

Findhorn Hinterland Trust Biodiversity Action Plan 2026-2031

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Contents

Section	Subject	Page
	Summary	4
1	Introduction	
1.1	Aim and scope	5
1.2	Fifty-year vision	6
1.3	Findhorn Hinterland Trust	6
1.4	Site description	7
1.5	Background	7
2	Biodiversity overview	
2.1	Site status	10
2.2	Protected and special sites	10
2.3	Sand/shingle and dune heath	11
2.4	Grassland	13
2.5	Woodland	14
2.6	Gorse scrub	16
2.7	Notable species	17
3	Geomorphology, history	
3.1	Status	28
3.2	Origins	28
3.3	Soils	29
3.4	Archaeology	30
3.5	Post medieval history	30
3.6	Sand stabilisation	31
4	Sand dune action plan	
4.1	Threats	35
4.2	Opportunities	37
4.3	Action to date	38
4.4	Proposed action 2026-2031	42
5	Grassland action plan	
5.1	Threats	50
5.2	Opportunities	50
5.3	Action to date	50
5.4	Proposed action 2026-2031	51
6	Woodland action plan	
6.1	Threats	55
6.2	Opportunities	55
6.3	Action to date	55
6.4	Proposed action 2026-2031	58
7	Gorse action plan	
7.1	Threats	61
7.2	Proposed Action 2026-2031	60

8	Survey, monitoring, data management	
8.1	Presence-absence surveys	62
8.2	Monitoring surveys	62
8.3	Casual records, citizen science	65
8.4	Database and geographic information system (GIS)	67
9	Implementation	
9.1	Community engagement and communication	69
9.2	Partnerships and stakeholders	69
9.3	Resources, fundraising	70
9.4	Protected species	73
9.5	Invasive species	73
9.6	Health and safety	74
10	Work programme	76
	Acknowledgements	79
	References	80
	Appendix 1. 2024 Dune restoration FAQs	83

Summary

This Local Biodiversity Action Plan (LBAP) describes the habitat and species priorities of land managed by the Findhorn Hinterland Trust (FHT), presents fifty-year vision, and outlines key management actions for biodiversity for the next five years.

The Plan reviews and builds on an earlier 2020-25 LBAP, which established sand dune habitats, threatened by gorse and tree encroachment, as being of the highest biodiversity priority. The 2020 plan recommended that sand dune habitat restoration action be undertaken, underpinned by ongoing community engagement.

Despite the impact associated with the Covid Pandemic, very good progress has been made over the last five years, culminating in the Findhorn Hinterland becoming certified as one of Scotland's first Nature30 sites in 2025. Since 2020, new research and guidance material on sand dune ecosystem management has become available and national initiatives have been launched, which inform this latest LBAP.

The overall aim for the FHT remains as maintaining and enhancing the full range of habitats present within its ownership boundary, while gradually increasing the area of sand/shingle/dune heath and dune grassland habitats.

1. Introduction

1.1 Aim and scope

This Local Biodiversity Action Plan (LBAP) is a strategic advisory document, aimed at identifying priority nature recovery actions for the Findhorn Hinterland Trust (FHT), based on nationally recognised biodiversity priorities. The scope of the Plan was agreed during several FHT Land Management Team meetings, in late 2024 and early 2025.

Previously, as agents of the Findhorn Foundation, a prescriptive management plan was required by the FHT as part of the legal agreement between the two organisations. Two five-year management plans, covering the full range of FHT interests, were commissioned during this important developmental phase of the FHT, covering: the vision for the FHT, environmental stewardship, woodland management, education, community engagement and access and recreation (Piper 2009, 2019).

As the FHT is now an owner of all of its 49ha of land (1.5.1), a detailed prescriptive management plan is no longer needed. Part of the aim of this LBAP is to perform an outline management plan function, in terms of land management and biodiversity.

In addition to the two management plans the FHT's land management has been guided by two earlier LBAPs – an early draft plan covering 2013-2018, and more recent plan covering 2020-2025. These plans emphasised the priority of sand dune habitats and species, helping to provide further focus to the FHT's nature recovery activities. This 2026 LBAP reviews and replaces the 2020 LBAP and includes a fifty-year vision.

The 2020 FHT LBAP was developed partly with an education and promotion aim. As such, it was a relatively simplified vision-orientated document. This Plan assumes that the purpose and value of an LBAP is understood and provides more detail on the context of the rationale for biodiversity project planning, and more detail on proposed actions and methods. The Plan serves as a reference document and forms a foundation for the development of other strategic plans (including for education and general promotion) and as a basis for annual work programming, multi-year project development, and associated fundraising. While more prescriptive than the previous LBAP, it retains the flexibility of being an advisory plan, consistent with an approach of adaptive management.

Co-creation with Nature is one of the core principles of the Park Ecovillage Findhorn. This can be defined as a collaborative, symbiotic partnership, where humans commune with the Spirit within Nature, and work consciously with natural systems and beings - not just on them - recognising interconnectedness for mutual benefit and healing. A key aspect of this approach is the development of *conscious awareness* - of the ecology and needs of habitats

and species, the dynamics of the ecosystem in which they exist, and of wider regional, national, and global context and priorities. This LBAP serves as a contribution to the development of conscious awareness within the ecovillage community.

1.2 Fifty-year vision

To provide a long-term strategic context for the FHT's work the following fifty-year vision is proposed:

In 2076 biodiversity within the Findhorn Hinterland is thriving, with all priority species and the full successional range of habitats in good conservation status. Natural processes have been restored to the point that habitat maintenance requires only occasional light intervention. The unique ecology of the area is understood and valued by the local community, and is recognised as an example of UK best practice in the conservation of sand dune and woodland habitats

1.3 Findhorn Hinterland Trust

The Findhorn Hinterland Trust (FHT) is a small charity, associated with the Park Ecovillage Findhorn. Its activities include nature conservation, education, the building of local community, the provision of recreational facilities, and the custodianship of a green burial area. As a registered charity, the FHT replaced an earlier community group in 2015, which had been active since 2005.

The Trust organises its work through several working groups, nature conservation work being covered by its Land Management Team (LMT). The Trust employs four part-time staff, including a Land Steward, and is supported by an enthusiastic group of volunteers. Three of the trustees lead on biological surveys and data management, including commissioning specialist ecological surveys. Strategic planning and sand dune restoration project development and management has been provided by the author, on a freelance and pro bono basis.

Current members of the Land Management Team, and their roles/special interest, are as follows:

- Alan Watson Featherstone – LMT Chair, ecological survey lead
- George Paul – Land management support
- Heather Paul – Lichenologist
- Hugh Andrews – Land management support
- Kajedo Wanderer – Land Steward, forester, habitat maintenance

- Dr. Neil Meikleham – Biological data management

1.4 Site description

The FHT area mostly forms the southern part of the Findhorn Dunes, an area of around 130ha of dune land located about 6km north of Forres in Morayshire, to the east of the Village of Findhorn and to the north of the Park Eco-Village (Figs. 1,2).

Findhorn dunes are a rare and sensitive sand dune ecosystem which is part of a coastline which is of international importance for wildlife (Section 2). The area is highly-valued by the local community and it is heavily used for informal recreation, mostly walking.

Fig.1. Geographic context



1.5 Background

1.5.1 Land ownership

Most of the Hinterland Trust area (49ha) lies adjacent to the Park Ecovillage and includes woodland and mostly gorse-covered sand dunes (Fig.2). The majority of the dunes, from the Hinterland boundary to the sea, are owned by a neighboring charity, the Findhorn Dunes Trust, associated with the village of Findhorn.

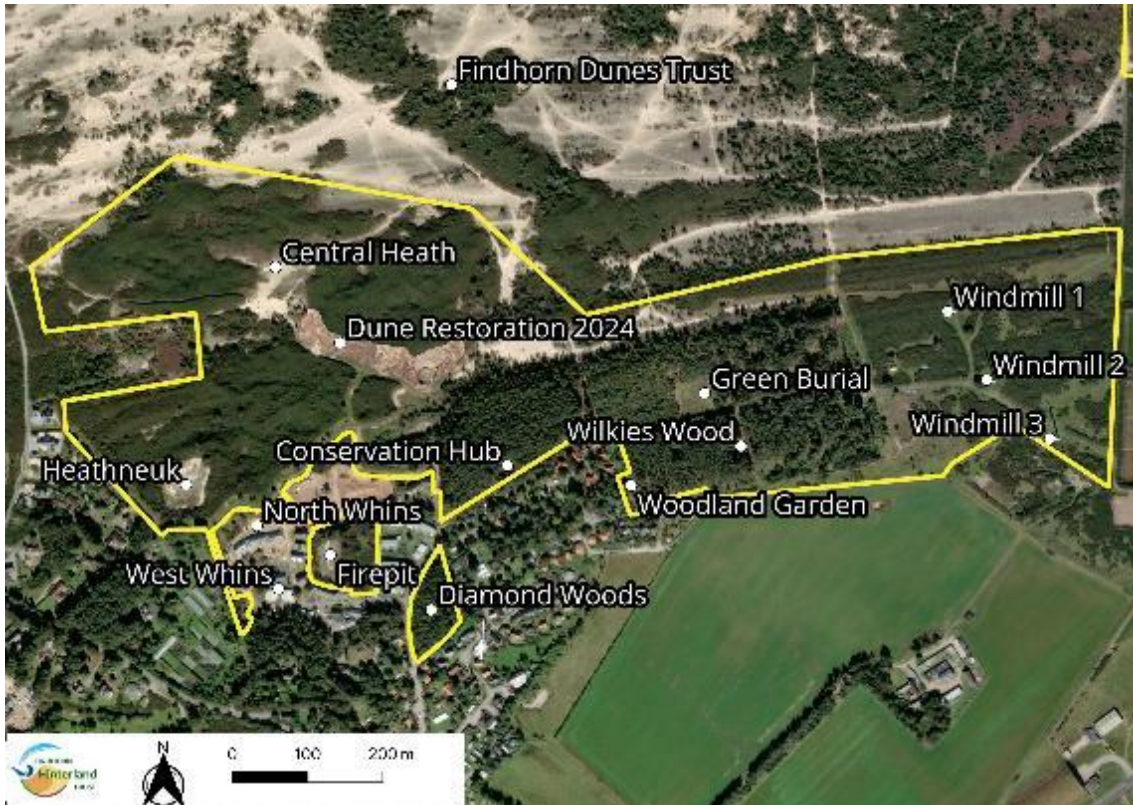
There have been significant changes in land ownership since the 2020 LBAP. The FHT has acquired full ownership of the 35ha of land which it previously managed as an agent of the Findhorn Foundation. It has also been gifted an additional 14ha from the community

development company Duneland Ltd, including a small satellite site of 2ha on the foreshore. Figure 3, below, shows place names at the Findhorn Hinterland.

Fig.2. Land ownership



Fig. 3. Place names within the Findhorn Hinterland



1.5.2 Policy context

The previous two FHT LBAPs raised the profile of sandy habitats, under threat of scrub encroachment, as the top priority for biodiversity action on the Hinterland. Sand and shingle habitats, and the species that they support, are recognised in the Scottish government's Biodiversity List (SBL), which underpins the Scottish Biodiversity Strategy.

The aim of the Strategy is to make the country 'Nature Positive' by 2030 and restore and regenerate biodiversity by 2045. The 2030 target is Scotland's response to the international Convention on Biological Diversity, which aims to effectively conserve at least 30% of land, inland water, and marine ecosystems by 2030 – especially those areas which are of particular biodiversity significance (NatureScot, 2025). The FHT aims to make a small contribution to these national and international objectives, especially since the Hinterland is recognised to be officially contributing to the Scottish Biodiversity Strategy's 2030 nature recovery target, having been certified by NatureScot as a Nature30 site in 2025 (Northern Scot, 2025).

Scotland's State of Nature report highlights the pressing need for action, with an average 15% decline in species abundance since 1994 and one in nine Scottish species threatened with extinction (NatureScot, 2023). As in any emergency, priorities are important in the Nature Crisis, to ensure that limited resources are directed where they are needed the most, so that species do not become extinct and resilient wildlife populations are restored. The SBL identifies these priorities, based on a firm foundation of survey and research, with a significant contribution coming from citizen science. Biodiversity surveys on the Findhorn Hinterland over the last ten years or so have revealed a very impressive number of SBL species – all of which must be considered carefully in the FHT's land custodianship (Section 2).

The Moray Council officially recognised the climate and ecological emergency in 2019 and reaffirmed this by declaring a nature emergency in 2023. Part of the Council's response to the Scottish Biodiversity 2030 and 2045 targets is in developing an online map-based Nature Network strategy, guided by NatureScot's Nature Network Framework, and linked to the council's 2027 local development plan. The network will aim to connect nature-rich sites and restoration areas, such as the Findhorn Hinterland, across the landscape (Moray Council, NatureScot 2024).

1.5.3 Best practice guidance

At the time of drafting the 2020 FHT LBAP, little official guidance was available of sand dune restoration in the UK and so the 2020 plan relied heavily on reports from EU-funded projects across Europe. Publication of the Sand Dune Managers Handbook in 2021 - with a second edition published in 2024 – was an important development in the subjects (UKCEH et al 2021, Dynamic Dunes 2024). The 2021 handbook confirmed that the FHT LBAP was on the right tracks and gave the FHT the confidence to move forward on this important work in 2023 and subsequent years.

2. Biodiversity overview

2.1 Site status

Findhorn dunes (c.130ha), of which the Findhorn Hinterland (c.50ha) are a part, are of national significance for lichens (Coppins, 2008). Due to the presence of some exceptionally rare species, they are also likely to be nationally important for invertebrates.

The dunes were once part of one of the largest sand dune systems in Europe, covering more than 5,000ha (50km²). Mobile sand dunes covered the Culbin Forest to the west and the hinterland of Burghead Bay to the east, including Roseisle Forest (Fig 1). At around 130ha, Findhorn Dunes are a tiny fragment of this once huge dune system. Though small in comparison to the original extent of the dunes, the dunes are still significant, representing around 0.1 % of the total Scottish resource of 15,014ha (excluding machair) (Dynamic Dunescapes 2024).

2.2 Protected and special sites

The Findhorn Hinterland was certified as one of Scotland's first Nature30 sites in 2025 (1.5.2) and lies within 500m of four nationally and internationally important statutory designated sites for nature, set out in Table 1, below.

Table 1. Designated sites within 500m of Findhorn Hinterland

Designation	Qualifying features
Culbin Sands, Culbin Forest, and Findhorn Bay Site of Special Scientific Interest (SSSI)	Geomorphology, sand dune habitats, plants, lichens, fungi, birds, invertebrates
Moray and Nairn Coast Special Protection Area (SPA)	Wintering wildfowl
Moray and Nairn Coast RAMSAR	Sand dunes, vegetated shingle, intertidal mudflats, estuarine alder woodland, vascular plants, invertebrates, breeding osprey, wintering wildfowl
Moray Firth Special Area of Conservation (SAC)	Subtidal sand banks, bottlenose dolphin

Findhorn Bay is also designated by the Moray Council as a Local Nature Reserve, which is managed by local people, in partnership with the Council and NatureScot.

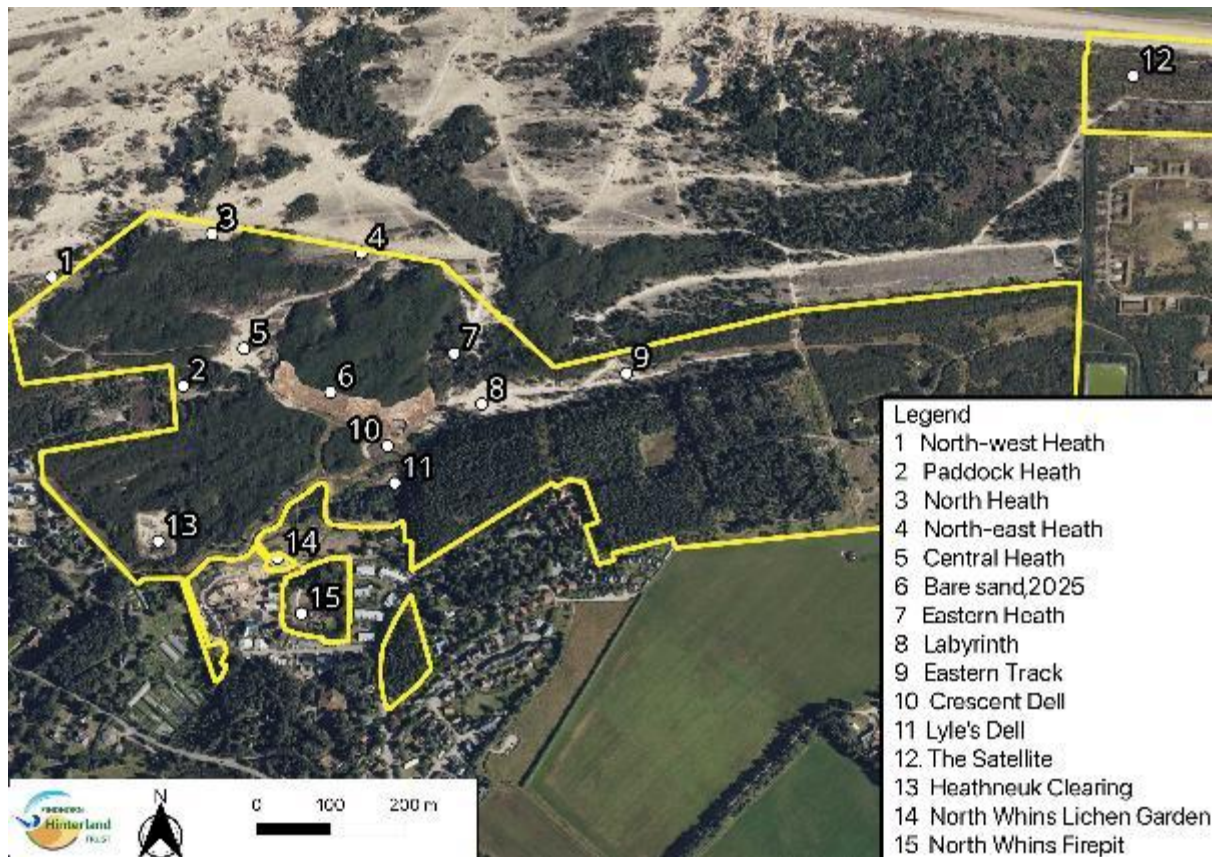
Findhorn dunes are part of Buglife's Findhorn and Culbin Important Invertebrate Area, which recognises a nationally important assemblage of invertebrates. (Buglife 2023).

2.3 Sand/shingle and dune heath

Dunes are wild, iconic landscapes that are universally recognisable. They support more than seventy nationally rare or red-data book species and are a refuge for many lowland species lost elsewhere due to agricultural intensification (Dynamic Dunescapes 2024).

Coastal sand dunes and vegetated shingle are Scottish Biodiversity List (SBL) habitats. Fig.4 shows the locations of the main sand/shingle and dune heath habitats at the Findhorn Hinterland. Most of the highest quality sand/shingle habitats on the Findhorn peninsula, including foredunes dunes near the sea shore, lie to the north of the FHT managed area. Here, the sand is more mobile, with the foredunes being supplied by fresh wind-blown sand from the beach and from Findhorn spit, where sand is deposited by the process of longshore drift (Section 3). The natural process of sand movement, and associated rare habitats, of this area threatened by rapid pine tree encroachment (4.1).

Fig.4. Location of main sand/shingle and dune heath habitats



Within the FHT managed area much of the dune land comprises stabilised, or 'fixed', dunes covered by gorse. Within the gorse are some excellent surviving examples of lichen-rich sand/shingle and dune heath habitats, covering around 3ha in total. These patches are either unvegetated – retaining some sand mobility - or have a crust of lichens, with dune heath being characterised by the presence of heather.

Sand movement is the natural process by which sand dunes are maintained in a healthy, sustainable, condition. Wind creates ‘sand rain,’ where a thin layer of sand is deposited on existing vegetation growing on a stabilised substrate. If this sand is relatively lime-rich - because of the contributing geology or of a high shell content - the calcium level of an acidified soil is raised and the topsoil pH increases, which can be vitally important in maintaining habitat conditions for some specialist dune species. Sand-dwelling ants and rabbits can also play an important role in maintaining a high lime content in the topsoil of stabilised sand by bringing buried sand to the surface (Dutch Forest and Nature Reserve Owners Association).

Fig. 5. Lichen-rich sand and shingle, with encroaching gorse



On stabilised dunes, the surface layer is more acidic because, under stable conditions, rain has leached lime out the sand. Higher sand acidity supports a lower diversity of species, but the species which do occur – lichens, invertebrates and fungi - include the rarest and most threatened species on the Hinterland.

Sand, shingle and heath grade into each other, forming a habitat mosaic. Roe deer, and rabbits in particular, help to maintain patches of dune heath through their browsing, nibbling and soil disturbance.

Coastal dune heaths in NE Scotland are likely to have the highest diversity of terricolous lichens of any dune systems in NW Europe (Dynamic Dunescapes 2024). Stabilised sand is essential for specialist dune invertebrates, particularly those that require open habitats or are heat-tolerant/ heat-adapted species.

Work in Wales has shown that 70-75% of sand dune invertebrates - especially beetles, bees, wasps, and moths - require bare sand and early successional stage habitats to complete their lifecycles, many creating burrows in sand where their larvae can develop (Sands for Life conference, 2024). Howe et al. (2010) estimate that at a site level, 10% to 30% bare sand is needed across a range of successional stages to support thermophilic invertebrate species (Dynamic Dunescapes 2024).

It takes around 300 years for beach sand to become acidic enough to allow dune heath to develop (Dynamic Dunescapes 2024). As noted in Section 3.5, below, it is 324 years since the main sand supply for the Findhorn dunes, from Culbin dunes, was cut-off. It seems likely that this allowed the initial stabilisation process to take place, which has been greatly accelerated in the last 100 years through human activity, allowing gorse to spread rapidly.

2.4 Grassland

Natural lowland dry acid grassland, and natural grassland on sand dunes, are listed as UK BAP habitats (JNCC, 2008). After sand/shingle/heath habitats, dune grassland is next in the priority of habitats on the Hinterland (JNCC 2008). 'Acid' refers to the low pH of the sandy soil.

Fig.6. Flower-rich dune grassland by the wind turbines



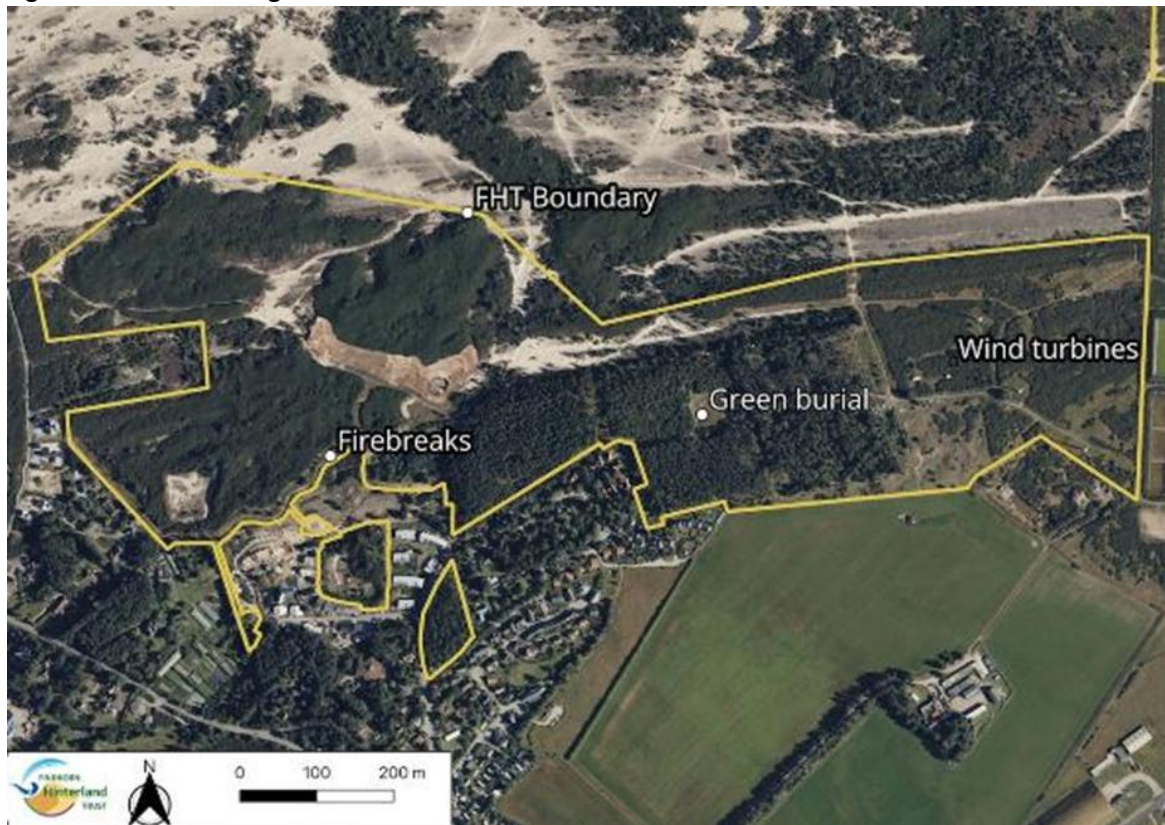
This habitat, of around 5.2ha (Fig.7) , is found mainly around the wind turbines (1.7ha), firebreaks through the gorse (1ha), and on the green burial field in Wilkie's Wood (0.2ha).

The grassland on FHT managed land is rich in wildflowers, providing habitat for SBL insects, including a very impressive list of around thirty SBL moth and

butterfly species (2.7), and food for Scottish Biodiversity List (SBL) birds, such as yellowhammer *Emberiza citronella* and linnet *Linaria cannabina*.

Less disturbed grassland areas, such as around the wind turbines – where grassland occurs in patches within the dense gorse - are likely to be the best for common lizards *Zootoca vivipara* and potentially slow worms *Anguis fragilis*. It is known that roe deer have had their young in this secluded area, and it is also the most likely place to come across a brown hare *Lepus europaeus*. There is also a badger *Meles meles* sett in this area, the unimproved grazed grassland here being ideal badger foraging habitat. Aerial photography shows that gorse was well-established in this area by the 1970s, but that there were still scattered patches of grassland, within what is now mature gorse, in 2004.

Fig.7. Location of main grassland habitats



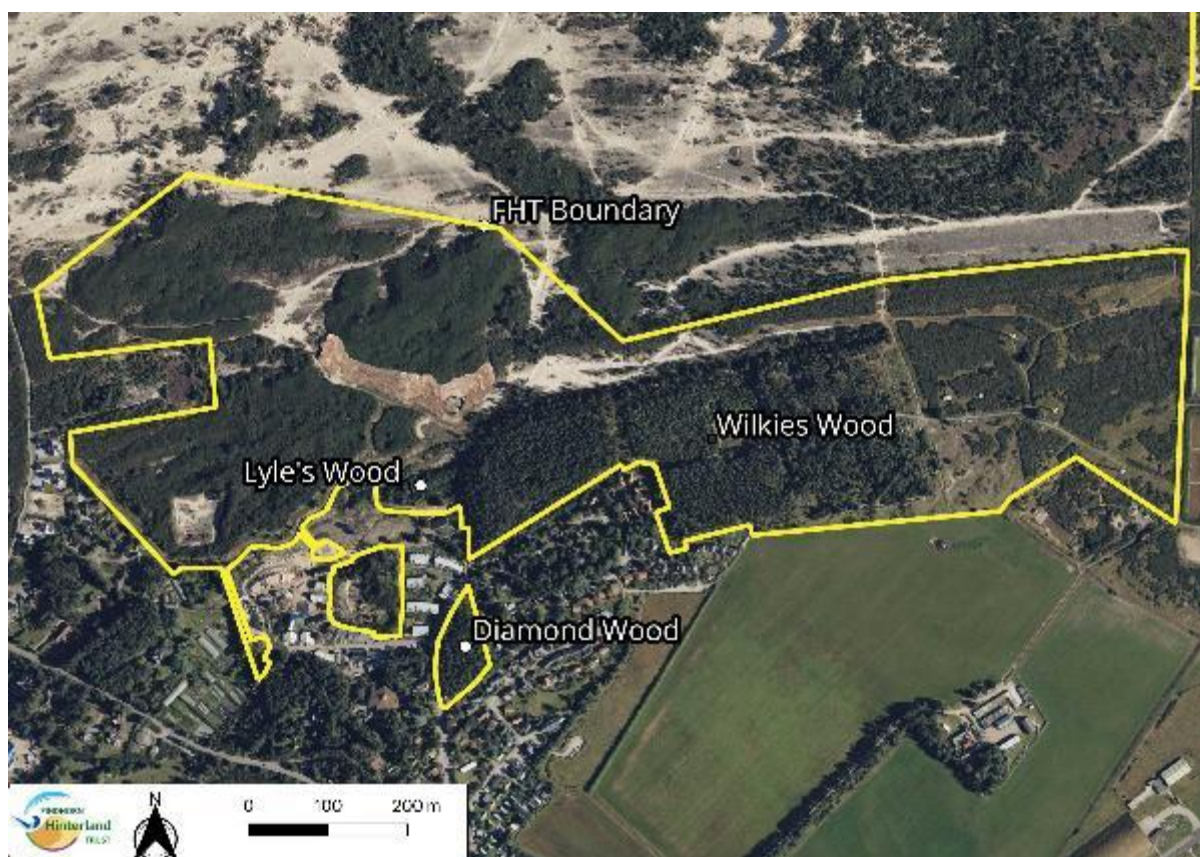
2.5 Woodland

The FHT's woodland comprises three areas:

1. Wilkie's Wood. A ten-hectare conifer woodland planted between 1952 and 1962 (Piper, 2009, 2019). Scots and Lodgepole pine were planted mainly on shingle ridges, with Corsican pine planted on areas of mobile sand. It seems likely that, as at nearby Culbin and Roseisle forests, the woodland was planted to stabilise mobile sand
2. Diamond Wood. A mature Scots pine woodland that has only recently (2025) come into FHT ownership
3. Lyle's Wood. An area of mixed conservation woodland established by the FHT in the 2000s.

The woodland areas provide valuable shelter to the adjoining Park Ecovillage and are a highly-valued community resource, providing recreational and social space, a sustainable supply of firewood, and occasional building materials. Significantly, the woodland also contains a Green Burial area of 0.54ha, forming a valuable woodland glade habitat (acid grassland with heather) (Fig.3). The Edible Woodland Garden provides valuable habitat diversity, and is particularly notable for the rare upright coral fungus.

Fig. 8. Location of woodlands on the Findhorn Hinterland



Under careful FHT conservation management for around twenty years, Wilkie's Wood is now much more diverse than a commercial forestry plantation. Woodland here contains the greatest amount of biomass and may contain the highest number of species of all the habitats on the Hinterland - though sand dune habitats contain the rarest and most threatened species, with the greatest need for restoration action

Wilkie's Wood supports a small population of SBL red squirrels *Sciurus vulgaris*, has occasional sightings of SBL pine marten *Martes martes*, and is likely to be important for bats - all bats are SBL and European protected species. Long-eared owl *Asio otus* (specially protected under Schedule 1 of the Wildlife and Countryside Act), has been recorded nesting in several years. The appearance of the scarce crested tit *Lophophanes cristatus* in recent summers may reflect the increase in standing deadwood. A very rare leafhopper, a nationally scarce orchid, an SBL fungus, and a SBL rust fungus have also been recorded here (Table 3)

Plantation coniferous woodland, such as that found on the Findhorn Hinterland, is widespread in the area and wider region, notably at the nearby Culbin and Roseisle Forests (Fig.1.). While not a high conservation priority in terms of a habitat type, this type of woodland can be of great value due to the rare species it supports, reflected in the conservation status of the Culbin area, described in 2.2, above. Very rare woodland species found at Culbin include: Pinewood Mason Bee *Osmia unciata*, Aspen Hoverfly.

Hammerschmidtia ferruginea, false clown beetle *Sphaerites glabratus*, April Melangyna *Melangyna barbifrons*, and the Golden Net winged Beetle *Dictyoptera aurora* (Buglife 2023) - giving some indication of the future potential of the Findhorn Hinterland woodland

Fig.9. Wilkie's Wood



The natural woodland cover for the lowlands of Scotland is mixed deciduous (Wilson 2015). This is a much diminished and relatively rare and localised habitat, which is included in the SBL. The nearest surviving areas of good quality ancient native woodland to the Findhorn Hinterland are mostly protected by SSSI status and are briefly described in Table 2 below.

Table 2. Nearest ancient SSSI woodland to Findhorn hinterland

Name	Dist. (km)	Woodland characteristic
Lower Findhorn Woods	8.5	Outstanding range of woodland types, including upland oak and birch woodland, mixed ash woodland, and wet woodland
Quarry Wood, Elgin	14	Ancient oak woodland with holly, birch and Scots pine
Cawdor Wood	25	Upland oak woodland, considered to be one of the finest broadleaved woodlands in Scotland. Includes ash and wych elm in the gorges and beech and Scots pine, likely to have been planted

Smaller areas, of variously modified, ancient oak woodland also occur 6km to the south of the Findhorn Hinterland on the edges of Forres, at Sanquhar and Kennel Woods (Hardie 2018, Drury 2025).

2.6 Gorse scrub

At Findhorn dunes, it seems likely that gorse scrub, the dominant habitat on the open dunes and around the wind turbines, first became established in the eighteenth century, following sand stabilisation as a result of a reduction in sand supply. As Section 3 describes, it seems likely that lichen communities were the first stage of vegetation establishment of the dunes,

followed by dune heath, creating a thin layer of acidic humus into which gorse could gain a foothold.

Gorse is a natural component of dune ecosystems that mainly occupies the older, more inland areas. It is a pioneer species that fixes nitrogen (in typically acidic soils), creating the conditions for the eventual next stage of vegetation succession, typically woodland. In this respect, gorse can play a valuable role in nature recovery in the appropriate location. Gorse is a fast-growing species that can outcompete rare and threatened native plant communities and their associated specialist fauna, however, including on rare sand dune habitats. Reduced wind speed and sand mobility, as result of human intervention such as tree planting can allow gorse to establish where it wouldn't occur naturally, and spread rapidly.

As a component of a healthy mosaic of dune habitats, gorse provides valuable biodiversity benefits. The dense, thorny cover provides shelter and nesting sites for red-listed and SBL yellow hammer and linnet, and for roe deer and (non-native) rabbits which help to maintain SBL grassland and heathland habitats. The three known badger setts within the FHT area are within gorse. Dead gorse is a good habitat for saprotrophic fungi, and a valuable invertebrate habitat, but does not appear to exclusively support any SBL species.

A cover of between 5-20% native scrub is considered to be a healthy proportion in fixed dune habitats (Dynamic Dunescape 2024). However, the main part of the FHT's sand dune habitat had more than 90% gorse cover until dune restoration work began in 2024, and so bare sand creation were recommended as a top priority action in the FHT's 2020 LBAP. Gorse is also highly flammable and can create fire hazards, including wildfires which can destroy valuable adjoining habitats (as well as threaten human settlements).

2.7 Notable species

A considerable amount of new data has been collected since the 2020 LBAP, largely through FHT commissioned surveys, along with many casual records, largely collected by FHT Land Management Team (LMT) members. The aim of this section is to emphasise the rarest and most significant species. These species are the highest priority for action, on a relatively small, threatened, and nationally important, site.

2.7.1 Top priority species overview

Table 3, lists the rarest species found on the Findhorn Hinterland, with notes on their status and ecology. These species have been used in FHT promotion work, as 'Star Species'.

Table 3. Exceptionally rare species found on the Findhorn Hinterland

Species	Common name	Ecology
<i>Ammophila sabulosa</i>	Red-banded sand wasp	Scottish Biodiversity List (SBL) species, known from only one other place in Scotland. A solitary hunting or 'digger' wasp, it nests in bare or sparsely vegetated sand. Nests are provisioned with several paralysed caterpillars upon each of which a single egg is laid. Remarkably, the species is known to steal caterpillars from neighbour's nests, removing the egg and laying its own.
<i>Actebia praecox</i>	Portland Moth	Nationally Scarce, with its national stronghold in the Moray Firth. Inhabits sparsely vegetated dunes with loose sand. The larvae emerge from their sandy burrows at night to feed on creeping willow and other sand-dune plants
<i>Caryocolum blandelloides</i>	Northern Barred Groundling Moth	New to science as recently as 1981. Its UK range is limited to dune systems in the western Moray Firth. Its caterpillars feed within the flowers of field mouse ear, which grows amongst dry dune grassland and on the edges of patches of sand and shingle
<i>Longalatedes elymi</i>	Lyme Grass moth	Nationally Scarce Restricted to coastal sandy habitats, where its food plant, Lyme-grass, grows
<i>Scythris empetrella</i>	Ling Owlet Moth	A provisional Red Data Book species, only found at two sites in Scotland, Findhorn Dunes being the most important. Requires crowberry and heather growing in loose sand to complete its lifecycle (Hammond 2023)
<i>Silometopus incurvatus</i>	Bend-bearing Blunt-brow Spider	SBL species, otherwise only known in Scotland from nearby from Culbin Forest, with only one site in England. A sand dune species associated with marram grass
<i>Drassyllus pusillus</i>	Spider	An uncommon ground hunting spider otherwise restricted to six areas of central Scotland. Found in dry, open habitats such as sandy heaths
<i>Hilara scrobiculata</i>	Dance fly	A Nationally Scarce grassland species recorded for the first time in Scotland in 2025, inside a harebell flower on the Hinterland. Recorded at only two sites in England
<i>Linnaemya comta</i>	Fly	The only Scottish record of this mostly coastal parasitic fly. The adults are pollinators, but lay their eggs on moths, which the larvae then consume
<i>Metopia tshernovae</i>	Fly	Nationally Scarce species, which is very rarely recorded. Restricted to coastal sites
<i>Pamponerus germanicus</i>	Pied-winged robber fly	Restricted to five small coastal areas in Scotland and is a Scottish Biodiversity List species. Robber flies, also called assassin flies, are expert ambush predators. Powerfully built, with strong legs to help with prey capture and stiff bristles for self-defence, they have voracious appetites and help to maintain a healthy balance between insect populations. Living in the sand, their larvae are also predatory, feeding on the eggs and larvae of other insects
<i>Pegomya deprimata</i>	Fly	Discovered feeding in sweet chestnut flowers in Wilkie's Wood in 2025. Known from only four other locations in Scotland, and four in England
<i>Phthiria pulicaria</i>	Flea bee-fly	A Nationally Scarce species, restricted to six small coastal areas in Scotland. A coastal species found in sandy habitats
<i>Tephritis praecox</i>	Fruit fly	The first record for Scotland was recorded in 2025 on the Hinterland. Primarily found in southern and central England and thought to be spreading northwards. Associated with gardens, grassy places and waste ground. Likely overlooked due to its small size
<i>Tipula nodicornis</i>	Crane fly	An Endangered species, restricted to five small areas in the UK, all in Scotland. Found in short-sward grass, including woodland glades
<i>Morychus aeneus</i>	Beetle	Known from seven areas in Scotland. Generally associated with open, sandy, or stony habitats, including coastal dunes

<i>Leiodes furva</i>	Beetle	A coastal species found at only one other site in Scotland. It lives underground, feeding on fungi
<i>Epuraea terminalis</i>	Beetle	A rare sap-feeding beetle, known from only three other sites in Scotland. Often associated with old-growth or mature woodland habitats. Its larvae develop in decaying wood
<i>Psammporus insularis</i>	Beetle	A Nationally Scarce and endemic small sand scarab beetle, associated with sand and shingle
<i>Gravesteiniella boldi</i>	Leafhopper	The first Scottish record was from the Findhorn Hinterland, in 2022. It is a dweller of coastal sandhills with marram grass
<i>Muirodelphax aubei</i>	Leafhopper	Only recorded at one other site in Scotland. A coastal species found in dry sandy areas
<i>Macropsis fuscula</i>	Leafhopper	Only been found once before in Scotland, at Gretna Green. A woodland species associated with brambles
<i>Agrocybe pusiola</i>	Lichenicolous fungus	An endangered species known in the UK only from sand dunes in Wales
<i>Dacampia peltigericola</i>	Lichenicolous fungus	Only known in Britain from the Findhorn dunes, growing on the endangered lichen <i>Peltigera malacea</i>
<i>Phellodon melaleucus</i>	Grey Tooth Fungus	A Scottish Biodiversity List species rarely found on the coast, and even more so growing away from trees, as most records are from Caledonian pine forest. It is a more frequent sight in some parts of southern Europe and is also recorded in North America
<i>Polycoccum trypethelioides</i>	Lichenicolous fungus	Classed as Near Threatened. Restricted to five areas in Scotland. Grows on the pioneer lichen <i>Stereocaulon condensatum</i> often the first lichen to appear on bare sand
<i>Psathyrella flexispora</i>	A brittlestem fungus	A rare sand dune species, known from only one other site in Scotland
<i>Sabuloglossum arenarium</i>	Sandy Earthtongue fungus	A very rare sand dune fungus, restricted to six small areas in Scotland. The species is sensitive to changes within its environment and is mostly found growing alongside crowberry <i>Empetrum nigrum</i> . The presence of Sandy Earthtongue is an indication that ground conditions have most likely been relatively undisturbed over a long period of time (historic aerial photography at Findhorn suggesting around thirty-years)
<i>Cladonia mitis</i>	Lichen	SBL species restricted to six coastal locations in Scotland
<i>Peltigera malacea</i>	Felt lichen	SBL, Red Data Book, Endangered and Nationally Rare species. There are significant populations at Findhorn. Found on sand and near moss, often at the edge of tracks
<i>Scytinium palmatum</i>	Lichen	Nationally Scarce species, found growing on sand

Fig.10. Red-banded sand wasp (A.Watson Featherstone)



2.7.2 North East Scotland Biological Records Centre (NESBReC)

A 2025 data NESBReC search forms provides a good summary of the rich biodiversity resource within a 2km radius of a central grid reference within the Findhorn Hinterland, set out in Tables 4-6, below. Additional sources, listed in 2.7.3 below, complete the full picture, as we know it to date.

Table 4. NESBReC data search: Mammals and herptiles within 2km

Species	Conservation status
Bats <i>Chiroptera</i>	European Protected Species
European Otter <i>Lutra lutra</i>	European Protected Species
Eurasian Badger <i>Meles meles</i>	Protection of Badgers Act
Brown Hare <i>Lepus europaeus</i>	UK BAP
Common Lizard <i>Zootoca vivipara</i>	UK BAP
Common Seal <i>Phoca vitulina</i>	UK BAP
Common Toad <i>Bufo bufo</i>	UK BAP
Eurasian Red Squirrel <i>Sciurus vulgaris</i>	UK BAP
Pine Marten <i>Martes martes</i>	UK BAP
West European Hedgehog <i>Erinaceus europaeus</i>	UK BAP

Table 5. NESBReC data search: Birds within 2km

Species	Conservation status
Arctic Tern <i>Sterna paradisaea</i>	Annex 1 EU Birds Directive
Bar-tailed Godwit <i>Limosa lapponica</i>	Annex 1 EU Birds Directive
Black-throated Diver <i>Gavia arctica</i>	Annex 1 EU Birds Directive
Common Tern <i>Sterna hirundo</i>	Annex 1 EU Birds Directive
Osprey <i>Pandion haliaetus</i>	Annex 1 EU Birds Directive
Red-throated Diver <i>Gavia stellata</i>	Annex 1 EU Birds Directive
Sandwich Tern <i>Sterna sandvicensis</i>	Annex 1 EU Birds Directive
Short-eared Owl <i>Asio flammeus</i>	Annex 1 EU Birds Directive
Common Scoter <i>Melanitta nigra</i>	UK Biodiversity Action Plan
Curlew <i>Numenius arquata</i>	UK Biodiversity Action Plan
Dunnock <i>Prunella modularis</i>	UK Biodiversity Action Plan
Grey Partridge <i>Perdix perdix</i>	UK Biodiversity Action Plan
Herring Gull <i>Larus argentatus</i>	UK Biodiversity Action Plan
House Sparrow <i>Passer domesticus</i>	UK Biodiversity Action Plan
Lapwing <i>Vanellus vanellus</i>	UK Biodiversity Action Plan
Linnet <i>Linaria cannabina</i>	UK Biodiversity Action Plan
Reed Bunting <i>Emberiza schoeniclus</i>	UK Biodiversity Action Plan
Skylark <i>Alauda arvensis</i>	UK Biodiversity Action Plan
Song Thrush <i>Turdus philomelos</i>	UK Biodiversity Action Plan
Spotted Flycatcher <i>Muscicapa striata</i>	UK Biodiversity Action Plan
Starling <i>Sturnus vulgaris</i>	UK Biodiversity Action Plan
Yellowhammer <i>Emberiza citrinella</i>	UK Biodiversity Action Plan
Dunlin <i>Calidris alpina</i>	Scottish Biodiversity List
Black-headed Gull <i>Chroicocephalus ridibundus</i>	Scottish Biodiversity List
Hooded Crow <i>Corvus cornix</i>	Scottish Biodiversity List
Kestrel <i>Falco tinnunculus</i>	Scottish Biodiversity List
Swift <i>Apus apus</i>	Scottish Biodiversity List
Woodcock <i>Scolopax rusticola</i>	Scottish Biodiversity List

Table 6. NESBReC data search: UK BAP/SBL Invertebrates

Spiders:

- Bend-bearing Blunt-brow Spider
Silometopus incurvatus (Table 2)

Butterflies:

- Pearl-bordered Fritillary *Boloria euphrosyne*
- Small Heath *Coenonympha pamphilus*
- Small Pearl-bordered Fritillary *Boloria selene*

Moths:

- Anomalous *Stilbia anomala*
- Autumnal Rustic *Eugnorisma glareosa*
- Broom-tip *Chesias rufata*
- Brown-spot Pinion *Agrochola litura*
- Dingy Skipper *Erynnis tages*
- Ear Moth *Amphipoea oculea*

- Garden Dart *Euxoa nigricans*
- Garden Tiger *Arctia caja*
- Ghost Moth *Hepialus humuli*
- Grayling *Hipparchia semele*
- Grey Mountain Carpet *Entephria caesiata*
- Haworth's Minor *Celaena haworthii*
- Heath Rustic *Xestia agathina*
- Lunar Yellow Underwing *Noctua orbona*
- Mouse Moth *Amphipyra tragopoginis*
- Rosy Minor *Litologia literosa*
- Rosy Rustic *Hydraecia micacea*
- Sallow *Cirrhia icteritia*
- Shaded Broad-bar *Scotopteryx chenopodiata*
- Shoulder-striped Wainscot *Leucania comma*
- Small Phoenix *Ecliptopera silaceata*
- White Ermine *Spilosoma lubricipeda*
- White-line Dart *Euxoa tritici*
- Dictyna major *Dictyna major*

Table 7. NESBReC data search: UK BAP/SBL lichens and plants

- Matt Felt Lichen *Peltigera malacea* (Table 3)
- Cartilage lichen *Ramalina fraxinea*
- Shepherd's Cress *Teesdalia nudicaulis*

Fig.11. *Peltigera malacea* (H.Paul)



2.7.3 Other key sources of data

1. Findhorn Dunes Trust (FDT) lichen survey (2008)

FDT commissioned a lichen survey of the dunes in 2008 (Coppins 2008). This concluded that the dunes are of national significance for lichens. One hundred species of lichens and fifteen species of lichenicolous fungi were recorded, including five nationally rare and eighteen nationally scarce lichens, one species listed as vulnerable and one species listed as near-threatened.

Nationally rare species which are not UKBAP/SBL species and not listed above are:

- *Buellia jugorum*
- *Cladonia mitis*
- *Ochrolechia frigida f. lapuensis*
- *Rhizocarpon cinereovirens*

Nationally scarce species recorded were:

- *Alectoria sarmentosa subsp. Vexillifera*
- *Caloplaca asserigena*
- *Catillaria atomarioides*
- *Cladonia macrophylla*
- *Cladonia uncialis subsp. Uncialis*
- *Cladonia zopfii*
- *Lecanora farinaria*
- *Lecidea auriculata*
- *Lecidea brachyspora*
- *Lecidea diducens*
- *Lecidea plana*
- *Lepraria elobata*
- *Protothelenella corrosa*
- *Psoroma hypnorum*
- *Scytinium palamatum*
- *Stereocaulon condensatum*
- *Stereocaulon leucophaeopsis*
- *Epilichen scabrosu*

The Survey considered the issue of sand disturbance and vegetation succession, noting that natural dune ecosystems are both dynamic and self-sustaining, with sand dune lichen-rich habitats occurring where sand has largely stabilised and a biological soil crust has developed. The issue of vegetation succession and threat of encroaching gorse and trees was also addressed.

2. Moths

A number of moth trapping surveys have been carried out on the Hinterland, as follows:

- 2013 – G. Hunter et. al.
- 2023 – C. Wilkinson et. al.
- 2024 – P. Moore and T. Munro et. al. (Butterfly Conservation, Species on the Edge).

These surveys add two additional SBL species to the NESBReC data, centre barred sawfly *Atethmia centrago*, and the nationally scarce *Caryocolum blandelloides* found in 2023 and 2024 (Table 2).

Findhorn Dunes are well-known to the charity Butterfly Conservation, which holds records for four-hundred species of moths for the site. These include four additional SBL moth species, not listed in the NESBReC data search:

- Narrow-bordered Bee Hawk-moth *Hemaris Tityus*
- Dark Spinach *Pelurga comitata*
- Grass Rivulet *Perizoma albulata*
- Neglected Rustic *Xestia castanea*

Butterfly Conservation's list of nationally scarce moth species at Findhorn dunes (not UKBAP/SBL species), include:

- White-dusted Owlet *Scythris picaepennis*
- Ling Owlet *Scythris empetrella*
- Tansy Plume *Gillmeria ochrodactyla*
- Perth Button *Acleris abietana*
- Northern Marble *Phiaris palustrana*
- Square-spot Bell *Notocelia tetragonana*
- Sandhill Knot-horn *Anerastia lotella*
- Northern Grey *Scoparia ancipitella*
- Heath Grass-veneer *Crambus ericella*
- Scarce Grass-veneer *Crambus pratella*
- Scotch Grass-veneer *Catoptria permutatellus*
- Scotch annulet *Gnophos obfusate*
- Sweet Gale Moth *Acrionicta cinerea*
- Lyme Grass moth *Longalatedes elymi*
- Northern Arches or Exile *Apamea exulis*
- Portland Moth *Actebia praecox*
- Coast Dart *Euxoa cursorial*

Fig.12. Ling owlet moth (D.Hammond)



3. Diptera (true flies). FHT Survey, 2019

Fig.13. Pied-winged robber fly (A. Watson Featherstone)



A new species to Britain, *Metopia tshernovae*, the Red data book *Tipula nodicornis*, nationally scarce pied-winged robber fly *Pamponerus Germanicus* and flea bee-fly *Phthiria pulicaria* were found in dune heath habitats (Table 3).

4. Fungi. Holden, 2020

Particularly notable findings of this survey were from sand and shingle habitats, including:

- *Agrocybe pusiola* – a sand dune species which is unknown in Scotland;
- The brittlestem fungus *Psathyrella flexispora*, known from only one other site in Scotland;
- The sand specialist sandy earth tongue *Sabuloglossum arenarium*, since found to be widespread on the dunes in such areas.

Fig.14. *Psathyrella flexispora* (A. Watson Featherstone)



Fig.15. Sandy earthtongue fungus (A. Watson Featherstone)



The SBL rust fungus, *Pucciniastrum goodyerae*, was recorded on creeping lady's tresses *Goodyera repens* in Wilkie's Wood, representing one of only a handful of sites for this species in north-east Scotland (Table 3).

The interface of the pine plantation and the dune was found to support a number of pine associating species including SBL and UKBAP/SBL species *Bankera (Phellodon) fuligineoalba*. The SBL species Upright Coral Fungus *Ramaria stricta* has been recorded in the Edible Woodland Garden.

The survey suggested that dune heath, dune grassland, and part of the pinewood, could be managed to develop the mycological interest.

5. Bryophytes. Rothero.G, 2020

This survey recorded 51 bryophyte taxa on the site, (39 mosses and 12 liverworts). Almost all of the species recorded are very common in the area. The survey noted that some removal of the dense gorse scrub would substantially increase the area available to bryophytes.

6. Hemiptera ('true bugs'). Botting, 2023

This three-day survey covered all habitats within the then FHT boundary. The rarest species were recorded on the open dunes - which is to be expected as these are very rare habitats nationally.

Several particularly notable species were found, including: Blue Shieldbug *Zicrona caerulea*, the planthoppers *Gravestiniella boldi* and *Muirodelphax aubei* (Table 3), the leafhoppers *Anoscopus serratulae* and *Macropsis fuscula* (Table 3), and the mirid *Hallodapus rufescens*.

The early successional stages of vegetation growth on sand and shingle were noted to be of highest value and conservation action, to clear gorse and mobilise sand, was recommended for open sandy habitats.

Fig.16. *Gravestiniella boldi* (A. Watson Featherstone)



The sunny and sheltered south-eastern fringes of Wilkie's Wood were noted to have the highest diversity of hemiptera, including three exceptionally rare leafhoppers, *Edwardsiana crataegi* and *Doratura stylata* and *Populicerus laminatus* – the latter two species having being recorded at only one other site in Scotland. The scarce ground bugs

Edwardsiana crataegi and *Eremocoris plebejus* were also found here, with the scarce ground bug *Lopus decolor* being found to be abundant in dry grassy areas generally. Three species of very rare *Eupteryx* leafhoppers were also found in the Forest Garden.

The least interesting area for hemiptera were areas of dense gorse on the dunes and the western (Corsican pine) section of Wilkie's Wood.

While not included in the survey, it was noted that the Hinterland beetle fauna appeared to be particularly interesting.

7. Bats. 2024

Volunteer surveys within the adjoining Park Ecovillage have found four species of bat, all of which are European Protected and SBL species and likely to be active throughout the Hinterland area:

- Common pipistrelle *Pipistrellus pipistrellus*
- Soprano pipistrelle *Pipistrellus pygmaeus*

- Natterer's bat *Myotis nattereri*
- Brown long-eared bat *Plecotus auritus*

Natterer's bat is particularly notable, as it has a restricted range in northern Scotland.

8. Beetles. 2025

The James Hutton Institute surveyed the whole of the Hinterland area for beetles in 2025. A total of 121 invertebrate species were found, including 79 beetle species. Important finds included six Nationally Scarce beetles:

- Pill beetle *Morychus aeneus* – a pill beetle, found in sandy habitats
- *Trypocopris vernalis* – a dung beetle, found in sandy habitats
- Round Fungus Beetle *Leiodes furva* – found in sandy habitats
- *Psammporus insularis* – an endemic beetle, found in sandy habitats
- *Epuraea terminalis* – a woodland sap-feeding beetle.

The survey also recorded, the scarce spider *Drassyllus pusillus* and the lacebug *Acalypta carinata*, both associated with sandy habitats.

9. FHT Casual records

In addition to some of the groups covered above, FHT casual records also cover birds, flowering plants, hymenoptera, beetles, aphids, spiders, molluscs, springtails, sawflies, dragonflies and damselflies, myriapods, mites and slime moulds.

Hymenoptera records include the SBL species Red-banded sand wasp *Ammophila sabulosa* (Table 2) and Dusky ant *Formica fusca*, both associated with sandy dune habitats. Other notable SBL species are grey tooth fungus *Phellodon melaleucus* (Table 2), and nationally scarce creeping lady's tresses *Goodyera repens*, a type of orchid, found in Wilkie's Wood. FHT casual bird records, not included in the NESBReC search, include SBL bullfinch *Pyrrhula pyrrhula* and red-listed (Birds of Conservation Concern) Lesser Redpoll *Acanthis cabaret*.

3. Geomorphology, history

3.1 Status

Culbin Sands, Culbin Forest and Findhorn Bay, form one of the most extensive areas of stabilised blown sand in Britain, containing unique systems of intertidal flats, sand and shingle bars, dunes, dune slacks, saltmarsh, heath, freshwater bodies and scrub woodland. There is no comparable site in Europe that matches the scale, complexity and preservation of coastal geomorphological features found here (Hansom 2003, NatureScot 2019).

The size and scale of the mobile dunes which once existed can be seen in the forest-covered dunes at Culbin, to the west. Dunes here are among the largest of their kind in Europe, with the 'Lady Dune' at over 30m high, and parabolic dunes reaching a height of 15m, with flanks up to 400 m long and a maximum width of c. 400m, (NatureScot 2019, Steers 1937). The scale of the dune system here is indicative of an extremely abundant sediment supply, combined with exposure to strong onshore winds (Dynamic Dunescapes 2024).

3.2 Origins

The dunes are formed of glacial material washed down from the mountains into the sea in the last Ice Age. These deposits were worked over by marine and coastal processes and then exposed as sand and gravel ridges and raised storm beaches as the land rebounded, after the ice had melted, starting around 6,500 years ago (Hansom 2003, Dynamic Coast, Steers).

Much of the glacial source material for the dunes came from as far away as the River Spey, 30km to the east, a huge marine channel once funnelling material along the coast. This channel became blocked as the land rose, from around 6,000 years ago, and sediment supplies from rivers gradually reduced (Comber 1993). Since then, the shore of Burghead Bay and the Culbin headland have been eroding, with material being carried west by longshore drift and deposited in the Bar area of Culbin (Hansom, Steers). Much of the beach between Burghead and Findhorn is eroding at around 1m a year, whereas the spit at Culbin is growing by around 15m a year, leaving a broad salt marsh in its lee (NatureScot 2019, Steers, Hansom, Dynamic Coast).

As the post-glacial land rose, and the sea level fell, a shallow bay developed at the mouth of the river Findhorn, which slowly dried out as the land continued to rise, forming a delta and exposing gravel, sand flats, mobile sand, and areas of fertile sediment, including peat (Steers). Peat layers from eroding sand cliff sections at Burghead Bay, corresponding to former freshwater habitats, have been radio-carbon dated, to between 10,000 and 2,000 years ago, with a sample from Culbin being dated at around 10,500 years ago (Comber).

Areas of fertile alluvial soil - still farmed today around Findhorn Bay - are likely to have been the focus of agriculture within the current Culbin forest area, before being buried by sand in the seventeenth century (Gillen 1993, Ross 1992, 1993). Surveys of today's soils at Culbin Forest show that these are mostly infertile podzols, developed through rain-leached sand - as is the case at Findhorn (Gauld 1981, Gillen 1993, Forest Enterprise 2018,).

It is not clear when, and to what extent, the sand dunes at Findhorn were stable or active. Many sand dune systems in north west Europe were activated during the 'Little Ice Age' (1300s to 1850) during a period of increased storminess (Dynamic Dunescapes 2021, 2024). It seems likely that this is also the case at Findhorn dunes, but that mobile sand dunes also existed here before this period.

Major periods of sand instability, interspersed with periods of stabilisation, are known from around 4,500 years ago in North East Scotland, and the first documented reference to sandstorms at Culbin was in 1097 AD, by which time some dunes must have been well-established. Parish records also mention sand storms in the thirteenth century and many settlements were described as having been lost to sand by 1586 (Hansom, Comber, Steers).

3.3 Soils

Fig.17. Buried soils with burn layers, Findhorn Dunes (M. Sharpe)



The presence of well-developed buried soil ('palaeosol') at Culbin - unusual in large dune systems, which tend to become remobilised regularly - suggests that some of the dunes at least remained stable until relatively recently, supporting a vegetation cover that prevented sand-blow (Hansom). A palaeosol, showing signs of burning, is also visible on Findhorn dunes, indicating vegetation cover here, possibly during the same period as at Culbin (Fig.17). Radio carbon dating from 2025 places this deposit as being between 1658 and 1916 (M. Sharpe, pers. comm.). Fragments of charcoal indicate a possible dune heath vegetation, indicating a stabilised landscape, at least in places, which may have been covered in sand during the Great Storm of 1694, followed by stabilisation following a reduction of sand

supply shortly afterwards (3.5).

3.4 Archaeology

The coastal plain of Moray and Nairn is unusual when compared to other parts of northern Scotland in that there is a range of material from the Neolithic period, from areas near Roseisle, Fochabers, and Buckie, as well as from the Culbin and the Findhorn Sands. Polished stone axes suggest the clearing of woodland, although they may also have been symbolic (NatureScot 2019).

Local archaeologist, Michael Sharpe, has discovered objects from multiple periods, ranging from the Mesolithic to the second world war, including: fire-cracked stone (used for cooking), flint tools, hammer stones, a Neolithic axe, pot shards, beads, copper alloy objects, burnt bone, a midden, two grain grinding stones ('querns'), and at least one Bronze Age cremation site. He suggests that at least some of these findings may be ritual objects, the area possibly long being considered as a 'liminal place', of spiritual significance (Sharpe, 2023).

The two querns are particularly interesting. One is a saddle quern, characteristic of between Neolithic to early Iron Age; the other, a rotary quern which could date from the Iron Age right up to the post-medieval period. These finds may indicate cultivation over a long period of time, possibly sporadic due to wind-blown sand.

Midden excavations from the middle of Culbin forest in the 1970s exposed the bones of cow, pig, and sheep or goat, as well as a few charred cereal grains and a pot. Radio carbon dating of charred wood showed that it was from the Bronze Age, around 3,500 years ago. Authors of the study considered that the area would not have been suitable for cultivation or animal husbandry, and that the animals from which the bone derived may have been stolen from land to the south (Coles and Taylor, 1973).

3.5 Post medieval history

A series of sandstorms were recorded at Culbin between 1670 and 1695. Most notable, was the great sandstorm of 1694, which buried farmland and buildings, forced people from their homes (Steers, Davies, McKenzie 2014), and may have contributed significantly to the formation of the Findhorn dunes. Jutland, in Denmark, is recorded as being affected by similar events, indicating wider environmental shifts around the North Sea at the time (Culbin Stories).

The Culbin area is sometimes referred to as being the 'granary of Moray,' before the great storm of 1694. There may be some confusion around this, however, Culbin possibly being confused with the much larger 'Laich of Moray' – the area of rich farmland which still exists

between Forres and Elgin (NatureScot 2019). While the Great Storm undoubtedly had a huge impact on the local human population of Culbin, the extent of loss of agricultural land may have been much less than has often been reported (Ross, Steers). At the time, agricultural holdings were much smaller than today, supporting much higher numbers of people per hectare. Apparently, there was confusion in the records of the time, between number of holdings and numbers of people, and suggestions that the Estate may have exaggerated the extent of agricultural loss to maximise financial relief from the state (Ross). It may be that agriculture at Culbin was always relatively marginal.

Despite a degree of uncertainty, the history of Culbin gives a valuable impression of the scale and dynamics of natural sand dune processes once in operation in the area. While the historic ratio of infertile sand/gravel and agricultural land at Culbin may be unclear, it is known that sand movement has long been a concern in the area, as indicated earlier. Even today, sand storms can have an agricultural impact and sand can spread across roads south and west of Findhorn Bay.

The first attempts to stabilise the shifting sands at Culbin were in the west, the area of coastal deposition and source of blowing sand, in 1839 (Forestry Commission 1951, 1955). A massive thirty-year afforestation programme was started by the newly established, Forestry Commission in the 1920's – and at Roseisle from the 1930's. At this time, the whole Culbin area was mostly mobile sand dunes. Once again, planting started in the west, to cut-off the sand supply. Planting often first targeted areas of stabilised sand, between sand or gravel ridges, to shelter the surrounding mobile sand from the wind and encourage the spread of sand stabilisation. Brash from forestry operations elsewhere was brought in to lay as a thatch cover on mobile sand and Corsican pine was planted on the more mobile sand areas.

3.6 Sand stabilisation

Key to understanding the ecology of the Findhorn dunes is the fact that the Findhorn spit once extended much further west (around 8km), to Culbin (Fig.18). This long spit was breached twice, most recently during a storm in 1702, forming the current mouth of the river, and causing the destruction of an earlier village of Findhorn. The present Culbin Bar has developed since that point, slowly becoming connected to the land by sand dunes and saltmarsh (Steers).

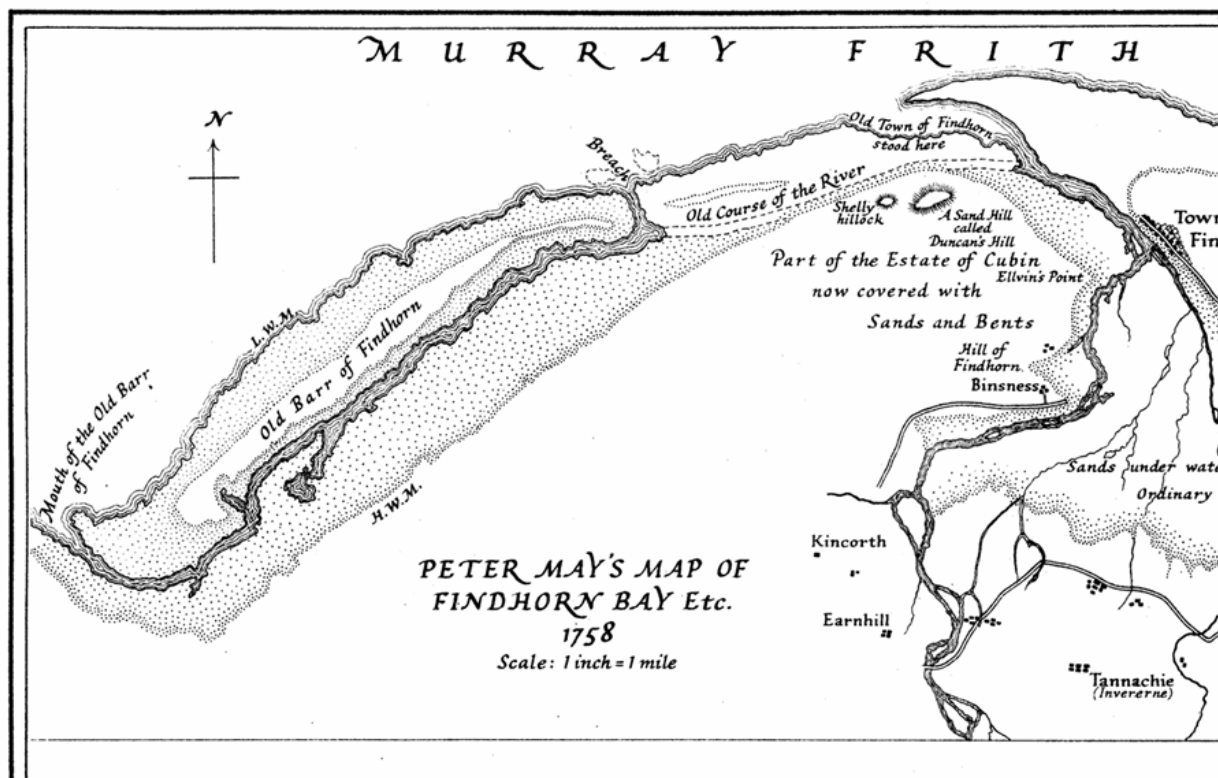
Until the breaches of the former long spit of Findhorn, particularly the breach of 1702, the dunes between Culbin and Burghead would have been connected as a single sand dune system. It is likely that sand movement formed a cycle within a 'coastal cell', with a plentiful

sand supply from the Culbin sand deposition area, blowing eastwards to Findhorn and Roseisle, from where it was eroded and transported back to Culbin by longshore drift (Hansom).

Most sand supply to the Findhorn and Roseisle dunes probably stopped in 1702, when the Culbin bar and dunes became separated from the Findhorn Dunes by the new river mouth, indicated in Fig. 17 below. If so, the wider Findhorn dunes have probably slowly stabilised since then, under natural processes, developing areas of dune heath, gorse, and latterly encroaching pine trees. This theory, of stabilisation as a result of reduced sand supply, would be consistent with the fact that it takes three hundred years of leaching for sand to become suitable for dune heath development (Sand Dune Managers Handbook 2024).

Most of the shore of Burghead Bay/Findhorn Dunes is eroding, with deposition at the Findhorn spit. It seems likely that the active Findhorn primary/foredunes of today are still supplied with sand from the spit, drying sand at low tides being blown westwards along the beach to supply the still active, though somewhat restricted, foredunes (Sand Dune Managers Handbook 2021, 2024).

Fig.18. Historic map (1758) showing the old course of the River Findhorn and the separation of Old Bar from Findhorn Dunes (from Steers, 1937)



Aerial photographs from the 1940's show that dune ridge tops were the first areas to be vegetated, most probably by marram grass (Fig.19). Aerial photographs from 1999 show extensive areas of dune heath within what is now gorse on stabilised dunes and the author can remember areas of dune heath in 2004, which have now been entirely lost to gorse. It seems logical that the dune ridge tops, most exposed to leaching under stable conditions, were the first areas to develop acid-loving dune heath, and that the heath slowly developed an acid soil into which gorse could establish and spread. Gorse-covered ridges are likely to have then sheltered the lower ground between from the wind, causing it to stabilise and allow rain leaching, thereby allowing more dune heath to establish and create the conditions for gorse to spread.

Fig.19. Aerial photo, 1946, showing the extent of bare sand, vegetated sand, and a historic golf course (the vegetated ground adjoining the village and road)



The theory that Findhorn Dunes had largely stabilised by the 1940s could be further substantiated by the fact that it was not planted with forestry in the early part of the twentieth century in order to stabilise sand - apart from at Wilkie's Wood, in the early 1960's. The western part of Wilkie's Wood shows clear dune formations, which have been

planted with Corsican Pine - the chosen species for mobile sand at Culbin and Roseisle – indicating that while mostly stabilised, there were still small areas of mobile sand at that time.

While sand stabilisation at Findhorn is likely to be partly a result of natural processes, at a wider scale the impact of human activity in the last one hundred years is far more significant, destroying around 99% of the former sand dune ecosystem between Nairn and Burghead, as follows:

- Culbin and Roseisle around 3,700ha
- The MoD base at Kinloss 900ha
- Findhorn Village, Park Ecovillage and Wilkie’s Wood removing around 150ha.

In addition, between 1926 and 1939 around 20ha of natural dune habitats at Findhorn were covered with topsoil in the creation of a golf course (Shand). The course was abandoned in the 1930’s, and later largely subsumed by an expanding Findhorn Village and caravan park, but around 6ha of the former golf course - now gorse-covered - can still be seen on aerial photography, between the edge of the village and the ‘Dunes Road’ (Fig.20).

Fig.20. Layout of the Findhorn golf course (Shand, Forgotten Greens of Scotland)



4. Sand Dune Action Plan

4.1 Threats

Dynamic dune systems, with naturally blowing sand, no longer occur across most of north-west Europe. Habitat has been lost to a widely-shared list of threats, including: plantation forestry, golf courses and caravan parks, and building and industrial development. Several threats often operate simultaneously on the same area, as on the Findhorn peninsula. Atmospheric nitrogen deposition can also be an important factor fuelling rapid plant growth and sand stabilisation, but is not a significant factor in north Scotland (S. Angus pers comm).

Fig. 21. Dune heath with encroaching gorse (S.Reed)



Most surviving dune systems in the UK consist of largely stabilised dunes, covered in vegetation, and often highly fragmented. Many rare specialist dune species, particularly those associated with the early successional habitats, have suffered significant population declines and are now very rare, in many cases only remaining through targeted habitat management

(Dynamic Dunescapes 2024).

The Findhorn peninsula has been heavily impacted by human activity over the last one hundred years, as described in Section 3, most significantly by the:

- Establishment of plantations at Culbin and Roseisle Forests. Some 6,000 hectares of Scotland's sand dunes have been converted to conifer plantation (Dynamic Dunescapes 2024), Culbin forest being a particularly notable example
- Creation (and later abandonment) of a golf course
- Establishment and maturation of Wilkie's Wood
- Creation of Kinloss military base
- Building-up of Findhorn Village and Findhorn Park Ecovillage.

The result has been a huge loss of habitat, with over 95% of the original dune ecosystem between Nairn and Burghead being destroyed over the course of a century. This has left Findhorn dunes as a small isolated fragment, subject to a new and existential impact, of

reduced windspeed and loss of natural wind-driven processes, due to the sheltering effect of trees and buildings.

Wilkie's Wood has a particularly notable effect on windspeed, being planted on a sand dune ridge some 70 years ago, probably specifically to stabilise sand. Wind speed on adjoining dune land has been significantly reduced as the trees have grown-up, enabling the establishment and rapid spread of dense gorse, resulting in the direct loss of sand/shingle/heath habitats and species, and further reducing wind speeds and sand mobility within surviving sandy areas.

Wilkie's Wood is also the source of tree seeds which have led to the encroachment of self-sown pine trees on the dunes, especially on land to the north of the FHT's boundary (Fig.3). Encroachment of trees is the most significant threat to the ecological integrity and function of the Findhorn dunes, because the trees are spreading so rapidly – much faster than the spread of gorse, as indicated in Fig.22. An accelerating negative feedback loop has been established over large areas, whereby encroaching trees and gorse create more wind-shelter, allowing more trees and gorse to establish, which then spread more seeds and create more shelter.

Fig. 22. The same location, a log barrier, in 2011 and 2024 (H.Paul)



Lack of management intervention can be a threat to such rare and isolated ecosystems, through a lack of ecological understanding, or because of an overly cautious approach by conservationists (Sanderson 2023).

Historically, the approach to sand dune management was one of stabilising sand. This policy has unfortunately contributed to the widespread loss of open sandy dune habitats across Europe. Best practice has more recently shifted to one of restoring the operation of natural dune processes, as described in the Sand Dune Managers Handbook (2021, 2024) and illustrated by sand dune restoration projects across Europe and beyond. A departure from

traditional sand stabilisation techniques can unfortunately still be perceived by the public as damaging nature, rather than restoring it, however.

Other threats to sand/shingle and dune heath at Findhorn Hinterland include trampling by humans, motorcycle/mountain bike/4x4 vehicle damage, and non-native invasive plant species.

Regular human disturbance of the fragile soil crust, without sufficient habitat recovery time, destroys lichen-rich dune heath. This can have a catastrophic impact in heavily-used 'honeypot' areas, such as around car parks - and to very rare species in specific locations, such as a rare lichen on the edge of a footpath - but is not a significant threat to the integrity of sand/shingle/heath habitats and associated species on the Findhorn Hinterland.

Human disturbance is a complex issue, as occasional disturbance – which in natural/wild conditions would be caused by large browsing animals (and by rabbits nowadays) - also creates areas of bare sand for colonisation of pioneer lichens, thereby resetting the succession of lichen species and maintaining healthy dune heath.

Human disturbance has been an integral part of lichen-rich heathland habitats in the UK since their formation (Sanderson 2023); archaeological evidence at Findhorn dunes indicates that this is also likely at the Hinterland. It is notable that on Findhorn dunes the highest quality dune heath areas are often near to broad footpaths; human traffic is likely to play an important role in keeping these areas open.

Because of a loss of natural dynamism and increased sand stabilisation, even without encroaching gorse and trees at the Findhorn Hinterland, without human intervention sand and shingle habitats are likely to slowly succeed to dense heather, as soil nutrients build-up and pH decreases with leaching. Occasional human disturbance of these habitats is likely to play a valuable role in their maintenance.

Invasive non-native plant species (INNS) are potential threats to these fragile habitats. Of particular concern are sea buckthorn *Hippophae rhamnoides*, which is an introduced species in northern Scotland, which has been planted at North Whins, and Japanese Rose *Rosa rugosa*, which is found scattered through the Park Ecovillage. Escaping from gardens these plants can spread quickly, forming dense thickets which shade out dune flora and build-up thick layers of organic litter and are very difficult and expensive to remove.

4.2 Opportunities

The Sand Dune Managers Handbook suggests a target of between 10-30% bare sand at dune ecosystem site level, in general, with around 5-20% cover of scrub being considered as

favourable (Dynamic Dunescapes 2024). As noted in Section 2, until dune restoration work began in 2024, the main Findhorn Hinterland sand dune area - to the north of the Park Ecovillage - was dominated by gorse, with over 90% cover. The Handbook recommends management intervention when the percentage of bare sand and mobile/partially mobile dunes is <10-15%, shows evidence that it is likely to decline further, and where loss of bare sand habitats is the direct result of human actions.

The wider Findhorn Dunes, mainly to the north of the Findhorn Hinterland, has around 50% open sandy habitats and so still appears currently to be in good ecological status. This status is threatened significantly, however, by the rapid spread of trees. Larger scale management action is urgently needed here to prevent loss of high-quality vegetated sand and shingle within areas of scattered young trees and to ensure that further spread of trees is prevented. It may be that trees will be able to spread only slowly westwards, towards Findhorn Village, against the prevailing wind, and this western edge would be a good focus for management action.

Early intervention is important in dealing with tree removal, because pine trees grow so quickly. With each year that goes by, encroaching trees grow bigger and are more difficult to remove. Once young trees are removed, preventing further encroachment by 'weeding' tree seedlings every few years is a relatively easy task, which can be undertaken by volunteer work parties. Tree seedlings can also be controlled by hand tools and mechanical brush cutters. It is far more onerous and expensive to remove larger trees, potentially requiring specialist equipment and contractors.

It must be emphasised that rare sand dune species make no distinction between pine species. While non-native Lodgepole pine spreads more rapidly on sand dune habitats than Scots pine, both species spread, drop needles, cast shade, and slow wind speed, and so both are considered as invasive on the dunes, where they would not be growing under natural conditions (2.5, above).

4.3 Action to date

4.3.1 Dune Heath Maintenance

The FHT first explored dune heath maintenance work in 2013, in collaboration with the Findhorn Dunes Trust. Several volunteer work parties, and the FHT Land Steward, cleared gorse and pine seedlings and saplings from one of the highest quality areas of dune heath on the dunes (1.6ha).

The area has remained in good condition, with occasional hand maintenance, and visits of groups of pupils from Forres Academy, who have pulled up around 3,500 tree seedlings in

three 20-minute sessions. Land immediately adjoining to the west was of the same habitat quality as this area in 2013, but will soon be closed canopy woodland, with complete loss of dune heath habitat, along with much of the north-eastern part of the dunes.

The best lichen areas within the FHT managed area were mapped by the Trust's volunteer lichenologist in 2018 (Fig. 4). These areas were identified in the 2020 LBAP as the highest priority for action, by removing encroaching gorse and trees.

Despite Covid social distancing restrictions (2020-2022) and general pandemic-related disruption, the FHT's Land Steward was able to make a very effective impact on gorse in much of this area using a brush cutter. Monthly work parties have also made an important contribution, including along the Eastern Track on the edge of Wilkie's Wood in early 2024, with the assistance of a group of locally accommodated asylum seekers.

The 2020 LBAP recommended removal of all trees less than 5m tall within 5m of priority dune heath areas. The five-metre height of trees was suggested on the following basis:

- There were (and still are) few trees taller than 5m on the dunes
- A sparse scattering of mature pine trees is not considered to present a strategic threat to sand/shingle and dune heath habitats
- A sparse scattering of mature pine trees is likely to have some biodiversity benefits, such as creating microhabitats for lichens, recognised in the 2008 Lichen Survey, and also possibly for specialist invertebrates and fungi
- The Findhorn Ecovillage community has a tradition of honouring mature trees.

Areas of trees less than five metres tall remain to be cleared in some areas, presenting a continuing threat to priority dune habitats. FHT Land Management Team discussions for the preparation of this LBAP concluded that the 'less than metre tall' tree removal policy should only apply to areas where high-quality sand dune habitats exist beneath and between young trees, and that where this ground habitat has already been lost to gorse or shading, young trees will be allowed to continue to grow.

A public appreciation for a non-intervention rewilding approach was identified in a 2016 public engagement visioning exercise (Chalmers 2016). In this study, strong support was measured for action for biodiversity, but there was some (unfortunately unquantified), appreciation recorded for a 'naturally rewilding' landscape, with self-sown trees spreading across the dunes. The person/s expressing this view was/were presumably not aware that encroaching trees are the result of historic human activities, rather than natural processes - and indeed, that natural processes here are threatened by encroaching trees. The same sentiment has also recently been strongly expressed on social media, in response to a community consultation for gorse clearance to reduce fire risk at the Firepit.

The FHT's 2024 dune restoration project (4.3.2) public relations plan recognised that a non-

intervention rewilding view was likely to be widely held by the public – as is usually the case with scrub control projects - and developed clear messaging around the need for management action, reflected in its FAQs (Appendix 1).

Routine maintenance of footpaths and fire breaks has been carried out by the FHT, helping to guide human traffic and avoid its potentially damaging impact, though occasional motorbike use remains a problem. The threat of non-native invasive species (INNS) has been partly addressed through advice to new residents at the Whins, by the developer Duneland Ltd and by the FHT.

The Findhorn Dunes Trust (FDT) undertakes similar habitat maintenance work on their land. In 2024, the two Trusts discussed the potential for collaboration in a dune restoration project, but this initiative unfortunately fell-through.

4.3.2 Dune Restoration Project (DRP)

The 2020 LBAP recommended that a programme of sand dune restoration be developed on the Findhorn Hinterland, suggesting the creation of around 1ha of bare sand, in patches, and 2ha of dune grassland and heath.

It was possible to trial this new approach early in 2020 at Heathneuk (Fig. 3), with the developer Duneland Ltd, as part of an ecological mitigation and enhancement plan for the North Whins housing development. Around 3,400m² of sand and shingle habitat were restored here and around 300m² at a small area known as The Crescent. A large excavator was used, with a heavy-duty forestry mulcher and excavator bucket, to scrape away and dump the mulch litter, and underlying humus layer, including gorse roots. In 2025, with minimal maintenance, the bare sand areas remain gorse-free, are showing early signs of pioneer lichen establishment, and are being used by dune specialist invertebrates. Even mulched areas without any scraping have remained gorse-free here, thanks to the locally abundant rabbit population.

Unfortunately, the Covid Pandemic then intervened, setting back planning for large-scale dune restoration by three years. Once the Trust was fully operational again, a determined effort was made to catch up on dune restoration and in late 2023 discussions began on how to take dune restoration forward on FHT land.

The 2020 LBAP suggestion of creating 2ha of dune grassland/heath was not favoured by the FHT, due to concerns about ongoing mowing costs. Guided by the recently published Sand Dune Managers Handbook (2021), and more information becoming available on the approaches taken on similar projects elsewhere in the UK, a natural process-led project, focused on bare sand only, was agreed as the best way forward – named the Dune

Restoration Project (DRP).

The DRP concluded a very successful first year, creating 0.83ha of new bare sand. Two large excavators, with expert operators (Northern Contracting Solutions), were used to mulch tall, dense, mature gorse and then scrape and bury the mulch and humus layer, including the gorse roots.

Cutting down vegetation, including gorse scrub (especially with heavy machinery), can become a controversial action with the public if the rationale is not carefully explained. A major focus of the DRP was the early development of a public relations strategy - based on clear and consistent messages (Appendix 1), running over a period of one year - before any action on the ground was taken. This vital PR work included public meetings and presentations, social events, newspaper and newsletter articles, and social media posts. Gorse clearance using big machines is expensive and a measure of the success of the PR campaign was that eventual work on the ground was funded by a Big Give public appeal.

Fig 23. Bare sand creation 2024



Establishing the dune restoration project also involved reaching out to conservation partners, to learn from their experience in this rapidly developing field of work. This included:

- Exchange site visits with the RSPB, who have a dune restoration project at their Culbin reserve
- A site visit to Butterfly Conservation's and NatureScot's Species on the Edge dune restoration work at Nairn
- A mothing event at the FHT with Species on the Edge and Butterfly Conservation
- Discussions with sand dune experts from across the UK, including NatureScot's coastal advisers
- Becoming a member of the Sand Dune and Shingle Network, based at Liverpool Hope University.

At this stage, during 2023-24, the DRP concept was one of connecting the two main sand/shingle/heath areas (adjacent to Wilkie's Wood, and the Central Heath – Fig.2), with each other and the open dunes, via a large area of new bare sand (0.5ha), to increase wind speeds and assist the natural process of wind-blown sand. Connecting areas of high-quality habitat is recognised good practice in nature recovery. Bigger is generally considered to be better in habitat creation, including with bare sand, where larger patches minimise wind sheltering by, and seeding from, surrounding gorse (Sand Dune Managers Handbook 2021, 2024).

A FHT Land Management Team (LMT) review of the 2024 DRP project raised concerns about the size of the new bare sand area (0.83ha), however, which was larger than the 0.5ha which had been originally planned. There were also concerns over the proposed speed of and scale of future action, with a suggested 3ha of bare sand being created in 5 years, and the potential impact of blown sand on a small area of dune heath at the Crescent Dell (c.300m², Fig.4), containing sandy earthtongue fungus. The Crescent Dell has now been partially covered by blown sand, though it remains to be seen what ecological impact this will have. One potential impact is of raising the sand pH, which could potentially have a negative impact on acid-loving lichens, and the sandy earthtongue, though the species is still present.

New research from the Netherlands also became available in 2025, emphasising the value of smaller sand patches in areas with existing high value habitats (Dutch Forest and Nature Reserve Owners Association). This document, a review of the Sand Dune Managers Handbook (which also identifies the need to protect existing habitats), and the LMT concerns, has led to a change of approach for the period of this LBAP, to:

- creating smaller bare sand patches
- within large gorse stands and away from existing priority habitats
- over a longer time period.

Consultation with a specialist NatureScot ecologist, in the production of this LBAP, has confirmed that optimisation of natural processes is the main priority for sand dune restoration in Scotland. On Findhorn dunes, this would ideally involve large scale removal of encroaching pine trees to the north of the FHT area. Unlike in Wales, and to a lesser extent England (reflected in the Sand Dune Managers Handbook), the creation of bare sand is not strongly favoured as a main management solution in Scotland. The NatureScot ecologist was, however, relaxed about the bare sand approach being taken by FHT.

4.4 Proposed action 2026-2031

In considering biodiversity action, it is important to recognise that the FHT can only act on the land that it owns. To address the threats outlined above on the FHT's sand dune area,

three main objectives are proposed:

1. Protect the highest quality lichen-rich dune heath areas from encroaching gorse and trees, and from newly-created mobile sand.
2. Gradually create around 1ha of new bare sand, to provide a range of early successional sand and shingle habitats - allowing rare and threatened specialist sand dune species to recover and ensuring long term ecosystem sustainability within the FHT area.
3. Allow newly-created bare sand areas to develop naturally, but prevent any extensive (>10%) spread of gorse/trees on these areas.

Objective 1. Protect the highest quality lichen-rich dune heath areas from encroaching gorse and trees

Good progress has been made on this objective since 2020. Recommendations for the period of this LBAP are summarised in Table 7 and explored in more detail, below. Locations of named areas are shown in Fig.4.

Table 7. Recommended management actions for the main sand/shingle/heath areas within FHT ownership

Area No.	Area name	Recommended Management Action	Timing
1-2	North West & Paddock Heaths	<ul style="list-style-type: none"> • Dune heath restoration project. Gorse and <5m tall tree removal where high-quality dune habitat exists between and below young trees 	Winter 2026/27
3-11	See Fig.4	<ul style="list-style-type: none"> • Annual monitoring, with clearance of gorse regrowth and tree seedlings by brush cutter as required • Removal of trees less than 5m tall in areas where high-quality dune habitat exists between and below young trees • Detailed monitoring of sandy earthtongue at the Crescent Dell • Consider tree thinning at Lyle's Dell to reduce shading of lichens 	Any Oct-Feb
12	Satellite site	<ul style="list-style-type: none"> • Removal of encroaching pine trees and broom shrubs • Liaison with MOD re. future of the Moray coastal path and coastal erosion, including possible signage 	Oct-Feb Any
13	Heathneuk Clearing	<ul style="list-style-type: none"> • Habitat maintenance as in 3-11 • Research project: using multispectral imaging to identify lichens from aerial photography 	Any
13	Lichen garden	<ul style="list-style-type: none"> • Annual work party to remove weeds, tree seedlings, and gorse 	Any
14	Firepit	<ul style="list-style-type: none"> • Annual work party to remove tree seedlings and encroaching gorse bushes • Gorse regrowth maintenance by brush cutter, as required • Consider trialling small-scale disturbance/scraping to 	Any Oct-Feb Any

Findhorn Hinterland Trust Biodiversity Action Plan 2026-2031

		rejuvenate lichen habitat <ul style="list-style-type: none"> • Research project to determine how long does <i>Peltigera malacea</i> live • Maintain ecovillage resident awareness of sea buckthorn and Japanese Rose as invasive species 	Any Any Ongoing
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Two dune heath areas remain where loss to gorse and trees can be prevented – the North West Heath and the Paddock Heath. Restoration of such areas involves the cutting and removal of gorse bushes, including old gorse with thick stems. As elsewhere, this can be done by work parties, chainsaw and brush cutter, or a combination of both. Removal of gorse bushes must be done outside of the bird breeding season (October-February inclusive).

Good practice guidance on gorse removal by hand, including the Sand Dune Managers Handbook, usually recommends use of glyphosate. This can be applied safely to the surface of thick cut stems with a sponge applicator bottle, with no need for mixing, no wastage or impact on other vegetation, and very low risk of spillage, or skin contact when using gloves. Glyphosate kills the gorse plant, meaning that labour-intensive repeat cutting over many years is avoided. The FHT has never used glyphosate and has a ‘no glyphosate’ policy, however, and so control of gorse regrowth from cut stems will be mostly by brush cutter.

Elsewhere, most dune heath restoration has now been completed and so the emphasis is now on control of gorse regrowth and small tree seedlings. Rabbits and deer help to control the regrowth and spread of gorse, but to varying degrees, and in general not enough to prevent regrowth and encroachment of gorse and trees onto open dune habitats. Grazing with livestock/ponies is not an option on the open dunes, mainly due to the high levels of public access. Heavy machinery to control vegetation growth is also generally not an option here, due to habitat sensitivity. Consequently, the only option available to control the spread of gorse and tree seedlings in most areas is direct maintenance by hand, mostly by brush cutter. Where gorse regrowth and tree seedlings are very small (<10cm) and there is no risk to nesting birds, this work can be done at any time of year. Otherwise, this work must be carried between October and the end of February.

To be effective, dune habitat maintenance by brush cutter needs to be based on an annual walkover, cutting vegetation where required. This is currently manageable within existing FHT resources and is a sustainable approach, consistent with using the minimum level of human intervention necessary to maintain the biodiversity interest of existing high-quality dune habitats.

At North Whins, which is within a residential area, a more labour-intensive ‘dune gardening’ approach is appropriate, including hand-pulling of pine seedlings. Here, habitat maintenance by the local community is a means of sensitively maintaining the habitat by hand, and fostering an understanding of the importance of sand dune biodiversity.

While good footpath and fire break maintenance has avoided a damaging impact of foot traffic, motorbike use remains an occasional issue. Providing interpretative panels - which include emphasising the fragility of sand dune habitats - at North Whins and at Heathneuk has been identified as a high priority for 2026.

Heathneuk and the Firepit are ideal locations for lichen research and trailing management techniques. Three projects stand out for further exploration:

- Using multispectral imaging to identify lichens from aerial UAV surveys
- Determining how long *Peltigera malacea* lives
- Trialling very small scrapes to monitor lichen recolonisation.

Objective 2. Create approximately 1ha of bare sand, to provide a range of early successional sand and shingle habitats

Loss of early successional stage habitats, upon which the rarest and most threatened dune species depend, is the greatest threat to biodiversity on the Findhorn dunes. Rapid encroachment of pine trees to the north of the FHT area is now the main threat, but there is an opportunity to create new sand and shingle habitats within the Hinterland area, where early-stage habitats have been lost to gorse encroachment.

Creating areas of new bare sand is a means of restarting natural dune processes and rejuvenating sand dune habitats, allowing populations of threatened species to recover, and contributing to the resilience of the wider dune ecosystem.

An excellent start was made with dune restoration on the Findhorn Hinterland in 2024, based on the 2020 LBAP and the Sand Dune Managers Handbook (Dynamic Dunescapes, 2021). This work was recognised in the 2025 certification of the FHT area as a Nature30 site, a major milestone in the development of the FHT. This LBAP recommends continuing this work, with a programme of dune restoration (Fig 23), informed by the methods used and lessons learnt so far. The recommended approach is summarised in Table 8 and explored in more detail, below.

Table 8. Policy and method overview for bare sand creation

Policy/method	Effect
Gradual approach. A 5-year programme of small-scale bare sand creation (Fig.24)	<ul style="list-style-type: none"> • Continuous supply of new bare sand for specialist dune species • Small and gradual approach, likely to be more acceptable to the public • Give FHT time to develop and adapt techniques, based on experience, and to address public concerns
Focused away from existing areas of high-quality sand/shingle/heath habitat	<ul style="list-style-type: none"> • Protect existing high-quality habitat

Findhorn Hinterland Trust Biodiversity Action Plan 2026-2031

Include ridge tops and south-facing slopes	<ul style="list-style-type: none"> • Ensure sand mobility
Target mulching only, without scraping, around bare sand	<ul style="list-style-type: none"> • Mulching upwind to maximise wind speed in the first few years and minimise gorse seeding • Mulch down-wind to create sand deposition areas where scraped mulch/litter/humus can be buried
Ensure badger survey in advance	<ul style="list-style-type: none"> • Avoid impacts on badgers
Mark and protect rabbit burrows wherever possible	<ul style="list-style-type: none"> • Maintain rabbit population as habitat maintenance agents

An additional 1ha of new sand - added to the 0.8ha created in 2024 - will bring the total area of new bare sand to around 1.8ha. Along with the existing sand/shingle/heath habitat, the area of open sandy habitat will comprise around 4.4ha, or around 18% of the main FHT sand dune area of around 25ha.

The aim of sand dune restoration is to create habitat which is largely self-sustaining through natural processes, requiring relatively little intervention.

While the dominant gorse is a valuable habitat in itself, the aim is to achieve a healthier balance of bare sand and early successional habitats. This involves ‘resetting’ the habitat succession and re-activating sand movement through the creation of new bare sand.

Scraping and burying the surface layer exposes mobile sand with a higher pH (alkaline) and lower soil nutrients. Specialist dune species, including pioneer species such as marram grass, require these conditions. Removing the humus layer also reduces the ability of sand to hold moisture, so that it dries out and becomes more mobile, creating a more natural dune dynamic (UKCEH 2021). As newly-exposed sand gradually leaches and becomes more acidic (over decades) species diversity gradually decreases, but conditions improve for the rarest species, associated with vegetated sand and shingle and dune heath.

Location of bare sand creation and the scale and speed of action are important considerations in dune restoration on the Findhorn Hinterland (Fig. 23).

Natural processes, including wind action, work best at a large scale. If bare sand areas are too small, they can rapidly be colonised by plants from the edges – especially by gorse, and especially in less windy years. In this respect, the large (0.83ha) 2024 Dune Restoration Project (DRP) was very apposite.

The larger the area of new sand, the greater the potential of unintended consequences, however, such as sand blowing onto priority lichen/heath habitat (Dutch Forest and Nature Reserve Owners Association, Dynamic Dunescape 2024), and sudden and unexpected opposition from the public. Unintended ecological consequences and visual landscape impact can be mitigated by gradually joining small areas of new bare sand to create a larger

area, which is more likely to be self-sustaining, through wind action, than small scattered and sheltered patches.

It is essential that the scale of bare sand project area is balanced against potential negative impacts on people, and public reaction. The 2024 project included development of a detailed public relations strategy and over a year of regular public engagement and promotion. As a result, it was enthusiastically supported by the local community – to the extent that the project was fully-funded by a local appeal. Continuing public support cannot be taken for granted, however, and landscape impact and potential for blown sand to affect residential areas must always be considered as a top priority. Timing is also important in this respect, and in addition to avoiding the bird breeding season, all works should be completed each year by the end of January, to ensure that gorse is not cut down in full flower.

Fig.24. Proposed location of bare sand creation 2026-2031 (indicative only)

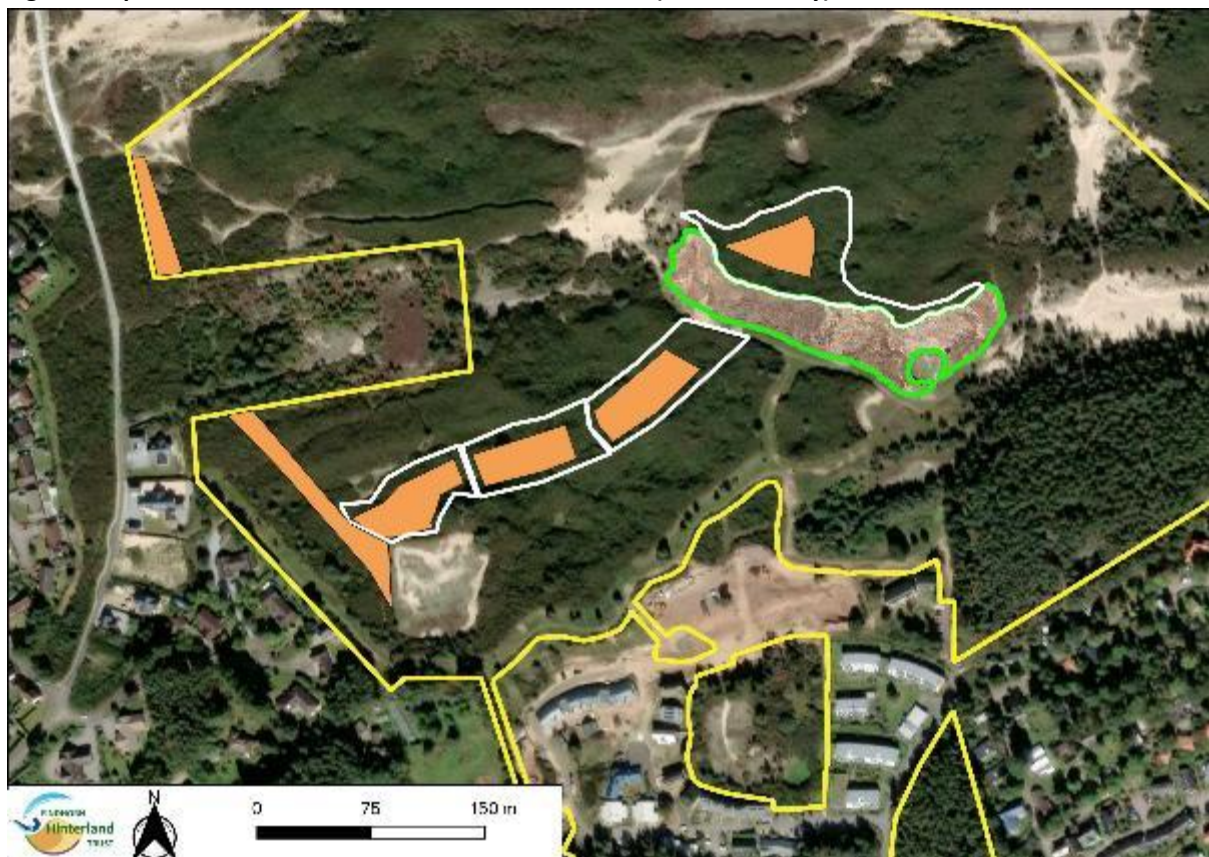


Fig.24, above, is an illustration of proposed bare sand areas, informed by a Light Detecting and Ranging (LiDAR) 3D model. This is an indicative map only, which will require further discussion and micro siting. In general terms, the aim is to create a (c.30m wide) corridor of sand through the gorse, aligned with the dominant south-westerly wind. Thick barriers of gorse ensure that visual impact is minimised from footpaths, and that residential areas are protected from blown sand in the very rare occasion that a summer storm is associated with a northerly or easterly wind. It is proposed that bare sand creation progresses gradually into

the prevailing south-west wind, so that newly mobile sand is blown out onto the dunes before stabilising. Bare sand areas have also been included that will serve as firebreaks to residential areas.

To ensure maximum sand mobility, it is recommended that new bare sand includes the tops of dune ridges. These areas are the most likely to catch the wind and become mobile, especially on the south sides of ridges where sand is dried more by the sun (Dutch Forest and Nature Reserve Owners Association, Dynamic Dunescape 2024).

Mulching c.20m down-wind of newly-created bare sand on ridges is also recommended, to:

- create a gorse litter/humus burial zone which will then be...
- covered by blown bare sand, creating ...
- a new bare sand area without having to scrape and bury, and...
- connecting up with the next bare sand area to be created.

Gorse mulch, litter and surface humus should be capped with 1m of clean sand, as recommended in the Sand Dune Managers Handbooks, with any subsequent blown sand on top of that being additional. It is recommended that badger survey is carried-out eight weeks before commencement of ground works, to give sufficient time for camera surveillance of potential badger setts, and that groundworks are completed before the start of the badger breeding season, on 1st of December. As key agents in habitat maintenance, wherever possible rabbit burrows should be marked and protected.

The relatively gradual approach proposed will ensure that new bare sand is available each year over the five-year period, achieving a continuous beneficial impact for specialist sand dune species. Fortunately, the area down-wind of the FHT area has no human habitation and so sand movement presents no threat to residential areas, as long as a shelter strip of gorse is maintained upwind as a safety measure.

Objective 3. Adaptive management: allow newly-created bare sand areas to develop naturally, with minimal intervention

The aim with newly-created bare sand is not to maintain these areas as pristine bare sand, but to allow them to slowly succeed to lichen heath and dune heath. It is during the early stages of succession, perhaps the first 20-30 years, that newly-created sand habitats will be of most value to rare and threatened specialist dune species.

Without any habitat maintenance, historic aerial photography indicates that a succession from sand to gorse or pine trees is likely to take around 40-80 years, with work in the Netherlands suggesting at least several decades for grassland to develop (Dutch Forest and Nature Reserve Owners Association). Removal of the leached acidic humus layer following

mulching raises the pH of the sand surface, which counteracts the inevitable process of leaching, acidification, revegetation, and nutrient enrichment (2.4, above), making the sand less suitable for gorse seedling establishment, especially in the first few years of sand exposure, when it is likely to be most mobile.

Experience from dune heath maintenance work parties in 2013, and dune restoration work in 2020 at Heathneuk, indicates that gorse encroachment is likely to be very slow (especially where rabbits are present), and that gorse and tree seedlings are not difficult to remove by hand from bare sand, using work parties.

The recommended approach to DRP bare sand maintenance, therefore, is one of adaptive management. If gorse spreads faster than anticipated, mechanical intervention remains an option, e.g. by a mechanical cultivator on a 10-20 year rotation to remobilise sand, or by repeat excavator scraping to remove young scrub. The main corridor of new bare sand is also likely to attract walkers, helping to maintain sand mobility (Sand dune Managers Handbook 2024).

Objective 4. The wider Findhorn Dunes

Biodiversity knows no borders. The two main land holdings on the dunes, of the Findhorn Dunes Trust (FDT) and FHT, are particularly closely connected. Land custodianship is more likely to achieve an optimum outcome if a shared vision can be developed, a collaborative approach adopted, and action on the ground coordinated.

Encroaching pine trees on the wider dunes are the most significant strategic threat to the integrity of the whole dune ecosystem (4.1, above). Wilkie's Wood, in the FHT area, has historically been the source of encroaching tree seeds, but now seeding is occurring from trees which have grown up on the dunes.

The priority on the wider dunes, outside of FHT ownership, is suggested as being tree seedling and sapling removal on the western edge of the advancing trees. Trees are likely to be advancing only slowly here, against the prevailing wind, and so volunteer work parties are likely have more chance of success. With contractor support, it would be possible to push back the advancing woodland edge and to save surviving areas of sand/shingle/dune heath within the developing closed woodland area (c.9ha). This work could be done gradually, alongside community engagement work.

5. Grassland Action Plan

5.1 Threats

Natural grassland habitats have declined by more than 97% in the UK over the last century and are very rare habitats in lowland Moray. The main causes of decline are the decline in hay making (including for horse feed), a switch from hay to silage making, and general intensification of farming practices since the 1950's, especially the use of artificial fertilisers. The main threat to natural grassland on the Findhorn Hinterland is gorse encroachment.

5.2 Opportunities

In addition to converting dense gorse, of relatively low conservation value, to bare sand through the proposed dune restoration programme outlined in Section 4, there is significant potential for increasing the amount of dune grassland on the Findhorn Hinterland through gorse mulching, mowing, and grazing.

5.3 Action to date

Firebreaks are maintained through annual winter mowing, using the FHT's vintage 'grey Fergie' tractor and a topper mower. Mowing has to be carried out annually because the FHT's topper is not powerful enough to cut gorse more than one year old.

Apart from firebreaks, the main areas of dune grassland are in the wind turbines area, in the east of the FHT's land holding. Here, footpaths and wind turbine vehicle access areas are mowed in the winter. Mowing is the only way to prevent these areas from being lost to gorse, but unfortunately it appears that flower diversity is declining in all mown areas, with a likely impact on specialist invertebrates and other biodiversity. This is due to a build-up of a dense vegetation mat, created by the cuttings from topping, and preventing flower seeds from reaching the soil surface, so that over time grasses have out-competed flowers.

Two butterfly glades were created in the gorse along footpaths in the wind turbines area in 2019, as recommended in the draft 2013 LBAP, and have been maintained by annual mowing. Small areas of surviving grassland have also been opened up, using a chainsaw, creating sheltered glades, which are ideal for flying insects.

The turbines area includes small areas of occasionally grazed and unmown tussocky grassland. These areas were recognised in the 2020 LBAP as being valuable for invertebrates and reptiles and have been maintained by removal of encroaching gorse with brush cutter and chainsaw, and by work parties with hand tools. Some of this work has unfortunately been carried out in the bird breeding season, however, which in addition to

risking damage or destruction to nesting birds, could potentially break the law, and may give a negative impression to the public.

The turbines area also contains 1.5ha of pony paddocks, currently grazed by three ponies. The ponies are kept by community members for personal interest, but are also a valuable conservation tool, also recognised in the 2020 LBAP.

While pony grazing has been beneficial, the amount of forage available is limited, which has in dry summers led to overgrazing of species-rich grassland. Due to the Covid pandemic and the priority given to dune restoration subsequently, there was no discussion with the pony grazers on how ponies could be used more effectively to improve flowering conditions in the turbines area (as recommended in the 2020 LBAP), until autumn 2025.

Research as part of a 2025 grant application revealed that the turbines area was part of a burial area for WW2 aircraft components, coming from perhaps as many as 1,000 aircraft (BBC 2015). A SEPA report concludes that radiation risk to the public is likely to be low, as long as the ground remains undisturbed (SEPA 2016). The report also raised the question of contamination by other substances, and a neighbouring landowner has mentioned the potential for asbestos contamination from aircraft brake pads. Radiological survey of accessible areas in October of 2025 revealed only four 'hotspots', all four showing low levels of radioactivity, with the highest count rate corresponding to a maximum dose rate of just over 2 microsieverts per hour in contact with the ground. This is not considered to present a significant threat to human health, if left undisturbed. Further research is underway to better determine the feasibility of habitat management in this area, and to clarify the FHT's liability.

Tree planting, for landscaping reasons, at the firebreak along the dune ridge to the north of North Whins has impacted on rare grassland habitat. Some trees have been planted recently and when these grow up there will be a significant loss of dune grassland here.

5.4 Proposed Action 2026-2031

Limited progress has been made on grassland enhancement since the 2020 LBAP, due mainly to the Covid pandemic, and other priorities then taking precedence, notably the 2024 dune restoration project.

The following six objectives are proposed, and explored in more detail, below:

1. Continue to maintain existing grassland areas in firebreaks and at the turbines area through mowing of firebreaks and gorse control with power and hand tools
2. Cessation of tree planting in firebreaks
3. Explore the feasibility of c.1.5ha grassland creation in the turbines area
4. Explore the feasibility of c.0.5ha grassland creation through an extension of the Green Burial area

Objective 1: Continue to maintain existing grassland areas in firebreaks and at the turbines area through annual mowing of firebreaks, winter pony grazing, and gorse control with power and hand tools

A healthy rabbit and roe deer population helps to maintain grassy areas, but this is not enough to stop gorse from regenerating quickly. Conservation grazing is not an option outside of the wind turbines pony grazing area, due to the high levels of public access along footpaths/firebreaks which would put ponies at an unacceptable risk of harassment and injury. Ensuring pony welfare outside of the current grazing area would be impractical, involving walking ponies to and from grazing areas, moving temporary fencing, checking on them daily, and providing water. Outside of the turbines area then, mowing is the only option available for maintenance of grassland.

Fig.25. Spring tine harrow



To break up the mat of decaying plant cuttings which results from annual mowing of firebreaks, it is recommended that the FHT acquires a spring tine harrow (Fig. 25) and that harrowing is carried-out immediately after mowing, to increase seed and soil contact and boost flower diversity and density. A harrow would also be useful in any new grassland areas which may be created (Actions 3 and 4).

There would be advantages of mowing areas which cannot be grazed on a two- or three-year rotation, to provide greater structural sward diversity for invertebrates. To do this a more powerful rotational flail mower would be needed (Fig. 26). Rotational flails are also better suited to uneven ground. Mowing less often would also have time/cost saving benefits. It is recommended that the Trust explores the acquisition of a rotational flail, ideally with a collector box to remove cuttings. It may be that areas of overgrown dune heath, which have lost their lichen interest and would benefit from soil surface disturbance, could also be very effectively managed with a flail and collector (much faster than a hand-held brush cutter, or work parties with hand tools).

Fig.26. Rotational flail



As on sand dune habitats, it is important that gorse control is firmly established as an annual task for the winter only, to avoid impacts on nesting birds, provide a good example to volunteers and the public, and ensure that no wildlife laws are broken.

Increasing the size of surviving glades within the gorse using a chainsaw, and removal of gorse bushes from tussocky grassland using work parties, has proved to be very effective and continuation is recommended, subject to availability of human resources. To be safe, it is recommended that this activity takes place at least 20m away from known radioactivity 'hotspots' (9.6, Fig.29, below) and that risk assessments highlight the importance of not disturbing the ground and not picking up any old objects from the ground.

Objective 2: Cessation of tree planting on grassland firebreaks

Birch trees have been planted along the main firebreak on the high dune ridge on the boundary of the North Whins development. As they grow up they will result in direct loss of priority grassland habitat. Birch is also a flammable tree and planting this species on a firebreak will significantly reduce its effectiveness. It is recommended that no more tree planting takes place on firebreaks.

Objective 3. Explore the feasibility of c.1.5ha grassland creation in the wind turbines area

Conversion of dense gorse to dune grassland in the turbines area would provide habitat for dune grassland species, especially for invertebrates, especially flying insects, and create year-round foraging habitat for red-listed yellowhammer and linnnet; increasing the gorse edge effect would also increase nesting opportunities for these birds.

The great benefit of creating new grassland in this area is that it could be maintained by conservation grazing, which is much better than mowing because it produces a more diverse sward structure and removes vegetation and soil nutrients. New grassland areas

would also take the grazing pressure off existing areas of flower-rich dune grassland. Creation of new grassland here would involve mulching the gorse to ground level and installing fencing to allow grazing. Depending on land contamination concerns, water could be piped in from the existing watering point, or rainwater harvesting could be used.

The risks posed by WW2 land contamination are significant constraints to any action which may disturb the ground surface here, however, and investigation is ongoing into the feasibility of grassland creation. The priority is to identify aircraft burial areas, which may have radiation and other land contamination health risks, and ensure that these areas are scoped-out of any habitat management work which may disturb the ground surface (Including a safety buffer). SEPA and the MoD have been approached for information and a preliminary radiological survey has been undertaken. This work must be guided by specialists. Further survey work may be required, which could be prohibitively expensive for the FHT.

Objective 4. Explore the feasibility of c.0.5ha grassland creation through an extension of the Green Burial area

A potential new green burial area was identified by the FHT in September 2024 and public consultation is in the earliest stages. Green burial would fall under the Town and Country Planning regulations (1997) and full public consultation is likely to be critical to any successful planning application.

As identified in Action 3 above, there would be significant benefits to specialist dune species, even if the burial area had to be maintained by mowing.

6. Woodland Action Plan

6.1 Threats

Unlike native pine woodland, a mostly upland SBL habitat, which is rare and threatened by deer and sheep browsing/grazing, plantation woodland is not threatened. Indeed, Scotland's forest plantation cover has increased by 13.5% over the last century, largely in response to government policies. Forest cover was around 18.5% in 2019 and has increased since, with a national target of 21% cover by 2032 – this is mostly commercial conifer forestry but includes native woodland creation.

The western end of Wilkie's Wood, dominated by Corsican pine (compartments 1 and 2, Fig.27), is underlain by very poor soils. In the main block here, Corsican pine is felt unlikely to regenerate after felling and it is not clear which species could be planted in such poor soils.

There is a sparse scattering of non-native Sitka spruce and Douglas Fir in the eastern woodland compartments part of the woodland, which are considered undesirable, with both self-seeding in places. Cotoneaster, an invasive non-native species, spreading from adjacent gardens, is found scattered throughout the woodland areas and is a particular concern in Diamond Wood.

6.2 Action to date

Woodland was the main habitat focus of the Findhorn Hinterland Trust (formerly the Findhorn Hinterland Group), until production of the 2013 Draft LBAP, when sand dune habitats became recognised as a new important priority for action, a priority which was re-emphasised in the 2020 LBAP.

In the early days of the former Hinterland Group, woodland expansion was seen as a priority, continuing the tree planting ethos developed in the Park Ecovillage in the 1980's and running through the 1990's (Reed & Shaw 2025). Tree planting was generally seen as inherently good, including for biodiversity, and there was an ambition to convert areas of gorse on the dunes into woodland on the Hinterland.

The importance of planting trees, particularly in response to concerns around global deforestation and climate change, remains a widely held ethos in society. More recently, however, the importance of careful planning of woodland creation, to avoid damage to existing habitats has been recognised - the principle of 'the right tree in the right place'.

A gorse fire in 2003, and wind blow from a storm in 2005, presented an opportunity to realise a woodland expansion ambition at Lyle's Wood, with the aim of extending Wilkie's

Wood, creating shelter for the Wood, and to create new opportunities for general biodiversity.

Lyle's Wood was the only place that new tree planting could take place, because the then land owner, Duneland Ltd, was agreeable to the proposal here. Prior to the fire, the area was dense gorse with a developed soil humus layer and so the trees have grown up very well, resulting in a diverse habitat and valued social space on the edge of the Ecovillage. Trees were planted close together to shade-out regenerating gorse, and are to be thinned at closed canopy stage. Despite this, regular and time-consuming maintenance by brush cutter has been required to prevent gorse from swamping the young trees.

Before the 2020 LBAP, the full significance of dune heath had not been grasped by the FHT and some trees were planted on dune heath at the edge of Wilkie's Wood. These trees were removed, or died, and concerns around tree planting on priority habitats became a catalyst for the production of the 2020 LBAP.

Woodland management is a long-term practice, with a vision that spans decades. At the Findhorn Hinterland work has been guided by two management plans, the first covering the period 2009-13, and the second 2019-2023.

The aim of woodland work is to enhance biodiversity, and provide a woodland experience to people, on a peninsula largely devoid of trees. Commercial products, such as firewood and timber, are a by-product of this aim. Action has focused mainly on:

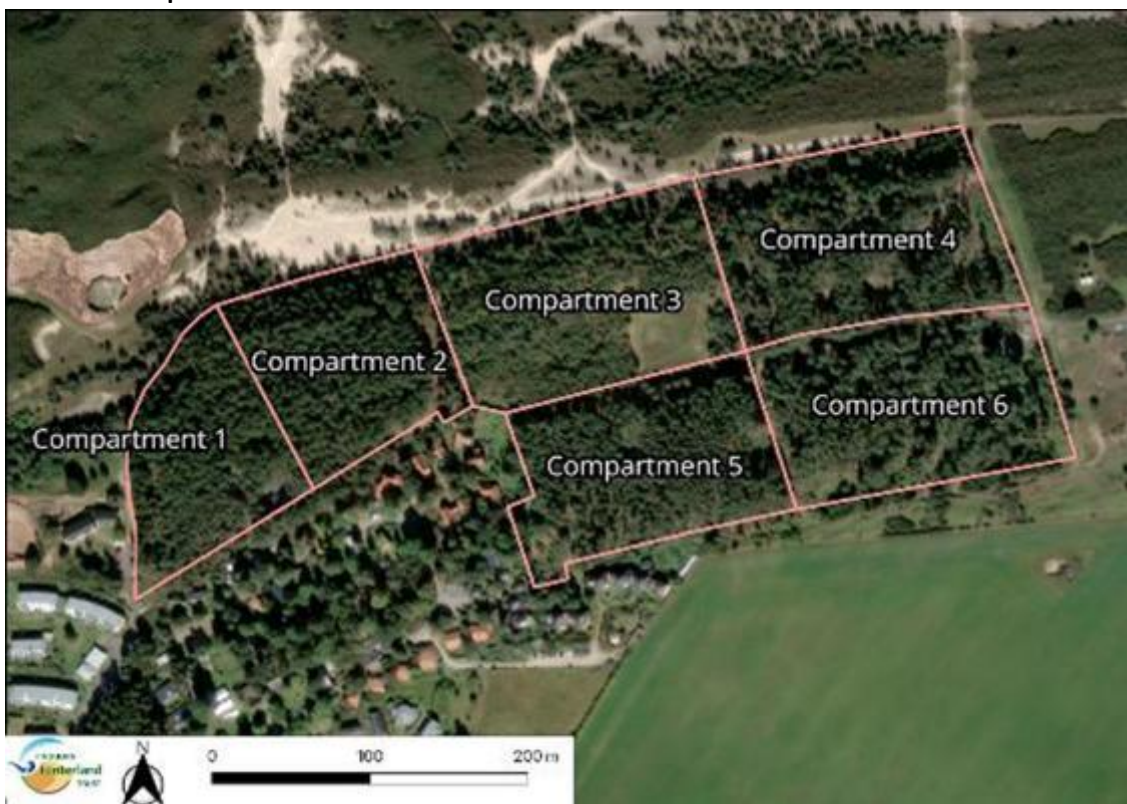
- Restructuring the age class, tree density/spacing, to avoid the need for large scale clear felling and/or wind blow. This work has been based on Low Impact Silvicultural Systems (LISS), which aims to maintain forest cover with a mixture of tree ages and sizes, promoting structural and species diversity while causing less rapid change to the environment than clear-felling systems. The focus has been on creating glades (small open areas) in the eastern half of the woodland (Compartments 4-6) and has been very successful, with good natural regeneration taking place. There is an abundance of standing and fallen deadwood and brash habitat piles, and the woodland appears very natural
- Diversifying the species composition of the woodland for biodiversity generally
- Reprofiling of woodland edges to improve habitat quality and long-term protection for taller trees in the main part of the woodland
- The construction of the Woodland Shelter on the edge of the green burial area, which serves as a vital social space
- The construction of the Conservation Hub building, as a work base, storage facility, and information and gathering point.

Woodland restructuring work has mostly focused in the eastern and central part of the woodland (compartments 3-6, Fig.27) . The western part of the wood (compartments 1 and

2) is on very poor soil and dominated by Corsican pine, which was typically chosen at the time of planting to stabilise mobile sand (Section 3). Here, there is some uncertainty of the best management strategy because natural regeneration is unlikely to occur and planted trees are unlikely to grow well in the poor soil.

The 2013 (draft) and 2020 LBAPs complimented the two management plans, resulting in the creation of two small ponds, establishment of a squirrel-friendly tree felling policy, and the significant increase in standing and fallen dead wood. The 2020 LBAP recommended identifying a scattering of trees for protection as 'veterans', which would be allowed to grow old and die naturally, and that monitoring of squirrel dreys be undertaken. While there is an awareness of these actions, they have not so far been undertaken.

Fig.27. Forest compartments



Diamond Wood (Fig.8) is a new addition to the FHT's ownership, being previously owned by the Findhorn Foundation. The FHT has carried-out some work here, but to date this woodland has not been a focus. Invasive cotoneaster has been identified as a particular concern here.

6.3 Proposed action 2026-2031

Excellent progress for biodiversity has been achieved at Wilkie’s Wood over the last twenty years. The woodland has been transformed from a stunted commercial plantation to a diverse nature-rich habitat.

Table 9 summarises the objectives and methods for woodland over the next five years.

Table 9. Woodland proposals 2026-2036

Woodland area	Objective	Action
Wilkie’s Wood C1, C2. Western and northern edge	Create healthy woodland edge	Significant wind blow. Gradually replace stunted trees with lower growing species. Allow some stunted trees to become battered by the wind and create standing and fallen deadwood
Wilkie’s Wood C1, C2 Corsican Pine. Main block	Clarify objectives, including diversification of species	Options include LISS felling for natural birch regeneration, clear fell and restocking, and non-intervention
Wilkie’s Wood C3 Birch thicket	Non-intervention area Selective thinning area	Maintain dense shrub layer Favour planted trees
Wilkie’s Wood C4-6 Scots pine	Minimum intervention Removal non-native conifers	Allow biodiversity to respond to management already completed. Consider reducing Scots pine component, in favour of deciduous species in the long term Removal of Sitka spruce and Douglas fir seedlings and parent trees
Lyle’s Wood	Species-rich mature mixed woodland	Continued maintenance of young trees
Diamond Wood	Clarify objectives	Develop woodland park plan Removal of Contoneaster
General	Maintain canopy connectivity for squirrels	General awareness
General	Cotoneaster control	Removal wherever found
General	Monitoring effectiveness of management	Surveys and monitoring of: Invertebrates, squirrels, birds
General	Veteran trees	Identify future veteran trees, as recommended in 2020 LBAP
General	Bat protection	Bat roost identification training

Overall, a period of reduced management activity has been proposed by the FHT's Land Steward for the next five years. The work carried out over the last two decades is bearing fruit, in terms of biodiversity, and the woodland will continue to improve with age.

Allowing some of the stunted trees on the north-west fringe of the western Corsican pine area (compartments 1 and 2) to grow old and die naturally will create valuable dead wood habitat, with eventual natural regeneration of birch and Scots pine likely (with gorse control). As the trees here are relatively stunted, standing deadwood is not considered to present a significant risk to the public, though this must be checked regularly. This area could potentially be replanted when Lyle's Wood becomes mature, to create a new shelter belt for the main woodland. In the meantime, enrichment planting of resilient shrub species is proposed.

The main part of the Corsican pine compartments are composed of mature trees. The soil is poor here and, apart from Corsican pine, planted trees are likely to grow poorly. This area is the most used by red-squirrels and has also held nesting sparrowhawks for the last two years in 2024 and 2025 (which though not a top priority species, is an interesting species, and is amber-listed due to historical declines). As the trees here are large and of a uniform age, however, wind blow damage is likely to occur, resulting in a lot of dead wood and potentially a safety risk. Potential approaches include:

- Gradual thinning and restocking, with a focus on birch, which is natural pioneer species here
- Glade creation with natural regeneration, most likely by birch, with some planting of squirrel-friendly species
- Non-intervention, with continuous safety assessment and clearing a proportion of fallen wood to encourage natural regeneration/create space for planting
- Clear felling to allow more planting/natural regeneration to maintain a varied age structure throughout the woodland.

The birch thicket adjoining the green burial area (compartment 3) provides a valuable woodland function, in that it includes a shrub layer, which is largely absent from Wilkie's Wood. This is a very valuable habitat in a natural woodland, which is damaged by thinning. A part of this area has been left to rewild naturally and this policy will remain.

Management of the Scots pine-dominated area to the east (compartments 4-6) is largely complete, though removal of non-native Lodgepole pine, Sitka spruce and Douglas fir is proposed. It should be noted that these mature Scots pine compartments are the main source of pine seeds which are being blown onto the dunes. The five-year period covered by this LBAP is an opportunity to begin to consider how to continue develop the FHT's woodland towards an increasingly natural, lowland mixed deciduous woodland (a UK BAP habitat).

At Lyle's Wood, continued maintenance will be by brush cutting of gorse until it is shaded out by a closed canopy, with tree thinning to take place at an appropriate stage.

At the newly-acquired Diamond Wood, a woodland park proposal – with an education and recreation focus - is at an early stage and further discussion is needed.

Identifying and marking of future veteran trees is an important action to undertake as soon as possible, to ensure that some trees will be allowed to grow on into veterans.

7. Gorse Action Plan

7.1 Threats

There are no significant threats to gorse, which is a common plant in good conservation status, nationally and locally (2.6).

7.2 Proposed Action 2026-2031

The extent of gorse coverage on the Findhorn Hinterland is the result of human activity, over the last one hundred years. Under more natural conditions, the Hinterland would have a greater proportion of sand and shingle habitats, which gorse now threatens (Section 4). Gorse seeds prolifically, and the plant can regenerate quickly from roots after being cut or burned, making it very persistent.

Non-intervention will be the general approach on the Hinterland, mainly because it would be too impractical and controversial to remove most of the gorse. Over the very long term, gorse is likely to succeed to woodland in some areas. This will require careful monitoring and management, to ensure that any spread of trees does not significantly impact threatened dune habitats.

The aim is also to establish a healthier proportion of gorse land cover, restoring high priority sand, heathland, and grassland habitats, while improving conditions for gorse specialist birds, as described in Section 5. This will involve clearance of small areas of gorse with heavy machinery to create new bare sand. Existing sand/shingle habitats will be restored by hand-cutting, and maintained by brush cutter, mowing - and where possible, grazing. In the case of hand-cutting of mature gorse, spot-treatment of stumps with glyphosate to prevent regrowth is often recommended. The FHT has a 'no glyphosate' policy, however, placing the emphasis on regular cutting.

All areas of gorse to be cleared must be carefully checked for badger setts and gorse clearance must take place outside of the bird breeding season (between October and the end of February).

8. Survey, monitoring, data management

Biological survey and monitoring is a vital aspect of nature restoration action. There are two main kinds of survey, covered below.

8.1 Presence-absence surveys

Survey work carried out so far is outlined in Section 2. This body of data, showing which species are known to be present, has been instrumental in establishing that Findhorn dunes are of national significance for lichens, and probably also for invertebrates and fungi.

The most important groups have now been covered, but some notable exceptions remain: birds, wasps (especially parasitic wasps), and flowering plants. Casual records have been collected for both over the years, however, and in the case of birds, records are likely to accurately represent the species present. Both these groups are also important in terms of ecological monitoring, covered in 8.2, below.

Casual records, including from visiting specialists, are suggested as the best way of adding new species to the FHT database (8.3).

8.2 Monitoring surveys

Another important role of surveys is to be able to monitor the effects of conservation action and adjust this if necessary. Monitoring involves carrying out surveys at regular intervals to show changes to habitats and populations of. To ensure that survey results are reliable and directly comparable, the same methodology must be used at each survey interval.

A summary of proposed monitoring surveys is presented in Tables 10 and 11 below.

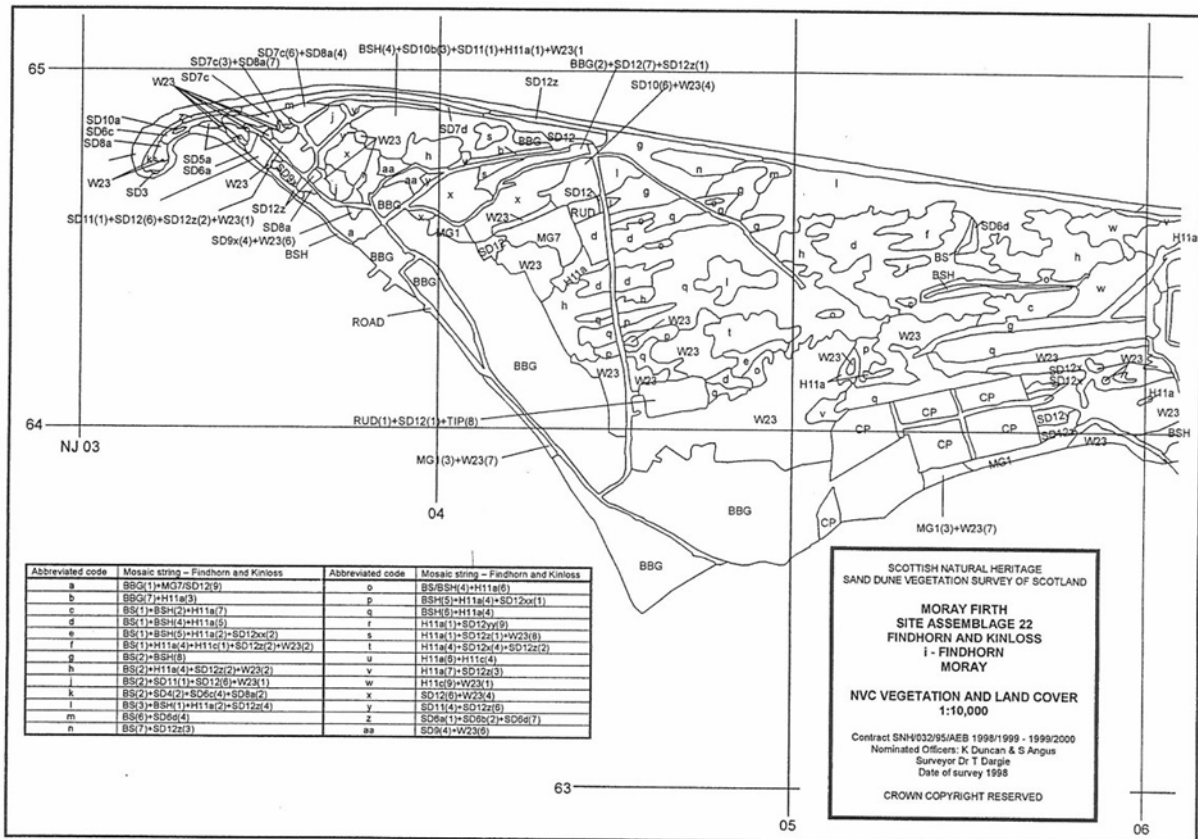
Table 10. Proposed species annual monitoring surveys

Survey group/species	Notes
UAV aerial photography	For dune restoration and grassland creation projects. Before and after annual projects and at 5-year intervals thereafter
Fixed point photography	Ground-level photos of dune habitats
Red squirrels	Drey counts
Butterfly transects	Grassland areas

Table 11. Proposed species monitoring surveys 2026-2036

Survey group/type	Year	Notes
Vegetation - NVC	2026	Whole FHT area
Birds	2026	Whole FHT area
Sandy earthtongue	2026	Dunes
<i>Peltigera malacea</i>	2026	Whole FHT area
UAV/aerial photography	2026	Whole FHT area
Historic aerial photography	2026	Whole FHT area
Herptiles	2027	Targeted at tussocky grassland, turbines area
Flowering plants	2027	Whole FHT area
Red squirrels	2027	Woodland
<i>P.malacea</i> survey	2027	Dunes
Bat survey	2028	Whole FHT area
Ling owlet moth	2029	Location and abundance, sand/shingle/heath
Moth trapping	2034	Surveyed in 2024
Beetles	2035	Whole FHT area. First survey in 2025
Vegetation - NVC	2036	Whole FHT area
Birds	2036	Whole FHT area

Fig 28. 1998 NVC Map



Photography is a time and cost-effective method of monitoring habitats. Aerial photography, using a drone (UAV), and fixed-point photography from the ground, was chosen as the main

means of monitoring newly-created bare sand in 2024. The FHT is also investigating the potential of multispectral imaging for lichen survey/monitoring.

Habitats are typically monitored by vegetation cover, using the National Vegetation Classification (NVC) methodology. Findhorn Dunes were surveyed using this methodology in 1998, as part of the Scottish Natural Heritage's Sand Dune Vegetation Survey of Scotland (Dargie, 2001) providing a valuable historic baseline (Fig 28).

A repeat NVC survey, including a list of notable species, is recommended as a top priority for action for the FHT, especially as dune restoration work has begun and will be continuing over the next ten years. In addition, a site visit by the county plant recorder is recommended, focusing on finding any particularly rare species.

Identifying species population changes can be done by full population surveys, for relatively easily detectable species (such as birds or squirrels), or by sampling small areas, in the case of more abundant/widespread and/or more difficult to detect species, (such as invertebrates, plants and lichens).

In considering species surveys, it is important to consider what is practically achievable. Surveys are often a specialist task, which must be done by trained professionals to obtain reliable results, meaning that there are potentially significant cost implications. It is recommended, therefore, that species survey and monitoring takes a strategic approach, whereby survey is focused on species which are:

- Relatively straightforward to survey and for which surveyors are likely to be reasonably available
- Found in substantial numbers and so likely to give reliable trend results
- Representative of the health of the habitat which they are found in.

Birds are often chosen as indicator species for monitoring the general health of ecosystems. A full bird survey, based on the Common Bird Census method, is recommended as a top priority for the FHT, in order to form a reliable baseline as soon as possible (particularly in relation to dune restoration and grassland creation proposals).

Red squirrel, a high-profile SBL species, is also a relatively detectable species, which is good indicator of woodland health. Regular monitoring of squirrel dreys was recommended in the 2020 LBAP, but this has not been undertaken in a systematic way, such as using 25m transects and recording locations with GPS. It would still be useful to do this as a relatively easy, straightforward, method of monitoring. Drey counts are not the most reliable method of squirrel monitoring, however, and so a specialist squirrel survey is recommended, to form a reliable baseline for future monitoring.

Moth trapping by Butterfly Conservation volunteers in 2024 provides a good basis for future monitoring, as numbers of each species trapped were recorded, and the same moth trap locations could be used. It is also recommended that some butterfly survey transects are established in grassland areas (Sevilleja, et al 2019).

Findhorn dunes are likely to be the most important site for the Ling Owlett Moth in Scotland (Hammond, 2023). With training, this is a relatively detectable species which flies during the day and leaves a distinctive larval case. Exploring methods for monitoring of this species is recommended.

As noted in Section 2.3, beetles are good indicators of sand/shingle/heath habitat quality, including newly-created bare sand. A beetle survey is underway in 2025 and will form a good baseline for monitoring these habitats in future.

The sandy earthtongue fungus and the lichen *Peltigera malacea* are both very rare but detectable species, indicative of stabilised sand, and for which Findhorn Dunes are particularly significant nationally. NVC survey will allow monitoring of the extent of the dune habitats in which these species are found, but it may be useful to explore survey methods for these species, as a reflection of habitat quality. In addition, exploring the potential for a research project on the ecology of sandy earthtongue is recommended.

Sandy earthtongue is found in areas with sparse vegetation, and it may be possible to identify all areas where it occurs, and to count all fruiting bodies. If this proves to be impractical, a good start would be to identify all areas where it occurs and then sample survey within some of those areas. *Peltigera malacea* is likely to be more widespread, in dune heath areas, and so a sampling method may be more practical.

8.3 Casual records, citizen science

The FHT's Land Management Team (LMT) includes members who are skilled in biological recording and who spend a lot of time on the land. Much of the information in the Trust's invaluable species lists has been collected by LMT members, as 'casual records' - records which are not part of a specific survey.

Casual records, including those collected by volunteers and visitors, have an important role to play in survey and monitoring, especially for the rarer, more localised - or more widely dispersed - and more difficult to detect species, including: lichens, rarer flowering plants, invertebrates, slow worm and common lizard, hedgehog, pine marten, butterflies; and also

for invasive species including sea buckthorn, Japanese Rose, cotoneaster, and potentially grey squirrel.

There are many ways to record and submit data and this can be confusing and potentially overwhelming for volunteers and members of the public. There is also significant potential for records to be duplicated through submission of the same data to different record-holding organisations.

Recorders with an interest in a particular wildlife group may be already sending their records to a national specialist organisation, such as the BTO's BirdTrack, for example <https://www.bto.org/get-involved/volunteer/projects/birdtrack>. That organisation may, or may not, be sending records to the regional biological records centre, the North East Biological Records Centre (NESBReC) covering the Hinterland area.

Other recorders may send their data directly to NESBReC, via their Online Form <https://nesbrec.org.uk/recording-services/online-form/>, or may be recording via a phone app.

The phone app iRecord <https://irecord.org.uk/> is linked to biological data centres such as NESBReC, but there are data quality issues, as the competence of recorders is unknown and much of this data is unverified (A. Salway, pers.comm.). The phone app iNaturalist <https://www.inaturalist.org/> is less useful to biological records centres because the data is migrated through iRecord and the ability to verify records is generally lost.

NESBReC is a very valuable resource for the FHT, as being a registered charity the FHT is able to obtain records from NESBReC free of charge. Making sure that NESBReC has FHT data is also very important, so that the FHT can contribute to the national body of biological knowledge.

As a small charity, with limited resources, the FHT has limited ability to deal with large quantities of data, especially data which needs verification to be reliable.

To keep recording as simple as possible, ensure reliable data quality, and avoid duplication, it is recommended that the FHT:

1. Focuses its database activity on quality data from reliable recorders. This is likely to continue being mostly members of the LMT and known volunteers
2. Standardises data collection as much as possible through use of a simple Excel form, with data submitted annually (4.4). For land management purposes in particular, 10-figure grid references are extremely useful, giving a resolution of 1m, allowing accurate location of rare species on the ground – which may ensure that they are not damaged during habitat management operations

3. Creates an email address for submission of records from members of the public and publicises this through the website and members newsletter, with some simple guidelines for submitting data, including highlighting those species which are of particular interest. The aim here is not to generate a large amount of records, which may be of dubious quality, but to collect valuable sightings of rarely recorded species (hedgehog, for example)
4. Verifies All citizen science records via FHT 'species leads' – i.e. a lead person for lichen records, birds records etc.
5. Recommends that species recorders continue submitting records via their established practice, and only submit records to the FHT which will not be submitted to another organisation or via a phone app, to avoid duplication
6. Organises a training day for LMT and volunteers as a priority. This could be repeated occasionally, or incorporated into other biodiversity-related events
7. Submits all existing data to NESBreC as a priority
8. Submits its data to NESBreC annually.

8.4 Database and geographic information system (GIS)

The Trust has a volunteer database and GIS manager, with additional volunteer support. An Excel database has been developed for casual records collected by LMT members and for records passed on from members of the public. This is a new development, however, and is not yet fully operational. A good start has been made by collating existing data and transferring this to a shared Drive.

Some records/surveys include grid references, which can be uploaded to GIS, so that records can be seen on maps. This is very valuable, particularly for the less mobile species, as it allows tracking of changes in distribution over time. Having 'dots on maps' is also a valuable tool for project planning, allowing an assessment of potential impact on vulnerable species.

Presence/absence records, found on the Hinterland during specialist surveys, do not generally have grid references. Although less valuable for GIS, they are still invaluable records of what is known to occur on site.

Wherever possible, grid references should be ten figures (collected with a hand-held GPS). These give a resolution of 1m, which can be very helpful for monitoring, and for avoiding unnecessary impacts when planning habitat management. Any location information is much better than none, however, and 10-figure grid references, giving a resolution of 100m are also very helpful – and in the absence of that even records with a verbal description only can be invaluable.

Many records are georeferenced to photos taken by the Land Trustee. Extracting grid references from these will be an onerous task and it is recommended that options are explored on how best to do this, such as through volunteer support, or grant funding.

The FHT lichenologist submits records to the British Lichen Society (BLS). BLS records are likely to be transferred to the National Biodiversity Gateway (NBN) and NESBReC and so to avoid duplication it is recommended that recording via the BLS is continued.

9. IMPLEMENTATION

9.1 Community engagement and communication

Recommendation:

- *Maintain community public relations as a top priority for dune restoration work 2026-31*
- *Open this draft LBAP for public consultation*

The FHT is a very active community-based organisation, with regular events and work parties, and an online presence via its website and Facebook page. Education is a core purpose and the FHT Green Burial area is also an integral part of the community connection which the Trust fosters and enjoys. The Trust's membership can follow closely all aspects of its work via its regular newsletter. All these aspects of the FHT's work are expected to continue and develop over the next five years.

The 2020 LBAP identified community engagement and communication as the highest priority for action in developing its sand dune restoration plans. A detailed public relations strategy was crucial to the success of the first year's dune restoration work, in 2024, resulting in the certification of the Hinterland as one of Scotland's first Nature30 sites, in 2025 (4.1, 4.3.2).

Maintaining public support remains the highest priority for dune restoration work over the next five years, and dune restoration will continue to feature highly in the FHT's public relations work, including regular messaging and events.

Findhorn Dunes are dearly loved by the local community and visitors alike. It will be vital to ensure that dune restoration work does not impact negatively on residents through sand blow, as detailed in Section 4.4, Objective 2. New bare sand must also be planned to minimise landscape impact and this is part of the reason for creating small patches of bare sand, of around 0.14ha. A 'slow and steady' approach also gives space to incorporate public feedback and to adjust plans accordingly. The advantages of reduced fire risk to residents, through the creation of wide fire breaks, will hopefully be self-evident.

Annual habitat maintenance tasks, such as brush cutting, can also be perceived by the public as destructive. It will be important to include these tasks in PR messaging. Acquisition of an electric brush cutter and chainsaw is likely to help in this regard.

9.2 Partnerships and stakeholders

Recommendations:

- *Explore the potential for collaborative working with adjoining land owners*

Partnerships and collaboration offer advantages in nature conservation through the development of shared visions, pooling diverse resources, sharing knowledge and expertise, increasing funding opportunities, and improving efficiency. Working together prevents duplicated efforts, shares innovative solutions to complex challenges, and fosters a collective voice that strengthens policy and public engagement.

Reaching out to conservation partners, including NatureScot, the RSPB, Butterfly Conservation, Species on the Edge, and the Sand Dune and Shingle Network – along with regular and ongoing community engagement - have been key to successful nature recovery action on the Findhorn Hinterland over the last few years. This momentum will need to be maintained over the next five years.

The neighbouring Findhorn Dunes Trust (FDT) is the largest landowner of high-quality open dune habitats on the Findhorn Dunes and is engaged in habitat management. The Findhorn Dunes lie within the project area of the River Findhorn Watershed Initiative, a partnership organisation aiming to restore nature-rich habitats, grow a local culture of nature connection and enable a nature-positive economy.

The following organisations will remain as key partners for sharing information and accessing community feedback:

- Findhorn Village Conservation Company (with which the FHT shares a boundary of around 100m, along the Dunes road)
- Findhorn and Kinloss Community Council
- Findhorn Bay Nature Reserve
- Ministry of Defence

9.3 Resources, fundraising

Recommendations:

- *A lead person is designated for FHT fundraising*
- *Grants for habitat maintenance, as well as for habitat restoration projects, be explored*
- *The potential of establishing a conservation apprenticeship position be explored*

- *A lead person is designated for work party planning, with work parties being planned one-year in advance and consistently advertised*
- *Leadership of work parties is shared between a small team of competent volunteers*
- *Maintain awareness that the primary function of work parties are community/nature connection, and not physical work*

9.3.1 Fundraising

The FHT has been a primarily a self-funding organisation over the last two decades, with revenue from green burials being the main source of income, the Trust not having the experience or resources to invest substantially in fundraising.

The first substantial grant which was secured by the FHT was for the construction of its Conservation Hub building, with the support of a fundraising consultant. Along with private donations, grant funding enabled the completion of a beautiful wooden workshop, storage facility and gathering place, in 2022.

Costs of hiring the heavy machinery and expert operators needed for the 2024 dune restoration project focused minds on fundraising once again, with the exploration of a large grant application in 2023, in collaboration with the neighbouring Findhorn Dunes Trust. While it was not possible to apply for the grant, valuable experience was gained, which proved to be useful in informing the eventual project.

The FHT was able to raise the necessary funds for the 2024 dune restoration work from the local community and supporters of the Park Ecovillage Findhorn, via a Big Give crowd funding campaign. While gratifying for the FHT to see the level of community support for its work, the Trust recognises that crowd funding is not a sustainable means of funding going forward.

In 2025, funding was secured from Inspiring Scotland, for the development of this LBAP and for a beetle survey of the whole of the Hinterland, representing the most significant grant secured by the Trust to date. Another, more substantial grant was explored, but the Trust could not meet its criteria.

Experience over the last two years has given the FHT the experience that it needs, along with the clear steer provided by this LBAP, to carry-out effective fundraising for the next phase of its operations. For effective fundraising to take place, however, it is recommended that responsibility leading on this vital aspect of work is delegated to a single person, with professional fundraising support if needed.

9.3.2 Human resources

The availability of human resources to carry-out the FHT's work was identified as a key issue in production of this LBAP.

The FHT's experience with fundraising for habitat work so far is that grants are generally available for new nature restoration projects, but not for ongoing habitat maintenance. Habitat maintenance is carried out by the FHT's part-time Land Steward and by monthly work parties. There are ongoing concerns about the level of human resources available to do the physical work which is needed, especially with recent (albeit small, at c.0.8ha), land acquisitions at North Whins.

Woodland management has until the last few years been the main focus of the Land Steward's work. Most of the work identified in the woodland management plans has now been completed (Section 6) and the Land Steward's work is now roughly equally divided between woodland work and dune and grassland habitat maintenance. This is considered to be sustainable at the current level of resourcing, but only just.

It is recommended that the two new areas of initial gorse clearance by hand – at the North West and Paddock Heaths (4.4) be treated as 'dune heath restoration', rather than 'maintenance', that funds are raised to specifically pay for this work, and that any shortfall in resources for dune heath maintenance is met through funded support. Exploring the potential for green apprenticeship, and possibly working holidays, could also offer a significant human resources boost.

While very successful overall, attendance at work parties can vary and the physical ability of small groups with hand tools to make a significant impact can sometimes be limited. This appears to be partly a result of a lack of advance planning, so that it is sometimes not possible to know what a work party will be doing in advance and advertise it accurately. As a result, some work parties have not been advertised and have had poor attendance.

It is recommended that a lead person is designated for work party planning, with work parties being planned one year in advance and always advertised the Park Ecovillage's newsletter (Rainbow Bridge) and on Facebook.

A shortage of experienced work party leaders is also a significant issue and an important area for development. The new FHT Education and Community Team may have an important role to play in boosting community engagement, including membership and work parties.

The FHT recognises that work parties are only partly about physical work and that providing an opportunity for community and nature connection is more important. It is recommended that this awareness be maintained, partly because the less-pressured and more enjoyable work parties are, the more likely they will be well-attended.

9.3.3 Equipment

Section 5 identifies the build-up of decaying cuttings from annual mowing as having a negative impact on flower diversity and abundance in some ungrazed areas, especially in the turbines area. It is recommended that purchase of a spring tine harrow be considered for such areas, as recommended in 5.3, above. Section 5 also recommends consideration of the purchase of a rotational flail, which would be able to mow coarser vegetation on more uneven ground, and in smaller spaces, allowing rotational mowing of grassland areas, with a time saving for the FHT. The FHT is interested in reducing its climate, and noise impact, through acquisition of electric chainsaws.

9.4 Protected species

Table 12, below, sets out the protected species known to be occurring on the Findhorn Hinterland and the control measures required to avoid negative impact on them and comply with legislation.

Table 12. Protected species

Species	Legislation	Control measures
Birds – all species	Wildlife and Countryside Act (WCA)	Scrub clearance to take place outside of nesting season, Feb-Oct. Careful inspection before felling any trees in this period
Long-eared owl	WCA, Schedule 1	No felling of potential nest trees, within Feb-Oct if a nest is possibly present, with a 250m no felling buffer around known nests
Bats – all species	Conservation of Habitats and Species Regulations	Careful inspection before felling/disturbing/destroying any tree/place. Specialist survey if bats likely to be present
Red squirrel	Wildlife and Countryside Act	Careful inspection before felling trees, with a 50m no felling buffer around known dreys
Badger	Protection of Badgers Act	Badger survey before gorse clearance. No excavations within 30m of a sett entrance
Herptiles	Wildlife and Countryside Act	Mowing and brush-cutting of grass - between Oct-Feb only

9.5 Invasive Species

The three main species of concern at the Hinterland are sea buckthorn, Japanese Rose and cotoneaster. All these species should be monitored and removed as necessary. Sea buckthorn, planted by some residents in the gardens at the Park Ecovillage, is a particular risk due to its ability to spread rapidly on sand dunes and the difficulty and expense involved in removing it. PR messaging should continue to mention occasionally the risk of invasive species to biodiversity on the Findhorn Hinterland, especially from gardens at the Whins developments.

In the woodland compartments, Sitka spruce and Douglas fir saplings are invasive, because of seeding from mature trees (6.3). Lodgepole pine is also considered as an invasive species, on the dunes as well as in the woodland.

9.6 Health and Safety

It is beyond the scope of an LBAP to cover health and safety, which is covered in detail in the FHT's working policies. Experience over the last two years has highlighted the importance of two important safety risks, which are important to mention, however – radioactivity and unexploded ordnance (UXO).

Investigation of options for grassland creation at the turbines, during the development of this report have highlighted the issue of land contamination by radioactivity, and potentially by asbestos and other chemicals, described in Section 5.3, Action 3.

Fig. 29. Known radioactivity hotspots, October 2025 (readings = micro sieverts per hour)



FHT activity in the turbines area is subject to the Ionising Radiation Regulations (2017), which are aimed at protecting workers and the public from radiation from work activities. While the known risk to human health is low (SEPA 2016, R.Kerr pers.comm.), risk assessments work in this area must recognise the risk of contaminated materials, and emphasise the importance of not disturbing the ground surface, or picking up objects from the ground. It is recommended to err on the side of caution and that no work parties take place within 50m of known hotspots for radioactivity (Fig.29), until further information is available.

Being in the vicinity of a WW2 air base, the FHT commissioned a UXO assessment in 2024, which concluded that the whole of the Findhorn Dunes is of Medium risk for UXO, due to its proximity to a WWII military base. The key control measure identified was UXO supervision of gorse mulching and sand excavation. Following the 2024 project, however, the supervising consultancy (Brimstone UXO) concluded that supervision was only required for sand excavation.

10. Work Programme

Sections 3-7 include key objectives and actions to be undertaken over the next five years. These include a programme of bare sand and grassland creation, and of survey and monitoring. Most projects are bunched into 2026/27 and no projects are identified for 2029-31. As projects are dependent of funding, however, it is unlikely that all identified projects will be undertaken in the first year and there will be some slippage into the later years.

Table 13. Annual tasks

Task	Timing	Responsibility	Funding required?
Dune heath maintenance	N/A	Land Steward	Yes
Dune restoration (bare sand) PR work	Sept-Nov	Ecologist, FHT marketing	Yes
Dune restoration (bare sand) project: <ul style="list-style-type: none"> • Two days contractor • Two days ECoW • One day UXO supervision • Badger survey before • Before & after aerial photography 	Nov-end Feb	Ecologist	Yes
Topping firebreaks	Sept-Feb	Land Steward	No
Woodland work	Sept-Feb	Land Steward	No
Conservation grazing	Sept-May	Pony Team	No
Monitoring and control of invasive species, including maintaining community awareness	Ongoing	Land Steward, LMT	No
Fundraising	N/A	Ecologist	No
Volunteer work party planning	End of the year	Single person lead (TBC)	No
Monthly work parties	Year-round	Work party team (TBC)	No
Squirrel drey counts	Winter	Volunteer/s	No
Submission of biological data to FHT	End of year	LMT, volunteers	No
Collation of biological data	N/A	Database Manager	No
Submission of FHT data to NESBReC	N/A	Database Manager	No

Table 14. Five Year Work Programme

Year	Task	Timing	Responsibility	Funding required?
2026/7	Bird survey	N/A	Ecologist	Yes
	NVC survey	N/A	Contractor	Yes
	UAV survey (whole FHT)	Apr-Sept	Contractor	Yes
	Purchase aerial photography 1950's to present	N/A	Ecologist	Yes
	Bat roost training event	N/A	Contractor	Yes
	NW and Paddock Heath restoration	Oct-end Feb	Land Steward	Yes
	Explore sandy earthtongue research project	TBC	Land Trustee	Probably
	Explore acquisition of electric chainsaw and brush cutter	N/A	Land Trustee	Yes
	Clarify objectives for woodland Compartments 1 and 2	N/A	LMT, Land Steward. + Consultant?	Possibly
	Clarify objectives for Diamond Wood	N/A	LMT, Land Trustee Education & Community Team. + Consultant?	Possibly
	Installation of interpretative panels, N.Whins, Heathneuk	N/A	LMT	Possibly
	Extraction of georeferenced photo data	N/A	Land Trustee, Database Manager	Possibly
	Resolve contaminated land safety issues at turbines. Develop grassland creation plan, if appropriate	N/A	Ecologist, possibly with contractor support	Possibly
	Firepit: monitoring lifespan of <i>P.malacea</i>	N/A	FHT Lichenologist	No
Explore multispectral imaging for lichen monitoring	N/A	FHT Lichenologist	No	

Findhorn Hinterland Trust Biodiversity Action Plan 2026-2031

	Confirm location of Green Burial extension (dune grassland creation opportunity)	N/A	LMT/green burial team	No
	Identify future veteran trees	N/A	Land Steward	No
	Explore collaborative opportunities with Findhorn Watershed Initiative	N/A	Ecologist, Land Trustee	No
	Identify overall work party lead, and team of focalisers	N/A	LMT	No
	Development of casual records protocol, including training day	N/A	Ecologist, Database Manager	No
	Explore potential for collaborative working between the Findhorn Watershed Initiative and the FHT	N/A	Ecologist, Land Manager	No
	Explore potential for conservation apprentice	N/A	LMT	No
2027/8	Early summer beetle survey	May-June	Contractor	Yes
	Flowering plant survey	May-Jul	Contractor	Yes
	Possible grassland creation: green burial/turbines	Oct-end Feb	Ecologist, Land Trustee, LMT	Possibly
	Firepit: Trial lichen scrapes	N/A	FHT Lichenologist	No
	Explore acquisition of rotational flail and spring tine harrow	N/A	Ecologist, Land Steward	No
2028/9	Wasp survey	Summer	Contractor	Yes
	Herptile survey	Apr-Sept	Ecologist	Yes
	Sandy earthtongue survey	TBC	Land Trustee	Yes
	<i>P. malacea</i> survey	TBC	Lichenologist	Yes
2029 - 31	Bat survey	May-Oct	Contractor	Yes
	Red squirrel survey	Spring/autumn	Contractor	Yes

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Appendix 1. 2024 Dune Restoration FAQs

Q: Why are you removing all the gorse? This is an important habitat too!

A: We are only removing carefully selected areas of gorse, to make maximum biodiversity benefit for extremely rare species and habitats. While gorse is a valuable habitat, in places it is replacing far more valuable habitats. These habitats support species which are threatened with extinction if action is not taken urgently.

Q: The dunes are rewilding, why do you want to interfere with this natural process?!

A: The extent of gorse and tree growth on the dunes is not natural. It is the result of previous human actions - mainly house building and tree planting – which has resulted in reduced wind speeds. This has allowed scrub to spread quickly, so that natural, rare and fragile sand dune habitats and species are now threatened. We aim to open up the scrub to truly natural, wind-driven, processes, rejuvenating the dune ecosystem. We are carefully targeting our action to benefit key habitats and species. Gorse and woodland will continue to develop elsewhere on the dunes. We are not alone in undertaking this urgent conservation work. The Royal Society for the Protection of Birds (Europe's largest nature conservation charity), Forestry and Land Scotland (the government agency responsible for the national forest estate), the charity Butterfly Conservation, and the Species on the Edge partnership, all have dune restoration projects on the Moray Firth.

Q: What's the point of doing this work if the gorse is going to take over anyway? It's a losing battle.

A: National biodiversity interest - lichens and insects - are under threat of extinction. We know what the problem is. We can do something about it. If we don't the problem will get worse. We are in a biodiversity crisis and feel that, as custodians of the land, we have a responsibility to protect high priority species and habitats. Increasing the flow of wind through the area will help to slow the spread of gorse and trees. It's an ongoing issue. We are just starting. But even if we do this project and nothing else, there will be immediate benefits for priority wildlife over the long term.

Q: Why should I care about a few moths and lichens? There are far more important things to worry about!

A: Findhorn Dunes are of national importance for rare wildlife. Some species are found at only a handful of sites in Scotland and are under threat of extinction. We are in a biodiversity crisis and feel that, as custodians of the land, we have a responsibility to protect high priority species and habitats. We believe that all species and habitats are integral to the web of life, upon which we as humans also depend.

Q: How can you justify the use of large machinery to take out gorse and trees in a climate crisis?

A: The climate crisis is of central concern to all who are involved with ecology and the health of our environment. There is also a biodiversity crisis, of equal importance, however. This project is a response to the biodiversity crisis. The latest State of Nature report <https://stateofnature.org.uk/> highlights the urgent need for restoration of rare habitats. Findhorn dunes contains species which are at risk of extinction in the UK due to habitat loss. We are already controlling scrub by hand on the dunes, but the extent of scrub cover on the dunes is such that it will not be possible to restore the sand dune ecosystem without the use of machinery. The climate impact of removing trees and fuel used by the machinery is considered to be of on-site significance only in terms of climate change, in contrast to the national biodiversity interest of the Findhorn Dunes. It should be emphasised that FHT has planted more than 5,000 trees in its woodland area.

Q: What will happen if this work isn't done.

A: Areas of priority sand dune habitats and their associated threatened species will be lost and the overall health of the wider sand dune ecosystem will continue to decline.