Relict woodland on the cliffs and within the waterfall ravines of Swaledale - An introduction

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Abstract

This article is an introduction to a project concerned to record the vegetation and woody species composition of surviving fragments of native woodland on cliffs and within waterfall ravines throughout the Swale Catchment.

Woodland fragments within adjacent areas of Stainmore to the north, and selected woodland localities in the catchment of the Ure to the south, have also been recorded. Reference to these adjacent areas is made for comparative purposes. These fragmentary woodlands survive on and below cliffs and within waterfall ravines inaccessible to rabbits, to stock and excessive human exploitation. Woodland sites visited to date in Swaledale are shown on Map 1: Swale Catchment upstream of Richmond. Sites visited. Throughout this study area the distributions of just four selected tree species - aspen, juniper, yew and lime are shown on Maps 2-5. These tree species are of special interest having colonised northern Britain at different climatic periods throughout postglacial time (Godwin, 1975). Indicative details of the woodland composition and associations at all localities are contained within Tables 1-4.

The geological controls on woodland in Swaledale and the evidence for past woodland from tree remains in peat were previously outlined (Laurie, 2004). This is summarised by stating that the woodland composition of Swaledale responds to the soils of varying pH derived from abruptly alternating limestones, shales, sandstone and chert strata and of the glacial drift present on the lower dale sides. (See, for example, woodland below Kisdon Force, Rodwell 1991, pp164 -5).

As yet, no published ‘Flora of Swaledale’ exists, but as a guide to the vegetation which may be expected in Swaledale see Millward 1988 for a Flora of Wensleydale. This Flora includes a detailed account from Professor C.A.M. King of the geological structure, the soils and vegetation of this adjacent Dale. The woodland composition at comparative localities in Swaledale is however different in several respects from that of Wensleydale, see below. Tree remains in peat show that oak/birch woodland with willow and alder was present during later prehistory, at least within the comparative shelter of in-cutting streams, over the mainly acidic Namurian strata of the high plateau.

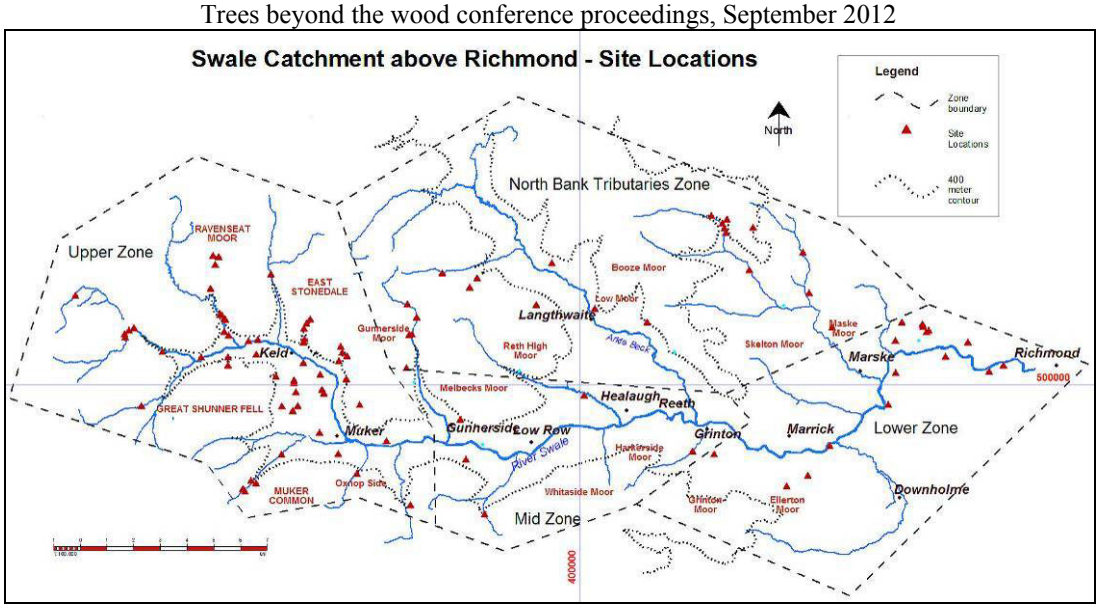
In this project, the author is collaborating with Mrs Linda Robinson, one of two BSBI Recorders for vc65, and with the Woodland Trust who have all the detailed records. Linda is separately recording the vegetation at each locality visited.

Space precludes publication here of her full vegetation lists at the many localities visited however these, together with photographic record files are, or soon will be available within the Database and Woodland Project Section of the Swaledale and Arkengarthdale Archaeological Group, at **www.swaag.org**. This Project is work in progress.

Keywords: Swaledale. Relict Woodland. Aspen. Juniper. Yew. Lime. Limestone. Cliffs. Ravines.

Figure 1 Deepdale. The Upper Scar.

Figure 2: White Scar, Downholme. Limestone Scar at 220m elevation with cliff yews and the rare rock whitebeam. Single. Coppiced, large-leaved lime tree in woodland below.



Map 1: Swale Catchment upstream of Richmond. Sites visited

Introduction

This paper identifies the relict cliff woodlands of Swaledale west of Richmond. Key tree species within these communities include aspen, juniper, wych elm and yew at many locations. A healthy population of large-leaved limes, recorded by the BSBI many years ago and re-discovered by Professor Donald Pigott more recently, is present on and below the limestone cliffs of lower Swaledale.

A small population of rock whitebeam, *S. rupicola* was recorded at three localities in the early 19C (BSBI Records. inf. Dr Tim Rich). Two shrubs of this species survive today at just a single location, at the top edge of White Scar above Downholme Bridge. For comparative purposes, we have also recorded at selected woodland locations on cliffs within the adjacent catchments of the River Ure (Wensleydale) and of the Rivers Tees and Greta (Stainmore).

Localities visited to date are indicated on Map 1. The distribution of aspen, juniper, yew and large leaved lime across the Swale Catchment west of Richmond is provided on Maps 2-5. Indicative woodland composition at all localities is summarised, see Tables 1-4. Space constraints preclude full vegetation lists, which are available for many localities however these can be seen at www.swaag.org together with a photographic record of the sites. Details of many specimen trees representative of those present at the localities recorded can be seen at http://www.ancient-tree-hunt.org.uk/ .

With the notable exception of the exceptional tufa spring sites at How Edge Scars recorded separately by Dr Allan Pentecost, mosses, lichens and algae have been excluded as

beyond the scope of this project. Completion of these records would be a valuable future research project.

The native woodlands that survive on the limestone scars and in the waterfall ravines of Wensleydale is different from Swaledale, most of the high cliffs are barren of trees. Aspen is confined to hedgerows in the Lower Dale and juniper is absent today. Yew is only rarely present and confined to lower elevations. Large leaved lime clones are present at one location, at Haw Bank, Carperby in Wensleydale. To the north of Swaledale, within the catchment of the River Greta on Stainmore, juniper is not present but both aspen and yew are present.

It may be fair to note that the relict woodlands of the Swale Catchment deserve to be recognised as relatively isolated populations, as for example the relict woodland recently recorded on the Isle of Coll, Inner Hebrides (Pearman, Preston and Bland, 2012). The relict woods of the Swale have responded throughout postglacial time to local geological, rapidly changing climatic and soil conditions together with selective economic extraction, rabbit damage and the constant threat of disease. This being so, the detailed recording and appreciation of these relict woods is necessary and it is to be hoped that a British University will take up the challenge to complete the objectives of this reconnaissance.

Geological Controls on Woodland Composition

The geological controls and resulting mosaic of very different woodland communities present in Swaledale today and in prehistory as fossil remains below blanket peats has been described elsewhere (Laurie, 2004). In summary, the landscapes of the North Eastern Dales are determined by outcropping hard rock strata forming sandstone edges and limestone scars or cliffs. The most prominent of these are formed by the Main Limestone that makes up the uppermost Scars of the Dale Side reaching an elevation of 500m in Upper Swaledale at Long Scar in Great Sleddale on Birkdale Common and at Oxnop Scar. The Main Limestone is the uppermost and thickest of the named limestones that outcrop in succession on the Dale sides. The strata that overlie the Main Limestone are very different being siliceous cherts, sandstones and mudstones of the Richmond Chert and Main Chert Series. The most prominent and Highest Scars are formed by the Main Limestone. Stepped exposures of the Underset, Three Yard, Five Yard, Middle, Hardraw Scar and Simonstone Limestones (Dunham and Wilson 1985). These are usually masked by glacial and superficial talus but the lower limestones occasionally outcrop as low cliff features at intervals on the Dale Sides. The most significant and species-rich relict limestone woodland survives on exposed cliffs and within somewhat sheltered ravines cut by streams through the Underset Limestone and Main Limestone. Above the Main Limestone- on acidic soils over chert, sandstone and mudstone strata with thin limestones of Namurian Age, acidic, species-poor remnants of upland birch woodland communities often with both juniper and aspen survive on low cliffs beside the highest reaches of the tributary streams.

It must be noted that Swaledale is exceptional in that many of the highest and most open and exposed limestone scars are well vegetated and possess species-rich woodland. Many of the scars up to an elevation of 400m in Swaledale, are dominated by yews. Aspen and

juniper are widely present at all elevations up to 500m. In contrast, and with very few exceptions, and these are all at low elevations, the rather similar limestone scars of Wensleydale are more or less barren and devoid of woodland. I have not seen aspen above 300m in Wensleydale. Juniper is entirely absent today from Wensleydale. Native yews are very rare in Wensleydale and these confined to lower elevations. Indicative woodland composition present at all cliff and ravine localities visited to date during the project is summarised here in Tables 1-4. Space considerations preclude full tree species lists. Woodland composition is indicated, after Rodwell 1991, as either:

Localities Type A: Upland Oak/Birch Wood (W11, W16, W17) where the locality is generally acidic. Species composition may be increased locally at locations which are generally acidic by strongly calcareous, tufa forming groundwater seepages from calcareous marine shale bands (Dunham and Wilson, *op. cit*.).

Localities Type B: Limestone Ash-Wych Elm Wood (W9) with and without yews where the woodland is on or below the Main Limestone.

The limestone scars listed in the tables and described below vary in length from a few metres as, on the northern side of Lower Swaledale, the small outcrop at the head of Deepdale above Low Applegarth (Figure 1). Most localities are sheer cliffs of considerable length as- to the south of Lower Swaledale- White Scar Downholme (Figure 2) and Ellerton Scar (Figure 3) which forms the northern edge of the Catterick Army Ranges.

Figure 3: Ellerton Scar.

Figure 4: Applegarth Scar. Species-rich cliff woodland with yews (many recently dead) and with large-leaved lime

Species-rich cliff woodland can be seen from the Coast-to-Coast Path which passes close below the limestone Scars of the southern side of Lower Swaledale east of Marske. Most notable of these are Applegarth Scars (Figure 4), Deepdale Scars (Figures 1 and 17) and Whitcliffe Scars (Figure 19). Most accessible to view of the Limestone Scars of Upper Swaledale are Cotterby Scar which can be inspected from below and at close quarters from the B6270 road above Wainwath Falls, upstream of Keld (Figures 5 and 6). At 500m

elevation, for those with a head for heights and not of suicidal disposition, Oxnop Scar can be approached with extreme care from the unfenced road from Askrig to Muker (Figures 10 and 11).

Figure 5: Cotterby Scar, view downstream towards Wainwath Falls.

Figure 6: Cotterby Scar. Aspen clones with yew and downy birch at top of Scar

The waterfall ravines are similarly of very different dimensions, ranging from those at small isolated waterfalls at the very head of the tributary streams as those in Little Sleddale (Figures 7 and 8) to impressive glacially enlarged ravines as for example Swinnergill (Figure 9).

Figure 7: Birkdale Common. Little Sleddale. Upper Falls with juniper and rowan.

Figure 8: Birkdale Common. Little Sleddale. Aspen clones in ravine below Upper Falls.

Figure 9 Swinnergill

A brief account of the woodland composition at a single locality representative of Localities Type A and B are discussed here to illustrate the characteristic contrasting woodland communities present on a high limestone scar and within a waterfall ravine cut through sandstone and shales.

Oxnop Scar (SD937952, 495m) Figures 10 and 11

West facing, fully exposed and sheer limestone cliff with aspen clones and juniper (two bushes, prostrate form) on face and top edge of the cliff. Surprisingly, this cliff also supports a varied relict woodland, with ash, blackthorn, elder, hawthorn, hazel, a single sycamore and downy rose at their local altitudinal limit. Other species include lesser meadow rue and the rigid buckler-fern, *Dryopteris submontana*.

Figure 10: Oxnop Scar from Oxnop Gill.

Figure 11: Aspen and juniper at top edge of Oxnop Scar.

Great Ash Gill (NY869007, 420m). Figures 12 and 13

Great Ash Gill is a ravine, stream cut through Namurian sandstones and mudstones with two waterfalls and local enrichment from tufa forming groundwater seepages just above the stream.

Generally, acidic vegetation with two cloned aspen colonies, two isolated junipers, downy birch and rowan. Stone bramble, common butterwort and oak fern are also present.

Figure 12: Great Ash Gill. Aspen clones at Upper and Lower Falls

Figure 13: Great Ash Gill. Aspen clones at Lower Falls.

Woodland Site References within the Tables are to the Tree Site Records listed within the Database of the Swaledale and Arkengarthdale Archaeological Group which can be accessed at www.swaag.org These Records include a more detailed description of all of the woodland localities listed together with a photographic record of specimen trees. For clarity, since the area of this survey is very large, woodland localities listed in Table One, are grouped under Area Headings. These areas are further defined as follows:

Upper Swaledale Zone (Map 2 and Table 1) Upper Swaledale comprises all sites within the catchment of the River Swale within the Civil Parish of Muker.

Mid Swaledale Zone (Map 3 and Table 2): Mid Swaledale (from the eastern limits of Muker CP downstream to include woodland Sites within the Civil parishes of Melbecks, Reeth and Grinton)

Lower Swaledale Zone (Map 4 and Table 3): Lower Swaledale (from the lower limits of Reeth CP and of Grinton CP downstream to Richmond to include woodland sites within the Civil Parishes of Marrick, Marske, Ellerton, Downholme, Hudswell and Richmond.

North Bank Tributary Zone (Map 5 and Table 4): The North Bank Tributary Streams of the Swale.

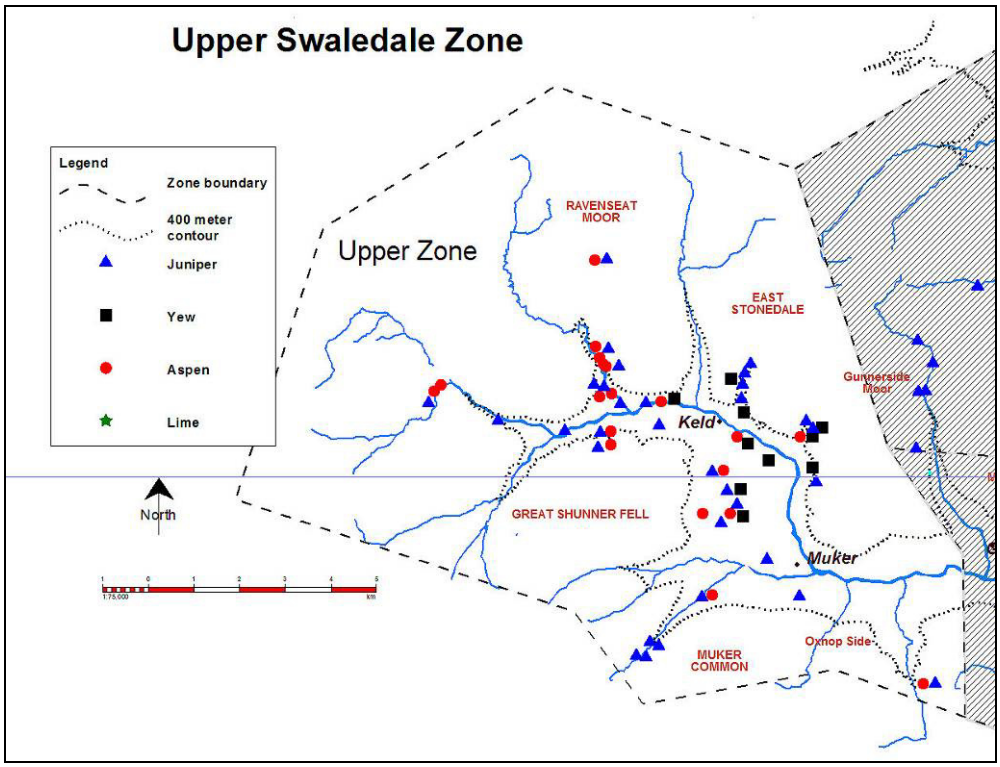
Woodland sites visited in the Swale Catchment

Maps 1-5 and Tables 1-4 refer:

WARNING!

Most if not all localities are on open access land or directly visible at a distance from public right of way or access land. Many sites are only accessed from long and arduous walks on rough moorland. The cliffs are all extremely dangerous being sheer, unstable and without any recognisable footpath access. For these reasons, no recommendations of sites to visit are made. This is effectively to say that they should not be visited unless the risks inherent in such expeditions are fully understood and accepted.

Upper Swaledale



Map 2: Upper Swaledale

Table 1 Woodland sites visited in Upper Swaledale

a=aspen, b=juniper, c=yew, d= lime (*T. platyphyllos*)

LOCATION	SWAAG Site Ref	Site Type	a	b	c	d	Notes
NY81200330 Uldale Beck Falls.	295	A					Rowan only
SD827989 Great Sleddale. Long Scar. The Coppermine Scar.	327	B					Depleted W9 woodland above 500m (Due to extraction for mining activity perhaps). Rarities include: Beech Fern and Fir Clubmoss.
NY831017 Little Sleddale. Upper Falls. (Figure 7)	308	A		#			Juniper and rowan only.
NY831019 Little Sleddale ravine below Upper Falls. (Figure 8)	323	A	#				Aspen clones and rowan. Tufa spring with enriched ground flora including *Pinguicula vulgaris.*
NY832020 Little Sleddale. Lower Falls.	324	A	#				Aspen clones, rowan and sallow.
NY834021 Birkdale Beck. Small scar above confluence with Little Sleddale Beck.	307	A					Rowan, willow sp (*Salix phylicifolia)*.
SD837992 Great Sleddale Pastures.	326	B					Isolated hazel.
NY845012 Birkdale, Ellers, Black Scar.	283	A		#			Junipers (4), rowan, sallow
NY859010 Birkdale, Stone Houses	315	A		#			Juniper (1), rowan, sallow.
NY862036 Ravenseat. Jenny Whalley Force.	343	A					Rowan, sallow
NY863048 Ravenseat Moor. Graining Scars.	347	A					Rowan, sallow
NY864045 Ravenseat Moor. Middle Tongue.	344	A					Rowan, sallow
NY866047 Ravenseat Moor, Hoods Bottom Beck Lower Falls.	345	A	#	#			Rowan, sallow
NY866026 Whitsundale. How Edge Scars. Upper. (Figure 16)	341	A	#	#			Aspen clones, junipers (2), oak *(Qu. robur)*, birch (*B. pubescens*), sallows *(S. cinerea, S.caprea, S.caprea ssp spacelata)*, shrub willow spp (*S.aurita, S. phylicifolia*), Rarities: oak and beech ferns., Local enrichment of ground flora from tufa springs above

							stream level. Tufa cliff at head of ravine. Hazel present here only
NY867026 Whitsundale. How Edge Scars, Lower Section, down to Cop Gill. (Figure 16)	340	A	#	#			Juniper (1), aspen clones, oak, birch, sallow, shrub willow spp Local enrichment of ground flora from tufa springs just above stream level. Tufa cliff at head of ravine. Hazel present here only
NY868020 Whitsundale Beck. The Juniper Scar.	333	A	#	#			Juniper (20 -30), aspen (1), birch, sallow. Although unfenced, seedling junipers present here.
NY867019 Whitsundale Beck. West Bank Scar.	334	A	#	#			Junipers (2), rowan, sallow
NY868024 Whitsundale Beck. Ovenmouth Scars.	335	A	#				Aspen clones, rowan, sallows and shrub willows by stream.
NY869018 Whitsundale. Lamb Paddock Scar.	331	A	#	#			Junipers (3), rowan, rose spp, sallows and other willow spp
NY869007 Great Ash Gill. Upper Falls. (Figure 12)	328	A	#	#			Juniper (1) aspen clones, rowan, sallows and shrub willows. Local tufa spring enrichment
NY869010 Great Ash Gill, Lower Falls (Figure 12 and 13)	284	A	#	#			Juniper (1), aspen clones, birch, rowan, sallow, stone bramble.
SD875961 Muker Common. Scar below Buttertubs Road	375	B		#			Juniper (1) Depleted W9
SD875960 Muker Common, Cliff Beck Cave Scar	373	B		#			Juniper (2) , Depleted W9
NY877016 River Swale, Low Bridge. Windy Gill Scar. (Continuation of Cotterby Scar).	348	B		#			Junipers (2). , Species rich W9
SD878964 Muker Common. Cliff Beck. Upper Waterfalls Scar	372	B		#			Junipers (5-10), Depleted W9
SD878964 Muker Common. Cliff Beck West Bank. Lower Scar	374	B		#			Junipers (5-10?) , Species rich W9
SD879963 Muker Common. Lover Gill	376	B		#			Junipers (2) , Depleted W9
SD880011 Muker, Blackburn Beck Falls.	504	B		#			Juniper (1), Depleted W9

NY880017 River Swale North Bank. Cotterby Scar. (Figures 5 and 6)	349	B	#		#		Aspen clones on top of cliff. Figure 12. Species rich W9 with cliff yews. Wych elms on scree mostly dead.
NY881963 Lover Gill Upper Ravine.	378	B					Depleted W9 Lead mine nearby.
NY885041 West Stonesdale. Startindale Gill.	351	A					Rowan and sallows only Oak fern at falls.
NY887003 Aygill Force.	332	B					Depleted W9
SD889974 Cliff Beck Lower falls	464	B	#		#		Juniper (1) at falls. Aspen clones at lower end of ravine. Species rich W9 .
SD889992 Skeb Skeugh Gill.	357	B	#				Solitary aspen in pasture
SD893990 Kisdon Hill. Thwaite Stones.	364	B		#			Juniper scrub. Woodland Trust Site.
NY894001 Kisdon Hill West. Skeb Skeugh Site 1	360	B	#				Juniper scrub
NY894002 Kisdon West. Site 2.	363	B	#				Juniper scrub
SD894997 Kisdon. Hooker Mill Scars, Upper.	370	B		#	#		Isolated juniper Species rich W9 with yews.
SD895992 Kisdon. Hooker Mill Hole Scar. (Figure 14)	371	B	#	#	#		Aspen, juniper (5-10) and yews on face of cliff with Invasive larch. Species rich W9.
NY897008 Kisdon Force Ravine. Birk Hills Scars.	379	B	#		#		Aspen clones. Cliff yews and species rich W9
NY897016 East Stonesdale, Pry Hill Falls.	352	B			#		Cliff yews and species rich W9
NY897021 East Stonesdale Unnamed Ravine.	267	B		#	#		Junipers (5-10), cliff yews and species rich W9
NY897017 East Stonesdale, Black Scar.	269	A		#			Juniper (1) with rowan and sallow. Shales and sandstone.
NY898023 East Stonedale, Juniper Scar	268	B		#			Juniper (1) with hazel and stone bramble
NY900024 East Stonesdale, Hind Hole Falls.	359	A		#			Juniper (1) with rowan and birch
SD903982 Usha Gap.	463	B		#			Juniper (5-10) with holly, hawthorn, rowan. South facing

							lower dale slope
NY903004 Kisdon East. North Gang Scars.	404	B			#		Isolated cliff yew. Species rich W9
SD905996 Kisdon East. The Wych Elm Scar Scar.	406	B					Bird cherry, ash, wych elm, rowan, ivy and rose sp. Depleted W9
SD910974 Muker Side. Juniper scrub.	385	B		#			Area of juniper scrub on dale side.
NY910009 Swinner Gill, Lower Cliffs West. (Figure 9)	383	B	#		#		Aspen clones and yews. Species rich W9
NY911014 Swinner Gill Kirk Waterfall Ravine	381	B					Wych Elm (dead) at 426m AOD with sallow and rowan
NY911060 Swinner Gill Lower Cliffs, East	384	B		#	#		Juniper (1), cliff yews and species rich W9
NY912012 Swinner Gill Upper section	382	B		#	#		Juniper (2), cliff yews and species rich W9
NY913002 Muker, West Arngill Scar.	339	B		#	#		Juniper (1) with cliff yews and wych elm at 420m. Alder pollards on dale side below the cliff. Species rich W9.
NY918993 Muker, Arngill. The Lead Mine	235	B					Alder pollards on dale side and species rich W9
SD928979 Relict Hedgerows between Ivelet and Rampsholme.	457	B					Ancient laid ash trees and occasional wych elm pollards in relict hedgerows
SD937955 Oxnop Common. Oxnop Scar. 495m elevation. (Figures 10 and 11)	350	B	#	#			Aspen clones on cliff, Junipers (2) with ash, hazel, hawthorn, blackthorn at the local altitudinal limit and sycamore. *Thalictrum minus*.

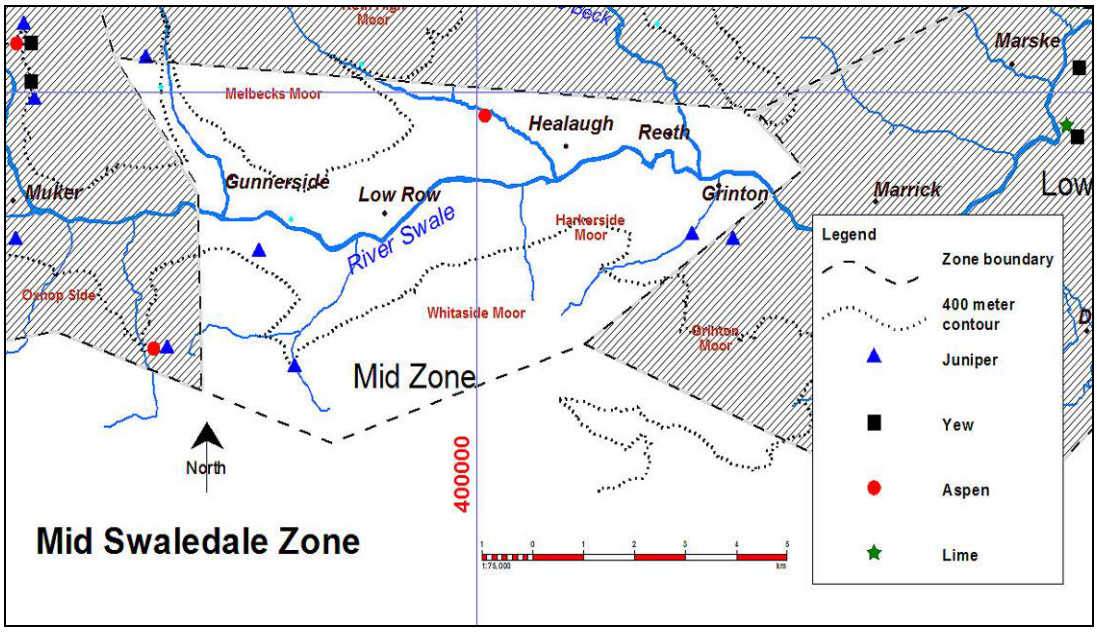
Figure 14 Kisdon Side. Hooker Mill Hole Scar with aspen clones, juniper, yew and invasive larch.

Figure 15 Arkengathdale, Fell End Scar. Cliff yews and solitary juniper (recently dead) on face of cliff.

Figure 16 Whitsundale. How Edge Scars. Stream cut ravine with aspen clones and juniper.

Figure 17 Deepdale. Lower Scar with yews and ash

Mid Swaledale



Map 3 Sites visited in Mid Swaledale

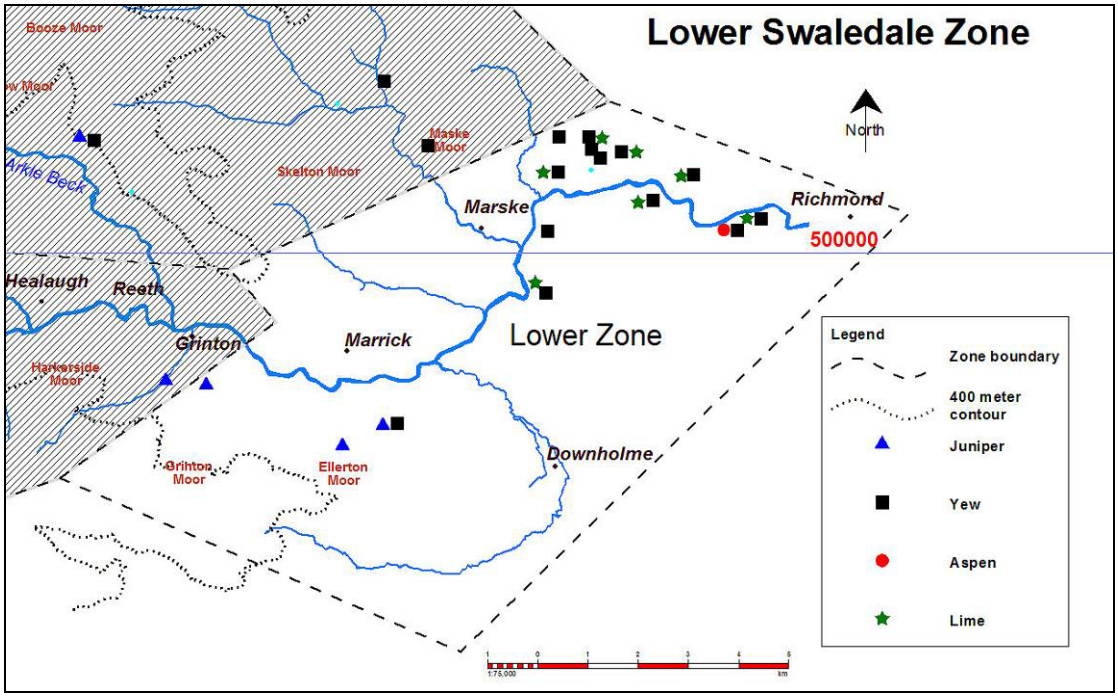
Table 2 Woodland sites visited in Mid Swaledale including Gunnerside Gill

a=aspen, b=juniper, c=yew, d= lime (*T.platyphyllos*)

LOCATION	SWAAG Site Ref	Site Type	a	b	c	d	Notes
SD645516 Summer Lodge Beck Falls.		A		#			Chert strata. Juniper (1)and rowan the only trees here.
SD575720 Spring End. Juniper Rig		B		#			Juniper scrub at 340m
NY935006 Gunnerside Gill. Botcher Gill gate.	492	B		#			Juniper (2) W9 depleted.
NY936030 Gunnerside Gill. Blakethwaite Smelt Mill. Ravine below		B		#			Juniper (2) W9 depleted.
NY936030 Scar below Blakethwaite Dams, chert strata	496	A					Bird cherry, blackthorn only
NY937019 Gunnerside Gill. Limestone outcrop above Blakethwaite Smelt Mill	495	B		#			Juniper (2). W9 depleted.

NY938019 Gunnerside Gill. small scar on east bank 100m upstream of Blind Gill.	493	B		#			Juniper (2). W9 depleted.
NY939025 Gunnerside Gill. Eweleap Scar.	494	B		#			Juniper (1). W9 depleted.
SD956987 Melbecks. Bents	451	B					W9 Depleted.
SE002996 Barney Beck Woods, W Bank.	292	B	#				Aspen clones (2 groves) with W9 woodland.
SE042975 Grinton Gill		B		#			Juniper scrub remnant.
SE050974 Cogden Gill		B		#			Juniper (1) in Gill
SE277962 Ellerton Moor, Juniper Gill (Army Ranges)		B		#			Juniper scrub. Some replanting from locally collected seed.

Lower Swaledale



Map 4 Lower Swaledale, from Grinton to Richmond

Table 3 Woodland sites visited in Lower Swaledale

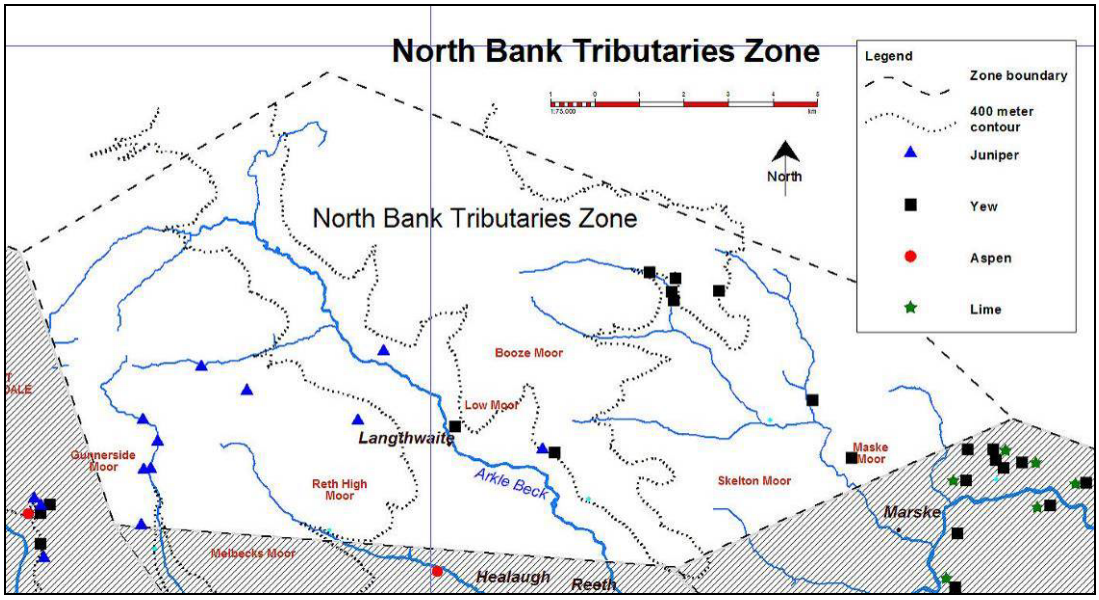
a=aspen, b=juniper, c=yew, d= lime (*T.platyphyllos*)

LOCATION	SWAAG Site Ref	Site Type	a	b	c	d	Notes
Ellerton Scar SE085966, 320m (Figures 3 and 18)	289,290	B		#	#		*J. communis ssp nana*, two prostrate shrubs on isolated stack. Many cliff yews. Species rich W9 ashwood
White Scar, Downholme. SE115993 (Figure 2)	224	B			#	#	*Tilia platyphyllos*, single large coppiced tree in woodland . *Sorbus rupicola*, two shrubs at top edge of the cliff. Many cliff yews.
Stainton Low Wood SE093977 (The River Swale Woodlands)	539	B					Wych elm, alder and ash coppice with *Paris quadrifolia.*
Red Scar, Far Spring and Thorpe Edge. NZ117002	576	B			#		Many cliff yews. Species rich W9 ashwood and *Silene maritima*.
Underbank Scar,Hudswell NZ136010	402	B				#	Many cliff yews. *Tilia platyphyllos*, single large coppiced tree in species rich W9 ashwood
Hudswell Bank Scar NZ153005		B	#		#		Many cliff yews. Species rich W9 ashwood
The Round How, western slope. NZ158007	408	B				#	*Tilia platyphyllos*, large group of tall maiden trees. Species rich W9 ashwood
Applegarth Scar NZ118 016	409	B			#	#	*Tilia platyphllos,* scattered population on the lower cliff, cloned group on terrace between upper and lower cliffs. Many cliff yews. Species rich W9 ashwood
West Applegarth Woods and Scars. Salmon Gill and Deepdale West. NZ128 022	407	B			#	#	*Tilia platyphyllos*, two trees on cliff at lower end of Deepdale. Many cliff yews. Species rich W9 ashwood
Deep Dale, Upper Scar NZ128021 (See Figure 1)	170	B			#		Solitary yew and rowan the only trees on this small outcrop of the Main Limestone.
Deepdale, Lower Scar NZ129020 (See Figure 17)	168	B			#		22 cliff yews, all except two are female trees, ? cloned population. Species rich W9 ashwood
Whitcliffe Scar West, including Willances Leap Scar NZ1305020	173,157	B			#		*Tilia platyphyllos*, single very large coppiced tree at top edge of cliff below Willance's Leap.

(See Figure 19)							Many clliff yews Species rich W9 ashwood
Whitcliffe Wood Scar NZ143018	516	B			#	#	*Tilia platyphyllos*, 20 Trees in ? cloned group. Species rich W9 ashwood

Figure 18 Ellerton Scar. Juniper, prostrate form. Top of isolated limestone stack.

North Bank Tributaries



Map 5 North Bank Tributaries

Table 4 Woodland sites visited on the North Bank Tributaries of the Swale including Arkle Beck, Marske Beck and Clapgate Beck.

a=aspen, b=juniper, c=yew, d= lime (*T.platyphyllos*)

LOCATION	SWAA Site Ref	Site Type	a	b	c	d	Notes
NY949041 Arkengarthdale. Great Punchard Gill Falls	537	B		#			W9 Juniper, rowan and ivy on Crow Limestone below Falls at 512m
NY959036 Arkengarthdale. Little Punchard Gill, Upper Ravine	To follow	B		#			Juniper (1 live, 1 recently dead) W9 ashwood with wych elm
NY962040 Arkengarthdale. Little Punchard Gill Lower Ravine	To follow	B					W9 ashwood with wych elm.
NY984030 Arkengarthdale. Hungry Hushes	277	A		#			Juniper (1) with rowan at 520m AOD
NZ006030 Arkengarthdale. Langthwaite Scar.	548	B			#		Ash, wych elm, downy birch, bird cherry, elder, hazel, rowan, hawthorn, sallow, rose sp. larch, sycamore
NZ025023 Ark. CP. Fell End Scar (See Figure 15)	181	B		#	#		Juniper (1 recently dead) W9 ashwood with yew
NZ094021 Marske CP. Orgate Scar West	195	B			#		W9 ashwood with yews
NZ085034 Marske. Dicky Edge	395	A			#		Ancient rowan growing through skeletal remains of yew.
NY990045 Ark. CP. Seal Houses	To follow	B		#			Juniper scrub at 370m AOD
NZ049063 Newsham CP. Arndale Beck. Upper or Sheepfold Scar	411	B			#		W9 ashwood, depleted, with yews
NZ053060 Arndale Beck Lower Ravine. Wych elm dominant woodland.	412	B					W9 ashwood, depleted, wych elms dominant
NZ054058 New Forest. Kexwith Gill, small limestone scar below Arndale Hole	422	B			#		W9 ashwood, depleted, wych elm and yew dominant
NZ054056 New Forest CP. Kexwith Beck East Bank Scar.	423	B			#		Cliff Yews with wych elm and W9 ashwood, depleted.

NZ055061 Arndale Springs Scars and Landslips	421	B			#		Cliff Yews with wych elm and W9 ashwood, depleted.
NZ063043 Holgate Beck Woods and. Rispey Wood	428	B					W9 Mixed deciduous woodland with W7 alder wood and upper fringe of W17 upland birch wood
NZ065058 New Forest. Arndale Hole, Lower Scar.	420	B			#		Solitary dead yew.
NZ083049 Waitegate Wood. Army Range.	387	B					W17 Upland oak-birch on faulted Ten Fathom Grit faulted against the Main Limestone.

Preliminary conclusions on the data

Localities Type A with W11, W17 Upland Oak-Birch Woodland

These generally acidic woodland localities, with very few exceptions on the Lower Dale slopes, are confined to the upper reaches of the Swale and tributaries of the Swale within the comparative shelter of ravines formed by incutting streams through chert, sandstone, mudstone and thin limestone strata of Namurian Age, above the Main Limestone.

Aspen and juniper may be present. Yews are never present much above 400m. Many sites have solitary rowans, sallows and occasionally downy birch. Native oak (*Qu. robur* here) are very rare in Swaledale upstream of Marrick and Ellerton. Oak is present at How Edge Scars in Whitsundale, and is generally present with birch as fringing woodland on the Richmond Chert strata at the top edge of the cliffs of Lower Swaledale. Shrub willows including *Salix phyllicifolia* and *S. aurita* are occasionally present at streamsides.

The presence of thin limestone strata or marine shales within the otherwise acidic Namurian strata does give rise to local enrichment in the form of tufa forming spring seepages, as at How Edge Scars, where there is a fine tufa cliff, with consequent presence of hazel and a rich ground flora.

Localities Type B with W9 Limestone ashwood communities.

Limestone ashwood, usually depleted and with and without yews is limited to localities on or below the Main Limestone.

The tree species present:

Selected species, aspen, juniper, yew and lime (*T. platyphyllos*) distribution as Maps 2-5, details as Tables 1-4:

Aspen, (*P. tremula*) see Maps 2-5 and Tables 1-4.

Aspen usually as cloned groves, have been recorded above the confluence with the Swale with Arkle Beck at both acidic localities type A and on limestone localities type B.

Aspen form cloned colonies usually with three or four generations and occasionally as small stunted trees on cliffs and in ravines, reaching an elevation of 495m at Oxnop Scar in Swaledale, see Figures 10 and 11.

Aspen has been recorded at just one location in Lower Swaledale (in woodland 1km above Richmond). Aspen are not uncommon in hedgerows in the Tees/ Swale/Ure Lowlands but rare in Wensleydale (Millward 1988). Aspen are recorded at several locations on tributary streams of the Tees and Greta. The significance of aspen as a native tree with a specialised dependent ecology has long been overlooked throughout Britain and the distribution of this tree throughout the uplands of northern England is largely unknown. In contrast as a result of the work of the Highland Aspen Group, the significance of aspen has now been fully recognised in Scotland where the distribution, ecology and economic potential of aspen is currently the subject of intensive research. Reference: http://www.treesforlife.org.uk/forest/aspen/AspeninScotland09.pdf

Juniper (*J.communis*), including prostrate juniper (*J. communis* ssp *nana*) (See Maps 2-5 and Tables 1-4)

Juniper, frequently in the prostrate form, are widely distributed both on cliffs and as extensive areas of juniper scrub on the dale sides across the whole of the Swale catchment upstream from Ellerton Scar.

In contrast, Juniper is absent from Wensleydale today.

Juniper is present on the River Tees and its tributaries upstream from Cotherstone but is not present on Stainmore within the catchment of the River Greta or in Deepdale.

In Swaledale, junipers are present at very many sites as isolated bushes or as less than 5 individuals. In most sites, the junipers are extremely old and often show bare branches and browned foliage. ***Many sites have junipers, which are recently dead.*** Juniper at all these sites are clearly at risk from onset of *Phythophthora austrocedrae,* a damaging plant pathogen now devastating the junipers of Upper Teesdale, and of sudden death from other causes. They cannot usually regenerate. However, at one site, the Juniper Scar in Whitsundale, the presence of seedlings demonstrates that regeneration can take place, provided grazing pressures are reduced (not removed) without recourse to fencing or planting.

Areas of juniper scrub on the lower dale sides appear at first inspection to be reasonable healthy except for rabbit damage, which can be extensive at the edges of the scrub. However, recent close examination at the junipers east of Browna Gill on Harkerside Moor shows the presence of junipers with loss of needles and which look distinctly sick, possibly from the same pathogen, which afflicts the juniper population in Upper Teesdale. This is yet to be confirmed.

Yew (*T.baccata*). See Maps 2-5 and Tables 1-4.

Yews, often stunted and multi stemmed are often dominant or co-dominant with wych elm, ash, rowan and hazel at the top edge and on the face of the limestone cliffs. Yews, often

very large specimen trees also grow on the scree talus slopes very close to the base of the cliffs.

There are very many multi-stem specimen yews, reaching girths of 5m to 8m, at many localities throughout the Swale catchment. These multi stem yews spring from a common rootstock visible on the face of the cliff or hidden beneath scree. Maiden yews are rare and the largest recorded single stem tree, in woodland below Clints Scar measures 5.10m girth.

There are reasons to believe that yew populations on isolated cliffs, where one sex predominates, may be cloned. Yews have the ability to regenerate from extensive root systems which penetrate far within the limestone. Their roots expand to completely destabilise the rock face which falls away to reveal the root system fully exposed, serpent like across the face of the cliff. It is also apparent that the life of individual cliff yews and other tree species is determined by the ability of the rock to bear the load of the tree canopy under maximum wet snow load. Yews fall away but regenerate from the tips of the broken roots when conditions allow.

Most yew populations in Swaledale are healthy and self regenerating. However individual dead, some recently dead, yews are often present. At Applegarth Scar there are very many recently dead individuals which collapse and die within weeks.

Large-leaved Lime (T.platyphyllos) See Map 4, and Table 3.

Pollen of *Tilia* is constantly present in two peat localities sampled on Grinton Moor and on Ellerton Moor in Swaledale to date, until its disappearance soon after 800Cal BC, marks the end of the Bronze Age (Inf. Dr James Innes).

A healthy population of large-leaved lime trees, often managed coppiced trees or self-coppiced multi-stem trees on the edge and face of sheer cliffs, has been recorded on limestone cliffs on both sides of Swaledale from Applegarth (Figure 20) down to Richmond.

Figure 19 Whitcliffe Scar, below Willance's leap. Large-leaved lime (*T. platyphyllos*) at top of cliff.

Figure 20: Applegarth Scar. *Tilia platyphyllos* with aril of yew.

The largest and most impressive of these lime trees is at the top edge of an inaccessible cliff immediately below Willance's Leap, some 2km west of Richmond (Figure 19). A further population, first noticed by Professor Pigott, is present on the southern bank of the Swale- on the western slopes of The Round How, I km upstream of Richmond. It is the immediate priority of this project to accurately record and map these lime trees in the Lower Swaledale Woods.

Remaining Tree Species

Woodland composition at sites is as indicated in the Tables. Composition is almost always severely depleted by accessibility to sheep, selective economic extraction and by local circumstance. Notes on the distribution and characteristics of tree species not mentioned previously follow:

Field Maple *(A. campestre*)

Field maple pollen of Later Prehistoric Age has been found in the peat infill to a small glacial overflow channel at Ellerton Moor (Fleming 1998) but is now rare, being confined to hedgerows downstream from Downholme Bridge in Lower Swaledale.

Birch (*B. pubescens*)

Birch, as native oak, is surprisingly scarce throughout much of Swaledale, although downy birch with common oak, form the top fringe of woodland on chert strata over limestone in Lower Swaledale. Birch is absent from the entire length of the Fremington Edge escarpment south of Sleigill, upstream of Sleigill birch is frequent within Arkengarthdale.

Oak (*Q. robur*)

As with birch, native oak are rare in Swaledale and the only real patch of native oak wood is at Waitegate Wood on Army Ranges at the head of Marske Beck. Fringing oak birch wood is present above limestone cliffs in Lower Swaledale and on Namurian sandstones at How Edge Scars.

Rowan (*S. aucuparia*)

Rowan is present at most localities. Very old specimen rowans occur as isolated trees at the highest waterfalls, sometimes in the sole good company of ancient junipers (Figure 7).

Rock Whitebeam (*S. rupicola*)

There are 19C BSBI records of rock whitebeam (*S. rupicola*) on at least three Scars on the southern side of Lower Swaledale (Inf. Dr Tim Rich). Today this shrub survives at just one of these locations. Two rock whitebeam shrubs grow at the inaccessible top edge of White Scar above Downholme Bridge, from where they were recently recognised.

Wych Elm (*U.glabra*)

Swaledale possesses a wealth of ancient wych elm trees which have survived the elm bark beetle. These trees are not immune and several trees continue to succumb and are lost each year.

Almost all of the ancient wych elm pollards recorded during the Swaledale Ancient Land Boundaries Project (Fleming, A. op cit) are apparently long dead however, these ancient wych elms are throwing up young growths from their root systems. They rise, like Lazarus to live again.

Ancient multi-stem wych elms with mature trunks rising from very great rootstocks grow well in the sheltered ravines up to around 430m elevation. Wych elms are a very significant feature of most of the limestone scars and waterfall ravines of Swaledale (see Tables 1-4)

Alder

A few alderwoods, once widespread widespread at all beck sides and spring flushes on the Dale Sides with occasional ancient pollards, survive. Good examples being above Horse Pasture wood at Low Whita in Mid Swaledale and at West Arngill upstream of Muker.

Ash

Ash, the tree most characteristic of Carboniferous Limestone, are usually present both on the cliffs and on the glacial drift covered Dale Sides where individuals attain girths in excess of 5m. Several ancient specimen trees survive as relict laid hedgerow trees, now within later, abutting 18C dry stone field walls. The population of mature large ash trees all of one age in Swaledale is reduced every year from windfall. They should be recorded before all are lost.

Blackthorn (*P. spinosa*)

Stunted blackthorn thickets are present on many of the most exposed and highest limestone cliffs, reaching 495m elevation at Oxnop Scar.

Bird Cherry (*P.padus*)

Bird cherry is widespread in ravines to above 500m but elsewhere vulnerable to grazing.

Gean or Wild Cherry (*P. avium*)

Cloned copses of wild cherry, grows on limestone cliffs, for example in Clapgate Gill, and elsewhere in woods. Lower Swaledale.

Elder (*S. nigra*)

Ancient gnarled elders are frequently the final remnant of woodland on the highest and most barren limestone cliffs.

Hawthorn (*C. monogyna*)

Ancient hawthorns are present below the cliffs as most resistant to grazing and very sparingly on some cliffs. Planted hawthorns comprise 40% of many Black Grouse Regeneration Schemes with unknown long term consequence to the integrity of native woodland composition.

Hazel (*C. avellana*)

Hazel is present in most woods and as stunted individuals on limestone cliffs to an elevation of 500m at Oxnop Scar.

Rose (*Rosa* spp)

Roses, (usually *R. canina* but often *R. mollis*), are usually present on the cliffs.

Willows (*Salix* spp)

Willows- mostly the sallows (*S. caprea* and *S. cinerea*) are widely distributed and grow on cliffs. The smaller willows (*S. aurita* and *S. phylicifolia*) occur locally in ravines. Specialist survey is needed to identify other willow species and the hybrid forms of willow present.

Some general observations on the cliff trees of Swaledale and their conservation

The cliff trees of Swaledale include many individual specimen trees of great age which possess a sculptural character reflecting their hard lives, many species being at the altitudinal limit for trees on the eastern side of the Pennines. This limit is at substantially lower altitudes than the more temperate uplands west of the Pennines. The large-leaved limes are at the northern limit of their distribution in Britain.

It is very clear that the relative accessibility to grazing animals, primarily rabbits, determines the present survival of plant communities at all locations. Removal of sheep allows the grass below cliffs to lengthen and this deters rabbit activity with immediate beneficial effect on the growth of seedling yews which, usually eaten down to the ground, are then capable of surprising growth.

The primary aim of this account of isolated woodland communities, is to draw attention to the presence of these isolated cliff communities as Woodland Sites. These merit the most careful conservation (not just to be treated as the background to a Black Grouse Project) but as significant localities in their own right with ancient trees of the highest sculptural and cultural value. It is also clear that isolated small and non-viable populations of juniper, yew, wych elm, and other tree species are currently subject to sudden death from several known and unknown causes and are subject to active and severe threats to their continued existence. Special conservation emphasis is needed to protect these relict woodland localities, refugia in Swaledale for the last surviving communities of truly native tree species which include alder, aspen, birch, bird cherry, wild cherry, hazel, juniper, large leaved limes, oak, rowan, whitebeam, yew, willows and wych elms.

The recording of the presence of numbers of ancient wych elm trees at remote locations provides, in itself, justification for this reconnaissance and preliminary survey. These wych elms, which survive (at the time of writing) through their isolation, are not immune to Dutch Elm Disease and several of these trees are lost each year.

Where dead trees are present, and the remains of dead trees survive for many years on the arid limestone Scars, it is very clear that in most instances tree death is sudden and that several individuals of the same species within an already small, isolated and non-viable population may be stricken.

Figure 21: Dead Yews West Applegarth

Figure 22: Dead Yews West Applegarth

The very recent sudden death of mature yews at West Applegarth (Figures 21 and 22) is such an instance and the survival of juniper in Swaledale in the face of infection from virus attack is a matter of great concern. The many isolated, non-viable populations of juniper are disappearing as I write and their plight is of equal if not more pressing significance. For example, a small group of four junipers at Hoods Bottom Beck Falls, Whitsundale comprises four junipers -one alive but with reduced foliage due to rabbit damage this winter, two recently dead (with brown foliage) as the result of ring barking from rabbits and one long dead. A single isolated juniper long known to grow on the face of the Main Limestone cliff at Fell End has recently died (Figure 15).

The risk that yews, alders, elms and other trees will suddenly succumb to virus disease is ever-present. Unbelievably, a risk to seedling and young trees on cliffs from rock climbers exists. Rock climbers routinely indulge in what they call ‘gardening’. This involves stripping all vegetation from the cliff face. This dire situation needs urgent research from a British University to record current populations on cliffs and identify threats.

English Nature priorities for woodland in the Uplands and for Moorland Conservation did not seem to include small fragments of relict woodland. Among these priorities is their partnership with the Game Conservancy Black Grouse Regeneration Scheme. Of immediate concern in this context is the recommendation for planting composition which includes ‘berried’ shrubs, i.e. hawthorn which may comprise 40-50% of the recommended species planting composition, see:
http://www.blackgrouse.info/advice/publications/woodland_planting.pdf

Plantings of tree species perhaps of non-local genetic source, above sheltered ravines, which have no regard for the composition of native woodland communities, will have long-term effects, which are not understood. The effects of this planting are uncertain. One can reasonably predict that the mass plantings of woodland in furtherance of Black Grouse Conservation at the sides of tributary gills will in due course be hawthorn scrub.

Similarly, DNA analysis can now determine the early post-glacial origins of the British Flora. The planting of trees and plants of distant lowland stock of unknown heredity may contaminate surviving native woodland communities in the Northern Dales for future genetic based research. The author welcomes reassurance on these matters.

Locations with small, stunted but healthy and apparently stable woodland communities exist in Swaledale on cliffs and within ravines at 500m, which is the present day local altitudinal limit for most deciduous trees. The altitudinal limit for most deciduous trees in neighbouring Wensleydale is 400m (Millward, 1988). In contrast, the altitudinal limit for deciduous trees on the western, atlantic-oceanic, side of Britain is much higher (Pearman and Corner, 2003).

The wooded Scars described here include well-known landmarks much admired for their general landscape quality but largely ignored at any level of scrutiny. More usually, these cliffs are at discrete locations on upper reaches and at the remote sources of tributary streams of the Swale easily overlooked, rarely noticed or visited. Occasionally these woodland fragments are close but hidden from view to walkers who look neither to the left or right, intent only to complete the Coast-to-Coast or Pennine Way footpaths.

It is probably true to say that the rich woodland communities with fine specimen yews on and below the limestone Scars of Swaledale are less well known or understood to the British Public than the jungles of Borneo. Most, but as yet not all, of the locations in Swaledale where woodland fragments survive have been visited. Accordingly, this account should be regarded as 'Work in Progress'. Fortunately, web-based publication allows for easy updating and additional woodland sites can be added from time to time to the www.swaag.org database as and when they are recognised. An understanding of the relict woodland once more widespread is fundamental to the landscape history of Swaledale.

As an independent archaeologist concerned with the survey and interpretation of archaeological landscapes, mainly prehistoric, throughout the Ure, Swale and Tees-Greta Uplands (Laurie, 2003) I have long been aware that no real understanding of past human activity is possible in the absence of an understanding of the contemporary prehistoric woodland environment.

The few pollen reports available from the study area do assist in this reconstruction, but they provide an overview or general picture and cannot relate to the woodland composition *at locality level*. The woodland vegetation will respond to the differing soils derived from glacial drift, ground water and faulted and abruptly changing, faulted geological strata. The relict fragments recorded and detailed here may be regarded as an analogue to woodland communities once widespread *in comparable localities* throughout Swaledale throughout postglacial time.

Individual trees are the characters in this account of the isolated fragmented woodland communities of native trees which survive wherever conditions allow- on river and streamside cliffs and on the high limestone scars- all locations which are less accessible to rabbits and sheep. These specimen trees can be looked for and admired by those able to risk

life and limb peering over sheer cliffs or scrambling carefully at the top of unstable scree at the base of the cliffs, often in near darkness below a closed canopy of ancient yews.

As far as I am aware the small fragments of woodland that survives in the more remote and inaccessible locations of the NE Pennine Dales, have not been recorded and do not enjoy the specific protection they merit. It is hoped that this introduction will lead to due consideration of a rich woodland resource, that this omission will in some way be addressed and that it may stimulate further well informed research.

Notes and acknowledgements

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References

Floras of adjacent areas:

Millward, D. (1988) *A Flora of Wensleydale*. The Yoredale Natural History Society.
Graham, G.G. (1988) *The Flora and Vegetation of Co Durham*. Durham Flora Committee and Durham County Conservation Trust.
Halliday, G. (1997) *A Flora of Cumbria*. University of Lancaster.
Clapham, A.R. (ed.) (1978) *Upper Teesdale. The Area and its Natural History.* Collins.

Woodland History, Physiognomy, Habitat and Communities:

Dunham, K.C. and Wilson, A.A. (1985) Geology of the North Pennine Orefield: Vol. 2, Stainmore to Craven. *Mem. Geol. Surv. G.B*.
Fleming, A. (1998) *Swaledale. Valley of the Wild River*. Edinburgh University Press, Edinburgh.
Godwin, H. (1975) *History of the British Flora. A Factual Basis for Phytogeography.* Second Edition. Cambridge University Press, Cambridge.
Laurie, T.C. (2003) *Researching the Prehistory of Wensleydale, Swaledale and Teesdale.* In Manby, T.G., Moorhouse. S. and Ottaway, P. (eds.) The Archaeology of Yorkshire. *Yorkshire Archaeol. Soc. Occ. Paper No 3*, 223-253.
Laurie, T.C. (2004) Springs, Woods and Transhumance. Reconstructing a Pennine Landscape during later Prehistory. *Landscapes*, **5(1)**, 73-102.
Pearman, D.A. and Corner, R.W.M. (2003) *Altitudinal Limits of British and Irish Vascular Plants.* Botanical Society of the British Isles, London.
Pearman, D.A., Preston, C.D. and Bland, K.P. (2012) Survival and relative frequency of native woody species and their native Lepidoptera on Coll, Inner Hebrides, two millennia after deforestation. *New Journal of Botany*, **2(1)**, 56-72.
Rodwell, J.S. (ed.) (1991) *British Plant Communities. Vol. 1 Woodlands and scrub*. Cambridge University Press, Cambridge.
Raven, J. and Walters, M. (1956) *Mountain Flowers*. Collins, London.