

RESTORING RAISED BOG IN IRELAND
Project Reference: LIFE04 NAT/IE/000121

A REPORT ON THE RESTORATION OF PROJECT SITE No. 1

LOUGH LURGEEN BOG & GLENAMADDY TURLOUGH, CO. GALWAY



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Table of Contents

	Page No.
1. Introduction:	3
2. Methods:	4
3. Site Photographs:	4
4. Vegetation of Project Site:	4
5. Changes in Overall Vegetation /Habitat Cover:	5
6: Monitoring Quadrats:	5
7. Changes in Water-levels:	11
8. Hydrological Monitoring (Walrag) Graphs	11
9. Conclusion:	13
10. References:	13

Project Site No. 1 - Lough Lurgeen Bog & Glenamaddy Turlough, Co. Galway

1. Introduction

Grid Reference IM 6643 6050	Elevation (m) 85	Bedrock Geology Limestone
SAC Name and Number Lough Lurgeen Bog & Glenamaddy Turlough cSAC (301)	Project Site Area (ha) 7.3	Main Restoration Methods Wind-row Brash Block drains with peat dams Control natural regeneration
SAC Area (ha) 1154		
Area of Conifer Cover (ha) 7.3	Area of Open Bog (ha) 0	Area of Birch Woodland (ha) 0
Noteworthy plant/animal species present Greenland White-fronted Goose use this site as a wintering ground		

General Site Description

Lough Lurgeen Bog/ Glenamaddy Turlough cSAC covers almost 1,200 ha and is situated to the east of Glenamaddy, Co. Galway. It consists of a very large turlough, over 170 ha in area and a large area of over 1,000 ha of typical western raised bog habitat. A small lake occurs at the top of the bog dome.

On the high bog, there are a number of interesting features, pool/hummock systems, oligotrophic lake, a large fen and a number of flushes, dominated by Purple Moor-grass (*Molinia caerulea*). The lake is a traditional goose site and the turlough is now used by Greenland White-fronted Goose.

The lake, raised bog and turlough occur in close association with water from the bog feeding the lake, which in turn is linked to the turlough. This is a quite unique ecosystem, which is of high conservation value (NPWS, 2005).

The bog ranks as one of the largest and most important in the east Galway area and is also important in a national context being the largest and most important raised bog/turlough complex in the country. In terms of morphology the bog is one of the most unusual in the area due to the presence of a large oligotrophic lake (Lough Lurgeen) at its centre. The water in this lake flows into Glenamaddy turlough which lies to the north-west of the bog. Areas of forestry occur mostly on cutover areas along the northern and eastern margins of the bog. Coillte owns a plantation within the SAC boundaries at Cloonlara South, along the north-eastern margins of the site (Conaghan, 2003).

Project Site Description (Pre-restoration)

The project area consists of 7.3 hectares of clear-felled conifer plantation, on high bog to the north-east of the cSAC in the townland of Cloonlara South.

Description of bog vegetation adjoining planted areas

At Cloonlara South the area of recently felled Lodgepole Pine (*Pinus contorta*) adjoins some quite wet high bog dominated by Ling Heather (*Calluna vulgaris*) with a high cover of *Sphagnum* moss. High bog to the north-west of the clear-felled area has been colonised by pine saplings. These areas of adjoining bog are not owned by Coillte.

Restoration Actions

At this site the main restoration measures undertaken was the wind-rowing of the remaining brash and blocking of drains with peat dams. Follow-up work included the control of the natural regeneration of conifer seedlings.

Because tree-felling has occurred at this site, 6 months before the start of the project, the vegetation should be monitored by means of permanent quadrats. This monitoring will be important as it will provide important early clues regarding the recovery of bog vegetation on recently cleared areas of plantation.

2. Methods

Prior to the start of restoration activities at the site, the habitats and vegetation occurring was surveyed and described (Conaghan, 2003). During the initial restoration work of 2005, permanent quadrats were established on each of the vegetation types within the project site.

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 international 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.

3. Site Photographs

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. These include a selection of ground photographs taken by the Project Ecologist in order to illustrate the vegetation descriptions and changes in the habitats/vegetation present over time.

4. Vegetation of Project Site

The vegetation of the project site was previously dominated by tall, closed-canopy coniferous plantation. There was little or no living surface vegetation left after clear-felling of the plantation. It is hoped that there will be a regeneration of wet bog vegetation in this area following the blocking of drains.

5. Changes in Overall Vegetation/Habitat Cover

Much of the site is now cleared of conifers and brash. The brash which remained after clear-felling was wind-rowed to allow bog vegetation to re-colonise exposed peat surface.

6. Vegetation Monitoring Quadrats

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.

Three permanent quadrats were installed on this site, which were described and photographed to monitor changes in vegetation over time. In order to ensure the future position of quadrats the corners have been marked with short stakes and an 8-figure GPS reading was also recorded. Each 10m x10m quadrat was photographed annually and vegetation tables are presented below.

Quadrat 1: This quadrat is located on the northern margin of Lough Lurgeen Bog and occurred within recently clear-felled conifer plantation on high bog with vegetation containing Ling Heather, Hare's-tail Cotton-grass, Purple Moor-grass and Bramble with *Hypnum* moss and abundant brash. With the blocking of drains, Ling Heather and Hare's-tail cotton-grass cover increased. Over time *Sphagnum* cover will increase and this wet bog margin will develop raised bog habitat.

Lough Lurgeen Bog Quadrat 1

Area: 10 x 10m Location: 30m West W3 Grid Ref: N6622 6036 Altitude: 89m
 Bog Type: High Bog Ecotope: NA Slope: Slight Aspect: North
 Landuse: Forestry Management: Clear-fell

Date	30/08/2005	22/08/2007	31/07/2008
Firmness	Soft	Soft	Soft
Drains	Yes	Yes/Blocked	Yes/Blocked
Canopy Cover %	0	0	0
Canopy Height	0	0	0
Vegetation Cover %	40	45	65
Vegetation Height (cm)	10	20	30
Dwarf Shrub Cover %	5	15	25
Herb Cover %	20	20	40
Bryophyte Cover %	15	40	40
Sphagnum cover %	0	5	5
Open Water %	0	5	0
Brash cover %	40	20	10
Pine Needle cover %	15	20	20
Pine Needle Depth cm	5	1	1
Bare Peat %	5	10	5
Species number	11	15	18
<i>Pinus contorta</i>		1	1
<i>Betula pubescens</i>		1	1
<i>Rubus spp</i>	2	1	2
<i>Digitalis purpurea?</i>	1		1
<i>Molinia caerulea</i>	5		
<i>Pteridium spp</i>		1	1
<i>Dryopteris spp</i>	2		
<i>Epiolobium spp</i>	1	1	1
<i>Calluna vulgaris</i>	5	15	20
<i>Erica tetralix</i>			5
<i>Eriophorium vaginatum</i>	5	5	20
<i>E. angustifolium</i>	2	10	10
<i>Andromeda polifolia</i>		1	3
<i>Cladonia portentosa</i>		5	1
<i>C. fleurkiana</i>		1	1
<i>Campylopus atroverins</i>			5
<i>C. introflexus</i>	3	1	
<i>Hypnum jutlandicum</i>	10	30	25
<i>Polytricum commune</i>	2	5	5
<i>S. capillifolium</i>		5	
<i>S. subnitens</i>			5
Algae spp.			5

Quadrat 2: This quadrat is located on the northern margin of Lough Lurgeen Bog and occurred within recently clear-felled conifer plantation on high bog with vegetation containing Ling Heather, Hare's-tail Cotton-grass, with *Hypnum* moss and numerous *Sphagnum* species. With the blocking of drains, Ling Heather and Hare's-tail cotton-grass cover increased. Over time *Sphagnum* cover will increase and this wet bog margin will develop raised bog habitat.

Lough Lurgeen Bog Quadrat 2

Area: 10 x 10m **Location:** 30m East W2 **Grid Ref:** N6624 6044 **Altitude:** 80m
Bog Type: High Bog **Ecotope:** NA **Slope:** Slight **Aspect:** North
Landuse: Forestry **Management:** Clearfell

Date	30/08/2005	22/08/2007	31/07/2008
Firmness	Soft	Soft	Soft
Drains	Yes	Yes/ Blocked	Yes/ Blocked
Canopy Cover %	0	0	0
Vegetation Cover %	75	80	80
Vegetation Height (cm)		50	50
Dwarf Shrub Cover %	25	40	35
Herb Cover %	15	40	50
Bryophyte Cover %	35	55	55
Sphagnum cover %	20	20	25
Open Water %	0	5	1
Brash cover %	10	5	5
Pine Needle cover %	5	5	0
Pine Needle Depth cm	2	5	0
Bare Peat %	10	5	4
Species number	17	20	21
<i>Pinus contorta</i>	1	1	1
<i>Betula pubescens</i>	1	1	1
<i>Ulex eurpoeus</i>		5	5
<i>Rubus spp</i>		2	5
<i>Digitalis purpurea</i>		3	1
<i>Juncus eff</i>	1		1
<i>Molinia caerulea</i>	2		1
<i>Holcus lanatus</i>		1	1
<i>Pteridium spp</i>	2	2	1
<i>Epiolobium spp</i>		10	10
<i>Vaccinium myrtilus</i>	1	5	
<i>Calluna vulgaris</i>	20	30	30
<i>Erica tetralix</i>	3	5	5
<i>Eriophorium vaginatum</i>	3	10	20
<i>E. angustifolium</i>		5	5
<i>C. introflexus</i>	5		
<i>Hypnum jutlandicum</i>	10	30	25
<i>Polytricum commune</i>	5	5	5
<i>Sphagnum recurvum</i>	3	1	1
<i>S cuspidatum</i>	5	5	1
<i>S. capillifolium</i>	2	5	10
<i>S. subnitens</i>	5	5	5
<i>S. magellanicum</i>	5	5	10

Lough Lurgen Bog Quadrat 2, 2008



Quadrat 3: This quadrat is located on the northern margin of Lough Lurgeen Bog and occurred within recently clear-felled conifer plantation on cutover bog with vegetation dominated by Soft Rush, Willow-herb, Ling Heather, *Hypnum* moss and numerous *Sphagnum* species. With the blocking of drains, Soft Rush still dominates this mineral peat margin with Ling Heather and *Sphagnum* moss. Over time this margin will develop lagg zone habitat of the raised bog margin.

Lough Lurgeen Bog Quadrat 3

Area: 10 x 10m **Location:** 5m West W4 **Grid Ref:** N6627 6048 **Altitude:** 83m
Bog Type: Cutover Bog **Ecotope:** NA **Slope:** Flat **Aspect:** NA
Landuse: Unplanted **Management:** Non-intervention

Date	30/08/2005	22/08/2007	31/07/2008
Firmness	Firm	Soft	Soft
Drains	Yes	Yes/Blocked	Yes/Blocked
Canopy Cover %	0	0	0
Vegetation Cover %	85	70	95
Vegetation Height (cm)	50	80	100
Dwarf Shrub Cover %	15	10	10
Herb Cover %	25	60	80
Bryophyte Cover %	65	20	25
Sphagnum cover %	50	20	25
Open Water %	5	10	0
Brash cover %	10	20	5
Pine Needle cover %	0	0	0
Pine Needle Depth cm	0	0	0
Bare Peat %	0	0	0
Species number	17	14	15
<i>Pinus contorta</i>	5	1	1
<i>Betula pubescens</i>	5		
<i>Ulex eurpoeus</i>		2	
<i>Rubus spp</i>	5	10	10
<i>Digitalis purpurea</i>		1	1
<i>Potentilla erecta</i>		5	1
<i>Typha latifolia</i>	5		
<i>Juncus eff</i>	40	30	40
<i>Holcus lanatus</i>		1	1
<i>Pteridium spp</i>	2	5	1
<i>Epiolobium spp</i>	10	20	10
<i>Vaccinium myrtilus</i>	5		
<i>Calluna vulgaris</i>	10	10	10
<i>Menyanthes trifoliata</i>		5	10
<i>Carex spp</i>	1		5
<i>Eriophorium vaginatum</i>	3		
<i>E. angustifolium</i>			10
<i>Hypnum jutlandicum</i>	10		
<i>Polytricum commune</i>	5		
<i>Sphagnum recurvum</i>	5	5	10
<i>S. capillifolium</i>	10	5	
<i>S. subnitens</i>	20		5
<i>S. magellanicum</i>	15	10	10

Lough Lurgen Bog Quadrat 3, 2008



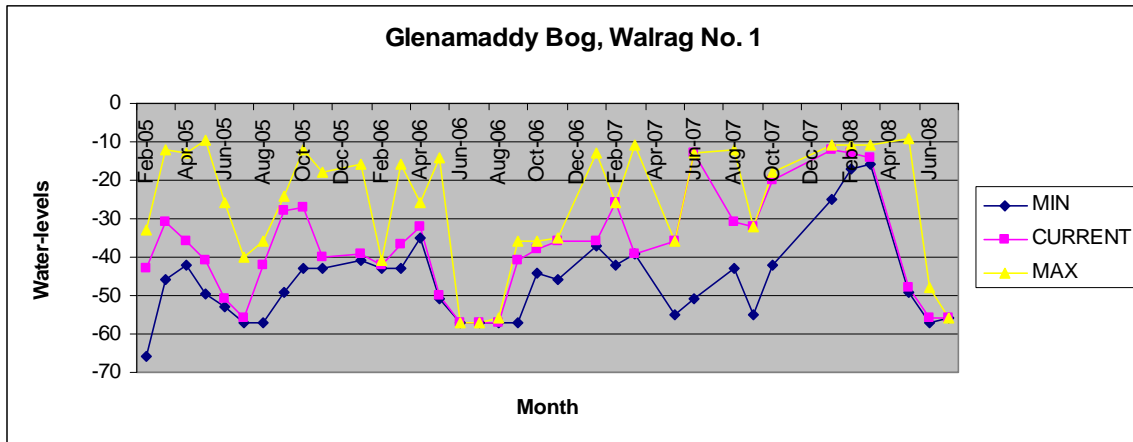
7. Changes in Water-levels

Prior to restoration, Walrags were installed in the conifer plantation to record any changes in water-levels, due to tree removal and drain blocking. Water-levels were found to be up to **60cm** below the surface. With the removal of conifers and drain-blocking, there was a rise in the water-table in the plantation on the high bog project and the water-table remains close to the bog surface throughout most of the year.

8. Hydrological Monitoring (Walrag) Graphs

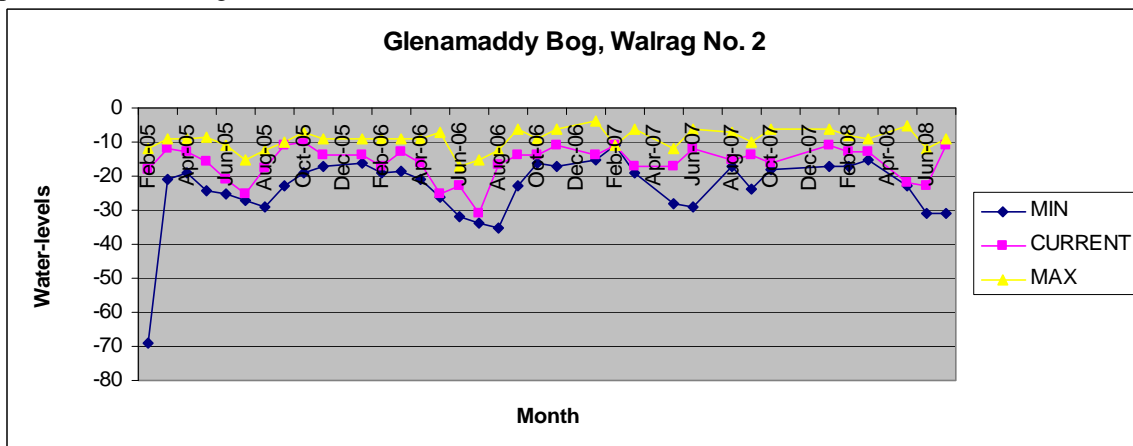
During the clear-felling operation, eight Walrags were installed on this site to record the changes in water-levels. The rise in water-levels is clearly seen in the following graphs.

Glenamaddy Bog Walrag 1: Clearfell on High Bog Margin. (Water-levels remain below 20cm of bog surface post restoration*, due to proximity of mineral soil. Water-levels decline further in summer months)



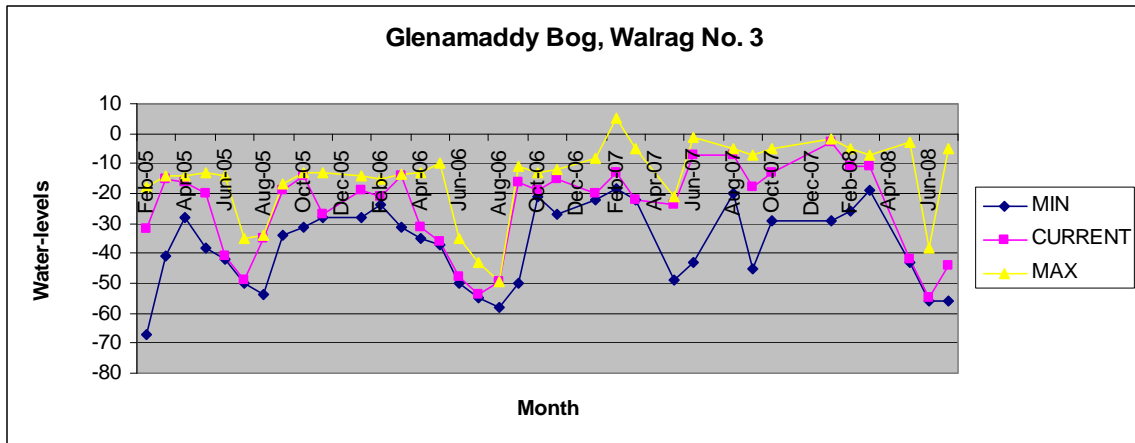
Clearfell (2004) May 2005 May 2006 *Drain-blocking May 2007 May 2008

Glenamaddy Bog Walrag 2: Clearfell on High Bog. (Water-levels remain within 20cm of bog surface post restoration*, slight decline in summer months)



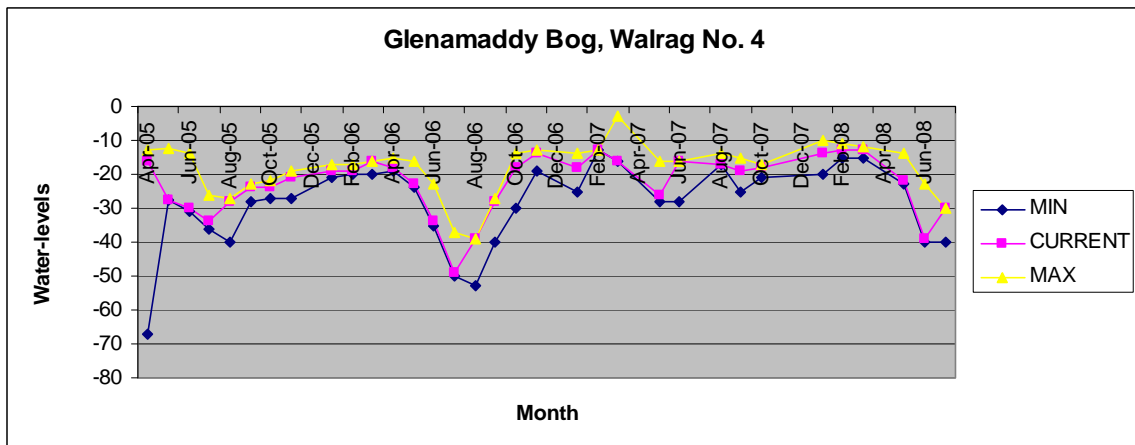
Clearfell (2004) May 2005 May 2006 *Drain-blocking May 2007 May 2008

Glenamaddy Bog Walrag 3: Clearfell on High Bog Margin. (Water-levels remain between 20 -30cm of bog surface post restoration*, with further decline in summer months)



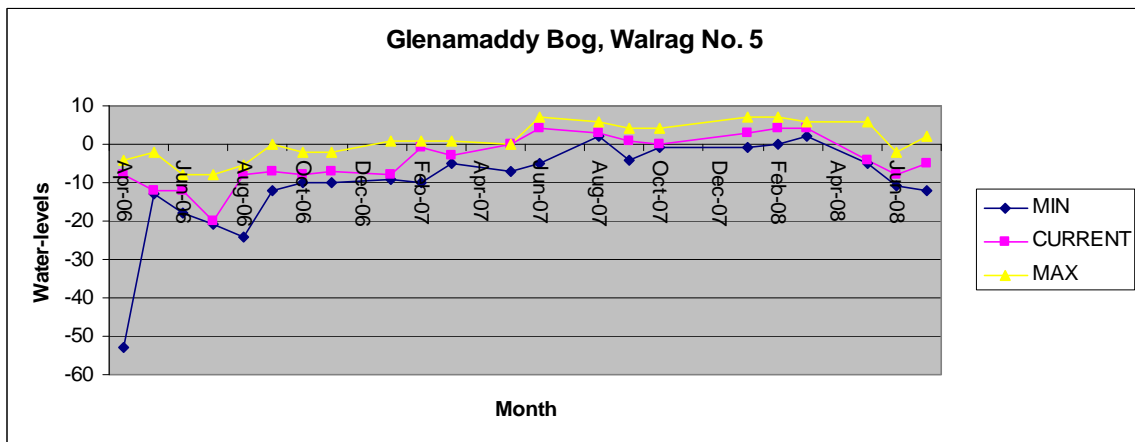
Clearfell (2004) May 2005 May 2006 *Drain-blocking May 2007 May 2008

Glenamaddy Bog Walrag 4: Clearfell on Cutover Bog. (Water-levels remain around 20cm of bog surface post restoration*, with further decline in summer months, due to proximity of mineral soil)



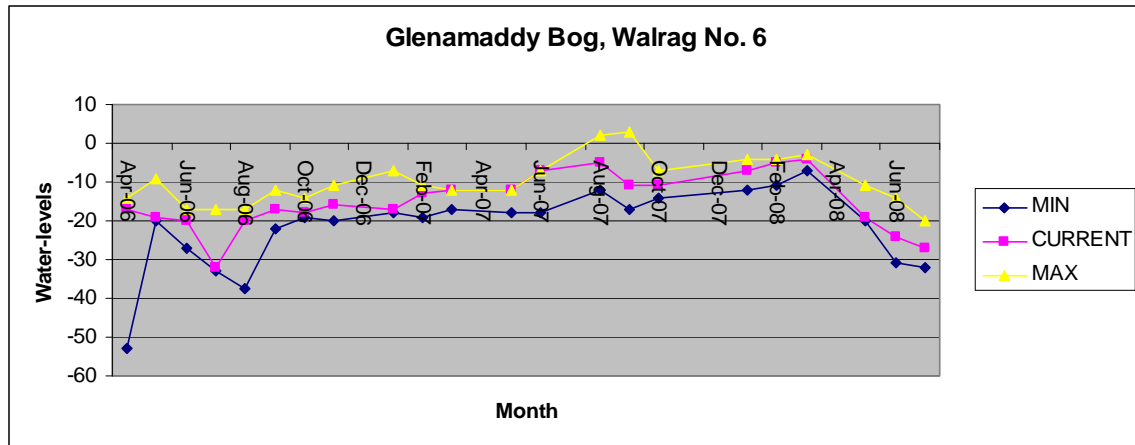
Clearfell (2004) May 2005 May 2006 *Drain-blocking May 2007 May 2008

Glenamaddy Bog Walrag 5: Clearfell on Cutover Bog. (Water-levels remain within 10cm of bog surface post restoration*, with slight decline in summer months)



Clearfell (2004) May 2005 May 2006 *Drain-blocking May 2007 May 2008

Glenamaddy Bog Walrag 6: Clearfell on Cutover Bog. (Water-levels within 20cm of bog surface post restoration*. Decline in summer months, due to proximity of mineral soil)



9. Conclusions

This site has limited restoration potential, due to the size and marginal location of the project area. However water-levels have been raised by drain-blocking and raised bog vegetation is becoming established in areas. The cutover bog areas to the north of the project will develop into lagg zone areas due to the proximity of the mineral soil.

10. References

- Brooks, S. (2005). *Assessment of Project Sites, Restoring Raised Bog in Ireland*. Coillte LIFE Nature Project. Peatland Consulting
- Conaghan, J. (2003). *Raised Bog Ecological Report*. Coillte
- Curtis, T.G.F. & McGough, H.N. (1988). *The Irish Red Data Book. 1: Vascular Plants*. The Stationery Office, Dublin.
- NPWS (2002) Site Synopsis