

RESTORING ACTIVE BLANKET BOG IN IRELAND

Project reference: LIFE02NAT/IRL/8490

A REPORT ON THE RESTORATION OF PROJECT SITE No. 15.
SESSUEGUILROY, CO. SLIGO



Compiled by: John Conaghan
11 Dun Ard,
Craughwell,
Co. Galway,
Ireland.
enviroscope@indigo.ie

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Project Site No. 15 - Sessuegilroy, Ox Mountains, Co. Sligo**1. Introduction**

Grid reference G 434 185	Elevation (m) 160 to 220	Bedrock geology Schist
SAC Name and number Ox Mountains Bogs (2006)	Site area (ha) 23.6	Main restoration methods Commercial felling, fell to waste and ring-barking of conifer crop. Wind-rowing of felled trees and drain-blocking.
Area of conifer cover (ha) 15.6	Area of open bog/heath (ha) 8.0	
Noteworthy plant/animal species occurring on site None recorded		

This project area is situated in the Ox Mountains, some 10 kilometres northwest of Tubercurry village in north-west Co. Sligo. The site lies within the Ox Mountains Bogs Special Area of Conservation and occupies an area of 23.6 hectares. The project site comprises a range of habitats including mature conifer plantation, young conifer plantation, blanket bog and wet heath. The unplanted area of this site is dominated by wet heath vegetation on thin, sloping peat. The main plant species in this vegetation is purple moor-grass (*Molinia caerulea*) with ling (*Calluna vulgaris*) particularly prominent around the numerous areas of outcropping rock. In places this wet heath vegetation is subject to a degree of flushing by flowing water which provides a habitat for flush species such as *Sphagnum auriculatum*, *S. recurvum*, soft rush (*Juncus effusus*) and marsh violet (*Viola palustris*). On the summit of the hill, deeper, ombrotrophic blanket peat is present and species such as ling (*Calluna vulgaris*), deer grass (*Trichophorum cespitosum*) and bilberry (*Vaccinium myrtillus*) are generally dominant. Whilst the removal of trees from the project site will not have a direct impact on the core areas of interest within the SAC, it is nonetheless important in that it will provide important information regarding the rehabilitation of blanket bog and wet heath habitats in the Ox Mountains.

The main restoration measures at this site were the felling of an area of tall, commercial conifer crop and the felling to waste of a younger conifer crop area. A small area of conifer plantation was ring-barked with chainsaws. The blocking of drains was also carried out.

2. Methods

Prior to the start of restoration activities at the site the habitats and vegetation occurring were surveyed and described. Habitats occurring were mapped with the aid of a vertical aerial photograph of the site taken in the year 2000 by the Ordnance Survey of Ireland. At the end of the project the habitats present were mapped with the aid of a vertical aerial photograph of the site taken in 2004.

The vegetation occurring at the site was described using the Zurich-Montpellier approach (Mueller-Dombois and Ellenberg, 1979), where the percentage cover of the various vegetation layers and plant species in a defined area is estimated visually. The cover of plant species in relevés was estimated in accordance with the Domin scale which is outlined in the table below.

Table 1. The Domin scale of cover/abundance.

1 = <4% cover with few individuals
2 = <4% cover with several individuals
3 = <4% cover with many individuals
4 = Cover between 4 and 10%
5 = Cover between 11 and 25%
6 = Cover between 26 and 33%
7 = Cover between 34 and 50%
8 = Cover between 51 and 75%
9 = Cover between 76 and 90%
10 = Cover between 91 and 100%

In addition to plant species presence and cover, the following parameters were noted for each relevé:

- (1) Size
- (2) Percentage cover of vegetation, bare soil, water and rock.
- (3) Percentage cover and height of the different vegetation layers, e.g. shrub, dwarf shrub, herb and bryophyte.
- (4) Soil type and depth.
- (5) Slope and aspect.
- (6) Additional details, such as the composition of the surrounding vegetation, degree of grazing and disturbance.

During the initial fieldwork a number of colour photographs of the site and vegetation encountered were taken with a digital camera and a selection of these are presented in this report in order to illustrate the vegetation descriptions and changes in the habitats/vegetation present over time. Mosses, liverworts and higher plants not readily identified in the field were collected and keyed out at a later date using keys in the appropriate publications (see below). During the field survey, particular attention was paid to the possible occurrence of plant and animal species which are considered to be rare in both a national

and local context with particular emphasis on animal species listed in Annex II of the E.U. Habitats Directive and plant species listed in the Irish Red Data Book for vascular plants (Curtis and McGough, 1988), the 1999 Flora Protection Order and Annex II of the E.U. Habitats Directive.

Plant species nomenclature in this report follows Stace (1997) for vascular plant, Smith (2004) for mosses, Smith (1991) for liverworts and Dahl (1968) for lichens.

3. Site Photographs

In order to illustrate the restoration activities which have taken place at this site a number of photographs are presented in the following pages. These include both aerial photographs, supplied by the Ordnance Survey of Ireland, and a selection of ground photographs taken by the author.



The unplanted parts of this site are dominated by relatively shallow blanket bog and wet heath vegetation with conspicuous *Calluna vulgaris*, *Molinia caerulea* and *Eriophorum vaginatum*. Areas of outcropping rock are also frequent. Photograph taken in September 2003.



On the afforested portions of this site the conifer plantation had grown relatively well and the existing bog vegetation was largely killed off by tree growth. This photograph, taken in September 2003, shows the

dominance of brash and needle litter following commercial tree removal.



A photograph of the typical ground vegetation underneath the tall conifer crop. A thick layer of pine needles dominates with a sparse layer of mosses also present. Photograph taken in June 2003.



On a portion of this site the conifer crop was not large enough for commercial harvest. These conifers were felled with chainsaw and windrowed by machine. Photograph taken October 2003.

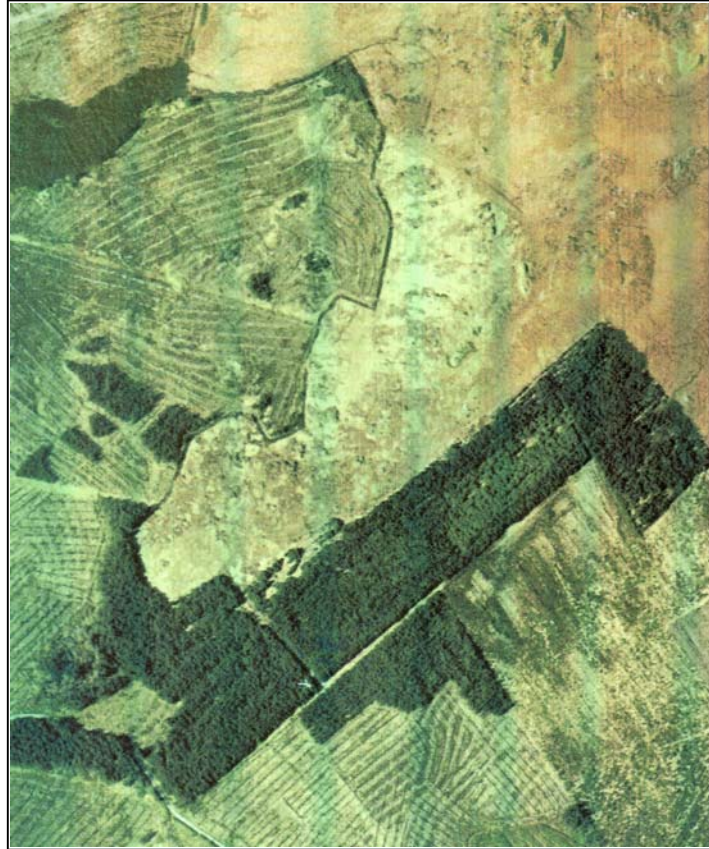


A view of windrowed conifer crop with a peat dam in place. It was generally difficult to put good dams in this site due to the well developed root systems of trees. Photograph taken October 2003.

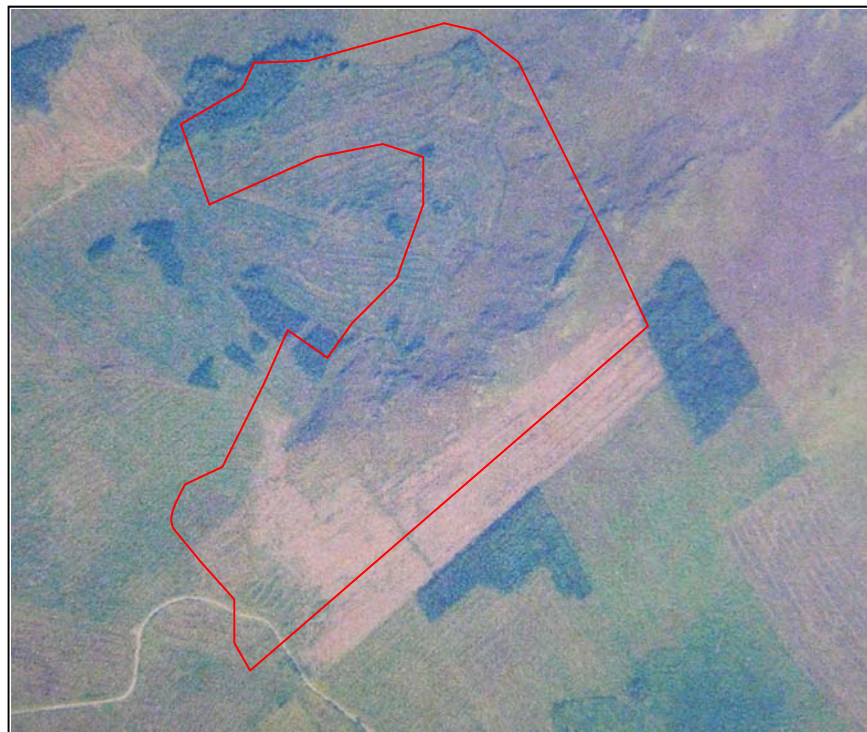


Ring-barked trees at the northern end of the site. At this site it took a couple of seasons for the trees to completely

die off and the regeneration of bog vegetation underneath the tree canopy is slow. Photograph taken August 2004.



An aerial photograph of the Sessuegilroy site prior to the start of restoration activities. Aerial photograph taken in the year 2000.



An aerial photograph of the Sessuegilroy site following restoration activities. Site outline in red. Aerial photograph

taken in the year 2004.

4. Vegetation of the site

This site contains quite a wide variety of habitats/vegetation types on peat. The majority of the restoration work at this site took place in the eastern half where a tall conifer crop grew. These conifers were planted in the mid-1970's and the main species was Sitka spruce with smaller amounts of intermixed lodgepole pine. By 2003 this conifer crop had generally attained a height of between 6 and 9 metres. The ground vegetation of this afforested area (see following table) was very sparse and species-poor with mosses such as *Hypnum cupressiforme*, *Thuidium tamariscinum*, *Rhytidiadelphus loreus* and *Sphagnum capillifolium* particularly prominent.

In the unplanted areas of this site species such as *Molinia caerulea*, *Calluna vulgaris*, *Erica tetralix*, *Trichophorum cespitosum* and *Sphagnum capillifolium* dominate in a species-rich blanket bog/wet heath vegetation. These areas are in good condition with little evidence of overgrazing by sheep evident.

Table 2. Vegetation at Sessuegilroy.

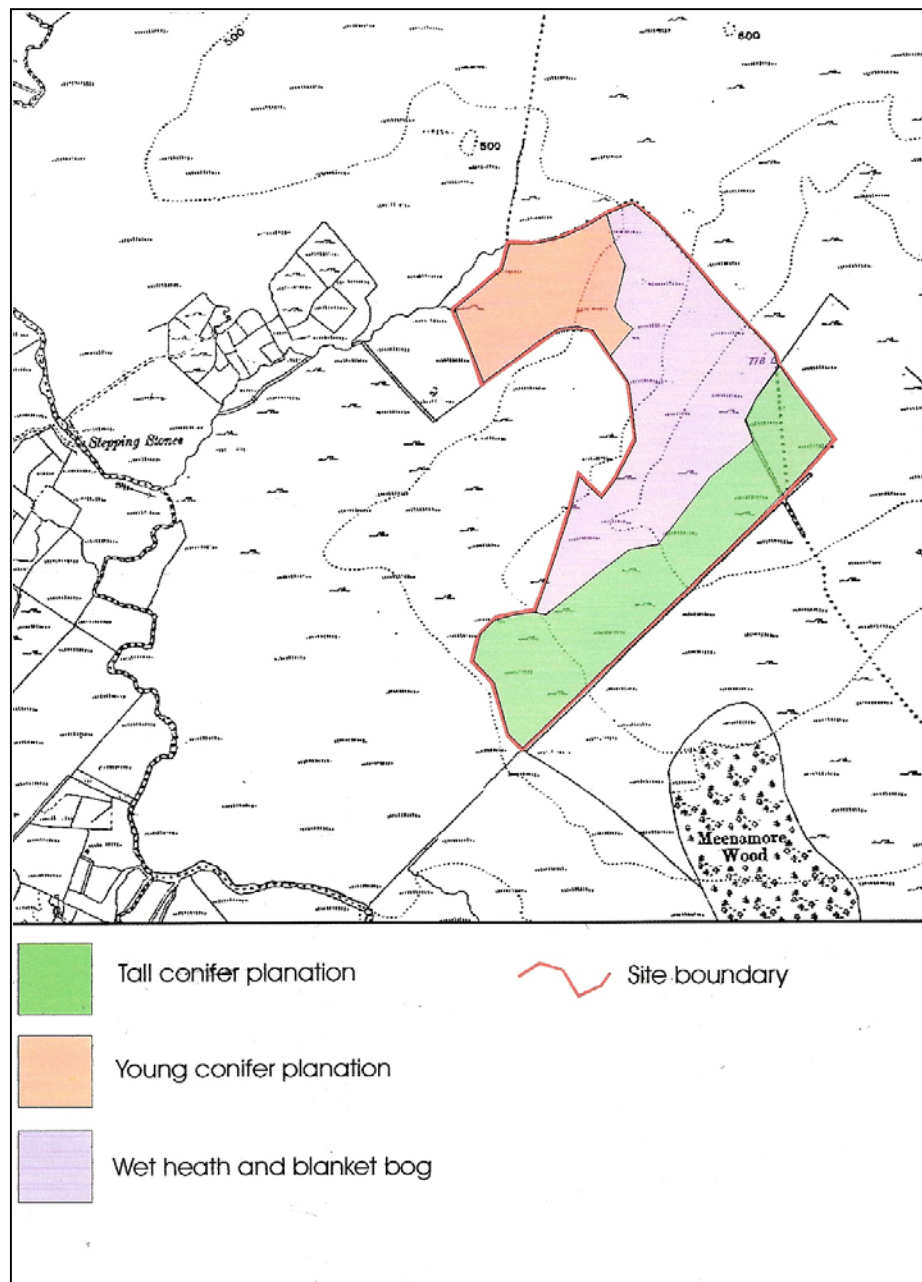
Vegetation type	A	A	A	A	A	B	B	B	B	B	
Quadrat code	S1	S2	S3	S4	SW6	SW3	SW2	SW4	SW5	SW7	
Quadrat size (m ²)	4	4	3	4	4	4	4	4	4	4	
Slope (degrees)	0-10	5-15	30-40	0-10	0-5	0-3	0-5	0	0	5-10	
Vegetation cover (%)	100	100	99	100	90	30	15	50	40	50	
Needle litter cover (%)	0	0	0	0	0	70	90	50	70	50	
Bare soil (%)	0	0	1	0	10	0	0	0	0	0	
Open water (%)	0	0	0	0	0	0	0	0	0	0	
Dwarf shrub cover (%)	30	45	45	35	25	0	0	0	0	0	
Herb cover (%)	85	55	50	80	70	0	0	1	2	5	
Bryophyte cover (%)	55	60	60	75	65	25	15	50	40	45	
Ht. of vegetation (cm)	30	25	20	15	25	<5	<3	<3	<3	<5	
No. of species	25	25	26	26	23	6	8	11	9	9	
<i>Molinia caerulea</i>	8	7	5	7	6			1	2	4	
<i>Calluna vulgaris</i>	5	7	6	5	5						
<i>Erica tetralix</i>	4	5	5	5	4						
<i>Potentilla erecta</i>	4	4	3	4	1						
<i>Carex panicea</i>	1	1	3	4	1						
<i>Trichophorum cespitosum</i>	3	4	5	5	5						
<i>Cladonia portentosa</i>	3	4		3	5						
<i>Narthecium ossifragum</i>	3	3		3	3						
<i>Erica cinerea</i>	1	4	4		3						
<i>Eriophorum angustifolium</i>	4	3		4	5						
<i>Sphagnum subnitens</i>	4	3	4		1						
<i>Sphagnum tenellum</i>	4		4	3	4						
<i>Juncus squarrosus</i>	1	3	4		3						
<i>Sphagnum palustre</i>	1		1	4	3						
<i>Polygala serpyllifolia</i>	3	1	3								
<i>Racomitrium lanuginosum</i>	4	7	5								
<i>Breutelia chrysocoma</i>	3		1								
<i>Pedicularis sylvatica</i>	1		1								
<i>Sphagnum cuspidatum</i>	3				3						
<i>Campylopus atrovirens</i>			1	1							
<i>Sphagnum papillosum</i>			5		4						
<i>Odontoschisma sphagni</i>			1		1						
<i>Carex binervis</i>				3	3						
<i>Thuidium tamariscinum</i>		1	1				4	4	4	4	
<i>Polytrichum commune</i>							1	4		1	
Liverwort species									1	2	
<i>Hypnum cupressiforme</i>	4	4	4	4	4	5	5	6	5	6	
<i>Sphagnum capillifolium</i>	6	5	5	5	7	4	3	5	5	4	
<i>Rhytidiadelphus loreus</i>	1	4	3	4	1	3	1	5	5	5	
<i>Hylocomium splendens</i>	1	4	1	5	4	3	3	4		4	
<i>Plagiothecium undulatum</i>		3	1	1		1	2	5	1		
<i>Pleurozium schreberi</i>		3	1	5				2	1	3	
<i>Dicranum scoparium</i>		1		1		4		2			
<i>Carex echinata</i>	3										
<i>Diplophyllum albicans</i>	1										
<i>Luzula multiflora</i>		1									
<i>Lophocolea bidentata</i>		1									
<i>Cladonia uncialis</i>		1									
<i>Sphagnum auriculatum</i>			3								
<i>Blechnum spicant</i>			1								
<i>Anthoxanthum odoratum</i>				4							
<i>Nardus stricta</i>				4							
<i>Agrostis capillaris</i>				3							
<i>Rhytidiadelphus squarrosus</i>				3							
<i>Leucobryum glaucum</i>				1							
<i>Galium saxatile</i>				1							
<i>Eriophorum vaginatum</i>					4						
<i>Eurhynchium praelongum</i>							1				
<i>Pseudoscleropodium purum</i>								1			
<i>Dryopteris dilatata</i>									1		

A = Intact blanket bog/wet heath vegetation

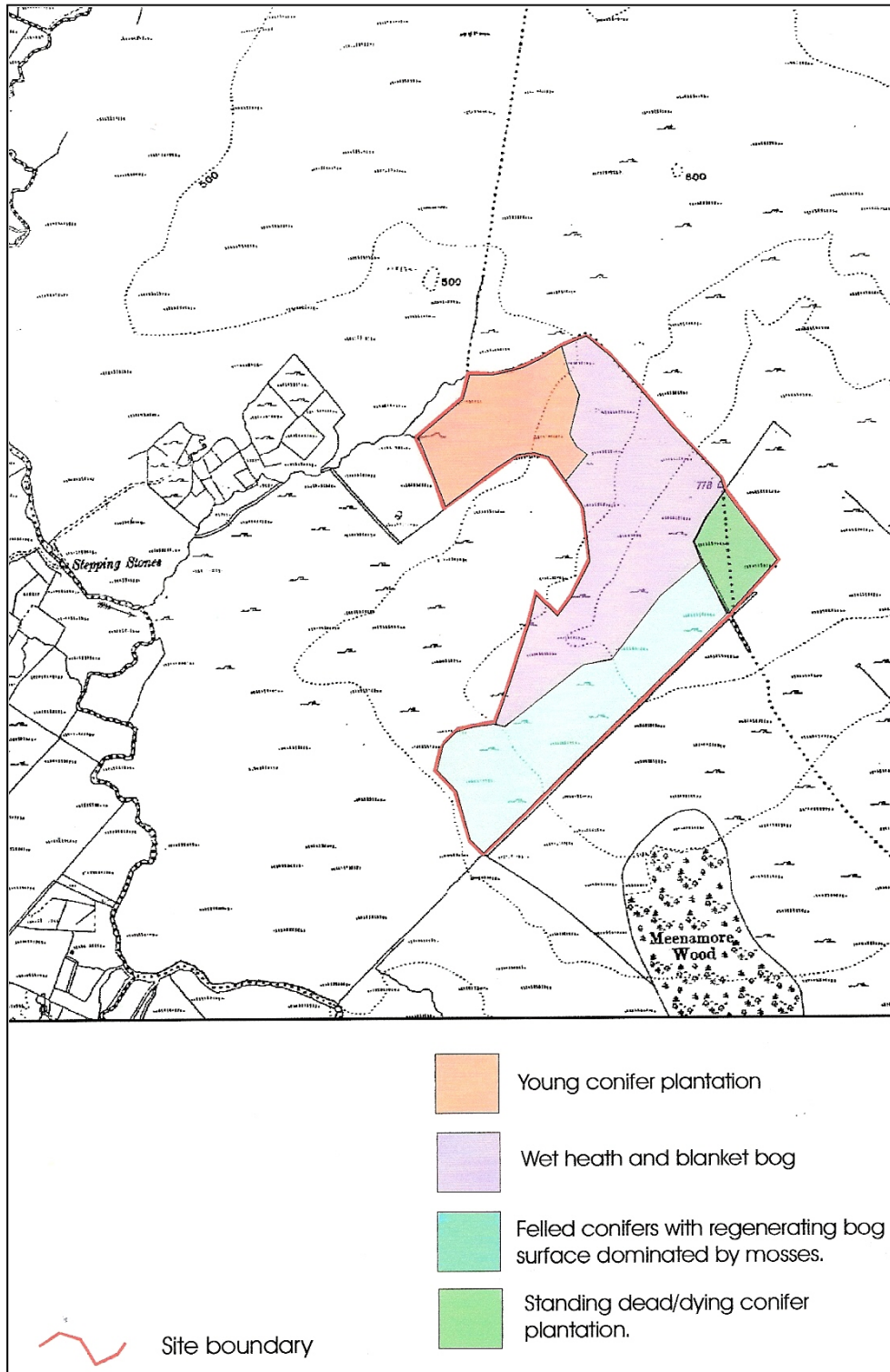
B = Species-poor vegetation underneath conifer canopy.

5. Changes in overall vegetation/habitat cover

At Sessuegilroy the main vegetation changes have occurred in the area of the site that was previously afforested with conifers. This part of the site is now dominated by a slowly regenerating blanket bog/heath vegetation in which moss species such as *Hypnum cupressiforme*, *Rhytidiadelphus loreus* and *Sphagnum capillifolium* are generally the dominant species. The remains of the felled conifer crop is still quite evident throughout this portion of the site and it will be interesting to see how long it will take this woody material to break down completely. It will also be interesting to see how the recolonization of the area of standing dead conifers will proceed over the forthcoming years.



A map of habitat/vegetation cover at Sessuegilroy prior to the start of restoration



A map of habitat/vegetation cover at Sessuegilroy at the end of the restoration project.

6. Monitoring quadrats

In the following pages the vegetation changes which have taken place within the site over the period of the restoration project are shown by means of observed changes in permanent quadrats. A total of 5 permanent quadrats were described and photographed. In order to ensure the future relocation of quadrats the corners have been marked with short sticks and a 10-figure GPS reading was also recorded. In the case of each quadrat photographs and vegetation tables are presented. The cover of plant species within the quadrats is presented in accordance with the scale outlined in the following table.

Cover of species in quadrat	Cover in presented quadrat tables
<1%	1
1 to 5%	2
5 to 10%	3
10 to 25%	4
25% to 50%	5
50 to 75%	6
75% to 100%	7

Since conifer felling/removal has taken place in the eastern part of this site, the recovery of bog vegetation has been slow. This is to be expected as the conifer crop had largely killed off the native blanket bog/wet heath flora and thus it will take a longer time for a peatland flora to recolonize. At the time of the last survey of the permanent quadrats (August 2006) the ground surface was largely dominated by a range of moss species such as *Hypnum cupressiforme*, *Rhytidiadelphus loreus*, *Polytrichum commune*, *Campylopus introflexus* and *Sphagnum capillifolium*. Vascular plant species cover was generally less than 20% with *Molinia caerulea*, *Juncus bulbosus* and *Juncus effusus* the only species with a locally high cover. The cover of *Sphagnum* appears to be higher in areas of felled conifers where the crop was felled and wind-rowed. This is mainly due to the fact that *Sphagnum* layer in these areas was not completely killed off as a result of the younger age of the conifer crop. The future monitoring of these quadrats will reveal the timescale of blanket bog regeneration and the plant species involved.



Quadrat No. 1 – August 2003



Quadrat No. 1 – August 2006

Site - Sessuegilroy			
Quadrat code - PQ1			
GPS - G 43206 18337			
Near Walrag? - 40 m S.E. of W.7			
Size (m) - 7x7			
Slope (Degrees) - 1 to 3			
Vegetation cover (%)	40	60	80
Needle litter cover (%)	50	50	3
Brash cover (%)	15	10	10
Bare ground cover (%)	0	0	10
Surface water cover (%)	0	0	5
Dwarf shrub cover (%)	0	1	3
Herb cover (%)	0	1	10
Bryophyte cover (%)	40	60	75
No of species present	7	14	25
Date of survey	11/8/2003	4/8/2004	9/8/2006
<i>Rhytidiadelphus loreus</i>	4	4	4
<i>Hypnum cupressiforme</i>	4	4	5
<i>Sphagnum capillifolium</i>	3	4	4
<i>Thuidium tamariscinum</i>	3	3	3
<i>Plagiothecium undulatum</i>	3	4	3
<i>Sphagnum palustre</i>	3	3	3
<i>Sphagnum cuspidatum</i>	3	3	3
<i>Polytrichum</i> sp.		2	4
<i>Calluna vulgaris</i>		1	1
<i>Pinus contorta</i> seedlings		1 (9 counted)	1 (1 counted)
<i>Dryopteris dilatata</i>		1	1
<i>Molinia caerulea</i>		1	1
<i>Sphagnum subnitens</i>		1	-
<i>Hylocomium splendens</i>		1	1
<i>Campylopus introflexus</i>			4
<i>Eriophorum angustifolium</i>			2
<i>Cladonia portentosa</i>			2
<i>Erica tetralix</i>			1
<i>Nardus stricta</i>			1
<i>Pseudoscleropodium purum</i>			1
<i>Dicranum scoparium</i>			1
<i>Cladonia</i> sp.			1
<i>Vaccinium myrtillus</i>			1
<i>Agrostis canina</i>			1
<i>Potentilla erecta</i>			1
<i>Drosera rotundifolia</i>			1
History – Previously dominated by a Sitka spruce plantation planted in the late 1970's. Trees were generally between 6 and 8 metres tall. Ground vegetation dominated by conifer needles and scattered mosses (mainly <i>Hypnum cupressiforme</i> and <i>Rhytidiadelphus loreus</i> . Trees felled and removed for sale in summer of 2003. In 2003 much of the moss cover was either dead or dying.			



Quadrat No. 2 – August 2003



Quadrat No. 2 – August 2006

Site - Sessuegilroy			
Code - PQ2			
GPS - G 43236 18394			
Near Walrag? - No			
Size (m) - 8x8			
Slope (Degrees) – 5 to 10			
Vegetation cover (%)	20	25	50
Needle litter cover (%)	20	20	5
Brash cover (%)	60	60	40
Dwarf shrub cover (%)	0	2	5
Herb cover (%)	10	10	15
Bryophyte cover (%)	15	20	50
No of species present	6	14	22
Date of survey	11/8/03	4/8/04	9/8/2006
<i>Molinia caerulea</i>	4	4	4
<i>Hypnum cupressiforme</i>	3	3	4
<i>Rhytidiadelphus loreus</i>	3	3	3
<i>Hylocomium splendens</i>	3	3	1
<i>Thuidium tamariscinum</i>	2	2	-
<i>Sphagnum capillifolium</i>	2	2	3
<i>Campylopus introflexus</i>		2	4
<i>Calluna vulgaris</i>		2	3
<i>Juncus bulbosus</i>		1	1
<i>Potentilla erecta</i>		1	1
<i>Luzula multiflora</i>		1	1
<i>Pleurozium schreberi</i>		1	2
<i>Agrostis</i> sp.		1	1
<i>Pinus contorta</i> seedlings		1 (8 counted)	-
<i>Polytrichum commune</i>			4
<i>Digitalis purpurea</i>			2
<i>Erica cinerea</i>			1
<i>Juncus effusus</i>			1
<i>Juncus squarrosus</i>			1
<i>Eriophorum vaginatum</i>			1
<i>Epilobium angustifolium</i>			1
<i>Carex echinata</i>			1
<i>Epilobium</i> sp.			1
<i>Galium saxatile</i>			1
<p>History – Previously dominated by a Lodgepole pine/Sitka spruce plantation planted in the late 1970's. Trees were generally between 6 and 8 metres tall. Ground vegetation dominated by conifer needles and scattered mosses (mainly <i>Hypnum cupressiforme</i> and <i>Rhytidiadelphus loreus</i>). Trees felled and removed for sale in summer of 2003. Approx. 60% of quadrat (western half) is dominated by a thick brash mat.</p>			



Quadrat No. 3 – August 2003

Not possible to refind this quadrat due to ground disturbance.

Site	Sessuegilroy	
Code	PQ3	
GPS		
Near Walrag?	C. 80 metres west of Walrag 2	
Size (m)	8x8	
Slope (Degrees)	5 - 15	
Date of survey	11/8/03	
Vegetation cover (%)	10	
Dwarf shrub cover (%)	0	
Herb cover (%)	1	
Bryophyte cover (%)	10	
Needle litter cover (%)	50	
Brash cover (%)	40	
Water cover (%)	0	
No of species present	6	
<i>Rhytidiadelphus loreus</i>	3	
<i>Thuidium tamariscinum</i>	2	
<i>Hypnum cupressiforme</i>	2	
<i>Sphagnum palustre</i>	1	
<i>Dryopteris dilatata</i>	1	
<i>Plagiothecium undulatum</i>	1	

History – Previously dominated by a Lodgepole pine/Sitka spruce plantation planted in the late 1970's. Trees were generally between 6 and 8 metres tall. Ground vegetation dominated by conifer needles and scattered mosses (mainly *Hypnum cupressiforme* and *Rhytidiadelphus loreus*). Trees felled and removed for sale in summer of 2003.

Approx. 50% of quadrat is dominated by a thick brash mat.



Quadrat No. 4 – August 2003



Quadrat No. 4 – August 2006

Site - Sessuegilroy			
Code - PQ4			
GPS – G 43106 18181			
Near Walrag? - W1 in centre of plot			
Size (m) - 8x8			
Slope (Degrees) - 15-20			
Vegetation cover (%)	5	25	80
Dwarf shrub cover (%)	0	1	1
Herb cover (%)	<1	2	10
Bryophyte cover (%)	5	25	75
Needle litter cover (%)	70	60	5
Brash cover (%)	25	20	20
Bare ground cover (%)	0	0	10
No of species present	4	16	22
Date of survey	11/8/03	4/8/04	9/8/06
<i>Hypnum cupressiforme</i>	2	3	5
<i>Thuidium tamariscinum</i>	2	3	1
<i>Plagiothecium undulatum</i>	1	4	3
<i>Dryopteris dilatata</i>	1	1	1
<i>Campylopus introflexus</i>		3	5
<i>Polytrichum commune</i>		3	5
<i>Pinus contorta</i> seedlings		1 (4 counted)	-
<i>Calluna vulgaris</i>		1	2
<i>Juncus squarrosus</i>		1	1
<i>Luzula multiflora</i>		1	1
<i>Digitalis purpurea</i>		1	2
<i>Anthoxanthum odoratum</i>		1	1
<i>Rubus fruticosus</i>		1	-
<i>Molinia caerulea</i>		1	1
<i>Epilobium angustifolium</i>		1	1
<i>Sphagnum recurvum</i>		1	1
<i>Juncus bulbosus</i>			1
<i>Eriophorum vaginatum</i>			1
<i>Sphagnum palustre</i>			1
<i>Vaccinium myrtillus</i>			1
<i>Rhytidiadelphus loreus</i>			1
<i>Blechnum spicant</i>			1
<i>Erica cinerea</i>			1
<i>Carex echinata</i>			1
History – Previously dominated by a mixed Lodgepole pine and Sitka spruce plantation planted in the late 1970's. Trees were generally between 6 and 8 metres tall. Ground vegetation dominated by conifer needles with very low moss cover. Trees felled and removed for sale in summer of 2003.			



Quadrat No. 5 – August 2003



Quadrat No. 5 – August 2006

Site - Sessuegilroy			
Code - PQ5			
GPS - G 43245 18346			
Near Walrag? - No			
Size (m) - 6 x 6			
Slope (Degrees) – 3 to 5			
Vegetation cover (%)	65	60	80
Dwarf shrub cover (%)	0	1	5
Herb cover (%)	<1	1	75
Bryophyte cover (%)	65	60	75
Needle litter cover (%)	60	45	5
Brash cover (%)	5	5	5
Bare soil cover (%)	30	10	10
Water in blocked drains (%)	0	15	15
No. of species present	10	14	27
Date of survey	8/10/03	4/8/04	9/8/06
<i>Hypnum cupressiforme</i>	4	4	4
<i>Sphagnum capillifolium</i>	4	4	4
<i>Rhytidiadelphus loreus</i>	4	4	4
<i>Thuidium tamariscinum</i>	3	3	2
<i>Sphagnum palustre</i>	3	3	3
<i>Plagiothecium undulatum</i>	2	2	2
Liverwort species	2	-	3
<i>Polytrichum commune</i>	2	2	5
<i>Dicranum scoparium</i>	2	-	1
<i>Hylocomium splendens</i>	2	2	-
<i>Pleurozium schreberi</i>		3	-
<i>Calluna vulgaris</i>		1	3
<i>Juncus</i> sp.		1	-
<i>Molinia caerulea</i>		1	2
<i>Erica tetralix</i>		1	3
<i>Sphagnum cuspidatum</i>		1	4
<i>Campylopus introflexus</i>			4
<i>Juncus bulbosus</i>			2
<i>Juncus effusus</i>			2
<i>Agrostis</i> sp.			2
<i>Juncus squarrosus</i>			2
<i>Carex echinata</i>			1
<i>Eriophorum angustifolium</i>			1
<i>Dryopteris dilatata</i>			1
<i>Rubus fruticosus</i>			1
<i>Vaccinium myrtillus</i>			1
<i>Cladonia</i> sp.			1
<i>Sphagnum subnitens</i>			1
<i>Potentilla erecta</i>			1
<i>Anthoxanthum odoratum</i>			1
History – Previously dominated by Sitka spruce plantation planted in the late 1970's. Trees were generally between 6 and 8 metres tall. Ground vegetation dominated by conifer needles with a low cover of mosses (<i>Hypnum</i> , <i>Sphagnum capillifolium</i> and <i>Rhytidiadelphus loreus</i>). Trees felled and windrowed in the summer of 2003.			

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