



## ENVIRONMENTAL REPORT

### ABOUT CORROUR

Corrour is a remote Scottish Highland estate, located in South East Lochaber, at the edge of Rannoch Moor. It is 23,000 hectares (57,000 acres) of hill, moor, forest and lochs. Its perimeter is 86 kilometers (54 miles).

**Total area**

23,000 ha (57,000 acres)

**Perimeter**

86 kilometers (54 miles)

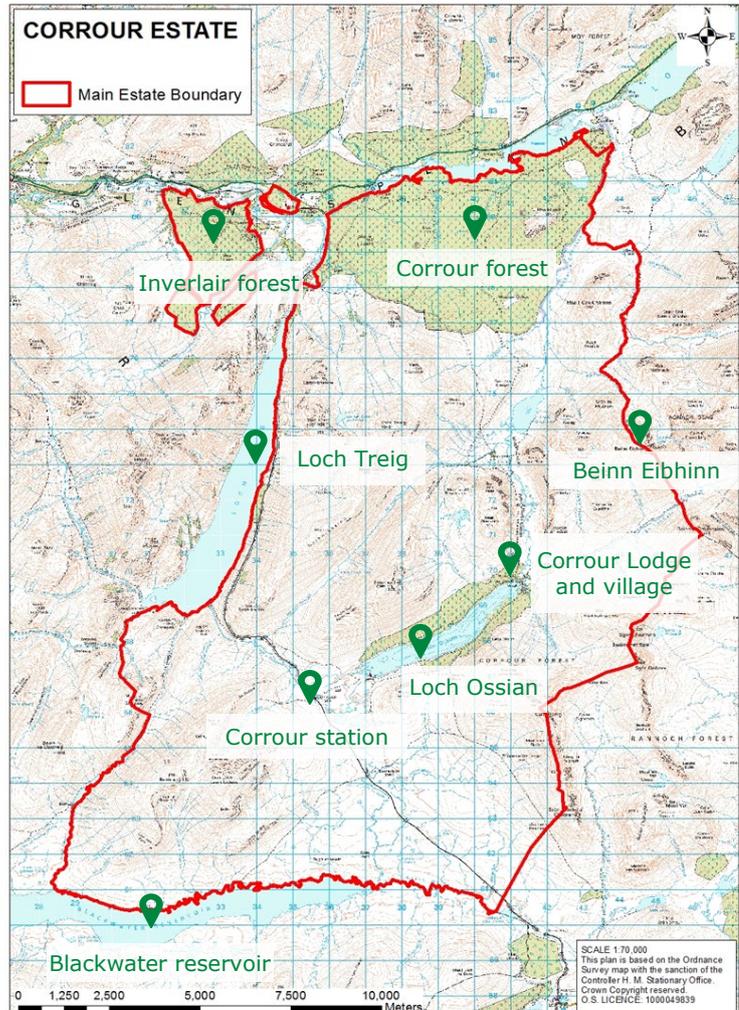
**Highest point** Beinn Eibhinn 1,102 metres (3,615 feet)

**Woodland**

259 ha native woodland 3,610 ha commercial

**Peatland**

7,043 ha blanket bog habitat (not including peatland restoration in forest)



We bought Corrour in 1995 from Donald Maxwell MacDonald, grandson of Sir John Stirling Maxwell. It is our family holiday home, and we protect and care for the land. A small team runs the estate, with the help of seasonal staff and volunteers.

We do not farm in hand. We have a forestry business that produces on average 16,000 tons of timber annually – some 600 lorry-loads. To ensure the estate’s economic viability, we built and operate four hydroelectric schemes.

We welcome tourism, and every year we receive tens of thousands of visitors. We have no public roads, but Corrour can be reached by train – Corrour station is the highest railway station in Britain, on the stunning West Highland Line. We rent out cottages and the lodge in Corrour village, and run the station restaurant. We also let stalking. The East Highland Way, part of the national coast-to-coast network for walkers, runs through the estate.



## ENVIRONMENTAL REPORT

### ENVIRONMENTAL WORK



Corrour is ecologically important, and we carefully manage our land toward long-term ecological sustainability. We encourage a return of the diverse flora and fauna that once flourished here and support natural habitats for many species.

#### **Corrour's environmental management plan (2007)**

- Ensure all 'priority' habitats and species are in 'favourable condition'
- Promote natural processes and the release of biodiversity potential
- Minimise human impact
- Maximise the lands positive carbon balance

In 2007, Dick Balharry, then Chair of the John Muir Trust, helped us make a management plan. It focused on whole habitats and on allowing natural processes to take place.

We now have 11 years of data. We have made a baseline assessment of habitats, and measure progress. The data informs and guides our land management, and we share it with interested neighbours, peers and scholars. Nature's response continues to guide our work. As damage to Corrour's ecosystems is gradually undone, habitats can once more welcome insects, birds and mammals.

#### **Since 1995 we have:**

- Surveyed the land. We use widely-accepted methodologies to map and identify Corrour's flora and fauna (p. 4).
- Improved wildlife habitat. We monitor the progress of birds, moths, butterflies, invertebrates, fish and deer population and vegetation (p.4).
- Reintroduced species such as red squirrel and hedgehog.
- Safeguarded and restored 51 hectares of ancient native woodland and planted 116 hectares of new native woodland (p. 8).
- Built four "run-of-river" hydro-electric schemes (p. 5).
- Made plans to restore more than 1,000 hectares of degraded peatland (p. 9).
- Implemented a deer management plan. We reduced numbers to about six deer per km<sup>2</sup> to lower pressure on the land, improve deer health and facilitate natural processes (p. 6).
- Removed a neighbour's flock of 350 ewes (with lambs). Today this local farmer runs his cattle through Corrour each summer, as people did in the past.



## ENVIRONMENTAL REPORT

### Fauna and Flora

Corrour is abundant with wildlife. We have black and red grouse, ptarmigans, dotterel, golden plover, dunlin and greenshank, as well as birds of prey such as golden eagle, peregrine falcon, hen harrier, buzzard, osprey, kestrel and merlin. We built nesting platforms for ospreys (so far, without luck). Crossbill, an iconic Scottish bird, lives in the forests on Corrour. At Loch Ossian, a Site of Special Scientific Interest, there are black-throated and red-throated divers, as well as otters and water vole. We have mountain hare, foxes, pine marten, and red, roe and sika deer. There have been recent sightings of wild boar.



We have a habitat and species monitoring programme and survey progress with the help of local environmental charities and experts. We monitor red grouse, black grouse lek, raptors and red and black throated diver. We do not kill any 'vermin' – foxes, crows and stoats – and only control the numbers of few non-native species as pests, especially sika deer. We want to find out how our forestry work, peatland restoration and deer management affect wildlife on the estate.

Reducing grazing pressure (see 'deer management', p. 6) improves habitat for animals such as mountain hare, voles, and ground-nesting bird, including black grouse. Corrour's lekking male black grouse numbers are slowly increasing and red grouse numbers are stable. The increase in these prey species has a positive knock-on effect for predators such as golden eagles because it provides a much-needed food source when they are rearing young. We also leave some deer carcasses where they are difficult or damaging to extract, for the benefit of wildlife – eagles, ravens and pine martens.



## ENVIRONMENTAL REPORT

We reintroduce species such as red squirrels and hedgehogs. Historically, these were part Corrour's ecosystem, but when we bought the estate they were missing.

We survey fish populations with the Lochaber Fisheries Trust. Corrour is home to the native brown trout, stickleback and brook lamprey and non-native minnows and pike. In Loch Treig we found three different types of charr, some that may be more closely related to charr found in Scandinavia than in other Scottish lochs.

We also survey aquatic invertebrates and plants along some of the waterways within Corrour forest. We found mayflies, stoneflies, beetles, caddis flies, true flies, mites and worms. Rare dwarf birch (*Betula nana*) is abundant in Corrour. Our survey also found many plant species, some rare in east Lochaber, including Red Pondweed (*Potamogeton alpinus*) and Delicate Stonewort (*Chara virgate*), which was previously unknown at Corrour.

In 2018 we surveyed the whole estate, excluding the forestry, to assess the types of habitat at Corrour. We used the national vegetation survey (NVC) methodology, a standardized approach to classifying UK vegetation. We also did a herbivore impact assessment. The survey results gave us an idea of what Corrour could be like with careful management and less grazing pressure. We identified and mapped 57 NVC communities and 103 sub-communities; 31 communities/sub-communities of conservation interest (28% of the estate); 8 nationally scarce species of plants and 15 other plant species of note.

We also look after an important rhododendron garden. Sir John Stirling Maxwell, who bought the estate in 1891, was a botanist and forester. He planted a 60-acre garden with 350 different rhododendron species collected in the Himalayas. It has 3,200 individual plants. In 2003, the area was listed by Historic Environment Scotland in its Inventory of Gardens and Designed Landscapes. We look after Sir John's beloved rhododendron garden with the help of the Rhododendron Species Conservation Group and Edinburgh's Royal Botanic Garden.



We reintroduced red squirrels around Loch Ossian



We monitor fish populations at 14 sites and use electrofishing – a method that causes no permanent harm to the fish.



We have a nationally-important colony of small cow wheat (*Melampyrum sylvaticum*).



## ENVIRONMENTAL REPORT

### Renewable energy



#### Corrour's hydro-electric schemes

Creagach: 100 kilowatts

Uisge Labhair: 1.2 megawatts

Chamabhreach: 1.15 megawatts

Ghuilbinn: 2.8 megawatts

**Together, the schemes provide enough renewable energy to power Corrour and 6,000 homes**

Renewable energy reduces our dependency on fossil fuels and minimizes our carbon footprint. To achieve economic and ecological sustainability, we built and operate four "run-of-river" hydro-electric schemes. Together, the schemes provide enough renewable energy to power Corrour and 6,000 homes through the National Grid. This makes Corrour one of Scotland's largest renewable energy producers. The hydro schemes will provide green electricity for the next 100 plus years.

The schemes are designed to have minimal impact on Corrour's exceptional Highland landscape and ecology. At times of low river flow, for example during droughts or when the rivers freeze, the hydro automatically shuts down. This preserves the natural ecology of the burns.

The turbine houses and other hydro buildings are built with locally-quarried stone. They are in the Scottish rural vernacular style, to blend in. Their construction paid tribute to the Highlands' landscape and history.





## ENVIRONMENTAL REPORT

### Deer management

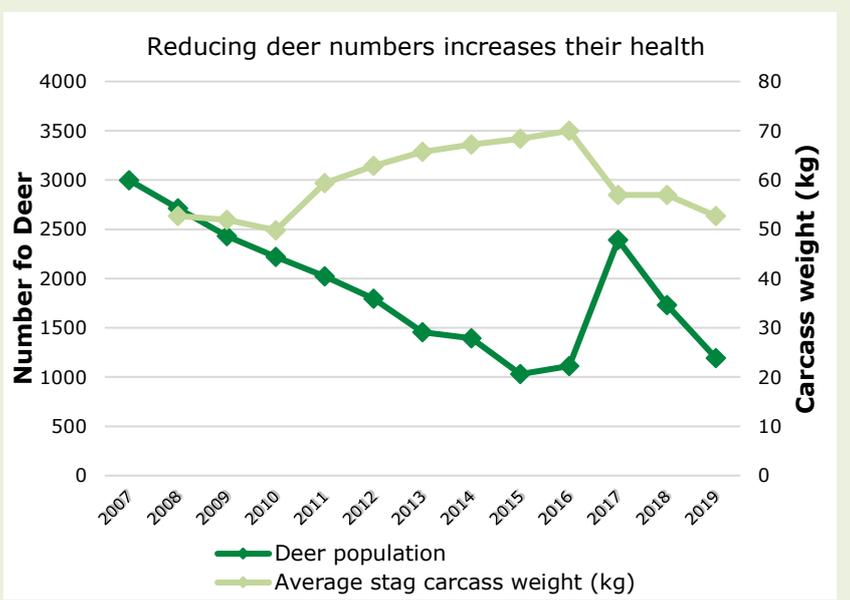


There is a large population of deer in Corrour: red, roe and sika deer. Native wild deer, particularly red deer, are an integral part of Corrour’s ecosystems. In 2006, Corrour had some three thousand deer. This overpopulation has had significant impact on habitats and species through the deer trampling and grazing. With no top predators for deer, culling and stalking remains essential.

We have a deer management plan in place. By reducing the deer numbers, we can reduce pressure on the land, and encourage and facilitate natural processes. We use Scottish Natural Heritage’s best practice guidance to measure the impact of deer, and closely monitor deer densities to inform our cull targets.

Lower deer densities improve vegetation. With less damage to seedlings and shrubs, native trees can regenerate (including rare willows and the rare dwarf birch). Heather is a key indicator species of grazing pressure and its condition and area cover are improving. We now have more and higher dwarf shrub heather, and our un-browsed blanket bog heather increased from 49% to 100%. We also monitor tree seedlings, and have seen a 55% increase in un-browsed tree seedlings at Corrour from 2008 (30%) to 2020 (85%). In total, 50% of the estate had low overall herbivore impact and only 11% had high overall impact. In 2017, the deer count was higher than we aimed for. We increased our cull to try to reach our target deer density of less than five deer per km<sup>2</sup>. The 2019 cull reduced the level to around six deer per km<sup>2</sup>, and we are going reduce it further.

Since 2006, we have reduced our deer from 3,000 to under a 1,000. Reduced numbers mean healthier deer: calf and winter mortality rates are lower, and on average our deer have grown heavier, with better antlers and heads. Corrour stags’ average dressed carcass weight has increased from 52.7kg (116 pounds) in 2008 to 57kg (124 pounds). But we have a way to go. South-west Norway has the same geology, rainfall and climate as the Highlands. The average red deer stag dressed carcass weight in Norway is around 100 kg (220 pounds).





## ENVIRONMENTAL REPORT

### Forestry

Over the years, Corroure has changed profoundly. From deep antiquity on, it was a vast wood pasture, with highly diverse ecosystems. Yet by 1995, when we bought Corroure, just 96 acres of the total 57,000 acres were natural native woodland. The high-altitude tree line had vanished altogether and only a few small trees remained where rocks and cliffs naturally protected them from browsing.



The woodland area started to increase in the early 1900's, when Sir John Stirling Maxwell, one of the first Forestry Commissioners, planted the diverse woodland by Loch Ossian. He experimented with planting methods and tree species to reforest Britain's uplands. The conifers that he planted have a historical and cultural value, and we manage them as continuous forest cover.

Post-World War UK forestry policy greatly damaged Corroure's historic landscapes. Between 1966 and 1984, these policies resulted in planting 3,000 hectares in Corroure with a monoculture of exotic conifers, which was then neglected. This erased vast, complex and ancient wood pastures and native woodlands.

Now, we focus on diversifying our forests' plantation structure. We clear-fell conifers and re-plant with native woodland species that are suited to the area's conditions. In certain areas we follow continuous-cover forestry (CCF), a sustainable management approach for maintaining forest stands in a permanently irregular structure by harvesting individual trees. We are also working to restore the remnants of ancient native woodland within the conifer plantations.

By diversifying the species, ages and densities of the woods, we are increasing the variety of ecological niches for animals and plants. We cleared conifers from riparian areas to increase open space, retained windblown trees to create deadwood habitat, and thinned mature pine to



## ENVIRONMENTAL REPORT

improve habitat for black grouse and other native species. We are restructuring and managing some non-native tree species to benefit biodiversity and native wildlife.

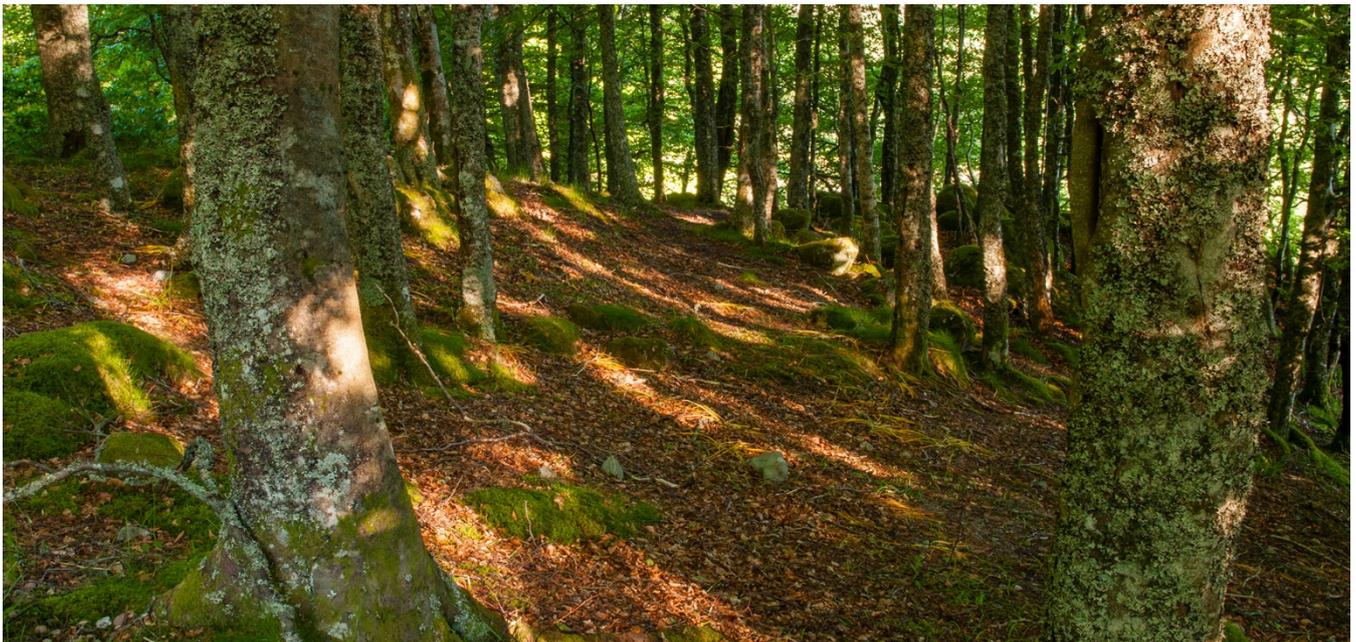
Between 2008 and 2011 we bought an additional 3,326 hectares (8,218 acres) from the Forestry Commission and neighbours, which included 12 hectares (30 acres) of native woodland. These remnants of natural woodland at Corrour Forest and Inverlair are now growing back.

**Compared with  
1995, today  
Corrour has  
six times  
more native  
woodland**

Since 1998, we have planted 56 hectares (138 acres) of new native woodland by Ossian Woods and on the moor. Trees are slowly spreading naturally over the moors, too, especially by Loch Treig. We have also planted 152 hectares (10 acres) of native woodland in place of felled commercial conifers. We have cleared 8 hectares (20 acres) of commercial conifers to allow natural tree generation of native tree species.

Today, Corrour has six times the amount of native woodland it had 23 years ago; up from 39 hectares (96 acres) to 259 hectares (639 acres). In 2019 we increased this by an additional 448 hectares (1,107 acres) through restoration work, natural regeneration and planting. In total, by 2020 we will have 707 hectares (1,746 acres) of native woodland – 20 times more than when we bought Corrour!

Our surveys show that Corrour has much more potential for woodland cover. Twelve percent of our open land – 2,228 hectares (5505 acres) – is suitable for continuous woodland cover and 52% is suitable for scattered groups of woodland and individual trees. Restoring this area of woodland could lead to annual rates of carbon accumulation of up to 16,000 tonnes CO<sub>2</sub> per year, a saving equivalent to the yearly emissions of 2,500 people in the UK.





## ENVIRONMENTAL REPORT

### Peatland



Degraded peatland in Corrour. Mainly as a result of human activities, exposed and eroded peat emits carbon, rather than storing it.

There are 7,043 hectares (17,404 acres) of blanket bog on Corrour – 30% of the estate. The peat bog is home to rare flora and fauna, including many birds like greenshank, mosses, liverwort, and bladderwort. Peat also stores carbon, but when it is degraded, it emits large quantities of carbon rather than sequestering it.

**Restoring Corrour's degraded peatland will reduce our carbon emissions by half**

Our 2018 survey showed that most of the peat bog – between 4,400 and 5,600 hectares (10,873 and 13,838 acres) – has some bare peat. Bare and degraded peat is a result of erosion caused by overgrazing and trampling by historically high herbivore numbers. Muirburn and wildfires, in the past often started by steam trains, as well as historical drainage, are also possible causes. This degraded peat emits an estimated 20,000 and 28,000 tonnes CO<sub>2</sub>e (carbon dioxide equivalent) per year. This is equal to the average carbon footprint of 3,000 people in the UK.

We have recently completed restoration of a 50 hectare (124 acres) area of degraded peatland and are currently undertaking restoration work on another 170 hectares (420 acre). Peatland restoration involves rewetting, reprofiling and revegetating these areas of damaged peat. This work has been done through Nature.Scot's Peatland Action fund.

In Corrour Forest, with approval from the Forestry and Land Scotland and support from the Nature.Scot, we are converting some inappropriately forested areas back to peat bog. So far,



## ENVIRONMENTAL REPORT

we have cleared conifers from 227 hectares (561 acres) to convert back to peat bog habitat. We will continue our restoration work by clearing a further 446 hectares (1,102 acres) of conifers, and blocking drains to raise the water table. Restoring Corrour's peatland could lower carbon emissions by half (between 10,000 and 13,000 tonnes CO<sub>2</sub>e per year), and also increase biodiversity.

### **Buildings and sustainability**

We renovate and maintain all estate buildings using both traditional and modern techniques. We protect the traditional materials, styles and appearance of our nineteenth-century buildings. We use local material where we can and keep traditional crafts alive. Around the buildings we garden naturalistically. We never use pesticides, herbicides, fungicides, or chemical fertilizers.

Since completing the hydro schemes we have been converting as much as possible, that was oil or gas, to electric and improving the building's energy efficiency. In the future, when technologies improve, we will also move to electric vehicles to further reduce our carbon footprint.





## ENVIRONMENTAL REPORT

### **FUTURE PLANS**

Our fragile mountain habitats mean natural responses may take many years. Our work will continue to be driven by our monitoring and habitat response and we will develop plans based on the data we collect.

We will allow native woodland to expand in a self-willed way by natural regeneration from remnant mature trees. These trees have already created significant seed banks in the land. We will continue to see natural regeneration when grazing pressure is lower. We will plant new woodland from suitable locally-sourced species. We want to link the woodlands together to restore habitat networks on the estate. As we reduce deer numbers, we hope to restore native woodland without fencing.

We are also currently developing a scheme that will allow us in the future to sell 'carbon credits' from our woodland and peatland restoration work.