in addition to biodiversity, are provisioning¹, regulation and maintenance (e.g. climate change adaptation), and cultural services.

Aside the importance of Sand dunes for biodiversity, coastal dunes also hold strong cultural associations, have potential to contribute to coastal risk management, and value for recreation. The indicators below were selected through the grant agreement to assess the contribution of the restoration work to ecosystem function (the potential that ecosystems have to deliver ecosystem services).

Much of the data for this was undertaken in collaboration with the work on Socio-Economic impacts (Deliverable D4) and the Impact of Engagement Report (Deliverable D5). The ecosystem services monitored, and the indicators reported against are set out below.

Ecosystem Services

2.1 Provisioning Services:

2.1.1 Reared animals and their outputs

Many of the projects with Dunescapes rely on reared grazing animals to restore and maintain the condition of the sites. Animals are usually cattle, sheep, ponies or horses, although on Penhale goats (to control scrub regrowth) have also been trialled.

In most cases livestock, especially cattle and sheep, are not owned by the participants in the project but are on grazing agreements and so the numbers of animals are not solely determined by the beneficiaries (with the exception of Ponies at Penhale). However, The use of 'No fence' collars at different sites has been important in ensuring that the grazing is targeted more effectively – and so whilst in some sites (e.g. Braunton Burrows) cattle numbers may not have changed through the project – the way the cattle are controlled – i.e. being able to access areas without fencing that may have previously been un-grazed. In addition, on some sites such as Saltfleetby- Theddlethorpe SAC, fencing provided through the project has allowed more effective grazing of new areas.

Although an 'industry standard', Livestock Units (LU) per year is an 'inexact' metric since grazing pressure is more nuanced - depending on the site characteristics, specific breeds,

¹ Provisioning = tangible, material products obtained directly from ecosystems that sustain human life and economic activity

age, behaviour of individual animals. However, wherever the data exists LUs have been calculated, or where not possible numbers of animals are represented.

Total Stocking rates are expressed based on the Livestock units relative to the areas the different animals grazed over.

As can be seen from data in Table 1 there is variation in the trends in stocking rates at the different component sites. However, within these figures there are important changes in the intensity and the distribution of grazing. Eg at Studland Cattle grazing was introduced (facilitated by no fence collars) where there was previously none. Penhale showed the most significant increase in grazing pressure, with a large increase in the number of cattle and ponies, as well as goats grazing the site – again facilitated by fencing and new grazing infrastructure.

		Young + Older CATTLE		SHEEP		HORSES/PONIES		GOATS				
site	year	Livestock Units /ha Calc	stock rate	Livestock Units /ha Calc	stock rate	Livestock Units /ha Calc	Stock rate	Livestock Units /ha Calc	Stock rate	TOTAL LU	TOTAL STOCKINGRATE	TREND 2019- 2025
Studland dunes	2019											
Studland dunes	2025	3.75	0.03							3.75	0.03	INCREASE
Gib Point SAC	2019	9.33	0.24	11.30	0.20		0.10			29.18	0.34	
Gib Point SAC	2025			7.80	0.18		0.26			10.95	0.26	DECREASE
Saltfleetby SAC	2019	5.25	0.50							5.25	0.50	
Saltfleetby SAC	2025	5.83	3.14							5.83	3.14	SIG. INCREASE
Sefton Coast	2019	5.00	0.05	14.58	0.14					19.58	0.05	
Sefton Coast	2025	3.00	0.03	14.58	0.14					17.58	0.03	SLIGHT DECREASE
Sandscale Haws	2019	54.00	0.24	10.00	0.04					68.20	0.24	
Sandscale Haws	2025	43.00	0.19	10.00	0.04					57.20	0.19	SLIGHT DECREASE
North Walney	2019	20.00	0.30	6.67	0.10					26.67	0.30	
North Walney	2025	36.00	0.30	5.63	0.08					41.63	0.30	NEUTRAL
South Walney	2019	15.00	0.18	20.42	0.16					44.42	0.18	
South Walney	2025	29.17	0.33	4.67	0.04					47.83	0.33	INCREASE
Penhale	2019	3.33	0.27			3.00	0.15			8.33	0.42	
Penhale	2025	15.00	0.10			12.60	0.05	15.00	1.50	51.60	1.66	SIG INCREASE
Braunton Burrows	2019	55.00	0.12							88.00	0.12	
Braunton Burrows	2025	55.00	0.12							88.00	0.12	NEUTRAL

2.1.1.1 TABLE 1: Changes in Total Livestock Units and stocking rates/Ha between 2019 and 2025 for component Dunescape sites.

2.2 Regulating Services:

2.2.1 Maintaining populations and habitats

The Dynamic Dunescapes Project sites funded through EU LIFE, are all SACs designated for the range of coastal sand dune habitats, and some also include elements of coastal heath and freshwater features. These habitats support a high diversity of species, and some very specialist ones with restricted distributions - some of which are endemic to the UK - that are dependent on the ecological niches that coastal dune systems provide.

Ecosystem Service indicators are expressed in terms of both habitats, and some of the sand dune specialist plant and animal species, represented across the suite of project sites.

Indicators:

2.2.2 SAC habitats: Area and condition of dune habitats in the sites.

The change in SAC habitat type area, is derived from the most accurate remote sensed Light Detection and Ranging (LiDAR) and aerial photography evidence available (using Environment Agency and NE data). Data is based on change in the habitat types where the survey data was available 'before' and 'after' DuneLIFE interventions. However, not all sites have remote sensed 'after' data available yet - totals shown in table 2.2.2.1 are comprised from habitats at four of the eight key SAC sites - Studland, Penhale, Branton Burrows and Sefton. The flight survey data for Cumbria and Lincolnshire are not yet available (have only just been completed or are due later in 2026).

Note that the 'before' totals differ from the existing Standard Data Forms (SDF) used in the original DuneLIFE bid planning, since the newer technology of the remote sensed data provides a different picture of habitat type coverage. It is important to acknowledge that any survey is a 'snapshot' in time, and ephemeral habitats such as embryo, mobile and wet slack features can change rapidly and within year. Thus, a true picture of habitat change can only really be ascertained over decades which is beyond the timeframe of this project.

There are apparently reduced areas of some habitat types –e.g. embryo (H2110) and mobile dunes (H2120) overall BUT there is much variability between sites (as can be seen at appendix 1) and as dune systems are inherently dynamic, these habitats fluctuate year on year. For H2170 creeping willow habitat type there was a decrease and this is potentially attributable to it being manged with other scrub. However, the fixed dune habitat H2130 shows a marked increase in area (270ha), and this is where much of the interventions for Dunescapes occurred and so is reflected by that figure. All these assessments will be repeated and assessed as aerial surveys are re-flown, and ground-truthed, in future years. This data will then be fed into the review process for Standard Data forms (SDF) via the UK's [Joint Nature Conservation Committee](#) along with the dune dynamics case study (a deliverable under D5), whenever that process happens (no confirmed date at time of writing).

Note that Sea Buckthorn H2160 is only an Annex 1 SAC feature on one site - Saltfleetby-Gibraltar Point – and that has not been aerial surveyed since DuneLIFE works were completed (scheduled for 2026). This species is considered an invasive on the west coast of England and is limited in range, so is not reported in this part of the Life Performance Indicators (LPIs.)

The full data for all sites showing survey dates for component sites, using LIDAR and Aerial Data is shown at Appendix 1.

	H2110 Embryo	H2120 Mobile	H2130 Fixed dune	H2150 Dune heath	H2160 Sea buckthorn	H2170 Slack Creeping willow	H2190 Slack vegetation
TOTAL AREA (ha) of each Annex 1 habitat type (derived from LiDAR etc) 'before' DuneLIFE	14.26	395.39	1069.67	85.53	0	169.75	277.3
TOTAL AREA (ha) of each Annex 1 habitat type (Derived from LiDAR etc) during or 'after' DuneLIFE	13.13	312.12	1339.59	71.95	0	139.62	193.3
% change	92.1	78.9	125.2	84.1		82.3	69.7

2.2.2.1 TABLE 2: Changes in Annex 1 SAC habitat area (Ha) between c 2016 and 2025, totalled up for four key component DuneLIFE SAC sites. NOTE whilst figures are presented for completeness, they are NOT representative of the whole project or activity undertaken - see text.

2.3 Site condition and trend:

The current trend and condition of each habitat type is only available from 2026 reporting under Article 9a of the UK habitats regulations. Whilst the reporting is done at country level, Dynamic Dunescape sites comprise a significant proportion of the overall dune habitat resource in England, BUT the trends can only be considered representative of the overall habitat resource in and outside SACs. This 9A reporting covers the period 2019-2025 and is based on existing condition data from that time - which is realistically too early to show the longer-term results and

trends that may result from the Dunescapes interventions. Nitrogen deposition was included in the assessment for Article 9a which makes all but one of the Dune Habitat types ‘Unfavourable Bad’. However, at individual site level (rather than England wide habitat) there will be local variation in condition with some habitats showing trends toward recovery.

Dune Habitat	2110 - Embryonic shifting dunes	2120 - Shifting dunes along the shoreline with <i>Ammophila arenaria</i> ('white dunes')	2130 - Fixed coastal dunes with herbaceous vegetation ('grey dunes')	2150 - Atlantic decalcified fixed dunes (<i>Calluno-Ulicetea</i>) (v.2024)	2160 - Dunes with <i>Hippophaë rhamnoides</i>	2170 - Dunes with <i>Salix repens</i> ssp <i>argentea</i> (<i>Salicion arenariae</i>)	2190 - Humid dune slacks (v.2024)
Article 9A report status (ie Habitat Condition)	UF BAD	UF BAD	UF BAD	UF BAD	FAVOURABLE	UF BAD	UF BAD
Article 9A Trend	Stable	Deteriorating	Deteriorating	Deteriorating	Improving	Deteriorating	Deteriorating

2.3.1.1 TABLE 3: Trends in condition of Annex 1 SAC habitat area ACROSS England as reported through Article 9A.

2.3.2 Delivery of action ‘on the ground’ for dune habitats through the project:

SAC dune habitats were grouped under the different Actions C1 and C2. In all sites there has been either stable, or in most cases, significant increase in the rejuvenated area of Sand Dunes and Associated Wetland Habitats, as expressed in Table 4.

Action	Site	Target area (ha)	Progress to Sept 25 (ha)	% complete
C1.1: Sand Dune rejuvenation	Lincolnshire	17	83.6	492
	Studland	3	4.58	153
	Cornwall	8.12	9.25	114
	North Devon	34	55	162
	Sefton	20.5	25.73	126
	Cumbria	46.25	54	117
	TOTAL	129	232	180
C1.2: Associated wetland rejuvenation	Lincolnshire	2	2	100
	Studland	2	3.1	155
	Cornwall	1	2.2	220
	North Devon	22	23.2	105
	Sefton	0.486	0.53	109
	Cumbria	5.05	7.35	146
	TOTAL	33	38	118

2.3.2.1 Table 4: Restoration of dune all dune SAC habitats (Dry Sand Dune and Dune Wetland Habitat rejuvenation) areas across the project from the initial target, to end of project.

Table 4 shows a significant increase in the overall area of rejuvenated Sand dune habitat since the project commenced for both the dry (80% gain of the original area), and associated wetland habitats (18% gain in the original area). Some areas showed particular gains (e.g. Lincolnshire) where the use of capital equipment such as the 'Softtrack' and grazing infrastructure, secured through Dunescapes have enabled large areas of habitat to be restored.

2.4 Populations: size or extent/range of key species populations.

There are a number of SAC Annex II, Annex IV, red list and other significant species of plants and animals that were monitored by the project, and that habitat restoration works were designed to restore, maintain or increase their populations.

Different species were selected at each site for use as monitoring indicators. Condition, trends and specific population extent/range/population figures (where available) can be seen in Table 5.

Changes in populations are variable, with some species stable, others increasing, while others show apparent reductions. However, the time between when interventions were carried out is not long enough for most species to respond to the changes in their supporting habitat. E.g. fauna where breeding maturity may be delayed (e.g. Natterjack toads only breed when 3 years old), or for plant species that are slow to disperse into newly restored areas (e.g. Bryophytes). In some cases, survey data is not available. Survey condition can also impact on accuracy of data – e.g. at Sefton survey reports acknowledge that the low count of spawn strings (the main way but not definitive method of estimating population success) in 2024 may be due to survey conditions at the time, thus affecting trends.

In addition, annual variability in climate can dramatically affect species numbers e.g. the reduction in Petalwort at Braunton Burrows was partly attributed to a very hot dry year in 2022.

For Dune gentian (*Gentianella amarella subsp. Occidentalis*) at Braunton burrows SAC huge variation in population has been noted by recorders. As an annual species the population varies considerably according to local climate variability. Continued grazing and action to control scrub should maintain or increase its potential range and population in favourable climatic years. However, whilst it is included in the table above for completeness, it is not shown in LPI dataset as there were very few plants recorded in 2024/25 as this would be mis- representative.

Thus, trends in species data should be treated with understanding of this short-term variability, and whilst presented here, do not represent a reliable trend. Monitoring in the AfterLIFE and longer period will determine if any changes are sustained.

However, the overall very positive change in extent of all the dune habitats in all locations is likely to lead to opportunities for colonisation and expansion of many of the target species over time.

SAC	Braunton Burrows	Braunton Burrows	Penhale	Penhale	Penhale	Sefton Coast	Sefton Coast	Sefton Coast	Studland dunes	Studland dunes	Studland dunes
Species of interest	Petalwort <i>(Petalophyllum ralfsii)</i>	Dune Gentian * <i>(Gentianella amarella subsp. Occidentalis)</i>	Petalwort <i>(Petalophyllum ralfsii)</i>	Shore dock <i>(Rumex rupestris)</i>	Early gentian <i>(Gentianella anglica)</i>	Sand Lizard <i>(Lacerta agilis)</i>	Naterjack Toad <i>(Epidalea calamita)</i>	Northern Dune Tiger Beetle <i>(Cicindela hybrida)</i>	Sand lizard <i>(Lacerta agilis)</i>	<i>Lycopodiella inundata</i> (moss)	<i>Common tiger Beetle</i> <i>(Cicindela sylvatica)</i>
Species status (2018)	Unknown	unknown	Unfavourable - inadequate	Unfavourable - inadequate	Other (Unfavourable – inadequate)	Unfavourable/ inadequate	Unfavourable/ inadequate	Other (Unfavourable/ inadequate)	unknown	other	other
Species status at end of project	Unknown	Unknown	favourable	Unfavourable - inadequate	Other (Unfavourable – inadequate)	favourable	Unknown	Other (Favourable)	unknown	other	other
Species trend (2018)	decreasing	decreasing	unknown	decreasing	fluctuating	unknown	decreasing	Unknown	decreasing	decreasing	decreasing
Species trend at end of project	increasing	unknown	stable	increasing	increasing	increasing	decreasing	increasing	stable	stable	increasing
Where protect ion listed	Annex II&IV	<i>Other</i>	Annex ii	<i>Annex iv</i>	red list - plants	Annex IV	Other - Ramsar	Other - Section 41 of NERC Act	Annex IV Habitats Directive	s. 41 NERC (2006)	s. 41 NERC (2006)
Species area (2018)	c.600 m2	c.80 m2	627ha	627ha	627ha	70ha	2100ha	70ha	70 ha	100m2 in 4 compartments	4.5 ha

SAC	Braunton Burrows	Braunton Burrows	Penhale	Penhale	Penhale	Sefton Coast	Sefton Coast	Sefton Coast	Studland dunes	Studland dunes	Studland dunes
Species of interest	Petalwort <i>(Petalophyllum ralfsii)</i>	Dune Gentian * <i>(Gentianella amarella subsp. Occidentalis)</i>	Petalwort <i>(Petalophyllum ralfsii)</i>	Shore dock <i>(Rumex rupestris)</i>	Early gentian <i>(Gentianella anglica)</i>	Sand Lizard <i>(Lacerta agilis)</i>	Naterjack Toad <i>(Epidalea calamita)</i>	Northern Dune Tiger Beetle <i>(Cicindela hybrida)</i>	Sand lizard <i>(Lacerta agilis)</i>	<i>Lycopodiella inundata</i> (moss)	<i>Common tiger Beetle</i> <i>(Cicindela sylvatica)</i>
Species area at end of project	c. 12000 m2	c.1500 m2	627ha	627ha	627ha	80ha	2100ha	80ha	73 ha	120m2 in 5 compartments	5 ha
Popln count (2018)	c. 22000	43	10000	78 (2017)	650 (2019 only small number of locations surveyed)	350-400 individuals	500 strings	3200 individuals	recorded in 14 dune compartments	11000 plants in 13 patches	3 colonies
Popln count - Latest or at end of project	7423	No survey data available*	1000-3000	196 (2024)	28634 Total (surveyed 2020+ 2025)	Estimated 500-600 across Sefton SAC	285 strings (2024)**	4393 (2019 is latest data from GEMS project)	Recorded in 14 dune compartments	c. 11000 plants in 14 patches	32 locations – thought to be at least 4 or 5 colonies

Table 5: Key species status, trends and population counts at key Dynamic DunesCAPS SACs

* Note Dune gentian (*Gentianella amarella subsp. Occidentalis*) at Braunton burrows SAC, whilst it is included in the table above for completeness, it is not shown in LPI dataset as there were very few plants recorded in 2025 and this would be mis- representative. As an annual, the population varies enormously from year to year according to local climate variability.

** This is the 9th lowest count since 1987, however the conditions for spawning were good, and number of recorded strings is likely to have been underestimated this year, though, due to the high water levels making some parts of the pools in the area inaccessible or otherwise difficult to survey.

2.4.1 Ecological condition of freshwaters

The key freshwater project under DunesCAP was the restoration of 'Little Sea' lake a characteristic SAC feature, within 'Studland Dunes' SAC, Dorset.

Recovery of lakes after perturbation is not straightforward – delays in recovery of lake ecosystems can result in a longer-term shift in the ecological condition of the lake. The chemistry of the lake ecosystem in Little Sea is also very complex – and is influenced not only by the lake biota, including the invasive Carp, but there is a complex and as yet uncertain relationship with the surrounding catchment in terms of water quality and water colour (in terms of Dissolved Organic Carbon from the catchment).

The indicators for this habitat in the project bid document were originally specified as phosphorus and Phytoplankton concentrations. Whilst these parameters can be used to indicate the nutrient status of the water over a number of years (i.e. to show reliable trends without undue influence of annual weather fluctuation etc) they are a subset of the suite of water quality parameters that are used to determine overall ecological condition/status of the lake, and so in their own right are not suitable for making that assessment.

The project in Studland did, and continues to collect water quality data for Little Sea using automated water quality sondes. Whilst the lake is still showing few signs of ecological recovery at these early stages (Pers comm. Property Manager, NT Studland), actions to further reduce the biomass of invasive Common Carp continues which is likely to have the greatest impact on enabling recovery of the lake ecological condition in the longer term. The reductions in fish biomass are reported in Section 2.2.6. When a long-term data set of water quality parameters is available, these will be analysed and published in follow up work.

2.4.2 Hydrological cycle and water flow maintenance

Indicators: Hydrology: ground water levels, drainage water flow

The Hydrology of dune systems is complex, and even small changes in water tables (e.g. <20cm) can affect the species composition and abundance of plant (and animal) communities in 'dune slacks' dramatically to a different NVC community (Denning *et al*, 2024). Thus an improved understanding of hydrological changes over longer time periods in dune ecosystems was an aspiration of the Dynamic dunesCAP project.

Through the project Hydrological Monitoring (dipwells) was installed at two of the DunesCAP locations, North Walney (Morcombe Bay SAC) in Cumbria (in 2023) and Saltfleetby- Theddlethorpe (King Charles III) SAC in Lincolnshire (September 2025).

At North Walney, thirteen instrumented dipwells have been installed (2023). The dipwells will provide data on shallow groundwater levels to help inform management decisions on how best to diversify and improve habitat for rare species, such as natterjack toads.

At Saltfleetby-Theddlethorpe, thirteen dipwells were installed in 2025, to provide valuable data to inform the site management plan and planned habitat restoration work going forward.

Because the dipwells at both sites have only been in place for a relatively short time data will not show any reliable long-term trends yet, and so trends cannot be reported here.

However, the dipwell and sonde (datalogger) technology used will permit groundwater level data collection over at least 10 years or more, and form an important part of the afterlife monitoring, to influence future management and restoration activity at these project sites.

2.4.3 Pest control

2.4.3.1 Invasive plant species:

A significant theme of the Dynamic Dunescapes work was work to control, manage and reduce the impacts of invasive Alien species (IAS). In most of the sites this was focussed around control of invasive plants such as Travellers Joy (*Clematis vitalba*), Japanese Rose (*Rosa rugosa*), and Sea Buckthorn, *Hippophae rhamnoides* (where it was not considered a natural component of the dune ecosystem).

An overall summary of the progress by the end of the project against the initial target in control /removal of IAS is shown in Table 5. Progress made on individual key IAS is shown in table 6.

Site	Target area (ha)	Progress by end of project (ha)	% complete
Lincolnshire	15	22.21	148
Cornwall	1.48	2.55	172
North Devon	6.25	6.55	105
Sefton	9.144	10.679	117
Cumbria	19.15	19.15	100
TOTAL	51	61	120

2.4.3.2 Table 6: summary of area of IAS controlled at from the start to end of project works.

Target IA species	Estimated area (Ha) at start of project (2018)	Area (Ha) cleared by end of project (2025)
Japanese Rose <i>Rosa Rugosa</i>	16.5	8.8
Sea Buckthorn <i>Elaeagnus rhamnoides</i>	12.3	10.3
Matrimony vine <i>Lycium barbarum</i>	0.75	0.3
Travellers joy <i>Clematis vitalba</i>	14.0	10.7

2.4.3.3 Table 7 : Progress made on individual key IAS from the start to end of project works.

2.4.3.4 Invasive Animal species (IAS):

At Little Sea lake in Studland Dunes SAC, a major focus of the project was removal of the illegally introduced Common Carp (*Cyprinus carpio*) that led to the rapid deterioration of the ecological condition of the lake and its ecosystem services, prior to the start of Dynamic Dunescape.

Over the course of the project over seven hundred fish were removed (Table 8) to try and reduce the disturbance to the dune-slack oligotrophic lake habitat and also limit further reproduction of Carp. Work continues beyond Dunescape to continue to remove fish, and additional research work (capture-mark-recapture) is being undertaken to help develop estimates of total population and biomass, and a better understanding of how Carp move around the lake. This evidence will inform efforts for further reduction in the Carp population.

year	No. of fish removed	total wt (kg)	No. of fish removal trips	avg wt/fish (kg)	avg wt/catch (kg)
2019	79	120	2	1.52	60.0
2020	Covid19 restrictions - no fishing possible.				
2021	126	388	4	3.08	97.0
2022	189	569	4	3.01	142.4
2023	141	502	4	3.56	125.4
2024	170	412	4	2.42	103.0
Total	705.0	1990.9	18.0	13.6	527.7

2.4.3.5 Table 8: Number and weight of Common carp (Cyprinus carpio) removed from Litte sea over the course of the Dunescapes project.

2.4.4 Flood protection

The underlying principle of the Dynamic Dunescapes project was to facilitate restoring Dune dynamism and natural processes. Dune systems can provide a nature-based solution for flood risk management, however flood protection was not a driver for the restoration interventions under this project. Therefore, a specific analysis of contribution to flood defence was deemed not appropriate and so was not undertaken.

However, flood risk management was considered through aspects of the project. The key technical output – the Dynamic Dunescapes ‘Sand Dune Mangers Handbook’ covers the principles around flood risk management as well as the Environmental Permitting and flood risk assessment process that is necessary when considering restoration works on Dune systems.

For the specific Dunescapes projects where frontal notches were proposed, flood risk assessments were undertaken as part of the planning and permitting processes, and flooding impacts were considered as part of the notch design by Ken Pye Associates (reports at [Kenneth Pye Associates Ltd](#)). Subsequent changes to elevation and profiles of dunes can be seen in the individual site monitoring reports and the corresponding CASI - LIDAR analysis - where this was carried out after any intervention works.

For the Lincolnshire Saltfleetby-Theddlethorpe dunes SAC ‘Washlands’ Project, an approved Environment Agency Flood Risk Assessment was needed which was submitted as part of the planning to the local planning authority. This project was driven by habitat improvement rather than a flood alleviation requirement - but the slowing of flow and the restoration of a heterogenous landform created pools that Natterjack toads were able to colonize, whilst also providing greater storage capacity in the river catchment.

2.5 Cultural Services:

For cultural services the data was collected and presented for the D5 Deliverable “Monitoring impacts on local communities, other user groups and professional engagement.” The text below captures the headlines from that, and the full data and report can be seen in the D5 deliverable, ‘Impact of engagement’ summary and full reports.

2.5.1 Scientific

2.5.1.1 Knowledge about techniques for dynamic dune restoration:

In terms of number of people involved in dune restoration technical workshops and/or arranged visits to sites; there were at least 154 training events for volunteers and others, reaching over 4150 participants.

In terms of number of downloads of information on dune restoration from the project website, there was significant activity in terms of access to information via the dynamic Dunescapes Website. E.g. over 500 downloads of the Sand Dune Manger and Citizen Science Handbooks by midway into the project (Feb 23).

From the start to the final year of the project (2018-25) Google Analytics reports over 160800 sessions on the Dynamic Dunescapes webpages.

2.5.2 Educational

2.5.2.1 Training in dynamic dune restoration:

Indicator: number of people trained in dynamic dune restoration at the site and the number of people visiting the site in person or remotely (via the website) for purposes of education:

- 22 Citizen Science events have taken place reaching 458 participants
- 48 training events have taken place for schools reaching 662 teachers
- 6182 school pupils engaged
- 47 skill development events for young people reaching 1,011 participants

2.5.3 Entertainment

Lots of the opportunities provided by the Dunescapes project could be considered as a ‘Community’ – e.g. the numerous citizen science activities, school and educational engagement and other events aimed at community specific groups. Examples of some of these specific community activities and the indicator of **number of people attending community events** include:

Dune Den events	269
Participants:	56,842
Additional events	432
Participants:	22,116
Events for dog walkers	67
Participants:	1,215
Events for older people living with dementia and their carers	62
Participants:	832
Events for young people	167
Participants:	4,217

(excerpt from data at Appendix 2).

Note that for the indicators ‘physical landscape use and experiential use’, aside from survey data capturing people’s response to their experiences related to Dunescapes activity, (as reported under deliverable D5), surveys for general visitors were not undertaken. This was because the majority of the visitors to popular sites such as Studland, Branton Burrows, or Sandscale Haws (Morcombe Bay SAC) were not there as a result of Dunescapes work (unless it was a bespoke Dunescapes training or participation, event etc) and so data collection for these was considered subsequently to not be possible or appropriate (and thus meaningful corresponding travel /carbon costs could not be calculated).

2.5.4 Existence

For this indicator, Project Activity participant surveys were carried out under deliverable D5. The headline in terms of reported wellbeing, is that volunteers involved in Dynamic Dunescapes also experienced improvements to their health and wellbeing. The survey identified:

- 60% were more likely to spend more time outside
- 89% identified it had a positive impact on health and wellbeing

Appendices follow with further detail to that covered in the report above.

END

2.5.5 Appendix 1: Changes in area (Ha) of Annex 1 SAC Habitat types, including survey data for component sites, using LIDAR and Aerial Data.

Site Name	Annex I type	H2110 Embryo	H2120 Mobile	H2130 Fixed dune	H2150 Dune heath	H2160 Sea buckthorn	H2170 Slack Creeping willow	H2190 Slack vegetation
Studland	CASI & LIDAR 2013	0	20.2	2.3	71.5	0	4.85	35.9
	CASI & LIDAR 2019	0.3	12.8	8.2	58.3	0	9.83	30.2
Braunto Burrows	CASI & LIDAR 2016	0.46	111	210	0	0	52.6	88
	CASI & LIDAR 2023	3	59	352	0	0	33	91
Penhale dunes	CASI & LIDAR 2016	0	155.98	283.97	0.68	0	4.17	18
	CASI & LIDAR 2024	0.83	100.32	315.39	0.65	0	2.79	15.1
Sefton	CASI & LIDAR 2015	13.8	108.21	573.4	13.35	0	108.13	135.4
	CASI & LIDAR 2022	9	140	664	13	0	94	57
Grune Point (Solway)	CASI & LIDAR 2019	0.65	1.49	7.93	0.03	0	0	0
	CASI & LIDAR 2025							
Silloth-Maryport (Solway)	CASI & LIDAR 2019	3.5	25.89	125.2	4.79	0	0	0
	CASI & LIDAR 2025							
Eskmeals	CASI & LIDAR 2013	9	44.65	354.59	21.4	0	7.3	46.2
	CASI & LIDAR 2025							
Haverigg	CASI & LIDAR 2013	6.89	16.12	78.6	0	0	4.45	4
	CASI & LIDAR 2025							
Sandscale	CASI & LIDAR 2013	3.74	14.74	114.24	0	0	9.81	13.83
	CASI & LIDAR 2019	3.28	13.87	87.45	1.38	0	21.44	25.86
	CASI & LIDAR 2025							
North Walney	CASI & LIDAR 2013	1.76	11.4	62.92	12.32	0	10	1.36

Site Name	Annex I type	H2110 Embryo	H2120 Mobile	H2130 Fixed dune	H2150 Dune heath	H2160 Sea buckthorn	H2170 Slack Creeping willow	H2190 Slack vegetation
	CASI & LIDAR 2019	1.8	9.06	49.37	7.71	0	4.66	4.08
	CASI & LIDAR 2025							
South Walney	CASI & LIDAR 2019	0.65	6.27	40.81	0	0	0	0.58
	CASI & LIDAR 2025							
Saltfleetby-Theddlethorpe	CASI & LIDAR 2012	4	8.5	88.8	0	44.7	0	13.7
	CASI & LIDAR 2018	5.1	15.1	67.9	0	44.9	0	14
	CASI & LIDAR 2026							
Seacroft-Gibraltar Point	CASI & LIDAR 2016	4.52	18.47	110.83	0	44.7	0	19.03
	CASI & LIDAR 2026							

Note that LiDAR based survey processed data is not available to assess impacts of interventions for some SAC sites until later in 2026 (blank cells) so were not available for the habitat change analysis.

2.5.6 Appendix 2: Table of project engagement statistics (‘outreach report’) gathered during the course of the project by engagement and communication officers.

Communication/engagement etc Activity across the Dynamic Dunescapes project.	No. etc
Comms:	
print / online media articles	141
TV appearances	13
radio interviews & mentions	8
press releases sent	34
online public talks	43
project communications have reached (million people)	34.9
temporary signage posters created and displayed for events and physical works	100+
A1 interpretation boards	9
Project website:	
visitors	58,109
page views	168027*
downloaded materials	4,150
2022 Midterm Report Downloads	
Blogs published	110
Social media:	
followers (national)	4,230
followers (local)	7,718
YouTube views	38,527
YouTube videos	145
YouTube (hours watched)	2,800
Newsletters sent	27
e-newsletter subscribers	665
Engagement:	
engagement events	701
participants	78,958
Dune Den events	269
Participants	56,842
additional events	432
participants	22,116
events for dog walkers	67
participants	1,215
events for older people living with dementia and their carers,	62
with participants	832
events for young people	167

participants.	4,217
Engagement (events)	1698
Engagement (participants)	85,222
Education:	
teaching staff	662
Pupils	6,182
additional members of the community	257
John Muir Award	462
Educator training events	48
for participants	607
student placement opportunities	47
student researchers working on projects	59
Apprentices	3
participants in on-site learning and training sessions	
taster events	47
for young people	1,011
Citizen Science Handbook downloads	
Sand Dune Manager's Handbook downloads	500+
sand dune management learning events	56
participants	716
additional events for project partner staff,	61
with participants.	1,154
Training events (participants)	4,150
Volunteering:	
days of volunteer activity	7,675
in-kind contribution across all volunteer activity	£429,618
new volunteering opportunities provided by Dynamic Dunescape,	947
involving volunteers	4,827
training events provided online and in person	154
for volunteers.	1,108
Citizen Science:	
events linked to the national citizen science programme	26
involving volunteers.	155
Events linked to local citizen science initiatives	118
involving volunteers	760
Collaboration:	
Main partners	7
Local delivery partners	45
Key delivery partners	52

Note Most data recorded until Dec 2024, when vast majority of project activities had finished, aside statistics such as *website visits which were taken from Google analytics up to December 2025.

2.5.7 Appendix 3: Key excerpts from LPI tool:

[7.4] Wildlife Species:

	Specific Context	Selected Overarching Context Items	First Level Descriptor	Second Level Descriptor	Begin Value	End Value	Beyond 5 Years Value	Unit
Compound Value ID: 32234								
	Braunton Burrows	[UK0012570(SCI/SAC)]	EU Habitats Directive Annex II	Petalophyllum ralfsii - Mosses & Liverworts (v.2024)	22000	7423	30000	number of individuals
	Braunton Burrows	[UK0012570(SCI/SAC)]	EU Habitats Directive Annex II	Petalophyllum ralfsii - Mosses & Liverworts (v.2024)	600	12000	12000	area covered by population in m2
	Braunton Burrows	[UK0012570(SCI/SAC)]	Species Trend		- decrease	- decrease	+ increase	
	Braunton Burrows	[UK0012570(SCI/SAC)]	Species Status		unknown	unknown	favourable (FV)	
Compound Value ID: 32286								
	Sefton Coast	[UK0013076(SCI/SAC)]	EU Habitats Directive Annex IV	Lacerta agilis - Reptiles (v.2024)	375	550	550	number of individuals

	Specific Context	Selected Overarching Context Items	First Level Descriptor	Second Level Descriptor	Begin Value	End Value	Beyond 5 Years Value	Unit
	Sefton Coast	[UK0013076(SCI/SAC)]	EU Habitats Directive Annex IV	Lacerta agilis - Reptiles (v.2024)	70	80	80	ha
	Sefton Coast	[UK0013076(SCI/SAC)]	Species Trend		x unknown	+ increase	+ increase	
	Sefton Coast	[UK0013076(SCI/SAC)]	Species Status		unfavourable - inadequate (U1)	favourable (FV)	favourable (FV)	
Compound Value ID: 32287								
	Penhale Dunes	[UK0012559(SCI/SAC)]	EU Habitats Directive Annex IV	Rumex rupestris - Flowering Plants (v.2024)	78	196	200	number of individuals
	Penhale Dunes	[UK0012559(SCI/SAC)]	EU Habitats Directive Annex IV	Rumex rupestris - Flowering Plants (v.2024)	627	627	627	ha
	Penhale Dunes	[UK0012559(SCI/SAC)]	Species Trend		- decrease	+ increase	+ increase	
	Penhale Dunes	[UK0012559(SCI/SAC)]	Species Status		unfavourable - inadequate (U1)	unfavourable - inadequate (U1)	unfavourable - inadequate (U1)	
Compound Value ID: 32291								
	Sefton Coast	[UK0013076(SCI/SAC)]	European Red List: Amphibians	Epidalea calamita - Amphibians (v.2024)	500	285	510	number of spawn clumps

	Specific Context	Selected Overarching Context Items	First Level Descriptor	Second Level Descriptor	Begin Value	End Value	Beyond 5 Years Value	Unit
	Sefton Coast	[UK0013076(SCI/SAC)]	European Red List: Amphibians	Epidalea calamita - Amphibians (v.2024)	2100	2100	2100	ha
	Sefton Coast	[UK0013076(SCI/SAC)]	Species Trend		- decrease	- decrease	+ increase	
	Sefton Coast	[UK0013076(SCI/SAC)]	Species Status		unfavourable - inadequate (U1)	unknown	favourable (FV)	
Compound Value ID: 32292								
	Sefton Coast	[UK0013076(SCI/SAC)]	Other	Include in comment box	3200	4393	5000	number of individuals
	Sefton Coast	[UK0013076(SCI/SAC)]	Other	Include in comment box	70	80	80	ha
	Sefton Coast	[UK0013076(SCI/SAC)]	Species Trend		U (unknown)	+ (increasing)	+ (increasing)	
	Sefton Coast	[UK0013076(SCI/SAC)]	Species Status		other	other	other	
Compound Value ID: 32293								
	Studland Dunes_	[UK0030038(SCI/SAC)]	EU Habitats Directive Annex IV	Lacerta agilis - Reptiles (v.2024)	14	14	14	number of localities
	Studland Dunes_	[UK0030038(SCI/SAC)]	EU Habitats Directive Annex IV	Lacerta agilis - Reptiles (v.2024)	70	73	73	ha

	Specific Context	Selected Overarching Context Items	First Level Descriptor	Second Level Descriptor	Begin Value	End Value	Beyond 5 Years Value	Unit
	Studland Dunes_	[UK0030038(SCI/SAC)]	Species Trend		- decrease	0 stable	+ increase	
	Studland Dunes_	[UK0030038(SCI/SAC)]	Species Status		unknown	unknown	unknown	
Compound Value ID: 32294								
	Studland Dunes_	[UK0030038(SCI/SAC)]	Other	Include in comment box	11000	11000	12000	number of individuals
	Studland Dunes_	[UK0030038(SCI/SAC)]	Other	Include in comment box	100	100	120	area covered by population in m2
	Studland Dunes_	[UK0030038(SCI/SAC)]	Species Trend		- (decreasing)	0 (stable)	+ (increasing)	
	Studland Dunes_	[UK0030038(SCI/SAC)]	Species Status		other	other	other	
Compound Value ID: 32295								
	Studland Dunes_	[UK0030038(SCI/SAC)]	Other	Include in comment box	3	4	5	number of colonies
	Studland Dunes_	[UK0030038(SCI/SAC)]	Other	Include in comment box	4.5	5	6	ha
	Studland Dunes_	[UK0030038(SCI/SAC)]	Species Trend		- (decreasing)	+ (increasing)	+ (increasing)	

	Specific Context	Selected Overarching Context Items	First Level Descriptor	Second Level Descriptor	Begin Value	End Value	Beyond 5 Years Value	Unit
	Studland Dunes_	[UK0030038(SCI/SAC)]	Species Status		other	other	other	
Compound Value ID: 32296								
	Penhale Dunes	[UK0012559(SCI/SAC)]	EU Habitats Directive Annex II	Petalophyllum ralfsii - Mosses & Liverworts (v.2024)	10000	3000	12500	number of individuals
	Penhale Dunes	[UK0012559(SCI/SAC)]	EU Habitats Directive Annex II	Petalophyllum ralfsii - Mosses & Liverworts (v.2024)	627	627	627	ha
	Penhale Dunes	[UK0012559(SCI/SAC)]	Species Trend		x unknown	0 stable	0 stable	
	Penhale Dunes	[UK0012559(SCI/SAC)]	Species Status		unfavourable - inadequate (U1)	favourable (FV)	favourable (FV)	
Compound Value ID: 61956								
	Penhale Dunes	[UK0012559(SCI/SAC)]	Other	Include in comment box	650	28634	28634	individuals / m2
	Penhale Dunes	[UK0012559(SCI/SAC)]	Other	Include in comment box	627	627	627	ha
	Penhale Dunes	[UK0012559(SCI/SAC)]	Species Trend		F (flucturing)	+ (increasing)	+ (increasing)	

	<u>Specific Context</u>	<u>Selected Overarching Context Items</u>	<u>First Level Descriptor</u>	<u>Second Level Descriptor</u>	<u>Begin Value</u>	<u>End Value</u>	<u>Beyond 5 Years Value</u>	<u>Unit</u>
	Penhale Dunes	[UK0012559(SCI/SAC)]	Species Status		other	other	other	

[7.5.1] – Invasive Alien species

	<u>Specific Context</u>	<u>Selected Overarching Context Items</u>	<u>Descriptor</u>	<u>Begin Value</u>	<u>End Value</u>	<u>Beyond 5 Years Value</u>	<u>Unit</u>
	Reduction of invasive species	[UK0030270(SCI/SAC), UK0013025(SCI/SAC), UK0013027(SCI/SAC), UK0013031(SCI/SAC), UK0012559(SCI/SAC), UK0012570(SCI/SAC), UK0013076(SCI/SAC), United Kingdom / SOUTH WEST / LITTLE SEA]	Cyprinus carpio (v.2024)	32	32	0	Area affected by IAS in ha

	<u>Specific Context</u>	<u>Selected Overarching Context Items</u>	<u>Descriptor</u>	<u>Begin Value</u>	<u>End Value</u>	<u>Beyond 5 Years Value</u>	<u>Unit</u>
	Reduction of invasive species	[UK0030270(SCI/SAC), UK0013025(SCI/SAC), UK0013027(SCI/SAC), UK0013031(SCI/SAC), UK0012559(SCI/SAC), UK0012570(SCI/SAC), UK0013076(SCI/SAC), United Kingdom / SOUTH WEST / LITTLE SEA]	Cyprinus carpio (v.2024)	31.25	9.2	0.32	populatio n/Ha
Compound Value ID: 62618							
	Reduction of invasive species	[UK0030270(SCI/SAC), UK0013025(SCI/SAC), UK0013027(SCI/SAC), UK0013031(SCI/SAC), UK0012559(SCI/SAC), UK0012570(SCI/SAC),	Rosa rugosa (v.2024)	16.54	7.72	3.86	Area affected by IAS in ha

	<u>Specific Context</u>	<u>Selected Overarching Context Items</u>	<u>Descriptor</u>	<u>Begin Value</u>	<u>End Value</u>	<u>Beyond 5 Years Value</u>	<u>Unit</u>
		UK0013076(SCI/SAC), United Kingdom / SOUTH WEST / LITTLE SEA]					
	Reduction of invasive species	[UK0030270(SCI/SAC), UK0013025(SCI/SAC), UK0013027(SCI/SAC), UK0013031(SCI/SAC), UK0012559(SCI/SAC), UK0012570(SCI/SAC), UK0013076(SCI/SAC), United Kingdom / SOUTH WEST / LITTLE SEA]	Rosa rugosa (v.2024)	0	0	0	populatio n/Ha
Compound Value ID: 62619							

	<u>Specific Context</u>	<u>Selected Overarching Context Items</u>	<u>Descriptor</u>	<u>Begin Value</u>	<u>End Value</u>	<u>Beyond 5 Years Value</u>	<u>Unit</u>
	Reduction of invasive species	[UK0030270(SCI/SAC), UK0013025(SCI/SAC), UK0013027(SCI/SAC), UK0013031(SCI/SAC), UK0012559(SCI/SAC), UK0012570(SCI/SAC), UK0013076(SCI/SAC), United Kingdom / SOUTH WEST / LITTLE SEA]	Elaeagnus rhamnoides (v.2024)	12.39	2.12	1.06	Area affected by IAS in ha
	Reduction of invasive species	[UK0030270(SCI/SAC), UK0013025(SCI/SAC), UK0013027(SCI/SAC), UK0013031(SCI/SAC), UK0012559(SCI/SAC), UK0012570(SCI/SAC), UK0013076(SCI/SAC),	Elaeagnus rhamnoides (v.2024)	0	0	0	population/Ha

	<u>Specific Context</u>	<u>Selected Overarching Context Items</u>	<u>Descriptor</u>	<u>Begin Value</u>	<u>End Value</u>	<u>Beyond 5 Years Value</u>	<u>Unit</u>
		United Kingdom / SOUTH WEST / LITTLE SEA]					
Compound Value ID: 62620							
	Reduction of invasive species	[UK0030270(SCI/SAC), UK0013025(SCI/SAC), UK0013027(SCI/SAC), UK0013031(SCI/SAC), UK0012559(SCI/SAC), UK0012570(SCI/SAC), UK0013076(SCI/SAC), United Kingdom / SOUTH WEST / LITTLE SEA]	Lycium barbarum (v.2024)	0.75	0.45	0.22	Area affected by IAS in ha

	<u>Specific Context</u>	<u>Selected Overarching Context Items</u>	<u>Descriptor</u>	<u>Begin Value</u>	<u>End Value</u>	<u>Beyond 5 Years Value</u>	<u>Unit</u>
	Reduction of invasive species	[UK0030270(SCI/SAC), UK0013025(SCI/SAC), UK0013027(SCI/SAC), UK0013031(SCI/SAC), UK0012559(SCI/SAC), UK0012570(SCI/SAC), UK0013076(SCI/SAC), United Kingdom / SOUTH WEST / LITTLE SEA]	Lycium barbarum (v.2024)	0	0	0	population/Ha
Compound Value ID: 62621							
	Reduction of invasive species	[UK0030270(SCI/SAC), UK0013025(SCI/SAC), UK0013027(SCI/SAC), UK0013031(SCI/SAC), UK0012559(SCI/SAC), UK0012570(SCI/SAC),	Clematis vitalba (v.2024)	14	3.26	1.62	Area affected by IAS in ha

	<u>Specific Context</u>	<u>Selected Overarching Context Items</u>	<u>Descriptor</u>	<u>Begin Value</u>	<u>End Value</u>	<u>Beyond 5 Years Value</u>	<u>Unit</u>
		UK0013076(SCI/SAC), United Kingdom / SOUTH WEST / LITTLE SEA]					
	Reduction of invasive species	[UK0030270(SCI/SAC), UK0013025(SCI/SAC), UK0013027(SCI/SAC), UK0013031(SCI/SAC), UK0012559(SCI/SAC), UK0012570(SCI/SAC), UK0013076(SCI/SAC), United Kingdom / SOUTH WEST / LITTLE SEA]	Clematis vitalba (v.2024)	0	0	0	popula

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