FINDHORN HINTERLAND TRUST
LOCAL BIODIVERSITY ACTION PLAN 2020-2025

Findhorn Hinterland Trust Commissioned Report
Sean Reed MCIEEM
May 2020



CONTENTS

SUMMARY			**3**
1	**INTRODUCTION**		3
1.1	The Site	. . . . .	3
1.2	Background and Aim	. . . . .	3
2	**BIODIVERSITY OVERVIEW AND KEY STRATEGIC ISSUES**		4
3	**HABITATS – DESCRIPTION, EVALUATION, ACTION**		6
3.1	Sand and Shingle, Dune Heath	. . . . .	7
3.2	Dune Grassland	. . . . .	10
3.3	Dune Scrub	. . . . .	11
3.4	Coniferous woodland - plantation	. . . . .	13
4	**SELECTED KEY SPECIES**		14
4.1	Matt Felt Lichen	. . . . .	14
4.2	Small Heath Butterfly	. . . . .	15
4.3	Yellowhammer	. . . . .	16
4.4	Red squirrel	. . . . .	17
5	**VISION AND PRIORITY ACTION**		19
5.1	Five-year Vision Statement	. . . . .	19
5.2	Priority Action	. . . . .	19
6	**ACKNOWLEDGEMENTS**		20
7	**REFERENCES**		20

APPENDICES (Separate)

1 Priority Habitats and Species

2 Key Species Management Actions

3 Work Programme

4 Outline PR Strategy

SUMMARY

This Local Biodiversity Action Plan describes habitat and species priorities of land managed by the Findhorn Hinterland Trust and outlines key management actions for biodiversity for the next five years.

The national importance of lichens, associated with sand and shingle and dune heath habitats, is identified as being of the highest priority.

The overall aim for the Trust is recommended as maintaining the full range of habitats present, while increasing the area of sand/shingle and dune heath, which is being lost to scrub and tree encroachment. Gaining understanding and support from the local community is recognised to be of central importance to achieving this aim.

1. INTRODUCTION

1.1 THE SITE

The Site comprises around 35ha of sand dune habitats and woodland managed by the charity the Findhorn Hinterland Trust.

FHT managed land forms the southern part of the Findhorn Hinterland, an area of around 130ha of 'wild' land located about 6km north of Forres in Morayshire, to the east of the Village of Findhorn and to the north of the Findhorn Eco-Village at the Park.

The Findhorn Hinterland is a rare and sensitive sand dune ecosystem; it is recognised to be nationally important for lichens, and forms part of a coastline which is of international importance for wildlife[1]. The area is highly-valued by the local community - to whom it is also known as 'the dunes' or 'the whins' – and it is heavily-used for informal recreation, mostly walking [2].

1.2 BACKGROUND AND AIM

An advisory draft Local Biodiversity Action Plan (LBAP), prepared in 2013, has helped guide the conservation work of Findhorn Hinterland Trust over the last seven years. While the 2013 draft LBAP covered all of the Findhorn Hinterland, this plan covers only FHT managed land – though the Plan is also relevant to the area as a whole.

This LBAP, also advisory, has been commissioned by the FHT to guide more detailed action planning - it does not necessarily represent the views of the FHT, which are developing. The Plan complements the FHT 2019-2023 Management Plan [1], by providing more detail on priorities, habitats and species. As an advisory document, the plan is aspirational - implementation will need to be balanced with other of the charity's priorities, and will depend on the resources available. The Plan also aims to provide information to volunteers, the local community, visitors, and potential funders.

Local Biodiversity Action Plan

While all wildlife is important, some habitats and species are rarer, or under greater threat than others, meaning that they have a higher priority for action. A Biodiversity Action Plan, or BAP, is a way of setting-out these priorities, so that scarce resources are used to best effect. Local Biodiversity Action Plans, or LBAPS, use lists set-out in the Scottish Biodiversity List (SBL), UK BAP - and other nationally recognised lists of priorities, such as species in the Red Data lists - to help decide priorities for local action.

There is a hierarchy of importance of wildlife habitats and species within the FHT managed area. 'Importance' has been assessed by the UK and Scottish governments, according to recognised standards, based mostly on rarity and population/habitat loss trends. Rarer species and habitats, species which are suffering serious declines, and habitats which have suffered large historic losses - or are being rapidly lost now - are seen as more important than those which are not threatened and which are considered to be in 'good conservation status'.

Caring for habitats and species within such a hierarchy is challenging, as it involves balancing competing objectives. Great work has been achieved since the Trust took management control of the area in 2006 - much of it by dedicated volunteers, led by a part-time paid Land Manager. Important challenges lie ahead, however, not least in addressing the strategic threat which encroaching gorse and pine trees present to rare and vulnerable sand and shingle and dune heath habitats. Helping the local community to understand this sensitive issue, and to support action to restore rare habitats, will be of vital importance.

2. BIODIVERSITY OVERVIEW AND KEY STRATEGIC ISSUES

To maintain and restore the rare and fragile habitats which the Findhorn Hinterland Trust is responsible for, the process of ecological succession needs to be interrupted in some cases. Balancing the protection of rare and fragile habitats, whilst ensuring that the process of ecological succession can still occur, is one of the main strategic challenges for the Trust.

Ecological Succession

Sand dune habitats are constantly changing, slowly evolving from bare sand, nearest the sea shore, to woodland furthest away from the shore. This process is known as 'ecological succession'. At each stage of the succession the plant community alters the soil and microclimate, allowing the establishment of another group of species. One community of plants is replaced by another as the succession develops.

The first plants to colonise the sand are known as 'pioneer species', most significantly marram grass – typically closer to the sea on mobile dunes. These plants trap sand blown in by the wind or washed in by the sea, binding it together with their roots. As they decay, they also add humus, allowing less hardy plants to grow and shade-out the pioneer plants. Eventually taller plants like heather, gorse, and trees are able to become established - on fixed dunes - where the vegetation is in a state of equilibrium with the local environmental conditions there is no further influx of new species - known as the 'climax stage'.

The Moray Coast is recognised to hold some of the best examples of sand dune habitats in Britain. The wider Findhorn dunes are recognised to be of national importance for lichens, with some species being found in only a few other places in the UK [3,4]. The dunes support seven nationally rare lichens and twenty-three nationally scarce lichens, one species listed as vulnerable and one species listed as near-threatened.

Naturally occurring coastal sand dune and vegetated shingle habitats are the highest conservation priorities within the FHT managed area. These habitats are included in the UK BAP and are also recognised as priority habitats in the EU Habitats Directive [5,6,7].

Sand dunes under threat

Sand dune systems throughout Scotland, the UK, and Europe, have been reduced in size and quality by a combination of threats, including the establishment of forestry plantations, housing, industrial, caravan park and golf course developments. Sand dune habitats are of high nature conservation priority and are listed in the UK BAP [5,6].

There are around 50,000 hectares of sand dune habitats remaining in Scotland – 71% of the UK's resource. Some 6,000ha have been converted to conifer plantation. The best example of this in Moray is at Culbin, where a huge area was afforested to stabilise drifting sand [7].

The Moray Firth contains over 8,000ha of sand dune habitats – a significant proportion of the total Scottish resource. East Nairn and Culbin form the second largest area in the Moray Firth, at 2,526ha. Only three sand dune systems, including Findhorn/Kinloss have more than 2.5% bare sand, highlighting the rarity of the dune system on the Findhorn peninsula [4].

Sand dunes are a component of dynamic coastal processes, including the movement and deposition of sand along the coast by the process of longshore drift, which then gets blown inland to form dunes. Human activity in the past means that natural sand dune landscapes, dependent on a plentiful supply of mobile sand, are now rarely seen in the UK. The Findhorn dunes are no exception, where the historic construction of houses, and planting of woodland has altered natural dune processes - principally by reducing wind-speed across the landscape - leading-to an unnatural acceleration of ecological succession and loss of rare habitats [8,9].

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. As a result, the management approach has more recently shifted to one of restoring the operation of natural dune processes, illustrated by recent EU-funded sand dune restoration schemes [8,10,11,12]. This departure from traditional techniques can unfortunately be perceived by the public as damaging nature. Overcoming this misconception is recognised as key to successful habitat restoration [13,14,15].

Trees, a threat to dune habitats

The establishment of plantation woodlands across Europe has been a principle factor in the loss of sand dune habitat. As well as direct loss of sand dune habitat, plantations interfere with the natural dynamics of adjacent sand dune ecosystems by reducing wind speed and increasing sand stability (the reason many plantations were planted) [8].

Plantations can also have a major detrimental effect through spreading tree seeds onto surrounding sand dune habitat. Pine needles dropped from newly established trees growing from these seeds enrich the nutrient-poor soil on the dunes, enabling the development of more woodland. This new woodland shades-out the rare dune heath and associated lichens. New young trees further reduce wind speed in the surrounding area, creating more sand stabilisation and better conditions for more tree establishment.

More tree seeds are then spread from the newly established trees, and without intervention to remove the new trees a negative feedback loop is quickly established, with consequent loss of rare dune heath habitat.

Related to the misconception around mobile sand is frequent public opposition to removing encroaching trees and scrub from sand dunes [9,13,15]. On Findhorn dunes, potential tension between the need to prevent trees and gorse *Ulex europaeus* from destroying national biodiversity interest and potential opposition to this is identified in a public consultation study commissioned by FHT, with support from the National Lottery [2].

The Study found high levels of support for restoration of rare habitats, management to increase biodiversity, and removal of invasive species, (76%, 67% and 65% agreement respectively). It also indicated, however, that the 'wild' appearance of self-sown trees on the dunes – which are damaging biodiversity interest – is also valued by the public. The Report suggests striking a balance between ecological requirements and public perception, through 'light touch' management.

While it is important to consider carefully balancing biodiversity priorities and public perception, it must also be recognised that the perception of 'balance' is subjective and the 'light touch' recommendation does not take fully into account the high level of threat which encroaching gorse and trees present to the nationally important ecological interest of the area. From a conservation perspective much of the Hinterland area is currently significantly out of balance, its naturally wild state having been altered by historic human intervention, such that without new intervention features of national importance will be lost.

The public consultation study also identified strong local support for educational activity, which can be seen as an opportunity to develop understanding of the threat which encroaching trees and gorse present to the national ecological interest of the dunes.

3. HABITATS – DESCRIPTION, EVALUATION, ACTION

Sand dune and vegetated shingle habitats include three more detailed habitat categories. In order of conservation importance these are:

1. Sand/shingle and dune heath
2. Dune grassland
3. Dune scrub

These habitats are considered in detail in 3.1-3.4, below - along with plantation woodland, which forms a significant part of the Hinterland area. Appendix 1, Table 1, lists key species associated with each habitat and gives brief information on management requirements.

3.1 SAND AND SHINGLE, DUNE HEATH

Most of the highest quality sand/shingle habitats on the Findhorn peninsula, including mobile sand dunes nearer to the sea shore, lie to the north of the FHT managed area. Within the FHT managed area much of the non-woodland area comprises fixed dunes covered by gorse, but within this are some excellent examples of lichen-rich sand/shingle and dune heath habitats, covering around 4ha in total. Sand and shingle habitats here are either unvegetated, or with a crust of lichens; dune heath is characterised by a cover of heather. Sand, shingle and heath grade-into each other, forming an intimate habitat mosaic in the more open areas between gorse stands.

Wilkies Wood was planted on a sand dune ridge some 65 years ago to stabilise sand. As a result, wind speed on adjoining land has been reduced, probably to a distance of around 300-400m from the edge of the Wood [8]. This has enabled the establishment of dense gorse, and the loss of rare sand/shingle habitats.

It is estimated that 40-60% of open sand is needed to maintain a sand dune system as fully functional [8]. The wider Findhorn Dunes, with around 50% open sand appears currently to be in good status - though encroaching Scots pine *Pinus sylvestris*, Lodgepole pine *Pinus contorta,* and gorse, pose a significant threat [3]. Within the FHT managed area only around 10% of the area remains as open sandy habitat, and without intervention much of this area will soon be lost.

The wind-sheltering effect of Wilkie's Wood means that restoration of natural sand movement, through large-scale removal of gorse and trees, is unlikely to be achievable in this area [8]. Large-scale scrub removal would also be likely to meet with considerable public opposition. The recommended management approach, therefore, is to:

1. Conserve and enhance the remaining open sandy areas through targeted gorse and tree removal.
2. Gradually create around 1ha of new sand and shingle habitat, focused around the edges of existing priority lichen areas.
3. Gradually create around 2ha of new dune heath/acid grassland mosaic, through cutting and mowing gorse.

The best lichen areas within the FHT managed area were mapped by the Trust's local lichen expert in 2018. These areas are the first priority for restoration, by removing encroaching gorse and trees. Removal of gorse and trees from within lichen beds is best done using hand and power tools, either by volunteer work parties, or local contractors.



Dune heath, with encroaching pine trees S.Reed

The Draft Management Plan proposes clearing gorse, and trees less than 5m tall, from within 5m of the edges of priority lichen areas – which are mostly on the edges of the large gorse stands. It is recommended that this work be part of a programme to create around 1 ha of new bare sand/shingle over the next five years, for future lichen colonisation. It is recommended that a low ground-pressure hi-mac digger is hired to mulch the gorse and then strip the brash and humus – a method successfully used as part of habitat enhancement measures included in the nearby North Whins housing development.



Stripping brash and humus S.Reed

It must be emphasised that lichens make no distinction between pine species. While alien Lodgepole pine spreads more aggressively on sand dune habitats, Scots pine – which spreads more slowly - also drops needles, casts shade, and slows wind speed, and so should generally be removed from priority lichen areas.

Early intervention is essential in dealing with tree removal. 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. It is far more onerous, and expensive, to remove larger trees – potentially requiring specialist equipment and contractors. Volunteer work parties, led by FHT, to clear one of the best lichen beds of trees on neighbouring land between 2013 and 2015, are a good example of what can be achieved through early intervention**.** Continuing to explore collaborative initiatives with the Findhorn Dunes Trust on adjoining land to the north is recommended.

To further enhance the biodiversity value of the FHT managed area, it is recommended that around 2ha of new dune heath/acid grassland mosaic is created, by mulching gorse between the Central and Eastern Dune Heaths, and opening-up the Central Dune heath to the open dunes to the north. Appendix 3, Fig. 1 shows a 10ha area where this work could be targeted. Choice of the exact areas to be mulched will be determined by topography which allows operation of the FHT's tractor and topper (mower). This new high priority habitat will also encourage the distribution of rabbits *Oryctolagus cuniculus* and movement of roe deer *Capreolus capreolus* through the area, helping to maintain sand/shingle and dune heath habitats through their browsing, grazing and ground disturbance [3,5].



Mulching gorse S.Reed

Wind speed is likely to be reduced to a distance of approximately 50m from the edge of large gorse stands [8]. Clearing gorse to create new acid grassland/dune heath will also increase wind flow through the area, helping to maintain priority lichen areas, and will also provide more effective firebreaks.

Tree and gorse removal is potentially a contentious issue for the local community, as mentioned in 2, above. It is recommended, as highest priority, that FHT develops and promotes a public relations strategy well before work commences (Appendix 1 Table 1, Appendix 4). The Strategy should include core messages, promoted regularly over an extended period through a variety of media - and a means to receive, and respond to, feedback. Carrying this work out gradually over the next five years should help people to understand and accept the need for this work**.**

Other threats to sand/shingle and dune heath at Findhorn include trampling by humans and non-native invasive plant species.

Regular trampling destroys lichens. This is a complex issue, however, as occasional disturbance of the fragile soil crust also creates areas of mobile sand – a natural part of the sand dune dynamic which has been lost to a significant extent due to reduced wind speed, as described in sections 3 and 4, below. Occasional disturbance also creates patches of bare sand for future lichen colonisation [3]. In general terms, the recommended aim within the FHT managed area is to avoid regular trampling of the best lichen areas through careful planning of access routes and providing public information.

Non-native invasive plant species are potential threats to these fragile habitats. Of particular concern are sea buckthorn *Hippophae rhamnoides*, an introduced species in northern Scotland, and Japanese Rose *Rosa rugosa* [5,7,15,16]. Escaping from gardens these plants can spread quickly and be very invasive, causing a reduction in ecological interest and diversity. Residents are advised against growing these plants in gardens on the edges of the dunes.

Many of the measures set-out in the draft 2019-2023 Management Plan, and outlined in this LBAP, derive from the 2008 Findhorn Dunes Lichen Survey and from EU LIFE-funded projects [3, 13]. It is recommended that links are continued to be fostered with lichen experts, to help monitor and guide FHT's developing policies, and that FHT seeks to make similar links and with sand dune experts and sand dune restoration schemes in the UK and beyond.

3.2 DUNE GRASSLAND

Next in the hierarchy of biodiversity priority are areas of 'unimproved' (natural) acid grassland, covering around 4ha in total, found around the wind turbines, in firebreaks through the gorse and on the green burial field in Wilkies Wood. 'Acid' refers to the low pH of the sandy soil.
Natural grassland habitats have declined by more than 97% in the UK over the last seventy years and are very rare habitats in lowland Moray [18]. Natural lowland dry acid grassland, and natural grassland on sand dunes, are listed as/included in UK BAP habitats [5,19].

The grassland on FHT managed land contains a variety of wildflowers, which in turn provide food for Scottish Biodiversity List (SBL) and UK BAP birds, such as the yellowhammer *Emberiza citronella* and linnet *Linaria cannabina*, and insects such as the small heath butterfly *Coenonympha pamphilus*, and an impressive fifteen SBL moth species (Appendix 1).



Species-rich grassland at the wind turbines S.Reed

Less disturbed grassland areas, such as around the wind turbines, are likely to be the best for common lizards *Zootoca vivipara* and slow worms *Anguis fragilis* within the FHT managed area. It is known that roe deer have had their young in this area, and it is also the most likely place to come across a brown hare *Lepus europaeus*. It is recommended that this area becomes a quiet 'Wildlife Sanctuary' with a 'Dogs on Leads' policy and appropriate signage.

In addition to creating 2ha of dune heath/acid grassland through gorse clearance (3.1) habitat

management on grassland around the wind turbines should continue to focus on careful planning of pony grazing to maximise the availability of flowers through the summer – maintaining a mosaic of open grasslands and gorse thickets with sheltered glades. It is also important to maintain areas of un-grazed, or infrequently grazed, tussocky grassland, for common lizards and slow worms, and as overwintering areas for insects.

Butterfly glades have recently been opened-up in the gorse of this area (winter 2019), using a tractor-mounted flail, as recommended in the previous draft LBAP. These areas will be maintained through annual/biennial mowing in September – once seeds have set - using the Trust's tractor and topper, during routine firebreak maintenance. It is also recommended that gorse is cleared, by tractor-mounted flail, around areas of ungrazed, or infrequently grazed grassland in the turbines area – to prevent these valuable areas being lost to scrub.

3.3 DUNE SCRUB

Next in the hierarchy of biodiversity priority is gorse, the habitat covering the largest area of ground, at around 15ha. Although sometimes viewed as 'just scrub' or even 'wasteland', gorse is actually an integral part of the sand dune habitat mosaic. Gorse provides nesting habitat for yellowhammers and linnets. It also provides shelter and refuge for deer and rabbits - which in-turn provide a helpful service in maintaining the rarer lichen and dune heath habitats. Gorse also creates valuable micro-habitats for butterflies and reptiles, provides a good nectar source for insects in spring, and feeding and overwintering places for common toads *Bufo bufo* (Appendix, Table 1).



Gorse S. Reed

Dune scrub is the next stage of ecological succession following dune heath. Without intervention the scrub would eventually develop into woodland. Aerial photography shows that gorse has been spreading across the rarer dune heath and shingle habitats on the Findhorn peninsula. While this is a natural ecological process, it is likely that it has been accelerated at Findhorn, as in many other places, through reduced wind speed and stabilisation of sand caused by the establishment of pine

plantations and historic building development nearby, as described in 2 above. As gorse spreads under these calmer conditions it also further reduces wind speeds across the dunes, contributing to a negative feedback loop of vegetation encroachment on rare sand and shingle habitats.

Gorse is a highly flammable shrub. While fire is a natural part of scrub (and woodland) ecology, the potential for large, uncontrollable fires - which could potentially spread into adjoining woodland and threaten houses - is significant at the Hinterland, due to the large numbers of people visiting the area. Maintenance of mown firebreaks through the gorse provides valuable corridors of acid grassland and dune heath through large stands of gorse.

This Plan recommends clearance of around 3ha of gorse over a five-year period – 1ha to bare sand and shingle, around priority lichen areas, and 2ha being converted to dune heath/acid grassland (3.1). As with tree removal, support of the local community will be essential in achieving this habitat enhancement. People are used to seeing, and understand the need for, gorse cutting and subsequent maintenance mowing in firebreaks. They may not understand the need for more extensive gorse clearance, or for digging-up gorse to protect and increase priority lichen areas. Development and deployment of a public relations strategy will be key to success (Appendix 1, Table 1).

It is recommended that the initial gorse control work is built-upon over the five-year period following this plan, by continuing to increase the area of bare sand and shingle, including within dune heath areas, and increasing the area of mowed dune heath, including by widening fire breaks.

3.4 CONIFEROUS PLANTATION WOODLAND

Wilkies Wood (c.10ha) is a highly-valued community resource and provides a sustainable supply of firewood to the local community. Woodland is rich in biodiversity generally, and has important wider environmental benefits, not least in ameliorating climate change. The woodland supports a small population of red squirrels *Sciurus vulgaris*, a SBL and UK BAP species. A notable plant is the nationally scarce creeping lady's tresses *Goodyera repens*, a type of orchid, and the associated fungus *Pucciniastrum goodyerae,* a SBL species, which grows on its leaves.

While plantation forestry supports species of high conservation concern, it is widespread in Scotland and is not considered to be a high-priority habitat for conservation in its own right - unlike naturally occurring native pinewood.

Woodland has formed the main focus of the Trust's activity to date and significant improvements have been made to the structure and composition of the woodland, including the planting of around 5,000 trees. The creation of two woodland ponds has also boosted the biodiversity potential of the woodland and standing and fallen deadwood, and brash habitat piles, have increased over the last five years. Deadwood is vitally important to woodland biodiversity and it is recommended that the recent increase in large fallen deadwood (logs and large branches) being left to decay naturally on the ground is continued over the next five years, and that some trees are identified that will be allowed to grow old, die and decay naturally.



Main path through Wilkies Wood S.Reed

In order to reintroduce natural dune processes, some large sand dune restoration projects in Europe have completely removed large areas of woodland [9, 14,15,16]. This is not considered to be appropriate on the land managed by the FHT, where the Trust's aim is to conserve the full range of habitats within its area, including continuing to improve the Woodland's ecological and community value [1].

4. SELECTED KEY SPECIES

This section gives more detail on the ecology and recommended management actions for four key species - one for each priority habitat – indicating the connection between habitat and species action planning.

A full list of priority wildlife species known to occur on the FHT managed area is set-out in Appendix 1 (Tables 2-11). The lists also include those species of particular local interest, which do not appear in the national priority lists, and species which are specially protected by law.

The lists here are intended to highlight priority species only. More detailed lists, of all species known to be occurring on FHT managed land, will be developed through an on-going programme of biodiversity surveys and the establishment of a new biodiversity database. Appendix 2, Tables 1-6, set-out key management actions for priority species.

4.1 MATT FELT LICHEN *Peltigera malacea* – Found on dune heath

Characterised by its dark green lobes, this lichen is listed as endangered, meaning it faces a high risk of extinction within the UK in the near future. It is found in very few locations on coastal sand dunes in East and north East Scotland and is declining.

Matt felt lichen prefers an open sandy habitat and often grows with moss and under stunted heather on dune heath - it does not grow under dense gorse or woodland.

Recommended action 2020-2025

- Create 1ha of new bare sand and shingle by mulching gorse and stripping the resulting brash and humus. This to include a minimum of 5m from the edge of all priority lichen areas identified in the FHT Management Plan 2019-2023.
- Cut around 2ha of gorse, to connect the Central and Eastern Dune Heaths with the open dunes. Maintain this area as mown dune heath - which will also increase wind speeds, helping to maintain lichen habitat (Appendix 3, Map 1).
- Ensure management activities, such as movement of scrub control equipment, avoid matt felt lichen areas.
- Establish a monitoring programme for matt felt lichen and other UK BAP lichens.
- Assess the risk of human trampling to key areas and take appropriate action, such as re-routing footpaths.



Matt felt lichen H.Paul

4.2 SMALL HEATH BUTTERFLY *Coenonympha pamphilus* – Found on species-rich grassland

The small heath is an inconspicuous but beautiful butterfly that flies only in sunshine and rarely settles more than a metre above the ground. Its wings are always kept closed when at rest. The underside of forewing has eyespot at tip. The hindwing is banded with brown, grey and cream. Its

larval foodplants are fine grasses. Adults will take nectar from plants such as bramble, yarrow and ragwort. Adults are active for a long period, from late April to late August. Many colonies have disappeared in recent years, making it of high conservation concern and a UKBAP listed species.

Recommended actions 2020-2025

- Increase the availability of foodplants for small heath butterflies by extending the area of dune heath/acid grassland, by around 2ha, focusing-on the area around the Central and Eastern Dune heaths (Appendix 3, Map 1).
- Ensure no mowing of firebreaks or butterfly glades between mid-April and the end of September.
- Continue to manage pony grazing around the turbines to produce flower-rich areas through the summer.
- Allow ragwort to flower if more than 40m from pony grazed areas
- Establish a simple monitoring programme for butterflies.



Small heath butterfly S.Reed

4.3 YELLOWHAMMER *Emberiza citronella* – Found in dune scrub

Male yellowhammers are unmistakeable with a bright yellow head and underparts, brown back streaked with black, and chestnut rump. They are often seen perched on top of a hedge or bush, singing. Recent population declines make yellowhammer a UK BAP species and Birds of Conservation Concern (BoCC) Red List species.

Yellowhammers nest on or close to the ground in thick hedgerows and scrub, and are often associated with gorse, their deep yellow colouring giving them good camouflage amongst gorse flowers. Adults feed mainly on seeds, while chicks depend largely on insects for food - the weedy species-rich grassland and dune heath fringing gorse scrub on the FHT managed area providing an abundance of both.

Key actions 2019-2025

- Ensure all scrub removal activity is carried-out after September, as yellowhammers often have chicks in the nest in August.
- Increase the availability of food for yellowhammers by extending the area of dune heath, by around 2ha, focusing-on the area around the Central and Eastern Duneheaths (Appendix 3, Map 1).
- Establish a monitoring programme for yellowhammer and other UKBAP birds.



Yellowhammer S.Reed

4.4 RED SQUIRREL *Sciurus vulgaris* – Found in woodland

Once widespread, red squirrels have declined in number and range across the UK, with Scotland a key stronghold for the species, supporting approximately 75% of the UK population [19]. Red squirrel is a UKBAP and European Protected species. Squirrels and their dreys are specially protected by law. It is an offence to intentionally kill or injure a red squirrel or intentionally or recklessly damage or destroy any structure or place a red squirrel uses for shelter or protection, or disturb a red squirrel while it occupies such a place. This protection does not apply to areas where red squirrels only feed. Red squirrels must also be taken into account in any planning of activity which might affect them.



Red squirrel D. Devonport

Red squirrels live in a range of woodland habitats; in Scotland they are mainly associated with coniferous woodland. The kind of trees and how well connected they are is very important, as squirrels rely on their immediate surroundings for both food and shelter. In general, red squirrels fare better in areas with a variety of tree species. This is due to the seeding patterns of trees. Most tree species have years when an abundance of seeds are produced (mast crops) followed by years with average or poor seeding. Different tree species do not mast in the same years and a good year for one species of tree can be a poor year for another, so that woodland composed of a mixture of species provides a more dependable supply of seed food. While tree seeds are the staple foods, red squirrels also eat fruits, tree shoots, buds, bark, fungi, lichens, song bird eggs and chicks and insects.

Changes in either the type of tree or the design of the woodland can significantly affect populations. Where suitable habitat is patchy, populations can become isolated from each other and/or their food sources and are at increased risk of predation where animals are forced to cross open ground.

The squirrels at Wilkies Wood are quite isolated and vulnerable because of the small area of woodland on the Findhorn peninsula. Squirrels have died-out in the past here, but new recruits are likely to come from Roseisle Forest, 2km to the east, during good breeding years. Woodland management over the last five years at Wilkies Wood, has improved conditions for squirrels and so hopefully a sustainable population can be maintained.

It is known that several squirrels have been killed by domestic cats in Wilkies Wood, and this is likely to have contributed to their disappearance in the past. New building development is likely to result in more cats, increasing the threat of predation. Raising awareness of this issue within the local community is a priority action for the next five years.

Key actions 2019-2025

- Carry-out annual drey surveys in late winter/early spring.

- Carry-out annual coordinated squirrel counts in summer, covering the whole woodland, with a team of volunteers.
- Raise the profile of cat predation on squirrels through a public relations strategy, including actions such as including squirrels in talks and articles, and recommending cat bells and 'birds-be-safe' collars.
- Ensure a no tree felling policy between April and August. Any felling between January and March should be targeted in areas with no dreys.
- Maintain some quiet 'chainsaw- free' blocks of woodland through the year, as squirrel refuges.
- Maintain corridors of high canopy connectivity for squirrel travel.

5. VISION AND PRIORITY ACTION

5.1 FIVE-YEAR VISION STATEMENT

'In 2025 biodiversity within the FHT area of management is thriving, with all priority species and the full successional range of habitats in good conservation status. With the understanding and support of the local community, the area of open sand and shingle has increased by around 1ha, and the area of dune heath/acid grassland by around 2ha. The area is recognised as an example of best practice in the conservation of sand dune and woodland habitats.'

5.2 PRIORITY ACTION

1. Develop and deploy a public relations strategy aimed at:
    - Explaining the hierarchy of habitat value and the process of ecological succession.
    - Gaining understanding and support of the local community for gorse and tree clearance on dune heath.
    - Raising awareness of: the national importance of lichens on the Hinterland; significance of sand and shingle and dune heath habitats; gorse and tree encroachment; trampling of lichens; predation of squirrels by cats; planting of potentially invasive species in the dunes; the ecological value of rabbits and deer.

2. Creation of 1ha of sand and shingle, targeted first at priority lichen areas as identified in the 2019-23 Management Plan..

3. Removing 2ha of gorse, to connect the main dune heath areas together, and to the open dunes - thereby increasing wind speed. Appendix 3 Map 1 indicates a 9ha area to be targeted.

4. Seek to develop collaborative tree removal projects with the neighbouring Findhorn Dunes Trust, especially on the boundary of the two land holdings.

5. Continue to maintain communication with national lichen experts and seek to make contact with sand dune experts and other sand dune restoration schemes.

6. Maintenance and enhancement of species-rich grassland in the wind turbines area through pony grazing, mowing and gorse clearance.

7. Increase the amount of large fallen and standing deadwood through Wilkies Wood, with due regard for public safety.

8. Identify a scattering of trees through the woodland which will not be felled, but allowed to grow old, die and decay naturally ('veterans'), with due regard for public safety.

9. Establish a programme of survey and monitoring for priority species. Information on fungi, mosses, slime moulds, springtails, beetles, spiders and most insect groups is currently limited.

11. Establish a GIS and spreadsheet database of species records and habitat management work, to improve knowledge, monitor progress and plan future action. Including: habitat maps and measurements, photographs, aerial photography.

Appendix 3, Tables 1 & 2, and Fig1, set-out a suggested broad work programme for the next five years.

6. ACKNOWLEDGEMENTS

Many thanks to Jonathan Caddy, Alan Watson Featherstone and Heather Paul for providing ecological records and information, and - along with Martin Harker, Kajedo Wanderer and George Paul – for helpful comments on draft versions.

7. REFERENCES

1. Piper.C.J. (2019). Findhorn Hinterland Trust Management Plan 2019-23 – Draft. Findhorn Hinterland Trust.

2. Chalmers. F. (2016). Findhorn Hinterland: Developing a Vision for Action. Findhorn Hinterland Trust.

3. Coppins. S & B. (2008). The Findhorn Dunes Lichen Survey Lichen report. Findhorn Dunes Trust

4. Dargie. T. (2001). Sand dune vegetation survey of Scotland: Moray Firth. Vol 1 : Main Report. Scottish Natural Heritage.

5. SCOTTISH NATURAL HERITAGE. Coastal Sand Dunes (UK BAP Priority Habitat) [Online]. https://www.nature.scot/sites/default/files/2018-02/Priority%20Habitat%20-%20Coastal%20Sand%20Dunes.pdf. Accessed at 15/01/20.

6. SCOTTISH NATURAL HERITAGE. Coastal Vegetated Shingle (UK BAP Priority Habitat) [Onlne]. https://www.nature.scot/sites/default/files/2018-02/Priority%20Habitat%20-%20Coastal%20Vegetated%20Shingle.pdf. Accessed at 15/01/20.

7. SCOTTISH NATURAL HERITAGE. Sand Dunes [Online]. https://www.nature.scot/landscapes-and-habitats/habitat-types/coast-and-seas/coastal-habitats/sand-dunes. Accessed at 15/01/20

8. Remke. E. (2016). Restoration of drift sands [PowerPoint presentation]. https://ec.europa.eu/environment/nature/natura2000/platform/documents/life_platform_dunes/day2/workshops/life_dunes_workshop_1_eva_remke_en.pdf. Accessed at 15/01/20.

9. Dam. P. (2016). Wuthering Heaths [PowerPoint presentation]. https://ec.europa.eu/environment/nature/natura2000/platform/documents/life_platform_dunes/day3/life_dunes_17_wuthering_heaths_rest_nl_p_dam_en.pdf. Accessed at 15/01/20.

10. Rooney.P. (2010). Changing perspectives in coastal dune management. Journal of Coastal Conservation 14:71-73

11. LIFE Platform on restoration of coastal and inland dune habitats (2016) [Conference Proceedings]. https://ec.europa.eu/environment/nature/natura2000/platform/events/258_ecology_morphology_management_of_coastal_and_inland_dunes_en.htm. Accessed at 15/01/20.

12. Dutch Dune Revival: revitalising dunes in Kennemerland (2016). [PowerPoint presentation]. https://ec.europa.eu/environment/nature/natura2000/platform/documents/life_platform_dunes/day2/life_dunes_12_dutch_dune_revival_netherlands_kuipers_en.pdf. Accessed at 15/01/20.

13. Rees. S. (2016). Developing a UK dune restoration programme. [PowerPoint presentation]. https://ec.europa.eu/environment/nature/natura2000/platform/documents/life_platform_dunes/day3/life_dunes_16_dune_restoration_programme_uk_rees_en.pdf. Accessed at 15/01/20.

14. Jonsson. M. (2016). Bringing back life to sandy habitat: project sandlife 2012-2018. [PowerPoint presentation]. https://ec.europa.eu/environment/nature/natura2000/platform/documents/life_platform_dunes/day1/life_dunes_5_sandlife_sweden_magnus_jonsson_en.pdf. Accessed at 15/01/20.

15. Geelen. L. (2016). Amsterdam dunes: source for nature [Powerpoint Presentation]. https://ec.europa.eu/environment/nature/natura2000/platform/documents/life_platform_dunes/day2/life_dunes_13_amsterdam_dunes_restoration_geelen_en.pdf. Accessed at 15/01/20.

16. Naedts. F. (2016). From pine plantations to inland dunes [PowerPoint presentation]. https://ec.europa.eu/environment/nature/natura2000/platform/documents/life_platform_dunes/day2/life_dunes_11_life_helvex_flanders_frederik_naedts_en.pdf. Accessed at 15/01/20.

17. Sturgess. P. Atkinson. D. (1993). The clear-felling of sand dune plantations: soil and vegetational processes in habitat restoration. Biological Conservation. 66: 171-183.

18. PLANTLIFE. Hay festival? Action now for species-rich grasslands [Online]. https://www.plantlife.org.uk/application/files/2315/3087/2058/Grasslands_action_plan_-_Plantlife.pdf. Accessed at 15/01/20.

19. Maddock. A. (2008). UK BAP Priority Descriptions. Lowland dry acid grassland. JNCC.

20. Scottish Wildlife Trust. Saving Scotland's red squirrels. https://scottishwildlifetrust.org.uk/our-work/our-projects/saving-scotlands-red-squirrels/

FINDHORN HINTERLAND BAP 2019-2024

APPENDIX 1 – PRIORITY HABITATS AND SPECIES

Table 1. Hinterland Priority Habitats

Priority Level	Habitat	Associated Key Species	Management policy/Actions
1	Sand/shingle, dune heath	Lichens Invertebrates	Development and deployment of a public relations/education strategy to: raise the profile of sand/shingle and dune heath; the need for gorse and tree control; and promote consistent messages in all communications, including via website, local press, printed materials, events, meetings, work parties. See Appendix 3, Table 1. Removal of encroaching gorse and trees from priority lichen beds, to within 5m where possible, using a hired excavator to mulch the gorse plants remove the brash and humus, creating around 1ha of bare sand and shingle. See FHT Management plan 2019-2023. Mulch around 2ha of gorse and maintain as dune heath, see Dune Scrub, below. Remove soil humus in some areas to create bare sand and shingle (Appendix 3, Fig.1). Careful planning of path routes to avoid priority lichen areas. Establish a method for monitoring the status of SBL lichens, including the impact of human trampling on lichen areas, such as regular photography of key areas.
2	Species rich grassland (mainly around the turbines)	Linnet Yellowhammer Cuckoo Long-eared owl Kestrel Common toad Common lizard Slow worm Hedgehog Brown Hare Bats Small heath Common blue	Survey to identify most flower-rich areas to protect from summer grazing and expand through gorse removal. Manage grazing to allow summer flowering (end April to mid-September) on the most valuable areas of open grassland and gorse glades. Leave some tussocky grassland and gorse glades un-grazed/grazed very infrequently. Create reptile hibernacula/refuges – log piles. Install temporary signs April-August: “Baby deer and hares – please keep dogs on leads in this area”.

		Dark green fritillary 15 Priority moth species Roe deer Rabbits	
3	Dune scrub	Linnet Yellowhammer Cuckoo Common toad Insects Bats Roe deer Rabbit	Mulch 2ha of gorse scrub, using a hired tractor-mounted flail, connecting-together the Central and Eastern Dune heaths with the open dunes beyond (Appendix 3, Fig. 1). Mowing firebreaks and butterfly glades in late autumn/winter, to avoid breeding season.
4	Coniferous woodland - plantation	Redpoll Crossbill Spotted flycatcher Song thrush Bullfinch Long eared owl Common toad Red squirrel Hedgehog Pine marten Brown long-eared bat Pipistrelle bat Roe deer Speckled wood Creeping ladies tresses Lichens Fungi	Identification and protection of future 'veteran' trees, which will be allowed to grow old, die and decay naturally, with due regard to safety. Provide new fallen deadwood annually, including large branches/logs. Map and mark squirrel nesting dreys each year in early spring. 'No felling' policy April – August, to minimise disturbance to breeding mammals and birds. Target any felling between January and March at areas with no dreys. Maintain corridors of high canopy connectivity for squirrel travel as much as posible. Maintain some areas of birch thicket for hedgehogs, amphibians, invertebrates and breeding birds. Maintain some un-thinned areas of dense forest for squirrels and breeding birds.

Table 2. List of priority mammals at Hinterland

MAMMALS	Priority for Action (H,M,L)	Scottish Biodiversity List	Local Interest	Special legal protection	Associated Habitat	Notes
Pine marten	H	•		•	Woodland	Likely to be transient
Brown long-eared bat (? tbc)		•		•	Woodland	Priority for survey, to establish status
Pipistrelle bat species	H	•		•	Woodland	Known to be common
Red squirrel	H	•		•	Woodland	Vulnerable isolated population
Hedgehog	H	•			Woodland Acid grassland	Likely to use adjoining gardens
Brown hare	M	•			Acid grassland	Turbines area
Badger	M		•		Woodland Acid grassland	Priority for monitoring
Roe deer	M		•		Woodland Acid grassland	Provides important ecosystem services
Rabbit	M		•		Acid grassland	Provides important ecosystem services

Table 3. List of priority reptiles and amphibians at Hinterland

SPECIES	Priority for Action (H,M,L)	Scottish Biodiversity List	Local Interest	Associated Habitat	Notes
Common lizard	H	•		Acid grassland	Priority for survey, to establish status
Slow worm (tbc)	H	•		Acid grassland	Priority for survey, to establish status
Common toad	M	•		Ponds Woodland Dune scrub	
Smooth newt	L		•	Ponds Woodland	
Palmate newt	L		•	Ponds Woodland	

Table 4. List of priority birds at Hinterland

BIRDS	Priority for Action (H,M,L)	Scottish Biodiversity List	Red Listed	Local Interest	Special legal protection	Associated Habitat	Notes
Skylark	L	•	•			Dune heath	
Redpoll	M	•	•			Woodland	Will benefit from winter garden feeding
Linnet	H	•	•			Dune scrub Acid grassland	
Cuckoo	H	•	•			Dune scrub	
Siskin	M	•				Woodland	Will benefit from winter

							garden feeding
Yellowhammer	H	•	•			Dune scrub Acid grassland Surrounding gardens	Will benefit from winter garden feeding
Crossbill	L	•*				Woodland	*Scottish crossbill only
Spotted flycatcher	H	•	•			Woodland Ponds	
House sparrow	L	•	•			Surrounding gardens	
Dunnock	L	•				Woodland	Thicket areas
Starling	L	•	•			Surrounding gardens Acid grassland	Will benefit from winter garden feeding
Song thrush	H	•	•			Woodland Surrounding gardens	Thicket areas
Bullfinch	M	•				Woodland	Thicket areas
Kestrel	H	•				Dune heath Acid grassland	
Long-eared owl	H			•	•	Woodland Dune heath Acid grassland	
Crested tit	L			•		Woodland	Spring visitor

Table 5. List of priority bees, wasps and beetles

SPECIES	Priority for Action (H,M,L)	Scottish Biodiversity List	Local Interest only	Associated Habitat	Notes
Moss carder bee (tbc)	M	•		Acid grassland	Priority for survey
Red-banded sand wasp (tbc)	H	•		Dune heath	Priority for survey
Green tiger beetle	L		•	Dune heath	

Table 6. List of priority butterflies and moths occurring on Hinterland

SPECIES	Priority for Action (H,M,L)	Scottish Biodiversity List	Local Interest only	Associated Habitat	Notes
Small heath butterfly	M	•		Acid grassland Dune scrub	
Common blue butterfly	L		•	Acid grassland Dune scrub	
Dark green fritillary butterfly	L		•	Acid grassland	
Dingy skipper butterfly (tbc)	M	•		Acid grassland	Priority for survey, to establish status
Speckled wood butterfly	L		•	Woodland	
Cinnabar moth	M	•		Acid grassland	
Brown-spot pinion	M	•		Acid grassland Woodland	
Ear moth	M	•		Acid grassland	

Mouse moth	M	•		Acid grassland Woodland	
Shoulder-striped wainscot moth	M	•		Acid grassland	
Garden tiger	M	•		Acid grassland	
Small phoenix	M	•		Acid grassland Woodland	
Grey mountain carpet	M	•		Dune heath	
Autumnal rustic	M	•		Dune heath Acid grassland	
Garden dart	M	•		Acid grassland	
White line-dart	M	•		Dune heath Acid grassland	
Rosy minor moth	M	•		Acid grassland	
Rosy rustic moth	M	•		Acid grassland	
Lunar yellow underwing		•		Acid grassland	
Shaded broad-bar moth	M	•		Acid grassland	
White ermine moth	M	•		Acid grassland	
Anomalous moth	M	•		Acid grassland Dune heath Woodland	

Table 7. List of damselflies and dragonflies at Hinterland

SPECIES	Priority for Action (H,M,L)	Scottish Biodiversity List	Local Interest only	Associated Habitat
Common blue damselfly	L		•	Ponds, woodland
Blue-tailed damselfly	L		•	Ponds, woodland
Emerald damsel fly	L		•	Ponds, woodland
Common darter dragonfly	L		•	Ponds, woodland
Southern hawker dragonfly	L		•	Ponds, woodland
Common hawker dragonfly	L		•	Ponds, woodland

Table 8. List of priority flies occurring on Hinterland

SPECIES	Priority for Action (H,M,L)	Scottish Biodiversity List	Nationally Scarce	Associated Habitat	Notes
Flea bee-fly (robber fly) *Phthiria pulicaria*	H	•	•	Dune heath	Preys on insects. Determine local distribution and habitat requirements to target action.
Pied-winged robberfly *Pamponerus germanicus*	H		•	Dune heath	Adults feed on flowers. Determine local distribution and habitat requirements to target action.
Metopia tshernovae	H			Not known	New to Britain 2019. Nests in ground nesting wasp and bee nests. Determine local distribution and habitat requirements to target action.

Table 9. List of priority flowering plants occurring on Hinterland

SPECIES	Priority for Action (H,M,L)	Scottish Biodiversity List	Local Interest	Associated Habitat
Creeping lady's tresses	M		•	Woodland
Birdsfoot trefoil	M		•	Acid grassland. Key butterfly food plant
Dog violet	M		•	Acid grassland. Key butterfly foodplant

Table 10. Priority fungi occurring on Hinterland

SPECIES	Priority for Action (H,M,L)	Scottish Biodiversity List	Red Data Listed	Local Interest	Associated Habitat
Pucciniastrum goodyerae	H	•	•		Coniferous woodland
Xylaria polymorpha	M			•	Sand/shingle, dune heath, acid grassland
Sandy earthtongue *Sabuloglossum arenarium*	M			•	Sand dunes, dune heath
Moor club *Clavaria argillacea*	M			•	Sand dunes, dune heath
Earpick fungus *Auriscalpium vulgare*	M			•	Coniferous woodland
Flaming scalycap *Pholiota flammans*	M			•	Coniferous woodland
Dune brittlestem *Psathyrella ammophila*	M			•	Sand dunes

Table 11. List of Priority Lichens occurring on Hinterland

SPECIES	Priority for Action (H,M,L)	Scottish Biodiversity List	Local Interest	National status	Associated Habitat
Buellia jugorum	M		•	Rare	Dune shingle
Cladonia mitis	H	•		Rare	Sand and gravel
Cladonia unicalis subsp. unicalis	H	•		Rare/occasional	Sand and gravel
Ochrolechia frigida f. *Lapuensis*	M		•	Rare	Sand and gravel
Matt felt lichen *Peltigera malacea*	H	•		Rare	Sand and gravel
Stereocaulon glareosum	H	•		Rare	Sand and gravel
Melaspilea interjecta		•		Rare	Dune shingle
Rhizocarpon cinereovirens	M	•		Rare	Dune shingle

APPENDIX 2 – KEY SPECIES MANAGEMENT ACTIONS

Table 1. Key management for mammals

Species	Management Actions
Red squirrel	• No felling policy April to July. Any felling between January and March should be targeted in areas with no dreys. • Restrict tree-feeling to clearly identified blocks, ensuring 'chainsaw-free' woodland blocks, as squirrel refuges. • Survey of active dreys each late winter/early spring. • Maintain corridors of high of tree canopy connectivity to allow squirrels to travel easily. • Raise the profile of squirrel predation by cats in the local community and encourage use of cat bells and 'birds be safe' collars.
Hedgehog	• Provision of large woodland brash piles for hibernation. • Maintenance of areas of woodland with a dense shrub layer, including thickets. • Grassland management to maintain a mosaic of grazed and un-grazed areas, with scattered scrub.
Pine marten	• Provide brash piles and maintain tussocky grass to encourage vole populations. • Maintain pony grazing on acid grassland to benefit rabbits.
Brown hare	• Maintenance of a mosaic of grazed and un-grazed grass with scattered scrub around the turbines. • Designate the turbines area as a dogs-on-leads 'Wildlife Sanctuary' during the spring and summer.
Bats	• Maintenance of varied woodland edges and large patches of scrub on adjoining grassland. • Survey to determine presence of brown long-eared bat, including of old bomb shelters for roosting sites. • Provision of bat boxes.
Badger	• Survey to determine location of any setts, latrines and paths.
Roe deer	• Raise profile of value to dune heath habitats within the local community. • Designate the turbines area as a dogs-on-leads 'Wildlife Sanctuary' during the spring and summer.
Rabbit	• Raise profile of value to dune heath habitats within the local community.

Table 2. Key management for herptiles

Species	Management Actions
Common lizard, Slow worm	• Priority area is around the wind turbines. • Maintain large patches of tussocky open grassland – un-grazed/very infrequently grazed -with scattered scrub. • Provide log/rubble piles for refuges and hibernacula. • Clear gorse to create new sheltered glades, un-grazed from end of April to mid-September.
Common toad	• Provide woodland brash piles. • Maintain large patches of tussocky open grassland with scattered scrub – un-grazed/very infrequently grazed. • Provide log/rubble piles for refuges and hibernacula.
Newts	• Leave patches of tussocky open grassland - un-grazed/very infrequently grazed - with scattered scrub. • Provision of log/rubble piles for refuges and hibernacula near the ponds.

Table 3. Key management for birds

Species	Management Actions
Skylark (Mainly on adjoining agricultural grassland)	• Prevent gorse encroachment on open grassland around the turbines.
Redpoll	• Maintain areas of birch thicket.
Linnet	• Maintain a mosaic of gorse thickets (nesting) adjoining grassland (feeding – insects & seeds). • Create around 2ha of food-rich dune heath/acid grassland. • Winter grazing to allow flowering and setting of seeds.
Cuckoo	• Maintain small areas of birch/scrub thicket to encourage host species e.g. dunnock.
Yellowhammer	• Maintain gorse thicket (nesting) adjoining grassland (food - insects, seeds). • Create around 2ha of food-rich dune heath/acid grassland. • Winter grazing to allow flowering and setting of seeds.
Crossbill	• Continue woodland management.
Spotted flycatcher	• Maintain open rides/glades in woodland.
House sparrow (Mainly around	• Will benefit from winter grazing to allow flowering and setting of seeds.

houses)	
Dunnock	• Maintain small areas of thicket woodland. • Provide brash piles for nesting. • Maintain gorse thickets adjoining grassland.
Starling (Mainly around houses)	• Will benefit from short-grazed areas in pony paddocks.
Song thrush	• Maintain small areas thicket woodland. • Maintain gorse thickets adjoining grassland.
Bullfinch	• Maintain birch dominated areas.
Long-eared owl	• Maintain some un-thinned denser woodland areas. • Provide nesting baskets. • Provide woodland brash piles to encourage prey species (voles, mice). • Leave some open grassland areas un-grazed/grazed very infrequently to encourage prey species (voles, mice).
Kestrel	• Prevent gorse encroachment on grassland through mowing. • Leave some open grassland areas un-grazed encourage prey species (voles, mice).
Crested tit	• Preservation of large standing dead trees.

Table 4. Key management for invertebrates

Species/Taxon	Management Actions
Moss carder bee (priority area is around the wind turbines)	• Confirm status. • Identify food plant areas – birds foot trefoil, kidney vetch, red clover. • Allow some large areas of species-rich grassland to flower from the end of April to late September. • Leave patches of un-grazed tussocky grass in the turbines as over-wintering areas.
Red-banded sand wasp	• Confirm status.
Butterflies and moths (Priority area	• Clear small patches of gorse to open-up new glades.

around wind turbines)	• Light autumn/winter grazing of some gorse glades each year. • Allow some large areas of species-rich grassland to flower from the end of April until mid-September. • Leave patches of un-grazed tussocky grass in the turbines as over-wintering areas. • Identify main colonies and food plant area (birds foot trefoil, kidney vetch, white clover, dog violet). • Leave ragwort if more than 40m from a grazed area.
Flies	• Determine local distribution and habitat requirements of three key species to target action

Table 5. Key Management for flowering plants

Species	Management Actions
Creeping laides tresses, birdsfoot trefoil, dog violet	Survey and monitoring

Table 6. Key management for non-flowering plants

Taxon	Management Actions
Lichens	• Remove all gorse within 5m of all the priority lichen areas identified in the FHT Management Plan, 2019-23, covering around 1ha over five years. Remove brash and leaf litter - and if possible roots, using an excavator - from site and scrape to bare sand, to create areas for new lichen colonisation. • Cut around 2ha of gorse, connecting the Central and Eastern Dune Heaths and opening-up the main gorse area to higher windspeeds. Use excavator to gorse roots and humus in the cleared areas to create patches of sand/shingle for lichen colonisation (Appendix 3 Map 1). • Annual maintenance to remove tree and gorse seedlings from cleared areas. • Devise simple research programme to assess the level of damage by human trampling and the level of disturbance which is beneficial to lichens. • Monitor lichen/dune heath recovery in each priority area using digital mapping and photography. • Manage the flow of visitors by maintaining recognised pathways and using gorse thickets and signage to steer visitors away from sensitive areas.

	• Install interpretative panels on best lichen beds. • Provide a regular supply of deadwood – standing and fallen – each year within the woodland. • Identify and protect future veteran trees.
Mosses	• Survey to establish baseline. • Provide a regular supply of deadwood – standing and fallen – each year within the woodland. • Identification and protection of veteran trees.
Fungi	• Survey to establish baseline. • Provide a regular supply of deadwood – standing and fallen – each year within the woodland. • Identification and protection of veteran trees.
Slime moulds	• Survey to establish baseline. • Provide a regular supply of deadwood – standing and fallen – each year within the woodland. • Identification and protection of veteran trees.

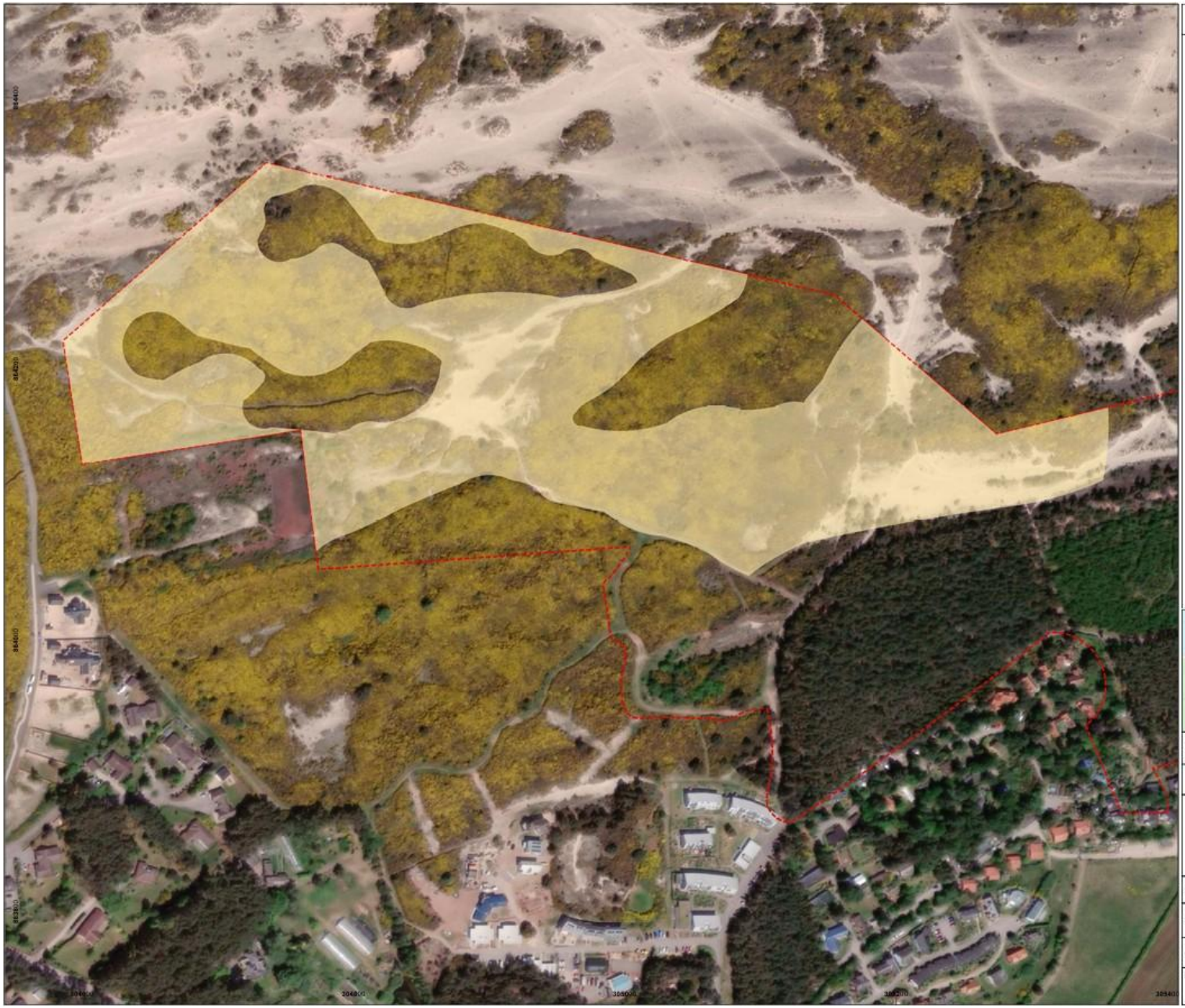
APPENDIX 3 – WORK PROGRAMME

Table 1. Priority work projects 2020-2025

Project	Year
Establishment of a public relations strategy to promote consistent messages in all communications, including via: website, articles, printed materials, events, meetings, work parties. Key messages: rare sand dune habitats under threat; national importance for lichens; responsible land stewardship; hierarchy of habitat value; ecological succession; the need for tree and gorse removal; FHT has planted around 5,000 trees; threat of invasive species; cat predation of squirrels; the ecological value of rabbits and deer; trampling of lichens	2020
Creation of around 1ha of sand and shingle through removal of gorse plants, using a hi-mac excavator. Targeted at priority lichen areas in newly-cut gorse around the Central and Eastern Dune Heaths	2020-2025
Cutting around 2ha of tall gorse to join the Central and Eastern Dune Heaths and open them up to the wider dunes	2020-2025
Explore collaborative tree and gorse removal with Findhorn Dunes Trust	2020-2025
Establishment of an Excel species database	2020
Establishment of a survey programme for key priority species	2021
Establishment of GIS habitat and species mapping system	2021
Completion of tree and gorse clearance from all priority dune heath areas, using contractor with hi-mac excavator	2022
Completion of gorse removal from established acid grassland in the turbines area	2023
Identification of future veteran trees (taking public safety fully into account)	2023
Collaborative tree removal with Findhorn Dunes Trust	2023-2025

Table 2. Timing of Annual Tasks

Task	Month
Tree removal & scrub control	October - March
Maintenance of cleared areas – priority lichen areas and glades in gorse	October - March
Maintain firebreaks	October - March
Squirrel drey survey	Aug & March
Bird & bat box maintenance	October
Tree thinning	September-January
Invasive species monitoring	On-going



Map Legend

Site Information

Findhorn Hinterland Trust management boundary

Management

Target area for creation of 1 ha bare sand and shingle and 2ha dune heath/acid grassland



Reproduced from Ordnance Survey Strategi and StreetView digital map data. Crown Copyright 2020. All rights reserved. License number 100049837.

0 10 20 40 60 80 100 m

ReedEcology

www.reedecology.co.uk

Project	FINDHORN HINTERLAND TRUST LBAP 2020 - 2025
Figure	Appendix 3, Fig. 1. Gorse and Tree Management
Client	Findhorn Hinterland Trust

Date	Reviewer	Version	Scale	Size
28/01/20	MP	2.0	1:2,500	A3

APPENDIX 4. OUTLINE PUBLIC RELATIONS STRATEGY

AUDIENCE	MESSAGES	METHOD
Local community	Rare sand dune habitats are under threat National importance for lichens Key species & habitats Hierarchy of habitat value Ecological succession Responsible land stewardship The need for tree and gorse removal FHT has planted more than 5,000 trees Cat predation of squirrels - collars The ecological value of rabbits and deer Trampling of lichens Threat of invasive garden plants Good news – eg species/habitat gains	Website Interpretative signs FHT members email - progress/plans updates twice a year Rainbow Bridge newsletter – progress/plans updates twice a year Occasional Sunday Slot Events/open days – inc. AGM
General public/visitors	Key species & habitats National importance for lichens Rare sand dune habitats under threat Ecological succession Responsible land stewardship FHT has planted more than 5,000 trees Good news – eg species/habitat gains	Website Events/open days – including schools Interpretative signs Forres Gazette – press release once a year.
Statutory agencies	Responsible land stewardship	Site visits – SNH, Moray Council
Potential funders	Rare sand dune habitats under threat National importance for lichens Key species and habitats The need for tree and gorse removal – costs	Identify most relevant funding bodies Make personal contact – site visits if possible Grant applications
External experts	National importance for lichens Key species & habitats The need for tree and gorse removal Welcome input	Maintain contact with national lichen experts Outreach via Universities, UK (+ European) sand dune restoration schemes