Scotland's National Nature Reserves

The Story of Muir of Dinnet National Nature Reserve

2nd Edition

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The Story of Muir of Dinnet National Nature Reserve

Foreword

Muir of Dinnet National Nature Reserve (NNR) is a landscape shaped by retreating glaciers at the end of the last Ice Age around 15,000 years ago. The most striking feature is the 'Vat' - a giant pothole some 25 metres across formed by the glacial meltwaters. Throughout the reserve, the melting glaciers left behind a variety of deposits and meltwater channels and kettle hole depressions that form the basis for the variety of habitats and species found at Muir of Dinnet today.

At the heart of the reserve are Lochs Davan and Kinord, with their near pure water and associated bogs and fens providing ideal habitat for a wide mix of species; from rare water beetles to the elusive otter, feeding and breeding on the reserve. During winter, the lochs are an important roost site, attracting migrating geese and other wildfowl.

Dry heaths, including the internationally important bearberry heath, thrive on the drier hummocky ground. The heaths support rare moths, such as the netted mountain and cousin German, and in summer are home to ground nesting birds, such as curlew and meadow pipit. Young pine and birch now cover large areas of the reserve and provide an interesting transition from open heath, young scrub to pine and birch woodland. These woodlands also support a rich variety of invertebrates and breeding birds including, the Kentish glory moth, redstart and Scottish crossbill.

Muir of Dinnet is one of more than forty-five National Nature Reserves in Scotland. Scotland's NNRs are special places for nature, where some of the best examples of Scotland's wildlife are managed. Every NNR is carefully managed for both nature and people, giving visitors the opportunity to experience our rich natural heritage. The network of trails, visitor centre and car parks all make Muir of Dinnet a truly accessible reserve for all to explore and enjoy.

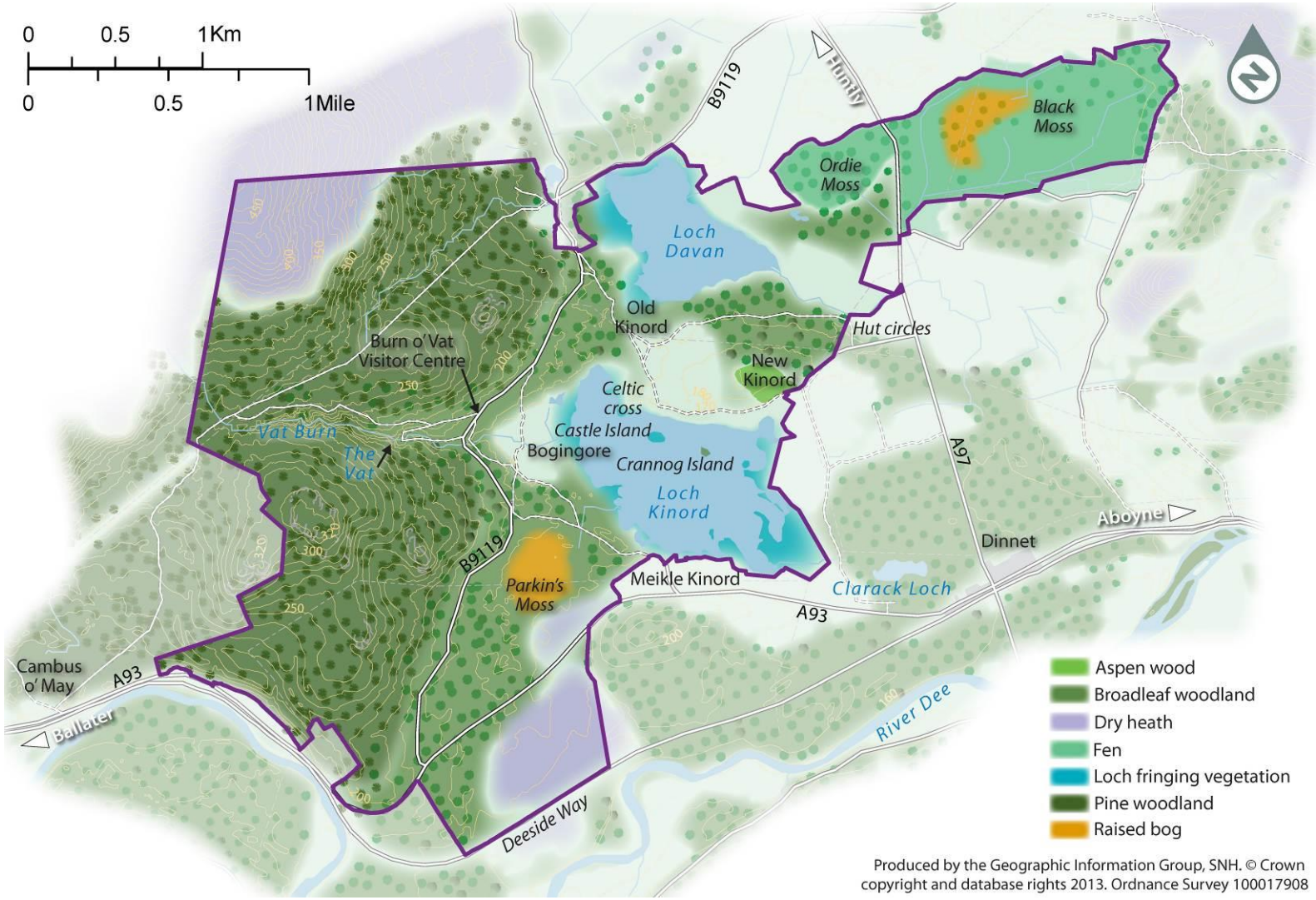
The Reserve Story contains background information about the reserve, describing the wildlife interest, its land use history and management since it became a reserve. The Muir of Dinnet NNR Management Plan 2014-2024 covers the future management of the reserve.

Contents

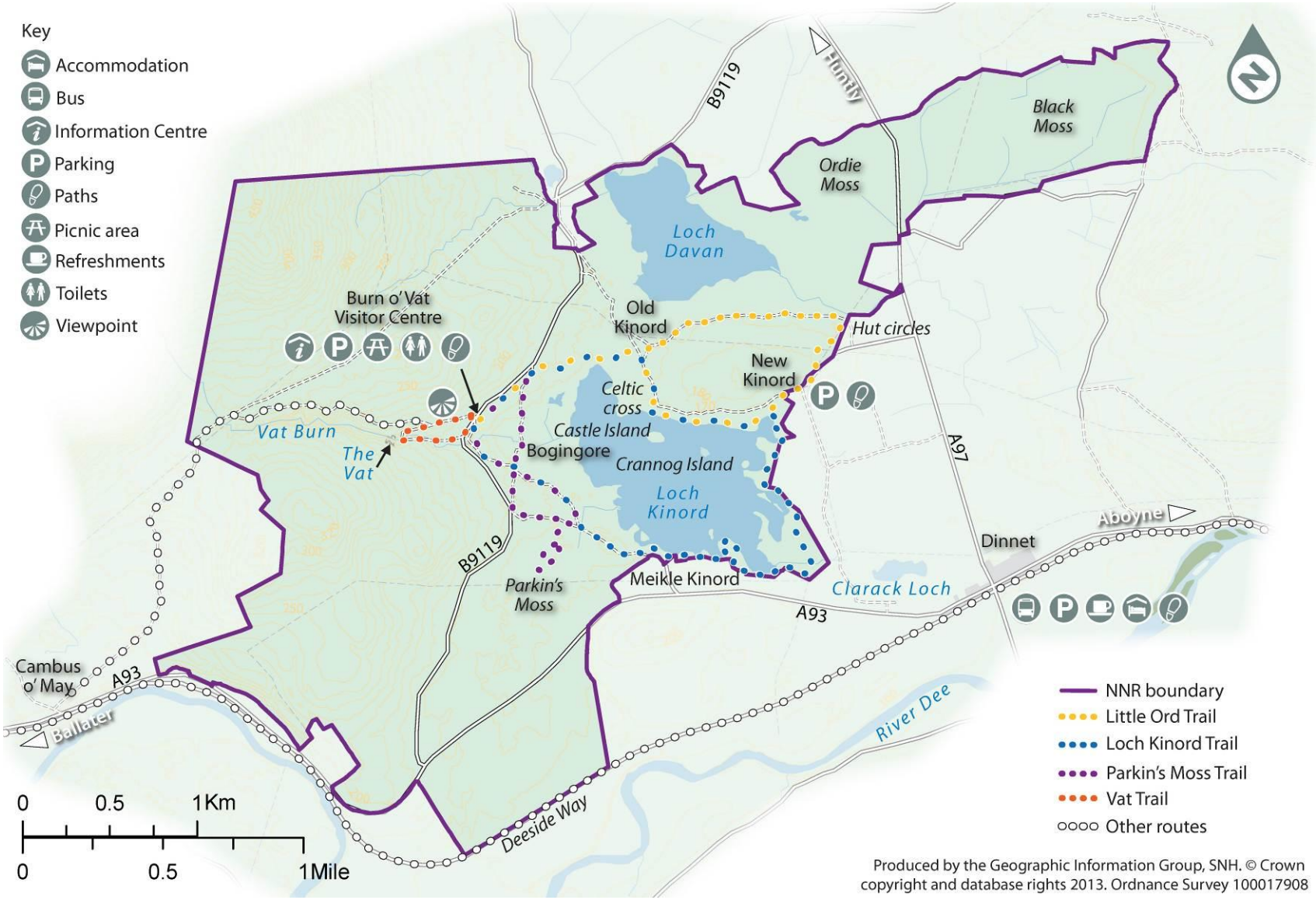
1 Maps of Muir of Dinnet NNR

Location map

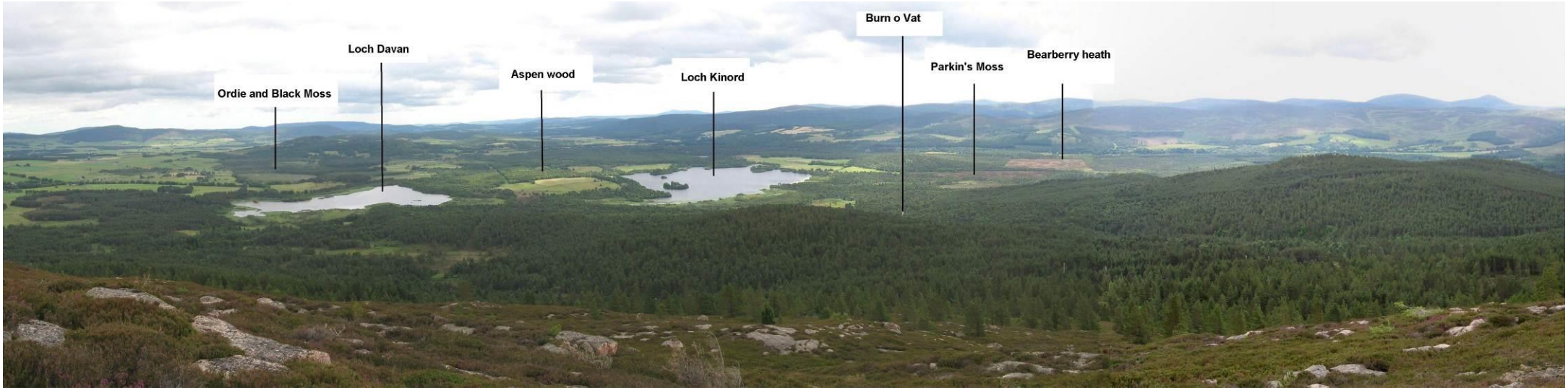
Reserve map - heritage



Reserve map – visitor facilities



Panoramic photograph of the reserve from Culblean hill.



2 Introduction

Muir of Dinnet NNR is close to the village of Dinnet, slightly north of the River Dee between the towns of Aboyne and Ballater in Aberdeenshire. Lying on the western edge of the Howe of Cromar, the reserve extends from the River Dee to the high slopes of Culblean Hill and covers approximately 1163 hectares (ha).

The reserve is set amidst a mix of low-lying agricultural land, forestry at Cambus o' May and grouse moor towards the top of Culblean Hill. The A93, a popular tourist route known as "The North Deeside Road" and the A97 and B9119 all transect the reserve, offering many views and points of access for visitors. The reserve itself is defined by a landscape of ridges, hummocks and depressions left behind after the last glaciation, when this part of Scotland was covered by ice up to 1,000 metres deep. These features are nationally important examples of glacial landforms and they provide the foundations for the variety of habitats and species found at Muir of Dinnet today.

Lochs Davan and Kinord lie in the central low-lying area of the reserve. The Red Burn and the larger Logie Burn feed Loch Davan, carrying water from the fields and moorland north of the loch. The water catchment area for Loch Kinord is smaller than Davan, the loch being fed solely by the Vat Burn, which drains a woodland and heathland area. The lochs are home to internationally important numbers of otter and wintering wildfowl and geese.

To the north and west of the lochs, the ground rises to Cnoc Hill and Culblean Hill (604 m). Culblean is the highest point of the reserve and is where the Vat Burn rises and flows down to the 'Vat', a huge pothole carved by the forces of glacial meltwaters and the debris they carried. Heather and bearberry heath dominate the higher, drier slopes of Culblean Hill, along with some of the low-lying drier areas south of Loch Kinord whilst self-seeded pine and birch have spread over much of the western side of the reserve. To the north-east corner of the reserve Ordie and Black Moss are areas of fen and raised bog.

Lying within the rain-shadow of the Cairngorms, the climate at Dinnet is relatively dry with an annual rainfall of 76 centimetres (cm). The yearly mean temperature is about 7^{o} Celsius (C), with an average summer (May - August) temperature of 16^{o} C and winter (November - February) temperature of 0^{o} C.

The Muir of Dinnet area also has a rich cultural heritage, with archaeological remains telling an interesting story of times gone by.

Muir of Dinnet was first declared a NNR in 1977. Dinnet Estate owns the reserve and Scottish Natural Heritage (SNH) manages it through a Nature reserve Agreement (NRA). Managing, monitoring and improving the natural heritage interest of the reserve has always been the focus of our work, but visitors are also important and we have provided facilities since the 1980's. As well as the Burn o'Vat visitor centre, which was refurbished in 2012, there are toilets, car parks, viewpoints, picnic areas, seasonal guided walks, onsite interpretation and several circular trails.

The natural heritage interests at Muir of Dinnet are of UK, European and global importance. The lochs are designated a Special Protection Area (SPA) and Ramsar site for supporting internationally important numbers of wintering wildfowl and geese. Two Special Areas of Conservation (SAC) also overlap the reserve. The Muir of Dinnet SAC is of European importance for its dry heaths, raised bogs, mires, lochs, and otter population of the reserve. The Monandavan Burn, which flows from Loch Davan is part of the River Dee SAC, which is of European importance for its Atlantic salmon, freshwater pearl mussel and otter.

The recognition of Muir of Dinnet as a European site of international importance (SPA and SAC) means that it is part of a Europe wide network of areas referred to as ‘Natura’ sites. This extremely important suite of sites includes other high profile reserves such as The New Forest in England with its extensive heaths, open water and wetland habitats as well as woodlands; premier salmon rivers like the River Shannon in Ireland; and the most important freshwater area for birds in Denmark, the Maribo Lakes which support an important population of greylag geese among other species. The inclusion of Muir of Dinnet in such company reinforces the message that it is considered one of the best sites in Europe.

At a national level, the reserve forms part of the Muir of Dinnet Site of Special Scientific Interest (SSSI). It also includes one Geological Conservation Review (GCR) site and three Scheduled Ancient Monuments (SAMs) and sits within the Cairngorms National Park.

Loch Davan

Table 1: Protected areas and features of Muir of Dinnet NNR

Protected Area	Feature
Muir of Dinnet RAMSAR Muir of Dinnet SPA Muir of Dinnet SSSI	Greylag goose, non-breeding
Muir of Dinnet SPA	Waterfowl assemblage, non-breeding
Muir of Dinnet SSSI	Breeding bird assemblage
Muir of Dinnet SSSI	Invertebrate assemblage
Muir of Dinnet SSSI	Dragonfly assemblage
River Dee SAC	Atlantic salmon[2]
Muir of Dinnet SAC River Dee SAC	Otter
Muir of Dinnet SAC	Clear-water lakes or lochs with aquatic vegetation and poor to moderate nutrient levels
Muir of Dinnet SSSI	Oligo-mesotrophic loch
Muir of Dinnet SSSI	Lowland dry heath[1]
Muir of Dinnet SAC	Dry heaths
Muir of Dinnet SAC	Very wet mires often identified by an unstable 'quaking' surface
Muir of Dinnet SSSI	Hydromorphological mire range
Muir of Dinnet SAC	Degraded raised bog
Muir of Dinnet SSSI	Quaternary of Scotland

3 The Natural and Cultural Heritage of Muir of Dinnet NNR

Earth Science

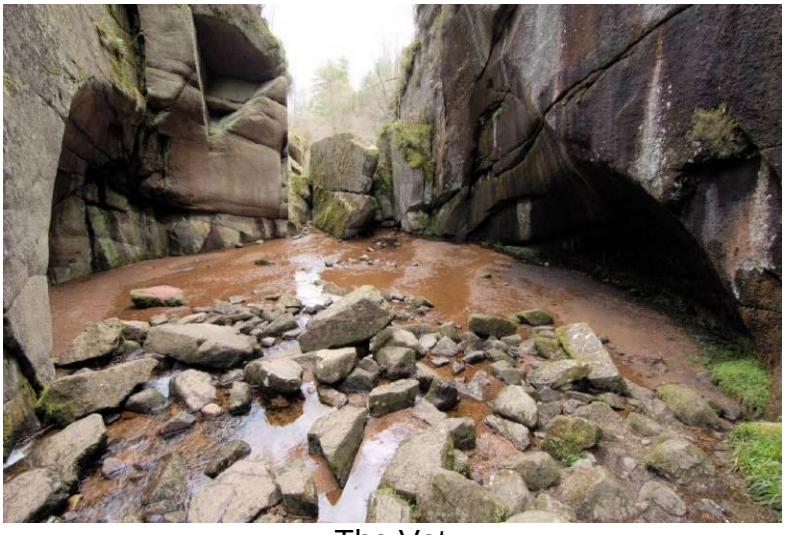
The oldest rocks at Muir of Dinnet NNR underlie the area around and to the south of Loch Kinord. They were initially laid down as sediments (sands and muds) in an ancient ocean around 600 million years ago. Later, around 460 million years ago, they were heated, compressed and folded when two of the Earth's tectonic plates collided and pushed up parts of the land surface, like car bodywork crumpling in a collision. Although slow and taking millions of years, this collision created mountains the size of the Alps or even the Himalaya, and resulted in hard, 'metamorphic' rock. At Muir of Dinnet, this metamorphic rock, known as 'Dalradian' rock, is mostly pale and dark striped 'gneiss'.

The remainder of the reserve is underlain by pink-coloured granite. This formed when rock, melted during the formation of the huge mountain chain, cooled and solidified slowly underground around 425 million years ago. Since then, erosion by ice, wind and water has exposed the once deeply buried granite, and worn down the huge mountain chain to form the hilly landscape around Muir of Dinnet.

Most of the landforms at Muir of Dinnet are the result of ice movement and melting during the last glaciation. This peaked around 22,000 years ago when there may have been up to 1000 m of ice covering Muir of Dinnet. Around 15,000 years ago, the climate warmed rapidly, and by 14,000 years ago the ice was largely gone. The melting glaciers released huge quantities of water, as well as silts, sands, gravels and rocks once frozen into the ice. The action of the glaciers and their meltwaters created important landforms at Muir of Dinnet.

Burn o'Vat

Although now a tiny burn, at the end of the last Ice Age, a huge meltwater river followed today's course of the Burn o'Vat. The force of the river, together with all the rock debris it carried, carved out the gorge and giant pothole known as the 'Vat'.



The Vat

The Vat probably formed where an area of harder bedrock caused an obstruction to the water flow and created a whirlpool behind it. The swirling waters, sand, pebbles and boulders then carved the circular pothole, which forms the Vat. Today, the Vat lies above the water level and is large enough to walk into despite the bottom half of the Vat being full of sand and rocks.

At the same time as the Vat formed, there was a low waterfall in the meltwater river just downstream of the Vat. The erosive action of the water and rocks at the bottom of this waterfall formed a wide bowl, in the gorge just outside of the present-day entrance to the Vat. It is hard to imagine this tree-covered area with its shallow stream as a huge, churning waterfall, but the boulders lying at the entrance to the Vat give a clue to the volume and power of the water. The force of the water pushed some of these boulders, which weigh over a tonne, here.

Further downstream, where the Vat Burn entered Loch Kinord, the fast-flowing water slowed down. Sediments carried along by the water were deposited in a fan-shaped landform at the mouth of the burn. This is now seen as a flat area of ground around Bogingore.

There are many other meltwater channels in the area besides the Burn o'Vat gorge. The majority are found around the lower slopes of Cublean Hill, with particularly impressive examples cut into the lower western slopes of Cnoc Dubh. Meltwater channels also occur in the area north of Dinnet.

Eskers, kames and kettle holes

Scattered throughout the reserve are a series of ridges (eskers), mounds (kames) and water-filled hollows (kettle holes) all left behind by the retreating glaciers. The kames were formed by small pockets of sand and gravel accumulating on or within the glacier. When the ice melted, these materials sank to the ground and now form the low mounds visible on the reserve today.

The rivers that flowed on top of or underneath the melting glacier also carried sand and gravel. As the ice melted, all of the sand and gravel carried by these rivers was deposited along the ground, following the line of the former rivers. On the reserve, these eskers form long, often winding ridges. Some of the best examples can be seen near Parkin's Moss, and the viewpoint above the Burn o'Vat visitor centre sits on top of one.

Lochs Davan and Kinord were also formed during this period and are textbook examples of kettle holes. These were formed when large blocks of ice became separated from the melting glacier and were buried by sand and gravel. When that ice finally melted, the sand and gravel that once lay on top of the ice collapsed, leaving a hollow (kettle hole) on the ground surface which later filled with water.

Cnoc Hill

Over a succession of glaciations, the grinding action of glaciers has smoothed and rounded off the hills around Muir of Dinnet. These rounded hills are known as 'roches moutonées', so called because they supposedly look like the rounded backs of big rocky sheep! Cnoc Hill and the two smaller hills at Wisdomhow indicate which way the glacier was flowing, as the gentler, smooth slope always points to the "upstream" of a glacier.

Ancient sediment records

The pollen and plant macrofossils preserved in the sediments on the floor of Loch Kinord provide an important regional record of late glacial and postglacial environmental changes. They have been used to reconstruct the vegetation history of the area, including the development of birch and pine woodland, from the time since deglaciation.

The kettle hole of lochs Davan and Kinord from Culblean Hill

Habitats

Heaths

Dry heath covers approximately 42 ha of the reserve. Unlike many areas of dry heath in Scotland, the heath at Muir of Dinnet is dominated by heather and bearberry. Across Europe, this type of heath is largely confined to north-east Scotland and to altitudes above 250 metres (m). At Muir of Dinnet however, the bearberry heath is found below 200m and is rich in a variety of plant species including, intermediate wintergreen, petty whin and stone bramble.

Bearberry heath

The UK holds a high proportion of the European dry heath resource and the reserve supports the fourth largest area of bearberry heath in Scotland.

There are small areas of wet heath on the reserve, scattered throughout the dry heath and around the edges of Black Moss. The wet heath tends to form in shallow kettle holes, where water collects. These patches of heath are often very small (less than a hectare in size).

Raised bogs and fens

Muir of Dinnet has two areas of raised bog, one at Parkin's Moss to the south-west of Loch Kinord and the other at Black Moss to the north-east of the reserve. Together they cover approximately 32ha. Sphagnum (bog) mosses, the most important plants of a raised bog, are found at both locations, growing in the wet, acid and nutrient-poor conditions. On Parkin's Moss, these mosses form a red and green carpet over most of the bog surface. Both bogs support other specialist bog plants including bog cotton, cranberry and the carnivorous plants, butterwort and sundew. The bogs are also home to a wide variety of insects, including at least eight species of dragonfly or damselfly.

The raised bogs on the reserve are described as degraded raised bog as they are not currently forming peat and have been damaged in the past by draining and peat removal. Despite this, with the correct management, both bogs are capable of natural regeneration and longer-term restoration to active raised bogs. Lowland raised bog habitat is one of the most threatened and diminished habitats in the UK with only 5% of intact raised bogs surviving. The UK holds a relatively high proportion of the total European raised bog resource, so even degraded sites are of importance.

The raised bog habitat of Black Moss comprises only 16ha of the 84ha moss. Most of Black Moss is fen habitat dominated by sedges and rushes with open pools and floating carpets of vegetation. The fen habitat provides a natural transition into the raised bog, a feature known as a lagg fen, which is often lost from many raised bogs. In the wettest areas, bottle sedge and slender sedge form “sedge meadows” with smaller amounts of black, pale, star, carnation and water sedges. In the drier areas of the fen, cross-leaved heath and bog myrtle form a shrub layer with willow and birch providing a scattered tree canopy.

Ordie Moss is also a fen once joined to Black Moss before the A97 dissected the two areas. Again, sedges are the commonest species, with varying amounts of water horsetail and reedmace in the wettest areas. At Ordie, willows are the dominant tree species, as it is generally too wet for pines and birch to survive. Fen habitat is widespread throughout Europe and the UK but their characteristics can vary considerably from fen to fen.

Parkin’s Moss

Lochs

The two Dinnet lochs, Kinord and Davan, are kettle-hole lakes formed in the depressions left at the end of the last ice age. They are both fairly small and shallow, with an average depth of around 1.2m at Loch Davan and 2m at Loch Kinord. The shallow depths of the lochs means that light can penetrate to the loch floor. Consequently, the lochs have a rich flora, with over 25 species of aquatic plants recorded and over 50 species of plant recorded around the loch edges.

Loch Kinord

Aquatic plant species include water lobelia, quillwort and shoreweed. During the summer months, Loch Kinord also hosts a tremendous display of white water-lily. Reeds, sedges, horsetails, bulrushes and

willow scrub partially fringe both lochs. There are also areas of hard, stony shoreline, kept free of sediment by wind and wave action. These stony shores support larval stages of invertebrate such as stoneflies.

The main difference between the two lochs is their water quality. Loch Kinord has a small water catchment area receiving fairly unpolluted rainwater from the slopes of Culblean Hill. Loch Davan's water catchment feeds into the Logie Burn, which is the main watercourse running into the loch. It is low-lying and includes run-off from agricultural land enriched with fertilisers and consequently, Loch Davan has a higher nitrate content than Loch Kinord. Both lochs maintain poor to moderate nutrient levels. These types of lochs are widespread and frequent in the north and west of the UK with fewer examples in the south.

The lochs are home to breeding and wintering birds, fish, and otters.

Woodland

Approximately 470ha of the reserve are covered in trees, most of which are less than fifty years old. Birch dominates the lower ground with Scots pine on higher slopes. Scattered rowan, willow, alder and aspen grow throughout the wood and occasional juniper. The woodland provides a natural succession from open heath, through scrub to semi-mature woodland and returning heath again on the higher slopes where the thinner soils and more exposed conditions make it more difficult for trees to grow.

Between Old and New Kinord there are also 4.5ha of aspen woodland. The woodland is one of only 14 stands of aspen greater than 4.5ha in Scotland and is home to the rare Red Data Book (RDB) species, aspen bristle moss. Dinnet boosts by far the largest population of this moss in Scotland with it being found on 29 trees in 2013, five trees more than the last time it was monitored in 2003. It also hosts the rare aspen hoverfly and some rare fungi including *Junghuhnia nitida*. Some of the most attractive ground flora on the reserve is also found in the aspen woodland in springtime, when the ground is carpeted with primroses, wood anemones and cowslips.

Aspen in Autumn

Flora and Fauna

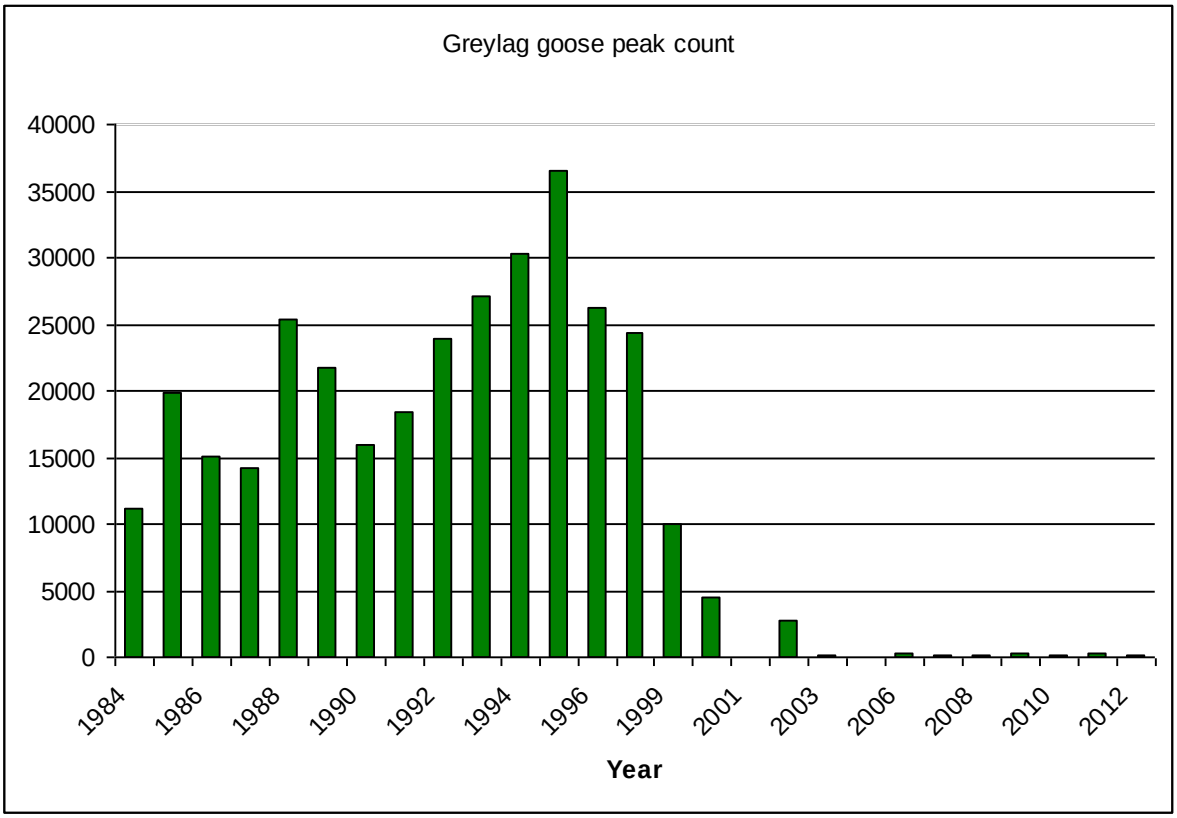
The tremendous variety of habitats found at Muir of Dinnet provide a wide mix of suitable niches for an equally tremendous diversity of birds, mammals, insects and plants alike.

Birds

We have recorded 140 bird species on the reserve, of which 76 species breed regularly, 7 occasionally and around 38 species are regular visitors. The remaining 19 species are irregular visitors to the reserve and include our first record of icterine warbler in 2013. The bird assemblage includes 13 UK Biodiversity Action Plan (UKBAP) and 40 RBD species such as Scottish crossbill, skylark and grey partridge. Bird visitors to the reserve include the wintering wildfowl for which the Dinnet lochs are internationally important.

Until the year 2000, dawn and dusk at Muir of Dinnet was filled with the sound of tens of thousands of greylag geese coming to and fro from the Dinnet lochs. Numbers peaked in 1995 with over 36,500 geese being counted. Since then however numbers have declined dramatically with as few as 10 birds being recorded in 2004. This decline coincides with a national shift in greylag geese wintering grounds. With milder winters, birds no longer travel as far south from their Icelandic breeding grounds. So whilst numbers of greylag at Muir of Dinnet have declined, in more northerly locations such as Loch Spynie and Orkney, their numbers have increased. Over the last six years (2007-12) numbers of wintering greylag have been stable with approximately 200 birds returning each year (table 2).

Table 2: Wintering greylag numbers at Muir of Dinnet NNR since 1984



The lochs are also internationally important for a whole variety of other wildfowl that choose to spend their winter on the reserve. Over the past 4 years (2008- 2012), a peak mean of 10 whooper swans, 151 goldeneye, 83 wigeon, 139 teal, 379 mallard and 139 tufted duck all over-wintered on the Dinnet lochs, together with smaller

numbers of pochard, mute swan, cormorant and goosander. In general, these numbers were slightly higher than in the previous 5 years.


Goldeneye

Mallard, teal, tufted duck, wigeon, greylag goose, mute swan and goldeneye also stay to breed in the area surrounding the lochs. Goldeneye numbers have increased on the reserve with the Dinnet lochs supporting the largest breeding population of goldeneye in Great Britain, outside Strathspey. During the summer, Loch Kinord is a magnet for goldeneye, with birds that breed off the reserve travelling several kilometres with their ducklings to join those breeding around Loch Kinord. In 2007, all goldeneye ducklings recorded on mid- Deeside were later seen at Loch Kinord.

Birds such as moorhen, water rail, sedge warbler and reed bunting also breed around the lochs, returning to Dinnet each year from their wintering grounds. The woodlands, wetlands, heath and farmland also provide a wide range of habitats for a variety of other breeding birds. Summer migrants such as redstart, willow warbler and tree pipit find ideal nesting and feeding grounds in the woodlands whilst, curlew, skylark and meadow pipit fill the air with their song on the heaths. The wetlands have been home to the rare spotted crake however no calling males were recorded in 2010. This may reflect a national decline in spotted crake as very few calling males have been heard in recent years.

Mammals


Otter

Muir of Dinnet has a thriving population of otters which move between the lochs and the middle reaches of the River Dee. Otter are a species of European importance and a UKBAP species. In freshwater habitats, like the reserve, they can be pretty elusive, active mostly between dusk and dawn. There are however plenty of clues to their presence as the shores of the lochs are peppered with tracks and spraints (droppings). Cub tracks, holts and occasional sightings of family groups on the reserve also confirm that otters breed here.

At least seven other UKBAP mammals make the reserve their home. The spread of pine on the reserve is good news for our thriving red squirrel population. We had hoped that it would also provide good wildcat habitat but with no confirmed sightings of wildcat on the reserve since the 1970's and our survey in 2008 also drawing a blank, its beginning to look unlikely many or even any pure wildcats survive locally nowadays. Three species of bat are known to actively use the reserve at night - pipistrelle, brown long-eared and Daubenton's bats. Pipistrelle and brown long-eared bats have found suitable roosting sites in the loft and roof space of the visitor centre returning each summer to raise their young. Daubenton's bats feed over the watercourses and lochs on the reserve but as yet, we have not found where they roost. Brown hare and badgers also use the agricultural fields within the reserve to forage and pine martens are also becoming increasingly common. They are rarely seen but their spraint can now be found all over the reserve.

Both red and roe deer are found on the reserve. Roe are widespread, whilst red deer are mostly confined to the higher ground.

Invertebrates

The reserve is a haven for invertebrates and has a nationally important assemblage of moths and water beetles as well as, 6 UKBAP and 2 RDB species. At least 349 species of moth (including micro-moths) are known to occur on the reserve including the UKBAP and RDB species, netted mountain moth which lives on the bearberry heath. Rare "micro-moths" such as *Levipalpis hepatariella* and *Depressaria silesiaca* (which have no common names) are also found on the heath areas, their larvae are thought to feed on bearberry and yarrow. Young birch provides food for Kentish glory moth caterpillars, while the aspen wood is the only known Scottish site for chocolate tip moth. The reserve is home to 14 species of butterfly, of which large white and the green-veined white are probably the commonest species, but good populations of pearl-bordered and small pearl-bordered fritillaries are also present.

Black Moss is particularly rich in water beetles with a number of uncommon species such as the rare *Acilius canaliculatus* and the nationally scarce *Enochrus affinis* (a water scavenger beetle), *Gyrinus aeratus* (a type of whirligig beetle) and *Hygrotus quinquelineatus.*

The reserve is also home to one of the best dragonfly assemblages in the North-East of Scotland. Common blue, northern, emerald and large red damselfly are all found here, along with golden-ringed, common hawker, black darter and four-spotted chaser dragonflies. The extremely rare white-faced darter has also been recorded just off the reserve.

Golden-ringed dragonfly

Fish

The burns and lochs on the reserve harbour at least seven different species of fish; pike, perch, European eel, brown trout, Atlantic salmon, brook lamprey and minnows, with pike the most common in the lochs. They are voracious predators and feed on ducklings and all of the other fish species, including smaller pike. One pike, caught many years ago at Loch Davan, was found to have a rabbit in its stomach, although how it acquired the rabbit remains a mystery!

Predation by pike keeps the other fish populations in the lochs at lower levels. Young brown trout and salmon move between the burns and the lochs but do not tend to spend long in the lochs. Improvement works to the Logie Burn in recent years is also creating gravel beds that may be suitable for fish spawning, and we hope that salmon or trout may use these in future years.

Reptiles

Three species of reptile are found on the reserve; adder, slow worm and common lizard. The reserve provides ample basking places for these cold blooded animals. Adders make full use of fallen dry stone dykes and ruins, warming themselves on the rocks. Slow worm and common lizard are often seen around Burn o'Vat.

Adder

Higher plants

Over 260 different plants have been recorded on the reserve, of which 4 species, intermediate wintergreen, Scots pine, juniper and six-stamened waterwort are nationally scarce. Juniper, also a UKBAP species is found scattered throughout the reserve, while intermediate wintergreen and creeping lady's tresses are found in the Scots pine woodland. The waterwort, an aquatic plant, is found in both lochs.

Lower plants and fungi

Lower plants on the reserve include a mix of mosses, liverworts and lichens. The Vat Burn gorge is the richest area for mosses and liverworts on the reserve, the moist conditions providing the perfect damp home. In 2007, the rare green shield moss was found along the Vat Burn, growing on rotten wood. Yearly monitoring suggests there is only a small population of this moss. Trees have been felled close to where the moss grows to provide a future home for it when the wood rots.

It is the aspen woodland and heath however which are home to the rarest mosses on the reserve - the aspen bristle moss and rusty fork moss. Until 2003, the aspen bristle moss was thought to be extinct in Scotland, then three populations were re-discovered, including one at Muir of Dinnet. Rusty fork moss, as the name suggests, is a small orange forked moss found on the dry heath. This species is listed as “Vulnerable” by the International Union for the Conservation of Nature (IUCN).

Green shield moss

The lichen flora is richest on the heaths, where over 30 species of *Cladonia* lichen have been recorded. The woodland areas have fairly low numbers of lichens. Lichens grow extremely slowly and because most of the trees are relatively young, the slow-growing lichens have not yet had time to develop.

The reserve has a typical array of fungi, mostly associated with the woodlands. Common examples of these woodland fungi are the fly agaric, bright red with white spots and brown birch boletes, which have a brown bun-like cap.

Local Biodiversity Action Plan (LBAP) species found at Muir of Dinnet are the pitted corky spine fungus and the booted knight. These species are associated with established pinewood, and often prefer track edges where soils are exposed. The aspen wood is home to some rare fungi including the aspen bracket fungus, birch mazegill, *Encoelia fascicularis, Lachnum corticale* and *Junghuhnia nitida.* The aspen wood here is only one of three places in Scotland where *Junghuhnia nitida* is found.

Archaeological, historical and cultural heritage

Archaeological remains are found all over the reserve and the oldest date back to around 6000 BC. They tell the story of human occupancy since Mesolithic (Stone Age) times, of early farmers, wars and outlaws, decadence and worship. The earliest remains of settlements date back to the Iron Age. To the north and west of New Kinord lie the remains of the New and Old Kinord settlements and field systems. A total of 15 hut circles have been found in this area. Some are quite large, approximately 15m across, and would have housed both people and animals. Next to the hut circles are hollows in the ground believed to be collapsed souterrains (underground storage rooms) and there are various banks, earthworks and sunken paths which may have been old field systems and tracks.

Around the same time, a crannog was built on Loch Kinord, probably for defence. Oak tree trunks were driven into the loch bed and stones built up around them. A large hut was then built on top of the structure. Carbon dating of timbers from the loch show that the crannog may have been used for over 1000 years, until the 10th

century AD. Dug-out oak canoes would have been used around the crannog and the remains of at least one are still preserved in the loch. Today the crannog can be seen as a small island covered with trees.

Loch Kinord cross slab

On the north shore of Loch Kinord stands a 9th century AD cross slab. Carved with an intricate pattern of knotwork, the cross slab indicates that there may have been a small monastery or chapel here at that time. The cross is considered to be a third period Pictish cross, as it has only Christian symbols and earlier crosses would have had pagan symbols as well. At some point in history, the cross was lost and buried. Dug up again in the 1820's, in a field near its current location, it was taken to Aboyne Castle and eventually returned to its present position in 1959.

There are also important archaeological remains around Loch Davan. The remains of a medieval moated homestead, known as The Heugh are visible on the north shore of the loch. The Heugh is thought to have been the headquarters of Andrew de Moray during the battle of Culblean in 1335.

The Heugh, Old Kinord settlements and field systems, and the Loch Kinord cross slab are nationally important, Scheduled Ancient Monuments (SAMs).

Summary

Few places in Scotland have such a wealth of geological interest and diversity of habitats within such a small area. It is this variety of habitats that allow so many different kinds of plants and animals to flourish within the reserve. This coupled with the evidence ancient human occupancy make Muir of Dinnet a special place for its natural and cultural heritage.

4 Management of Muir of Dinnet before it became a NNR

History of Muir of Dinnet

Neolithic 3000 BC	The first people arrive at Muir of Dinnet. Early hunter-gatherers started to establish small scale, nomadic dwellings.
Bronze Age 2000 -750 BC	The first permanent settlements are established and woodland is felled.
Iron Age 750 BC - 43 AD	Hut circles are built and work starts on building the crannog on Loch Kinord.
Romans in Scotland 80 - 399 AD	The promontory fort at the south of Loch Kinord is built in response to rumours of a Roman invasion.
Early Medieval 1000 -1285	King Malcolm III (Canmore) uses a wooden “peel” tower (a square wooden tower or palisade) on Castle Island, in Loch Kinord as a hunting lodge.
Wars of Independence 1286 -1370	Battle of Culblean, 30 November 1335. The forces of Sir Andrew de Moray, Regent for the infant King David II (son of Robert the Bruce), defeat those of Earl David of Strathbogie after the Earl attempts to capture the royal family at Kildrummy Castle.
The Reformation 1488 -1602	Ownership of Muir of Dinnet passes to the Earls of Huntly in 1488.
The Stuarts 1603 - 1713	Peel tower on Castle Island is demolished in 1648. In 1648, the notorious outlaw Gilderoy Macgregor uses the Vat and gorge as his hide-out, from which to mount cattle rustling and sheep stealing raids. He was eventually caught and hanged in 1658. Old documents note that General Mackay burnt the “Forest of Culblean” after an unsuccessful Jacobite uprising in1689.
North Britons and Jacobites 1714 -1836	Celtic cross slab is taken to Aboyne Castle for safekeeping in 1820.
The Victorians 1837 -1900	In 1848, Queen Victoria visits Balmoral for the first time, beginning the popularity of Deeside as a tourist location. The Deeside railway line to Ballater is completed in 1866, with a station at nearby Cambus o’May In 1876, the first diatomite is mined at Black Moss, for use in making dynamite, paints and pigments. A map, of 1885, shows Muir of Dinnet to be a predominantly tree-less moorland landscape, maintained by muirburn for grouse shooting. The Earls of Huntly sell Dinnet Estate to a Minister for Parliment, Charles Wilson in 1888. In 1896, Dinnet Estate is bought by Mr J.C. Barclay-Harvey, great-great-grandfather of the present owner.
Modern Scotland 1901-	Diatomite mining ceases in 1919. The Wall Street crash of 1929 causes a steep drop in sheep

1944	prices. Sheep farming becomes uneconomic and numbers of sheep are reduced at Dinnet.
1944	World War II marks a temporary end of regular heather burning at Dinnet and trees start to spread across the heath.
1949	Muir of Dinnet is included in the list of possible NNRs by the Scottish Wildlife Conservation Committee.
1950s	Sheep grazing ceases.
1966	Deeside railway line closes.
Early 1970's	Aberdeen County Council proposes to turn the area around Loch Kinord into a Country Park with extensive tracks, parking, camping and boating on the lochs.
1971	Muir of Dinnet notified as a SSSI
1972	The Vat path is constructed and parking areas created. The toilets are built and a tearoom is opened in the Burn o'Vat cottage.

Land use history

We know from pollen records preserved in peat and loch sediments that the first people came to the Dinnet area approximately 5-6000 years ago. The first direct evidence of people at Dinnet however comes from minute flakes of flint that have been found. These would have been cast aside from tool-making and are thought to date back to around 3000 BC. These findings coincide with a reduction in tree pollen and increase in grass pollen at the same time, suggesting that the Neolithic people were starting to clear some areas of woodland, possibly for firewood.

Farming

The first cereal pollens found in the peat and loch sediments date from around 1150 BC, and probably mark the start of agriculture at Muir of Dinnet. We can also tell from the remains of peat cuttings at Parkin's Moss and Black Moss that peat was cut from the bogs, probably for fuel and drying grain. Old records show that rent for the farms were partially paid in "peats". An account from 1622 records that:

"Mekle chandmoris - payis yerilie. Sett for four yeris, entree 1622. Aucht four markis maill, tua wadders, tua leitt of peitts".

This is roughly translated to the farm at "Meikle Chandmoris" (Meikle Kinord) paid as part of their rent, 84 marks of meal, two weathers (sheep) and two loads of peats. Meikle Kinord is fairly close to Parkin's Moss, so it is likely that the peat was cut from there.

In 1826, and again in the 1850s, Loch Kinord was partially drained, probably for agricultural reasons, and the level of the loch was lowered by about 1 metre. It is difficult to be certain, but as the land surrounding the loch today is relatively low, the loch would have been more extensive than it is today. In 1888, the outlet of Loch Kinord was modified to provide power for Dinnet House, by creating a "new" loch (Clarack Loch) which was controlled by sluice gates.

It is not clear from the records when exactly sheep and cattle grazing started around Muir of Dinnet. We know that both cattle and sheep were being farmed in the area during the 1600's as the Vat was used as a hide out by cattle and sheep rustlers. Prior to 1929 the moor was grazed by sheep and burned to maintain young vegetation rather than older woody heather. The old picture postcard below shows the building which is now the visitor centre - and no trees on the hill behind it!

Burning would have maintained the moorland habitat for red grouse as well as improving the grazing for sheep. Burning and grazing would also prevent the natural regeneration of Scots pine, birch and other trees. Sheep were grazed across Dinnet until the late 1950's and, after their removal; there was a marked increase in the spread of trees.

Although the removal of sheep from the site reduced grazing pressure, which had partly suppressed the establishment of tree seedlings, burning would have continued, for sport shooting purposes and maintained a site largely free of trees. However, the loss of gamekeepers to the Army during World War 2 and the temporary cessation of burning gave the birch trees enough time to become established. From the mid 1940s, the estate tried to control the birch with herbicide, and by burning and cutting the trees, but by this time the woodland was too well established to eradicate.

Tourism

The Vat has been a tourist attraction since Victorian times. Queen Victoria bought Balmoral Castle in 1854 and many people followed her example by visiting Deeside. The "Turnpike Road" (now the A93) opened in 1857 followed the completion of the last section of the Deeside railway to Ballater in 1866. This opened up Deeside to tourism and local people were quick to make the most of this new source of income. A horse and trap could be hired in the village to carry people to the Burn o' Vat and the cottage (which is now the visitor centre) became a tea room. Old postcards of the visitor centre, occasionally turn up in second hand sales with a sign reading "picnic parties catered for" sitting outside the building.

Burn o'Vat cottage looking towards Loch Kinord late 1800s

Diatomite mining

In 1867, Alfred Nobel discovered that the highly volatile nitro-glycerin liquid could be soaked up by inert diatomaceous earth, or diatomite. This substance could then be rolled into sticks and so dynamite was invented! Diatomite (sometimes called kieselguhr) was suddenly in demand and this resulted in a small industry springing up at Muir of Dinnet in 1867.

Lochs contain many billions of microscopic algae, which have an outer casing made largely of silica. As they die and decay, the durable silica cases accumulate into layers, called diatomite, at the bottom of lochs. Black Moss was particularly rich in diatomite and between 1867 and 1910, it was dug from the moss and sent all over the world to make dynamite, or be mixed into paint.

Summary

Visitors today walk through a landscape influenced by natural forces and thousands of years of human activity. The evidence we can find paints a picture of a changing landscape, with woodland coming and going from the reserve as a result of human activities.

5 Management of Muir of Dinnet NNR

Key events in the history of Muir of Dinnet since it became a NNR are as follows:

1977	A 25 year Nature reserve Agreement (NRA) between Dinnet Estate and the Nature Conservancy Council (NCC) is agreed. Muir of Dinnet is declared a NNR to commemorate the Queen's Silver Jubilee. The reserve is formally opened by the Duke of Edinburgh on 19th September 1977. A full time reserve Warden is based at New Kinord House.
1979	"Portrait of a Nature reserve" is published and leads to the production of the first 5 year reserve management Plan.
1980	A full time reserve estate worker is also employed by NCC.
1982	Byelaws are introduced and a seasonal warden is employed throughout the summer.
1984	NCC leases the old tearoom at Burn o'Vat Cottage and opens the Burn o'Vat visitor centre.
1984	Weekly monitoring of geese and wildfowl numbers starts.
1986	A new burning regime is introduced to maintain the bearberry heath.
1989	The SSSI is re-notified.
1999	The renovated Burn o'Vat visitor centre is opened.
1999	Ditch damming is carried out on Parkin's Moss to restore the bog
2002	The reserve continues to be managed as a NNR whilst negotiations are carried to renew the NRA. The reserve Manager is based at Aberdeen.
2005	Loch Kinord circular path created.
2006	A new NRA is concluded. The reserve is opened by the Duke of Rothsay on 20th April 2006.
2008	A public consultation of the draft reserve Plan 2008-2014 is carried out.
2007	Muirburn resumes on the bearberry further to the removal of over 7ha of pine.
2010	The Burn o'Vat visitor centre is extended to include office accommodation for the reserve Manager and a workshop. It achieves a gold GTBS standard award. A Visitor Management Plan is prepared for the reserve. New signage installed across much of the reserve.
2011	The meanders on the Logie Burn are reinstated back to their natural course. The car park is extended to double its size and a garage built to house the fire tendering equipment. The designated features of the reserve are reviewed under the Nature Conservation Act (NCA). Dragonflies and hydrological mire range are added to the list of features. A further 2 ha pine removed from bearberry heath.
2012	Over 600m of the Loch Kinord trail is surfaced. The viewpoint on the Burn O'Vat trail built is replaced and achieves a

	commendation award for design from Cairngorm National Park Authority (CNPA). The first phase of the new exhibits for the visitor centre are completed. Another 2 ha pine removed from bearberry heath.
2013	The final phase of the visitor centre refurbishments are complete and the new exhibits are opened by Logie Coldstone Primary School children. The visitor centre achieves a 4 star rating from Scottish Tourist Board.

Management of the Natural and Cultural Heritage

In 1950, Muir of Dinnet was one of the first sites to be identified by the Scottish Wildlife Conservation Committee in Britain as a possible NNR. It was 27 years later (1977) however, before Muir of Dinnet was declared a NNR and a 25 year agreement was concluded between Dinnet Estate and our predecessors, the NCC. The aspiration at the time was to provide protection for the wildlife in a way that would also allow the traditional land uses of agriculture, forestry and sporting activities to continue.

The first management plan was produced in 1981. The plan aimed to conserve the landforms and the diversity of plant and animal communities of the moorland, woodland, lochs and bogs, by a mixture of active management and protection. NCC also wanted to demonstrate the integration of nature conservation with existing land uses and to survey and record all aspects of the reserve's wildlife and encourage scientific research. A full time reserve warden helped deliver these tasks and lived on the reserve at New Kinord House. As was the case with many NNRs in the early days, byelaws were drawn up to assist with the management of the reserve. Amongst other things, byelaws prevented wildfowl shooting, camping, fires and the use of boats on the lochs. The byelaws remained in place until 1994 when they lapsed and were not renewed. Instead, our focus changed and the emphasis is now on promoting responsible access by visitors to the reserve.

A new reserve Plan was produced in 2008 after a public consultation where for the first time, we actively sought the views of visitors and neighbours on the management of the reserve. This plan set our management for the next six years until 2014 and key to implementing this was the building of a new office and storage at Burn o Vat, as this allowed staff to be based once again on-site, full time. There is a full time reserve Manager, a seasonal staff member and a cleaner. Since the new office extension was completed, the visitor centre is open most days and staff have daily contact with visitors. It has also become easier to manage the reserve as tools and equipment can be stored here.

Bearberry heath

The main focus of our active habitat management on the reserve has been carrying out controlled burning (muirburn) on the dry heath to maintain the bearberry heath. The natural regeneration of woodland at Muir of Dinnet is so successful that if we did not burn the heath to remove tree saplings, then eventually the heath would be

colonised by trees and the bearberry heath lost. By carrying out regular, small-scale burns we also prevent heather from becoming too tall and shading out other plant species. Unfortunately our programme of muirburn had stopped in 2002 when the reserve agreement came to an end and staff changes meant that the reserve manager was no longer based at the reserve.


Volunteers clearing pine for the bearberry heath

It was another 5 years before we were finally back in a position where we could recommence muirburn on the heath. The first task however was to remove all the large pines that had grown up, as it would have been unsafe to have burnt these. The pines had to be removed from the heath by hand. This was extremely time consuming work; the pine must be cut, chipped and the chippings taken off the heath. In the end we removed around 11ha of scattered pine scrub this way and much of the work was carried out by volunteers. In 2007, 2009 and 2010/11, we employed a local contractor to carry out the muirburn for us – where burning wasn't possible the heath was swiped (cut) to provide a similar result as the burning. Approximately 10ha (about quarter) of the existing bearberry heath has been brought back into a programme of muirburn management so far.

We have also felled saplings and gorse scrub on the bearberry heath to slow the spread of the trees, especially where burning is not a feasible option.

Parkin's Moss

Trying to retain the most natural areas and the areas with most potential are key parts of our approach.

In 1999, we set about blocking up the drains on an area of raised bog, which had been dug before it became part of the reserve. We initially placed 11 dams in the ditches. This has led to a rise in the water table and trees, which were previously able to grow on the dried-out bog, are now dying off due to the increased wetness of the site. We named the bog 'Parkin's Moss' in celebration of the contribution that a former reserve Warden, Jim Parkin, had made to the success of the reserve over his 18 years at Muir of Dinnet. A newly created bog, will take a very, very long time to achieve anything like the value of a naturally evolved bog, even one that is degraded, but restorable. Parkin's Moss continues to flourish and in 2012/13 we removed around 80 cone-bearing pines from the surrounding heath to open up the edge of the bog.

Similarily, on Black Moss, we installed four dams in the main ditches to slow water loss and retain the sedge meadows.

Biodiversity and monitoring

Since 1984, we have carried out weekly counts of wintering geese. The goose counts have recorded both the incredible rise of greylag geese on the lochs from 11,229 in 1984 to over 36,500 in 1994, and the subsequent decline. Reserve staff also recorded the numbers and species of different wildfowl once a week during the winter and monthly as part of national counts for waterfowl. With changes in our staffing, this work is now carried out by local volunteer counters as part of the British Trust for Ornithology's (BTO) Wetland Birds Survey (WeBS). We also still count three times a year as part of the Grey Goose census.

In addition to this, we also carry out a six yearly Site Condition Monitoring programme. This information is used to check whether the internationally and nationally important species and habitats are in favourable condition and that our management is appropriate. Tree regeneration onto the bearberry heath has led to it being in unfavourable condition which in turn affects the condition of assemblage of rare moths with them also being in unfavourable condition. Many of these moths feed on plants found on the bearberry heath and the loss of heath has led to a reduction in the number of moth species found here. By restoring the quality of the bearberry heath through our recommenced burning and tree management, we hope that this will also encourage the return of some of these moth species.

Research use

Research has been long established at Muir of Dinnet. Professor Gimmingham from the University of Aberdeen started his studies of heath management back in 1960. His work has given us a better understanding of the requirements of bearberry heath such as the ideal frequency for burning is every 16 -18 years, rather than the traditional 5 years or so that is carried out for grouse moors. Heathland research generally has also helped refine government advice in documents such as the Muirburn Code, which contains advice on the sensitivity of different habitats, as well as the more legal aspects of muirburn.

The otters and the ecosystems of lochs Kinord and Davan have also been studied in detail by the Institute of Terrestrial Ecology when they were based at Brathens. A key part of this study was to understand how otters use the different habitats around the lochs and the relative importance of prey species in the otter's diet. We know that eels used to be the most important prey species for otter at Dinnet but now form a much smaller part of their diet due to the massive decline in European eel populations internationally.

The lochs are one of a number of UK wide locations included in the Freshwater Environmental Change Network. This network collates a range of important environmental variables including measures of air and water quality and weather data. The data is then used to inform a wide range of future government planning and policy on environmental matters.

Over many years, the reserve has provided numerous field study sites for students and graduates pursuing general study, as well as MSc and PhD projects in ecology, forestry, genetics, geology, archaeology and many more.

Wider initiatives

In 2002, Scotland was one of five countries that agreed to participate in the North Sea Regional and Local implementation of the Water Framework Directive (NOLIMP). The 3 Dee Vision Project was developed as a delivery mechanism for NOLIMP with the aim to pilot methods to improve water quality and 'good ecological status' in the catchments of Loch Davan, the Tarland Burn, and the Elrick Burn. Most of this work involved reducing or modifying the way in which domestic livestock use natural watercourses for drinking water and involved fencing off stream margins or creating "hard standings" at cattle waterings, so the cows do not erode the stream banks. The 3 Dee Vision Project which was supported by SNH and our partners, Aberdeenshire Council, Scottish Environment Protection Agency, the Macaulay Institute, University of Aberdeen and Scottish Water, has made a considerable contribution to improving the water quality in the Loch Davan catchment and hence, Loch Davan itself.

Restored meanders of the Logie Burn

In 2011, we also set about reinstating the old meanders of the Logie Burn. At some point in the past, the burn had been straightened to drain farmland more rapidly. The old meanders were still visible beside the straightened burn were blocked off with dams of earth and were filled with lots of dead wood. The dams and wood were all cleared to direct the burn down its old course once again. This had to be done very carefully using 'sedimats' so we didn't flush lots of sediment into Loch Davan. The 'new' meanders seem to be working well - in times of spate, they overspill into the field and deposit sediment and nutrients there rather than into the loch. The bed of the burn is also far more varied and gravel beds are developing that we hope will be used by spawning fish.

Management for People

Early days

From the onset, we recognised that Muir of Dinnet was a special place where people could come to enjoy wildlife. Some of the visitor facilities around the Burn o' Vat were already in place when Muir of Dinnet became an NNR. The estate had built the toilet block with financial support from the Countryside Commission for Scotland

(CCS) and constructed the first formal car park and footpath to the Vat. At this time, small displays in the tearoom told visitors about the reserve.

The work of the first warden, employed in 1977, focussed on speaking to visitors and explaining the changes associated with the new reserve. About the same time, seasonal staff were appointed to operate the tearoom, clean the toilets and deal with visitors around the Burn o'Vat. Their wages were the profits (if any) from the tearoom. An old note in the accounts book shows that a week's profit of £12.62 ½ pence was considered a "good week"! Early interpretation in the tearoom was pretty low-key and consisted largely of a few photos with captions.

When the tearoom eventually closed in the late 1980s, we converted the building into a visitor centre for the reserve, adding more information to the displays and the seasonal staff became paid employees. A three dimensional model of the reserve was created and is still on display in the centre today albeit we have had to add lots more trees to take account of the spread of trees since the model was made.

As visitors became more familiar with the reserve and its requirements, especially with the introduction of byelaws in 1983, the roles of both the seasonal and fulltime warden evolved. Much more of the contact with visitors was proactive and more resources went into explaining more detail about the wildlife interests on the reserve. The Burn o'Vat visitor centre was open from May to September each year and a seasonal warden employed specifically to maintain the centre and trails, and speak to visitors.

The paths around the Burn o'Vat were gradually formalised in the late 1980s and early 1990's. We created a loop trail from the Vat, so that visitors could return to the car park a different way and produced a trail leaflet. Inmates on day release from Craiginches Prison constructed a boardwalk and steps up the side of the Vat gorge and the wooden viewpoint above the visitor centre.

Trails around the reserve

Until the mid-1990s however, there were no paths linking the Burn o'Vat with the rest of the reserve. In 1997 we built a link path connecting the Burn o'Vat to Old Kinord so that visitors could walk through the birch woodland to Loch Kinord. This area is rich in wildlife and archaeology and a wide choice of longer routes, including a trail around Loch Kinord which also provides links to Dinnet Village and the Deeside Way.

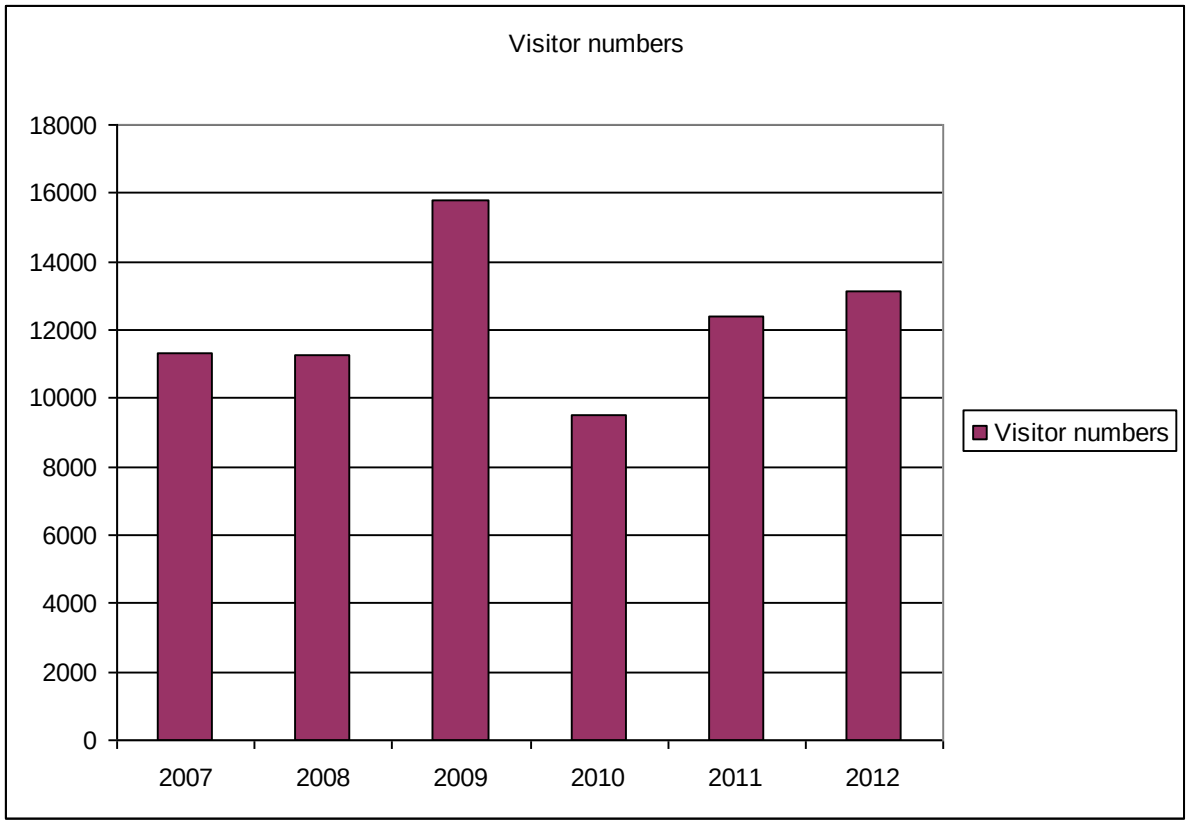
Also in the 1990s, we resurfaced the Burn o'Vat car park using a layer of Geoblock. At that time, this was a relatively new surfacing technology and provided a gap between the soil layer and vehicle tyres so that grass could grow and the car park appears 'natural'. Unfortunately, this has not been entirely

successful as the Geoblock has never really grassed over, but it does provide a robust free draining surface.

Path maintenance and upgrading forms a large part of our visitor provision work on the reserve. We have upgraded the lower part of the Burn o' Vat trail to an all abilities path as far as the Vat. This work began in 1998 when we built the "zig-zag" path behind the toilets. A year later, we built a bridge across the Vat Burn to replace the stepping stones, which were sometimes flooded over when the Vat Burn rose or were removed by children to build dams! We have resurfaced the lower part of the Vat trail a number of times using local quarry dust to provide a firm, level surface, and still need to do so occasionally when the Vat burn floods and erodes the path. In 2001, we installed a path between the Burn o'Vat and an old landrover track from Lochhead to Cambus o'May. This path has provided a link from the Burn o'Vat to a network of trails on Forest Enterprise land at Cambus o'May and the Deeside Way. We also installed a boardwalk onto Parkin's Moss.

Visitors

Visitor numbers peak between Easter and September, but the reserve is still busy "off season" as well. From 2007 we have used people counters to monitor visitor numbers across the reserve. Initially we used buried 'footfall' counters. These however proved to be unreliable, not working when the ground was frozen, and become less reliable as their batteries age leading to them underestimating numbers. They do however show us year-to-year variation in visitor numbers. The data in the graph below summarises results from the footfall counter across the road from Burn o Vat.



In addition, a people counter, installed by the Upper Deeside Access Trust (now incorporated into the Cairngorms Outdoor Access Trust) at Dinnet Village showed that 7400 people used all abilities link from the village to the reserve in 2007 (unfortunately the counter stopped working shortly afterwards).

In 2012, we installed a 'beam breaker' people counter in the visitor centre. This is far more reliable and shows an average of between 240 visitors per day during the busy summer period and 22 visitors per day in the winter months. Thanks to information we now estimate that approximately 40,000 people visit Muir of Dinnet NNR annually.

New visitor facilities

With much of the existing visitor provision dating back to the late 80's and 90's, one of the key objectives of the last reserve Plan was to take stock of what we had, think about our audience requirements, identify gaps in provision and update many of the key visitor facilities the reserve offered. In 2010, we contracted in professional interpretation consultants to prepare a Visitor Management Plan for the reserve. This drew on information provided by visitor surveys, the reserve Plan public consultation and direct experience from the reserve manager to identify our visitor requirements and themes for interpretation. From this we developed an Exhibit Plan which we have been steadily implementing across the reserve over the last few years.


New section of car park

One of the immediate problems to address was the inadequacy of the car park at the visitor centre. With the reserve becoming increasingly busy, the car park was often overflowing, at weekends, public holidays or just on nice, sunny days. Also with only one exit/access point and no parking delineated, traffic flow within the car park was poor with cars being badly parked taking up more room than necessary, and causing problems for vehicles needing to turn in order to get out of the car park. Extending the car park was obviously required but we wanted to do this in the least obtrusive way possible. Following a landscape design, the car park was doubled in size, an exit point was provided to allow vehicles to move in one direction through the car park and individual spaces were marked out using wooden sleepers. The extension retained some of the existing trees and used a modern equivalent of the geoblock, called 'grassguard'. The result is a green, relatively natural looking car park, to the point that the car park as well as the lawn needs mown!

The Visitor Management Plan also recommended rationalising the reserve's network of paths. We had created at number of paths but not all of these were as appealing to visitors as others. Most visitors want relatively short, well marked trails and, to achieve this, we chose to develop and promote four key trails; the Burn o Vat trail, Parkin's Moss trail, Loch Kinord trail and the Little Ord trail. These trails have had new signs and waymarkers installed and are on the updated reserve leaflet. Other trails are shown but are not waymarked, as more confident visitors looking for a longer walk are generally content to follow a map and do not require waymarking.

Along with the 'new' trail network, we also upgraded the 'sense of welcome' at the Burn o Vat visitor centre. We have installed a new orientation panel, with a simple clear map and general arrival information, as well as new welcome signs to greet visitors as they arrive. There are new leaflet dispensers outside the centre, so maps and information are available even on the few occasions when the centre is closed.

Some very subtle changes have occurred along the Burn o Vat trail, with placed boulders at the Vat entrance to provide easier access, yet not taking away the excitement of entering this hidden world. In 2011we replaced the viewpoint creating a larger, more attractive structure; so much so that it received a commendation in the Cairngorms National Park Design Awards.

New viewpoint

Big changes have also been made inside the visitor centre. The last displays and interpretation panels installed in 1999 and the panels, in particular, were in need of updating. Some of the displays have been very popular over the years and will always appeal to visitors, so we have retained some of these including the refurbished 3-D map and crannog, animal masks, jigsaw and the 'touch tables' with antlers, bones, fungi and feathers for visitors to handle; children love being told "please touch" for a change! We've provided new bespoke furniture for all of the 'old' displays and refreshed the paint work on the masks and jigsaw.

The new exhibits include a crawl -in model of the Vat for youngsters to explore and a carved granite bowl to swirl stones around in to mimic the erosion at the Vat. Real tree trunks bring the woodland section alive together with the digital photo frames that display photos of the woodlands and what can be seen there throughout the seasons. Try as we did to display a real peat core from Parkin's Moss, in the end we had to settle for a mock-up of a real peat core using a photograph. The fake "core" is however life size and, as we managed to core 6m of peat, we've had to chop some of the peat core off the photograph in order display it vertically in the building. Alongside the peat core and the history of events that have happened since the peat

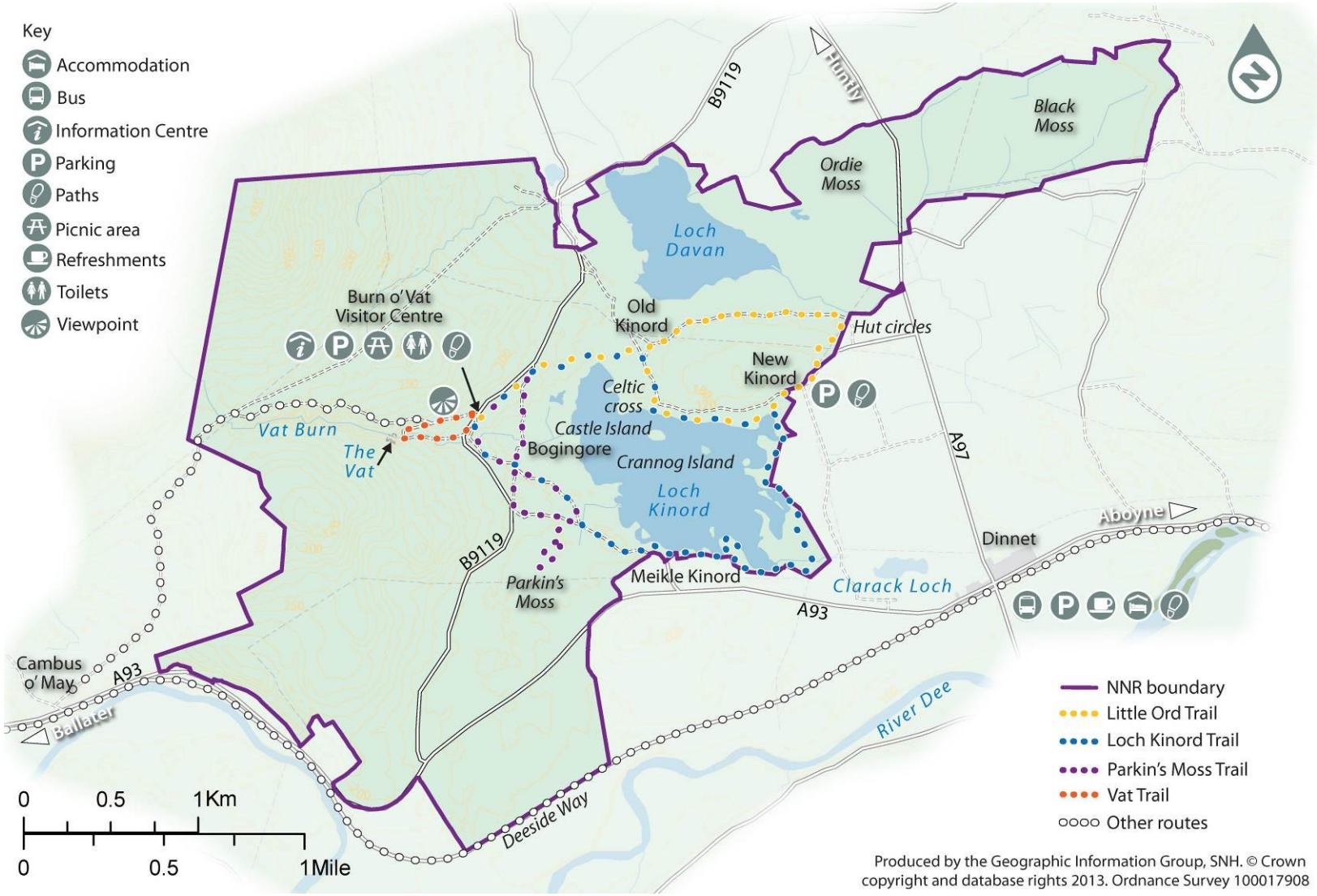
started to form is a live piece of bog showing visitors what the surface of the bog looks like today.

Muir of Dinnet is a reserve for all seasons, so we spent a year capturing footage of the seasonal wildlife highlights at Muir of Dinnet to produce a short 8 minute film. This can be seen in the visitor centre and online and will hopefully encourage visitors to come again at a different time of year next time.

Children from Logie Coldstone Primary School formally opened the new exhibits at the visitor centre in 2013.

New displays at the Burn o Vat visitor centre

Map showing the visitor facilities at Muir of Dinnet NNR



Education

Now reserve staff are based at the reserve again, we are seeing an increasing number of visits by education groups, ranging from primary schools to universities. In 2012, we spoke to around 450 pupils or students on the reserve, an increase of about 40% on the previous year. These groups are often met by reserve staff, who lead guided walks or other activities. ‘Stream dipping’ in the Vat Burn is particularly popular with the younger groups, while older students often come to study the landscape, to see how it was formed by ice and water or to look at conservation management on the reserve. Increasingly, groups are studying land use, and are keen to hear how we balance the need for conservation with visitor management, and how NNRs can feed into the local economy through visitors using local facilities and businesses.

Logie Coldstone Primary School at the opening of the new visitor centre exhibits

Volunteers

We are incredibly lucky that we have a small but dedicated team of volunteers who assist with the management of the reserve. Our volunteers are a varied bunch, from retirees to students, but they are all keen to help out on the reserve. Two volunteer wardens open and close the visitor centre for us when staff are not available and this means we can be open almost daily throughout the year. They opened the visitor centre for us on 102 days in 2012/13 and help out with events such as the annual Fun Day. Other volunteers have included Aberdeen University Conservation Volunteers, who cleared 2ha of pine from the bearberry heath and various individuals who have given up their time to help. Our longest serving volunteer has been with us for 5 years and we are continuing to recruit volunteers as we require for

specific tasks. In all, 56 volunteers have given us 305 days work in the past 5 years and helped with various tasks including scrub clearing, tree planting at the Logie meanders, litter picking, ditch clearing, general maintenance, tree tubing aspen, visitor liaison and pathworks.

We also established a reserve Liaison Panel, comprising of various stakeholders in the reserve- neighbouring landowners and managers, RSPB, a community councillor and local bird and invertebrate experts. We meet every six months and update the panel with what has been happening on the reserve and what our plans are for the next six months. This gives us the opportunity to draw on local expertise and local feeling on how the reserve is being managed.

Property Management

Muir of Dinnet NNR is owned by Dinnet and Kinord Estates and managed by SNH through a Nature reserve Agreement. A new 25 year agreement between the Estate and SNH was finalised in 2006. The agreement includes a change to the reserve boundary which now excludes land managed for agricultural or domestic stock. Consequently, the reserve has been reduced in size to 1163 ha, but ensures that all of the land within the reserve is now managed primarily for nature conservation. To celebrate the completion of the agreement, The Duke of Rothsay formally re-opened Muir of Dinnet NNR on 20th April 2006, a fitting tribute, following his father's opening of the original Muir of Dinnet NNR, 29 years previously.

Duke of Rothsay at the re-opening of Muir of Dinnet NNR

There are 4 buildings within the reserve boundary, 3 of which are not connected with the management of the reserve. Two of these are cottages which the Estate let as holiday homes and one is the old chapel at Meikle Kinord. The other building is the Burn o'Vat visitor centre, for which we have a separate lease with the Estate and are responsible for its maintenance. We are also responsible for the maintenance of paths and jointly responsible with the Estate for the maintenance of vehicular tracks. This work is either carried out by reserve staff or contracted out as necessary.

reserve staff carry out regular safety and condition checks on all the trails and related infrastructure (such as waymarkers, gates and bridges). Maintenance is

planned and carried out as required to allow us to maintain high standards of safety for visitors to the reserve.

The Estate lets roe deer shooting on the reserve all year round. This helps to control the number of roe deer on the reserve and allows for the successful regeneration of the woodland. The Estate also allows pike fishing on Loch Kinord between late March and the end of October.

Three public roads intersect the reserve; the A97, A93 and B9119. Aberdeenshire Council is responsible for their maintenance. A water main runs along the side of the A93 and is maintained by Scottish Water. A number of electricity wayleaves also cross the reserve and Scottish and Southern Energy maintain these by cutting trees and scrub. Some of these power lines may be dug underground in coming years to reduce their impact on the landscape.

6 Document Properties

References

Brown, I. 1992. Deglaciation of the Dee Valley, NE Scotland. Unpublished PhD thesis, University of Aberdeen.

Brown, I.M. (1993). Pattern of deglaciation of the last (Late Devensian) Scottish ice sheet: evidence from ice-marginal deposits in the Dee valley, northeast Scotland. *Journal of Quaternary Science*, 8, 235-250.

Clapperton, C. M. & Sugden, D.E. (1972). The Aberdeen and Dinnet glacial limits reconsidered. *North-east Scotland Geographical Essays. E*d. Clapperton, C. M. Department of Geography, University of Aberdeen, pp. 5-11.

Edwards, K. J. (1975). Aspects of the prehistoric archaeology of the Howe of Cromar. *Quaternary Studies in North East Scotland*. Ed. Gemmell, A. M. D. Department of Geography, University of Aberdeen, pp. 82-87.

Fraser, G. M. (1983). T*he Old Deeside Road.* Published by Robin Callander, Finzean

Gimmingham, C. H. (1972). *Ecology of heathlands*. Chapman and Hall, London.

Gordon, J.E. (1993). Muir of Dinnet. *Quaternary of Scotland*. Ed. Gordon, J.E. & Sutherland, D.G. Chapman and Hall, London, 246-251.

Marren, P. (1979). *Muir of Dinnet: Portrait of a National Nature Reserve.* Report to North East (Scotland) Region. NCC unpublished.

Michie, J. G. (1910). L*och Kinnord: Its History and Antiquities.* W Smith and Sons, Bon Accord Press

Smith, R. (1988). D*iscovering Aberdeenshire*. John Donald Publishers Ltd

Vasari, Y. (1977). Radiocarbon dating of the Lateglacial and early Flandrian vegetational succession in the Scottish Highlands and the Isle of Skye. Studies in the Scottish Lateglacial Environment. Ed. Gray, J.M. & Lowe, J.J. Pergamon Press, Oxford, 143-162.

Vasari, Y. & Vasari, A. (1968). Late- and post-glacial macrophytic vegetation in the lochs of northern Scotland. Acta Botanica Fennica, 80, 120pp.

Photographs & maps

Photography by Lorne Gill/SNH and Catriona Reid.

Maps by Eleanor Charman.

Acknowledgments

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Links

For information about Scotland's National Nature Reserves and further information about Muir of Dinnet NNR please go to: www.snh.org.uk/nnr-scotland

For information on the protected areas associated with Muir of Dinnet NNR please go to: www.snh.org.uk/snhi/

Other useful links:

Scottish Natural Heritage	www.snh.org.uk
Wildfowl and Wetlands Trust	www.wwt.org.uk
Historic Scotland	www.historic-scotland.gov.uk
Joint Nature Conservation Committee	www.jncc.gov.uk