Atlantic Hazel Audit of Assynt and Coigach

Roz Summers April 2017 – March 2018

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"It may seem paradoxical that there are so few big trees in ancient woods, but rural communities found poles much more useful than logs." **Peter Marren 1990 Britain's Ancient Woodland Heritage**

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Photos all Roz Summers unless otherwise indicated, the rest mostly from Gwen.

1.Introduction to the Atlantic Hazel Audit – Assynt and Coigach

1.1 The Assynt Field Club contracted me to carry out a survey of hazel trees (Corylus avellana) in Assynt and Coigach in March 2017 (Appendix 1.) What an inspiration these woodlands are! I have found myself asking more and more questions and having fewer and fewer answers.

Single hazel tree on shoreline at Newton – photo Gwen Richards

1.2 We sometimes think of Assynt as a spectacular but stark place with so many areas of rock, heath and bog – but here and there are plenty of trees – marvellous woods, those on better soils often dominated by hazel trees of amazing maturity hosting stunning lichens, mosses, liverworts and fungi which are unique to these type of woods. On a sunny day all the greens are there: the bright leaves, the subtle mosses on trunk and rock, and the really wild range of lichens. There are leafy, crusty and hairy forms on old, thicker stems and magical runic-style writing: dots, dashes and startling colours on the fresh younger growth. The young stems grow the crustose "graphidion" lichens and as the bark thickens and the microclimate changes, leafy lobarion lichens and others move in.

The trees themselves are in a myriad of forms, multi-stemmed and groaning outwards, mega-stemmed with an astonishing range of ages in one tree, broad single-stemmed trees with wide boles at the base, decrepit-looking ancients falling down the hill. These, however, are rarely dead, indeed they seem to morph into new forms, even possibly reverting to upright multi stems. This is the Celtic Rainforest (Coppins 2012).

1.3 Celtic Rainforest

Coastal Temperate Rainforest was identified as a rare and distinct part of a priority "Major Habitat Type" by WWF. (Rhind 2003). It is confined to only 7 areas of the world. The West Highlands of Scotland are part of the Northeastern Atlantic sector. The Atlantic Hazelwoods are special because of the high rainfall, lots of wet days, proximity to the coast and relatively even temperatures, which all add up to an "Climatic Oceanicity" of 20 (mean number of wet days divided by range of monthly mean temperatures, Averis et al 2004). They are also invaluable because they are still here – perhaps having survived in some form since the last ice retreated 10, 000 years ago (Coppins 2012). The high biodiversity of these woodlands has led to concerted action in Argyll, and the Atlantic Hazel Action Group in particular is working with the Forestry Commission to seek ways of ensuring landowners and crofters can obtain the resources they need to maintain and enhance the ancient hazelwoods. The coast of Assynt

and Coigach has an Oceanicity score of 20 but it is a lot further north than Argyll, where many of the Atlantic Hazelwoods are located, and has quite different geology, so the biodiversity may not be as high.

1.4 A Tree or a Shrub?

I call hazels trees! I always have done, to me a woody shrub is a cotoneaster. Hazels can have such an impact on us, they may not be tall, but they ain't small. They grow as a multi-stemmed tree, they don't have strong apical dominance, and they have an extraordinary capacity to recover from damage by raising new stems from epicormic buds which lie dormant until needed. If you plant a seedling with a single stem and make sure no-one eats it, it still grows into 3 or more stems in a few years. This has led to the trees mistakenly described as "coppiced" (Ferreira 1990). Coppicing is an early form of industrial wood production from England where oak "standards" often topped hazel, which was cut on a seven year rotation and protected from grazing. Here in the north-west people would have selected individual stems exactly the size they needed for the task, leaving the rest of the stool intact. The perfect tree.

Hazels don't produce nuts in the shade (Rackham 2003), so it is a misnomer to call them an understory shrub, but even very recent literature does so (Milner 2011)

1.5 History of Hazel in Assynt and Coigach

Lake sediment profiles from Lochs Sionascaig and Cam give clues to the vegetation history of Assynt and Coigach (Pennington 1995). After the Ice Age and the Loch Lomond re-advance, Hazel arrived in Assynt around 9,500 years BP, and was an abundant part of the forest cover on mineral soils along with Scots pine and birch. The mineral soils became progressively leached over time as the climate cooled and got wetter. The tree cover began to retreat from 5,000 yr BP, and peat began to spread, with no evidence of human influence. Pine declined steeply just before 4,000BP, when there is a sudden increase in water-logging of peat.

Birch and birch-hazel woods on mineral soils seem to have been cleared by fire from 3,500 BP onward, surviving as fragments on brown forest soils. Human history in this area, close to the lochs, has been dated from around 4500BP (Barber 2010) inferring from secondary Bronze Age carbon14 dates of 3600BP. Hence the Neolithic cairns were being built when hazel and other woodland was still fairly plentiful, and it is possible they were gradually cleared for agriculture.

1.6 A Really Useful Tree

Our ancestors must have valued, indeed revered, hazel. Hazels provided the 300 000 carbonized nutshells found in a 5m pit in the island of Oronsay, Inner Hebrides, dated to around 7700BC. Hazel shells were found in Skara Brae, Orkney, eaten 5000 years ago. (Flora Celtica 2004). It is possible our Mesolithic ancestors helped to spread, and possibly even managed hazel (Pryor 2012)

The natural growth habit of hazel means it is possible to select the exact size of stick or pole you need for a multitude of uses, particularly building works and stock management. Hazel trees may well be the main reason the ancestors could survive in North West Highlands, and would have been vital up until 100 years ago. I don't think the ancestors could have lived here without hazel, and, indeed hazel wood is in Clachtoll broch, carbon 14 dated to around 2000 years ago and also found in the 2017 excavation. I have seen it.

In Celtic memory the hazel tree was the tree of wisdom. The hazels would fall from the tree into the river and be eaten by salmon, who thus were smart enough to travel out to sea and find their way back. Humans eating the salmon would gain that wisdom. The spots on the salmon were evidence of their diet. It is also one of the 9 sacred woods used to light the Beltane fire every year. (MacNeil 1957).

A knot and growth – from a descending branch – extraordinary hazel growth at Gleann Leireag.

Hazel Gloves fungus from Ballachuan, not (yet) in Assynt!

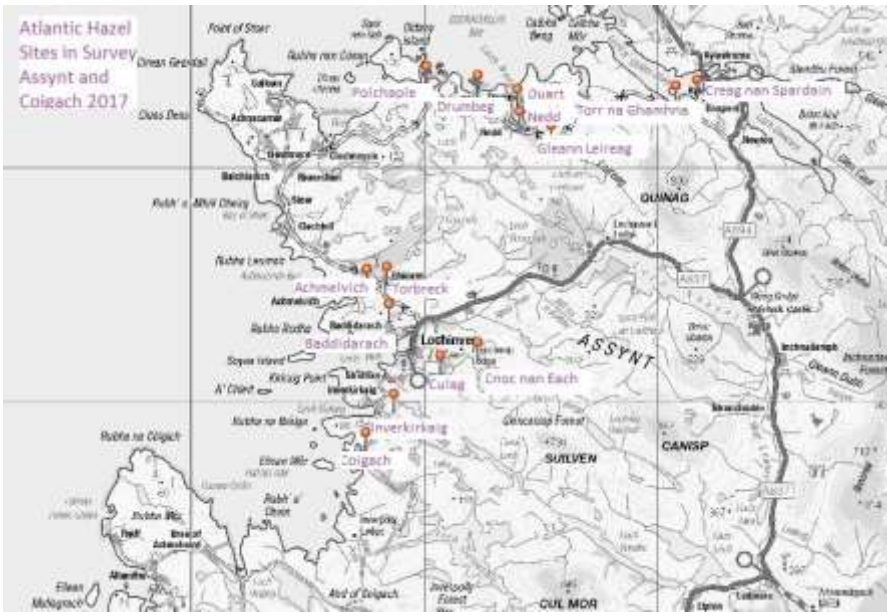
1.7 How Useful? Recognition at last.

Atlantic Hazel Woodland has now been recognised by the Forestry Commission as a habitat which can attract grants and annual payments, as a recognised woodland under the Biodiversity Action Plan and the Scottish Biodiversity Strategy. This can include Woodland Improvement Grants and Woodland Grazing Management options. Thus this survey may well be a beginning to help local crofters gain more benefit from the land as well as finding out how they can improve and sustain some of the woodland which would have been so useful, nay vital, to the ancestors.

Hazel Twigloo in Culag Wood children's area. Built by Ken Fairchild from Baddidarroch hazels.

2.Methodology The Survey was carried out between April and December 2017; usually by just one person, sometimes with a volunteer who was invaluable in helping to count and measure the trees.

2.1 The location of the Atlantic Hazel Survey Sites are shown in map 2.1.



These sites were chosen after visiting places recommended by volunteers, sites I already knew, and discussions with the Atlantic Hazel committee and with members of Assynt Field Club. While carrying out the desk study I chose further sites. Permission was obtained before surveying.

2.2 The Results of the Site Surveys are in Appendix 2. They are (from SW to NE):

1.to the north of the road at Gleann an t-Strathain in Coigach

2. Inverkirkaig

3.Culag Wood

4.Cnoc nan Each (near Glencanisp Lodge)

5.Baddidarach

6. Achmelvich

7.Torbreck

8.Culkein Drumbeg near Oldany Saltings

9. Drumbeg

10.Duart

11. Nedd

12.Gleann Leireag

13.Torr na Ghamhna

14.Creag nan Spardain

15. Small cliff site near Doire Cuillin

2.3 Survey sheets

After visiting several sites and taking notes I developed survey sheet (Appendix 4.1) derived from that in the Atlantic Hazel Site Assessment in Coppins 2012, however it became apparent this did not fulfil all the requirements of the brief. I then made a further survey form, (Appendix 4.2). While visiting more sites I decided this did not give enough information to show sites with different growth forms of hazel, so on consultation with the committee I added the sheet Appendix 4.3. However, when visiting Ballachuan I discovered the Hazel Gloves Survey (Acton 2014) had a very good methodology for assessing the hazels themselves, so I based a further survey sheet on that (Appendix 4.4) which I then used in conjunction with the other sheets. I took photographs and recorded Grid References on individual trees as well as the boundaries of sites. Ordnance Survey-based Maps derived from these may be available in due course, as I have requested help from Elaine Macaskill (CALL) for this.

The filled in sheets Site Surveys and Detailed Hazel Measurements will be available in digital format, they are summarised in the spreadsheets in **Appendix 2.**

2.4 The Desk Study focussed on Chris Ferreira's brilliant survey carried out between 1980 and 1985 (Ferriera 1995) This survey also provided vital geobotanical information. Alex Scott took part in some of these surveys and also provided valuable information. I also used *Trees of Assynt* by Robin Noble (2000) to help find other places to look and more background help. The *Flora of Assynt* (2002) also recorded hazel, and some of that data is in Appendix 2. Ian Evans and Gwen Richards also went out and surveyed other areas in 2017 and provided data and photos. Gwen did a detailed survey of Cnoc nan Each including detailed measurements and photos, for which I am very grateful! I also looked at the Ancient Woodlands Inventory and the Forestry Commission's Native Woodland Survey of Scotland (2014) maps online. The spreadsheet of hazel locations is in **Appendix 3**.

2.5 Lichens The survey would have really benefitted from **specialist lichen input**, and Gwen and Ian provided some valuable records, Tony Fletcher has surveyed many sites and there are records available for Torbreck so far. Brian and Sandy Coppins have visited some sites in Assynt, but their survey of Inverpolly was vital to help choose the Coigach site (Coppins 1999). I created some photographic laminated sheets of the most typical Atlantic Hazelwood species and took them with me while surveying, and used the Plantlife leaflet (Acton/Griffith 2008) as well as Dobson (2011). Unfortunately, the only lichen course I could find was cancelled as I was the only one wanting to attend!

2.6 Nomenclature I have used the descriptions of hazel woodland, hazel pasture, veteran trees as defined in Coppins 2012. A *site* is one of the named Sites which has had more detailed survey when possible, a *subcompartment* is an area of hazel woodland within a named site. A hazel stool is the whole plant. A *stem* is one of the uprights growing from the base. I have used circumference rather than diameter in measurements because Coppins (2012) indicate 1cm increase in girth is equivalent to one year's growth, although this rate will not be universal. Thus you can read the girth as an approximation of stem age.

The sizes of Site were estimated from NWSS (2014) online mapping tool. These unfortunately cannot be printed out.

3.1 Results

This survey details 15 continuous sites including 28 sub-compartments (Appendix 2). These sites make up a total of approximately 27 ha. A further nearly 50 sites are recorded (Appendix 3).

The three main concentrations of hazel woods are in Nedd, Achmelvich combined with Torbreck, and Inverkirkaig, but there are substantial areas in Drumbeg, Ardvar, Baddidarach, Croc nam Each, Culkein Drumbeg and Strathan. There are smaller sites in Assynt at Lochinver, Culag Woods, Little Assynt, near, and on scattered cliffs, on the roadsides and as an occasional component of birch woods especially in riverine habitats and ravines in both Assynt and Coigach.

Most of the hazel trees in Assynt and Coigach are grazed to different degrees by sheep, deer or both. There is some horse and cattle grazing and pigs and wild boar are also occasionally in the woods.

Most hazel woods are on slopes and they are usually on rocky ground or ridges. The NVC type is usually W9.

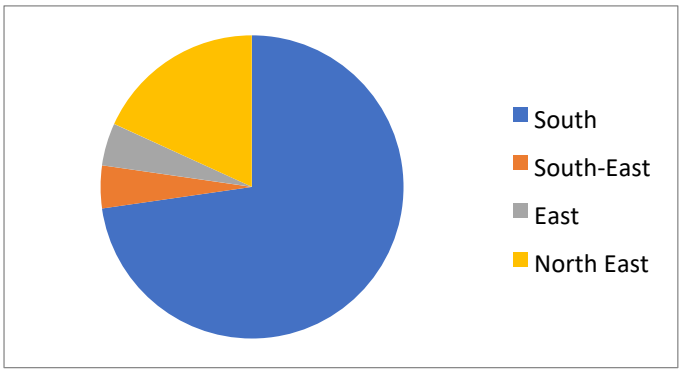
Most are multi-stemmed trees. In some sites there are scattered single stems. There is very little regeneration from nuts in sites not fenced against deer and sheep, and few saplings or young trees.

Glue crust fungus (*Hymenochaete corrugata*) was previously only known from 2 records in Inverkirkaig. However, it has now been found on hazel throughout much of the study area, mostly attaching dead sticks to young live, hazel stems, occasionally older live to live stems. and even attaching *Rosa sp.* to hazel (Achmelvich Bridge). There may be more than one species, a white form seen at Inverkirkaig (GR and IM pers comm) and the more common dark brown-black. There are a good variety of graphidion lichens on almost all the young stems, and some with leafy lobarions and other lichen on older stems. The stems are often mossy, with frizzled pin-cushion moss and scalewort liverworts throughout. A summary of lichen reports from part of this area is in the Inverpolly survey, Coppins 1999.

Black Glue Crust Fungus. Both photos in Inverkirkaig exclosure December 2017. Above - a paler version – or is it just younger?

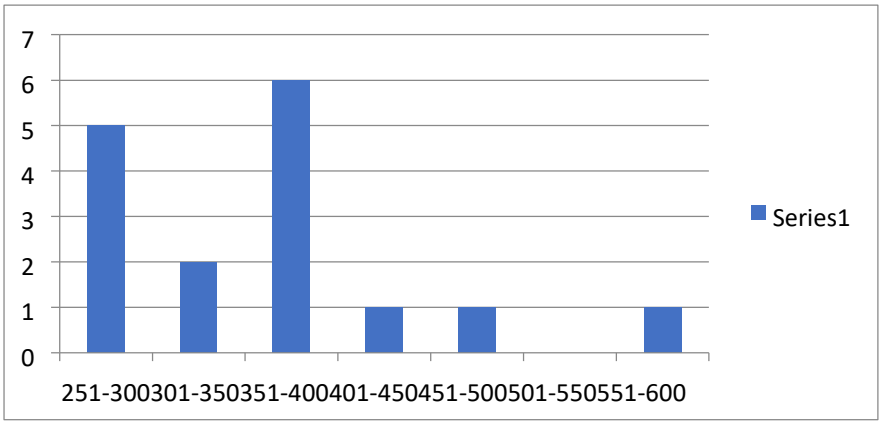
Most of the hazelwood sites in Assynt and Coigach include cliffs, river, burn, road, track or combination of any or all.

3.2 Aspect (Hazel Site Survey) In most sub compartments the slope has a southerly aspect. The main exception is in the Nedd area where there are deposits of glacial till facing north-east where the hazel grows well.



3.3 Girth of Whole Hazel Stool see graph below

Number of Sub compartments vs Maximum Girth of Hazel Stools in Detailed Site Survey (cm)



6 of the sites where detailed measurements were taken had maximum girth of stools 351-400cm. 5 had maximum girth of 251-300. One had a girth of 564 cm, in the Inverkirkaig exclosure, and was a tree fully cut down to the base around 20 years ago.

Trees with larger girth include one in Achmelvich (840 cm) which is a massive tree with 30 stems up to 75cm in girth, and one in Nedd with a stool girth of 1400cm. The largest single stem found was at Gleann Leireag with a girth at breast height of 103 cm. I am sure there are many other very large stools to be found.

Achmelvich Giant – still vigorous. 840cm girth

Nedd Hazel – less stems, still alive. 14m girth

3.4 Table Showing Summary of State of the Hazel by Site

Site Name	Size SML	L stool	M Stool	Single	Regen	Vigorous	Browsing	Some br	Big Stem	Condition	Urgent?
Achmelvich	L	YYY	YYY	Y	Y	YYY	N	Y	YYY	Good	
Torbreck	L	YYY	YY	Y	N	N	YY		YY	Needs action	Poss
Baddidaroch	M	YY	YY	Y	Y	Y	YY		Y	OK	
Badd fenced	M	YY	YY	N	YY	YY	N	Y	YY	Good	
Cnoc nan Each	M	YY	Y	YY	N	N	YYY		YY	Needs action	Y
Inverkirkaig	L	YYY	YY	Y	N	N	YYY			Needs action	Y
Inv. Fenced	M	YYY	YYY	N	Y	YYY	N	N	YY	Good	
Culag	S	Y	YY	N	Y	Y	YY		Y	Needs action	Y
Drumbeg	M	Y	YYY	YYY	N	N	YYY		Y	Needs action	Y
Duart	L	YYY	YY	YY	N	N	YYY		YY	Needs action	Y
Polchaple	M	YYY	Y	YY	N	N	YY		YYY	Needs action	Y
Nedd	L	YYY	YYY	YY	N	N	YYY		YYY	Needs action	Y
Nedd Fenced	M	YYY	Y	N	Y	YY	N	N	YY	Good	
G. Leireag	L	YYY	YY	YY	N	N	YYY		YY	Needs action	Y
G.n Spardain	S	Y	Y	N	Y	Y	Y	Y	Y	OK	
Torr na Gham	L	YY	YY	N	Y	YY	Y	Y	YY	OK	
Doire nan Cuil	S	Y	YY	N	Y	Y	Y		N	Needs action	

3.5 Site Surveys

a) Achmelvich NC0724.

Hazel trees line much of the unclassified road from the B869 to beyond the Ardroe road end. There are hazel wood sub-compartments of 60 – 80% hazel both above and below the road, eg. at Feadan. The slope varies from flat to 40 degrees. Much of the ground has cliffs and boulders and shallow soils, being mostly well drained. There are many bands of calcareous hornblendic rock within the Lewisian, and is close to a major shear zone (Ferreira 1995). The ground flora is the National Vegetation Classification (NVC) W9a (Rodwell) herb-rich ground layer, including bluebell, meadow buttercup, primrose, yellow pimpernel. Achmelvich 2 has many old walls and hazel trees are often growing out of these. The detailed surveys have probably covered less than half the hazel woods in Achmelvich, Torbreck and Ardroe combined. Achmelvich 1 is one of the few places I found young hazel outside deer fencing.

The trees are lightly browsed by deer, with little sheep grazing nowadays. Consequently, there is vigorous young stem regrowth and in the areas with more light there is a great number of graphidion lichens including *Graphis scripta, Opegrapha atra and Pyrenula laevigata* . There are leafy lobarian lichens and others on the larger stems. Glue fungus is easy to find. The trees in Achmelvich 2 are perhaps more browsed, there are horses here, which are eating the aspen bark but it is not clear how much they browse the hazel.




Achmelvich 1 new hazel *Dense and vigorous Achmelvich 1* *Some impressive stools Ach1* *Medium stool growing in old wall Ach2*

b)Torbreck NC0824.

The site to the west of the B869 is within a collapsing stock fence, and it is a truly magical site, with ancient trees and sunny glades, fantastic lichens including *Pseudocyphellaria crocata*. This would be a nature reserve elsewhere (quote from Tony Fletcher, lichenologist). A lot of the basal growth is suppressed and many new shoots arise from above browsing height. Some of the trees show very twisted twigs at their ends, curled over back on themselves and this is the place to find Glue Crust Fungus, as there are not many new stems arising from ground level. Cattle used to graze and now a small flock of sheep do, and there are plenty of signs of red and roe deer. The ground flora is species-rich W9a.



New aerial growth on a single-trunk tree *The edge of a glade in August* *Pseudocyphellaria crocata* by Gwen Richards c)

Baddidarach NC0823.

The south-facing slope runs down to Lochinver Bay and in some areas there are more than 75% hazel. There is plenty of exposed bedrock. Two areas are deer-fenced gardens and have been so for around 13 years. The one uphill one has one or two resident deer. The young hazel stems have been cut to make hurdles and the “twigloo” in Culag Wood. The fenced areas are part of the original hazel pasture, grazed by sheep until recent years.


Impressive stool showing W9a ground flora *New regeneration from nuts*

The uphill site (see below) shows the stools can regenerate if deer fenced, although this is quite sheltered.

Cut stump showing regeneration

Another one

Growing just beside the cottage

The trees in the adjacent unfenced area are most intriguing (below). A tree with later catkins than the others had many young hazel seedlings around it as well as very clear deer "nests" in bracken. I went back in December to find that tree still alive. This is one of the few places where there are new hazel seedlings in the presence of heavy deer browsing. Are the seedlings in fact layering? There are fallen trees on cliff edges still surviving here. The slope is at times more SE. Plenty of glue fungus present.

Unfenced hazel to east of road

Lovely specimen to east of burn

Probably layered hazel seedlings d)

Cnoc nan Each NC1121.

Many thanks to Gwen Richards and Ian Evans for surveying the area to the SW of Loch Druim Suardalain. The magnificent hazel here are in a sorry state, so grazed and browsed there are only a few younger shoots sprouting from high up, all basal growth gone, many trees as single trunks. Urgent action is needed to prevent these marvellous trees from dying. Only one specimen of Glue Crust Fungus found (GR/IME). There are plenty of very twisty twigs at the ends of branches high up. (See Discussion). A previous survey by Francis Rose identified 97 species of lichen at this site, and GR and IME photographed and identified some also.

Glue Crust Fungus Gwen Richards.

"Gondola" collapsed tree still alive GR

Fused trunks here GR

The area to the South of the loch is in a similar state, see below. A burn running N-S has younger hazel growing on the steeper slopes, also a large wych elm. Lots of red deer signs here. See below.



Trying to hang in there. *Growing out of old wall.* *On the steep sides of the burn.*

e) Culag Wood NC0921.

We surveyed this part of the woodland with a very enthusiastic senior class from Lochinver Primary School in late November. They got their eye in well for the few remaining hazel leaves and also managed to find a good few specimens of Glue Crust Fungus. While Culag Wood is deer-fenced, unfortunately the deer are coming in from the Lochinver end now and the hazel is very heavily browsed, following a spell of new growth. There are a few seedlings to the east of this site under the larch. Hopefully the children will take part in protecting the seedlings.


Hazel has had a recent flush of growth. *" I found Glue Fungus!"*

See Appendix 6 for spreadsheet of this visit

f) Inverkirkaig NC0919.

Before reaching the beach, on the right there are wind-clipped hazel on the shallow cliff, with hazel regenerating in a small boulder field on the opposite side. In contrast there are some huge riverside trees. The one below is between the road and the river.



Wind-clipped hazel to seaward *Regeneration inside stock fence in boulders* *Massive stool by the river*

Further along at An Droighneach and a good way up the River Kirkaig there are stands of hazel 70% or more. There is an exclosure deer-fenced for around 20 years, where a few of the hazels have been cut completely down. The growth indicates that the Coppins estimate of 1cm per year girth increase is quite accurate at this site.

Exclosure - Hazel stool completely cut. Younger stools are plentiful (not cut at all). A massive stool- most hazels are not cut in exclosure.

Nearby there are hazels which are stock-fenced, where the deer go in at will and where some hazel have been planted. Sheep numbers have varied throughout the years, as much of the site is Common Grazings.

Large hazels beyond the gate toward the Falls. Growing in the wall. Planted hazel inside a stock fence. g)

Culkein Drumbeg NC1032.

This site near Oldany has some amazing trees in different locations. The hill above the sea has smaller hazel stems/stools which used to be let for firewood cutting (by axe) and are now very heavily browsed by deer. I found Glue Crust Fungus in this area in partly-browsed new shoots. There is a small flock of sheep in the croft, which are usually not in this area but among the other trees up near the house and down to the saltmarsh. The trees around the old (damp) arable plot near the house are of great variety of size and shape, marvellous trees, many of which are very old, with massive stems. There are mature oak, birch, rowan, aspen and willow also. Sadly some oak have been cut down without the owners' consent. There is no new regeneration from nuts. Part of the area is stock-fenced.

A massive stool with little new stem growth. This tree has only partial protection by wire! There are many single stems here too

h) Drumbeg NC1133.

To the east side of Torr Beag there is a narrow band of hazel with birch/rowan atop running above the track. In places 75% hazel. Many mossy boulders and exposed bedrock. Heavily grazed, 40 + years ago this wood had blueberries (pers comm AMc) but no sign now, probably since the sheep stayed in the in-bye. Chris Ferreira records this as the best woodland in the area, with species-rich ground flora but little disturbance. In my opinion there is

much deterioration since his visit. Many trees are single stems or three stemmed, quite senescent - more than 50% of stools. Many dead stems and few of girth more than 47 cm. Some have nuts. There is sheep grazing at times but now there is a lot of deer evidence which is new (pers comm FS) and shown by deer wallow in wet area also. Tree damage by animals frequent, but some trees in good condition.

Some wonderful contorted shapes – Torr Beag

Some impressive stools with good new growth. i.)

Duart NC1332.

The crags to the SW of the site are Lewisian with a broad band of hornblendic rocks along the base, and also a fault with calcareous rocks where the burn descends before entering the lagoon (Ferreira 1995). This accounts for the hazel woodland, with some very old trees. There is some W9b ground flora here. While Ferreira (1995) describes the grazing as being of only "moderate" pressure, this is now no longer the case with most basal shoots completely browsed off the hazel and many signs of bark damage. There has previously been flushes of regeneration, as the arable land of Duart is now grown over with trees as it is no longer cultivated. The hazel here is in a myriad of amazing forms: below the crags, on the flat near the ruins, running down to the sea shore and in gullies, and there are many lichens, with previous records of Pseudocyphellaria norvegica (Ian Evans pers comm). In particular, there are many large stems still bearing graphidions covering the bark. The hazelwood is continuous with the Nedd hazels, and often 75% of the tree species.

Duart has some impressive large stems (see red pencil)

And they are often associated with ruins. Graphidions on large stems.

j.) Nedd NC1431.

This whole area displays an extremely diverse range of hazel shapes and sizes. Here, with Duart, is the largest continuous area of hazel in Assynt/Coigach, and the geology is Lewisian with bands of hornblendic schist and epidiorite over which deep, red-brown mineral soils have developed (Ferreira 1995), perhaps glacial till (Evans) with

a NE aspect. Hazel often comprises more than 75% of the tree species. There are a number of stock and deer fences, some very recent, so there is an interesting spectrum of grazing, browsing and pig rooting (the last have now gone). New stems are in quite short supply, however, in the unfenced areas, and there are many of the single tree- form hazel, and the stools often look moribund with few stems left able to leaf.



Strange shapes and loads of lichens (stock fence). *New hazel seedlings (deer fenced).* *Deer fenced off for 28 years ….*

A fenced off garden (above, centre and right - 28 years) has amazing regrowth, with seedlings popping up everywhere as "weeds" in the veg patch (Evans). Outside the fence the trees are senescent, with few new stems only above grazing height. There has been quite an amount of recent cutting the whole stool for firewood along the road here (2008) and the trees have often then died due to mostly browsing by deer.

The Nedd, Duart and Drumbeg hazel is so varied and there are so many trees to count – a more detailed survey with an extra person sometimes available would be really worthwhile. Their cultural significance is very high as well as the biodiversity value.

k.) Gleann Leireag NC1431.

This part of Ardvar Woodlands SSSI is near the disused salmon hatchery. As you travel east by the river the hazel begins to appear on the ridges of the drier feannagan ("lazy beds") which start off being colonised by willow. There is plenty of Glue Crust Fungus here. Past the hatchery the deer fence is broken, so while there is a contrast between the hazel outside and those within the fence now, this may not last.



On "lazy-beds" beside the river. *Glue crust fungus and Pyrenula sp.* *Here only one new stem has got away to the canopy.*



The trees in the Gleann show a lot of browsing, with many having fallen and hanging on by just one or two new shoots growing up through the tangle. There is a high proportion of hazel here, over 75% in places, and many green leafy lichens and mosses. The more damaged trees there have many twisty twigs at the top. I was delighted to see Wilson's filmy fern *Hymerephyllum wilsonii* carpeting a horizontal, still-living hazel trunk.

j.) Torr a Ghamhna NC2132.

This is a hazel wood along the banks of a river, southerly aspect. The Drumbeg – Kylesku road runs alongside the river too. The hazels are in good condition, a variety of sizes and shapes with plenty of young stools and new stems coming along well. There are many deer here but also stalking, and the banks are very steep, dominated by slippery great woodrush. It was too wet to do detailed measurements in time.


Large stools at Torr na Ghamhna, other side of river *...and plenty of smaller stools. Younger trees or regrowth?*

k.)Creag nam Spardain NC2232.

The hazel here are a small population at the extreme seaward end, on a steep NE- facing slope with many fallen boulders. The Lewisian has bands of hornblendic rock with epidote and actinolite and have strong calcareous elements. The ground flora is spectacular, with loads of Wilson's filmy fern growing on birch trunks as well as rocks. The single stems previously recorded have mostly fallen down the hill – but they are still growing strongly.

A good-sized stool on the cliff, plenty new stems.

Fallen down the hill but still growing well and producing new stems

l.) Doire nan Cuillin NC2125

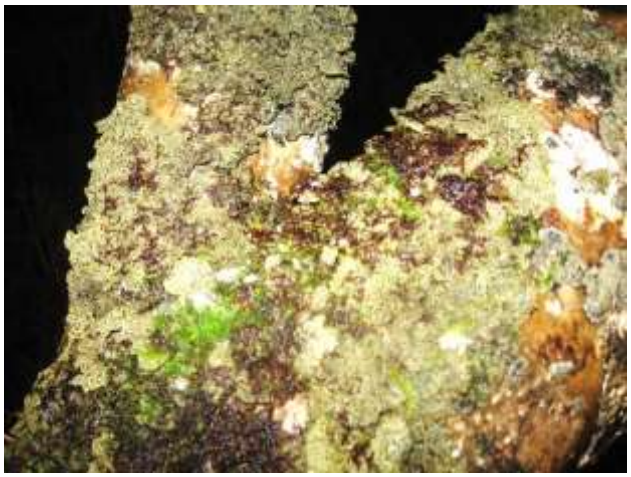
On the N side of Loch Assynt. Cuillin means holly, and it is a delight to find these crags with quite large hollies still surviving in spite of all the deer. This particular cliff has a few hazels, too, including large ones, but the boulder scree has little regeneration showing, now doubt due to the heavy grazing pressure. This site is very near the original Road to Assynt (Bangor-Jones 1996)

Cliff with hazel at Doire nan Cuillin. The boulders could be full of hazel regeneration if the deer pressure was reduced. j.)Gleann

nam Strathain, Coigach NB0863.

This is part of the Inverpolly SAC, which has an excellent detailed Lichen Survey (Coppins 1999) and an impressive Herbivore Impact Survey (Acton 2009). Rare species such as Norwegian Speckle-belly *Psyeudocyphellaria norvegica*

and Graphis alboscripta have been identified in the SAC, but unfortunately a wildfire spread through that area in May 2011, apparently as a result of kayakers on a loch. On a visit afterwards in 2011 we found many burnt trees and burnt wood ant nests. The brief visit for this survey discovered a number of dead hazel trees, which I believe were burnt too. There is evidence of heavy deer browsing now. The remaining live trees have a good lobarion and graphidion lichen cover, including *Pseudocyphellaria crocata*. Unfortunately, I ran out of light and don't have good photos.



Wildfire May 2011. Map of Inverpollaidh SAC. Burnt area hatched in red.(SNH) *Pseudochyphellaria crocata (top left) at j.)*

4. Discussion

4.1 Hazel Woodland

The Atlantic Hazel Celtic Rainforest is alive and well in Assynt and Coigach. There are an extraordinary and bewildering array of hazel tree forms in Assynt and Coigach. Hundreds of "veteran" trees (Coppins and Coppins) stand in plain sight along the roadside in Torbreck, or down the steep braes toward the sea in Nedd. They show an awesome tenacity to survive, clinging to a cliff out of reach of red deer feeding, or falling down a brae and starting again in a tangle of damage, to sprout and send forth new and vigorous life, all the while most of the root plate is up and out of the bouldery, moss-covered ground.

Further lichen information is needed to assess the full biodiversity of the habitat, and no doubt some temporary fencing is desirable to help some of the sites retain or enhance their value, but I firmly believe the hazel woods to be valuable and worthy of recognition and further study. Glue crust fungus (Hymenochaete corrugata) has now been identified throughout the survey area, and I am sure other as yet unrecognised species will come to light. Crucially, though, light has been shed on the value of hazel trees to the people who came here after the Ice Age, and hazel's continuing sustainable use until recent times.

Admiring glue fungus in Culag *Graphidion lichens Culkein Drumbeg.* *What fencing does in Nedd.* *New growth in Baddidarroch*

4.2 Hazels in the Assynt Townships. I don't know how unique Assynt is in this respect, but the largest stands of hazel woods are in the crofters' township inbye, eg. Nedd, Achmelvich, Torbreck, Inverkirkaig, Badnaban. Did the trees help people choose to live there? I believe you couldn't have survived in this part of the world without hazel trees.

Archeological digs at Clachtoll broch have discovered carbonized hazel twigs and nuts**.** They believe the hazel was used as woven floors in the broch, although to date the finds have not yet been completely analysed. **Are the trees this wood came from still alive, 2000 years later? See below.**

Carbonized hazel nuts, hazel sticks and barley from Clachtoll Broch excavation 2017. *Ullapool High School at broch excavation*

The number and extent of hazel trees are likely to have been at a maximum before the Neolithic times when on good land were cleared for agriculture. There were 5000 years or more of time for the trees to arrive and establish after the Ice Age. Nuts here will have been moved about by bank and field voles, wood mice, the crow family and rock doves, but we don't know whether there were red squirrels or jays. There were wild boar: a jawbone was discovered in the broch. Certainly more of these animals would have helped the hazel colonise and establish.

Climate change would also have played its part, as there are hardwood remains in the bogs as well as the Scots pine which became extinct around 4000 years ago due probably to human cutting and increased peat formation due to increasing rainfall and the cooling climate. This wood reappears in a number of abandoned peat-cuttings (SB pers comm.)

There was iron working of bog iron in Assynt, always near woods, including the ruins and slag at Ardvar. Ironworkings were always near woodlands for fuel. Iron was also found in the broch. Was hazel used for firewood as well as building and making vital stuff, or was it too important, if so when did that value reduce?

According to Home's Survey of Assynt (Adams 1960) – when present-day townships were the names of "Farms" and most locals people were sub-tenants, cottars and their families, many of the "woods abound with good grazing pasture" (Home's 1774) and hazel is mentioned as a component of woods quite frequently. He was writing to promote Assynt as a sheep-farming destination: and succeeded spectacularly. The year after Homes Survey was finished (1775) a station for curing and smoking herrings was built at Culag (Bangor-Jones 1996). It included 8 smoking houses, which could smoke 1000 barrels of fish at a time and employed 80-100 people on shore. A massive amount of wood was then taken for smoking (Bangor-Jones 2002) as well as birch bark for tanning the fishing nets. Again we don't know if hazel was used for this. Within a few years Assynt was let to 5 large sheep farms – see 4.3 below.

It is difficult to discover from the historical record how hazels were regarded as the tree itself is not often mentioned. The language was gaelic and the tradition oral. From the Sutherland Estate records Bangor-Jones writes (2002):

In 1765 the Assynt woods were being cut and smuggled away by men from Eddrachillis for sale in Lewis and Caithness. At some point the taking of wood included hazel from Gleann Leireag (pers comm Bangor-Jones).

Also, with peat diggings running out in some areas, people may have turned to the woods for fuel.
The rise of the herring fishing during the 18th century created additional pressures. People in Assynt and Eddrachillis sold bark to the large vessels from the Clyde ports – the herring busses - for preserving nets and sails. Bark was also used for local boats and wood was cut for smoking herrings at the fishing stations. In 1817 the factor for Assynt stated "that this country was, a few years ago nearly covered with wood, but owing to the

tenants being allowed to cut down as much of it as they pleased & to destroy by peeling off the bark, there is now scarcely a tree standing in the parish". No doubt he was guilty of exaggeration. However, the cumulative impact of these pressures may have been severe.

The picture is still more complicated, since when the Duke of Sutherland turned Assynt over to 5 large sheep farms the tenants were exhorted to protect the woods from damage, and indeed the birch seemed to colonise new areas at this time, in large amounts and the factor would send over woodsmen from Dunrobin to thin the birch (pers comm. MBJ). (It is possible of course that hazels were not included in the definition of "trees".) Later on, during the era of sporting estates, the shooting tenants were complaining about excessive burning, as was the landlord, and indeed burning still occasionally happens, and this sometimes affects hazel. Tenants were certainly threatened and indeed punished for taking wood. A very complicated picture; we don't know all the answers (Noble 2000).

Everyone made baskets, and it was so common and ordinary perhaps that is why little was written about it. It is possible "everyone" used hazel and it was an unspoken agreement that local people could take hazel stems for their own use. Home's Survey maps (1774) show summer sheilings where crops were grown, shown by pollen analysis in peat cores (Davis 2010), and these cores show the local presence of hazel. It would be interesting to compare shielings and woodlands on Home's maps with present day hazel locations.

Apparently, the wonderful strip of hazel wood just to the north of Achmelvich Bridge "belonged" to Clachtoll as they did not have their own (pers comm DM and others) and one person said they were planted. They could be planted or non-hazels could have been removed to keep the canopy open enough for new hazels to sucker or grow from seed. Hazels were needed for roofing, hurdles, creels, nuts and much more, and it is likely they would have been well looked after when it was possible to do so.

Clachtoll (?) hazels near Achmelvich Bridge. Wicker sledge in Sweden – perhaps like the hazel carts on solid wheels in the 1600's in Inverness?

The dog whelk is so named because in Arran a dead dog was put in a hazel creel and sunk, the whelks would crawl in and eat it and be harvested. As an aside, willow appears to be less well-used than hazel in the literature in the Highlands. The stems have different properties, but also willow bark is very attractive to sheep and other animals so if you are making an animal pen, it makes sense to use hazel. Longer lasting too.

Re-enacting the Clachtoll broch destruction c.2000 years ago. Brian Wilson helped Ullapool S1 make a heather thatch. Note the bent hazel pegs holding on the hazel struts (arrow). Many of the children wanted a hazel stick to take home.

Hazel has the habit of making amazing big lumps on the bark, known as calluses. A substance called Paclitaxel is known to have anti-cancer properties, it is a factor in callus development (Moieni 2017). Perhaps the Celtic Rainforest, like tropical rainforest, will prove home to more substances people can use.

4.3 Changes in Grazing and Browsing

The pace of change in terms of human interaction with the land in Assynt was probably very slow since colonisation in Neolithic times, as the ancestors had to try and make the land right for growing crops; manage the browsing of goats, grazing of sheep and cattle; alongside the gathering of wild plants, berries and nuts; the hunting of deer, other wild animals and fishing. Not to mention the storage and protection of food. Change would have sped up with the arrival of guns in the 1600's to finish off the wolf and remove the main predator of deer. I mention this because it impacts all trees including hazel.

1800 saw the extinction of goats in Assynt (Henderson 1812) coinciding with the introduction of the Caoran Mhor (big sheep) and the onset of the Clearances. At this time the Sutherland family banned goats from Nedd (Bangor-Jones 1998) and probably other townships. This is significant because goats were provided more milk than sheep (Mackenzie 1993) and their loss would have caused great hardship and, together with the rent rises, would have increased the pressure on the population to make any cash they could to pay to the landlord. Much of the land was lost to the tenants and cottars though the large sheep farms, and all of this were likely to have put the hazels under more stress.

Old Wall in Drum Tollaidh hazel grove

Possibly the other end of the wall – up in a sheilin

Once the sheep proved non-profitable the focus of land management turned to sporting, and high grouse and deer numbers were the priority.

There has been great change in land management in more recent years though, as around 50 years ago there were neither sheep nor deer in-bye, since then blueberries have disappeared from locations in Drumbeg and Nedd (various pers comm). You had to climb up Quinag to poach a deer (various pers comm) The Assynt Crofters Trust (ACT) Board changed their attitude markedly toward deer after the 10 Year Anniversary of their winning the land, in 2003. This was perhaps due to their concern to help young people gain a living from the land; and ACT effectively became a Sporting Estate. Previous to this the deer were seen as in direct competition with the sheep for forage (various pers comm). In the last 5 years or so, as sheep numbers have declined in some areas the increase in deer numbers has been striking, and crofters complain how much grass they are losing for their sheep (this is in addition to the impact of rabbits in some parts). The deer are now regularly seen all over the B869, and while a great deal of money has been spent in stock fencing to manage sheep and cattle, to enable vegetables and gardens to grow, or simply to avoid wading in the sheep dung to get into the house, in places like Clachtoll, for example, these are completely ineffective against deer. Red deer droppings now abound and the stags are roaring just beside the road in the township.

The picture is confusing, regeneration and browsing are not uniform throughout the area. Birch and eared willow have increased in some areas, and as mentioned before there has been an increase in woodland in Achmelvich and Inverkirkaig. However, I believe this flush of growth will prove short-lived, the deer are now browsing heavily on the roadside willow by both Clashnessie and Loch Assynt, indeed are seen throughout along the road and are inside the new forestry compartments where they are breeding. Hazel in exposed areas of Culkein Drumbeg for example are often completely browsed at the base and show a lot of bark damage. Where the winds are high the smaller trees are often on their way out of the ground at the root. Many of the older hazels are now becoming very badly damaged and losing the ability to grow new stems at the base, and even those higher up may soon not be sufficient to provide the leaf the tree needs to photosynthesise. This is particularly true in Cnoc nan Each near Lochinver, in
Gleann Leireag and on Inverpolly . In the last 5 years the red deer have been impacting further west in North Assynt. A crofter counted 30 stags in a small area of woodland 2 years ago.

The effect of deer browsing is very different from that of sheep grazing (Gill 2001) and will produce a different sort of woodland. The changes to the Atlantic Hazelwood in Assynt and Coigach is happening at speed. (Woodland Trust 2002)

Recent roe deer bark damage to a hazel which had regenerated in a forestry compartment.

4.4 Multistems vs Single Trunk Trees Assynt shows a tremendous range of hazel habit. We have wind-stunted, compact flourishing trees in Inverkirkaig roadside, a flush of new growth in the boulder fields of Altnabradhan, veteran trees festooned with lobarion lichens beside the road at Torbreck and Badnaban, trees which have fallen and are growing again in a whole new form in Nedd, Gleann Leireag and Gleann nan Spardain.




Inverkirkaig *Badnaban* *Glue fungus and strangely growing trees at Gleann Leireag*

Chris Ferreira (Ferreira 1995, based on visits in 1980) describes hazel as “usually coppiced” in NW Sutherland, but as “still” being single stemmed in good condition in a few places, eg. Creag nan Spardain. Upon visiting, I discovered there were no longer any single stems, instead they had fallen down the hill and resprouted in wonderful new multi-stemmed shapes. This goes some way to confirm the idea that single stems are a product of continuous grazing (Coppins 2012, Summers 2017). I wonder how differently some sites would have been assessed if this was known then. It is becoming better known that multi-stems help the survival of trees under grazing/browsing pressure (Tanentzap 2012, Bellingham 2009), so perhaps so-called “coppiced” trees should be seen as naturally arising, in better condition, and valuable, rather than more damaged. Hazel trees have an extraordinary ability to sprout new branches from epicormic buds (Natural England 2001)




Falling down C.nam Spardain and here at Duart, still strong Single stem 100 yrs ++ (clipboard) and new from old, both G.Leireag

4.3 Variation in Hazelwoods throughout Survey Area

At Achmelvich it is likely that both sides of the road were hazel pasture which has grown into woodland as the sheep numbers have gone down. Many people say how the trees are recent – but the hazel stools are not new. As they "got away" first they have provided a nursery for birch, rowan and particularly aspen, which are now so frequent they are beginning to shade out the hazel. I believe the woods here were once managed to encourage the hazel – while birch is great firewood, rowan for furniture and important in folklore, aspen rots too quickly to be very useful for anything and was probably cut down. Now the aspen is tall again and shading the hazel. The hazel was strong but pliable and vital for building walls of houses and pegging roof thatch (Wilson pers comm), chicken runs, lobster creels (pers comm), cattle pens (Mackenzie 1921,2005) and you could just take the size of branch you needed at the time. The tree would continue to flourish. A perfect source of sustainable material.

The soils in north Assynt near the townships are often noticeably deeper and more fertile, and this has greatly benefitted tree growth. What is lost in winter sun is made up for in soil fertility.

4.4 Variations within Site

Confusingly, within one site there can be a great contrast in the size, form and condition of the hazel trees. This could be do to variations in shading, root stability, soil depths and nutrients, shelter, aspect, exposure, arthropods… the list is endless. Very important factors are grazing and browsing. (Gill 2001). Apparently when herbivores arrive, hazels are among the trees which can produce extra tannin in the leaves to make them less palatable, when it is needed (Dey 1997). What is more, they can communicate with other trees in the woodland via ectomycorrhizal fungi (Simard, 1997) perhaps to warn of the oncoming hungry beasts. (Simard was the first to show that Douglas Fir and Paper Birch transfer carbon between them via fungal mycelia, and appear to "help out" younger, smaller trees.) Hazel trees survive with a tiny piece of root still in the ground, perhaps fungi help with this? See 4.6 below.

Hazel tree at Inverkirkaig growing out of a hole in the banking – and a rock.

4.5 Adapted to Assynt – Atlantic Woodland Hazel Groves (Calltuinn)

A recent study showed how the biodiversity of the hazel habitat, particularly lichens on the branches, decreases as with increasing coppicing and moving east and southward in Britain. (Bellinchon 2016). Here in the far north west the Atlantic hazelwoods are nearly at the extreme north-west – there are a few woods further north including Loch

a Mhuilinn SSSI/SAC and the tiny relict hazel in the limestone grykes at Loch Croisipol, but Assynt has the largest continuous areas of hazel.

Researchers have only recently turned their attention to how well trees with a multi-stemming habit survive disasters, whether it be high winds and storms, overgrazing or fire (Bond 2001, Bellingham 2009, Gotmark 2014). These extremes of weather apply to Assynt and Coigach, and hazel's survival must be attributed to the numbers of epicormic buds (Natural England 2001) enabling new growth after traumatic events, at least until they are all used up. They are also adept at coming up below the browsing level within scree where the soil is suitable. This is striking at Altan'abradhan – are these the descendents of the 2000 year old hazel found in the broch?

The very twisty twigs at the apex of the tree, probably an adaption to getting as much light as possible, particularly when the tree is unable to make enough new stems due to grazing, bears further study, as does the presence of lumps and bumps on over-grazed trees. Is this a function of the tree not being able to produce basal growth so the action has to happen somewhere else in the trunk?

This tree, although fenced off from grazing for 15 years has no new basal growth. Note the enlarged boll at the base. This is probably a sign the tree will not survive long, it is very old and the shoots have been nipped off at the base too often. When it falls, it is possible epicormic buds will sprout from a different part of the trunk. Annual photo-monitoring would be really useful.

4.6 Lichens and Glue Crust and more

While this survey has uncovered the widespread presence of Glue Crust fungus in Assynt and Coigach, more must be done to investigate the lichens on the Atlantic hazel woods. Luckily Tony Fletcher is recording the lichens, and Andy Acton will be holding a workshop later in 2018. It would be worth collating existing records.

I am fascinated by the role of Glue fungus – is it just eating up the hazel or does it have a deeper function, perhaps in symbiosis with the tree? Is it helping the new stems gain nutrients from its older branches? It almost appears that the tree is pulling in lichens, dead wood, mosses, fungi, all in toward itself. Is there a role of mychorrhizal fungi in stems as well as in the ground, like a sort of beneficial biome like in the human gut? It may be fanciful, but hopefully future studies will shed more light onto this.

4.7 What next for Hazel in Assynt and Coigach?

It is difficult to decide what sort of management is best for hazel, and it will depend on what land managers want and also what they can or want to change. There is a wonderful hazel site in Assynt where the owner wants to do

what is best for the trees – the journey in finding what that is and what resources are available to help has just begun. The results will be interesting and I hope there will be the opportunity for on-going monitoring. Atlantic hazel woodland now qualifies for grant aid and annual payments, for example via the Woodland Grazing Toolbox.

While visiting a site fenced off and planted for forestry since 2000 (in March 2018) I came across a fabulous sight – ancient venerable hazels, which must have been close to death, sprouting brand new growth. The deer are back in this exclosure but the hazels have a new lease of life and we have direct evidence of how their shape can change radically, and they can in fact look very young. Do they have the secret of eternal life?

At first glance this appears to be a young hazel on the right– but if you look closely you can see it is growing from an old, dead trunk lying on the floor off to the left. Another young tree is growing from the old top of the dead stump to the left! Is this layering? If so it is extraordinary to come from such an apparently decayed tree!

The whole scene in this forgotten wee wood illustrates how difficult it is to determine how old a hazel stool is.

New growth as grazing pressure is relieved. The old single stem.

In a few years no-one will be able to tell this tree has fallen down the hill.

There are a number of large hazel stools in Assynt which look like they are in a ring. It would be very interesting to carry out DNA testing on some of these to see if they arise from the same origin, as has been done a little in other areas (Coppins 2012). It would also be worthwhile measuring the growth of hazel in terms of increasing stem girth. Luckily there are people with hazels willing to take on a long term study (pers comm).

Long term fencing (28 years above) creates big change for hazels. Not only are the trees protected from grazing and browsing but the flush of vegetation provided enhances the habitat for bank voles and woodmice which plant the hazel nuts by dropping them or forgetting them. In these circumstances hazel seedlings can even grow in heather. At Loch a' Mhuillin further north hazel nuts have grown in the open, 100m from the nearest seed-bearing specimen – have they been moved by field voles, rock doves or hoodies?

Muirhead red squirrell sanctuary 2013

Squirrels have been reintroduced to Dundonald and spread to the other side of Loch Broom. There is interest among crofters in doing the same in Assynt. A report (Patten, 2014) looking into this indicated that the main species in Assynt is birch, as information was not available at that time on the hazel woodlands. This new survey information and the flourishing Scots pine in some of the new forestry plantings may go a long way to making the case for red squirrel translocation in Assynt.

While nuts aren't being stored by squirrels just yet, luckily in this year Assynt Field Club is involved in the Millenium Seed Bank and will be collecting hazelnuts from Assynt and Coigach for long term storage and protection.

The writing on the tree – what is it telling us?

Roz Summers April 2018

WildSummers Ecology

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Transactions of the Highland and Agricultural Society of Scotland 1829 vol V11 p143 hazel commonly quite neglected. Only sought when nuts rip and shoots wanted for hoops to casks or dishes. If due care were taken much better fruit, more and better shoots for cooper andn staff make. Sprouts much browsed by catlle when too high the best brushwood for fences, ribs of creels and baskets. Tough wood can be split

Roof pegs brian Wilson pers comm. Roadsides
Twigloo culag woods, hurdles. Ken 2007

Silver bough not in the black wane of the moon, sap goes down to root and wood become brittle and crumbly without pith/good

William fraser sta account scot vol viii p 48 parish gigha and cara Argyllshire. Kill dog cut up into trap lik basket of hazel, sink into sea with rocks. Dog whelk crawl in, cant get out, then use any fishbait and they will continue, check every day!

N Scotland hazel fishing baskets flat rectangular on bottom with semi circ hoops of hazel, string netting F fraser darling (check his other books)

Hazel creels between solid wheels in inverness 1730 Veitch K transport and communications 2009

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Horse head eels achiltibuie

Assynt Field Club

Assynt Field Club

Atlantic Hazel Woodland Audit Brief

27th February 2017

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1. Introduction

Assynt Field Club invites bids to audit the extent and condition of our existing Atlantic hazel woodland in the area of Assynt and Coigach, prepare a report and assist in the presentation of the findings to the public.

Bids should be submitted to Ian Evans via email (assyntwildlife@gmail.com) by 5:00pm on 15th March 2017

Please supply a total price to complete the work, along with an estimate of the number of days involved.

We envisage the project's budget being in the region of £5,000 - £7,000 and include a minimum of 40 days work

The funding for this project is being provided through the Heritage Lottery Fund (HLF) and Scottish Natural Heritage (SNH) as part of the Coigach and Assynt Living Landscape Partnership (CALLP).

We will choose a contractor within one week of the closing date. The project will commence on **Monday 3rd April 2017** and is scheduled to complete by the **30th September 2017.**

Before commencing the successful contractor must show a copy of their:

1. Risk Assessment detailing the risks involved, and how such risks will be minimised.
2. Proof of Public Liability Insurance.

2. About the organisation

Assynt Field Club (AFC) was founded in 1986 and is run by a committee of dedicated volunteers. The Club is a constituted group, whose aims are to encourage the study and enjoyment of the Assynt landscape, geology and wildlife. It organises talks and other events in the winter and field trips in the summer. Members participate in a variety of surveys, many of which have resulted in reports or publications. Membership, which is currently around 130, is free and open to all. Funds are raised by donations at meetings and from the sale of publications. AFC has no employees. Members receive circulations in spring and autumn, by e-mail or post, with a programme of events and a summary of recent wildlife observations.

3. Project Background and Description

The Atlantic Hazel woods are one of Scotland's most ancient woodlands. People have made use of the hazel in Assynt and Coigach in many ways over thousands of years. They are important for a whole range of connected species but in recent years they have not been doing very well for a variety of reasons. We know that many of the old hazel stools show little or no regeneration; they are aging and will die if not protected from grazing.

In Assynt, hazel has been recorded from 77/164 tetrads, mainly in the north and west of the parish where it is an important component of our coastal woodland. There is no comparable survey for Coigach. There will be records within the Forestry Commission Scotland and SNH and the now defunct North Highland Forest Trust. Hazel has probably been present in the CALL area, and therefore an important part of our landscape, for over 9,500 years. It has now been recognized as the dominant tree of a climax woodland type, Atlantic hazelwood, which occurs along the western coasts of Scotland and Ireland (Atlantic Hazel: Scotland's Special Woodlands by Sandy and Brian Coppins (2012) published by the Atlantic Hazel Action group). SNH advisory information leaflet; Atlantic Hazel – Scotland's Special Woodlands also highlights the threats.

This project aims to identify the extent of hazel woodland in Assynt and Coigach, where it is and what condition it is in. We envisage most of the work will be in Assynt as that is where most of the hazels are, most of the existing information and most of the volunteers exist. We would aim to map and catalogue all major stands of hazel and to assign an index of importance based on the presence/absence of key indicator species and assign an index of the threats each stand faces. We will search existing records and data bases and consult Forestry Commission Scotland (FCS) for information and advice.

In doing so we hope to raise the profile of this important habitat locally and further afield, promote a better awareness of the habitat and instil a sense of pride and local identity, which together with a better understanding about the health and condition of this habitat will allow for better future management decisions to be made.

The project will be coordinated by a steering group of members from the Assynt Field Club and others and delivered mainly by a paid field surveyor. The steering group would set the terms of reference of the project and line manage the field surveyor.

An important part of the project will also be the use of volunteers. Volunteers would be involved in doing a bio-blitz on some of the core and best area of hazel stands. There would be opportunities for volunteers to work alongside the contractor and get on site training in identification.

The findings will be written up in a report, summarized in a free public leaflet and also fed back to the community in a series of public presentations, field trips to the best areas, a leaflet and a public day of celebration for the hazel. **4.**

Details of work

A/ Desk Based Research

- Collate existing information (from a variety of sources) on Hazels in Assynt and Coigach and other relevant details

- Identify potential volunteer surveyors living close to good hazel patches.
- Map the occurrence of hazel at 1km square level, marking up a 1:50,000 map with assessments of three levels of abundance e.g: present, but only as isolated or scattered trees/ localised clumps or groves/extensive areas of hazel woodland from existing data sources where possible.

B/ Fieldwork

- Supplement and ground truth the 1km hazel distribution map produced and identified as part of the desk based research.

- Identify ten key sites in consultation with the steering group and focus detailed fieldwork, involving volunteers, on these ten specific sites (Mostly in Assynt but at least one in Coigach)

- Detailed fieldwork to include percentage cover of hazel within a stand, dominant habit, pole density (stems/ha), structural class, distance from coast, soil pH, proximity to water course, niche suitability for expansion, percentage of dead hazel wood, number of seedlings and regenerating poles, indication of basal shoot suppression and other factors to be discussed with steering group as appropriate.

- Detailed fieldwork to include index of biodiversity using key species (e.g. epiphytic lichens and other species to be discussed with steering group).

C/ Reporting & Public Engagement

- Prepare a detailed report summarising the results with appropriate maps and suggestions for future management.

- Prepare a simple short leaflet precis of the report in plain English for the public.

- Assist the steering group in presenting the findings at two public meetings.

- Assist the steering group organise a family day of events celebrating our hazel trees.

- Assist the steering group in running two field trips for the public.

<u>GENERAL CONDITIONS:</u>

<u>Supervision</u>

The Contractor will be responsible for the management of their own time but will consult regularly with and take direction from the steering group (which consists of four members of the Assynt Field Club). The contractor will be responsible for all the work being carried out within the timeframe and within the budget.

<u>Volunteers</u>

The contractor will from time to time be required to work with volunteers.

Access and permissions

The steering group and local volunteers will assist with getting required access from local landowners and tenants as appropriate for the contractor. However the contractor must check that this has been done prior to site visits.

Insurance

The Contractor shall satisfy us that during the whole period of the contract they are covered by insurance in respect of liability for injury of persons, animals, or damage by fire or otherwise to- the landowner, or any third party.

Health and Safety at Work

The Contractor shall carry out all work in a safe manner and prepare, and submit to the Steering Group for approval, a written risk assessment for site visits.

Submission

A quotation must be received by Ian Evans via email (assyntwildlife@gmail.com), by mid-day by 5:00pm on 15th March 2017.

Invoicing

Contractors should submit invoices periodically (according to an agreed timeframe) to the Scottish Wildlife Trust for time spent /work completed and confirmed by the steering group.

12. Evaluation Criteria

The applications for tender will be assessed on

1. Technical ability of the contractor
2. Previous experience of undertaking similar work
3. Quality and clarity of the response to this brief
4. Ability to do the work within the stated timeframes
5. Value for money offered by the proposal

For any questions or points of clarification please contact Ian Evans.

Ian Evans
Assynt Field Club steering group
27th February 2017

Site name	Site Grid Reference	Data Source
Clachtoll Broch	NC036 278	AOC Acheology Survey
Clachtoll CAM	NC046 277	RS
Altnabradhan	NC057 262	RS
Manse Loch Crag	NC095 250 *	Ferreira '95
Nead an Fhitich	NC082 224	Ferreira '95
Baddidarach	NC084 230	Ferreira '95
Loch Roe Wooded Crags	NC068 239	Ferreira '95
Feadan Woodland (2)	NC069 247	Ferreira '95
Loch Bad a'Chigean Ravine	NC168 269	Ferreira '95
Loch Leathad a' Baile Fhogair Crags	NC054 278	Ferreira '95
Loch Eilenach	NC088 314	RS
Cnoc na Ciste	NC080 312	RS
Druim na Tollaidh (2)	NC108 318	Ferreira '95
Pollachapuill Woodland	NC106 331	Ferreira '95
Torr Beag (S)	NC115 330	Ferreira '95
Nedd Woodland	NC136 319	Ferreira '95
Allt na Claise ravine	NC171 329	Ferreira '95
Creag and Spardain	NC218 328	Ferreira '95
Cnoc a 'Ghille Chlais	NC074 249	Ferreira '95
River Inver ravine	NC096 230	Ferreira '95
Cnoc Ruigh Chlachain	NC077 243	Ferreira '95
Achadhantuir ravine	NC080 249	Ferreira '95
Loch Leathaid a' Phris Dhroighinn Crag	NC071 266	Ferreira '95
Dubharlainn Wood	NC120 292	Ferreira '95
Oldany River ravine	NC100 317	Ferreira '95
Druim na Tollaidh (NW)	NC106 328	Ferreira '95
Torr Beag	NC119 330	Ferreira '95
Meallard	NC157 336	Ferreira '95
Loch Glencoul SSSI SW side	NC250 298	Ferreira '95
Lochinver behind old visitor centre		RS
Nedd Woodland		Noble R, 2000
Tree at Newton	NC 238 319	
Cnoc nan Each	NC 111 215	
River Kirkaig Wooded Ravine	NC103 182	Ferreira '95
Glenleireag Woodlands floodplain 1	NC147 314	Gifford T 2017, Noble R
Glenleireag Woodlands floodplain 2	NC150 313	
Nedd Woodland	NC141 319	Gifford T 2017
Nedd N Creag Dharaich Glen	NC144 320	Gifford T 2017
Leireag W		
plot other 3 arvar sites hazel		
R. Kirkaig An Droigneach (2)	NC082 195	Ferreira '95
Allt a'Chalda Mor wooded ravine	NC245 235	Ferreira '96
N of Bad nan h-Aclaise	NC120 214	GR & IME
SW of Culag Wood	NC087 216	Noble R, 2000

Duart Wood	NC132 332	Ferreira '95
Culkein Drumbeg		
Loch Leathad a' Bhaile Fhogair crags	NC054 278	Ferreira '95
Badnaban Crag Woodland	NC 073 211	Ferreira '95
Meallan a 'Bhuic woodland	NC084 216	Ferreira '95
Allt Poll an Droghinn ravine	NC259 220	Ferreira '95
Torr Mor Little Assynt	NC159 250	

Site visit this survey	Survey number(s)	Aspect	Geology	Slope
Summer 2017	NA	All	Torridonian	0
RS CAM 31/05/2017		E	Lewisian gneiss	30
RS 31/05/17		NE and SW	Lewisian gneiss	0-30
NA	4.5.11	S	Lewisian gneiss	
NA	4.5.8	S	Lewisian gneiss	0-40
RS 09/05&05/09/17	4.5.8	S	Lewisian gneiss	0-40
NA	4.5.9	NW	Lewisian gneiss	NA
RS IC 23/05 to 20/10/17	4.5.10	S	Lewisian gneiss	0-30
NA	4.5.14	NW & SE	Lewisian gneiss	
NA	4.5.14	NW	Lewisian gneiss	
Summer 2017			Lewisian gneiss	0
Summer 2017	4.5.19	NE	Lewisian gneiss	40
NA	4.5.20		Lewisian gneiss	
RS ES 26/08/17	4.5.21	SW and W	Lewisian gneiss	
RS ES 03/08/17	4.5.22	E	Lewisian gneiss	10 to 40
RS ES 03/08/17	4.5.23	N	Lewisian gneiss	>30
NA	4.5.27	SW	Lewisian gneiss	
RS RG 09/11/17	4.1.2	NE	Lewisian gneiss	40-60
RS ES GR 17/08/17	4.3.2	SE to SW	Lewisian gneiss	0-50
RS Summer 2017	4.4.2		Lewisian gneiss	30
NA	4.4.3	W	Lewisian gneiss	
NA	4.4.4	S	Lewisian gneiss	
NA	4.4.6		Lewisian gneiss	
NA	4.4.8		Lewisian gneiss	
NA	4.4.11		Lewisian gneiss	
NA	4.4.12		Lewisian gneiss	
RS ES 030817	4.413	NE	Lewisian gneiss	20-50
R Noble 2000	4.4.14	S	Limestone	
NA	4.2.2		Quartzite, Fucoid,	
RS Summer 2017			S lli Li Lewisian gneiss	30-40
RS Summer 2017		NE	Lewisian gneiss	
GR,IME Nov2017		NE	Lewisian gneiss	
GR Nov2017		NE	Lewisian gneiss	0-30
RS GR IME 2017	4.5.2	NE	Lewisian gneiss	0-40
RS Dec 2017	Map 6 Gifford	NE	Lewisian gneiss	
RS Dec 2017		NE	Lewisian gneiss	
	Map 6 Gifford	NE	Lewisian gneiss	
	Map 6 Gifford	SW	Lewisian gneiss	

	Map 6 Gifford		Lewisian gneiss	Description
	Map 6 Gifford		Lewisian gneiss	Found as ca
RS Summer 2017	4.5.1		Lewisian gneiss	Carol Ann M Hazel regen With hornb
	4.3.6		Lewisian gneiss	More oak i
GR & IME 02/14/17			Lewisian gneiss	RCF describ Young woo
R Noble 2000			Lewisian Gneiss	See Site su Crush
RS Nov 2017	4.3.4	NE	Lewisian gneiss	zone Hornblendi A
RS Nov 2017			Lewisian gneiss	few smal Scattered h One on
	4.5.15		Lewisian gneiss	S s Hornblendi Hornblendi

Hornblendi Along a fau Boulder scr

Bands of ho
Birch-hazel Crags with Hornblendi Stunted ha W11/17 pr Middle sec
Hornblendi
Hazel wood
Doesn’t me
W9 mixed w

0 NC 2381 31
NC 1107 21
Open birch 0 NC1475 31
0 NC15026 3
30 NC1405 31 40 NC1435 32 glen ard w,

Lewisian ho 400m in len
NC1201 21
0 Rig/furrow to 136 330 Lexy's loch

	4.5.5	Lewisian gneiss	S side Loch
	4.5.6	Lewisian gneiss	E of Kirkaig
	4.4.22	Durness limestone	N facing cra
GR & IME 26/01/18		Lewisian gneiss	Deer fence

n
arbonised roundwood circa 2000
Macleod croft, 2 tiny relict multistems, much chewed
neration in rockfalls both sides of road. NC05700 26212
blendic bands. W11 on crags with slopes to lochside birch-hazel W9. Brahcypodium grassland. RCF
n this S site. Good age range oak and also aspen. Most frequent oak in Assynt. 4.5.8 RCF
bed Lewisian with bands of hornblendic rock within, and as oakwood, with W9a rich ground layer in p
odland in 1982 ,40 years old, good condition. W11/17 birch-rowan aspen crag woodland with scattere
rvey. RFC says hazel nearly all coppiced and descibes N side as lo birch-hazel scrub woodland.
e with calcareous rock crosses. Birch-hazel woodland (W9) and wych elm, aspen. Good condition 198
ic rock at NE end. Steep rocky slopes with birch hazel woodland W9. Good tall herb community and le
l hazel trees growing on an island, on N side, visible from road.
hazels growing on slopes and in rockfalls side of Druim. S good birch-hazel (W9) RCF says some old
uncoppiced hazel.. Good condition in 1981. ic rock. See site surveys. Frequent oak. W9a on rocks.
Reasonable condition in 1981 but 2017 the W ic. Birch hazel W9 with frequent oak. Electricty line. See
site survey
ic schist and epidiorite with deep red-brown mineral soil. RCF describes as coppiced hazel woodland W
ultline. W9 Birch-hazel woodland with complex mosaic tall herb community
ree and steep crag slopes, herb rich, now many of the single hazels have fallen over and new stems ha
ornblendic and ultrabasic rock. See site survey. Good lichens. Narrow-leaved helleborine. Lots of glue
l W9 near river. bands of hornblendic rock. Scattered hazels.
ic and ultrabasic bands. On N side birch-hazel woodland (W9a) and scrub hazel on scree. S and SE Side
zel scrub in 1981. Herb-rich
redominates except for narrow discontinuous band of birch-hazel (W9) along shoreline. Good age stru
tor of ravine birch-hazel with herb rich ground layer W9a. "Exceptionally fine hazels with single trunk
ic bands. Steep boulder slopes. Hazel amongst and on the larger boulders which are 2-3m in height. R
d. See site survey. W9a. RCF Describes as mostly coppiced with secondary growth reaching good age,
ention tree spp but says is like Traligill. RN describes old hazel at this location, and a few to the west, n
woodland including hazel

190 Lone tree on shore. Sheep in area
149
h-rowan woodland with scattered hazel. Hazel on crags also. See site survey for hazels toward the we
140 hazel and birch in old rig/furrows. See site survey Glen Leireag
31277 Rig/furrow dominated by multistem hazel med-large stools
185 Hazel, aspen, holly, willow. Other side of road (S) Hazel, oak and willow
200 hazel stand, to South and East hazel and willow, and NC145317 hazel and holly. NC148 316 hazel a
, hazel holly se broch, roadside rientraid

ornblenic rocks with light brown mineral soil. Birch-hazel on lower slopes W9. To the E of bookshop b
ngth, clothed birch- hazel W9, also rowan and wych elm. W9a on upper and W9b lower slopes. Dry 136
photo. Nearing gorge. On slope with boulders. Within deer fence.
now grown over with birchs and hazel beyond.
0.5km in length NW/SE, up to 350m breadth. Broad band hornblendic rock outcrops along base line o
. Bands hornblendic rock NE end. Birch-hazel W9 woodland.Old trees incl ancient rowan

Inver.Dioritic dykes within Kewisian. W11 at NW end chages to W9 birch-hazel. Good fiel layer. "Ha
g point. Crush zone W11 with scattered hazel and oak on crags.
ags with amazing hazel and wych elm with great limestone ground flora

d birch woodland, with large hazel possible pollard, and incl 5 young saplings, plus large trees with yo

es and Stands places. Now with regrowth of hazel now looks like hazel pasture. See

2017 site survey

ed hazel. RCF

1. RCF
edges.

. On NE side W11 asnd scattered multistem hazels.
slopes show serious red stag browsing damage.

W9. See site survey.

ave arisen from fallen, also have rooted again. Or they have converted to multistem. Some young see
e fungus. Very vigourous hazel now (seen as coppiced by RCF)

es also Birch hazel too. Fire damage noted nearby in 1981.

ucture wood, good mosses.No new regeneration although 10-15 year old birch
ks 5-6m in height also wych elm. Good condition in 1981
RCF says hazels mostly coppiced but in the centre are ver old with single trunks.
and hazel regeneration.This is no longer the case Very old goat willow - he says 80 yrs. Still there.
not doing well.

est end of the Kirkaig.

and willow. birch hazel, , much "coppice". Heavy sheep grazing. See

site surveys.

of crags. Rocky slopes beneath crags birch-hazel W9 withold large hazels. See site survey

azels entirely coppiced". Now stock fenced and tree planted.

oung growth. Deer in here now. Photos

edlings and saplings. See site survey.

Notes re Atlantic Hazel Site List

1 REC Ferrerera 1995 - Please note these surveys were carried out in the early 80's - see ind

2 Grid ref* where 8 or 10 figure grid reference is available this is in the description

3 Key to Ferreira Numbers. 4 - woodland 2nd digit Grade:
3rd digit - Site number

dividual surveys for more detailed comparison and for grid reference bounding site

Site Name and Subcompartment number	Grid Reference	Surveyor	Date surveyed # if more than one visit	Area (ha) approx (measured with NWSS)	Geology	Dominant habitat as assessed by surveyor -	Distance to coast (m). Estimate from map.	MaIn hazel stand type(s) *woodland may have been hazel pasture historically	Other hazel stand types present in site	Aspect(s) of site	Slope (degrees)	Is a significant proportion of the hazel stand associated with a burn or loch? 0: no, 1: some, 2: yes*, 3: most or all.	Is a significant proportion of the hazel stand associated with a road or wide track 0: no, 1: some, 2: yes*, 3: most or all.	Is a significant proportion of the hazel stand associated with a cliff or boulder scree 0: no, 1: some, 2: yes*, 3: most or all.
Results Fieldwork Atlantic Hazel Survey in Assynt and Coigach April-December 2017						**Environmental Data**								
					Lewisian				hazel in woodland,					
Coigach	Coigach Glean an Strathain	NB08638 16515	RS ES	24/11/2017	0.5	Gneiss	hazel pasture	600m	Hazel pasture	ravines, cliffs	S	0-30	0	0	1
Achmelvich x ha	Lewisian														
	Achmelvich 1	NC07260 24685	RS ES	17/08/2017	all	Gneiss	W9 birch hazel woodland	750m	Hazel pasture	hazel in woodland	S	0-30	0	0	1
						Lewisian				hazel in woodland,					
	Achmelvich 2	NC07336 24698	RS ES	17/08/2017	site	Gneiss	W9 birch hazel woodland	650m	Hazel in woodland	cliffs	S	0-35	2	1	2
	Lewisian														
	Achmelvich 3	NC07075 24850	RS ES	# 17/08/2017	=	7.0 Gneiss	W9 birch hazel woodland	700m	Hazel in woodland	hazel in woodland	S	0-30	2	1	1
	Lewisian														
Baddidarach	Achmelvich 4	NC07151 24851	RS ES	# 04/09/2017		0.4 Gneiss	W9 birch hazel woodland	750m	Hazel in woodland	hazel in woodland	S	30-40	0	1	1
						Lewisian				hazel in woodland,					
	Achmelvich 5 BM	NC07017 24689	RS	# 23/05/17		0.17 Gneiss	W9 birch hazel woodland	100m	Hazel pasture	ravines, cliffs	S	20-30	0	0	1
	Lewisian														
	Baddidarach Ken	NC07154 24853	RS ES	# 09/05/17		0.15 Gneiss	W9 birch hazel woodland	300m	Hazel pasture	hazel in woodland	S	30	0	0	1
Lewisian															
	Baddidarrach unfenced	NC08512 23145	RS	# 13/12/17		0.5 Gneiss	W9 birch hazel woodland	400m	Hazel pasture	hazel in woodland	E	20 40	3	2	2
			RS AS			Lewisian									

	Culag	Culag Woods	NC09530 21665	LochinverP7	# 28/11/17	0.6	Gneiss	W9 birch hazel woodland	750m	Hazel woodland	hazel in woodland	E	0-30	0	1	1
Cnoc SW		Lewisian														
		Cnocnaneach SW of loch	NC 11070 21490	GR IM	# 02/11/17	0.25	Gneiss	W9 birch hazel woodland	1750m	Hazel woodland	Hazel in woodland	SE	0-40	1	1	
Cnoc S		Lewisian														
		Cnocnaneach S of loch	NC 1110 2130	RS ES AS	11/01/2018	1.4	Gneiss	W9 birch hazel woodland	2000m	Hazel woodland	Hazel ravine		0-50	3	0	3
	Lewisian															
	Drumbeg		Drumbeg 1	NC11910 32953 2	RS ES	03/08/2017	0.16	Gneiss	W9 birch hazel woodland	200m	Hazel woodland	Hazel in woodland	NE	20-40 0			
		Lewisian														
Nedd xha		Nedd IME	NC13863 21998	RS ES	# 030817	0.15	Gneiss	Garden	40m	Hazel woodland	NA	NE	0	0	1	0
		Lewisian														
		Nedd	records coming	RS	#	5.0	Gneiss Lewisian	W9 birch hazel woodland	200m	Hazel woodland						
G.Leireag											hazel in woodland,					
		Duart, Nedd	NC13483 32383	RS	30/11/2017	3.0	Gneiss Lewisian	W9 birch hazel woodland	5m	Hazel pasture	ravines, cliffs	N, NE	0-70	1	1	3
		Gleann Leireag hatchery	NC15063 31211	RS	04/12/2017	3.0	Gneiss Lewisian	W9 birch hazel woodland	500m	Hazel pasture	hazel in woodland,cliffs, riparian	NE	0 -60	2	1	2
Inverkirkaig x ha		Inverkirkaig road		RS		0.6	Gneiss Lewisian	W9 birch hazel woodland	800m	Hazel woodland	hazel pasture, cliffs,		40			3
		Inverkirkaig exclosure	NC08849 19319	RS	# 21/09/2017	0.7	Gneiss Lewisian	W9 birch hazel woodland	800m	Hazel woodland	riparian	S	0-40	2	2	2
		Inverkirkaig exclosure	NC08849 19316	RS	# 21/09/2017	as above	Gneiss Lewisian	W9 birch hazel woodland	750m	Hazel woodland	hazel pasture, cliffs, riparian	S	0-40	2	2	2
		Inverkirkaig exclosure	NC08809 19329	RS	# 21/09/2017	as above	Gneiss Lewisian	W9 birch hazel woodland	750m	Hazel woodland	hazel pasture, cliffs, riparian	S	0-40	2	2	2
ha		Inverkirkaig beyond gate	NC08929 19298	RS	#13/12/17	0.9	Gneiss Lewisian	W9 birch hazel woodland	850m	Hazel woodland	hazel pasture, cliffs, riparian	S	0-30	2	2	2
		Inverkirkaig Car Park	NC08522 19330	RS	#13/12/18	1.3	Gneiss	W9 birch hazel woodland	650m	Hazel woodland	hazel pasture, cliffs, riparian	S	0-30	2	2	2
	Lewisian															
		Doire Cuilinn N Loch Assynt	NC21140 25782	RS RG	09/11/2017	0.1	Gneiss Lewisian	W9 birch hazel woodland	15000m	Hazel woodland on cliffs	hazel pasture, cliffs, riparian	S	60	0	0	3
		Torr na Ghamhna	NC21234 32280	RS RG	09/11/2017	2.0	Gneiss Lewisian	W9 birch hazel woodland	500m	Hazel woodland	hazel pasture, cliffs, riparian	NE	50 60	2	2	2
		Creag nan Spardain	NC22225 32639		09/11/2017	1.0	Gneiss Lewisian	W9 birch hazel woodland	100m	Hazel woodland		NE	0-20	0	0	3
		Polchaple Culkein Drumbeg	NC10712 33200	RS ES	# 26/8/17	1.2	Gneiss Lewisian	W9 birch hazel woodland	100m	Hazel pasture	hazel in woodland	S		0	1	1
		Torbreck (Ach Bridge S)	NC08271 24763	RS ES GR	# 31/05/17	0.7	Gneiss	W9 birch hazel woodland	1500m	Hazel woodland	hazel in woodland, riparian	S	30	1	2	2
		Torbreck (Ach Bridge N)	NC08253 24817	RS GR	# 19/10/17	0.2	Gneiss (with outcrop)	W9 birch hazel woodland W4	1500m	Hazel woodland	hazel in woodland	S	0-60	0	3	3

JMT sites x

Torbreck H croft	NC09031 24073	RS ES GR	# 19/08/17		Lewisian	W9 birch hazel woodland	2000m	Hazel pasture	hazel in woodland	S	0-30	0	1	1
				2.7	Gneiss									

Polchaple

Torbreck x ha

	26.68

Description

Slope to N of road. Bracken, viola spp. P.crocata on med2. Poss G.alboscripta and P.norvegica. Most younger stems above grazing height. Many Sma3 small girth (<30cm)and moribund. W extent of site NB08607 16554. Glue NB08638 16515. I believe these trees were burnt by a wildfire in May 2011

South slope below Achmelvich road. Dark. Large aspen debarked by horses.

Along a wee gully W-E with boulders.

Continuous to E of gully

N side of Achmelvich road. Hazels very vigourous, many young stems. Subcompartment surveys in appendix .
To W side of Ardroe road. Birch, loads aspen, aspen suckers, bluebells, primroses. Burnett rose. Sheep off 1991, was pasture now woodland. Cattle grazed 1 year 2005 but thought damage too much. FG regen grant, not enough regen.
Kens garden. Stems cut to make the twigloo in Culag Wood, also in adjacent fenced ground which now has a few deer living there. His and Ellies land fenced 13 years ago. Land outside the fence by burn to E of interest with fallen gondola trees.

Gleann an Salach. Are willows to E of burn, and further hazels to east up hill below big rockface
Via school path. The children quicly recogniced hazel by the remaining leaves and the multistem form, and they helped to count and measure the trees and we looked at the deer browsing, and identified the other trees - rowan, birch, Scots pine, sitka spruce, willow. They found glue fungus, and admired the graphidion and lobarion lichens.

Birches and rowans, most hazel. Used to be inside deer fence. Broad stems. 20% fallen over, 61% had live new stems above sheep grazing level. Nut caches found under 3 trees, eate

Torr Beag. Narrow band of hazel with birch atop and heather. On glacial till. 70% hazel. Many senescent with only few stems good diameter. Ancient large S, cinerea. Wet area with deer wallow.
Fenced off 1990, 27 years. Has 26 trees and 150 new seedlings. Keeps pulling out of veg bed. On glacial till. Heathers, bird cherry, birch, rowan, aspen. Bank vole, woodmice, badgers, moles. Many garden plants.

NE and E facing slopes down to Loch Nedd. Was inhabited and site has cultivation fields now largely colonised by birch. Very rich site, recently grazed by sheep but now many deer signs. Some very old sallow, aspen, and giant hazel stool NC13496 32879 ~14m girth. Stems >80cm. Near pc house hazels unusual see photos. Masses of hazels.

Many massive stools. Often have fallen down hill and regrowing in different shape. Wilsons filmy fern on hazel!

Coastal side of road. Wind blasted. Strong growth.
Some stools coppiced around 20 years ago (MBJ pers com). Woodland quite dark as has been deer fenced. NC* whole stool cut ~20 years ago, majority stems 23cm. NC** stool also cut but one immediately next not, hence anomally of on @52cm. Most stems 24 or so. NC*** not cut. Most trees in exclosure have max size stools.

Some stools quite moribund but most have good strong shoots above browsing height. Used to be for tups. Common grazing.

Doire Cuilinn holly cliffs. Boulders which would have more hazel if less deer. Small site but worthwhile

Above Allt nan Caorach. Really good condition hazel. Could not do detailed measurements until is drier as is so steep above river.

Described by Chris Ferrer as being un coppiced, single trees and this is a good thing. However, now the trees have become multistemmed, many have fallen over, still thriving.

Ground flora fantastic.

Damp pasture with old drainage surrounded by trees on ridges and walls and rock exposures including cliffs. Trees surround pasture, near road 80% hazel. Only a few younger trees but very varied in structure. Massive hazel NC10796 33156. Turners regenerating stools.

20m wide strip below road 90% hazel. Boulders moss-covered. Very damp (yellow pimpernel, wood ruff) Deer fence on river side. Honeysuckle, bluebell, bramble. Used to be Clachtoll's hazel. Very varied trees. Later were pigs digging up site.

Above road. Seedlings growing out of cliff. Glue attaching Rosa spp to live hazel. Strange soil from outcropping rocks.

Fabulous woodland enclosed in relict stock fence. Previously cattle now sheep and deer. Glades. Losing vigour with quite a lot of senesence now. Goood variety of stool sizes. P.crocata, glue. Curled end twigs in places.

Detailed Site Measurements

Max1 Stool location	No. Stools	Stool Girth 1 cm	No. Stems	Stem Girth Max bh cm	Stem Girth Min bh cm	No. dead	% dead	Med2 Stool location	No. Stools	Stool Girth 2 cm	No. Stems	Stem Girth Max bh cm	Stem Girth Min bh cm	No. Dead	% dead	Sma3 Stool location	No. Stools	Stool girth 3 cm	No. Stems	Stem Girth Max bh cm	Stem Girth Min bh cm	No. Dead
NB08638 16515	7	360	4	64	47	0	0.0	NB08638 16482	23	184	4	99	40	0	0.0	NB08639 16074	40	94	1	41	N	0
NC07260 24685	4	286	27	39	6	3	11.1	NC07285 24674	13	145	10	49	28	3	30.0	NC07380 24711	4	75	1	28	N	0
NC07336 24698	7	361	5	45	16	1	20.0	NC07364 24709	25	112	4	32	18	1	25.0	NC07380 24911	15	94	2	23	9	0
NC07444 247771	38	325	22	47	3	7	31.8	NC07461 24775	82	239	9	50	3	1	11.1	NC07423 24791	40	104	1	24	N	0
NC07075 24850	30	385	48	45	2	11	22.9	NC10718 33176	92	206	17	43	2	3	17.6	NC07129 24857	5	104	1	8	N	0
NC07071 24706	NA	360	39	46	2	8	20.5	NC07082 24704	NA	210	17	50	2	7	41.2	NC07105 24732	NA	35	1	14	N	0
NC08434 23123	29	310	20	39	4	3	15.0	NC08448 23109	26	208	10	28	6	0	0.0	NC08463 23113	5	47	3	8	3	0
NC08551 23210	NA	320	40	41	1	4	10.0	NC08574 23236	NA	150	9	21	2	1	11.1	NC08578 23248	NA	33	1	N	N	N
NC09530 21665	25	275	12	41	6	NA		NC10685 22083	15	69	6	51	15	NA		NA	NA	NA	NA	NA	NA	NA
NC11070 21490	45	270	22	50	2	NA	18.0	NA	NA	NA	NA	NA	NA	NA		NA	NA	NA	NA	NA	NA	NA
NA	NA	NA	NA	NA	NA	NA		NA	NA	NA	NA	NA	NA	NA		NA	NA	NA	NA	NA	NA	NA
NC13815 31983	18	390	71	56	2	10	14.1	NC13812 31985	7	42	24	2	3	3	12.5	NC13787 31950	150	65	6	8	2	0
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NC13593 32584	NA	394	11	42	3	3	27.3	NC13589 32593	NA	142	4	43	15	1	25.0	NC13618 32599	NA	71	1	23		0
NC15063 31211	NA	300	7	83	38	1	14.3	N							#DIV/0!	NC15017 30986	NA	128	1	49		

NC08846

19319 *	NA	564	58	26	3	2	3.4	NA	NA	NA	NA	NA	NA	NA		NA	NA	NA	NA	NA	NA	NA	NA	
NC08849 19316 **	NA	480	32	52	2	0	0.0	NC08844 19311	NA		190	25	42	2	0	0.0	NC08837 19304	NA		80	10	14	1	1
NC08809 19329 ***	NA	420	60	49	2	4	6.7	NA	NA	NA	NA	NA	NA	NA		NA	NA	NA	NA	NA	NA	NA	NA	
NC08929 19298	NA	400	13	36	12	1	7.7	NC08922 19315	NA		240	8	42	2	0	0.0	NC08933 19312	NA		150	1	150 N		0
NC08522 19330	NA	300	40	25	1	5	12.5	NC08572 19328	NA		130	21	46	1	5	23.8	NC08518 19344	NA		87	2	23	14	0
NC21150 25796	3	294	46	22	2	10	21.7	21140 25782		15	136	19	14	2	2	10.5	NA		9 NA		3 NA	NA	NA	
NA	NA	NA	NA	NA	NA	NA	#VALUE!	NA	NA	NA	NA	NA	NA	NA		NA	NA	NA	NA	NA	NA	NA	NA	
	24 NA		NA	NA	NA	NA	#VALUE!	NA		9 NA	NA	NA	NA	NA		NA	NA	NA	NA	NA	NA	NA	NA	
NC10756 33196	56	270	19	52	4	5	26.3	NC10814 33053		47	230	6	42	11	1	33.0	NC10710 33167		31	112	1	45 N		0
NC08304 24881	53	370	18	84	5	5	27.8	NC08357b2 4922		55	205	16	33	5	2	12.5	NC08313 24897		17	31	2	8	1	0
NC082553 24817	8	276	56	48	3	7	12.5	NC08359 24844		12	89	6	19	8	0	0.0	NC08303 24891		5	27	3	5	2	0
NC09031 24073	57	386	45	46	1	11	24.4	NC09018 24061		79	186	12	31	3	3	25.0	NA		32	75	1	51 N		0
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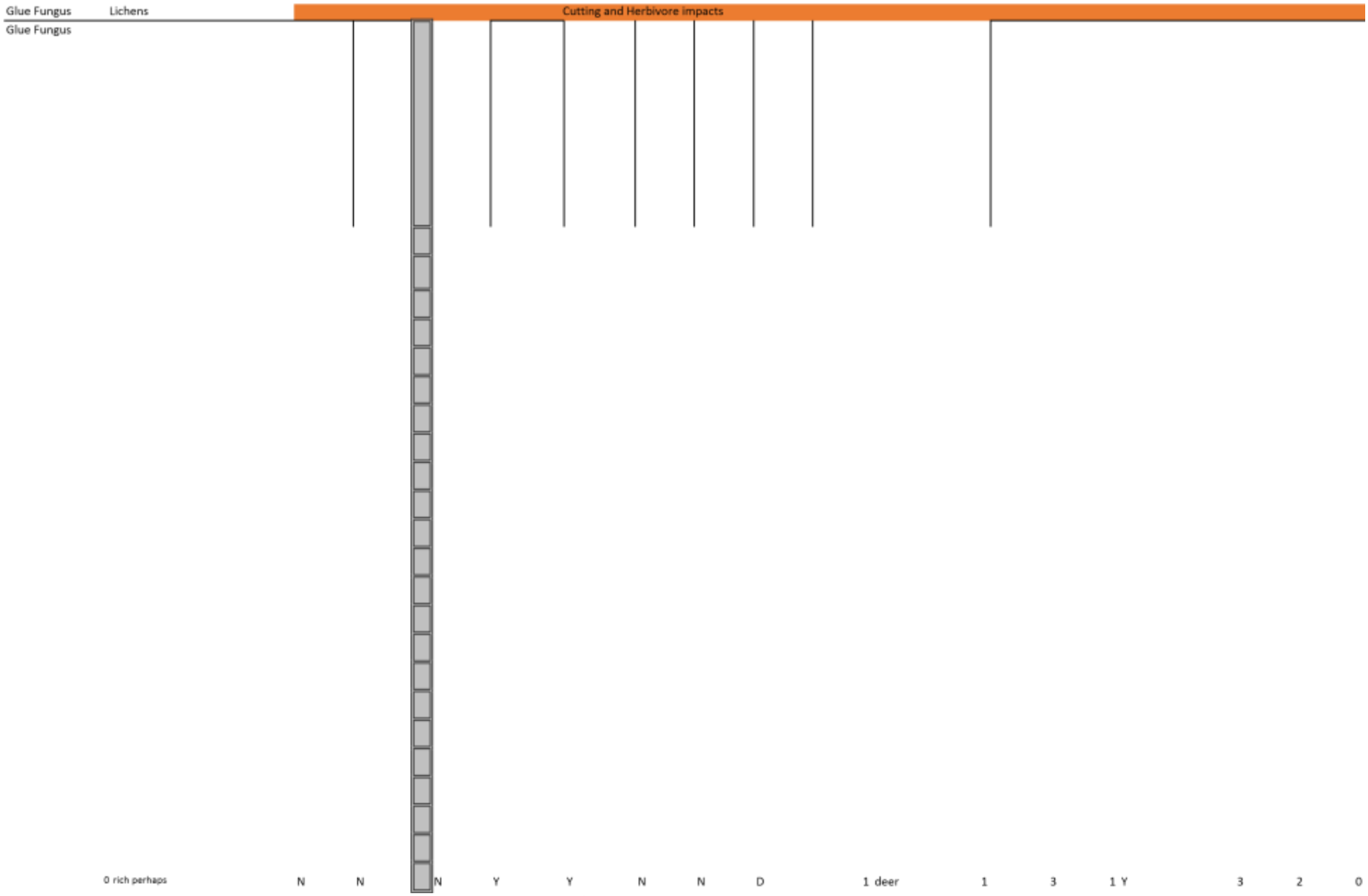

Glue Fungus
Lichens
Cutting and Herbivore impacts
Glue Fungus
0 rich perhaps
N
N
N
Y
Y
N
N
D
1 deer
1
3
1 Y
3
2
0
Mossy hazel stems in subcompt.
Evidence
Evidence
If hazel
In the surveyors
In the surveyors
Evidence
Evidence
Evidence Any
Bark
Is the
Potential for
Basal shoots
at least 4 in Proportion of Proportion
Proportion

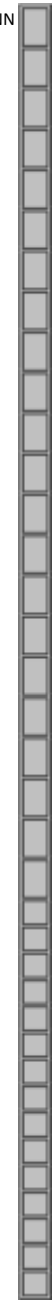
0.Not found have at least20 hazels	with a 'lush' well-developed hazel stems in subcompt.	of stems in of hazel	of whole stands present in	opinion do a significant	opinion does a significant	of cattle C	of sheep	of deer	bark evidence of	stripping subcompt	expansion of hazelwood		**suppressedcurrently**
1.Scarce 2.Occasional 3.Frequent (Y/N) - if	**Lobarion** 0: none, 1: scarce, 2: occasion, 3: frequent hazel, stems in subcompt. Y (Y/N) - if Y (0: **>47cm** dbh 1: scarce, 2: occasion, 3: frequent, 4: most stems in subcompt. dominated by Graphidion	selective cutting make note	stool cutting make note	subcompt are they dominated the near future to regen. in the hazels? prevent loss of hazels/decline of near future for continuity of (Y/N)	number of hazels proportion of the require a flush of stand require a basal regen. in (P) scarce, 2: hazel stand	or horses (S) (H) Pigs flush of basal horse, 2: stock Graphidion habitat	(D)	stripping?	culprit (0: none, 1: ubtful, 2: **hazel stools cbh reaching** 3: frequent)	1: (deer, none, 1: 22- **47cm** that are rabbit, 3: deer goat etc) if known	habitat? 1: unfenced, dominated by **Graphidion** fenced?	**1 or chewed** **2 on most** 0: none, by tree form occasional 3: Good potential for expansion.	1 successfu shoot **< 9 cm** cattle, fenced, **3 reaching) the** **canopy** (Y/N).	that are 2**7cm cbh** Yes/probably, plenty, 3: most	9 - subcompt. 0: that are **Not chewed (or nearly** none, 1: some, 2: plenty; 3: most)	s in subcompt. some, 2: **cbh** (0: none, 1: some, 2: plenty; 3: most)

	2	Leafy lobarians and oceanic graphidions	N	N	Y	Y	Y	NA	NA	D		3 deer	1		1			
	2	Leafy lobarians and oceanic graphidions	Y occ	N	N	Y	Y	H	N	D		3 horse	2	3	2 Y	2	3	2
	2	Leafy lobarians and oceanic graphidions	Y occ	N	N	Y	Y	H	N	D		1 deer	2	1	2 N	1	2	2
	2	Leafy lobarians and oceanic graphidions	Y occ	N	N	N	N	H	N	D		2 horse	2	1	2 Y	2	2	2
	2	Leafy lobarians and oceanic graphidions	Y occ	Y hydro	N	N	N	N	N (occ)	D		1 deer	1	1	2 Y	2	2	1
	2	Leafy lobarians and oceanic graphidions	N	N	N	N	N	C past	N	D		2 deer	2	2	2 Y	2	2	2
NA		Leafy lobarians and oceanic graphidions	Y	Y hydro	N	N	N	N	N	N (occ)	N	NA	3	3	3 Y	2	2	2
	2	Leafy lobarians and oceanic graphidions	Y occ	N	N	N	N	N	N	D		2 deer	1	2	1 Y	2	2	1
	2	Leafy lobarians and oceanic graphidions Pertusaria leioplaca, T.petractoides,	Y occ	N	N	Y	N	N	N	D		2 deer	1	2	2 Y	3	2	1
		P.macrospora, Parmelia crinita	Y occ	N	Y	Y	Y	N	S	D		2 deer	1	2	1 N	1	2	2
NA		Leafy lobarians and oceanic graphidions	Y occ	N	N	Y	Y	N	S	D		2 deer	1	2	1 N	1	2	1
NA		Leafy lobarians and oceanic graphidions	Y occ	N	N	N	N	N	N	N	N	NA	3	1	3 Y	3	2	2
		P. Norvegica, P.crocata, varied		Y	N	Y	Y	N	S	D		3 deer	1	3	1 N	2	2	2
2. NC13518 32829		graphidions	Y occ	N N Y N NA S D		2 deer	2 part	1 1 Y	2 3 2	0	Very rich assemblage of lichens	N N N Y Y N N D	2 deer	1 1 2	N 2 3 2			
	3	One or two graphidions on new stems.	Y	Y 20 yrs	N	N	N	N	N	N	NA	NA	3	1	3 Y	3	2	1
	3	Leafy lobarians and oceanic graphidions	Y 20 yrs	N NA NA	3	1	3	Y	3	2	1	3 Graphis scripta and Opegrapha atra.	N N NA NA	3	1	3	Y	3 2 1

Pseudocyphyllaria norvegica. Graphis 3
scripta and Opegrapha atra.

2
Graphidions and few lobarions. Not as

NA	Leafy lobarians and oceanic graphidions	N	NN	N	N	N	N	D	NA	NA	1	1	1 Y	2	2	2	



0	Leafy lobarians and oceanic graphidions	N	NN	N	N	N	S	D	2 deer	1	3	2					
1	Leafy lobarians and oceanic graphidions	Y occ	NN	Y	Y	N	S	D	2 deer	2 part	2	1 N	2	2	2		
3	Leafy lobarians and oceanic graphidions	Y occ	NN	N	N	P	S	D	1 deer	3 part	1	2 Y	2	2	2	2	Leafy lobarians and oceanic graphidions
		Y occ	Y road	N	N	P	S	D	2 deer	1	2	2 Y	2	2	2		
1	Pseudocyphyllaria crocata G. scripta, plenty lobarions	Y occ	NN	Y	Y	N	S	D	1 deer	1	2	1 N	2	3	2		

Dead stems **922cm c**bh in subcompt 0: none, 1: some, 2: plenty	Dead stems **2247 cm cbh** in subcompt (0: none, 1: some, 2: plenty)	Dead stems **> 47cm cbh** in subcompt. 0: none, 1: some, 2: plenty	**Hazel seedlings/ young saplings <1.5m** 0: none, 1: some, 2: plenty	**Hazel saplings (>1.5m)** 0: none, 1: some, 2: plenty	
1	2	2	0		0
2	2	1	0		0
1	1	1	1	1	
1	1	0	1	1	
1	1	0	1	1	
1	1	0	2	1	
1	1	1	1	1	
1	1	0	1		0
2	2	1	0		0
1	1	1	0	0	
1	1	0	2		2
2	2	1	0		0
1	1	1	0	0	
1	1	1	0	0	
1	1	NA	1	1	
1	1	NA	1	1	
1	1	NA	1	1	

1	1	0	1	1
NA	NA	NA	1	1
1	1	1	0	0
1	1	1	1	1
1	1	0	1	1
1	1	1	0	1

Appendix 4 Atlantic Hazel Survey Sheets Assynt Coigach 2017

4.1

Atlantic Hazel Survey Assynt Coigaich Roz Summers. Ref:			
Site Name:	Grid Ref Start	Own/Ten:	
Grid Refs Boundary Site			
Grid Refs Hazel Stands			
Description Site			
Grazing?			
Aspect	Geology	Elevation	
Type A: closed canopy	? Grid Refs		*Area*
Type B: scattered pasture	? Grid Refs		*Area*
Type C: veteran hazels	? Grid Refs		*No.*
Type D: woodland	? Grid Refs		*Area*

Table HAT.2 ATLANTIC HAZEL CONDITION ASSESSMENT		**YES Score 1 NO Score 0**	
Type A (closed canopy, multi-stemmed stands pure hazel)			
Closed canopy mostly intact (apart from some occasional glades)			
Stools often fairly small, evenly-spaced, with usually slender to medium-sized stems (c. 3--25 cm girth)			
Ground flora not trampled, with few bare areas or just occasional tracks/paths			

Stems mottled with bryophytes and lichens Light, seasonal grazing, or grazing by a few deer, with evidence of some basal shoots being browsed			
In 20 stools, there are at least 4 instances of a successful young shoot (whip) reaching (or nearly reaching) the canopy, i.e. one stool in 5 demonstrates viable stool dynamics within the stand, even with low grazing levels			
Any additional comments: Total score for type A			

Table HAT 2. Atlantic Hazel Condition Assessment	**YES Score 1.**	**NO Score 0**	
Type B (Scattered stools in pasture, including occasional small hazel 'trees')			
Most scattered stools robust, with many stems of varying thicknesses, and canopy wide-spreading			
Ground flora not trampled, few bare areas or occasional tracks			
If stools are reduced to a few, thickened stems, are there signs of recovery, with viable, well-established regeneration present?			
Stems mottled with bryophytes and lichens Light seasonal grazing, or grazing by a few deer, with evidence of a few basal shoots being browsed			
Any additional comments: **Total score for type B**			
Type C (veteran stools, or veteran hazel 'trees'			
How many veteran hazels are present within the site? (score 1 point under the YES column for each veteran)			
Do the veteran hazel 'tree' appear viable, i.e. at least some viable canopy present above grazing height? (score 1 point for each veteran)			
Trunk(s) is/are stable, and not requiring pruning (score 1 point for each)			
If in imminent danger of collapse, is there potential for remedial pruning/ pollarding, in order to preserve the stool? (score 1 point for each veteran where this action would be applicable)			
Trunks with bryophytes and lichens present (score 1 for yes)			
Are the veterans within a pasture woodland habitat today? (score 1 for yes)			
Any additional comments: **Total score for Type C**			
Type D (Hazel in woodland, including ravines)			
Stools forming discrete mosaics amongst other tree species (e.g. at stream-sides)			

Glades present			
Individual stools not widely separated (isolated) from other stools, i.e. not more than 20m apart			
Stools not reduced to one or two stems only			
Stools not becoming tall and gangly, drawn up by being shaded from increased canopy development or infill from taller tree species (unless in ravines)			
Ground flora not trampled, with few bare areas, or just occasional tracks/paths			
Stems mottled with bryophytes and lichens			
Evidence of light seasonal grazing within the woodland, or grazing by a few deer, so that at least some basal shoots are noted as successfully getting away to maintain stool viability			
Any additional comments: Total score for **Type D**			

4.2

Site name: Grid Ref start: date: who:RS Distance sea and direction			
Description incl boulders etc:			
Species and wildlife:			
Lichens/Bryo/Fungi			
Paths/tracks/browsing animals:			
Aspect:	Slope:	Geol:	Water:
Regen:			
Hazel description:			
Max size %age	Med size %age	Min size %age	
%new growth reaching canopy			
Within site- type:	Grid Ref:		
Description:			
Species and wildlife:			

Lichens/Bryo/Fungi		
Paths/tracks/browsing animals:		
Aspect:	Slope:	Water/features:
Regen:		
Hazel description:		
Max size %age	Med size %age	Min size %age
Av new growth reaching canopy		

4.3

Table of Detailed Hazel measurements Atlantic Hazel Project Roz Summers Assynt/Coigach 2017

Site Identity	*Stool girth 1 max*	*Stem No*	*Stem girths range*	*% dead*	*Basal ?*	*Stool girth 2 med*	*Stem No*	*Stem girths range*	*% dead*	*Basal ?*	*Stool girth 3 min*	*Stem No*	*Stem girths range*	*% dead*	*Basal?*

Appendix 4.4

Hazel Site Survey Template

Site name: Distance sea and direction	Grid Ref start:	date:	who:RS
Description incl boulders etc:			
Species and wildlife:			
Lichens/Bryo/Fungi			
Paths/tracks/browsing animals:			
Aspect:	Slope:	Geol:	Water:
Regen:			
Hazel description:			
Max size %age	Med size %age	Min size %age	
%new growth reaching canopy			
Within site- type:	Grid Ref:		
Description:			
Species and wildlife:			
Lichens/Bryo/Fungi			
Paths/tracks/browsing animals:			
Aspect:	Slope:	Water/features:	
Regen:			
Hazel description:			
Max size %age	Med size %age	Min size %age	
Av new growth reaching canopy			

Site Identity	*Stool girth 1 max*	*Stem No*	*Stem girths range*	*% dead*	*Basal ?*	*Stool girth 2 med*	*Stem No*	*Stem girths range*	*% dead*	*Basal ?*	*Stool girth 3 min*	*Stem No*	*Stem girths range*	*% dead*	*Basal?*

Site name and location	Grid Reference	Surveyor	Date surveyed	Geology	Dominant habitat as assessed by surveyor -	Distance to coast (m). Estimate from map.	Main hazel stand type(s)	Other hazel stand types present in site	Aspect(s) of site (degrees)	Is a significant proportion of the hazel stand associated with a burn or loch? 0: no, 1: some, 2: yes*, 3: most or all.	Is a significant proportion of the hazel stand associated with a road or wide track 0: no, 1: some, 2: yes*, 3: most or all.	Is a significant proportion of the hazel stand associated with a cliff or boulder scree 0: no, 1: some, 2: yes*, 3: most or all.	**Basal shoots currently all suppressed on most hazel stools** (Y/N)	at least 4 in 20 hazels have at least 1 successful shoot **< 9 cm cbh reaching (or nearly reaching) the canopy** (Y/N).	Proportion of hazel stems in subcompt. that are 9 - **27cm cbh** 0: none, 1: some, 2: plenty, 3: most	Proportion of hazel stems in subcompt. that are **22-47cm cbh** (0: none, 1: some, 2: plenty; 3: most)	Proportion of hazel stems/trunks in subcompt. that are **>47cm** dbh (0: none, 1: some, 2: plenty; 3: most)	Dead stems **9-22cm** cbh in subcompt 0: none, 1: some, 2: plenty	Dead stems **22-47 cm cbh** in subcompt (0: none, 1: some, 2: plenty)	Dead stems **> 47cm cbh** in subcompt. 0: none, 1: some, 2: plenty	**Hazel seedlings /young saplings <1.5m** 0: none, 1: some, 2: plenty	**Hazel saplings (>1.5 m)** 0: none, 1: some, 2: plenty

Detailed Site Measurements

Max1 Stool location	No. Stools	Stool Girth 1	No. Stems	Stem Girth Max	Stem Girth Min	No. dead	%Dead	Med 2 Stool location	No. Stools	Stool Girth 2	No. Stems	Stem Girth Max	Stem Girth Min	No. Dead	% Dead	Sma3 Stool location	No. Stools	Stool Girth 3	No. Stems	Stem Girth Max	Stem Girth Min

4.5

Site name and location	Grid Reference	Surveyor	Date surveyed	Geology	Dominant habitat as assessed by surveyor -	Distance to coast (m). Estimate from map.	Main hazel stand type(s)	Other hazel stand types present in site	Aspect(s) of site (degrees)	Is a significant proportion of the hazel stand associated with a burn or loch? 0: no, 1: some, 2: yes*, 3: most or all.	Is a significant proportion of the hazel stand associated with a road or wide track 0: no, 1: some, 2: yes*, 3: most or all.	Is a significant proportion of the hazel stand associated with a cliff or boulder scree 0: no, 1: some, 2: yes*, 3: most or all.	**Basal shoots currently all suppressed on most hazel stools** (Y/N)	at least 4 in 20 hazels have at least 1 successful shoot **< 9 cm cbh reaching (or nearly reaching) the canopy** (Y/N).	Proportion of hazel stems in subcompt. that are 9 - **27cm cbh** 0: none, 1: some, 2: plenty, 3: most	Proportion of hazel stems in subcompt. that are **22-47cm cbh** (0: none, 1: some, 2: plenty; 3: most)	Proportion of hazel stems/trunks in subcompt. that are **>47cm** dbh (0: none, 1: some, 2: plenty; 3: most)	Dead stems **9-22cm** cbh in subcompt 0: none, 1: some, 2: plenty	Dead stems **22-47 cm cbh** in subcompt (0: none, 1: some, 2: plenty)	Dead stems **> 47cm cbh** in subcompt. 0: none, 1: some, 2: plenty	**Hazel seedlings /young saplings <1.5m** 0: none, 1: some, 2: plenty	**Hazel saplings (>1.5m)** 0: none, 1: some, 2: plenty

Detailed Site Measurements

Max 1 Stool location	No. Stools	Stool Girth 1	No. Stems	Stem Girth Max	Stem Girth Min	No. dead	%Dead	Med 2 Stool location	No. Stools	Stool Girth 2	No. Stems	Stem Girth Max	Stem Girth Min	No. Dead	% Dead	Sma3 Stool location	No. Stools	Stool Girth 3	No. Stems	Stem Girth Max	Stem Girth Min

Atlantic Hazel Woodlands (Celtic Rainforest)

Site name and location	Grid Reference	Surveyor	Date surveyed	Geology	Dominant habitat as assessed by surveyor -	Distance to coast (m). Estimate from map.	Main hazel stand type(s)	Other hazel stand types present in site	Aspect(s) of site (degrees)	Is a significant proportion of the hazel stand associated with a burn or loch? 0: no, 1: some, 2: yes*, 3: most or all.	Is a significant proportion of the hazel stand associated with a road or wide track 0: no, 1: some, 2: yes*, 3: most or all.	Is a significant proportion of the hazel stand associated with a cliff or boulder scree 0: no, 1: some, 2: yes*, 3: most or all.	**Basal shoots currently all suppressed on most hazel stools** (Y/N)	at least 4 in 20 hazels have at least 1 successful shoot < 9 cm cbh reaching (or nearly reaching) the canopy (Y/N).	Proportion of hazel stems in subcompt. that are 9 - 27**cm cbh** 0: none, 1: some, 2: plenty, 3: most	Proportion of hazel stems in subcompt. that are 22- **47cm cbh** (0: none, 1: some, 2: plenty; 3: most)	Proportion of hazel stems/trunks in subcompt. that are **>47cm** dbh (0: none, 1: some, 2: plenty; 3: most)	Dead stems **922cm** cbh in subcompt 0: none, 1: some, 2: plenty	Dead stems **2247 cm cbh** in subcompt (0: none, 1: some, 2: plenty)	Dead stems **> 47cm cbh** in subcompt. 0: none, 1: some, 2: plenty	**Hazel seedlings/ young saplings <1.5m** 0: none, 1: some, 2: plenty	**Hazel saplings (>1.5m)** 0: none, 1: some, 2: plenty
Culag Woods School Path	NC09464 21642	Annabel, Lewin, Ella, Ruby, James, Mrs Macrae, Lacey, Seamus. Bronya, Jacob	28/11/2017	Lewisian Gneiss	W9 Birch hazel woodland	800m	hazel in woodland	hazel in woodland	E 10-30	0	1	1	Y	Y	3	1	1	1	1	0	1	1

Detailed Site Measurements

Max1 Stool location	No. Stools	Stool Girth 1	No. Stems	Stem Girth Max	Stem Girth Min	No. dead	%Dead	Med2 Stool location	No. Stools	Stool Girth 2	No. Stems	Stem Girth Max	Stem Girth Min	No. Dead	% Dead	Sma3 Stool location	No. Stools	Stool Girth 3	No. Stems	Stem Girth Max	Stem Girth Min
NC09464 21642	15	216	11	73	2	2		NC09460 21646	13	86	9	41	2	1		NA	3	NA	NA	NA	NA

Description

Coming from the steps beside the road, the children quickly recognised the tree species, and looked for them and counted them in a marked off area with Andy. They discussed how to protect them from being eaten by deer. They were really keen. After a break they swapped groups and joined Roz. They counted and measured the hazel, which was most helpful. We looked at the deer browsing on the shoots and discussed how to protect the hazel. We looked for glue fungus after measuring the trees, and took photos. We ate hazelnuts!

Hairy birch, Scots pine, rowan, eared willow, broom, wood sorrel, bracken, sitka spruce

Appendix 6 Atlantic Hazel Survey Sheets Assynt Coigach 2017

6.1

Atlantic Hazel Survey Assynt Coigaich Roz Summers. Ref:			
Site Name:	Grid Ref Start	Own/Ten:	
Grid Refs Boundary Site			
Grid Refs Hazel Stands			
Description Site			
Grazing?			
Aspect	Geology	Elevation	
Type A: closed canopy	? Grid Refs		*Area*
Type B: scattered pasture	? Grid Refs		*Area*
Type C: veteran hazels	? Grid Refs		*No.*
Type D: woodland	? Grid Refs		*Area*

Table HAT.2 ATLANTIC HAZEL CONDITION ASSESSMENT		**YES Score 1 NO Score 0**	
Type A (closed canopy, multi-stemmed stands pure hazel)			
Closed canopy mostly intact (apart from some occasional glades)			
Stools often fairly small, evenly-spaced, with usually slender to medium-sized stems (c. 3--25 cm girth)			
Ground flora not trampled, with few bare areas or just occasional tracks/paths			

Stems mottled with bryophytes and lichens Light, seasonal grazing, or grazing by a few deer, with evidence of some basal shoots being browsed			
In 20 stools, there are at least 4 instances of a successful young shoot (whip) reaching (or nearly reaching) the canopy, i.e. one stool in 5 demonstrates viable stool dynamics within the stand, even with low grazing levels			
Any additional comments: Total score for type A			

Table HAT 2. Atlantic Hazel Condition Assessment	**YES Score 1.**	**NO Score 0**	
Type B (Scattered stools in pasture, including occasional small hazel 'trees')			
Most scattered stools robust, with many stems of varying thicknesses, and canopy wide-spreading			
Ground flora not trampled, few bare areas or occasional tracks			
If stools are reduced to a few, thickened stems, are there signs of recovery, with viable, well-established regeneration present?			
Stems mottled with bryophytes and lichens Light seasonal grazing, or grazing by a few deer, with evidence of a few basal shoots being browsed			
Any additional comments: **Total score for type B**			
Type C (veteran stools, or veteran hazel 'trees'			
How many veteran hazels are present within the site? (score 1 point under the YES column for each veteran)			
Do the veteran hazel 'tree' appear viable, i.e. at least some viable canopy present above grazing height? (score 1 point for each veteran)			
Trunk(s) is/are stable, and not requiring pruning (score 1 point for each)			
If in imminent danger of collapse, is there potential for remedial pruning/ pollarding, in order to preserve the stool? (score 1 point for each veteran where this action would be applicable)			
Trunks with bryophytes and lichens present (score 1 for yes)			
Are the veterans within a pasture woodland habitat today? (score 1 for yes)			
Any additional comments: **Total score for Type C**			
Type D (Hazel in woodland, including ravines)			
Stools forming discrete mosaics amongst other tree species (e.g. at stream-sides)			

Glades present			
Individual stools not widely separated (isolated) from other stools, i.e. not more than 20m apart			
Stools not reduced to one or two stems only			
Stools not becoming tall and gangly, drawn up by being shaded from increased canopy development or infill from taller tree species (unless in ravines)			
Ground flora not trampled, with few bare areas, or just occasional tracks/paths			
Stems mottled with bryophytes and lichens			
Evidence of light seasonal grazing within the woodland, or grazing by a few deer, so that at least some basal shoots are noted as successfully getting away to maintain stool viability			
Any additional comments: Total score for **Type D**			

6.2

Site name: Grid Ref start: date: who:RS Distance sea and direction			
Description incl boulders etc:			
Species and wildlife:			
Lichens/Bryo/Fungi			
Paths/tracks/browsing animals:			
Aspect:	Slope:	Geol:	Water:
Regen:			
Hazel description:			
Max size %age	Med size %age	Min size %age	
%new growth reaching canopy			
Within site- type:	Grid Ref:		
Description:			
Species and wildlife:			

Lichens/Bryo/Fungi		
Paths/tracks/browsing animals:		
Aspect:	Slope:	Water/features:
Regen:		
Hazel description:		
Max size %age	Med size %age	Min size %age
Av new growth reaching canopy		

6.3