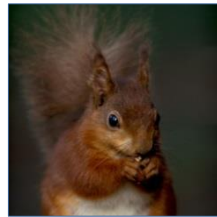


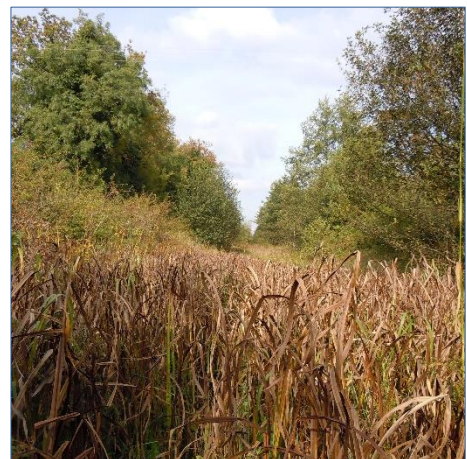
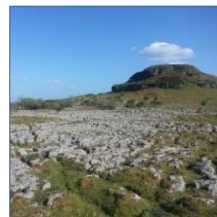
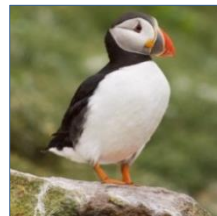
NATIONAL PARKS AND WILDLIFE SERVICE



MONITORING OF SITES AND HABITAT
FOR THREE ANNEX II SPECIES OF
WHORL SNAIL (*VERTIGO*) (IWM 104).
APPENDIX VI. *VERTIGO MOULINSIANA*
SITE REPORTS



John T. Brophy and Maria P. Long



An Roinn Cultúir,
Oidhreacht agus Gaeltachta
Department of Culture,
Heritage and the Gaeltacht

National Parks and Wildlife Service (NPWS) commissions a range of reports from external contractors to provide scientific evidence and advice to assist it in its duties. The Irish Wildlife Manuals series serves as a record of work carried out or commissioned by NPWS, and is one means by which it disseminates scientific information. Others include scientific publications in peer reviewed journals. The views and recommendations presented in this report are not necessarily those of NPWS and should, therefore, not be attributed to NPWS.

Front cover, small photographs from top row:

Coastal heath, Howth Head, Co. Dublin, Maurice Eakin; **Red Squirrel** *Sciurus vulgaris*, Eddie Dunne, NPWS Image Library; **Marsh Fritillary** *Euphydryas aurinia*, Brian Nelson; **Puffin** *Fratercula arctica*, Mike Brown, NPWS Image Library; **Long Range and Upper Lake**, Killarney National Park, NPWS Image Library; **Limestone pavement**, Bricklieve Mountains, Co. Sligo, Andy Bleasdale; **Meadow Saffron** *Colchicum autumnale*, Lorcan Scott; **Barn Owl** *Tyto alba*, Mike Brown, NPWS Image Library; **A deep water fly trap anemone** *Phelliactis* sp., Yvonne Leahy; **Violet Crystalwort** *Riccia huebeneriana*, Robert Thompson

Main photograph:

Habitat at Royal Canal, Longford Branch (VmCAM21), Co. Longford, October 2015 John T. Brophy



Monitoring of sites and habitat for three Annex II species of whorl snail (*Vertigo*) (IWM 104). Appendix VI. *Vertigo moulinsiana* site reports

John T. Brophy and Maria P. Long

Keywords: *Vertigo moulinsiana*, Article 17, monitoring

Citation: Brophy, J.T and Long, M.P. (2019) Monitoring of sites and habitat for three Annex II species of whorl snail (*Vertigo*) (IWM 104). Appendix VI. *Vertigo moulinsiana* site reports in Long, M.P. & Brophy, J.T. (2019) Monitoring of sites and habitat for three Annex II species of whorl snail (*Vertigo*). *Irish Wildlife Manuals*, No. 104. National Parks and Wildlife Service, Department of Culture, Heritage and the Gaeltacht, Ireland

The NPWS Project Officer for this report was: Dr Brian Nelson; brian.nelson@chg.gov.ie

ISSN 1393 – 6670

© **An tSeirbhís Páirceanna Náisiúnta agus Fiadhúlra 2019**
National Parks and Wildlife Service 2019

An Roinn Cultúir, Oidhreachta agus Gaeltachta, 90 Sráid an Rí Thuaidh, Margadh na Feirme, Baile Átha Cliath 7, D07N7CV
Department of Culture, Heritage and the Gaeltacht, 90 North King Street, Smithfield, Dublin 7, D07 N7CV

Contents

- VmCAM01 Borris
- VmCAM02 Fin Lough (Offaly)
- VmCAM03 Lough Owel
- VmCAM04 Mountmellick
- VmCAM05 Louisa Bridge
- VmCAM06 Ballybeg Lough
- VmCAM08 Cappankelly
- VmCAM09 Waterstown Lough
- VmCAM10 Ballynafagh Bog
- VmCAM11 Charleville Lake
- VmCAM12 Curragh Chase
- VmCAM14 Kildallan Bridge
- VmCAM15 Lisbigney Bog
- VmCAM16 Lisduff Fen
- VmCAM17 The Murrough
- VmCAM18 Pollardstown Fen
- VmCAM19 Portumna
- VmCAM21 Royal Canal, Longford Branch
- VmCAM22 Fiagh Bog
- VmCAM23 Castletown

Appendix VI *Vertigo moulinsiana* site reports

Introduction

This Appendix to the main report on the *Vertigo* habitat and site monitoring project contains the individual reports for *Vertigo moulinsiana* sites. These have been generated from the Microsoft Access database as part of the Vertigo National Monitoring Project. Each site report provides the results from the current monitoring survey (2014-2017) and the previous monitoring survey (2008-2010). These reports should be read in conjunction with the main report. Note that the correction of errors or omissions from the data relating to the previous monitoring period was not part of the current project and so may still be present within the site reports.

Site report - Vertigo Monitoring

Vertigo moulinsiana monitoring at Borris

1. SITE CODE AND LOCATION DETAILS

1.1 Site code and location

Vertigo Site Code: VmCAM01 **County:** Carlow

SAC Site Code: 002162 River Barrow and River Nore

Location description (from baseline survey):

Monitoring period	Date surveyed	Recorders
2013-2018	10 Nov 2014	John Brophy & Maria Long
2007-2012	21 October 2008	Evelyn Moorkens & Ian Killeen

1.2 General Habitat Description (from baseline survey):

The general habitat in which *Vertigo moulinsiana* is present at Borris Bridge is a low lying area of swamp fen. The EU habitats that this relates to are water fringe vegetation comprising medium-tall waterside communities (CORINE 53.14) and reed sweetgrass beds (CORINE 53.16) with some rich fen characteristics (CORINE 54.2, Annex I 7230) (Romão, 1996; Devillers et al., 1991). The snail is found typically on *Glyceria maxima* in association with *Equisetum fluviatile*, *Filipendula ulmaria*, *Iris pseudacorus*, and *Phragmites australis*. The water table was above ground surface level in places. The specific areas that are within a wider mosaic, but that form specific *V. moulinsiana* habitat fit the *Filipendula* mire of the M27 Rodwell characteristic vegetation classification (Rodwell, 1991). This falls within the more general habitat of rich fen and flush (PF1), reed and large sedge swamps (FS1) and tall herb swamps (FS2) of Fossitt (2000).

1.3 Definition of Vegetation Classes (from baseline survey):

Class I: <i>Glyceria maxima</i> , <i>Phalaris arundinacea</i> , <i>Equisetum fluviatile</i>	Class III: <i>Iris pseudacorus</i> , <i>Urtica dioica</i>
Class II: <i>Berula erecta</i> , <i>Epilobium hirsutum</i>	Class IV: All other species

1.4 Definition of Soil Moisture Classes (from baseline survey):

- 1: Dry. No visible moisture on ground surface.
- 2: Damp. Ground visibly damp, but water does not rise under pressure.
- 3: Wet. Water rises under light pressure.
- 4: Very wet. Pools of standing water, generally less than 5cm deep.
- 5: Site under water. Entire sampling site in standing or flowing water over 5cm deep.

2. SUMMARY:

This is a small site, but the habitat appears to be in good condition and potentially suitable for *Vertigo moulinsiana*. However, the species was not found in spite of 31 samples taken at nine locations in 2014. Moorkens & Killeen (2011) noted low numbers for the species at the site in two previous surveys (2006 and 2008). It is not clear whether this site may always have harboured a small population, in low and difficult-to-detect numbers, or whether the species is lost, or nearly so, from the site. The site is likely to be subject to occasional flooding from the adjacent River Barrow, and perhaps this regime has altered, causing the loss/decline of the species. Only careful and dedicated monitoring will help elucidate this. No active management is recommended at this time for the site, but scrub encroachment is a potential issue and may need action by the time of the next monitoring (two years' time).

3. TRANSECT DETAILS

TRANSECT: 1	MONITORING PERIOD: 2013-2018
Start point:	S 71192 50386 End of marginal fen & swamp before the start of the woodland
End point:	S 71110 50415 Bay with marginal <i>Glyceria</i> , <i>Iris</i> and willow by towpath
Transect length: 90	Direction: ESE-WNW
Description:	
Sampling frequency:	

TRANSECT: 1	MONITORING PERIOD: 2007-2012
Start point:	S 71191 50381 End of marginal fen & swamp before the start of the woodland
End point:	S 71102 50415 Bay with marginal <i>Glyceria</i> , <i>Iris</i> and willow by towpath
Transect length: 97	Direction:
Description:	
Sampling frequency:	

4. RESULTS

Vertigo moulinsiana monitoring at Borris

Polygon habitat characteristics

Monitoring Period: 2013-2018

Polygon	Habitat Type	Area (ha)	Comment
A	Optimal-Suboptimal	1.1527	Polygon A status has been upgraded from Suboptimal to Optimal-Sub-ptimal due to it appearing to be wetter underfoot in 2014, and therefore more suitable for <i>Vertigo moulinsiana</i> . The habitat consists of a swamp with tall-growing species such as <i>Glyceria maxima</i> , <i>Phalaris arundinacea</i> and <i>Iris pseudacorus</i> .

Monitoring Period: 2007-2012

Polygon	Habitat Type	Area (ha)	Comment
	Sub-optimal	1.1325	All habitat is within one polygon area

Transect samples

Mon. period	Transect	Sample	Location	Adults	Juveniles	Total	Veg. class	Wetness	Habitat suitability
Monitoring period 2013-2018 Transect 1 (21 samples)									
2013-2018	1	1	0m a	0	0	0	I	3	Optimal
2013-2018	1	2	0m b	0	0	0	I	3	Optimal
2013-2018	1	3	0m c	0	0	0	I	3	Optimal
2013-2018	1	4	19m a	0	0	0	I	5	Optimal
2013-2018	1	5	19m b	0	0	0	I	5	Optimal
2013-2018	1	6	19m c	0	0	0	I	5	Optimal
2013-2018	1	7	34m a	0	0	0	I	5	Optimal
2013-2018	1	8	34m b	0	0	0	I	5	Optimal
2013-2018	1	9	34m c	0	0	0	I	5	Optimal
2013-2018	1	10	47m a	0	0	0	I	5	Optimal
2013-2018	1	11	47m b	0	0	0	I	5	Optimal
2013-2018	1	12	47m c	0	0	0	I	5	Optimal
2013-2018	1	13	72m a	0	0	0	IV	5	Optimal-Suboptimal
2013-2018	1	14	72m b	0	0	0	IV	5	Optimal-Suboptimal
2013-2018	1	15	72m c	0	0	0	IV	5	Optimal-Suboptimal
2013-2018	1	16	80m a	0	0	0	I	5	Optimal
2013-2018	1	17	80m b	0	0	0	I	5	Optimal
2013-2018	1	18	80m c	0	0	0	I	5	Optimal
2013-2018	1	19	90m a	0	0	0	I	5	Optimal
2013-2018	1	20	90m b	0	0	0	I	5	Optimal
2013-2018	1	21	90m c	0	0	0	I	5	Optimal
Monitoring period 2007-2012 Transect 1 (23 samples)									
2007-2012	1	1	sub-sample 1a - S71191 50381 - Glyceria and Urtica swamp by towpath	3	1	4		5	
2007-2012	1	2	sub-sample 1b - S71191 50381 - Glyceria and Urtica swamp by towpath	1	0	1		5	
2007-2012	1	3	sub-sample 1c - S71191 50381 - Glyceria and Urtica swamp by towpath	0	0	0		4	

Vertigo moulinsiana monitoring at Borris

2007-2012	1	4	Sub-sample 2a - S71175 50388 - Glyceria and Urtica swamp by towpath	9	4	13	5
2007-2012	1	5	Sub-sample 2b - S71175 50388 - Glyceria and Urtica swamp by towpath	3	1	4	5
2007-2012	1	6	Sub-sample 2c - S71175 50388 - Glyceria and Urtica swamp by towpath	6	3	9	5
2007-2012	1	7	Sub-sample 2d - S71175 50388 - Glyceria and Urtica swamp by towpath	2	4	6	4
2007-2012	1	8	Sub-sample 2e - S71175 50388 - Glyceria and Urtica swamp by towpath	0	0	0	4
2007-2012	1	9	Sub-sample 3a - S71158 50400 - Marginal Glyceria, Iris and willow by towpath	3	1	4	5
2007-2012	1	10	Sub-sample 3b - S71158 50400 - Marginal Glyceria, Iris and willow by towpath	1	0	1	4
2007-2012	1	11	Sub-sample 3c - S71158 50400 - Marginal Glyceria, Iris and willow by towpath	0	0	0	4
2007-2012	1	12	Sub-sample 4a - S71149 50400 - Marginal Glyceria, Iris and willow by towpath	6	1	7	4
2007-2012	1	13	Sub-sample 4b - S71149 50400 - Marginal Glyceria, Iris and willow by towpath	1	3	4	4
2007-2012	1	14	Sub-sample 4c - S71149 50400 - Marginal Glyceria, Iris and willow by towpath	0	2	2	4
2007-2012	1	15	Sub-sample 5a - S71127 50406 - marginal Phragmites, Iris and willow by towpath	0	0	0	5
2007-2012	1	16	Sub-sample 5b - S71127 50406 - marginal Phragmites, Iris and willow by towpath	0	0	0	4

Vertigo moulinsiana monitoring at Borris

2007-2012	1	17	Sub-sample 5c - S71127 50406 - marginal Phragmites, Iris and willow by towpath	0	0	0	
2007-2012	1	18	Sub-sample 6a - S71113 50410 - Swamp with Equisetum and Berula by towpath	1	0	1	5
2007-2012	1	19	Sub-sample 6b - S71113 50410 - Swamp with Equisetum and Berula by towpath	0	0	0	4
2007-2012	1	20	Sub-sample 6c - S71113 50410 - Swamp with Equisetum and Berula by towpath	1	1	2	4
2007-2012	1	21	Sub-sample 7a - S71102 50415 - Marginal Glyceria, Iris and willow by towpath	0	0	0	5
2007-2012	1	22	Sub-sample 7b - S71102 50415 - Marginal Glyceria, Iris and willow by towpath	0	1	1	5
2007-2012	1	23	Sub-sample 7c - S71102 50415 - Marginal Glyceria, Iris and willow by towpath	0	0	0	4

Spot Samples

Mon. period	Sample	Grid ref.	Adults	Juveniles	Total	Veg. class	Wetness	Habitat suitability
Monitoring period 2013-2018 (10 samples)								
2013-2018	01a	S 71311 50318	0	0	0	I	4	Optimal
2013-2018	01b	S 71309 50317	0	0	0	I	4	Optimal
2013-2018	01c	S 71307 50318	0	0	0	I	4	Optimal
2013-2018	01d	S 71314 50316	0	0	0	I	4	Optimal
2013-2018	01e	S 71312 50320	0	0	0	I	4	Optimal
2013-2018	02a	S 71306 50334	0	0	0	I	4	Optimal
2013-2018	02b	S 71310 50333	0	0	0	I	4	Optimal
2013-2018	02c	S 71310 50337	0	0	0	I	4	Optimal
2013-2018	02d	S 71304 50337	0	0	0	I	4	Optimal
2013-2018	02e	S 71304 50334	0	0	0	I	4	Optimal
Monitoring period 2007-2012 (39 samples)								
2007-2012	01	S 71265 50301	0	0	0		4	
2007-2012	02	S 71265 50301	0	0	0		5	
2007-2012	03	S 71280 50318	0	0	0		4	
2007-2012	04	S 71280 50318	0	0	0		4	

Vertigo moulinsiana monitoring at Borris

2007-2012	05	S 71290 50325	0	0	0	4
2007-2012	06	S 71290 50325	0	0	0	4
2007-2012	07	S 71290 50325	0	0	0	4
2007-2012	08	S 71290 50325	1	2	3	4
2007-2012	09	S 71290 50325	1	1	2	4
2007-2012	10	S 71307 50323	0	0	0	4
2007-2012	11	S 71307 50323	0	0	0	4
2007-2012	12	S 71307 50323	1	3	4	4
2007-2012	13	S 71307 50323	0	0	0	4
2007-2012	14	S 71307 50323	0	0	0	
2007-2012	15	S 71307 50323	0	0	0	4
2007-2012	16	S 71326 50333	0	0	0	3
2007-2012	17	S 71326 50333	0	0	0	3
2007-2012	18	S 71326 50333	0	0	0	4
2007-2012	19	S 71326 50333	0	0	0	4
2007-2012	20	S 71294 50341	0	0	0	4
2007-2012	21	S 71294 50341	0	0	0	4
2007-2012	22	S 71294 50341	0	0	0	4
2007-2012	23	S 71270 50364	0	0	0	3
2007-2012	24	S 71270 50364	0	0	0	2
2007-2012	25	S 71270 50364	0	0	0	3
2007-2012	26	S 71249 50368	0	0	0	2
2007-2012	27	S 71249 50368	0	0	0	2
2007-2012	28	S 71249 50368	0	0	0	3
2007-2012	29	S 71221 50373	0	0	0	5
2007-2012	30	S 71221 50373	0	0	0	4
2007-2012	31	S 71221 50373	0	0	0	5
2007-2012	32	S 71222 50393	0	0	0	2
2007-2012	33	S 71222 50393	0	0	0	3
2007-2012	34	S 71222 50393	0	0	0	2
2007-2012	35	S 71179 50400	0	0	0	4
2007-2012	36	S 71179 50400	0	1	1	4
2007-2012	37	S 71179 50400	3	5	8	4
2007-2012	38	S 71087 50425	0	0	0	5
2007-2012	39	S 71087 50425	0	0	0	5

5. CONDITION ASSESSMENT

5.1 Population Assessment: 2 passes Favourable (green); 1 pass Unfavourable Inadequate (amber); 0 passes Unfavourable Bad (red)

Mon. period	Transect	Indicator	Target	Result	Pass/Fail
2013-2018	1	Density	50% of the samples contain at least 5 adult snails from at least 20 samples	0% of the samples contain any snails, from 21 samples	Fail

Vertigo moulinsiana monitoring at Borris

2013-2018	1	Presence/Absence	V. moulinsiana is present in 60% of the samples on the Transect, from at least 20 samples	V. moulinsiana Absent from the Transect, from 21 samples	Fail
2007-2012	1	Density	50% of the samples contain at least 5 adult snails from at least 20 samples	3 samples with 5 or more adults (14%)	Fail
2007-2012	1	Presence/Absence	V. moulinsiana is present in 60% of the samples on the Transect, from at least 20 samples	Present in 14 samples (64%)	Pass

Mon. period	Population Notes
2013-2018	Vertigo moulinsiana was not recorded from any samples at Borris in the course of the current survey indicating a serious decline or even loss of the species from the site. In the previous sampling period (2007-2012) it was recorded at 20 of 60 samples, as compared with no records from 31 samples. Based on the criteria of Moorkens & Killeen (2011), the Population Assessment is Unfavourable Bad (red).
2007-2012	the snail is scattered in its distribution and present in very low numbers

5.2 Habitat Assessment: 3 passes Favourable (green); 2 passes Unfavourable Inadequate (amber); 0-1 passes Unfavourable Bad (red)

5.2.1 Transect level

Mon. period	Transect	Indicator	Target	Result	Pass/Fail
2013-2018	1	Habitat extent	90% of samples in the Transect are dominated by suitable vegetation (Classes I & II), from at least 20 samples	85% of samples in the Transect are dominated by suitable vegetation (Classes I & II), from 21 samples. (Expert judgement rounded to allow pass)	Pass
2013-2018	1	Habitat quality	90% of samples in the Transect fall within soil moisture classes 3-5, from at least 20 samples	100% of samples in the Transect fall within soil moisture classes 3-5, from 21 samples	Pass
2007-2012	1	Habitat extent	90% of samples in the Transect is dominated by suitable vegetation (Classes I & II), from at least 20 samples	22 samples suitable (100%)	Pass
2007-2012	1	Habitat quality	90% of samples in the Transect fall within soil moisture classes 3-5, from at least 20 samples	22 samples suitable (100%)	Pass

5.2.2 Site level

Mon. period	Indicator	Target	Result	Pass/Fail
2013-2018	Habitat extent	1ha of the site optimal or with sub-optimal areas	1.15ha Optimal-Suboptimal	Pass
2007-2012	Habitat extent	1ha of the site optimal or with sub-optimal areas	1.13 ha Sub-optimal	Pass

Mon. period	Habitat Notes
2013-2018	Despite the fact that Vertigo moulinsiana was not recorded during the survey, it appears that the site is at least as suitable as it was in 2007-2012, with the habitat suitability being raised from Sub-optimal to Optimal-Suboptimal based on the fact that the wetness throughout the site was more favourable. Based on the criteria of Moorkens & Killeen (2011), the Habitat Assessment is Favourable (green).
2007-2012	the habitat at the site is in good condition for V. moulinsiana

5.3 Future Prospects Assessment

Mon. period	Activity code	Activity description	Location	Intensity	Influence	Area affected	Comment
2013-2018	I01	invasive non-native species	Inside	Low	Negative	2%	Informed by NPWS DCO that Impatiens glandulifera removal has occurred at the site

Vertigo moulinsiana monitoring at Borris

2013-2018	K02.01	species composition change	Inside	Medium	Negative	25%	Scrub encroachment may be an issue at this site.
2013-2018	L08	inundation (natural processes)	Inside	Medium	Negative	100%	Flooding by River Barrow likely, though not present at time of survey. Change in flooding regime may be cause of population drop, but no data available.

Mon. period	Future Prospects	Notes
2013-2018	Based on the field survey, succession by scrubbing over is one of the main impacts that was identified that may threaten the Future Prospects of the site as being suitable for <i>Vertigo moulinsiana</i> . It may be the case however, that periodic flooding from the nearby river keeps scrub under control. Data are not available on the flooding regime, but it is likely that the site floods periodically, and changes in this regime may be having an impact. The highly invasive <i>Impatiens glandulifera</i> is known to occur at the site. Due to the fact that the target species was not recorded, the Future Prospects have been retained as being Unfavourable Inadequate (amber).	
2007-2012	Although these impacts are potential rather than actual, given the small size and vulnerability of the site, Future prospects have been assessed as Unfavourable inadequate	

5.4 Overall Assessment

Mon. period	Population assessment	Area of suitable habitat	Future prospects	Overall assessment
2013-2018	Red	Green	Amber	Red
2007-2012	Amber	Green	Amber	Amber

Mon. period	Overall Notes
2013-2018	<i>Vertigo moulinsiana</i> was not recorded at Borris in the current survey, despite the site still supporting suitable habitat and showing good levels of ground moisture. Based on the negative samples, the Overall Assessment for the site is Unfavourable Bad (red).
2007-2012	

6. DISCUSSION

Monitoring period
2013-2018
<p>Area of occupancy: As in 2007-2012, the habitat that supports <i>Vertigo moulinsiana</i> within this SAC lies downstream of Borris Bridge and comprises a strip of fen and swamp less than 0.5 ha in area.</p> <p>Discussion:</p> <p>This is a small site, but the habitat appears to be in good condition and potentially suitable for <i>Vertigo moulinsiana</i>. However, the species was not found in spite of 31 samples taken at nine locations in 2014. Moorkens & Killeen (2011) noted low numbers for the species at the site in two previous surveys (2006 and 2008). It is not clear whether this site may always have harboured a small population, in low and difficult-to-detect numbers, or whether the species is lost, or nearly so, from the site. The site is likely to be subject to occasional flooding from the adjacent River Barrow, and perhaps this regime has altered, causing the loss/decline of the species. Only careful and dedicated monitoring will help elucidate this. No active management is recommended at this time for the site, but scrub encroachment is a potential issue and may need action by the time of the next monitoring (two years' time).</p> <p>Monitoring recommendations:</p> <p>The overall assessment for this site has dropped to Unfavourable Bad (red) due to the failure to find <i>Vertigo moulinsiana</i> in 2014. In light of this, 2 yearly monitoring should be carried out following the recommendations of Moorkens & Killeen (2011):</p> <ul style="list-style-type: none"> - Repeat Transect 1. In field record: vegetation height, vegetation composition, ground moisture class, numbers of <i>Vertigo moulinsiana</i> (adult & juvenile) and other molluscs, minimum 10 samples - Take 5 samples at each from at least 2 other locations with optimal habitat (e.g. sites 10 and 11 from the 2008 survey), record information as above - Re-determine boundary of the habitat polygons and assign habitat to either Optimal, Optimal-Suboptimal, Suboptimal, Suboptimal-Unsuitable, or Unsuitable - Assess the management regime and impacts upon the habitat for <i>Vertigo moulinsiana</i> - Use results to determine overall condition assessment <p>Management recommendations:</p> <p>The site is not actively managed and no grazing is occurring. While some succession is occurring in the form of scrub, grazing should</p>

Vertigo moulinsiana monitoring at Borris

not be introduced as it could negatively impact on the vegetation required by the snail. The ecology of the site is controlled by groundwater, surface water run-off from higher ground and occasional flooding of the River Barrow. At this time, no management intervention is recommended, though future removal of scrub may be necessary (carefully planned removal by hand, not machine) and this should be monitored closely as part of the ongoing monitoring of the site.

2007-2012

Area of occupancy: The habitat that supports *Vertigo moulinsiana* within this SAC lies downstream of Borris Bridge and comprises a strip of fen and swamp less than 0.5ha in area.

Discussion:

The Condition of the site and the feature based upon the 2008 survey has been assessed as unfavourable inadequate due principally to the low rate of occurrence and low numbers of *V. moulinsiana*.

Comparison with the results obtained in 2006 (Table 1 and Appendix), the 2008 results gave higher numbers of *Vertigo moulinsiana*, particularly adult individuals, but the actual numbers are still extremely low. However, the population assessment improved from red to amber. The area of potential habitat is a little over 1 hectare but the area of occupancy (probably <300m²) is extremely small making the *V. moulinsiana* population particularly vulnerable to severe flood events and loss of habitat. Much of the area with potentially suitable habitat is currently too dry with dense *Iris* and *Filipendula* dominated fen. Scrub and woodland encroachment may also be becoming an issue; the aerial photograph used in Moorkens (2007e) (millennium edition) shows a more open habitat than that shown in Figure 1 of this report which utilizes a later aerial photograph. It is recommended that options for drain blocking or sluice introduction are assessed to see if this small habitat area can be kept at a suitable level of dampness and further succession delayed.

Monitoring recommendations:

Given the Unfavourable assessment of the Condition of the site, particularly in terms of *Vertigo moulinsiana* distribution and abundance, it is recommended that monitoring is carried out at a minimum of 3 yearly intervals. This should be re-assessed in light of any deterioration of Condition or any changes to site management:

Frequency: Next monitoring due 2011

Methods (see Section 4 of main report for full details). Prescription as follows:

- Repeat transect 1, in field record: vegetation height, vegetation composition, ground moisture class, numbers of *V. moulinsiana* (adult & juvenile) and other molluscs, minimum 10 samples
- Take 5 samples at each from at least 2 other locations with optimal habitat (e.g. sites 10 and 11 from the 2008 survey), record information as above
- Re-determine boundary of the habitat polygons and assign habitat to either Optimal, Optimal & Sub-optimal, Sub-optimal, Sub-optimal and Unsuitable, or Unsuitable
- Assess the management regime and impacts upon the habitat for *V. moulinsiana*
- Use results to determine overall condition assessment

Management recommendations:

Existing Management

The *V. moulinsiana* habitat at this site comprises a single management unit. There is currently no management within the site of the *V. moulinsiana* habitat.

Proposed management prescription for *Vertigo moulinsiana*

The prescription remains as described in 2006 (Moorkens 2007e):

The *Vertigo moulinsiana* habitat is maintained by its high groundwater table and probably by occasional flooding from the River Barrow nearby. It is low lying with respect to the banks and path between the river and the swamp. Any grazing of the tall vegetation of the swamp would be likely to have a detrimental effect on the usefulness of the habitat for this species. The site is vulnerable to long term hydrogeological changes, and any water abstraction from the river that would result in a lowering of the groundwater table at any time of year. Any site that has no grazing management needs to be kept under surveillance to ensure succession is not taking place and the area is being maintained by wetness. It is useful to have a small site that is likely to only be affected by hydrogeology changes as it allows the assessment of changes over time of a single factor, although this factor can be influenced by a number of issues, such as abstraction and climate change.

Site report - Vertigo Monitoring

Vertigo moulinsiana monitoring at Fin Lough (Offaly)

1. SITE CODE AND LOCATION DETAILS

1.1 Site code and location

Vertigo Site Code: VmCAM02 **County:** Offaly

SAC Site Code: 000576 Fin Lough (Offaly)

Location description (from baseline survey):

Monitoring period	Date surveyed	Recorders
2013-2018	5-6 Nov 2014	John Brophy & Maria Long
2007-2012	21 October 2008	Evelyn Moorkens & Ian Killeen

1.2 General Habitat Description (from baseline survey):

The lake and its surrounding wetland communities are arranged in distinct zones across a hydrological transition. They include open water, reedswamp, tall sedge, alkaline fen, fen-bog transition, swamp woodland and bog. EU habitats present at Vertigo moulinsiana habitat are Alkaline fens: low sedge-rich communities (Annex I Habitat 7230), rich fens of CORINE 54.2 and fen-sedge beds of CORINE 53.3 (Romão, 1996; Devillers et al., 1991). Principal habitats at the site include water fringe vegetation: reedbeds and large sedge communities e.g. Glyceria maxima swamp, Carex elata swamp, Typha/Phragmites beds, most communities of Corine 53 (water-fringe vegetation), especially: common reed beds, dry Phragmites beds (53.112), reedmace beds (53.13), medium-tall waterside communities (53.14), reed sweetgrass beds (53.16), and large Carex beds (53.21). In transition areas of lower and more tightly cropped sward, the habitat falls into the Rodwell M10 Pinguicula-Caricetum dioicae Caricion davallianae group, characteristically being distinguished by Carex viridula, C. panicea, Parnassia palustris, Campyllum stellatum, Pinguicula vulgaris, Selaginella selaginoides, and Drepanocladus revolvens. These communities merge into one another with throughout the habitat. They fall within the more general habitat of rich fen and flush (PF1) of Fossitt (2000).

1.3 Definition of Vegetation Classes (from baseline survey):

Class I: Tall Carex species, Equisetum fluviatile, Typha angustifolia, Sparganium erectum	Class III: Filipendula ulmaria, Epilobium hirsutum, Menyanthes trifoliata, Mentha aquatica, Schoenus nigricans
Class II: Phragmites australis, Schoenoplectus lacustris, Eriophorum angustifolium	Class IV: All other species

1.4 Definition of Soil Moisture Classes (from baseline survey):

- 1: Dry. No visible moisture on ground surface.
- 2: Damp. Ground visibly damp, but water does not rise under pressure.
- 3: Wet. Water rises under light pressure.
- 4: Very wet. Pools of standing water, generally less than 5cm deep.
- 5: Site under water. Entire sampling site in standing or flowing water over 5cm deep.

2. SUMMARY:

This site consists of an infilling lake, and so contains a wide variety of transitional habitats. It also has areas of calcareous fen with Schoenus along its northern shore. There are large areas of habitat suitable for Vertigo moulinsiana. The site continues to have habitat in good condition and shows good future prospects, but received an Unfavourable (Red) assessment for its population. Only approximately half of sample locations were positive for the target species in 2014, compared to three-quarters when Moorkens and Killeen last surveyed. The abundances were lower also. As the habitat appears to still be in good condition, it is hoped that these results are the result of weather or a poor breeding year for the species. Monitoring in three years' time will be very important in terms of assessing whether the population is indeed declining.

3. TRANSECT DETAILS

TRANSECT: 1	MONITORING PERIOD: 2013-2018
Start point: N 03803 29596	Start of T1, T2 and T3. Old fence post at southern end of delapidated wall.
End point: N 03787 29550	
Transect length: 50	Direction: NE-SW
Description:	
Sampling frequency:	

Vertigo moulinsiana monitoring at Fin Lough (Offaly)

TRANSECT: 2 **MONITORING PERIOD:** 2013-2018

Start point: N 03803 29596 Start of T1, T2 and T3. Old fence post at southern end of delapidated wall.

End point: N 03819 29630

Transect length: 50 **Direction:** SW-NE

Description:

Sampling frequency:

TRANSECT: 3 **MONITORING PERIOD:** 2013-2018

Start point: N 03803 29596 Start of T1, T2 and T3. Old fence post at southern end of delapidated wall.

End point: N 03841 29560

Transect length: 50 **Direction:** NW-SE

Description:

Sampling frequency:

TRANSECT: 4 **MONITORING PERIOD:** 2013-2018

Start point: N 03824 29572 30m mark on T3

End point: N 03811 29551

Transect length: 30 **Direction:** NE-SW

Description:

Sampling frequency:

TRANSECT: 1 **MONITORING PERIOD:** 2007-2012

Start point: N 03803 29595 at old fence post at southern end of dilapidated wall

End point: N 03794 29560 in lake margin

Transect length: 36 **Direction:**

Description:

Sampling frequency:

TRANSECT: 2 **MONITORING PERIOD:** 2007-2012

Start point: N 03803 29595 at old fence post at southern end of dilapidated wall

End point: N 03825 29637 in large block of Schoenus

Transect length: 51 **Direction:**

Description:

Sampling frequency:

TRANSECT: 3 **MONITORING PERIOD:** 2007-2012

Start point: N 03803 29595 at old fence post at southern end of dilapidated wall

End point: N 03841 29558

Transect length: 53 **Direction:**

Description:

Sampling frequency:

TRANSECT: 4 **MONITORING PERIOD:** 2007-2012

Start point: N 03824 29575

End point: N 03808 29550 at boundary between Typha dominated fen and grassy, mossy scraw

Transect length: 30 **Direction:**

Description:

Sampling frequency:

Vertigo moulinsiana monitoring at Fin Lough (Offaly)

4. RESULTS

Polygon habitat characteristics

Monitoring Period: 2013-2018

Polygon	Habitat Type	Area (ha)	Comment
A	Optimal	17.2175	Polygon A status remains Optimal (Moorkens & Killeen have mapped Polygon A as Optimal, but classify it as Optimal and Sub-optimal in the site report and database). The polygon contains large areas of swamp and reedbed, much of which is suitable for <i>V. moulinsiana</i> .
B	Suboptimal-Unsuitable	0.7724	Polygon B status was raised from Unsuitable to Suboptimal-Unsuitable as it has some potential to support <i>Vertigo moulinsiana</i> . It comprised an area of <i>Schoenus nigricans</i> .
C	Suboptimal-Unsuitable	0.071	Polygon C status was raised from Unsuitable to Suboptimal-Unsuitable as it has some potential to support <i>Vertigo moulinsiana</i> . It comprised a small area of <i>Schoenus nigricans</i> .

Monitoring Period: 2007-2012

Polygon	Habitat Type	Area (ha)	Comment
	Sub-optimal with optimal areas	16.55	All of the potentially suitable <i>V. moulinsiana</i> habitat is included in one large polygon of optimal and sub-optimal habitat, 16.5532ha in area. Much of the site is scraw and floating swamp which cannot be accessed safely. Therefore the actual area of optimal habitat may be larger. Two areas of <i>Schoenus fen</i> , currently unsuitable, lie in the North-west (710m ²), and the South-east (7723m ²).

Transect samples

Mon. period	Transect	Sample	Location	Adults	Juveniles	Total	Veg. class	Wetness	Habitat suitability
Monitoring period 2013-2018 Transect 1 (11 samples)									
2013-2018	1	1	0m	0	0	0	II	4	Optimal
2013-2018	1	2	5m	0	0	0	III	3	Optimal-Suboptimal
2013-2018	1	3	10m	0	3	3	I	3	Optimal
2013-2018	1	4	15m	1	2	3	I	5	Optimal-Suboptimal
2013-2018	1	5	20m	0	0	0	I	5	Suboptimal-Unsuitable
2013-2018	1	6	25m	0	0	0	I	5	Suboptimal
2013-2018	1	7	30m	0	0	0	I	5	Optimal-Suboptimal
2013-2018	1	8	35m	1	0	1	I	5	Optimal-Suboptimal
2013-2018	1	9	40m	0	0	0	II	5	Optimal-Suboptimal
2013-2018	1	10	45m	0	0	0	I	5	Optimal-Suboptimal
2013-2018	1	11	50m	0	1	1	I	5	Optimal-Suboptimal
Monitoring period 2013-2018 Transect 2 (10 samples)									
2013-2018	2	1	5m	0	0	0	II	3	Optimal-Suboptimal
2013-2018	2	2	10m	0	0	0	I	3	Optimal-Suboptimal
2013-2018	2	3	15m	0	0	0	III	4	Suboptimal-Unsuitable
2013-2018	2	4	20m	0	0	0	III	3	Suboptimal-Unsuitable
2013-2018	2	5	25m	0	0	0	III	3	Suboptimal-Unsuitable
2013-2018	2	6	30m	0	0	0	III	3	Suboptimal-Unsuitable
2013-2018	2	7	35m	0	0	0	III	3	Suboptimal-Unsuitable
2013-2018	2	8	40m	0	0	0	III	3	Suboptimal-Unsuitable
2013-2018	2	9	45m	0	0	0	III	3	Suboptimal-Unsuitable
2013-2018	2	10	50m	0	1	1	III	3	Suboptimal-Unsuitable
Monitoring period 2013-2018 Transect 3 (10 samples)									
2013-2018	3	1	5m	0	2	2	I	4	Optimal

Vertigo moulinsiana monitoring at Fin Lough (Offaly)

2013-2018	3	2	10m	3	14	17	I	4	Optimal
2013-2018	3	3	15m	7	71	78	I	5	Optimal
2013-2018	3	4	20m	1	5	6	I	5	Optimal-Suboptimal
2013-2018	3	5	25m	0	2	2	I	5	Optimal-Suboptimal
2013-2018	3	6	30m	0	1	1	I	5	Optimal-Suboptimal
2013-2018	3	7	35m	1	1	2	I	5	Optimal-Suboptimal
2013-2018	3	8	40m	0	2	2	I	5	Optimal-Suboptimal
2013-2018	3	9	45m	1	16	17	I	5	Optimal-Suboptimal
2013-2018	3	10	50m	1	0	1	I	5	Optimal-Suboptimal
Monitoring period 2013-2018 Transect 4 (6 samples)									
2013-2018	4	1	5m	1	8	9	I	5	Optimal-Suboptimal
2013-2018	4	2	10m	6	23	29	I	5	Optimal-Suboptimal
2013-2018	4	3	15m	7	20	27	I	4	Optimal-Suboptimal
2013-2018	4	4	20m	5	7	12	I	3	Optimal
2013-2018	4	5	25m	0	0	0	I	3	Optimal
2013-2018	4	6	30m	0	0	0	I	3	Optimal-Suboptimal
Monitoring period 2007-2012 Transect 1 (11 samples)									
2007-2012	1	1	0m	39	109	148		4	
2007-2012	1	2	5m	12	42	54		4	
2007-2012	1	3	10m	16	66	82		5	
2007-2012	1	4	15m	20	39	59		5	
2007-2012	1	5	20m	0	0	0		5	
2007-2012	1	6	25m	0	1	1		5	
2007-2012	1	7	30m	3	26	29		5	
2007-2012	1	8	35m	0	0	0		5	
2007-2012	1	9	40m	3	13	16		5	
2007-2012	1	10	45m	0	3	3		5	
2007-2012	1	11	50m	6	6	12		5	
Monitoring period 2007-2012 Transect 2 (12 samples)									
2007-2012	2	1	0m	39	109	148		4	
2007-2012	2	2	5m	0	0	0		3	
2007-2012	2	3	8m	6	18	24		3	
2007-2012	2	4	11m	2	1	3		3	
2007-2012	2	5	15m	2	0	2		4	
2007-2012	2	6	20m	0	0	0		3	
2007-2012	2	7	25m	0	0	0		3	
2007-2012	2	8	30m	0	0	0		3	
2007-2012	2	9	35m	0	0	0		3	
2007-2012	2	10	40m	0	0	0		3	
2007-2012	2	11	45m	0	0	0		2	
2007-2012	2	12	50m	0	0	0		2	
Monitoring period 2007-2012 Transect 3 (11 samples)									
2007-2012	3	1	0m	39	109	148		4	

Vertigo moulinsiana monitoring at Fin Lough (Offaly)

2007-2012	3	2	5m	11	19	30	4
2007-2012	3	3	10m	19	84	103	4
2007-2012	3	4	15m	13	48	61	4
2007-2012	3	5	20m	29	122	151	5
2007-2012	3	6	25m	6	14	20	5
2007-2012	3	7	30m	0	5	5	5
2007-2012	3	8	35m	0	3	3	5
2007-2012	3	9	40m	1	5	6	5
2007-2012	3	10	45m	7	18	25	5
2007-2012	3	11	50m	1	2	3	5
Monitoring period 2007-2012 Transect 4 (7 samples)							
2007-2012	4	1	0m	0	5	5	5
2007-2012	4	2	5m	6	14	20	5
2007-2012	4	3	10m	12	36	48	4
2007-2012	4	4	15m	18	63	81	4
2007-2012	4	5	20m	9	18	27	3
2007-2012	4	6	25m	0	2	2	3
2007-2012	4	7	30m	0	0	0	3

Spot Samples

Mon. period	Sample	Grid ref.	Adults	Juveniles	Total	Veg. class	Wetness	Habitat suitability
Monitoring period 2013-2018 (20 samples)								
2013-2018	01a	N 03750 29621	0	0	0	II	3	Optimal-Suboptimal
2013-2018	01b	N 03753 29614	0	0	0	II	3	Optimal-Suboptimal
2013-2018	02a	N 03731 29626	1	0	1	II	5	Optimal-Suboptimal
2013-2018	02b	N 03731 29627	0	0	0	I	5	Optimal-Suboptimal
2013-2018	03a	N 03679 29676	0	2	2	I	4	Optimal
2013-2018	03b	N 03680 29676	3	4	7	I	4	Optimal
2013-2018	04a	N 03655 29689	3	5	8	I	4	Optimal
2013-2018	04b	N 03657 29689	3	5	8	I	4	Optimal
2013-2018	05a	N 03614 29682	0	0	0	I	4	Optimal
2013-2018	05b	N 03607 29689	0	0	0	I	4	Optimal
2013-2018	06a	N 03533 29640	3	19	22	II	3	Optimal
2013-2018	06b	N 03533 29639	8	43	51	II	3	Optimal
2013-2018	07a	N 03384 29637	1	0	1	I	3	Optimal
2013-2018	07b	N 03386 29637	0	7	7	I	3	Optimal
2013-2018	08a	N 03813 29495	0	0	0	I	3	Optimal
2013-2018	08b	N 03813 29491	2	4	6	I	3	Optimal
2013-2018	09a	N 03768 29484	0	0	0	I	5	Optimal-Suboptimal
2013-2018	09b	N 03769 29484	0	0	0	I	5	Optimal-Suboptimal
2013-2018	10a	N 03467 29873	0	0	0	III	5	Suboptimal-Unsuitable
2013-2018	10b	N 03465 29874	0	0	0	III	5	Suboptimal-Unsuitable
Monitoring period 2007-2012 (38 samples)								

Vertigo moulinsiana monitoring at Fin Lough (Offaly)

2007-2012	01a	N 03461 29871	0	0	0	5
2007-2012	01b	N 03461 29871	0	0	0	4
2007-2012	01c	N 03461 29871	0	0	0	4
2007-2012	01d	N 03461 29871	0	0	0	4
2007-2012	02a	N 03812 29491	0	2	2	3
2007-2012	02b	N 03812 29491	2	0	2	4
2007-2012	02c	N 03812 29491	0	0	0	4
2007-2012	02d	N 03812 29491	1	4	5	3
2007-2012	02e	N 03812 29491	1	2	3	3
2007-2012	03a	N 03769 29481	0	0	0	5
2007-2012	03b	N 03769 29481	2	5	7	4
2007-2012	03c	N 03769 29481	0	2	2	5
2007-2012	03d	N 03769 29481	0	0	0	5
2007-2012	04a	N 03792 29600	13	56	69	4
2007-2012	04b	N 03792 29600	2	19	21	4
2007-2012	04c	N 03792 29600	7	44	51	4
2007-2012	04d	N 03792 29600	0	18	18	4
2007-2012	05a	N 03747 29621	4	12	16	3
2007-2012	05b	N 03747 29621	0	3	3	3
2007-2012	05c	N 03747 29621	2	2	4	3
2007-2012	06a	N 03708 29651	0	3	3	4
2007-2012	06b	N 03708 29651	0	0	0	5
2007-2012	06c	N 03708 29651	1	4	5	4
2007-2012	07a	N 03678 29680	4	14	18	4
2007-2012	07b	N 03678 29680	0	3	3	3
2007-2012	07c	N 03678 29680	9	22	31	3
2007-2012	08a	N 03646 29693	29	82	111	4
2007-2012	08b	N 03646 29693	17	44	61	4
2007-2012	08c	N 03646 29693	29	19	48	3
2007-2012	09a	N 03594 29696	22	16	38	3
2007-2012	09b	N 03594 29696	7	33	40	4
2007-2012	09c	N 03594 29696	44	8	52	4
2007-2012	10a	N 03517 29642	16	2	18	4
2007-2012	10b	N 03517 29642	1	12	13	4
2007-2012	10c	N 03517 29642	0	17	17	3
2007-2012	11a	N 03376 29630	4	14	18	3
2007-2012	11b	N 03376 29630	0	0	0	3
2007-2012	11c	N 03376 29630	2	23	25	4

5. CONDITION ASSESSMENT

5.1 Population Assessment: 4 passes Favourable (green); 2-3 passes Unfavourable Inadequate (amber); 0-1 passes Unfavourable Bad (red)

Vertigo moulinsiana monitoring at Fin Lough (Offaly)

Mon. period	Transect	Indicator	Target	Result	Pass/Fail
2013-2018	1	Density	10 samples (from a minimum of 38) contain at least 20 adult and juvenile snails	3 samples (from 37) on transects contain at least 20 adult and juvenile snails	Fail
2013-2018	1	Presence/Absence	V. moulinsiana is present in 21 samples (= 75% of samples) on Transects T1, T3 and T4 combined (minimum 28 samples)	V. moulinsiana is present in 18 samples (= 67% of samples) on Transects T1, T3 and T4 combined (27 samples)	Fail
2013-2018	2	Presence/Absence	V. moulinsiana is present in 2 samples (excluding the start point) on Transect T2 (minimum 10 samples)	V. moulinsiana present in 1 sample on Transect T2 (10 samples)	Fail
2007-2012	1	Density	10 samples (from a minimum of 38) contain at least 20 adult and juvenile snails	16 samples with 20 or more adults and juveniles	Pass
2007-2012	1	Presence/Absence	V. moulinsiana is present in 21 samples (= 75% of samples) on Transects T1, T3 and T4 combined (minimum 28 samples)	Present in 25 samples	Pass
2007-2012	2	Presence/Absence	V. moulinsiana is present in 2 samples (excluding the start point) on Transect T2 (minimum 10 samples)	Present in 3 samples	Pass

Mon. period	Indicator	Target	Result	Pass/Fail
2013-2018	Species extent	V. moulinsiana is present at 5 other locations (50% of those sampled from at least 10 locations) with a geographical spread of appropriate habitat	V. moulinsiana is present at 6 other locations (60% of those samples from 10 locations) with a geographical spread of appropriate habitat	Pass
2007-2012	Species extent	V. moulinsiana is present at 5 other locations (50% of those sampled from at least 10 locations) with a geographical spread of appropriate habitat	Present at 11 other locations (100%)	Pass

Mon. period	Population Notes
2013-2018	Vertigo moulinsiana was found throughout the area surveyed at Fin Lough and in moderate numbers. In the current survey, 25 of 47 sample locations (53%) were positive, as compared to 38 of 50 sample locations (76%) in the 2007-2012 survey. Based on the abundance criteria of Moorkens & Killeen (2011), along with the decreased abundance of the species in positive samples, the population assessment is Unfavourable Bad (red).
2007-2012	the snail is widespread and locally abundant

5.2 Habitat Assessment: 3 passes Favourable (green); 2 passes Unfavourable Inadequate (amber); 0-1 passes Unfavourable Bad (red)

5.2.1 Transect level

Mon. period	Transect	Indicator	Target	Result	Pass/Fail
2013-2018	1	Habitat extent	25 samples on the 4 Transects combined are dominated by suitable vegetation (Classes I & II)	28 samples on the 4 Transects combined are dominated by suitable vegetation (Classes I & II)	Pass
2013-2018	1	Habitat quality	25 samples on the 4 Transects combined fall within soil moisture classes 3-5	37 samples on the 4 Transects combined fall within soil moisture classes 3-5	Pass
2007-2012	1	Habitat extent	25 samples on the 4 Transects combined are dominated by suitable vegetation (Classes I & II)	27 samples suitable	Pass
2007-2012	1	Habitat quality	25 samples on the 4 Transects combined fall within soil moisture classes 3-5	37 samples suitable	Pass

5.2.2 Site level

Mon. period	Indicator	Target	Result	Pass/Fail
2013-2018	Habitat extent	At least 15ha of the site optimal with sub-optimal areas	17.22ha Optimal	Pass

Vertigo moulinsiana monitoring at Fin Lough (Offaly)

2007-2012	Habitat extent	At least 15ha of the site optimal with sub-optimal areas	17.21 ha suitable	Pass
-----------	----------------	--	-------------------	------

Mon. period	Habitat Notes
2013-2018	The largest polygon (A) continues to be classed as Optimal, while polygons B and C are upgraded from Unsuitable to Sub-optimal/Unsuitable. This upgrade is due to the use of a 5-point scoring system allowing more differentiation. The vegetation and wetness of the habitat along the transects is suitable for supporting <i>Vertigo moulinsiana</i> . Based on the criteria of Moorkens & Killeen (2011), the habitat assessment is Favourable (green).
2007-2012	The habitat at the site is in good condition for <i>V. moulinsiana</i>

5.3 Future Prospects Assessment

Mon. period	Activity code	Activity description	Location	Intensity	Influence	Area affected	Comment
2013-2018	A04.02.01	non intensive cattle grazing	Inside	Medium	Negative	3%	Some poaching
2013-2018	H02.06	diffuse groundwater pollution due to agricultural and forestry activities	Inside	Low	Negative	2%	Enrichment evidenced by <i>Ranunculus repens</i> , etc. in Polygon A
2007-2012	A04.02.01	non intensive cattle grazing	Inside	Low	Neutral	0.6ha	Cattle grazing at present is mainly outside the <i>V. moulinsiana</i> habitat, with minor areas within the habitat being poached.
2007-2012	K02.01	species composition change (succession)	Outside	Medium	Negative	16.55ha	Long term succession to drier habitat due to influences (drainage, peat cutting) outside the site may have an increasing negative effect in the future. Thus if vegetational succession becomes evident in future monitoring, some remedial management may need to be recommended, such as drain blocking.
2007-2012	M01.01	temperature changes (e.g. rise of temperature & extremes)	Inside	Low	Negative	16.55ha	The most likely issues which could potentially affect <i>V. moulinsiana</i> at Fin Lough relate to climate change. However, these impacts are potential rather than actual, and given the large area of the site, these are not likely to be problematic during the next few rounds of Condition monitoring.
2007-2012	M01.02	droughts and less precipitations	Inside	Low	Negative	16.55ha	
2007-2012	M01.03	flooding and rising precipitations	Inside	Low	Negative	16.55ha	

Mon. period	Future Prospects Notes
2013-2018	The only activities/threats identified on the site in 2014 were non-intensive cattle grazing and some enrichment due to agricultural run-off. Both effects were negative, with the cattle grazing considered of medium rank and the enrichment low. Only small areas are showing the effects of these impacts, 2-3%. Based on this, the Future Prospects of the site are assessed to be Favourable (green).
2007-2012	At present, there is no sign of deterioration to the habitat and therefore Future prospects have been assessed as Favourable

5.4 Overall Assessment

Mon. period	Population assessment	Area of suitable habitat	Future prospects	Overall assessment
-------------	-----------------------	--------------------------	------------------	--------------------

Vertigo moulinsiana monitoring at Fin Lough (Offaly)

2013-2018	Red	Green	Green	Red
2007-2012	Green	Green	Green	Green

Mon. period	Overall Notes
2013-2018	While the habitat and Future Prospects assessments were both Favourable (green), the Unfavourable Bad (red) result for the population assessment has resulted in an overall assessment of Unfavourable Bad (red).
2007-2012	Fin Lough is a very good site for <i>Vertigo moulinsiana</i> . Optimal habitat occurs over an area of at least 16ha and possibly more. The snail is present in good numbers over a wide area, and there appear to be few imminent threats.

6. DISCUSSION

Monitoring period
<p>2013-2018</p> <p>Area of occupancy: Fin Lough is a shallow limestone lake surrounded by a complex of wetland habitats, 7km north-east of Shannonbridge in Co. Offaly. Access to the site from Shannonbridge is approximately 2km past Clonmacnoise on the R444.</p> <p>Discussion:</p> <p>This site consists of an infilling lake, and so contains a wide variety of transitional habitats. It also has areas of calcareous fen with <i>Schoenus nigricans</i> along its northern shore. There are large areas of habitat suitable for <i>Vertigo moulinsiana</i>. The site continues to have habitat in good condition and shows good future prospects, but received an Unfavourable (Red) assessment for its population. Only approximately half of sample locations were positive for the target species in 2014, compared to three-quarters when Moorkens & Killeen last surveyed. The abundances were lower also. As the habitat appears to still be in good condition, it is hoped that these results are the result of weather or a poor breeding year for the species. Monitoring in three years' time will be very important in terms of assessing whether the population is indeed declining.</p> <p>Monitoring recommendations:</p> <p>Recommended monitoring is as per Moorkens & Killeen (2011) at three yearly intervals:</p> <ul style="list-style-type: none"> - Repeat Transect 1. In field record: vegetation height, vegetation composition, ground moisture class, numbers of <i>V. moulinsiana</i> (adult & juvenile) and other molluscs, minimum 10 samples - Repeat Transect 2, as above, minimum 12 samples - Repeat Transect 3, as above, minimum 10 samples - Repeat Transect 4, as above, minimum 7 samples - Take at least 2 samples at each from at least 10 other locations with optimal habitat, record information as above - Re-determine boundary of the habitat polygons and assign habitat to either Optimal, Optimal & Sub-optimal, Sub-optimal, Sub-optimal and Unsuitable, or Unsuitable - Assess the management regime and impacts upon the habitat for <i>V. moulinsiana</i> - Use results to determine overall condition assessment <p>Management recommendations:</p> <p>The site is largely fenced off from grazing cattle in the surrounding lands. At this time, no changes are necessary with regard to the management of the site for <i>Vertigo moulinsiana</i>.</p>

Vertigo moulinsiana monitoring at Fin Lough (Offaly)

2007-2012

Area of occupancy: Fin Lough is a shallow limestone lake surrounded by a complex of wetland habitats, 7 km north-east of Shannonbridge in Co. Offaly. Access to the site from Shannonbridge is approximately 2km past Clonmacnoise on the R444.

Discussion:

Monitoring recommendations:

Given the Favourable Condition of the site, it is recommended that monitoring is carried out at 3 yearly intervals. This should be re-assessed in light of any deterioration of Condition or any changes to site management:

Frequency: Next monitoring due 2011

Methods (see Section 4 of main report for full details). Prescription as follows:

- Repeat transect 1, in field record: vegetation height, vegetation composition, ground moisture class, numbers of *V. moulinsiana* (adult & juvenile) and other molluscs, minimum 10 samples
- Repeat transect 2, as above, minimum 12 samples
- Repeat transect 3, as above, minimum 10 samples
- Repeat transect 4, as above, minimum 7 samples
- Take at least 2 samples at each from at least 10 other locations with optimal habitat, record information as above
- Re-determine boundary of the habitat polygons and assign habitat to either Optimal, Optimal & Sub-optimal, Sub-optimal, Sub-optimal and Unsuitable, or Unsuitable
- Assess the management regime and impacts upon the habitat for *V. moulinsiana*
- Use results to determine overall condition assessment

Management recommendations:

Existing Management

Fin Lough is grazed by cattle that are moved to different areas around the site from the fields and slopes above. The landowner belongs to the REPS scheme. The grazing is complicated by the movement of fences from time to time, such that the management units do not have permanent boundaries from year to year at present. However, the majority of *V. moulinsiana* habitat is fenced and only subject to small-scale poaching.

Proposed management prescription for *Vertigo moulinsiana*

Whilst there is some small-scale, localized poaching of habitat, grazing at Fin Lough is more of an issue for *Vertigo geyeri* than *V. moulinsiana* (Moorkens 2006).

With current management practice, there are no short to medium-term threats to the *Vertigo moulinsiana* population. In the longer term, continued contraction of the lake may for a while provide more *V. moulinsiana* habitat but this will be offset by a contraction of the existing most suitable marginal fringe habitat. Ultimately, without intervention (i.e. providing additional water to the lake) the site will dry out and become carr and scrub, the *V. moulinsiana* habitat will diminish and eventually disappear along with the snail. This may be preventable with a drain blockage scheme in the future.

No management specific to *V. moulinsiana* is recommended until the next round of monitoring when it should be reviewed.

Site report - Vertigo Monitoring

Vertigo moulinsiana monitoring at Lough Owel

1. SITE CODE AND LOCATION DETAILS

1.1 Site code and location

Vertigo Site Code: VmCAM03 **County:** Westmeath

SAC Site Code: 000688 Lough Owel

Location description (from baseline survey):

The habitat that supports *Vertigo moulinsiana* within this site lies along the canal feeder from Lough Owel and in fen on either side of the road from the bridge at N424563 to the lake. Access is from the road and lakeshore car park.

Monitoring period	Date surveyed	Recorders
2013-2018	22-23 October 2014	John Brophy & Maria Long
2007-2012	15 September 2008	Evelyn Moorkens & Ian Killeen

1.2 General Habitat Description (from baseline survey):

The general habitat in which *Vertigo moulinsiana* is present at Lough Owel is a low lying old canal area of swamp fen with some spring flushing. The snail is found typically on *Glyceria maxima* in association with *Phalaris arundinacea*, and *Iris pseudacorus* with some sub storey mosses. The water table was above ground surface level in places. There are no EU habitats that correspond to this habitat, the closest CORINE category would be Atlantic and sub-Atlantic humid meadows (37.21) (Devillers et al., 1991). This falls within the more general habitat of rich fen and flush (PF1), freshwater marsh (GM1), reed and large sedge swamps (FS1) and tall herb swamps (FS2) of Fossitt (2000).

1.3 Definition of Vegetation Classes (from baseline survey):

Class I: Tall <i>Carex</i> species, <i>Equisetum fluviatile</i> , <i>Carex paniculata</i> , <i>Iris pseudacorus</i>	Class III: <i>Filipendula ulmaria</i> , <i>Epilobium hirsutum</i> , <i>Menyanthes trifoliata</i> , <i>Mentha aquatica</i>
Class II: <i>Phalaris arundinacea</i> , <i>Eriophorum angustifolium</i> , <i>Cladium mariscus</i>	Class IV: All other species

1.4 Definition of Soil Moisture Classes (from baseline survey):

- 1: Dry. No visible moisture on ground surface.
- 2: Damp. Ground visibly damp, but water does not rise under pressure.
- 3: Wet. Water rises under light pressure.
- 4: Very wet. Pools of standing water, generally less than 5cm deep.
- 5: Site under water. Entire sampling site in standing or flowing water over 5cm deep.

2. SUMMARY:

Numbers of *V. moulinsiana* recorded at this site, as well as the number of locations from which it was found, both decreased compared with the previous survey. 2014 was a relatively dry year, and this may have had an effect on numbers. Apart from polygon C, where the transect is located, the site appears to still be suitable. No changes in management are recommended currently, but monitoring within three years is imperative to investigate if weather or other factors are responsible for the low numbers recorded.

3. TRANSECT DETAILS

TRANSECT: 1	MONITORING PERIOD: 2013-2018
Start point:	N 42185 56297 As for 2007-2012
End point:	N 42229 56272 As for 2007-2012
Transect length: 50	Direction: NW-SE
Description:	As for 2007-2012
Sampling frequency:	As for 2007-2012
<hr/>	
TRANSECT: 1	MONITORING PERIOD: 2007-2012
Start point:	N 42173 56307 5m towards the lake from a bankside alder tree
End point:	N 42215 56279 (at 35m distance, the transect is in line with a roadside telegraph pole)
Transect length: 50	Direction: NW-SE
Description:	The transect runs along the north side of, and parallel with the canal feeder, and runs through tall vegetation (mostly <i>Iris</i> , <i>Phragmites</i> and <i>Carex</i>) approximately 2m from the waters edge
Sampling frequency:	16 samples were taken at 5m or 10m intervals. At each interval, one sample was taken on the canal feeder side of the line (right R) or on the landward side of the line (left L)

Vertigo moulinsiana monitoring at Lough Owel

4. RESULTS

Polygon habitat characteristics

Monitoring Period: 2013-2018

Polygon	Habitat Type	Area (ha)	Comment
A	Optimal-Suboptimal	1.5756	Polygon A status remains Optimal-Suboptimal. The habitat is mostly patches of sedges with pools, but there are also areas of wet grassland. While the polygon boundary has remained the same, the area has changed in order to correct a previous error.
B	Optimal-Suboptimal	3.929	Polygon B status remains Optimal-Suboptimal. The habitat includes grazed sedge-rich sward and reed swamp, dominated by <i>Phragmites australis</i> . While the polygon boundary has remained the same, the area has changed in order to correct a previous error.
C	Optimal-Suboptimal	0.1945	Polygon C status has dropped from Optimal and Sub-optimal to Suboptimal due to succession and drying out. The habitat is now grassy, with <i>Phalaris arundinacea</i> and brambles. While the polygon boundary has remained the same, the area has changed in order to correct a previous error.

Monitoring Period: 2007-2012

Polygon	Habitat Type	Area (ha)	Comment
A	Sub-optimal with optimal areas	3.839	Polygon A - Fen meadow with patches of <i>Iris</i> , <i>Cladium</i> and large pools. It should be noted that all of the flush habitat is contained within the boundaries of these polygons, but because <i>V. moulinsiana</i> habitat is often dendritic, not all of the total area of each will be optimal or sub-optimal habitat.
B	Sub-optimal with optimal areas	15.756	Polygon B - Extensive area on south side of canal feeder with wet fen meadow, runnels with sedges, small areas of flush, canal margins
C	Sub-optimal with optimal areas	1.945	Polygon C - Strip between the road to the lakeshore car park and the north bank of the canal feeder. Tall fen vegetation particularly at the lake end but becoming ranker and with more bramble towards the SE end

Transect samples

Mon. period	Transect	Sample	Location	Adults	Juveniles	Total	Veg. class	Wetness	Habitat suitability
Monitoring period 2013-2018 Transect 1 (16 samples)									
2013-2018	1	1	0m a	0	0	0	II	2	Suboptimal
2013-2018	1	2	0m b	0	0	0	II	2	Suboptimal
2013-2018	1	3	5m a	0	0	0	II	2	Suboptimal
2013-2018	1	4	5m b	0	0	0	II	2	Suboptimal
2013-2018	1	5	10m a	0	0	0	II	2	Suboptimal
2013-2018	1	6	10m b	0	0	0	II	2	Suboptimal
2013-2018	1	7	20m a	0	0	0	IV	2	Suboptimal
2013-2018	1	8	20m b	0	0	0	IV	2	Suboptimal
2013-2018	1	9	30m a	0	0	0	II	2	Suboptimal
2013-2018	1	10	30m b	0	0	0	II	2	Suboptimal
2013-2018	1	11	35m a	0	0	0	IV	2	Suboptimal
2013-2018	1	12	35m b	1	0	1	IV	2	Suboptimal
2013-2018	1	13	40m a	0	0	0	III	2	Suboptimal
2013-2018	1	14	40m b	5	0	5	III	2	Suboptimal
2013-2018	1	15	50m a	1	0	1	II	2	Suboptimal
2013-2018	1	16	50m b	0	0	0	II	2	Suboptimal
Monitoring period 2007-2012 Transect 1 (16 samples)									
2007-2012	1	1	0m right	63	29	92		3	
2007-2012	1	2	0m left	48	33	81		3	
2007-2012	1	3	5m right	0	2	2		3	

Vertigo moulinsiana monitoring at Lough Owel

2007-2012	1	4	5m left	29	14	43	3
2007-2012	1	5	10m right	19	14	33	3
2007-2012	1	6	10m left	3	0	3	3
2007-2012	1	7	20m right	2	0	2	3
2007-2012	1	8	20m left	2	4	6	3
2007-2012	1	9	30m right	9	0	9	3
2007-2012	1	10	30m left	2	2	4	3
2007-2012	1	11	35m right	7	1	8	3
2007-2012	1	12	35m left	1	1	2	3
2007-2012	1	13	40m right	16	2	18	3
2007-2012	1	14	40m left	0	0	0	3
2007-2012	1	15	50m right	0	0	0	3
2007-2012	1	16	50m left	0	0	0	3

Spot Samples

Mon. period	Sample	Grid ref.	Adults	Juveniles	Total	Veg. class	Wetness	Habitat suitability
Monitoring period 2013-2018 (18 samples)								
2013-2018	01a	N 42307 56246	1	3	4	I	5	Optimal-Suboptimal
2013-2018	01b	N 42307 56246	0	0	0	I	5	Optimal-Suboptimal
2013-2018	01c	N 42307 56246	0	0	0	I	5	Optimal-Suboptimal
2013-2018	02a	N 42465 56141	0	0	0	I	3	Optimal-Suboptimal
2013-2018	02b	N 42465 56141	0	1	1	I	3	Optimal-Suboptimal
2013-2018	02c	N 42465 56141	0	0	0	I	3	Optimal-Suboptimal
2013-2018	03a	N 42558 56008	0	0	0	I	4	Optimal-Suboptimal
2013-2018	03b	N 42558 56008	0	0	0	I	4	Optimal-Suboptimal
2013-2018	03c	N 42558 56008	0	0	0	I	4	Optimal-Suboptimal
2013-2018	04a	N 42438 56114	9	12	21	I	4	Optimal-Suboptimal
2013-2018	04b	N 42438 56114	15	31	46	I	4	Optimal-Suboptimal
2013-2018	04c	N 42438 56114	2	21	23	I	4	Optimal-Suboptimal
2013-2018	05a	N 42286 56091	0	0	0	I	4	Optimal-Suboptimal
2013-2018	05b	N 42286 56091	0	0	0	I	4	Optimal-Suboptimal
2013-2018	05c	N 42286 56091	0	0	0	I	4	Optimal-Suboptimal
2013-2018	06a	N 42015 56314	7	67	74	I	4	Optimal
2013-2018	06b	N 42015 56314	4	45	49	I	4	Optimal
2013-2018	06c	N 42015 56314	1	62	63	I	4	Optimal
Monitoring period 2007-2012 (58 samples)								
2007-2012	01a	N 42431 56119	0	1	1		4	
2007-2012	01b	N 42431 56119	0	1	1		4	
2007-2012	01c	N 42431 56119	0	0	0		4	
2007-2012	01d	N 42431 56119	0	1	1		4	
2007-2012	01e	N 42431 56119	2	0	2		4	
2007-2012	02a	N 42463 56101	3	6	9		5	

Vertigo moulinsiana monitoring at Lough Owel

2007-2012	02b	N 42463 56101	1	3	4	4
2007-2012	02c	N 42463 56101	2	4	6	5
2007-2012	03a	N 42463 56091	1	1	2	5
2007-2012	03b	N 42463 56091	0	0	0	4
2007-2012	03c	N 42463 56091	0	1	1	4
2007-2012	04a	N 42498 56076	0	0	0	5
2007-2012	04b	N 42498 56076	0	0	0	5
2007-2012	04c	N 42498 56076	0	0	0	5
2007-2012	05a	N 42508 56063	6	3	9	4
2007-2012	05b	N 42508 56063	2	5	7	4
2007-2012	05c	N 42508 56063	1	3	4	5
2007-2012	06a	N 42451 56065	6	2	8	5
2007-2012	06b	N 42451 56065	11	1	12	4
2007-2012	06c	N 42451 56065	3	4	7	4
2007-2012	06d	N 42451 56065	1	6	7	5
2007-2012	07a	N 42354 56083	8	8	16	4
2007-2012	07b	N 42354 56083	11	2	13	5
2007-2012	07c	N 42354 56083	13	9	22	4
2007-2012	07d	N 42354 56083	1	4	5	3
2007-2012	08a	N 42263 56104	0	1	1	4
2007-2012	08b	N 42263 56104	0	0	0	4
2007-2012	08c	N 42263 56104	2	2	4	5
2007-2012	09a	N 42265 56179	0	0	0	4
2007-2012	09b	N 42265 56179	0	0	0	4
2007-2012	09c	N 42265 56179	0	0	0	4
2007-2012	10a	N 42030 56334	16	9	25	4
2007-2012	10b	N 42030 56334	23	2	25	5
2007-2012	10c	N 42030 56334	6	8	14	5
2007-2012	10d	N 42030 56334	11	9	20	4
2007-2012	11a	N 42066 56350	0	0	0	3
2007-2012	11b	N 42066 56350	1	2	3	3
2007-2012	11c	N 42066 56350	0	0	0	4
2007-2012	12a	N 42149 56300	3	5	8	4
2007-2012	12b	N 42149 56300	0	1	1	3
2007-2012	12c	N 42149 56300	2	0	2	3
2007-2012	13a	N 42178 56293	3	1	4	3
2007-2012	13b	N 42178 56293	2	4	6	3
2007-2012	14a	N 42204 56275	0	1	1	4
2007-2012	14b	N 42204 56275	1	4	5	4
2007-2012	15a	N 42308 56248	18	7	25	5

Vertigo moulinsiana monitoring at Lough Owel

2007-2012	15b	N 42308 56248	9	9	18	5
2007-2012	15c	N 42308 56248	11	2	13	5
2007-2012	16a	N 42314 56295	9	3	12	4
2007-2012	16b	N 42314 56295	4	4	8	5
2007-2012	17a	N 42484 56133	3	1	4	4
2007-2012	17b	N 42484 56133	0	0	0	5
2007-2012	17c	N 42484 56133	2	0	2	4
2007-2012	18a	N 42474 56116	3	5	8	4
2007-2012	18b	N 42474 56116	3	1	4	3
2007-2012	19a	N 42563 56023	2	2	4	5
2007-2012	19b	N 42563 56023	0	0	0	5
2007-2012	19c	N 42563 56023	5	3	8	5

5. CONDITION ASSESSMENT

5.1 Population Assessment: 3 passes Favourable (green); 1-2 passes Unfavourable Inadequate (amber); 0 passes Unfavourable Bad (red)

Mon. period	Transect	Indicator	Target	Result	Pass/Fail
2013-2018	1	Density	At least 3 samples contain 20 or more adult and juvenile snails	None of 16 samples with 20 or more adults/juveniles	Fail
2013-2018	1	Presence/Absence	V. moulinsiana is present in 10 samples (from a minimum of 16 taken) on the Transect	Present in 3 samples	Fail
2007-2012	1	Density	At least 3 samples contain 20 or more adult and juvenile snails	4 samples with 20 or more adults and juveniles	Pass
2007-2012	1	Presence/Absence	V. moulinsiana is present in 10 samples (from a minimum of 16 taken) on the Transect	Present in 13 samples	Pass

Mon. period	Indicator	Target	Result	Pass/Fail
2013-2018	Species extent	V. moulinsiana is present in at least one location in Polygon A (minimum 2 sampled) and in at least 2 other locations in Polygon B (at NW and SE ends - minimum 4 sampled)	Present in 2 locations in Polygon A and 2 in Polygon B	Pass
2007-2012	Species extent	V. moulinsiana is present in at least one location in Polygon A (minimum 2 sampled) and in at least 2 other locations in Polygon B (at NW and SE ends – minimum 4 sampled)	Present at 5 locations in Polygon A and 12 in B	Pass

Mon. period	Population Notes
2013-2018	The population of Vertigo moulinsiana at Lough Owel appears to have shown a decrease in numbers. The number of positive results on the transect dropped from 13 in 16 in 2007-2012, to 3 in 16 in the current survey. Positive sample locations throughout the rest of the site dropped from 17 out of 19 (90%) in 2007-2012, to 4 out of 6 (67%) in the current survey. Based on the criteria of Moorkens & Killeen (2011), the Population Assessment is Unfavourable Inadequate (amber).
2007-2012	The snail is scattered in its distribution and present in rather low numbers

5.2 Habitat Assessment: 3 passes Favourable (green); 2 passes Unfavourable Inadequate (amber); 0-1 passes Unfavourable Bad (red)

5.2.1 Transect level

Mon. period	Transect	Indicator	Target	Result	Pass/Fail
2013-2018	1	Habitat extent	12 samples (75%) on the Transects are dominated by suitable vegetation (mostly Classes I & II)	10 samples suitable	Fail

Vertigo moulinsiana monitoring at Lough Owel

2013-2018	1	Habitat quality	12 samples on the Transect fall within soil moisture classes 2-4	16 samples suitable	Pass
2007-2012	1	Habitat extent	12 samples (75%) on the Transects are dominated by suitable vegetation (mostly Classes I & II)	14 samples suitable	Pass
2007-2012	1	Habitat quality	12 samples on the Transect fall within soil moisture classes 2-4	16 samples suitable	Pass

5.2.2 Site level

Mon. period	Indicator	Target	Result	Pass/Fail
2013-2018	Habitat extent	5-6ha of the site with optimal and sub-optimal areas (NB: Target adjusted from 20-22ha, which was set in error)	5.70ha Optimal-Suboptimal	Pass
2007-2012	Habitat extent	20-22ha of the site with optimal and sub-optimal areas	5.70	Pass

Mon. period	Habitat Notes
2013-2018	Polygons A and B were classified as Optimal-Suboptimal following the current survey, which is unchanged from the 2007-2012 sampling period. Polygon C, where the transect is located, was downgraded from Optimal and sub-optimal in 2007-2012, to Suboptimal owing to ecological change evidenced by the fact that it is now very dry and grassy, with dense vegetation and scrub encroachment (bramble). Based on the criteria of Moorkens & Killeen (2011), the Habitat Assessment is Unfavourable Inadequate (amber).
2007-2012	

5.3 Future Prospects Assessment

Mon. period	Activity code	Activity description	Location	Intensity	Influence	Area affected	Comment
2013-2018	A04.02.01	non intensive cattle grazing	Inside	Medium	Positive	60%	
2013-2018	H02.06	diffuse groundwater pollution due to agricultural and forestry activities	Inside	Medium	Negative	5%	Enrichment evidenced by Ranunculus repens, etc. in Polygon A, but quite limited in extent.
2013-2018	K02.01	species composition change (succession)	Inside	Medium	Negative	10%	Bramble encroaching at transect and change to drier, grassy species.
2007-2012	A04.02.01	non intensive cattle grazing	Inside	Low	Neutral	91%	The level of grazing appears to be low and is at present having neither a positive nor negative effect.
2007-2012	A04.02.03	non intensive horse grazing	Inside	Low	Neutral	91%	

Mon. period	Future Prospects Notes
2013-2018	Two negative impacts that were not observed in 2008 were recorded in 2014 - enrichment and succession. However, it should be noted that these impacts are affecting a small area only. For this reason, the Future Prospects have been assessed as Favourable (green).
2007-2012	The level of grazing appears to be low and is at present having neither a positive or negative effect. As the impact is low, Future prospects have been assessed as Favourable.

5.4 Overall Assessment

Mon. period	Population assessment	Area of suitable habitat	Future prospects	Overall assessment
2013-2018	Amber	Amber	Green	Amber
2007-2012	Green	Green	Green	Green

Vertigo moulinsiana monitoring at Lough Owel

Mon. period	Overall Notes
2013-2018	Based on the lower number of positive samples for <i>Vertigo moulinsiana</i> , the decreased habitat suitability of the transect polygon, the Overall Assessment for Lough Owel is Unfavourable Inadequate (amber).
2007-2012	Lough Owel is a very good site for <i>Vertigo moulinsiana</i> . Optimal habitat occurs over a relatively wide area on both the north and south side of the canal feeder. The snail is also present in good numbers over a wide area, with a relatively high proportion of juveniles present. There appear to be few imminent threats.

6. DISCUSSION

Monitoring period
<p>2013-2018</p> <p>Area of occupancy: As in 2007-2012, the habitat that supports <i>Vertigo moulinsiana</i> within this site lies along the canal feeder from Lough Owel and in fen on either side of the road from the bridge at N424563 to the lake. Access is from the road and lakeshore car park.</p> <p>Discussion:</p> <p>Numbers of <i>Vertigo moulinsiana</i> recorded at this site, as well as the number of locations from which it was found, both decreased compared with the previous survey. 2014 was a relatively dry year, and this may have had an effect on numbers. Apart from Polygon C, where the transect is located, the site appears to still be suitable. The location of the transect at this site should be re-considered as it is sited in an isolated area that is atypical for the site as a whole. No changes in management are recommended currently, but monitoring within three years is imperative to investigate if weather or other factors are responsible for the low numbers recorded.</p> <p>Monitoring recommendations:</p> <p>Monitoring should be carried out on a 3 yearly basis, broadly following that of Moorkens & Killeen (2011):</p> <ul style="list-style-type: none"> - Repeat the transect. In field record: vegetation height, vegetation composition, ground moisture class, numbers of <i>Vertigo moulinsiana</i> (adult & juvenile) - Take samples from at least 6 other locations with optimal habitat, record information as above - Re-determine boundary of the habitat polygons and assign habitat to either Optimal, Optimal-Suboptimal, Suboptimal, Suboptimal-Unsuitable, or Unsuitable - Assess the management regime and impacts upon the habitat for <i>Vertigo moulinsiana</i> - Use results to determine overall condition assessment <p>Management recommendations:</p> <p>This site is currently managed by cattle grazing (and perhaps horses?), at least in polygons A and B. This is appropriate for supporting <i>Vertigo moulinsiana</i>, and the current levels appear to be suitable. There is no grazing in Polygon C, the strip along the feeder canal, and this area appears to be drying out and bramble is encroaching. It is likely to be difficult to counteract the changes which are taking place in this polygon. The water level in the canal is considerably below the bank-full height and so may not be able to contribute appreciably to the wetness levels in Polygon C. It is likely that grazing would be beneficial in this polygon in terms of keeping scrub encroachment at bay, but its size and location are likely to be deterrents to this management. Furthermore, if drying out continues, this would negate benefits obtained from grazing. A fuller understanding of the hydrology of this polygon is needed before more detailed management prescriptions can be made. It is suggested in the meantime that efforts should be focused on the two more suitable, and much larger, polygons at this site.</p>
<p>2007-2012</p> <p>Area of occupancy: The habitat that supports <i>Vertigo moulinsiana</i> within this site lies along the canal feeder from Lough Owel and in fen on either side of the road from the bridge at N424563 to the lake. Access is from the road and lakeshore car park.</p> <p>Discussion:</p> <p>Monitoring recommendations:</p> <p>Management recommendations:</p> <p>The management at Lough Owel should remain the same as the present regime within the management unit for the 2008-2011 period, but should not exceed approximately 1 livestock unit per hectare. As with SACs for this species, damaging actions should not take place. Supplementary feeding of stock should not take place within inhabited area, no lime or fertiliser of any sort should be introduced within the inhabited area. No reclamation, infilling, ploughing or land drainage, reseeding, planting of trees or any other species, removal of aquatic vegetation, use of pesticide or herbicide in the inhabited area. No dumping of rubbish or other materials or storing or disposing of any chemicals or wastes in or within 50m of the inhabited area including the land spreading of used pesticides (e.g. sheep dip). No alteration of the banks, channel, bed or spring flow into the canal or of watercourses running into or out of it, including extracting water for irrigation or other purposes should take place.</p>

Site report - Vertigo Monitoring

Vertigo moulinsiana monitoring at Mountmellick

1. SITE CODE AND LOCATION DETAILS

1.1 Site code and location

Vertigo Site Code: VmCAM04 **County:** Laois

SAC Site Code: 002141 Mountmellick

Location description (from baseline survey):

Monitoring period	Date surveyed	Recorders
2013-2018	15 Oct 2014	John Brophy & Maria Long
2007-2012	18 September 2008	Evelyn Moorkens & Ian Killeen

1.2 General Habitat Description (from baseline survey):

The general habitat in which *Vertigo moulinsiana* is present at Mountmellick is a low lying old canal area of swamp fen with some spring flushing. The snail is found typically on *Glyceria maxima* in association with *Phalaris arundinacea*, and *Iris pseudacorus* with some sub storey mosses. The water table was above ground surface level in places. There are no EU habitats that correspond to this habitat, the closest CORINE category would be Atlantic and sub-Atlantic humid meadows (37.21) (Devillers et al., 1991). This falls within the more general habitat of rich fen and flush (PF1), freshwater marsh (GM1), reed and large sedge swamps (FS1) and tall herb swamps (FS2) of Fossitt (2000).

1.3 Definition of Vegetation Classes (from baseline survey):

Class I: <i>Glyceria maxima</i>	Class III: <i>Epilobium hirsutum</i> , <i>Agrostis stolonifera</i> , <i>Rorippa nasturtium-aquaticum</i> , <i>Urtica dioica</i> , <i>Juncus</i> spp.
Class II: <i>Phragmites australis</i> , <i>Iris pseudacorus</i> , <i>Phalaris arundinacea</i>	Class IV: All other species

1.4 Definition of Soil Moisture Classes (from baseline survey):

- 1: Dry. No visible moisture on ground surface.
- 2: Damp. Ground visibly damp, but water does not rise under pressure.
- 3: Wet. Water rises under light pressure.
- 4: Very wet. Pools of standing water, generally less than 5cm deep.
- 5: Site under water. Entire sampling site in standing or flowing water over 5cm deep.

2. SUMMARY:

This site possesses a significant length of disused canal bed which was all classed as Sub-optimal or better, with two-thirds of its length containing some Optimal habitat. Consequently it was surprising that only 50% of samples were positive (compared to 93% in 2008), and also that numbers were generally low (apart from three samples at the southern end). Moorkens & Killeen (2011) raised the issue of succession and drying out at this site, threats which face many disused canal beds. It may be that this site is beginning to show signs of these processes (e.g. only 73% of samples in 2014 were classed as having optimal wetness for *V. moulinsiana*, compared to 90% in 2009). However, 2014 was a very dry year, and 2008 was a very wet one. Monitoring must be carried out at this site within three years to attempt to ascertain if the lower numbers constitute a trend, and if so, measures must be taken to maintain the sites wetness (e.g. blocking of outflow).

3. TRANSECT DETAILS

TRANSECT: 1 **MONITORING PERIOD:** 2013-2018

Start point:	N 49158 08533	As for 2007-2012
End point:	N 49088 08390	As for 2007-2012
Transect length:	170	Direction: As for 2007-2012
Description:	As for 2007-2012	
Sampling frequency:	As for 2007-2012	

TRANSECT: 1 **MONITORING PERIOD:** 2007-2012

Start point:	N 49166 08557	End of open canal habitat (barbed wire fence) where it becomes very overgrown and shaded
End point:	N 49048 08378	Near Dangan's Bridge
Transect length:	228	Direction:
Description:		
Sampling frequency:		

4. RESULTS

Vertigo moulinsiana monitoring at Mountmellick

Polygon habitat characteristics

Monitoring Period: 2013-2018

Polygon	Habitat Type	Area (ha)	Comment
A	Optimal	0.2244	Polygon A remains Optimal habitat and consists of tall-growing wetland vegetation in the canal bed. The polygon boundary was altered to better reflect the habitat extent, which is limited to the canal bed. (NB: The area recorded by Moorkens & Killeen below should read 0.148ha)

Monitoring Period: 2007-2012

Polygon	Habitat Type	Area (ha)	Comment
	Optimal	1.493	All habitat within the canal bed

Transect samples

Mon. period	Transect	Sample	Location	Adults	Juveniles	Total	Veg. class	Wetness	Habitat suitability
Monitoring period 2013-2018 Transect 1 (30 samples)									
2013-2018	1	1	0m	0	0	0	II	2	Suboptimal
2013-2018	1	2	5m	0	0	0	I	2	Suboptimal
2013-2018	1	3	10m	0	1	1	I	2	Suboptimal
2013-2018	1	4	15m	0	1	1	I	2	Suboptimal
2013-2018	1	5	20m	1	2	3	I	2	Suboptimal
2013-2018	1	6	25m	0	3	3	I	2	Suboptimal
2013-2018	1	7	30m	1	3	4	I	2	Suboptimal
2013-2018	1	8	35m	0	0	0	I	2	Suboptimal
2013-2018	1	9	40m	0	0	0	II	3	Optimal-Suboptimal
2013-2018	1	10	45m	0	0	0	I	3	Optimal-Suboptimal
2013-2018	1	11	50m	0	0	0	I	3	Optimal-Suboptimal
2013-2018	1	12	55m	0	0	0	I	3	Optimal-Suboptimal
2013-2018	1	13	60m	0	1	1	I	4	Optimal
2013-2018	1	14	65m	0	0	0	I	4	Optimal
2013-2018	1	15	70m	0	0	0	I	4	Optimal
2013-2018	1	16	75m	0	0	0	I	3	Optimal
2013-2018	1	17	80m	0	0	0	III	3	Suboptimal
2013-2018	1	18	85m	0	0	0	III	3	Suboptimal
2013-2018	1	19	90m	0	0	0	III	3	Suboptimal
2013-2018	1	20	95m	2	7	9	II	3	Optimal
2013-2018	1	21	100m	0	1	1	II	3	Optimal
2013-2018	1	22	105m	0	1	1	I	3	Optimal
2013-2018	1	23	110m	0	3	3	I	3	Optimal-Suboptimal
2013-2018	1	24	115m	0	0	0	I	3	Optimal-Suboptimal
2013-2018	1	25	120m	0	1	1	I	3	Optimal
2013-2018	1	26	130m	0	0	0	I	4	Optimal
2013-2018	1	27	140m	0	1	1	I	3	Optimal
2013-2018	1	28	150m	3	10	13	I	3	Optimal
2013-2018	1	29	160m	5	15	20	I	3	Optimal
2013-2018	1	30	170m	10	90	100	I	3	Optimal
Monitoring period 2007-2012 Transect 1 (30 samples)									
2007-2012	1	1	0m start point	4	6	10		5	

Vertigo moulinsiana monitoring at Mountmellick

2007-2012	1	2	5m	16	26	42	5
2007-2012	1	3	10m	20	49	69	5
2007-2012	1	4	15m	25	64	89	5
2007-2012	1	5	20m	39	88	127	5
2007-2012	1	6	25m	29	14	43	5
2007-2012	1	7	30m	16	29	45	5
2007-2012	1	8	35m	9	15	24	5
2007-2012	1	9	40m	25	104	129	5
2007-2012	1	10	45m	9	33	42	5
2007-2012	1	11	50m	68	188	256	5
2007-2012	1	12	55m	14	60	74	5
2007-2012	1	13	60m	6	9	15	5
2007-2012	1	14	65m	0	2	2	5
2007-2012	1	15	70m	46	44	90	4
2007-2012	1	16	75m	2	6	8	5
2007-2012	1	17	80m	0	2	2	5
2007-2012	1	18	85m	4	9	13	5
2007-2012	1	19	90m	9	16	25	5
2007-2012	1	20	95m	0	0	0	5
2007-2012	1	21	100m open water	0	0	0	5
2007-2012	1	22	105m	3	3	6	5
2007-2012	1	23	110m	28	84	112	5
2007-2012	1	24	115m	9	49	58	4
2007-2012	1	25	120m	20	106	126	4
2007-2012	1	26	130m	6	77	83	4
2007-2012	1	27	140m	11	20	31	4
2007-2012	1	28	150m	2	7	9	4
2007-2012	1	29	160m	5	22	27	4
2007-2012	1	30	170m	0	3	3	4

Spot Samples

5. CONDITION ASSESSMENT

5.1 Population Assessment: 2 passes Favourable (green); 1 pass Unfavourable Inadequate (amber); 0 passes Unfavourable Bad (red)

Mon. period	Transect	Indicator	Target	Result	Pass/Fail
2013-2018	1	Density	10 samples contain at least 20 adult and juvenile snails	2 samples contain at least 20 adult and juvenile snails	Fail
2013-2018	1	Presence/Absence	V. moulinsiana is present in 23 samples (75% of a minimum of 30 samples) on the Transect	V. moulinsiana is present in 15 samples (50% of 30 samples) on the Transect	Fail
2007-2012	1	Density	10 samples contain at least 20 adult and juvenile snails	19 samples with 20 or more adults and juveniles	Pass
2007-2012	1	Presence/Absence	V. moulinsiana is present in 23 samples (75% of a minimum of 30 samples) on the Transect	Present in 28 of the 30 samples (93%)	Pass

Mon. period	Population Notes
2013-2018	The population of <i>Vertigo moulinsiana</i> at Mountmellick appears to have fallen based on the current survey results. In 2007-2012, positive samples accounted for 28 of 30 locations, while in the current survey only 15 of 30 locations were positive.

Vertigo moulinsiana monitoring at Mountmellick

2013-2018	Much higher numbers were recorded towards the end of the transect in 2014 and only these are comparable to the large numbers recorded in 2007-2012 at many of the sample locations. Based on the criteria of Moorkens & Killeen (2011), the Population Assessment is Unfavourable Bad (red).
2007-2012	the snail occurs throughout the site and is locally abundant

5.2 Habitat Assessment: 3 passes Favourable (green); 2 passes Unfavourable Inadequate (amber); 0-1 passes Unfavourable Bad (red)

5.2.1 Transect level

Mon. period	Transect	Indicator	Target	Result	Pass/Fail
2013-2018	1	Habitat extent	25 samples (or 80%) on the Transect is dominated by suitable vegetation (Classes I & II)	27 samples (90%) on the Transect is dominated by suitable vegetation (Classes I & II)	Pass
2013-2018	1	Habitat quality	25 samples (or 80%) on the Transect fall within soil moisture classes 3-5	22 samples (73%) on the Transect fall within soil moisture classes 3-5	Fail
2007-2012	1	Habitat extent	25 samples (or 80%) on the Transect is dominated by suitable vegetation (Classes I & II)	30 samples suitable	Pass
2007-2012	1	Habitat quality	25 samples (or 80%) on the Transect fall within soil moisture classes 3-5	30 samples suitable	Pass

5.2.2 Site level

Mon. period	Indicator	Target	Result	Pass/Fail
2013-2018	Habitat extent	Suitable habitat should exist in the canal bed throughout the c.170m length from old Dangan's Bridge at the western edge and the fence/woodland at N 491 085. (Habitat area of 1.4ha mentioned below is incorrect.)	Habitat is Suboptimal or better all along the 170m transect.	Pass
2007-2012	Habitat extent	Suitable habitat should exist the canal bed throughout the c.170m length from old Dangan's Bridge at the western edge and the fence/woodland at N 491 085 – an area of c. 1.4ha	Target fulfilled	Pass

Mon. period	Habitat Notes
2013-2018	The Vertigo moulinsiana habitat polygon continues to be considered Optimal, unchanged from the 2007-2012 survey period (the target area of 1.4ha in Moorkens & Killeen (2011) is incorrect and should have been 0.14ha). There is some evidence of drying out of parts of the habitat to the north end of the transect, which will negatively impact on the snail. Based on the criteria of Moorkens & Killeen (2011), the Habitat Assessment is Unfavourable Inadequate (amber).
2007-2012	Although there has been some recent damage. most of the habitat at the site appears to be in good condition for V. moulinsiana

5.3 Future Prospects Assessment

Mon. period	Activity code	Activity description	Location	Intensity	Influence	Area affected	Comment
2013-2018	A04.02.03	non intensive horse grazing	Inside	Low	Negative	65%	Trampling & dung seen at site
2013-2018	H05	Soil pollution and solid waste (excluding discharges)	Outside	Low	Negative	5%	Dumping of manure & straw on canal bank
2013-2018	H05.01	garbage and solid waste	Inside	Low	Negative	5%	Significant quantities of dumped household waste at southern end of site by bridge and road.
2013-2018	K01.03	Drying out	Inside	Medium	Negative	30	

Vertigo moulinsiana monitoring at Mountmellick

2013-2018	K02.01	species composition change	Inside	Medium	Negative	20	
2013-2018	K06	other forms or mixed forms of interspecific floral competition	Inside	Low	Negative	15%	Shading
2007-2012	A04.02.01	non intensive cattle grazing	Inside	Low	Positive	1.49ha	The grazing is a result of cattle straying into drier parts of the canal which is probably having a positive impact
2007-2012	J02.01.03	infilling of ditches, dykes, ponds, pools, marshes or pits	Inside	Low	Negative	1.49ha	The infilling with rubbish and rubble has been addressed and is unlikely to be an impact into the future
2007-2012	K02.01	species composition change (succession)	Inside	Medium	Negative	1.49ha	Slow succession over the years may lead to continued drying of this feeder until the habitat can no longer sustain a population of <i>V. moulinsiana</i> .

Mon. period	Future Prospects Notes
2013-2018	A number of activities are having a low negative impact on the Mountmellick site including succession, drying out, dumping of garbage, horse grazing/trampling, dumping of farmyard manure and associated enrichment. Moorkens & Killeen (2011) noted succession and the associated drying out as a negative impact on the whole polygon and one that may need to be addressed if the habitat becomes less suitable for <i>Vertigo moulinsiana</i> as a result. The Future Prospects of the site were classed as Favourable (green) by Moorkens & Killeen (2011), but the low numbers and the apparent drying out may indicate that succession is beginning to have a measureable negative impact on the <i>Vertigo moulinsiana</i> habitat. For this reason, the Future Prospects are considered to be Unfavourable Inadequate (amber).
2007-2012	As the impacts are low, Future prospects have been assessed as Favourable

5.4 Overall Assessment

Mon. period	Population assessment	Area of suitable habitat	Future prospects	Overall assessment
2013-2018	Red	Amber	Amber	Red
2007-2012	Green	Green	Green	Green

Mon. period	Overall Notes
2013-2018	There has been a drop in the number of positive samples for <i>Vertigo moulinsiana</i> , along with the abundances, recorded at Mountmellick. While the Habitat Assessment and Future Prospects are assessed as Unfavourable Inadequate (amber), due to the poor Population Assessment results, the Overall Assessment must be considered Unfavourable Bad (red).
2007-2012	

6. DISCUSSION

Monitoring period	
2013-2018	
Area of occupancy:	As in 2007-2012, the habitat that supports <i>Vertigo moulinsiana</i> within this cSAC is the swamp fen habitat of the disused canal between the old Dangan's Bridge at the western edge and the fence at N 491 085. Access is from Dangan's Bridge at N 490 084.
Discussion:	This site possesses a significant length of disused canal bed which was all classed as Suboptimal or better, with two-thirds of its length containing some Optimal habitat. Consequently it was surprising that only 50% of samples were positive (compared to 93% in 2008), and also that numbers were generally low (apart from three samples at the southern end). Moorkens & Killeen (2011) raised the issue of succession and drying out at this site, threats which face many disused canal beds. It may be that this site is beginning to show signs of these processes (e.g. only 73% of samples in 2014 were classed as having Optimal wetness for <i>Vertigo moulinsiana</i> , compared to 90% in 2009). However, 2014 was a very dry year, and 2008 was a very wet one. Monitoring must be carried out at this site within three years to attempt to ascertain if the lower numbers constitute a trend, and if so, measures must be taken to maintain the sites

Vertigo moulinsiana monitoring at Mountmellick

wetness (e.g. blocking of outflow).

Monitoring recommendations:

Monitoring is recommended on a 3-yearly basis, as per Moorkens & Killeen (2011):

- Repeat Transect 1. In field record: vegetation height, vegetation composition, ground moisture class, numbers of *Vertigo moulinsiana* (adult & juvenile) and other molluscs, minimum 30 samples
- Re-determine boundary of the habitat polygons and assign habitat to either Optimal, Optimal-Suboptimal, Suboptimal, Suboptimal-Unsuitable, or Unsuitable
- Assess the management regime and impacts upon the habitat for *Vertigo moulinsiana*
- Use results to determine overall condition assessment

Management recommendations:

Management recommendations for Mountmellick include the removal of dumped garbage and manure and a slight reduction in the grazing by horses to allow the tall vegetation required by *Vertigo moulinsiana* to again become dominant at the site. It appears that succession and drying may be beginning to negatively impact the habitat, so some means of increasing/maintaining the wetness may need to be found in the future (e.g. blocking of outflow). The additional management details provided in Moorkens & Killeen (2011) are still relevant and should be referred to.

Vertigo moulinsiana monitoring at Mountmellick

2007-2012

Area of occupancy: The habitat that supports *Vertigo moulinsiana* within this cSAC is the swamp fen habitat of the disused canal between the old Dangan's Bridge at the western edge and the fence at N 491 085. Access is from Dangan's Bridge at N 490 084.

Discussion:

The results obtained in 2008 are very similar to those obtained in 2006. For example, in 2008 the mean number of snails per sample was 51.9 compared to 56.7 in 2006. However, in 2008 ground moisture levels were very high with the majority of the site being in Class 5 - in standing water over 5cm deep. This probably reflects the very wet summer of 2008.

In late 2007/early 2008 it was reported that a large quantity of rubbish had been tipped into the central part of the site from the north bank. This was subsequently removed at the request of NPWS. The survey in September 2008 showed that a section of just under 20m in length had been affected from a position of approximately 90m on the transect towards Dangan's Bridge. The entire width of the canal had been affected with the loss of virtually all of the suitable tall swamp vegetation in this section. The habitat in the impacted area comprised pools of standing water with large quantities of filamentous algae, with sparse *Lemna*, *Glyceria fluitans* and *Rorippa*. Some rubble is still present on the north bank. It is likely that the habitat and *Vertigo moulinsiana* population will, in time, recover in the impacted area. Longer term succession needs to be monitored and the dominant vegetation noted in the transect can be used for this purpose. The 170m long transect was chosen for this purpose.

Monitoring recommendations:

Given the Favourable Condition of the site, it is recommended that monitoring is carried out at 3 yearly intervals. This should be re-assessed in light of any deterioration of Condition or any changes to site management:

Frequency: Next monitoring due 2011

Methods (see Section 4 of main report for full details). Prescription as follows:

- Repeat transect 1, in field record: vegetation height, vegetation composition, ground moisture class, numbers of *V. moulinsiana* (adult & juvenile) and other molluscs, minimum 30 samples
- Re-determine boundary of the habitat polygons and assign habitat to either Optimal, Optimal & Sub-optimal, Sub-optimal, Sub-optimal and Unsuitable, or Unsuitable
- Assess the management regime and impacts upon the habitat for *V. moulinsiana*
- Use results to determine overall condition assessment

Management recommendations:

Existing Management

The site at Mountmellick is grazed by cattle within the wider area that include the fields on either side of the unused canal. From the evidence on the ground, it appears that some cattle may enter the drier areas of the canal floor, particularly from the North, but not the very wet swampy areas where *V. moulinsiana* is most abundant. They play an important role in grazing the line along the canal edges where scrub could otherwise take hold and create a tunneling effect. Part of the canal area was used for dumping in late 2007/early 2008 with resultant loss of habitat (see Discussion).

Proposed management prescription for *Vertigo moulinsiana*

The management at Mountmellick should remain the same as the present regime within the management unit for the 2007-2011 period. This works out at approximately 1 livestock unit per hectare based on observed current rates, and grazing periods can remain flexible as the grazing area mainly consists of improved grassland, which will vary from year to year in its capacity to carry livestock. As with all SACs for this species, damaging actions should not take place. Supplementary feeding of stock should not take place within 50m of the canal, no lime or fertiliser of any sort should be introduced within 50m of the canal. No reclamation, infilling, ploughing or land drainage, reseeding, planting of trees or any other species, removal of aquatic vegetation, use of pesticide or herbicide in the canal area or within 50m of the canal. No dumping of rubbish or other materials or storing or disposing of any chemicals or wastes in or within 50m of the canal including the land spreading of used pesticides (e.g. sheep dip). No alteration of the banks, channel, bed or spring flow into the canal or of watercourses running into or out of it, including extracting water for irrigation or other purposes should take place.

Site report - Vertigo Monitoring

Vertigo moulinsiana monitoring at Louisa Bridge

1. SITE CODE AND LOCATION DETAILS

1.1 Site code and location

Vertigo Site Code: VmCAM05 **County:** Kildare

SAC Site Code: 001398 Rye Water Valley/Cartron

Location description (from baseline survey):

Monitoring period	Date surveyed	Recorders
2013-2018	22-23 Oct 2014	John Brophy & Maria Long
2007-2012	9 October 2008	Evelyn Moorkens & Ian Killeen

1.2 General Habitat Description (from baseline survey):

The general habitat in which *Vertigo moulinsiana* is present at Louisa Bridge is a low lying area of flood plain. The EU habitats that this relates to are water fringe vegetation comprising medium-tall waterside communities (CORINE 53.14) (Devillers et al., 1991). This does not fit within any Annex I habitat. The snail is found typically on *Sparganium erectum* and *Glyceria maxima*. The water table rises above ground surface level in places. Further up the slope lies tufaceous spring and alkaline fen habitat (HD Annex I 7220, 7230; CORINE 54.12, 54.2) (Romão, 1996; Devillers et al., 1991). *Vertigo moulinsiana* was found here on *Deschampsia caespitosa*, *Typha angustifolium* and *Equisetum palustre*. This lower habitat falls within the more general habitat of large sedge swamps (FS1) and tall herb swamps (FS2), and the higher area within Rich Fen and Flush (PF1) and calcareous springs (FP1) of Fossitt (2000).

1.3 Definition of Vegetation Classes (from baseline survey):

Class I: Tall <i>Carex</i> species, <i>Sparganium erectum</i> , <i>Glyceria maxima</i>	Class III: <i>Epilobium hirsutum</i> , <i>Mentha aquatica</i> , <i>Juncus</i> spp., <i>Deschampsia cespitosa</i> , <i>Eupatorium cannabinum</i>
Class II: <i>Phragmites australis</i> , <i>Equisetum fluviatile</i> , <i>Typha angustifolia</i>	Class IV: All other species

1.4 Definition of Soil Moisture Classes (from baseline survey):

- 1: Dry. No visible moisture on ground surface.
- 2: Damp. Ground visibly damp, but water does not rise under pressure.
- 3: Wet. Water rises under light pressure.
- 4: Very wet. Pools of standing water, generally less than 5cm deep.
- 5: Site under water. Entire sampling site in standing or flowing water over 5cm deep.

2. SUMMARY:

Vertigo moulinsiana was found at 6 out of 10 sample locations, though in lower numbers than in 2008. The population appears to have decreased, but habitat conditions remain good, and in the lower valley area they appear to have improved such that three out of the four samples in Polygon E were positive. Overall, this site needs no management change or intervention – but it does need to be protected from potentially well-meaning though damaging uses such as tree-planting, path creation or other increases in amenity usage. Re-survey in three years' time is important in order to gain further information to allow a fuller assessment of the population trend.

3. TRANSECT DETAILS

TRANSECT: 0 **MONITORING PERIOD:** 2013-2018

Start point: NO TRANSECT RECORDED

End point:

Transect length: **Direction:**

Description:

Sampling frequency:

TRANSECT: 0 **MONITORING PERIOD:** 2007-2012

Start point: NO TRANSECT RECORDED

End point:

Transect length: **Direction:**

Description:

Sampling frequency:

4. RESULTS

Vertigo moulinsiana monitoring at Louisa Bridge

Polygon habitat characteristics

Monitoring Period: 2013-2018

Polygon	Habitat Type	Area (ha)	Comment
A	Optimal	0.0724	Polygon A status remains Optimal-Suboptimal. The habitat is a small area of wetland dominated by tall Carex species. The boundary was redrawn to better delineate the habitat on the ground.
B	Suboptimal-Unsuitable	0.0801	Polygon B status remains Suboptimal-Unsuitable. The habitat is wet grassland with Iris pseudacorus, scrubbing over with Rubus fruticosus. The polygon boundary was redrawn to better reflect the situation on the ground.
C	Suboptimal	0.2082	Polygon C status changes to Suboptimal. It was created by merging two existing polygons; one Optimal and sub-optimal and one Sub-optimal and unsuitable, and redrawing the boundary. The habitat is wetland dominated by Carex spp.
D	Optimal-Suboptimal	0.065	Polygon D status remains Optimal-Suboptimal. The habitat is wetland dominated by Carex spp. The polygon boundary was redrawn slightly to remove the artificial gap between it and the adjacent polygon.
E	Optimal	0.1626	Polygon E status increases to Optimal. The polygon boundary was created by merging two polygons; one Suboptimal and Unsuitable and one Optimal-Suboptimal, which had similar vegetation. The habitat is riverside wetland dominated by tall vegetation (e.g. Glyceria maxima, Iris pseudacorus and Phragmites australis).

Monitoring Period: 2007-2012

Polygon	Habitat Type	Area (ha)	Comment
	Sub-optimal with unsuitable areas	0.471	4 polygon areas were considered to be a mosaic of Unsuitable and Sub-Optimal habitat, with the following areas: 1184m ² , 2461m ² , 1065m ² giving a total of 0.471 ha.
	Sub-optimal with optimal areas	0.204	The habitat is very fragmented but 4 polygon areas were considered to be a mosaic of Optimal and Sub-Optimal habitat, with the following areas: 490m ² , 347m ² , 767m ² , 439m ² giving a total of 0.204ha

Transect samples

Mon. period	Transect	Sample	Location	Adults	Juveniles	Total	Veg. class	Wetness	Habitat suitability
2013-2018	0	0	NO TRANSECT RECORDED						
2007-2012	0	0	NO TRANSECT RECORDED						

Spot Samples

Mon. period	Sample	Grid ref.	Adults	Juveniles	Total	Veg. class	Wetness	Habitat suitability
Monitoring period 2013-2018 (31 samples)								
2013-2018	01a	N 99485 36691	1	2	3	I	4	Optimal
2013-2018	01b	N 99485 36691	2	2	4	I	4	Optimal
2013-2018	01c	N 99485 36691	0	3	3	I	4	Optimal
2013-2018	02a	N 99455 36698	0	0	0	IV	2	Suboptimal-Unsuitable
2013-2018	02b	N 99455 36698	0	1	1	IV	2	Suboptimal-Unsuitable
2013-2018	03a	N 99493 36787	0	3	3	IV	2	Suboptimal
2013-2018	03b	N 99493 36787	0	1	1	IV	2	Suboptimal
2013-2018	03c	N 99493 36787	0	0	0	IV	2	Suboptimal
2013-2018	03d	N 99493 36787	0	0	0	IV	2	Suboptimal
2013-2018	04a	N 99507 36761	0	0	0	IV	2	Suboptimal
2013-2018	04b	N 99507 36761	0	0	0	IV	2	Suboptimal

Vertigo moulinsiana monitoring at Louisa Bridge

2013-2018	04c	N 99507 36761	0	0	0	IV	2	Suboptimal
2013-2018	04d	N 99507 36761	0	0	0	IV	2	Suboptimal
2013-2018	05a	N 99516 36793	0	0	0	III	4	Suboptimal
2013-2018	05b	N 99516 36793	0	0	0	III	4	Suboptimal
2013-2018	05c	N 99516 36793	0	0	0	III	4	Suboptimal
2013-2018	06a	N 99532 36794	0	0	0	III	3	Optimal-Suboptimal
2013-2018	06b	N 99532 36794	0	0	0	III	3	Optimal-Suboptimal
2013-2018	06c	N 99532 36794	0	0	0	III	3	Optimal-Suboptimal
2013-2018	07a	N 99534 36840	0	0	0	IV	3	Optimal
2013-2018	07b	N 99534 36840	1	0	1	IV	3	Optimal
2013-2018	07c	N 99534 36840	0	0	0	IV	3	Optimal
2013-2018	08a	N 99530 36850	0	0	0	I	4	Optimal
2013-2018	08b	N 99530 36850	0	0	0	I	4	Optimal
2013-2018	08c	N 99530 36850	0	0	0	I	4	Optimal
2013-2018	09a	N 99487 36848	0	10	10	I	3	Optimal
2013-2018	09b	N 99487 36848	0	10	10	I	3	Optimal
2013-2018	09c	N 99487 36848	0	2	2	I	3	Optimal
2013-2018	10a	N 99500 36848	0	0	0	I	4	Optimal
2013-2018	10b	N 99500 36848	2	2	4	I	4	Optimal
2013-2018	10c	N 99500 36848	1	1	2	I	4	Optimal

Monitoring period 2007-2012 (36 samples)

2007-2012	01	N 99477 36712	0	0	0		4	
2007-2012	02	N 99477 36712	0	2	2		4	
2007-2012	03	N 99477 36712	6	6	12		4	
2007-2012	04	N 99477 36712	0	3	3		3	
2007-2012	05	N 99477 36712	5	8	13		4	
2007-2012	06	N 99468 36728	0	0	0		2	
2007-2012	07	N 99468 36728	0	0	0		2	
2007-2012	08	N 99484 36785	1	4	5		4	
2007-2012	09	N 99484 36785	0	3	3		4	
2007-2012	10	N 99484 36785	6	11	17		4	
2007-2012	11	N 99484 36785	2	2	4		3	
2007-2012	12	N 99484 36785	5	3	8		3	
2007-2012	13	N 99503 36770	0	0	0		3	
2007-2012	14	N 99503 36770	1	0	1		3	
2007-2012	15	N 99503 36770	0	2	2		3	
2007-2012	16	N 99498 36794	0	0	0		4	
2007-2012	17	N 99498 36794	0	0	0		3	
2007-2012	18	N 99498 36794	0	0	0		3	
2007-2012	19	N 99510 36800	0	0	0		2	

Vertigo moulinsiana monitoring at Louisa Bridge

2007-2012	20	N 99510 36800	0	0	0	2
2007-2012	21	N 99510 36800	0	0	0	2
2007-2012	22	N 99510 36800	0	0	0	2
2007-2012	23	N 99521 36804	4	2	6	4
2007-2012	24	N 99521 36804	2	7	9	4
2007-2012	25	N 99521 36804	3	15	18	4
2007-2012	26	N 99526 36835	0	0	0	4
2007-2012	27	N 99526 36835	0	0	0	4
2007-2012	28	N 99526 36835	0	0	0	3
2007-2012	29	N 99526 36835	0	0	0	3
2007-2012	30	N 99526 36835	0	0	0	3
2007-2012	31	N 99486 36853	2	0	2	3
2007-2012	32	N 99486 36853	4	4	8	4
2007-2012	33	N 99486 36853	2	0	2	3
2007-2012	34	N 99486 36853	0	0	0	3
2007-2012	35	N 99482 36851	1	1	2	4
2007-2012	36	N 99482 36851	7	4	11	4

5. CONDITION ASSESSMENT

5.1 Population Assessment: 3 passes Favourable (green); 2 passes Unfavourable Inadequate (amber); 0-1 passes Unfavourable Bad (red)

Mon. period	Transect	Indicator	Target	Result	Pass/Fail
2007-2012	0	N/A	NO TRANSECT RECORDED		

Mon. period	Indicator	Target	Result	Pass/Fail
2013-2018	Density	5 samples contain at least 10 adult and juvenile snails (based upon at least 20 samples)	2 samples contain at least 10 adult and juvenile snails (31 samples)	Fail
2013-2018	Presence/Absence	V. moulinsiana is present in 50% of the samples where the habitat is optimal (based upon at least 20 samples)	V. moulinsiana is present in 39% of the samples where the habitat is optimal (31 samples)	Fail
2013-2018	Species extent	V. moulinsiana is present in 5 of the 10 sample areas	V. moulinsiana is present in 6 of the 10 sample areas	Pass
2007-2012	Density	5 samples contain at least 10 adult and juvenile snails (based upon at least 20 samples)	5 samples with at least 10 individuals	Pass
2007-2012	Presence/Absence	V. moulinsiana is present in 50% of the samples where the habitat is optimal (based upon at least 20 samples)	in 19 out of 22 samples in 6 positive areas	Pass
2007-2012	Species extent	V. moulinsiana is present in 5 of the 10 sample areas	Present in 6 areas	Pass

Mon. period	Population Notes
2013-2018	While the distribution of the Vertigo moulinsiana population at Louisa Bridge appears to be similar to 2007-2012, with six out of ten sample locations returning positive results, the number of individuals at each location is down on the previous sampling period. In addition, looking at subsamples taken at each of the ten sample locations, only 11 of 31 (35%) are now positive compared with 19 of 36 (53%) in 2007-2012. Based on the criteria of Moorkens & Killeen (2011), the Population Assessment is Unfavourable Bad (red).
2007-2012	the snail is present in moderate to low numbers

5.2 Habitat Assessment: 3 passes Favourable (green); 2 passes Unfavourable Inadequate (amber); 0-1 passes Unfavourable Bad (red)

Vertigo moulinsiana monitoring at Louisa Bridge

5.2.1 Transect level

Mon. period	Transect	Indicator	Target	Result	Pass/Fail
2007-2012	0	N/A	NO TRANSECT RECORDED		

5.2.2 Site level

Mon. period	Indicator	Target	Result	Pass/Fail
2013-2018	Habitat extent	>0.2ha of the site comprising a mosaic of Optimal and sub-optimal habitat	0.51ha Suboptimal or higher	Pass
2007-2012	Habitat extent	>0.2ha of the site comprising a mosaic of Optimal and sub-optimal habitat	0.204 ha	Pass

Mon. period	Indicator	Target	Result	Pass/Fail
2013-2018	Habitat extent	5 of the 10 sample areas are classed as Optimal/Sub-optimal or better	5 of the 10 sample areas are classed as Optimal/Sub-	Pass
2013-2018	Habitat quality	5 of the 10 sample areas fall within soil moisture classes 3-5	7 of the 10 sample areas fall within soil moisture classes 3-	Pass
2007-2012	Habitat extent	5 of the 10 sample areas are dominated by suitable vegetation (Classes I & II)	6 sample areas suitable	Pass
2007-2012	Habitat quality	5 of the 10 sample areas fall within soil moisture classes 3-5	8 sample areas suitable	Pass

Mon. period	Habitat Notes
2013-2018	Overall, the habitat patches at Louisa Bridge appear to be in good condition and largely suitable for <i>Vertigo moulinsiana</i> . The habitats at the lower (northern) end of the site in particular appear to have improved in condition since the survey by Moorkens & Killeen (2011). Based on the criteria of Moorkens & Killeen (2011), the Habitat Assessment for Louisa Bridge is Favourable (green).
2007-2012	Although very small in area, much of the habitat at the site appears to be in good condition for <i>V. moulinsiana</i>

5.3 Future Prospects Assessment

Mon. period	Activity code	Activity description	Location	Intensity	Influence	Area affected	Comment
2013-2018	H05.01	garbage and solid waste	Inside	Low	Negative	5%	
2013-2018	K02.01	species composition change (succession)	Inside	Medium	Negative	20%	Encroachment by trees including <i>Salix</i> spp. and <i>Crataegus monogyna</i> .
2013-2018	K04.05	damage by herbivores (including game species)	Inside	Low	Positive	3%	Deer trampling
2007-2012	J02.01.03	infilling of ditches, dykes, ponds, pools, marshes or pits	Inside	Low	Negative	1.49ha	In the past, serious levels of dumping occurred at the site, resulting in infilling of habitat. This problem appears to have been addressed, but needs to ensure it will not reoccur at some point in the future.
2007-2012	K02.01	species composition change (succession)	Inside	Low	Negative	1.49ha	Early warning of succession has been incorporated in the condition monitoring at this site.

Mon. period	Future Prospects Notes
2013-2018	Threats to the site include succession, littering, and trampling by deer. The soil moisture of the site is maintained by groundwater and this is an important element maintaining the suitability of the site for <i>Vertigo moulinsiana</i> . While the gradual change in vegetation types (suggested by encroachment and trees/scrub) may pose a risk to the target species in the long-term, at the current time the Future Prospects are considered to be Favourable (green).

Vertigo moulinsiana monitoring at Louisa Bridge

Mon. period	Future Prospects Notes
2007-2012	At present the Future Prospects are good

5.4 Overall Assessment

Mon. period	Population assessment	Area of suitable habitat	Future prospects	Overall assessment
2013-2018	Red	Green	Green	Red
2007-2012	Green	Green	Green	Green

Mon. period	Overall Notes
2013-2018	While the Habitat Assessment and Future Prospects for the site are both good, the lower numbers of <i>Vertigo moulinsiana</i> recorded results in an Unfavourable Bad (red) assessment for population. Consequently, the Overall Assessment for the site is Unfavourable Bad (red).
2007-2012	

6. DISCUSSION

Monitoring period
<p>2013-2018</p> <p>Area of occupancy: As in 2007-2012, the habitat that supports <i>Vertigo moulinsiana</i> within this cSAC is the tall marsh habitat at the base of the slope with in the Rye River flood plain. Access is from the main road just to the west of the Louisa Bridge railway station and the Royal Canal.</p> <p>Discussion:</p> <p><i>Vertigo moulinsiana</i> was found at 6 out of 10 sample locations, though in lower numbers than in 2008. The population appears to have decreased, but habitat conditions remain good, and in the lower valley area they appear to have improved such that three out of the four samples in Polygon E were positive. Overall, this site needs no management change or intervention, but it does need to be protected from potentially well-meaning, though damaging, uses such as tree-planting, path creation or other increases in amenity usage. Re-survey in three years' time is important in order to gain further information to allow a fuller assessment of the population trend.</p> <p>Monitoring recommendations:</p> <p>Monitoring recommendations are as per Moorkens & Killeen (2011), on a 3-yearly basis:</p> <ul style="list-style-type: none"> - Take at least 30 samples from a total of 10 sample locations. In field record: vegetation height, vegetation composition, ground moisture class, numbers of <i>Vertigo moulinsiana</i> (adult & juvenile) and other molluscs - Re-determine boundary of the habitat polygons and assign habitat to either Optimal, Optimal-Suboptimal, Suboptimal, Suboptimal-Unsuitable, or Unsuitable - Assess the management regime and impacts upon the habitat for <i>Vertigo moulinsiana</i> - Use results to determine overall condition assessment <p>Management recommendations:</p> <p>There is currently no evidence of active management of the site, with ground moisture maintaining the vegetation. No management actions are recommended for this site, though this may change following future monitoring. Notes pertaining to the land use at this site (e.g. for amenity, parkland, etc.) made by Moorkens & Killeen (2011) should be noted.</p>

Vertigo moulinsiana monitoring at Louisa Bridge

2007-2012

Area of occupancy: The habitat that supports *Vertigo moulinsiana* within this cSAC is the tall marsh habitat at the base of the slope with in the Rye River flood plain. Access is from the main road just to the west of the Louisa Bridge railway station and the Royal Canal.

Discussion:

Comparison of the 2008 results with those from 2006 does not show any significant change. The habitat, and, therefore, the distribution of the snail at Louisa Bridge remains patchy and discontinuous, and the snail is still largely absent from the floodplain in the valley floor. The numbers of snails recorded in 2008 were slightly lower than in 2006, but this is mainly a result of lower numbers of juveniles recorded. This is likely to reflect the timing of the snail's main reproductive event in different years.

Monitoring recommendations:

Given the Favourable Condition of the site, it is recommended that monitoring is carried out at 3 yearly intervals. This should be re-assessed in light of any deterioration of Condition or any changes to site management:

Frequency: Next monitoring due 2011

Methods (see Section 4 of main report for full details). Prescription should follow exactly the 2008 survey as follows:

- Take at least 30 samples from a total of 10 sample locations 1, in field record: vegetation height, vegetation composition, ground moisture class, numbers of *V. moulinsiana* (adult & juvenile) and other molluscs, minimum 10 samples
- Re-determine boundary of the habitat polygons and assign habitat to either Optimal, Optimal & Sub-optimal, Sub-optimal, Sub-optimal and Unsuitable, or Unsuitable
- Assess the management regime and impacts upon the habitat for *V. moulinsiana*
- Use results to determine overall condition assessment

Management recommendations:

Existing Management

The *V. moulinsiana* habitats at this site comprises a single management unit. There is currently no grazing or other active management within the site of the *V. moulinsiana* habitat. In the past there has been very serious dumping within the *V. moulinsiana* upper habitat, but this has been removed and the habitat has shown good recovery.

Proposed management prescription for *Vertigo moulinsiana*

The management at the *V. moulinsiana* habitats at Louisa Bridge should remain the same as the present regime, i.e. no active management for the 2008-2011 period. There should be no grazing, tree planting or amenity paths put along the river flood plain habitat area. There should be no draining, amenity paths or dumping of any kind allowed in the upper spring areas.

In terms of importance, this *V. moulinsiana* population rates highly, as due to the continuous spring water source it is self-sustaining, and management is solely due to wetness levels, which is easier to manage on a long term basis than sites requiring active management. The location of the population at Louisa Bridge at the intersection of the river and the canal is of prime importance for the maintenance and future spread of the species. With more enlightened canal bank management and the encouragement of fringe vegetation along both canal and river, the snail would have an excellent chance of further colonization.

The past problems with dumping and subsequent pollution have largely been addressed, and it is most important that the area is strictly protected from vandalism (see Moorkens 1995), dumping, spraying, drainage of the complex hydrogeological area that drive the springs, and also from well meaning schemes that could inadvertently change the habitat such as tree planting or amenity pathways. As the source of the spring water may be affected by draining and abstraction in locations that are relatively remote from the site, it is important that Kildare County Council consider the requirements of this site when assessing planning applications within the general jurisdiction.

Site report - Vertigo Monitoring

Vertigo moulinsiana monitoring at Ballybeg Lough

1. SITE CODE AND LOCATION DETAILS

1.1 Site code and location

Vertigo Site Code: VmCAM06 **County:** Clare

SAC Site Code: n/a Not in SAC

Location description (from baseline survey):

Monitoring period	Date surveyed	Recorders
2013-2018	30 September & 1 October 2015	John Brophy & Maria Long
2007-2012	29 March 2009	Ian Killeen & Evelyn Moorkens

1.2 General Habitat Description (from baseline survey):

Most of the lake is surrounded by woodland or grassland running right down to a rocky lakeshore, and there is very little potential *V. moulinsiana* habitat. Most of the suitable habitat lies at the very northern end of the lake where a broad swampy margin, dominated by *Carex paniculata* has developed. A large area of less suitable fen occurs further to the north. EU habitats present at *Vertigo moulinsiana* habitat are Alkaline fens: low sedge-rich communities (Annex I Habitat 7230), rich fens of CORINE 54.2 and fen-sedge beds of CORINE 53.3 (Romão, 1996; Devillers et al., 1991). Principal habitats at the site include water fringe vegetation: reedbeds and large sedge communities including: common reed beds, dry *Phragmites* beds (53.112), medium-tall waterside communities (53.14), and large *Carex* beds (53.21).

1.3 Definition of Vegetation Classes (from baseline survey):

Class I: <i>Carex paniculata</i>	Class III: <i>Epilobium hirsutum</i> , <i>Menyanthes trifoliata</i> , <i>Mentha aquatica</i>
Class II: <i>Phragmites australis</i> , <i>Polygonum persicaria</i> , <i>Equisetum fluviatile</i> , <i>Typha angustifolia</i> , <i>Sparganium erectum</i>	Class IV: All other species

1.4 Definition of Soil Moisture Classes (from baseline survey):

- 1: Dry. No visible moisture on ground surface.
- 2: Damp. Ground visibly damp, but water does not rise under pressure.
- 3: Wet. Water rises under light pressure.
- 4: Very wet. Pools of standing water, generally less than 5cm deep.
- 5: Site under water. Entire sampling site in standing or flowing water over 5cm deep.

2. SUMMARY:

The Overall Conservation Assessment for Ballybeg Lough in the monitoring period 2007-2012 was Favourable (green), but this has dropped to Unfavourable Inadequate (amber) for the current monitoring period (2013-2018) due to a drop in the number of positive samples, and also the number of individuals recorded, along the transects. The reason for this drop is unclear, as suitable vegetation is still present, and the wetness continues to be favourable. It may be, therefore, that the apparent drop in the *Vertigo moulinsiana* population is due to natural variation in the population. The habitat polygons at the site have been assessed as the same or better quality than the previous monitoring period, and this, along with the lack of major threats, has resulted in favourable Future Prospects. Polygon A is likely to benefit from intermittent grazing to prevent scrubbing over, with no management currently required for Polygon B, which is wet and supports abundant tall sedge and reed habitat.

3. TRANSECT DETAILS

TRANSECT: 1	MONITORING PERIOD: 2013-2018
Start point:	R 33409 74115 Large <i>Carex paniculata</i> tussock
End point:	R 33457 74135 Large <i>Carex paniculata</i> tussock
Transect length: 50	Direction: SW-NE
Description:	Transect follows the line of <i>Carex Paniculata</i> tussocks along the swampy margin of the lake
Sampling frequency:	Ten samples were taken at approximately 5m intervals

TRANSECT: 2	MONITORING PERIOD: 2013-2018
Start point:	R 33457 74135 Large <i>Carex paniculata</i> tussock
End point:	R 33467 74110 Large <i>Carex paniculata</i> tussock at corner
Transect length: 25	Direction: NW-SE
Description:	Transect follows the line of <i>Carex paniculata</i> tussocks along the swampy margin of the lake
Sampling frequency:	Four samples were taken at approximately 5m intervals

Vertigo moulinsiana monitoring at Ballybeg Lough

TRANSECT: 3 **MONITORING PERIOD:** 2013-2018

Start point: R 33467 74110 Large Carex paniculata tussock at corner

End point: R 33519 74145 Tree

Transect length: 65 **Direction:** SW-NE

Description: Transect follows the line of Carex paniculata tussocks along the swampy margin of the lake

Sampling frequency: Ten samples were taken at approximately 5m intervals

TRANSECT: 4 **MONITORING PERIOD:** 2013-2018

Start point: R 33519 74145 Tree

End point: R 33549 74233 Tree

Transect length: 90 **Direction:** SW-NE/SSE-NNW (dog Leg)

Description: Transect follows the line of Carex paniculata tussocks along the swampy margin of the lake, then crosses Carex disticha and Carex riparia sward

Sampling frequency: Ten samples were taken at approximately 5-10m intervals

TRANSECT: 1 **MONITORING PERIOD:** 2007-2012

Start point: R 33409 74115

End point: R 33457 74135 Large tussock

Transect length: 52 **Direction:**

Description:

Sampling frequency:

TRANSECT: 2 **MONITORING PERIOD:** 2007-2012

Start point: R 33457 74135 Large tussock

End point: R 33467 74110 Tussock on corner

Transect length: 27 **Direction:**

Description:

Sampling frequency:

TRANSECT: 3 **MONITORING PERIOD:** 2007-2012

Start point: R 33467 74110 tussock on corner

End point: R 33519 74145 Tree

Transect length: 63 **Direction:**

Description:

Sampling frequency:

TRANSECT: 4 **MONITORING PERIOD:** 2007-2012

Start point: R 33519 74145 Tree

End point: R 33549 74223 Tree

Transect length: 93 **Direction:**

Description:

Sampling frequency:

4. RESULTS

Polygon habitat characteristics

Monitoring Period: 2013-2018

Polygon	Habitat Type	Area (ha)	Comment
A	Optimal-Suboptimal	1.871	Polygon A status remains Optimal-Suboptimal. Area following shoreline of lake, with large tussocks of Carex paniculata.

Vertigo moulinsiana monitoring at Ballybeg Lough

Monitoring Period: 2013-2018

Polygon	Habitat Type	Area (ha)	Comment
B	Optimal	5.5054	Polygon B status upgraded to Optimal. The south-western section is mostly wet grassland, but the extensive north-eastern section is reed-bed and swamp, with large stands of <i>Phragmites australis</i> and <i>Cladium mariscus</i> .

Monitoring Period: 2007-2012

Polygon	Habitat Type	Area (ha)	Comment
A	Sub-optimal with optimal areas	1.871	Polygon A - along the swamp margins
B	Sub-optimal with unsuitable areas	5.505	Polygon B - larger areas of taller fen or marsh

Transect samples

Mon. period	Transect	Sample	Location	Adults	Juveniles	Total	Veg. class	Wetness	Habitat suitability
Monitoring period 2013-2018 Transect 1 (10 samples)									
2013-2018	1	1	0m	0	1	1	I	2	Optimal
2013-2018	1	2		1	0	1	I	3	Optimal
2013-2018	1	3		0	0	0	I	3	Optimal
2013-2018	1	4		0	0	0	I	3	Optimal
2013-2018	1	5		0	0	0	I	3	Optimal
2013-2018	1	6		0	0	0	I	2	Optimal
2013-2018	1	7		0	0	0	II	3	Optimal
2013-2018	1	8		0	1	1	I	4	Optimal
2013-2018	1	9		2	2	4	I	4	Optimal
2013-2018	1	10		0	1	1	I	3	Optimal
Monitoring period 2013-2018 Transect 2 (4 samples)									
2013-2018	2	1	0m	0	0	0	I	3	Optimal
2013-2018	2	2		0	0	0	II	3	Optimal
2013-2018	2	3		0	0	0	I	3	Optimal
2013-2018	2	4		1	0	1	I	3	Optimal
Monitoring period 2013-2018 Transect 3 (10 samples)									
2013-2018	3	1	0m	1	1	2	I	5	Optimal
2013-2018	3	2		1	0	1	I	5	Optimal
2013-2018	3	3		0	1	1	I	4	Optimal
2013-2018	3	4		0	1	1	I	5	Optimal
2013-2018	3	5		1	0	1	I	3	Optimal
2013-2018	3	6		0	0	0	I	4	Optimal
2013-2018	3	7		1	2	3	I	4	Optimal
2013-2018	3	8		1	1	2	I	5	Optimal
2013-2018	3	9		0	0	0	I	5	Optimal
2013-2018	3	10		0	2	2	I	5	Optimal
Monitoring period 2013-2018 Transect 4 (10 samples)									
2013-2018	4	1	0m	1	0	1	I	4	Optimal
2013-2018	4	2		0	1	1	I	3	Optimal
2013-2018	4	3		0	0	0	I	4	Optimal
2013-2018	4	4		0	0	0	I	4	Optimal
2013-2018	4	5		0	0	0	I	3	Optimal

Vertigo moulinsiana monitoring at Ballybeg Lough

2013-2018	4	6		1	0	1	I	4	Optimal
2013-2018	4	7		0	0	0	IV	5	Suboptimal
2013-2018	4	8		0	0	0	IV	3	Suboptimal
2013-2018	4	9		0	0	0	I	3	Suboptimal
2013-2018	4	10		0	0	0	IV	3	Suboptimal
Monitoring period 2007-2012 Transect 1 (10 samples)									
2007-2012	1	1	0m	13	5	18		3	
2007-2012	1	2	5m	7	2	9		3	
2007-2012	1	3	10m	18	9	27		4	
2007-2012	1	4	15m	4	4	8		3	
2007-2012	1	5	20m	13	1	14		4	
2007-2012	1	6	25m	6	0	6		4	
2007-2012	1	7	30m	26	4	30		4	
2007-2012	1	8	35m	3	1	4		3	
2007-2012	1	9	40m	9	4	13		4	
2007-2012	1	10	45m	31	11	42		4	
Monitoring period 2007-2012 Transect 2 (4 samples)									
2007-2012	2	11	10m	2	0	2		3	
2007-2012	2	12	15m	7	0	7		3	
2007-2012	2	13	20m	6	3	9		3	
2007-2012	2	14	25m	19	8	27		4	
Monitoring period 2007-2012 Transect 3 (12 samples)									
2007-2012	3	15	5m	0	0	0		3	
2007-2012	3	16	10m	1	0	1		3	
2007-2012	3	17	15m	5	1	6		4	
2007-2012	3	18	20m	0	0	0		4	
2007-2012	3	19	25m	2	0	2		3	
2007-2012	3	20	30m	0	0	0		4	
2007-2012	3	21	35m	0	0	0		4	
2007-2012	3	22	40m	7	2	9		3	
2007-2012	3	23	45m	0	0	0		3	
2007-2012	3	24	50m	1	1	2		3	
2007-2012	3	25	55m	5	2	7		3	
2007-2012	3	26	60m	0	1	1		3	
Monitoring period 2007-2012 Transect 4 (15 samples)									
2007-2012	4	27	5m	1	1	2		4	
2007-2012	4	28	10m	14	6	20		5	
2007-2012	4	29	20m	3	1	4		5	
2007-2012	4	30	25m	0	0	0		3	
2007-2012	4	31	30m	0	0	0		4	
2007-2012	4	32	40m	4	0	4		4	
2007-2012	4	33	50m	2	2	4		5	
2007-2012	4	34	55m	0	0	0		5	

Vertigo moulinsiana monitoring at Ballybeg Lough

2007-2012	4	35	60m	0	0	0	4
2007-2012	4	36	65m	13	5	18	4
2007-2012	4	37	70m	1	0	1	4
2007-2012	4	38	75m	0	0	0	4
2007-2012	4	39	80m	0	0	0	4
2007-2012	4	40	85m	5	0	5	3
2007-2012	4	41	90m	1	0	1	4

Spot Samples

Mon. period	Sample	Grid ref.	Adults	Juveniles	Total	Veg. class	Wetness	Habitat suitability
Monitoring period 2013-2018 (3 samples)								
2013-2018	01	R 33743 74247	13	5	18	IV	4	Optimal
2013-2018	02	R 33755 74282	1	0	1	IV	4	Optimal
2013-2018	03	R 33704 74363	3	1	4	IV	3	Optimal

5. CONDITION ASSESSMENT

5.1 Population Assessment: 3 passes Favourable (green); 2 passes Unfavourable Inadequate (amber); 0-1 passes Unfavourable Bad (red)

Mon. period	Transect	Indicator	Target	Result	Pass/Fail
2013-2018	1	Density	At least 5 samples on Transects 1 and 2 should have >10 <i>V. moulinsiana</i> individuals	No samples with >10 individuals	Fail
2013-2018	1	Presence/Absence	<i>V. moulinsiana</i> is present in at least 75% of samples on Transects 1 (min 10 samples) and 2 (min 4 samples)	Present in 43% of samples (5 out of 10 on Transect 1, 1 out of 4 on Transect 2)	Fail
2013-2018	3	Presence/Absence	<i>V. moulinsiana</i> is present in at least 50% of samples on Transects 3 and 4 (minimum 10 samples on each)	Present in 55% of samples (8 out of 10 on Transect 3, 3 out of 10 on Transect 4)	Pass
2007-2012	1	Density	At least 5 samples on Transects 1 and 2 should have >10 <i>V. moulinsiana</i> individuals	7 samples with >10 individuals	Pass
2007-2012	1	Presence/Absence	<i>V. moulinsiana</i> is present in at least 75% of samples on Transects 1 (min 10 samples) and 2 (min 4 samples)	Present in 100% of samples	Pass
2007-2012	3	Presence/Absence	<i>V. moulinsiana</i> is present in at least 50% of samples on Transects 3 and 4 (minimum 10 samples on each)	Present in 59% of samples	Pass

Mon. period	Population Notes
2013-2018	In the monitoring period 2007-2012, <i>Vertigo moulinsiana</i> was recorded at 29 out of 41 sample locations along the four transects (71%), resulting in a Population Assessment of Favourable (green). In the current survey, 17 out of 34 locations along the transects were positive (50%), with the abundances recorded being much lower than the previous survey. Three spot samples taken in Polygon B in 2015 were all positive. Based on the criteria of Moorkens & Killeen (2011), and because of the reduced numbers on the transect, the Population Assessment for Ballybeg Lough is Unfavourable Inadequate (amber).
2007-2012	the snail is widespread in its distribution within the suitable habitat and is locally frequent

5.2 Habitat Assessment: 3 passes Favourable (green); 2 passes Unfavourable Inadequate (amber); 0-1 passes Unfavourable Bad (red)

5.2.1 Transect level

Mon. period	Transect	Indicator	Target	Result	Pass/Fail
2013-2018	1	Habitat extent	Over 80% of the samples on all transects are dominated by suitable vegetation (Classes I & II)	91% of samples	Pass
2013-2018	1	Habitat quality	Over 80% of the samples on all transects fall within soil moisture classes 3-5	94% of samples	Pass

Vertigo moulinsiana monitoring at Ballybeg Lough

2007-2012	1	Habitat extent	Over 80% of the samples on all transects are dominated by suitable vegetation (Classes I & II)	100% of samples	Pass
2007-2012	1	Habitat quality	Over 80% of the samples on all transects fall within soil moisture classes 3-5	100% of samples	Pass

5.2.2 Site level

Mon. period	Indicator	Target	Result	Pass/Fail
2013-2018	Habitat extent	At least 7ha of habitat within Polygons A and B is classed as Optimal and sub-optimal	7.4ha suitable	Pass
2007-2012	Habitat extent	At least 1.7ha of habitat within polygon area A is classed as Optimal and sub-optimal	1.87 ha suitable	Pass

Mon. period	Habitat Notes
2013-2018	Good habitat for <i>Vertigo moulinsiana</i> was found throughout this site, and in particular large areas in Polygon B were identified as both being suitable, and supporting the target species (three out of three positive samples). Based on the criteria of Moorkens & Killeen (2011), the Habitat Assessment for Ballybeg Lough is Favourable (green).
2007-2012	Although the habitat is very restricted in its extent, the site appears to be in good condition for <i>V. moulinsiana</i>

5.3 Future Prospects Assessment

Mon. period	Activity code	Activity description	Location	Intensity	Influence	Area affected	Comment
2013-2018	A04.03	abandonment of pastoral systems, lack of grazing	Inside	Medium	Negative	25%	Cattle no longer grazing - last 5 years
2013-2018	A10.01	removal of hedges and copses or scrub	Inside	High	Negative	1%	Clearance
2013-2018	E03.03	disposal of inert materials	Inside	High	Negative	1%	Some infilling with rock/soil
2013-2018	K02.01	species composition change	Inside	Medium	Negative	25%	Alder, willow, ash scrub
2013-2018	L08	inundation (natural processes)	Inside	-	Neutral	100%	Floods every year - Farmer information
2007-2012	A04.02.01	non intensive cattle grazing	Inside	Low	Neutral	<2ha	The cattle grazing has very little impact on the <i>V. moulinsiana</i> habitat and therefore the impact is neutral.
2007-2012	M01.01	temperature changes (e.g. rise of temperature & extremes)	Inside	Low	Negative	<2ha	Given the susceptibility of the site to flooding, future potential impacts from climate change are likely to be negative. However, rising water levels, to some extent, may result in the suitability of currently marginal habitat elsewhere becoming suitable.
2007-2012	M01.02	droughts and less precipitations	Inside	Low	Negative	<2ha	
2007-2012	M01.03	flooding and rising precipitations	Inside	Low	Negative	<2ha	

Mon. period	Future Prospects Notes
2013-2018	The Future Prospects for Ballybeg Lough for the 2007-2012 monitoring period were assessed as Favourable (green). A number of activities and impacts occur at the site that may affect its ability to support <i>Vertigo moulinsiana</i> into the future.

Vertigo moulinsiana monitoring at Ballybeg Lough

Mon. period	Future Prospects Notes
2013-2018	Succession is occurring across 25% of the site in the form of the spread of trees such as Alder, willow and Ash, which is related to the abandonment of grazing in this area for the previous five years. This is a change from conditions noted by Moorkens & Killeen (2011). The area is said to flood every year (landowner - pers. comm.), but this is considered to be having a neutral effect (the continued presence of the snail at the site suggests that the flooding regime is within its tolerance levels). Very small areas of the site have been affected by scrub removal and infilling. Considering all of the above, it is considered that Vertigo moulinsiana is likely to continue to occur at this site into the future owing to the abundance of habitat present and thus the Future Prospects are Favourable (green).
2007-2012	The impacts are at present and into the foreseeable future, low, and therefore, Future prospects have been assessed as Favourable

5.4 Overall Assessment

Mon. period	Population assessment	Area of suitable habitat	Future prospects	Overall assessment
2013-2018	Amber	Green	Green	Amber
2007-2012	Green	Green	Green	Green

Mon. period	Overall Notes
2013-2018	While the Habitat Assessment and the Future Prospects for Ballybeg Lough have returned a Favourable result, the Unfavourable Inadequate (amber) Population Assessment results in an Overall Assessment of Unfavourable Inadequate (amber).
2007-2012	

6. DISCUSSION

Monitoring period
<p>2013-2018</p> <p>Area of occupancy: Ballybeg Lough lies 2km to the south of Ennis. The Vertigo moulinsiana habitat is at the northern end of the lake. Access is across private land from the R473 road to Labasheeda.</p> <p>Discussion:</p> <p>The Overall Conservation Assessment for Ballybeg Lough in the monitoring period 2007-2012 was Favourable (green), but this has dropped to Unfavourable Inadequate (amber) for the current monitoring period (2013-2018) due to a drop in the number of positive samples, and also the number of individuals recorded, along the transects. The reason for this drop is unclear, as suitable vegetation is still present, and the wetness continues to be favourable. It may be, therefore, that the apparent drop in the Vertigo moulinsiana population is due to natural variation in the population. The habitat polygons at the site have been assessed as the same or better quality than the previous monitoring period, and this, along with the lack of major threats, has resulted in favourable Future Prospects. Polygon A is likely to benefit from intermittent grazing to prevent scrubbing over, with no management currently required for Polygon B, which is wet and supports abundant tall sedge and reed habitat.</p> <p>Monitoring recommendations:</p> <p>Given the fact that the site has dropped from Favourable (green) to Unfavourable Inadequate (amber), it is recommended that monitoring is carried out at three-yearly intervals. Monitoring should follow that of Moorkens & Killeen (2011), with some additions:</p> <ul style="list-style-type: none"> - Repeat Transect 1, in field record: vegetation height, vegetation composition, ground moisture class, numbers of Vertigo moulinsiana (adult & juvenile) and other molluscs, minimum 10 samples - Repeat Transect 2, as above, minimum 4 samples - Repeat Transect 3, as above, minimum 10 samples - Repeat Transect 4, as above, minimum 10 samples - Take at least 2 samples in the most suitable habitat in Polygon B and analyse for molluscan composition - Re-determine boundary of the habitat polygons and assign habitat to either Optimal, Optimal-Suboptimal, Suboptimal, Suboptimal-Unsuitable, or Unsuitable - Assess the management regime and impacts upon the habitat for Vertigo moulinsiana - Use results to determine overall condition assessment <p>Management recommendations:</p> <p>It is recommended that limited non-intensive cattle grazing be reintroduced in Polygon A in order to slow down the effects of succession, though at a level that does not impact vegetation and habitat supporting Vertigo moulinsiana. There is no evidence of management in Polygon B, but the habitat does not appear to require any management at this time. As this site is very close to a major urban centre (Ennis), and is not part of an SAC, it should be flagged as being of high conservation importance with the relevant authorities (especially Clare County Council) immediately by the NPWS. No development should be allowed in or near the site that might impact on the Vertigo moulinsiana habitat.</p>

Vertigo moulinsiana monitoring at Ballybeg Lough

2007-2012

Area of occupancy: Ballybeg Lough lies 2km to the south of Ennis. The *V. moulinsiana* habitat is at the northern end of the lake. Access is across private land from the R473 road to Labasheeda.

Discussion:

Ballybeg Lough is a good site for *Vertigo moulinsiana*. Although restricted to a narrow zone of marginal swamp, optimal and sub-optimal habitat occurs over at least 300m of the lake margin. The snail is present in good numbers over a relatively wide area, and there appear to be few imminent threats.

The *Vertigo moulinsiana* habitat is maintained by its high groundwater table and by inundation of the lake water at wet times of year. The low level of grazing has led to a build up of deep litter which rises above the inundation at times of year when the snails are at litter level. During active periods, the snails are in humid conditions high on the stems of the swamp vegetation. The site would be vulnerable to long term hydrogeological changes, and any water abstraction from the lake or other change that would result in a lowering of the groundwater table at any time of year.

Monitoring recommendations:

Given the Favourable Condition of the site, it is recommended that monitoring is carried out at 3 yearly intervals. This should be re-assessed in light of any deterioration of Condition or any changes to site management:

Frequency: Next monitoring due 2012

Methods (see Section 4 of main report for full details). Prescription as follows:

- Repeat transect 1, in field record: vegetation height, vegetation composition, ground moisture class, numbers of *V. moulinsiana* (adult & juvenile) and other molluscs, minimum 10 samples
- Repeat transect 2, as above, minimum 4 samples
- Repeat transect 3, as above, minimum 10 samples
- Repeat transect 4, as above, minimum 10 samples
- Re-determine boundary of the habitat polygons and assign habitat to either Optimal, Optimal & Sub-optimal, Sub-optimal, Sub-optimal and Unsuitable, or Unsuitable
- Assess the management regime and impacts upon the habitat for *V. moulinsiana*
- Use results to determine overall condition assessment

Management recommendations:

Existing Management

The site is subject to some cattle grazing which could become a problem if it the intensity was increased.

Proposed management prescription for site

No change recommended. The non-intensive cattle grazing should continue at the present rates.

Site report - Vertigo Monitoring

Vertigo moulinsiana monitoring at Cappankelly

1. SITE CODE AND LOCATION DETAILS

1.1 Site code and location

Vertigo Site Code: VmCAM08 **County:** Westmeath

SAC Site Code: n/a Not in SAC

Location description (from baseline survey):

Monitoring period	Date surveyed	Recorders
2013-2018	21 September 2015	John Brophy & Maria Long
2007-2012	9 September 2009	Ian Killeen & Maria Long

1.2 General Habitat Description (from baseline survey):

The lake and its surrounding wetland communities are arranged in distinct zones across a hydrological transition. They include open water, reedswamp, tall sedge, alkaline fen, fen and willow scrub. EU habitats present at Vertigo moulinsiana habitat are Alkaline fens: low sedge-rich communities (Annex I Habitat 7230), rich fens of CORINE 54.2 and fen-sedge beds of CORINE 53.3 (Romão, 1996; Devillers et al., 1991), Calcareous Fen with Cladium mariscus (HD Annex I Habitat 7210; CORINE 53.3). Principal habitats at the site include Cladium mariscus beds, water fringe vegetation: reedbeds and large sedge communities e.g. Glyceria maxima swamp, Carex elata swamp, Typha/Phragmites beds, most communities of Corine 53 (water-fringe vegetation). In small transition areas of lower and more tightly cropped sward at the southern side of the lake, the habitat falls into the Rodwell M10 Pinguicula-Caricetum dioicae Caricion davallianae group, characteristically being distinguished by Carex viridula, C. panicea, Parnassia palustris, Pinguicula vulgaris. They fall within the more general habitat of rich fen and flush (PF1) of Fossitt (2000).

1.3 Definition of Vegetation Classes (from baseline survey):

Class I: Tall Carex species, Cladium mariscus	Class III: Epilobium hirsutum, Menyanthes trifoliata, Mentha aquatica
Class II: Phragmites australis, Polygonum persicaria, Equisetum fluviatile, Typha angustifolia, Sparganium erectum	Class IV: All other species

1.4 Definition of Soil Moisture Classes (from baseline survey):

- 1: Dry. No visible moisture on ground surface.
- 2: Damp. Ground visibly damp, but water does not rise under pressure.
- 3: Wet. Water rises under light pressure.
- 4: Very wet. Pools of standing water, generally less than 5cm deep.
- 5: Site under water. Entire sampling site in standing or flowing water over 5cm deep.

2. SUMMARY:

The Overall Conservation Assessment for Cappankelly has dropped from Favourable (green) in the 2007-2012 monitoring period to Unfavourable Inadequate (amber) for the current monitoring period (2013-2018). This drop is due to the fact that fewer Vertigo moulinsiana individuals were recorded in the samples on the transect (criterion: >20 individuals in at least 12 samples). As the habitat and Future Prospects remain good, the drop in the Population Assessment may be the result of natural fluctuations in the snail's population, rather than reflecting a real decline. Further surveys at this site will help elucidate this. There is currently no requirement for a change to the management of the site, though scrub encroachment may be an issue in the future. It should be noted that this site floods to quite a depth some years (evident in aerial photographs). This is likely to help control scrub, but does not appear to be having a large impact on the target species, as evidenced by its continued widespread presence at the site.

3. TRANSECT DETAILS

TRANSECT: 1	MONITORING PERIOD: 2013-2018
Start point:	N 06183 44799 Lake margin
End point:	N 06253 44773 Lake margin
Transect length: 85	Direction: W-E
Description:	Lake margin with tall sedges and Cladium mariscus. Transect in Moorkens & Killeen (2011) report was given as 'approx. 85m'; 95m shown below is error in database.
Sampling frequency:	Ten samples were taken at approximately 10m intervals

Vertigo moulinsiana monitoring at Cappankelly

TRANSECT: 1 **MONITORING PERIOD:** 2007-2012

Start point: N 06183 44799 Lake margin

End point: N 06253 44773 Lake margin

Transect length: 95 **Direction:**

Description:

Sampling frequency:

4. RESULTS

Polygon habitat characteristics

Monitoring Period: 2013-2018

Polygon	Habitat Type	Area (ha)	Comment
A	Optimal-Suboptimal	0.2236	Polygon A status remains Optimal-Suboptimal. Area of mixed vegetation - grades from wet grassland, to a sedge-dominated sward, to swamp near the water's edge. This area floods some years (seen from aerial photos, and on previous site visit).
B	Optimal	0.194	Polygon B status remains Optimal. Strip of tall wetland vegetation with line of scrub (mostly <i>Salix cinerea</i> subsp. <i>oleifolia</i>).

Monitoring Period: 2007-2012

Polygon	Habitat Type	Area (ha)	Comment
A	Sub-optimal with optimal areas	0.224	Polygon A
B	Optimal	0.189	Polygon B

Transect samples

Mon. period	Transect	Sample	Location	Adults	Juveniles	Total	Veg. class	Wetness	Habitat suitability
Monitoring period 2013-2018 Transect 1 (24 samples)									
2013-2018	1	1	01a; 0m	6	0	6	I	3	Optimal
2013-2018	1	2	01b; 0m	4	1	5	I		Optimal
2013-2018	1	3	01c; 0m	8	4	12	I		Optimal
2013-2018	1	4	02a; 10m	2	0	2	I	3	Optimal
2013-2018	1	5	02b; 10m	7	0	7	I		Optimal
2013-2018	1	6	02c; 10m	9	0	9	I		Optimal
2013-2018	1	7	03a; 20m	0	0	0	I	3	Optimal
2013-2018	1	8	03b; 20m	0	0	0	I		Optimal
2013-2018	1	9	03c; 20m	3	0	3	I		Optimal
2013-2018	1	10	04a; 30m	10	1	11	I	3	Optimal
2013-2018	1	11	04b; 30m	20	0	20	I		Optimal
2013-2018	1	12	04c; 30m	10	1	11	I		Optimal
2013-2018	1	13	05a; 40m	3	0	3	I	3	Optimal
2013-2018	1	14	05b; 40m	5	0	5	I		Optimal
2013-2018	1	15	05c; 40m	4	6	10	I		Optimal
2013-2018	1	16	06a; 50m	0	0	0	I	3	Optimal
2013-2018	1	17	06b; 50m	0	0	0	I		Optimal
2013-2018	1	18	06c; 50m	5	4	9	I		Optimal
2013-2018	1	19	07a; 60m	6	1	7	I	3	Optimal
2013-2018	1	20	07b; 60m	10	1	11	I		Optimal
2013-2018	1	21	07c; 60m	6	0	6	I		Optimal
2013-2018	1	22	08a; 80m	0	0	0	I	3	Optimal

Vertigo moulinsiana monitoring at Cappankelly

2013-2018	1	23	08b; 80m	0	1	1	I	Optimal
2013-2018	1	24	08c; 80m	1	0	1	I	Optimal
Monitoring period 2007-2012 Transect 1 (24 samples)								
2007-2012	1	1	#10a at N06183 44799	26	14	40		5
2007-2012	1	2	#10b at N06183 44799	4	9	13		5
2007-2012	1	3	#11a - 11m on from #10	11	29	40		5
2007-2012	1	4	#11b - 11m on from #10	7	17	24		5
2007-2012	1	5	#12a - N06190 44776	9	8	17		5
2007-2012	1	6	#12b - N06190 44776	2	16	18		5
2007-2012	1	7	#12c - N06190 44776	6	7	13		5
2007-2012	1	8	#12d - N06190 44776	6	1	7		5
2007-2012	1	9	#13a - N06213 44783	17	24	41		5
2007-2012	1	10	#13b - N06213 44783	6	9	15		5
2007-2012	1	11	#14	19	44	63		5
2007-2012	1	12	#15	29	32	61		5
2007-2012	1	13	#16a - N06218 44780	17	52	69		5
2007-2012	1	14	#16b - N06218 44780	29	68	97		5
2007-2012	1	15	#17a - 4m from 16	9	6	15		5
2007-2012	1	16	#17b- 4m from 16	31	44	75		5
2007-2012	1	17	#17c - 4m from 16	24	57	81		5
2007-2012	1	18	#17d - 4m from 16	19	17	36		5
2007-2012	1	19	#18a - N06235 44778	42	28	70		5
2007-2012	1	20	#18b - N06235 44778	29	38	67		5
2007-2012	1	21	#19a - N06245 44772	8	9	17		5
2007-2012	1	22	#19b - N06245 44772	33	12	45		5
2007-2012	1	23	#20a - N06253 44773	31	51	82		5
2007-2012	1	24	#20b - N06253 44773	19	38	57		5

Spot Samples

Mon. period	Sample	Grid ref.	Adults	Juveniles	Total	Veg. class	Wetness	Habitat suitability
Monitoring period 2013-2018 (4 samples)								
2013-2018	01a	N 06228 44849	0	0	0	I	4	Optimal
2013-2018	01b	N 06228 44849	0	0	0	I		Optimal
2013-2018	02a	N 06217 44847	1	0	1	I	4	Optimal

Vertigo moulinsiana monitoring at Cappankelly

2013-2018	02b	N 06217 44847	0	0	0	I	Optimal
Monitoring period 2007-2012 (21 samples)							
2007-2012	25	N 06183 44799	3	0	3		5
2007-2012	26	N 06183 44799	0	0	0		5
2007-2012	27	N 06200 44825	1	0	1		5
2007-2012	28	N 06200 44825	0	0	0		5
2007-2012	29	N 06220 44848	2	0	2		5
2007-2012	30	N 06220 44848	2	2	4		5
2007-2012	31	N 06220 44848	3	1	4		5
2007-2012	32	N 06204 44840	0	0	0		5
2007-2012	33	N 06204 44840	0	1	1		5
2007-2012	34	N 06188 44844	0	0	0		5
2007-2012	35	N 06191 44841	2	0	2		5
2007-2012	36	N 06191 44841	5	4	9		4
2007-2012	37	N 06191 44841	0	0	0		4
2007-2012	38	N 06177 44824	0	0	0		4
2007-2012	39	N 06177 44824	0	0	0		4
2007-2012	40	N 06177 44824	0	0	0		5
2007-2012	41	N 06165 44817	0	0	0		4
2007-2012	42	N 06165 44817	0	0	0		5
2007-2012	43	N 06170 44811	2	0	2		4
2007-2012	44	N 06170 44811	1	0	1		5
2007-2012	45	N 06274 44779	3	1	4		5

5. CONDITION ASSESSMENT

5.1 Population Assessment: 2 passes Favourable (green); 1 pass Unfavourable Inadequate (amber); 0 passes Unfavourable Bad (red)

Mon. period	Transect	Indicator	Target	Result	Pass/Fail
2013-2018	1	Density	12 samples (= 50% of minimum 24 samples) contain at least 20 adult and juvenile snails	1 sample with >20 individuals	Fail
2013-2018	1	Presence/Absence	Vertigo moulinsiana is present in 75% of samples (minimum 24 samples) on the Transect	Present in 79% of samples (all 8 locations positive, with 19 of 24 individual samples positive)	Pass
2007-2012	1	Density	12 samples (= 50% of minimum 24 samples) contain at least 20 adult and juvenile snails	16 samples with >20 individuals	Pass
2007-2012	1	Presence/Absence	V. moulinsiana is present in 75% of samples (minimum 24 samples) on the Transect	present in 24 samples	Pass

Mon. period	Population Notes
2013-2018	In the 2007-2012 monitoring period, Vertigo moulinsiana was recorded at 18 out of 21 locations and in 35 out of 45 individual samples. All 24 samples (at 11 locations) taken on Transect 1 were positive, with good numbers of Vertigo moulinsiana. In the current survey, Vertigo moulinsiana was recorded at 8 out of 10 locations overall, and 19 out of 24 individual samples taken on Transect 1 were positive for the species (though generally in lower numbers than the previous survey). Two locations (with two samples each) were sampled in Polygon A in 2015, with one sample being positive. This compares to 21 samples in total (from 10 locations) sampled in 2009, of which 11 samples were positive. Based on the criteria of Moorkens & Killeen (2011), and because of the dearth of samples with >20 individuals on the transect, the

Vertigo moulinsiana monitoring at Cappankelly

2013-2018	Population Assessment for Cappankelly is Unfavourable Inadequate (amber). Note that Moorkens & Killeen (2011) made no recommendation to take any samples in Polygon A, and do not include results from here in the assessment for this site. As the population appears smaller in this area, we propose to take samples, but not to add an additional assessment criterion.
2007-2012	the snail is present in relatively high numbers

5.2 Habitat Assessment: 3 passes Favourable (green); 2 passes Unfavourable Inadequate (amber); 0-1 passes Unfavourable Bad (red)

5.2.1 Transect level

Mon. period	Transect	Indicator	Target	Result	Pass/Fail
2013-2018	1	Habitat extent	24 samples on the Transect are dominated by suitable vegetation (Classes I & II)	24 samples suitable	Pass
2013-2018	1	Habitat quality	24 samples on the Transect fall within soil moisture classes 3-5	24 samples suitable	Pass
2007-2012	1	Habitat extent	24 samples on the Transect are dominated by suitable vegetation (Classes I & II)	24 samples suitable	Pass
2007-2012	1	Habitat quality	24 samples on the Transect fall within soil moisture classes 3-5	24 samples suitable	Pass

5.2.2 Site level

Mon. period	Indicator	Target	Result	Pass/Fail
2013-2018	Habitat extent	Potentially suitable habitat exists along the southern margins of the lake from N06183 44799 to N06274 44779	Yes. 0.19ha Optimal habitat in Polygon B	Pass
2007-2012	Habitat extent	Potentially suitable habitat exists along the southern margins of the lake from N06183 44799 to N06274 44779	Yes	Pass

Mon. period	Habitat Notes
2013-2018	The 2007-2012 monitoring period survey delineated two habitat polygons supporting <i>Vertigo moulinsiana</i> , and in the current survey, these polygons were found to be unchanged in status, with suitable vegetation and ground moisture recorded. Based on the criteria of Moorkens & Killeen (2011), the Habitat Assessment for Cappankelly is Favourable (green).
2007-2012	Although good <i>V. moulinsiana</i> habitat is restricted, it is in good condition,

5.3 Future Prospects Assessment

Mon. period	Activity code	Activity description	Location	Intensity	Influence	Area affected	Comment
2013-2018	A04.02.01	non intensive cattle grazing	Inside	Low	Negative	50%	Grazing and trampling along edges
2013-2018	K02.01	species composition change	Inside	Low	Negative	35%	<i>Salix cinerea</i> subsp. <i>oleifolia</i> & others
2013-2018	L08	inundation (natural processes)	Inside	Low	Negative	100%	Site floods completely some years as seen on APs
2007-2012	A04.02.01	non intensive cattle grazing	Inside	Low	Neutral	<1ha	The cattle grazing has very little impact on the <i>V. moulinsiana</i> habitat and therefore the impact is neutral.
2007-2012	M01.01	temperature changes (e.g. rise of temperature & extremes)	Inside	Low	Negative	<1ha	Given the susceptibility of the site to flooding, future potential impacts from climate change are likely to be negative.
2007-2012	M01.02	droughts and less precipitations	Inside	Low	Negative	<1ha	
2007-2012	M01.03	flooding and rising precipitations	Inside	Low	Negative	<1ha	

Vertigo moulinsiana monitoring at Cappankelly

Mon. period	Future Prospects Notes
2013-2018	The Future Prospects for Cappankelly were rated as Favourable (green) in the 2007-2012 monitoring period. The current survey recorded non-intensive cattle grazing, flooding and succession all having minor effects on the site. The Future Prospects for Cappankelly are considered, overall, to be Favourable (green).
2007-2012	The impacts are at present and into the foreseeable future, low, and therefore, Future prospects have been assessed as Favourable

5.4 Overall Assessment

Mon. period	Population assessment	Area of suitable habitat	Future prospects	Overall assessment
2013-2018	Amber	Green	Green	Amber
2007-2012	Green	Green	Green	Green

Mon. period	Overall Notes
2013-2018	While the Habitat Assessment and Future Prospects for Cappankelly have returned a Favourable result, the Unfavourable Inadequate (amber) Population Assessment results in an Overall Assessment of Unfavourable Inadequate (amber). This is due to failure to meet the criterion of >20 snails in at least 12 samples on the transect, in spite of 19 out of 24 samples on the transect having the snail present, albeit in lower numbers than the previous survey.
2007-2012	

6. DISCUSSION

Monitoring period
<p>2013-2018</p> <p>Area of occupancy: This small un-named lough lies between the townland of Cappankelly and Friar's Island. Access is from the minor road and then track which runs from Ballykeeran (N074442) to Friar's Island.</p> <p>Discussion:</p> <p>The Overall Conservation Assessment for Cappankelly has dropped from Favourable (green) in the 2007-2012 monitoring period to Unfavourable Inadequate (amber) for the current monitoring period (2013-2018). This drop is due to the fact that fewer <i>Vertigo moulinsiana</i> individuals were recorded in the samples on the transect (criterion: >20 individuals in at least 12 samples). As the habitat and Future Prospects remain good, the drop in the Population Assessment may be the result of natural fluctuations in the snail's population, rather than reflecting a real decline. Further surveys at this site will help elucidate this. There is currently no requirement for a change to the management of the site, though scrub encroachment may be an issue in the future. It should be noted that this site floods to quite a depth some years (evident in aerial photographs). This is likely to help control scrub, but does not appear to be having a large impact on the target species, as evidenced by its continued widespread presence at the site.</p> <p>Monitoring recommendations:</p> <p>Given the apparent drop in the population at this site, it is recommended that monitoring is carried out at three-yearly intervals. Monitoring should follow that set out in Moorkens & Killeen (2011), with one addition, as listed below:</p> <ul style="list-style-type: none"> - Repeat Transect 1, in field record: vegetation height, vegetation composition, ground moisture class, numbers of <i>Vertigo moulinsiana</i> (adult & juvenile) and other molluscs, minimum 24 samples - Take at least 2 samples in at least two locations in the most suitable habitat in Polygon A - Re-determine boundary of the habitat polygons and assign habitat to either Optimal, Optimal-Suboptimal, Suboptimal, Suboptimal-Unsuitable, or Unsuitable - Assess the management regime and impacts upon the habitat for <i>Vertigo moulinsiana</i> - Use results to determine overall condition assessment <p>Management recommendations:</p> <p>The site is currently subject to non-intensive cattle grazing, but at a level that is not negatively impacting on the <i>Vertigo moulinsiana</i> habitat, and so no change is recommended at this time. The potential exists for scrubbing over by <i>Salix</i> spp. and this should be monitored and action taken if shading starts to become a problem.</p>

Vertigo moulinsiana monitoring at Cappankelly

2007-2012

Area of occupancy: This small un-named lough lies between the townland of Cappankelly and Friar's Island. Access is from the minor road and then track which runs from Ballykeeran (N074442) to Friar's Island.

Discussion:

This is a small site with a rather small amount of habitat (less than 200m² optimal). However, it is in good condition with a strong *V. moulinsiana* population. There are few threats but it is subject to frequent inundation, and, therefore, it is especially vulnerable in the longer term to potential effects of climate change.

The *Vertigo moulinsiana* habitat is maintained by its high groundwater table and by inundation of the lake water at wet times of year. The lack of grazing has led to a build up of deep litter which rises above the inundation at times of year when the snails are at litter level. During active periods, the snails are in humid conditions high on the stems of the swamp vegetation. The site would be vulnerable to long term hydrogeological changes, and any water abstraction from the lake or other change that would result in a lowering of the groundwater table at any time of year.

Monitoring recommendations:

Given the Favourable Condition of the site, it is recommended that monitoring is carried out at 3 yearly intervals. This should be re-assessed in light of any deterioration of Condition or any changes to site management:

Frequency: Next monitoring due 2012

Methods (see Section 4 of main report for full details). Prescription as follows:

- Repeat transect 1, in field record: vegetation height, vegetation composition, ground moisture class, numbers of *V. moulinsiana* (adult & juvenile) and other molluscs, minimum 24 samples
- Re-determine boundary of the habitat polygons and assign habitat to either Optimal, Optimal & Sub-optimal, Sub-optimal, Sub-optimal and Unsuitable, or Unsuitable
- Assess the management regime and impacts upon the habitat for *V. moulinsiana*
- Use results to determine overall condition assessment

Management recommendations:

Existing Management

The site is subject to some cattle grazing which could become a problem if it the intensity was increased.

Proposed management prescription for site

No change recommended

Site report - Vertigo Monitoring

Vertigo moulinsiana monitoring at Waterstown Lough

1. SITE CODE AND LOCATION DETAILS

1.1 Site code and location

Vertigo Site Code: VmCAM09 **County:** Westmeath

SAC Site Code: n/a Not in SAC

Location description (from baseline survey):

Monitoring period	Date surveyed	Recorders
2013-2018	22 September 2015	John Brophy & Maria Long
2007-2012	30 September 2009	Ian Killeen & Maria Long

1.2 General Habitat Description (from baseline survey):

The lake and its surrounding wetland communities are arranged in discontinuous but often distinct zones across a hydrological transition. They include open water, reedswamp, tall sedge, alkaline fen, fen-Iris marsh to grassland transition and bog. The general habitat in which *Vertigo moulinsiana* is present at Waterstown Lough is Calcareous Fen (HD Annex I Habitat 7230; CORINE 54.2), Calcareous Fen with *Cladium mariscus* (HD Annex I Habitat 7210; CORINE 53.3), petrifying springs with tufa formation (HD Annex I Habitat 7220; CORINE 54.12), ditch and waterside communities including most communities of CORINE 53 (Romão, 1996; Devillers et al., 1991). Principal habitats at the site include water fringe vegetation: reedbeds and large sedge communities e.g. *Typha/Phragmites* beds, most communities of Corine 53 (water-fringe vegetation), especially: common reed beds, dry *Phragmites* beds (53.112), reedmace beds (53.13), medium-tall waterside communities (53.14). The specific areas that are within a wider mosaic, but that form specific *V. moulinsiana* habitat fit the *Cladium* and *Schoenus* communities of M13, and the tall *Carex* M9 Rodwell characteristic vegetation classification (Rodwell, 1991). In transition areas at the northern end of the site, the habitat falls into the Rodwell M10 *Pinguicula-Caricetum dioicae* *Caricion davallianae* group, characteristically being distinguished by *Carex viridula*, *C. panicea*, *Parnassia palustris*, *Campylium stellatum*, *Pinguicula vulgaris*, *Selaginella selaginoides*, and *Drepanocladus revolvens*. These communities merge into one another with throughout the habitat. They fall within the more general habitat of rich fen and flush (PF1) of Fossitt (2000).

1.3 Definition of Vegetation Classes (from baseline survey):

Class I: Tall <i>Carex</i> species, <i>Phragmites australis</i>	Class III: <i>Carex paniculata</i> , <i>Mentha aquatica</i>
Class II: <i>Cladium mariscus</i> , <i>Equisetum fluviatile</i> , <i>Schoenus nigricans</i>	Class IV: All other species

1.4 Definition of Soil Moisture Classes (from baseline survey):

- 1: Dry. No visible moisture on ground surface.
- 2: Damp. Ground visibly damp, but water does not rise under pressure.
- 3: Wet. Water rises under light pressure.
- 4: Very wet. Pools of standing water, generally less than 5cm deep.
- 5: Site under water. Entire sampling site in standing or flowing water over 5cm deep.

2. SUMMARY:

Waterstown Lough is a very important site, as it supports all three Annex II *Vertigo* species (*Vertigo angustior*, *Vertigo geyeri* and *Vertigo moulinsiana*); one of only two sites to do so in Ireland, the other being Pollardstown Fen. The site has dropped from Favourable (green) to Unfavourable Bad (red) in the current monitoring round for *Vertigo moulinsiana*. This is due to a dramatic drop in the abundance of this species at the site. It is unclear what has caused this drop, given that there appears to be extensive suitable habitat, and no obviously severe impacts were noted. The reduction in the *Vertigo moulinsiana* population at the site may be due to natural fluctuations in the population, or it may be the case that some subtle change has taken place at the site. None of the activities identified at the site (e.g. cattle grazing, water abstraction at springs, etc.) are considered sufficient to cause such a widespread negative effect on the *Vertigo moulinsiana* population at the site. The possibility that natural succession processes, leading to drying as the lake infills, cannot be ruled out; however, all areas with potential for *Vertigo moulinsiana* appear adequately wet.

If focus is shifted a little wider, land use in the surrounding area includes turf cutting and drainage on the raised bog to the west and south of the site, and forestry and its associated works to the north-west and south-east. Research is needed to ascertain if any of these activities may be resulting in changes to the water chemistry (e.g. becoming more acid), water quality (e.g. increased siltation) or hydrological/flooding regime (e.g. lowering of water table) of Waterstown Lough. Extreme care is needed in terms of any activities in the vicinity of this site (e.g. further turf-cutting, drainage or forestry plantings). These activities need to be carefully monitored, and further/new works should not be permitted. This site is currently designation as a pNHA (Waterstown Lake pNHA, 001732), but should be considered for SAC status based on the occurrence of all three *Vertigo* species.

3. TRANSECT DETAILS

TRANSECT: 0	MONITORING PERIOD: 2013-2018
Start point:	NO TRANSECT RECORDED
End point:	
Transect length:	Direction:

Vertigo moulinsiana monitoring at Waterstown Lough

Description:

Sampling frequency:

TRANSECT: 0 **MONITORING PERIOD:** 2007-2012

Start point: NO TRANSECT RECORDED

End point:

Transect length: **Direction:**

Description:

Sampling frequency:

4. RESULTS

Polygon habitat characteristics

Monitoring Period: 2013-2018

Polygon	Habitat Type	Area (ha)	Comment
A	Optimal-Suboptimal	4.3045	Polygon A status remains Optimal-Suboptimal. Fen habitat grading into reed-bed.
B	Optimal-Suboptimal	12.8695	Polygon B - Not previously surveyed by Moorkens & Killeen (2011). Status is Optimal-Suboptimal. Many areas difficult to access. Much of the habitat is reed-bed, and many areas floating/quaking. (Note: Polygon C is included below due to a database error, as it is a polygon for Vertigo geyeri)

Monitoring Period: 2007-2012

Polygon	Habitat Type	Area (ha)	Comment
A	Sub-optimal with optimal areas	4.303	Polygon A
B	Sub-optimal with optimal areas	9.528	Polygon B Potential Sub-optimal and optimal habitat but not surveyed due to inaccessibility
C	Sub-optimal	2.157	Polygon C - Sub-optimal habitat for Vertigo geyeri

Transect samples

Mon. period	Transect	Sample	Location	Adults	Juveniles	Total	Veg. class	Wetness	Habitat suitability
2013-2018	0	0	NO TRANSECT RECORDED						
2007-2012	0	0	NO TRANSECT RECORDED						

Spot Samples

Mon. period	Sample	Grid ref.	Adults	Juveniles	Total	Veg. class	Wetness	Habitat suitability
Monitoring period 2013-2018 (60 samples)								
2013-2018	01a	N 10295 45854	0	0	0	I	4	Optimal
2013-2018	01b	N 10295 45854	0	0	0	I		Optimal
2013-2018	01c	N 10295 45854	0	0	0	I		Optimal
2013-2018	02a	N 10280 45844	0	0	0	I	4	Optimal
2013-2018	02b	N 10280 45844	0	0	0	I		Optimal
2013-2018	02c	N 10280 45844	0	1	1	I		Optimal
2013-2018	03a	N 10265 45828	0	0	0	II	4	Optimal-Suboptimal
2013-2018	03b	N 10265 45828	0	0	0	II		Optimal-Suboptimal
2013-2018	03c	N 10265 45828	0	0	0	II		Optimal-Suboptimal
2013-2018	04a	N 10260 45852	0	0	0	II	3	Optimal-Suboptimal

Vertigo moulinsiana monitoring at Waterstown Lough

2013-2018	04b	N 10260 45852	0	0	0	II		Optimal-Suboptimal
2013-2018	04c	N 10260 45852	0	0	0	II		Optimal-Suboptimal
2013-2018	05a	N 10238 45790	0	0	0	I	4	Optimal
2013-2018	05b	N 10238 45790	0	0	0	I		Optimal
2013-2018	05c	N 10238 45790	0	0	0	I		Optimal
2013-2018	06a	N 10205 45737	0	0	0	I	3	Optimal
2013-2018	06b	N 10205 45737	0	1	1	I		Optimal
2013-2018	06c	N 10205 45737	0	1	1	I		Optimal
2013-2018	07a	N 10184 45861	0	0	0	II	4	Optimal-Suboptimal
2013-2018	07b	N 10184 45861	0	0	0	II		Optimal-Suboptimal
2013-2018	07c	N 10184 45861	0	0	0	II		Optimal-Suboptimal
2013-2018	08a	N 10141 45914	1	1	2	I	4	Optimal
2013-2018	08b	N 10141 45914	0	2	2	I		Optimal
2013-2018	08c	N 10141 45914	0	2	2	I		Optimal
2013-2018	09a	N 10122 45960	0	0	0	I	4	Optimal
2013-2018	09b	N 10122 45960	0	0	0	I		Optimal
2013-2018	09c	N 10122 45960	0	1	1	I		Optimal
2013-2018	10a	N 10089 46011	0	0	0	I	4	Optimal
2013-2018	10b	N 10089 46011	0	1	1	I		Optimal
2013-2018	10c	N 10089 46011	0	0	0	I		Optimal
2013-2018	11a	N 10047 46045	0	0	0	I	3	Optimal
2013-2018	11b	N 10047 46045	0	1	1	I		Optimal
2013-2018	11c	N 10047 46045	0	0	0	I		Optimal
2013-2018	12a	N 10071 46081	0	0	0	II	2	Optimal-Suboptimal
2013-2018	12b	N 10071 46081	0	0	0	II		Optimal-Suboptimal
2013-2018	12c	N 10071 46081	0	0	0	II		Optimal-Suboptimal
2013-2018	13a	N 10061 46100	0	0	0	II	3	Optimal-Suboptimal
2013-2018	13b	N 10061 46100	0	0	0	II		Optimal-Suboptimal
2013-2018	13c	N 10061 46100	0	0	0	II		Optimal-Suboptimal
2013-2018	14a	N 10077 46108	0	0	0	II	4	Optimal-Suboptimal
2013-2018	14b	N 10077 46108	0	0	0	II		Optimal-Suboptimal
2013-2018	14c	N 10077 46108	0	0	0	II		Optimal-Suboptimal
2013-2018	15a	N 10010 46087	0	0	0	I	3	Optimal
2013-2018	15b	N 10010 46087	0	0	0	I		Optimal
2013-2018	15c	N 10010 46087	0	0	0	I		Optimal
2013-2018	16a	N 10058 45641	0	0	0	I	3	Optimal
2013-2018	16b	N 10058 45641	0	0	0	I		Optimal
2013-2018	16c	N 10058 45641	0	0	0	I		Optimal
2013-2018	17a	N 10081 45618	1	0	1	I	3	Optimal
2013-2018	17b	N 10081 45618	0	0	0	I		Optimal

Vertigo moulinsiana monitoring at Waterstown Lough

2013-2018	17c	N 10081 45618	0	1	1	I		Optimal
2013-2018	18a	N 09856 45403	0	0	0	II	3	Optimal-Suboptimal
2013-2018	18b	N 09848 45410	0	0	0	II		Optimal-Suboptimal
2013-2018	18c	N 09849 45408	0	0	0	II		Optimal-Suboptimal
2013-2018	19a	N 09846 45423	0	0	0	I	3	Optimal
2013-2018	19b	N 09845 45430	0	0	0	I		Optimal
2013-2018	19c	N 09844 45428	0	0	0	I		Optimal
2013-2018	20a	N 09801 45404	0	0	0	I	2	Optimal
2013-2018	20b	N 09805 45403	0	0	0	I		Optimal
2013-2018	20c	N 09809 45399	0	0	0	I		Optimal

Monitoring period 2007-2012 (41 samples)

2007-2012	01	N 10321 45853	0	0	0		3	
2007-2012	02	N 10321 45853	0	0	0		4	
2007-2012	03	N 10309 45852	6	9	15		4	
2007-2012	04	N 10309 45852	2	13	15		4	
2007-2012	05	N 10293 45856	5	17	22		4	
2007-2012	06	N 10293 45856	0	2	2		3	
2007-2012	07	N 10293 45856	2	12	14		3	
2007-2012	08	N 10293 45856	0	0	0		4	
2007-2012	09	N 10293 45856	0	0	0		4	
2007-2012	10	N 10282 45842	0	7	7		4	
2007-2012	11	N 10282 45842	11	32	43		4	
2007-2012	12	N 10282 45842	0	0	0		4	
2007-2012	13	N 10278 45851	2	9	11		3	
2007-2012	14	N 10262 45848	3	9	12		3	
2007-2012	15	N 10262 45848	0	4	4		3	
2007-2012	16	N 10217 45761	9	19	28		3	
2007-2012	17	N 10217 45761	2	8	10		3	
2007-2012	18	N 10202 45711	2	5	7		4	
2007-2012	19	N 10202 45711	0	15	15		4	
2007-2012	20	N 10237 45787	0	0	0		3	
2007-2012	21	N 10237 45787	1	0	1		3	
2007-2012	22	N 10197 45869	65	58	123		4	
2007-2012	23	N 10197 45869	45	38	83		4	
2007-2012	24	N 10204 45887	2	2	4		3	
2007-2012	25	N 10204 45887	0	1	1		3	
2007-2012	26	N 10151 45914	21	13	34		4	
2007-2012	27	N 10151 45914	11	11	22		4	
2007-2012	28	N 10079 46083	21	13	34		4	
2007-2012	29	N 10079 46083	2	0	2		4	

Vertigo moulinsiana monitoring at Waterstown Lough

2007-2012	30	N 10039 46081	80	25	105	4
2007-2012	31	N 09978 46089	6	3	9	3
2007-2012	32	N 09978 46089	7	17	24	3
2007-2012	33	N 09978 46089	4	12	16	3
2007-2012	34	N 09994 46129	11	4	15	3
2007-2012	35	N 09994 46129	28	19	47	3
2007-2012	36	N 10062 46131	5	3	8	4
2007-2012	37	N 10079 46111	0	1	1	3
2007-2012	38	N 10086 46088	2	2	4	3
2007-2012	39	N 10147 45984	0	0	0	
2007-2012	40	N 10182 45938	0	0	0	
2007-2012	41	N 10272 45861	0	0	0	

5. CONDITION ASSESSMENT

5.1 Population Assessment: 2 passes Favourable (green); 1 pass Unfavourable Inadequate (amber); 0 passes Unfavourable Bad (red)

Mon. period	Transect	Indicator	Target	Result	Pass/Fail
2013-2018	0	N/A	NO TRANSECT RECORDED		
2007-2012	0	N/A	NO TRANSECT RECORDED		

Mon. period	Indicator	Target	Result	Pass/Fail
2013-2018	Density	25% of the samples (from a minimum of 45 samples) should have over 20 individuals	No samples with >20 individuals	Fail
2013-2018	Presence/Absence	Adult or sub-adult snails are present in samples from at least 10 separate locations (minimum 45 samples from 15 locations with a geographical spread)	Present in 7 out of 20 sample sites (11 out of 60 individuals samples)	Fail
2007-2012	Density	25% of the samples (from a minimum of 45 samples) should have over 20 individuals	11 of the 38 samples have >20 individuals	Pass
2007-2012	Presence/Absence	Adult or sub-adult snails are present in samples from at least 10 separate locations (minimum 45 samples from 15 locations with a geographical spread)	Present in 16 out of 18	Pass

Mon. period	Population Notes
2013-2018	In the survey conducted in 2009 as part of the 2007-2012 monitoring period, <i>Vertigo moulinsiana</i> was recorded at 17 out of 18 locations (and in 32 out of 38 samples, or 84%), with good numbers present throughout. The Population Assessment was determined to be Favourable (green). In the current survey, <i>Vertigo moulinsiana</i> was recorded from 7 out of 20 locations (and in 11 out of 60 samples, or 18%) and in very low numbers (typically 1-2 juveniles only). These positive locations were, however, quite widely spread across the north, north-eastern and central portions of the site. Based on the criteria of Moorkens & Killeen (2011), the Population Assessment for Waterstown Lough is Unfavourable Bad (red).
2007-2012	the snail is widespread in its distribution and is locally common

5.2 Habitat Assessment: 3 passes Favourable (green); 2 passes Unfavourable Inadequate (amber); 0-1 passes Unfavourable Bad (red)

5.2.1 Transect level

Mon. period	Transect	Indicator	Target	Result	Pass/Fail
2013-2018	0	N/A	NO TRANSECT RECORDED		
2007-2012	0	N/A	NO TRANSECT RECORDED		

5.2.2 Site level

Mon. period	Indicator	Target	Result	Pass/Fail
2013-2018	Habitat extent	Over 4 ha of the northern part of the	4.3ha Optimal-	Pass

Vertigo moulinsiana monitoring at Waterstown Lough

2013-2018	Habitat extent	site sub-optimal and optimal areas	Suboptimal	Pass
2007-2012	Habitat extent	Over 4ha of the northern part of the site sub-optimal and optimal areas	4.3 ha	Pass

Mon. period	Indicator	Target	Result	Pass/Fail
2013-2018	Habitat extent	Over 80% of the samples sites near are dominated by suitable vegetation (Classes I & II)	100% of samples	Pass
2013-2018	Habitat quality	Over 80% of the sample sites fall within soil moisture classes 3-5	95% of samples	Pass
2007-2012	Habitat extent	Over 80% of the samples sites near are dominated by suitable vegetation (Classes I & II)	100%	Pass
2007-2012	Habitat quality	Over 80% of the sample sites fall within soil moisture classes 3-5	100%	Pass

Mon. period	Habitat Notes
2013-2018	Extensive areas of potentially suitable habitat for <i>Vertigo moulinsiana</i> appear to occur at this site. Some areas are difficult to access because they are quaking and/or floating, and in other areas, are cut off by large, deep drains (southern and western parts in particular). However, all areas visited have the potential to support <i>Vertigo moulinsiana</i> , and as noted above, the species was found to be quite widespread in north, north-eastern and central parts of the site. Based on the criteria of Moorkens & Killeen (2011), the Habitat Assessment for Waterstown Lough is Favourable (green).
2007-2012	Much of the habitat at the site appears to be in good condition for <i>V. moulinsiana</i>

5.3 Future Prospects Assessment

Mon. period	Activity code	Activity description	Location	Intensity	Influence	Area affected	Comment
2013-2018	A04.02.01	non intensive cattle grazing	Inside	Low	Negative	30%	Grazing at edges reducing vegetation height
2013-2018	D03.01.02	piers / tourist harbours or recreational piers	Inside	Low	Negative	1%	Small, old boat jetty. Two small boats.
2013-2018	F06.01	game/ bird breeding station	Inside	Low	Negative	1%	Pheasantry at north end of site
2013-2018	J02.07	Water abstractions from groundwater	Inside	Low	Negative	5%	Very difficult to assess what effect, if any, this water abstraction is having on the site. Site appears sufficiently wet.
2013-2018	K01.03	Drying out	Inside	Low	Negative	100%	Site may be drying out as reeds fill the lake
2007-2012	A04.02.01	non intensive cattle grazing	Inside	Low	Negative	<1ha	
2007-2012	A04.03	abandonment of pastoral systems, lack of grazing	Inside	Low	Negative	<1ha	The lack of grazing (A04.03) refers to a small part of polygon area A where the landowner has recently fenced off part of the Schoenus dominated habitat. Already this has led to a spread of <i>Rhododendron</i> in the area. In the medium to long term the habitat in this area is likely to become less suitable, but in terms of the overall site, it will have little impact.

Mon. period	Future Prospects Notes
2013-2018	The Future Prospects for Waterstown Lough in the monitoring period 2007-2012 were assessed as Favourable (green). In

Vertigo moulinsiana monitoring at Waterstown Lough

Mon. period	Future Prospects Notes
2013-2018	the current survey, a number of activities and impacts were noted at this site that could potentially affect its suitability for <i>Vertigo moulinsiana</i> . Non-intensive cattle grazing has resulted in a reduction in vegetation height along the edges of the reedbeds in part of the site. The pheasantry and the jetty have resulted in some loss of habitat. In terms of the hydrology, which is critical at this site as with other wetlands, the site may be drying out as the lake infills and reeds extend their range into the lake (for example, the six-inch map from the early 1900s shows a much larger area of open water than that which occurs today). However, all areas with potential for <i>Vertigo moulinsiana</i> were adequately wet for the species at the time of survey. Water abstraction is occurring to provide water for a house adjacent to the site, but is likely to have only a localised effect. None of these impacts appear widespread in their effects, or serious in their intensity, and so the Future Prospects for Waterstown Lough are considered to be Favourable (green).
2007-2012	As the impact is low rather than severe, Future prospects have been assessed as Favourable

5.4 Overall Assessment

Mon. period	Population assessment	Area of suitable habitat	Future prospects	Overall assessment
2013-2018	Red	Green	Green	Red
2007-2012	Green	Green	Green	Green

Mon. period	Overall Notes
2013-2018	While the Habitat Assessment and Future Prospects for Waterstown Lough have returned a Favourable (green) result, the Unfavourable Bad (red) Population Assessment results in an Overall Assessment of Unfavourable Bad (red).
2007-2012	Waterstown Lough is a very good site for <i>Vertigo moulinsiana</i> . Optimal habitat occurs over an area of at least 16ha and possibly more. The snail is present in good numbers over a wide area, and there appear to be few imminent threats.

6. DISCUSSION

Monitoring period
<p>2013-2018</p> <p>Area of occupancy: Waterstown Lough lies to the east of the southern end of Lough Ree, approximately 5km north-east of Athlone. Access to the main sample site is along a private track off the main track from N105458.</p> <p>Discussion:</p> <p>Waterstown Lough is a very important site, as it supports all three Annex II <i>Vertigo</i> species (<i>Vertigo angustior</i>, <i>Vertigo geyeri</i> and <i>Vertigo moulinsiana</i>); one of only two sites to do so in Ireland, the other being Pollardstown Fen. The site has dropped from Favourable (green) to Unfavourable Bad (red) in the current monitoring round for <i>Vertigo moulinsiana</i>. This is due to a dramatic drop in the abundance of this species at the site. It is unclear what has caused this drop, given that there appears to be extensive suitable habitat, and no obviously severe impacts were noted. The reduction in the <i>Vertigo moulinsiana</i> population at the site may be due to natural fluctuations in the population, or it may be the case that some subtle change has taken place at the site. None of the activities identified at the site (e.g. cattle grazing, water abstraction at springs, etc.) are considered sufficient to cause such a widespread negative effect on the <i>Vertigo moulinsiana</i> population at the site. The possibility that natural succession processes, leading to drying as the lake infills, cannot be ruled out; however, all areas with potential for <i>Vertigo moulinsiana</i> appear adequately wet.</p> <p>If the focus is shifted a little wider, land use in the surrounding area includes turf cutting and drainage on the raised bog to the west and south of the site, and forestry and its associated works to the north-west and south-east. Research is needed to ascertain if any of these activities may be resulting in changes to the water chemistry (e.g. becoming more acid), water quality (e.g. increased siltation) or hydrological/flooding regime (e.g. lowering of water table) of Waterstown Lough. Extreme care is needed in terms of any activities in the vicinity of this site (e.g. further turf-cutting, drainage or forestry plantings). These activities need to be carefully monitored, and further/new works should not be permitted. This site is currently designation as a pNHA (Waterstown Lake pNHA, 001732), but should be considered for SAC status based on the occurrence of all three <i>Vertigo</i> species.</p> <p>Monitoring recommendations:</p> <p>Due to the drop in status from Favourable to Unfavourable Bad, it is recommended that monitoring of Waterstown Lough is carried out at a minimum of two-yearly intervals, particularly because of its almost unique status in supporting all three protected <i>Vertigo</i> species. This should be re-assessed in light of any further deterioration of condition or any changes to site management. Monitoring should follow that of Moorkens & Killeen (2011), with just a minor alteration, as shown below:</p> <ul style="list-style-type: none"> - Take 3 samples at each from at least 15 locations with optimal habitat, in field record: vegetation height, vegetation composition, ground moisture class, numbers of <i>Vertigo moulinsiana</i> (adult & juvenile) and other molluscs, minimum 10 samples. At least two samples to be from Polygon B. - Re-determine boundary of the habitat polygons and assign habitat to either Optimal, Optimal-Suboptimal, Suboptimal, Suboptimal-Unsuitable, or Unsuitable - Assess the management regime and impacts upon the habitat for <i>Vertigo moulinsiana</i> - Use results to determine overall condition assessment

Vertigo moulinsiana monitoring at Waterstown Lough

Management recommendations:

The main form of land management in Polygon A is non-intensive cattle grazing. At this site, the needs of all three *Vertigo* species need to be balanced. While cattle may poach *Vertigo geyeri* habitat, they are crucial in maintaining it open. Cattle tend to be less necessary in *Vertigo moulinsiana* habitat, and if levels are high, they can graze or trample vegetation so that it becomes too low. At this site however, while both effects mentioned above were seen in places, the balance is about right. Thus it is recommended that the status quo be maintained.

There is little management taking place in Polygon B, apart from minor vegetation clearance along small, rough tracks for access for shooting. This is very small scale and not seen to be detrimental. Again, the status quo should remain.

As noted in the discussion section, the answer to the decrease in *Vertigo moulinsiana* numbers MAY come from land management outside this site, relating to turf-cutting and/or forestry plantations. These activities need to be carefully monitored, and further/new works should not be permitted.

2007-2012

Area of occupancy: Waterstown Lough lies to the east of the southern end of Lough Ree, approximately 5km north-east of Athlone. Access to the main sample site is along a private track off the main track from N105458.

Discussion:

Of particular interest was the discovery of *Vertigo geyeri*, *V. angustior* and *Pupilla pratensis*. Waterstown Lough is one of only 2 known sites in Ireland where all 3 Annex II *Vertigo* species are known (Pollardstown Fen is the other). *Vertigo geyeri* occurred in good numbers in the samples. However, the calcareous flush habitat is vulnerable as it is trampled by cattle. Two individuals of *V. angustior* were retrieved from sample 21 which was taken higher up the flush slope nearer the transition into Iris habitat. It is more likely that the Iris transition is its principal habitat at the site.

Waterstown Lough is one of only 2 known sites in Ireland for *Pupilla pratensis* (the other is Clonaslee Eskers, Co Laois). It was first recognised in Ireland at Clonaslee having previously been recorded as *P. muscorum*. The species occurs in the transition zone between the botanically diverse spring seepage with some patches of tufa formation and the wet Iris and *Potentilla anserina* grassland transition. *Pupilla pratensis* appears to be a rare species in Ireland as no other sites have been located during extensive studies of similar habitats as part of this *Vertigo* SAC monitoring programme for National Parks & Wildlife or during other surveys of suitable habitats.

Monitoring recommendations:

Although the site is in good condition for *Vertigo moulinsiana* in terms of distribution and abundance, it is recommended that monitoring is carried out at a minimum of 3 yearly intervals. This should be re-assessed in light of any deterioration of Condition or any changes to site management:

Frequency: Next monitoring due 2012

Methods (see Section 4 of main report for full details). Prescription as follows:

- Take 3 samples at each from at least 15 locations with optimal habitat, in field record: vegetation height, vegetation composition, ground moisture class, numbers of *V. moulinsiana* (adult & juvenile) and other molluscs, minimum 10 samples
- Re-determine boundary of the habitat polygons and assign habitat to either Optimal, Optimal & Sub-optimal, Sub-optimal, Sub-optimal and Unsuitable, or Unsuitable
- Assess the management regime and impacts upon the habitat for *V. moulinsiana*
- Use results to determine overall condition assessment

This site is of high importance. It is strongly recommended that surveys to assess the status of *Vertigo geyeri* and *V. angustior* are instigated as soon as possible.

Management recommendations:

Existing Management

The northern end of the site (i.e. that with the 3 *Vertigo* species) is in private ownership. There are cattle in the lake margins and there was some poaching of the calcareous springs, which is likely to affect *V. geyeri* rather than *V. moulinsiana* at the site. One area has been fenced off for pheasant rearing. There is also some management of the marginal vegetation for wildfowl rearing (or shooting).

Proposed management prescription for site

Given the importance of the site, it is recommended that cattle are managed in a way that is protective to the spring habitats, and are moved away through temporary electric fencing or other enclosure partition when the springs are vulnerable to trampling (very wet conditions where damage is likely to be high or very dry conditions where the cattle may preferentially graze along the spring line). Cattle numbers should not be increased in density, and supplementary feeding should not occur within the important habitat areas mentioned above. The habitat area should not be drained or fertilised. As the management has been non-intensive to date, this is essentially maintenance of the status quo.

Site report - Vertigo Monitoring

Vertigo moulinsiana monitoring at Ballynafagh Bog

1. SITE CODE AND LOCATION DETAILS

1.1 Site code and location

Vertigo Site Code: VmCAM10 **County:** Kildare

SAC Site Code: 000391 Ballynafagh Bog

Location description (from baseline survey):

Monitoring period	Date surveyed	Recorders
2013-2018	5-6 October 2015	John Brophy & Maria Long
2007-2012	10 August 2009	Ian Killeen & Maria Long

1.2 General Habitat Description (from baseline survey):

The general habitat in which *Vertigo moulinsiana* is present at Ballynafagh Lake and the Blackwood Feeder is a low lying area of swamp fen. The EU habitats that this relates to are Alkaline Fen (Annex I 7230), water fringe vegetation comprising medium-tall waterside communities (CORINE 53.14) and reed sweetgrass beds (CORINE 53.16) with some rich fen characteristics (CORINE 54.2,) (Romão, 1996; Devillers et al., 1991). The snail is widespread around the lake margins, becoming less dense as habitat becomes drier away from the lake. It is found in parts of the dried canal feeder that still have some spring or water input, and maintain swamp conditions. It was mainly found on found typically on *Carex paniculata*, *Carex riparia*, *Glyceria maxima*, *Phalaris arundinacea*, and *Iris pseudacorus*, and *Phragmites australis*. The water table was above ground surface level in the best *V. moulinsiana* habitats. *V. moulinsiana* is also found in a swampy ditch dominated by tall carices and *Sparganium erectum* on the north side of the Grand Canal, west of Bonyng Bridge. The specific areas that are within a wider mosaic, but that form specific *V. moulinsiana* habitat fit the Filipendula mire of the M27 and the tall *Carex* M9 Rodwell characteristic vegetation classification (Rodwell, 1991). This falls within the more general habitat of rich fen and flush (PF1), reed and large sedge swamps (FS1) and tall herb swamps (FS2) of Fossitt (2000).

1.3 Definition of Vegetation Classes (from baseline survey):

Class I: Tall <i>Carex</i> species, <i>Glyceria maxima</i> , <i>Typha angustifolia</i> , <i>Sparganium erectum</i>	Class III: <i>Filipendula ulmaria</i> , <i>Epilobium hirsutum</i> , <i>Menyanthes trifoliata</i> , <i>Mentha aquatica</i> , <i>Schoenus nigricans</i>
Class II: <i>Phragmites australis</i> , <i>Cladium mariscus</i> , <i>Carex rostrata</i> , <i>Equisetum fluviatile</i>	Class IV: All other species

1.4 Definition of Soil Moisture Classes (from baseline survey):

- 1: Dry. No visible moisture on ground surface.
- 2: Damp. Ground visibly damp, but water does not rise under pressure.
- 3: Wet. Water rises under light pressure.
- 4: Very wet. Pools of standing water, generally less than 5cm deep.
- 5: Site under water. Entire sampling site in standing or flowing water over 5cm deep.

2. SUMMARY:

As noted by Moorkens & Killeen (2011), this is an important site for *Vertigo moulinsiana* given the loss of the snail from other canal-side locations in Co. Kildare. This is a site which has seen a serious decline in recent years, and is in need of immediate and broad-ranging conservation actions if the species is to continue to survive there. The Overall Conservation Assessment for Ballynafagh Bog was Favourable (green) in the monitoring period 2007-2012 - there were very high numbers of *Vertigo moulinsiana* found across the site, and the habitat was deemed to be in good condition. The assessment result has dropped to Unfavourable Bad (red) for the current monitoring period (2013-2018). The population and habitat assessments have dropped to Unfavourable Bad (red), while the Future Prospects have dropped to Unfavourable Inadequate (amber). The decline in the population and habitat is considered to represent real decline (rather than interpretation or mapping issues), as the habitat has changed through drying out, vegetation change (e.g. succession, scrub encroachment) and heavy cattle-grazing (Polygon C). Actions required to improve the situation for *Vertigo moulinsiana* at Ballynafagh Bog include an overall strategic hydrological plan aimed at increasing, or at least maintaining, water levels across the site. Also needed is some targeted scrub removal, particularly at Transect 1, and a reduction in grazing in the Blackwater Feeder.

It is worth noting that the Population Assessment criteria in particular are set quite high at this site. Moorkens & Killeen (2011) mention that in 2006 numbers of *Vertigo moulinsiana* were much lower across the site than in 2010. It may be that 2010 was an exceptionally good year for the species, and that the population criteria should be reduced/relaxed somewhat. However, even should these changes be made, the site would still struggle to pass assessment due to habitat changes (and this will continue to affect the snail's survival).

3. TRANSECT DETAILS

TRANSECT: 1	MONITORING PERIOD: 2013-2018
Start point:	N 81202 28983 Willow tree at end of shallow ditch
End point:	N 81205 28951 Western end of habitat
Transect length: 30	Direction: N-S
Description:	Transect follows and old, shallow ditch. Has dried out and scrubbed over since 2007-2012
Sampling frequency:	Six samples were taken at approximately 5m intervals

Vertigo moulinsiana monitoring at Ballynafagh Bog

TRANSECT: 2 **MONITORING PERIOD:** 2013-2018

Start point: N 80676 28567 Old hawthorn covered in brambles

End point: N 80616 28557 Old hawthorn on slope of bank

Transect length: 60 **Direction:** E-W

Description: Large open depression near end of Blackwood Feeder. Dominated by Phalaris arundinacea, with Carex acutiformis, Epilobium hirsutum and Filipendula ulmaria

Sampling frequency: Ten samples were taken at approximately 5m intervals

TRANSECT: 1 **MONITORING PERIOD:** 2007-2012

Start point: N 81202 28983 Willow tree at the end of a shallow ditch

End point: Western end of habitat

Transect length: 34 **Direction:**

Description:

Sampling frequency:

TRANSECT: 2 **MONITORING PERIOD:** 2007-2012

Start point: N 80676 28567 Old hawthorn covered in bramble

End point: N 80616 28557 Old hawthorn on slope of bank with bracken above

Transect length: 61 **Direction:**

Description:

Sampling frequency:

4. RESULTS

Polygon habitat characteristics

Monitoring Period: 2013-2018

Polygon	Habitat Type	Area (ha)	Comment
A	Suboptimal	10.2151	Polygon A status remains Suboptimal. This is a large area of lakeside habitat, and is quite variable in terms of quality and make up. Some areas are still quite wet, however some are drying and scrub encroachment is an issue.
B	Suboptimal	1.0157	Polygon B status drops from Optimal and sub-optimal, to Suboptimal due to drying out and a change in the vegetation. This is a low-lying area of tall sedge vegetation with some scrub.
C	Suboptimal-Unsuitable	0.4076	Polygon C status drops from Optimal and sub-optimal, to Suboptimal-Unsuitable due to drying out and heavy grazing. This is a stretch of abandoned canal bed. It is of variable wetness underfoot, and the vegetation varies also, with grazing and wetness impacting on vegetation composition (and particularly on occurrence of tall-growing species which Vertigo moulinsiana favours).
D	Optimal-Suboptimal	0.7263	Polygon D status drops from Optimal to Optimal-Suboptimal due to drying out. Habitat quite dry underfoot, and quite shaded.

Monitoring Period: 2007-2012

Polygon	Habitat Type	Area (ha)	Comment
A	Sub-optimal	10.21	Polygon A - Ballynafagh Lake – Sub-optimal, includes most of the suitable habitat around the lake margins
B	Sub-optimal with optimal areas	1.06	Polygon B - Ballynafagh Lake – Optimal and sub-optimal depression with sedge fen
C	Sub-optimal	0.41	Polygon C - Blackwood Feeder – Sub-optimal old canal bed
D	Optimal	0.73	Polygon D - Bonyng Bridge – Optimal swampy ditch

Transect samples

Mon. period	Transect	Sample	Location	Adults	Juveniles	Total	Veg. class	Wetness	Habitat suitability
Monitoring period 2013-2018 Transect 1 (8 samples)									
2013-2018	1	1	1.5m	0	0	0	IV	3	Suboptimal-Unsuitable

Vertigo moulinsiana monitoring at Ballynafagh Bog

2013-2018	1	2	8.5m	0	0	0	IV	2	Unsuitable
2013-2018	1	3	13.5m	0	0	0	IV	2	Unsuitable
2013-2018	1	4	16m - S4a	0	0	0	IV	2	Unsuitable
2013-2018	1	5	16m - S4b	0	0	0	IV	3	Unsuitable
2013-2018	1	6	S05a	0	0	0	IV	2	Unsuitable
2013-2018	1	7	S05b	0	0	0	IV	3	Unsuitable
2013-2018	1	8	S6	0	0	0	IV	3	Suboptimal-Unsuitable

Monitoring period 2013-2018 Transect 2 (10 samples)

2013-2018	2	1	10m	0	0	0	III	2	Suboptimal
2013-2018	2	2	15m	1	0	1	III	2	Suboptimal
2013-2018	2	3	20m	0	0	0	III	2	Suboptimal
2013-2018	2	4	25m	0	0	0	III	2	Suboptimal
2013-2018	2	5	30m	1	0	1	II	2	Optimal-Suboptimal
2013-2018	2	6	35m	1	1	2	II	2	Optimal-Suboptimal
2013-2018	2	7	40m	0	0	0	II	2	Optimal-Suboptimal
2013-2018	2	8	45m	0	0	0	II	2	Optimal-Suboptimal
2013-2018	2	9	50m	0	0	0	II	2	Optimal-Suboptimal
2013-2018	2	10	60m	0	0	0	II	2	Optimal-Suboptimal

Monitoring period 2007-2012 Transect 1 (11 samples)

2007-2012	1	1	0m	0	0	0			
2007-2012	1	2	4m along transect	0	0	0			
2007-2012	1	3	6m along transect	0	0	0			
2007-2012	1	4	11m along the transect	0	0	0			
2007-2012	1	5	14m along transect	0	0	0			
2007-2012	1	6	16m along transect	9	2	11			
2007-2012	1	7	18m along transect	8	6	14			
2007-2012	1	8	21.5m along transect	8	11	19			
2007-2012	1	9	24m along transect	3	15	18			
2007-2012	1	10	27m along transect	3	14	17			
2007-2012	1	11	29.5m along transect	15	4	19			

Monitoring period 2007-2012 Transect 2 (13 samples)

2007-2012	2	1	1m along transect	0	0	0			
2007-2012	2	2	5m along transect	0	0	0			
2007-2012	2	3	10m along transect	0	0	0			
2007-2012	2	4	15m along transect	0	0	0			
2007-2012	2	5	20m along transect	0	0	0			
2007-2012	2	6	25m along transect	39	11	50			
2007-2012	2	7	30m along transect	33	12	45			
2007-2012	2	8	35m along transect	6	2	8			
2007-2012	2	9	40m along transect	47	5	52			
2007-2012	2	10	45m along transect	48	14	62			

Vertigo moulinsiana monitoring at Ballynafagh Bog

2007-2012	2	11	50m along the transect	22	7	29
2007-2012	2	12	55m along transect	85	0	85
2007-2012	2	13	59m along transect	0	0	0

Spot Samples

Mon. period	Sample	Grid ref.	Adults	Juveniles	Total	Veg. class	Wetness	Habitat suitability
Monitoring period 2013-2018 (25 samples)								
2013-2018	01a	N 79831 27144	0	0	0	I	2	Suboptimal
2013-2018	01b	N 79831 27144	0	0	0	I	2	Suboptimal
2013-2018	01c	N 79831 27144	0	0	0	I	2	Suboptimal
2013-2018	02a	N 79940 27267	0	0	0	I	2	Suboptimal
2013-2018	02b	N 79940 27267	0	0	0	I	2	Suboptimal
2013-2018	02c	N 79940 27267	0	0	0	I	2	Suboptimal
2013-2018	03a	N 79965 27286	0	0	0	I	2	Suboptimal
2013-2018	03b	N 79965 27286	0	0	0	I	2	Suboptimal
2013-2018	03c	N 79965 27286	0	0	0	I	2	Suboptimal
2013-2018	04a	N 80017 27316	0	0	0	I	2	Suboptimal
2013-2018	04b	N 80017 27316	0	0	0	I	2	Suboptimal
2013-2018	05a	N 80826 25451	0	0	0	I	2	Optimal-Suboptimal
2013-2018	05b	N 80826 25451	4	1	5	II	2	Optimal-Suboptimal
2013-2018	05c	N 80826 25451	4	4	8	II	2	Optimal-Suboptimal
2013-2018	06a	N 80859 25442	0	0	0	II	2	Optimal-Suboptimal
2013-2018	06b	N 80859 25442	1	0	1	II	2	Optimal-Suboptimal
2013-2018	06c	N 80859 25442	0	0	0	II	2	Optimal-Suboptimal
2013-2018	07a	N 80915 25410	4	4	8	II	3	Optimal-Suboptimal
2013-2018	07b	N 80915 25410	31	9	40	II	3	Optimal-Suboptimal
2013-2018	07c	N 80915 25410	18	16	34	II	2	Optimal-Suboptimal
2013-2018	08a	N 81093 25343	4	3	7	I	2	Optimal-Suboptimal
2013-2018	08b	N 81093 25343	3	8	11	I	2	Optimal-Suboptimal
2013-2018	08c	N 81093 25343	7	0	7	I	2	Optimal-Suboptimal
2013-2018	09a	N 80709 28596	0	0	0	II	3	Optimal
2013-2018	09b	N 80709 28596	0	0	0	II	3	Optimal
Monitoring period 2007-2012 (36 samples)								
2007-2012	01a	N 81181 28880	0	0	0			
2007-2012	01b	N 81181 28880	2	0	2			
2007-2012	01c	N 81181 28880	4	2	6		n/a	
2007-2012	02a	N 81023 28702	2	0	2		n/a	
2007-2012	02b	N 81023 28702	15	5	20		n/a	
2007-2012	02c	N 81023 28702	22	16	38			
2007-2012	03a	N 80666 28639	65	0	65		3	
2007-2012	03b	N 80666 28639	7	2	9		4	

Vertigo moulinsiana monitoring at Ballynafagh Bog

2007-2012	03c	N 81023 28702	2	0	2	4
2007-2012	04a	N 80541 28811	1	3	4	5
2007-2012	04b	N 80541 28811	3	0	3	5
2007-2012	04c	N 80541 28811	0	2	2	5
2007-2012	05a	N 80735 28979	0	0	0	4
2007-2012	05b	N 80735 28979	0	0	0	4
2007-2012	05c	N 80735 28979	0	0	0	4
2007-2012	06a	N 79904 27215	1	8	9	4
2007-2012	06b	N 79904 27215	5	4	9	4
2007-2012	06c	N 79904 27215	3	1	4	4
2007-2012	07a	N 79924 27253	4	9	13	3
2007-2012	07b	N 79904 27215	11	23	34	3
2007-2012	07c	N 79904 27215	4	4	8	4
2007-2012	08a	N 80020 27345	0	0	0	4
2007-2012	08b	N 80020 27345	0	0	0	4
2007-2012	09a	N 80040 27371	0	0	0	4
2007-2012	09b	N 80040 27371	11	5	16	3
2007-2012	10a	N 80769 25474	30	38	68	3
2007-2012	10b	N 80769 25474	24	75	99	4
2007-2012	10c	N 80769 25474	72	80	152	4
2007-2012	11a	N 80903 25422	39	220	259	3
2007-2012	11b	N 80903 25422	32	260	292	3
2007-2012	11c	N 80903 25422	0	0	0	
2007-2012	12a	N 80978 25397	24	37	61	3
2007-2012	12b	N 80978 25397	62	135	197	3
2007-2012	12c	N 80978 25397	72	280	352	3
2007-2012	13a	N 81103 25351	11	9	20	3
2007-2012	13b	N 81103 25351	9	31	40	3

5. CONDITION ASSESSMENT

5.1 Population Assessment: 6 passes Favourable (green); 4-5 passes Unfavourable Inadequate (amber); 0-3 passes Unfavourable Bad (red)

Mon. period	Transect	Indicator	Target	Result	Pass/Fail
2013-2018	1	Presence/Absence	Vertigo moulinsiana is present in 5 samples (or 50% of samples) on Transect 1 (minimum 10 samples)	Vertigo moulinsiana absent from Transect 1	Fail
2013-2018	2	Density	At least 5 samples on Transect 2 should have >20 V. moulinsiana individuals	No samples with >20 individuals	Fail
2013-2018	2	Presence/Absence	Vertigo moulinsiana is present in 5 samples (or 50% of samples) on Transect 2 (minimum 10 samples)	Present in 3 samples	Fail
2007-2012	1	Presence/Absence	V. moulinsiana is present in 5 samples (or 50% of samples) on Transect 1 (minimum 10 samples)	Present in 6 samples	Pass
2007-2012	2	Density	At least 5 samples on Transect 2 should have >20 V. moulinsiana individuals	6 samples with >20 individuals	Pass

Vertigo moulinsiana monitoring at Ballynafagh Bog

2007-2012	2	Presence/Absence	V. moulinsiana is present in 5 samples (or 50% of samples) on Transect 2 (minimum 10 samples)	Present in 7 samples	Pass
-----------	---	------------------	---	----------------------	------

Mon. period	Indicator	Target	Result	Pass/Fail
2013-2018	Density	50% of the samples at Bonyngge should have >50 individuals (minimum 10 samples)	No samples with >50 individuals	Fail
2013-2018	Presence/Absence	Adult or sub-adult snails are present in 3 of the 4 sample locations in the Blackwood Feeder	Vertigo moulinsiana absent from 4 locations sampled	Fail
2013-2018	Species extent	Adult or sub-adult snails are present in 3 of the 4 sample locations at Bonyngge Bridge	Present in all 4 locations	Pass
2007-2012	Density	50% of the samples at Bonyngge should have >50 individuals (minimum 10 samples)	80% of samples with >50 individuals	Pass
2007-2012	Presence/Absence	Adult or sub-adult snails are present in 3 of the 4 sample locations in the Blackwood Feeder	Present in 3 of the 4 locations	Pass
2007-2012	Species extent	Adult or sub-adult snails are present in 3 of the 4 sample locations at Bonyngge Bridge	Present in all 4 locations	Pass

Mon. period	Population Notes
2013-2018	<p>For Ballynafagh Lake (Polygons A and B) the results for 2007-2012 were:</p> <ul style="list-style-type: none"> - Transect 1 - Six out of 11 locations positive - Transect 2 - Seven out of 13 locations positive - Four out of five spot locations were positive (11/15 samples). <p>This compares to the following results from the current survey (2015):</p> <ul style="list-style-type: none"> - Transect 1 - No positive samples (6 locations, 10 samples in total) - Transect 2 - Three out of 10 locations positive - A single location at the southwestern end of Ballynafagh Lake was negative (2 samples). <p>For the Blackwood Feeder (Polygon C):</p> <ul style="list-style-type: none"> - Three out of four positive locations in 2010 (7/10 samples) - All four locations sampled in 2015 were negative (0/11 samples). <p>For Bonyngge Bridge (Polygon D):</p> <ul style="list-style-type: none"> - Four out of four positive locations (10/10 samples) in 2010. - Four out of four positive locations (9/12 samples) in 2015. <p>Based on these results, and on the criteria of Moorkens & Killeen (2011), the Population Assessment for Ballynafagh Bog is Unfavourable Bad (red).</p>
2007-2012	

5.2 Habitat Assessment: 4-5 passes Favourable (green); 2-3 passes Unfavourable Inadequate (amber); 0-1 passes Unfavourable Bad (red)

5.2.1 Transect level

Mon. period	Transect	Indicator	Target	Result	Pass/Fail
2013-2018	1	Habitat extent	Over 50% of the samples on Transect 1 are dominated by suitable vegetation (Classes I & II) AND Over 80% of the samples on Transect 1 fall within soil moisture classes 3-5	0% of samples dominated by suitable vegetation AND 30% of samples with suitable moisture	Fail
2013-2018	2	Habitat extent	Over 80% of the samples on Transect 2 are dominated by suitable vegetation (Classes I & II) AND Over 80% of the samples on Transect 2 fall within soil moisture classes 2-4	60% of samples dominated by suitable vegetation AND 100% of samples with suitable moisture	Fail

Vertigo moulinsiana monitoring at Ballynafagh Bog

2007-2012	1	Habitat extent	Over 50% of the samples on Transect 1 are dominated by suitable vegetation (Classes I & II) and over 80% of the samples on Transect 1 fall within soil moisture classes 3-5	64% of samples and 100% of samples	Pass
2007-2012	2	Habitat extent	Over 80% of the samples on Transect 2 are dominated by suitable vegetation (Classes I & II) and over 80% of the samples on Transect 2 fall within soil moisture classes 2-4	100% of samples and 100% of samples	Pass

5.2.2 Site level

Mon. period	Indicator	Target	Result	Pass/Fail
2013-2018	Habitat extent	At least 10ha of the site, including habitat in all 4 polygon areas, should be classed as Optimal and sub-optimal	0.73ha Optimal-Suboptimal & 11.2 ha Suboptimal, but Polygon C Suboptimal-Unsuitable	Fail
2007-2012	Habitat extent	At least 10ha of the site including habitat in all 4 polygon areas should be classed as Optimal and sub-optimal	12.36 ha	Pass

Mon. period	Indicator	Target	Result	Pass/Fail
2013-2018	Habitat extent	Over 80% of the samples at Blackwood Feeder are dominated by suitable vegetation (Classes I & II) and fall within soil moisture classes 3-5	100% of samples with suitable vegetation AND 0% of samples with suitable soil moisture	Fail
2013-2018	Habitat quality	Over 80% of the samples at Bonyng Bridge are dominated by suitable vegetation (Classes I & II) and fall within soil moisture classes 3-5	100% of samples with suitable vegetation AND 17% of samples with suitable soil moisture	Fail
2007-2012	Habitat extent	Over 80% of the samples at Blackwood Feeder are dominated by suitable vegetation (Classes I & II) and fall within soil moisture classes 3-5	100% of samples	Pass
2007-2012	Habitat quality	Over 80% of the samples at Bonyng Bridge are dominated by suitable vegetation (Classes I & II) and fall within soil moisture classes 3-5	100% of samples	Pass

Mon. period	Habitat Notes
2013-2018	Three out of the four polygons at this site have dropped in status, and the changes are due to ecological effects (rather than mapping or interpretation issues). In most cases the habitat was found to be much drier in 2015 compared to previous surveys, and vegetation changes were noted also, the most dramatic of which is the large decrease in the occurrence of <i>Carex rostrata</i> along Transect 1. Based on the criteria of Moorkens & Killeen (2011), the Habitat Assessment for Ballynafagh Bog is Unfavourable Bad (red).
2007-2012	

5.3 Future Prospects Assessment

Mon. period	Activity code	Activity description	Location	Intensity	Influence	Area affected	Comment
2013-2018	A04.02.01	non intensive cattle grazing	Inside	High	Negative	3%	Cattle grazing and poaching has removed tall vegetation from Polygon C
2013-2018	H05.01	garbage and solid waste	Inside	High	Negative	1%	Dumping of horse manure
2013-2018	K01.03	Drying out	Inside	High	Negative	15%	Drying out of Blackwater Feeder channel

Vertigo moulinsiana monitoring at Ballynafagh Bog

2013-2018	K02.01	species composition change	Inside	High	Negative	4%	Willow and birch scrub invading
2007-2012	A04.02.01	non intensive cattle grazing	Inside	Medium	Negative	0.41ha	Cattle grazing is having an impact at Blackwood Feeder as there is such a small area which is suitable.
2007-2012	A04.03	abandonment of pastoral systems, lack of grazing	Inside	Low	Negative	10.2ha	Whilst there is not a problem at present, abandonment (lack of grazing) could have a negative impact on the quality of the habitat in the medium to long term if the site scrubs up and becomes drier.

Mon. period	Future Prospects	Notes
2013-2018		In the 2007-2012 monitoring period, lack of grazing and overgrazing were identified as affecting the suitability of parts of the site for <i>Vertigo moulinsiana</i> , however, on balance, the Future Prospects were considered to be Favourable (green). In the current survey, drying out of habitat was identified as a problem in a number of locations including the area around Transect 1 and Polygon B at Ballynafagh Lake, all of Polygon C and part of Polygon D. Succession is occurring in tandem with drying out, with the spread of willow and birch. Overgrazing by cattle is an issue across most of Polygon C at the Blackwood Feeder, due to the very limited suitable habitat present and the consequent high impact of the grazing. Some dumping of horse manure is also occurring in Polygon C. Given the extent of the potentially suitable habitat in other areas of the site (particularly in Polygon A), it is likely that the species will continue to survive at this site at least in the short to medium term, in spite of the challenges. Therefore, the Future Prospects are considered Unfavourable Inadequate (amber).
2007-2012		as the impacts are low to moderate rather than severe, Future prospects have been assessed as Favourable

5.4 Overall Assessment

Mon. period	Population assessment	Area of suitable habitat	Future prospects	Overall assessment
2013-2018	Red	Red	Amber	Red
2007-2012	Green	Green	Green	Green

Mon. period	Overall Notes
2013-2018	Based on the results of the population and habitat assessments, the Overall Assessment for Ballynafagh Bog is Unfavourable Bad (red).
2007-2012	Much of the habitat at Ballynafagh Lake appears to be in good condition for <i>V. moulinsiana</i> , the snail is scattered in its distribution and present in low to moderate numbers. The Bonyngé Bridge site is in excellent condition and the snail is abundant, whereas the snail is uncommon at Blackwood Feeder and the habitat is small in extent.

6. DISCUSSION

Monitoring period
2013-2018
<p>Area of occupancy: The habitat that supports <i>Vertigo moulinsiana</i> within this cSAC is the fen swamp habitat around Ballynafagh Lake and sections of the Blackwood Feeder between Ballynafagh and the Grand Canal, and along the Grand Canal west of Bonyngé Bridge</p> <p>Discussion:</p> <p>As noted by Moorkens & Killeen (2011), this is an important site for <i>Vertigo moulinsiana</i> given the loss of the snail from other canal-side locations in Co. Kildare. This is a site which has seen a serious decline in recent years, and is in need of immediate and broad-ranging conservation actions if the species is to continue to survive there. The Overall Conservation Assessment for Ballynafagh Bog was Favourable (green) in the monitoring period 2007-2012 - there were very high numbers of <i>Vertigo moulinsiana</i> found across the site, and the habitat was deemed to be in good condition. The assessment result has dropped to Unfavourable Bad (red) for the current monitoring period (2013-2018). The population and habitat assessments have dropped to Unfavourable Bad (red), while the Future Prospects have dropped to Unfavourable Inadequate (amber). The decline in the population and habitat is considered to represent real decline (rather than interpretation or mapping issues), as the habitat has changed through drying out, vegetation change (e.g. succession, scrub encroachment) and heavy cattle-grazing (Polygon C). Actions required to improve the situation for <i>Vertigo moulinsiana</i> at Ballynafagh Bog include an overall strategic hydrological plan aimed at increasing, or at least maintaining, water levels across the site. Also needed is some targeted scrub removal, particularly at Transect 1, and a reduction in grazing in the Blackwater Feeder.</p>

Vertigo moulinsiana monitoring at Ballynafagh Bog

It is worth noting that the Population Assessment criteria in particular are set quite high at this site. Moorkens & Killeen (2011) mention that in 2006 numbers of *Vertigo moulinsiana* were much lower across the site than in 2010. It may be that 2010 was an exceptionally good year for the species, and that the population criteria should be reduced/relaxed somewhat. However, even should these changes be made, the site would still struggle to pass assessment due to habitat changes (and this will continue to affect the snail's survival).

Monitoring recommendations:

The following was recommended by Moorkens & Killeen (2011) and remains valid: Due to the transitional nature of the habitat and the need for active management of the site, it should be placed under regular surveillance to ensure that it is being maintained in favourable conservation status in the short to medium term. This is particularly important until a suitable hydrological and management regime can be agreed and implemented in a manner that is proven to support the designated habitats and species.

Based on the above and due to the unfavourable assessment for this site, it is recommended that monitoring is carried out at yearly intervals, in tandem with management actions. If management actions do not commence immediately, monitoring for *Vertigo moulinsiana* should nonetheless take place within two years of this report, in an attempt to quantify and confirm the apparent large decrease in the population at the site. The monitoring frequency can be re-assessed in light of any improvements seen following changes to site management, after a period of years. The details of the monitoring should follow that of Moorkens & Killeen (2011):

- Repeat Transect 1, in field record: vegetation height, vegetation composition, ground moisture class, numbers of *Vertigo moulinsiana* (adult & juvenile) and other molluscs, minimum 10 samples
- Repeat Transect 2, as above, minimum 10 samples
- Take at least 10 samples from 4 locations on Blackwood Feeder, record information as above
- Take at least 10 samples from 4 locations at Bonyng Bridge, record information as above
- Re-determine boundary of the habitat polygons and assign habitat to either Optimal, Optimal-Suboptimal, Suboptimal, Suboptimal-Unsuitable, or Unsuitable
- Assess the management regime and impacts upon the habitat for *Vertigo moulinsiana*
- Use results to determine overall condition assessment

Note that it is possible that Transect 1 will be dropped or moved in future years due to the fact that it is located in an area that is drying and scrubbing over. However, for the moment, it is recommended that it continues to be monitored as is, because it represents changes that are happening at the site.

Management recommendations:

Moorkens & Killeen (2011) discuss the history of this site and management recommendations for it in detail, and it is recommended to read these carefully. Some aspects are reproduced here, and updated based on our most recent findings.

Artificially created and maintained habitats are some of the most difficult to protect, and a strategic plan for hydrological management needs to be put in place for this site. It is likely that some areas of the site will be able to be managed by careful hydrological control, and then the parts of the site that cannot be maintained this way will continue their transition towards drier habitat. Moorkens & Killeen note that the lake is fed by a surface water stream from the north-west, and from groundwater, and that the flow from the stream was partially diverted in the past meaning that there is less water now feeding the lake. Advice should be sought from a hydrologist, and in conjunction with an ecologist and a molluscan specialist, a hydrological plan should be put in place for this site. This should clearly outline areas which could be re-wetted, or have their wetness levels maintained.

The Ballynafagh Lake area (Polygon A) is subject to scrub encroachment in areas where it is drying out. Moorkens & Killeen noted that in 2010 "These areas do not generally coincide with the *Vertigo moulinsiana* habitats". However, in 2015, the area where Transect 1 is located was clearly seen to be suffering from scrub encroachment and species composition change related to drying out. There is currently a programme of scrub control at the site (scrub control noted, particularly at the south-west). This should be continued, but in careful consultation with molluscan experts, and with a view to balancing the needs of all the valuable habitats and species at the site. Drying out is also likely to be responsible for the drop in population in Polygon B.

The management of the Blackwood feeder needs to be considered in the context of its continued drying from a watercourse that was open water 50 years ago to its present state today. Moorkens & Killeen (2011) note that the "Blackwood Feeder has been drained and grazed in many areas, but the best remaining swamp areas are avoided by grazing animals and are where *Vertigo moulinsiana* remains". Unfortunately, the current case is that grazing animals have access to the old channel, and while levels are not extremely high, it has been enough to alter the vegetation. There are no longer areas of tall sedge or *Glyceria maxima*, the types of species which *Vertigo moulinsiana* is typically associated with. The channel also appears to be drying out, so a combination of management of grazers (exclusion, at least temporarily) and re-wetting is needed.

The issue of dumping of horse manure should also be addressed by liaison with local land owners and managers.

Vertigo moulinsiana monitoring at Ballynafagh Bog

2007-2012

Area of occupancy: The habitat that supports *Vertigo moulinsiana* within this cSAC is the fen Swamp habitat around Ballynafagh Lake and sections of the Blackwood Feeder between Ballynafagh and the Grand Canal, and along the Grand Canal west of Bonyng Bridge

Discussion:

A retrospective Condition Assessment of the site and the feature based upon the 2006 survey results showed that it was Unfavourable Inadequate due to the very low numbers of *V. moulinsiana* found on the 2 transects. In 2010, numbers of *V. moulinsiana* found on the 2 transects had increased significantly with the result that the Overall Assessment is now Favourable.

The Ballynafagh Lake, Blackwood Feeder and Bonyng Bridge sites are a complex mixture of habitats, made more complicated by their artificial origin and the extreme hydrological changes that have occurred there over the last 200 years. Artificially maintained habitats are some of the most difficult to protect, and a strategic plan of water management needs to be put in place before grazing management can seriously be approached. It is likely that a subset of the site will be able to be managed by careful hydrological control, and then the parts of the site that cannot be maintained this way will continue their transition towards drier habitat. The latter areas will need grazing management if they are not to continue the transition to widespread scrub. At best, water management should ensure that the snail habitat will be maintained by wetness. Any grazing management introduced for other purposes should not interfere with the favourable condition of the snail habitat.

This is an important site for *V. moulinsiana* given the loss of the snail from other canalside locations in County Kildare. Due to the transitional nature of the habitat and the acknowledged need for active management of the site, the Annex I habitats and the *V. moulinsiana* habitats should be placed under regular surveillance to ensure that it is being maintained in favourable conservation status in the short to medium term. This is particularly important until a stable hydrological regime can be agreed and implemented in a manner that is proven to support the designated habitats and species.

Monitoring recommendations:

Although the Condition of the site, both in terms of habitat and *Vertigo moulinsiana* distribution and abundance has been assessed as Favourable, it is recommended that monitoring is carried out at a minimum of 3 yearly intervals. This should be re-assessed in light of any deterioration of Condition or any changes to site management:

Frequency: Next monitoring due 2013

Methods (see Section 4 of main report for full details). Prescription as follows:

- Repeat transect 1, in field record: vegetation height, vegetation composition, ground moisture class, numbers of *V. moulinsiana* (adult & juvenile) and other molluscs, minimum 10 samples
- Repeat transect 2, as above, minimum 10 samples
- Take at least 10 samples from 4 locations on Blackwood Feeder, record information as above
- Take at least 10 samples from 4 locations at Bonyng Bridge, record information as above
- Re-determine boundary of the habitat polygons and assign habitat to either Optimal, Optimal & Sub-optimal, Sub-optimal, Sub-optimal and Unsuitable, or Unsuitable
- Assess the management regime and impacts upon the habitat for *V. moulinsiana*
- Use results to determine overall condition assessment

Management recommendations:

The management is discussed by Moorkens in White Young Green et al. (2006) and Moorkens (2007) and is repeated below with minor modifications.

Existing Management

The *V. moulinsiana* habitat is on a natural peatland but within an area of artificially created wetland arising from digging Ballynafagh Lake by the Grand Canal Company in the late 18th Century. The lake fed the Blackwood Feeder, which was active until the 1950's for the transport of turf and agricultural products (White Young Green et al., 2006). There has been no grazing management at Ballynafagh Lake for many years, but the Blackwood Feeder has been drained and grazed in many areas, but the best remaining swamp areas are avoided by grazing animals and are where *V. moulinsiana* remains. There is no grazing management at the north end of the feeder near to the old sluice gate. In the centre section an area of 1 hectare is grazed by 20 bullocks for 2 days a month between April and July. This has taken place for the last 10 years. In the lowest *V. moulinsiana* habitat, nearest the canal, there is some grazing at the northern end of this area (marked 4 in Figure 1.2). The grazing here consists of 40 cattle grazed extensively over approximately 40 hectare including access to this part of the feeder. The cattle are present from May to June annually.

Proposed management prescription for site

The Ballynafagh Lake area is subject to scrub encroachment where it has become dry enough. These areas do not generally coincide with the *V. moulinsiana* habitats, but in order to maintain the other habitats present some grazing would have a positive affect. The area of occupancy of *V. moulinsiana* has not changed significantly since 1997 (see Dromey, 1997). However, there is evidence of slow drying out of the area. The lake is fed by a surface water stream from the north west, and from groundwater. The flow from the stream was partially diverted thus there is less water feeding the lake compared with in the past. In order to maintain *V. moulinsiana* at the Ballynafagh Lake area, ground saturation and occasional inundation is needed. If water levels continue to reduce *V. moulinsiana* will be reduced to the deepest of the drains present and will ultimately disappear. No grazing management is recommended for the site for the snail at present. Any grazing management introduced for other purposes should not interfere with the favourable condition of the

Vertigo moulinsiana monitoring at Ballynafagh Bog

snail habitat. However, a reconnection of the watercourse that fed the lake in the past should be considered.

The management of the Blackwood feeder needs to be considered in the context of its continued drying from a watercourse that was open water 50 years ago to its present state today. Ten years ago *V. moulinsiana* was more widespread and *Pisidium pseudosphaerium* was present along the extensive swamp habitat (Dromey et al., 1997). Now *P. pseudosphaerium* is no longer present and *V. moulinsiana* is reduced to the three short areas with some remaining habitat. These areas should be protected from overgrazing, where stock should be reduced to 0.6 livestock units per hectare or temporary electric fencing placed around the habitat to prevent its grazing. Ultimately, the source of the groundwater feeding the remaining swamp habitat needs to be understood and protected or enhanced, as management of this habitat is wetness rather than grazing driven. This requires a specific hydrogeological survey. This also applies to the Bonyngé Bridge site.

Site report - Vertigo Monitoring

Vertigo moulinsiana monitoring at Charleville Lake

1. SITE CODE AND LOCATION DETAILS

1.1 Site code and location

Vertigo Site Code: VmCAM11 **County:** Offaly

SAC Site Code: 000571 Charleville Wood

Location description (from baseline survey):

Monitoring period	Date surveyed	Recorders
2013-2018	6-7 September 2016	John Brophy & Maria Long
2007-2012	10 September 2010	Evelyn Moorkens & Ian Killeen

1.2 General Habitat Description (from baseline survey):

The general habitat in which *Vertigo moulinsiana* is present at Charleville Lake is a lake fringe area of swamp fen. The EU habitats that this relates to are water fringe vegetation comprising medium-tall waterside communities (CORINE 53.14) with some with some rich fen characteristics (CORINE 54.2, Annex I 7230) (Romão, 1996; Devillers et al., 1991). The snail is found typically on *Typha angustifolia*, *Carex riparia*, *Carex rostrata*, *C. acutiformis* in association with *Equisetum fluviatile* and *Phragmites australis*. The water table was above ground surface level but with a litter layer in very humid conditions above the water table. The specific areas that are within a wider mosaic, but that form specific *V. moulinsiana* habitat fit the M27 Rodwell characteristic vegetation classification (Rodwell, 1991). This falls within the more general habitat of reed and large sedge swamps (FS1) and tall herb swamps (FS2) of Fossitt (2000).

1.3 Definition of Vegetation Classes (from baseline survey):

- Class I:** Tall *Carex* species, *Typha angustifolia*, *Carex rostrata*, *Phragmites australis* **Class III:** *Phalaris arundinacea*
- Class II:** *Equisetum fluviatile*, *Iris pseudacorus* **Class IV:** All other species

1.4 Definition of Soil Moisture Classes (from baseline survey):

- 1: Dry. No visible moisture on ground surface.
- 2: Damp. Ground visibly damp, but water does not rise under pressure.
- 3: Wet. Water rises under light pressure.
- 4: Very wet. Pools of standing water, generally less than 5cm deep.
- 5: Site under water. Entire sampling site in standing or flowing water over 5cm deep.

2. SUMMARY:

Charleville Lake supports a good population of *Vertigo moulinsiana*, with abundant suitable habitat around the fringes of the lake, and presumably also in parts of the inaccessible centre. In addition to the already known *Vertigo moulinsiana* habitat, the species was found to be present in an area of wet woodland with an understorey of tall *Carex* species to the east, and this area has been added to the site as a new polygon. This is an important site, not only because of its healthy *Vertigo moulinsiana* population, but also because it supports excellent examples of ancient and wet woodlands, and a range of uncommon plants, animals and fungi.

Discussions with the local NPWS Conservation Ranger revealed that the site is believed to be infilling more quickly over recent years, perhaps due to siltation arising from peat extraction on nearby raised bogs, and consideration has been given to dredging areas of the lake (in a manner sensitive to the *Vertigo moulinsiana* population) in order to maintain the open water element. Our recommendation is to employ all other means possible to reduce/eliminate the silt reaching the lake, rather than to undergo dredging which is likely to be destructive of at least some habitat. We also recommend detailed hydrological and vegetation monitoring be instigated at the site to inform any and all future management at this important site.

3. TRANSECT DETAILS

TRANSECT: 1	MONITORING PERIOD: 2013-2018	
Start point:	N 31298 22773	As for 2007-2012
End point:	N 31284 22677	As for 2007-2012
Transect length:	As for 2007-2012	Direction: As for 2007-2012
Description:	As for 2007-2012	
Sampling frequency:	As for 2007-2012	

Vertigo moulinsiana monitoring at Charleville Lake

TRANSECT:	1	MONITORING PERIOD:	2007-2012
Start point:	N 31298 22773		Near the road
End point:	N 31284 22677		Near to outfall
Transect length:	101	Direction:	
Description:			
Sampling frequency:			

4. RESULTS

Polygon habitat characteristics

Monitoring Period: 2013-2018

Polygon	Habitat Type	Area (ha)	Comment
A	Optimal-Suboptimal	7.5576	Polygon A status is Optimal-Suboptimal. Due to the presence of suitable vegetation and wetness all along the fringe of the lake, the existing polygons (drawn by Moorkens & Killeen (2011), and labelled A to E) were merged to form a single polygon extending around the lake.
B	Suboptimal-Unsuitable	9.2269	Polygon B is a new polygon, with Suboptimal-Unsuitable status, created to encompass the inaccessible habitat in the centre of the lake. This area is exceptionally difficult to access, consisting mostly of floating vegetation. It is likely to contain some areas of suitable habitat for the snail.
C	Suboptimal	5.8881	Polygon C is also a new polygon and was created to encompass the Suboptimal habitat of tall sedge in wet woodland south of the boathouse. This wet woodland is relatively recent in origin - being shown as rough pasture and marsh (rather than trees/woodland) on the six-inch OS maps.

Monitoring Period: 2007-2012

Polygon	Habitat Type	Area (ha)	Comment
	Sub-optimal with optimal areas	6.2	Sub-optimal and optimal habitat is found all around the margins and extending into parts of Charleville Lake. This covers a maximum area of 6.2ha.

Transect samples

Mon. period	Transect	Sample	Location	Adults	Juveniles	Total	Veg. class	Wetness	Habitat suitability
Monitoring period 2013-2018 Transect 1 (15 samples)									
2013-2018	1	1	01a	5	19	24	I	4	Optimal
2013-2018	1	2	01b	4	80	84	I	4	Optimal
2013-2018	1	3	01c	4	121	125	I	4	Optimal
2013-2018	1	4	02a	1	80	81	I	3	Optimal
2013-2018	1	5	02b	3	82	85	I	3	Optimal
2013-2018	1	6	02c	2	81	83	I	3	Optimal
2013-2018	1	7	03a	6	25	31	I	3	Optimal
2013-2018	1	8	03b	6	62	68	I	4	Optimal
2013-2018	1	9	03c	3	42	45	I	4	Optimal
2013-2018	1	10	04a	0	4	4	I	4	Optimal
2013-2018	1	11	04b	1	5	6	I	4	Optimal
2013-2018	1	12	04c	1	9	10	I	4	Optimal
2013-2018	1	13	05a	9	69	78	IV	3	Optimal
2013-2018	1	14	05b	8	29	37	IV	3	Optimal
2013-2018	1	15	05c	1	40	41	IV	3	Optimal
Monitoring period 2007-2012 Transect 1 (17 samples)									
2007-2012	1	1	#1a at N31298 22773	14	7	21		5	

Vertigo moulinsiana monitoring at Charleville Lake

2007-2012	1	2	#1b at N31298 22773	3	9	12	4
2007-2012	1	3	#1c at N31298 22773	25	16	41	5
2007-2012	1	4	#2a at N31289 22766	6	1	7	4
2007-2012	1	5	#2b at N31289 22766	2	0	2	5
2007-2012	1	6	#2c at N31289 22766	8	5	13	4
2007-2012	1	7	#3a at N31283 22748	36	19	55	5
2007-2012	1	8	#3b at N31283 22748	67	95	162	4
2007-2012	1	9	#3c at N31283 22748	15	22	37	5
2007-2012	1	10	#4a at N31283 22702	9	29	38	4
2007-2012	1	11	#4b at N31283 22702	48	103	151	5
2007-2012	1	12	#4c at N31283 22702	17	66	83	5
2007-2012	1	13	#5a at N31284 22677	65	177	242	4
2007-2012	1	14	#5b at N31284 22677	22	96	118	5
2007-2012	1	15	#5c at N31284 22677	119	225	344	4
2007-2012	1	16	#5d at N31284 22677	76	56	132	5
2007-2012	1	17	#5e at N31284 22677	166	300	466	5

Spot Samples

Mon. period	Sample	Grid ref.	Adults	Juveniles	Total	Veg. class	Wetness	Habitat suitability
Monitoring period 2013-2018 (13 samples)								
2013-2018	01a	N 31239 22550	0	41	41	II	5	Optimal-Suboptimal
2013-2018	02a	N 31247 22352	0	1	1	I	3	Suboptimal
2013-2018	02b	N 31247 22352	0	0	0	II	3	Suboptimal
2013-2018	03a	N 31392 22759	1	0	1	I	3	Optimal
2013-2018	03b	N 31392 22759	0	0	0	I	3	Optimal
2013-2018	04a	N 31548 22709	0	3	3	I	3	Optimal-Suboptimal
2013-2018	04b	N 31548 22709	0	1	1	I	3	Optimal-Suboptimal
2013-2018	05a	N 31534 22696	0	0	0	II	5	Suboptimal
2013-2018	05b	N 31534 22696	0	0	0	II	5	Suboptimal
2013-2018	06a	N 31647 22595	1	2	3	I	3	Optimal-Suboptimal
2013-2018	06b	N 31647 22595	3	0	3	I	3	Optimal-Suboptimal
2013-2018	07a	N 31747 22415	5	6	11	I	2	Suboptimal
2013-2018	07b	N 31747 22415	1	2	3	I	2	Suboptimal

5. CONDITION ASSESSMENT

Vertigo moulinsiana monitoring at Charleville Lake

5.1 Population Assessment: 3 passes Favourable (green); 2 pass Unfavourable Inadequate (amber); 0-1 passes Unfavourable Bad (red)

Mon. period	Transect	Indicator	Target	Result	Pass/Fail
2013-2018	1	Density	10 samples (from a minimum of 15 samples) on the Transect should have >20 V. moulinsiana individuals	12 samples with >20 individuals	Pass
2013-2018	1	Presence/Absence	Adult or sub-adult snails are present in all five of the sample areas (minimum 15 samples to be taken)	Present in all 5 areas	Pass
2007-2012	1	Density	10 samples (from a minimum of 15 samples) on the Transect should have >20 V. moulinsiana individuals	13 samples with >20 individuals	Pass
2007-2012	1	Presence/Absence	Adult or sub-adult snails are present in all five of the sample areas (minimum 15 samples to be taken)	Present in all 5 areas	Pass

Mon. period	Indicator	Target	Result	Pass/Fail
2013-2018	Presence/Absence	Adult or sub-adult snails are present in at least four other locations across the site (minimum six sample locations, and including at least one in Polygon C)	Present in all 4 areas	Pass

Mon. period	Population Notes
2013-2018	In the monitoring period 2007-2012, Vertigo moulinsiana was recorded in all 15 samples taken across five locations on the transect, with high numbers in many samples. Similarly, the current survey recorded Vertigo moulinsiana in all 15 samples across five sample locations on the transect, with >20 individuals at 12 of 15 samples. Numbers of individuals recorded were down on the previous survey, but good numbers were recorded, nonetheless. In the current survey, additional samples were taken from around the lake shore, and also in areas of wet woodland. To take account of these and to better represent the occurrence of Vertigo moulinsiana across the site, a new criterion was added. Based on the criteria of Moorrens & Killeen (2011), as well as the new criterion added, the population assessment for Charleville Lake remains Favourable (green).
2007-2012	the snail is scattered in its distribution and is locally common

5.2 Habitat Assessment: 4 passes Favourable (green); 2-3 passes Unfavourable Inadequate (amber); 0-1 passes Unfavourable Bad (red)

5.2.1 Transect level

Mon. period	Transect	Indicator	Target	Result	Pass/Fail
2013-2018	1	Habitat extent	75% of the samples on the Transect are dominated by suitable vegetation (Classes I & II) (minimum 15 samples)	80% with suitable vegetation	Pass
2013-2018	1	Habitat quality	75% of the samples on the Transect fall within soil moisture classes 3-5 (minimum 15 samples)	100% with soil moisture classes 3-5	Pass
2007-2012	1	Habitat extent	75% of the samples on the Transect are dominated by suitable vegetation (Classes I & II) (minimum 15 samples)	100% with suitable vegetation	Pass
2007-2012	1	Habitat quality	75% of the samples on the Transect fall within soil moisture classes 3-5 (minimum 15 samples)	100% with soil classes 3-5	Pass

5.2.2 Site level

Mon. period	Indicator	Target	Result	Pass/Fail
2013-2018	Habitat extent	>5ha of site optimal and sub-optimal	7.6ha Optimal-Suboptimal	Pass
2013-2018	Habitat quality	At least 25% of Polygon C supports habitat consisting of patches of tall sedge vegetation, with soil moisture class 3-5	>25% supports suitable habitat	Pass
2007-2012	Habitat extent	>5ha of the site optimal and sub-optimal	6.4 ha	Pass

Mon. period	Habitat Notes
-------------	---------------

Vertigo moulinsiana monitoring at Charleville Lake

2013-2018	The 2007-2012 monitoring period identified four Optimal and Sub-optimal habitat polygons around the margins of Charleville Lake, covering an area of 6.2ha. Following the current survey, the existing polygons were merged to form a single polygon (called Polygon A) of 7.6ha extending around the lake margin. The suitability is Optimal-Suboptimal. The habitat where the transect is located occurs in Polygon A, and continues to support the tall vegetation and wetness necessary for supporting a population of <i>Vertigo moulinsiana</i> . A new Suboptimal-Unsuitable polygon (9.2ha; Polygon B) was created to encompass the inaccessible habitat in the centre of the lake, which is likely to support some pockets of suitable habitat for the snail. Another new polygon (5.9ha; Polygon C) was created to encompass the Suboptimal habitat of the more recently developed wet woodland to the south of the boathouse, which supports an understorey of tall <i>Carex</i> species and which was found to support <i>Vertigo moulinsiana</i> . Based on the criteria of Moorkens & Killeen (2011), along with one additional criterion, the habitat assessment for Charleville Lake is Favourable (green).
2007-2012	In general, the site is in good condition for <i>V. moulinsiana</i>

5.3 Future Prospects Assessment

Mon. period	Activity code	Activity description	Location	Intensity	Influence	Area affected	Comment
2013-2018	H05.01	garbage and solid waste	Inside	Low	Negative	10%	Lots of plastic waste around edge of lake
2013-2018	J02.11.02	Other siltation rate changes	Outside	Medium	Negative	100%	Siltation of lake from nearby peat-cutting could lead to loss of habitat.
2013-2018	K04.05	damage by herbivores (including game species)	Inside	Low	Positive	30%	Deer. Low levels of trampling helpful in keeping woodland habitat open
2007-2012	H01	Pollution to surface waters (limnic, terrestrial, marine & brackish)	Outside	Low	Negative	6.2ha	As the lake is fed by surface water, a major pollution incident (e.g. petrochemical) or increased nutrient levels leading to eutrophication would have a detrimental effect on the snail population, but again there is no evidence of pollution to date.
2007-2012	J02.05	Modification of hydrographic functioning, general	Outside	Low	Positive	6.2ha	At the Charleville Lake site, the lake level is managed by means of a sluice, which at present is maintaining and excellent height and consistency of water in the lake. If at some point in the future the sluice was to malfunction or be changed, resulting in greater fluctuations in lake level, this would go from a positive influence to a negative influence. There is no indication of change or plans for change at present.

Mon. period	Future Prospects Notes
2013-2018	There is little evidence of any major threat to the <i>Vertigo moulinsiana</i> population at Charleville Lake in the short- to medium-term. However, siltation is thought to be occurring at the site from nearby peat harvesting (NPWS, pers. comm.) and in the long-term this may pose a threat to the <i>Vertigo moulinsiana</i> habitat by accelerating drying out and succession. However, given the timescale for such an effect and the possibility of mitigating the issue significantly through management (e.g. filters, silt traps, etc.) the Future Prospects are considered to be Favourable (green).
2007-2012	As the impacts at present are low, Future prospects have been assessed as Favourable

5.4 Overall Assessment

Mon. period	Population assessment	Area of suitable habitat	Future prospects	Overall assessment
2013-2018	Green	Green	Green	Green
2007-2012	Green	Green	Green	Green

Vertigo moulinsiana monitoring at Charleville Lake

Mon. period	Overall Notes
2013-2018	Due to the Favourable (green) Population Assessment, Habitat Assessment and Future Prospects, the Overall Assessment for Charleville Lake is Favourable (green).
2007-2012	

6. DISCUSSION

Monitoring period

2013-2018

Area of occupancy: The habitat that supports *Vertigo moulinsiana* within this cSAC is the fringe swamp habitat at the edge of Charleville Lake. Access is from the main road (N52), and a pedestrian route enters near the lake edge.

Discussion:

Charleville Lake supports a good population of *Vertigo moulinsiana*, with abundant suitable habitat around the fringes of the lake, and presumably also in parts of the inaccessible centre. In addition to the already known *Vertigo moulinsiana* habitat, the species was found to be present in an area of wet woodland with an understorey of tall *Carex* species to the east, and this area has been added to the site as a new polygon. This is an important site, not only because of its healthy *Vertigo moulinsiana* population, but also because it supports excellent examples of ancient and wet woodlands, and a range of uncommon plants, animals and fungi.

Discussions with the local NPWS Conservation Ranger revealed that the site is believed to be infilling more quickly over recent years, perhaps due to siltation arising from peat extraction on nearby raised bogs, and consideration has been given to dredging areas of the lake (in a manner sensitive to the *Vertigo moulinsiana* population) in order to maintain the open water element. Our recommendation is to employ all other means possible to reduce/eliminate the silt reaching the lake, rather than to undergo dredging which is likely to be destructive of at least some habitat. We also recommend detailed hydrological and vegetation monitoring be instigated at the site to inform any and all future management at this important site.

Monitoring recommendations:

The site at Charleville Lake is in favourable condition and should be surveyed once during the next monitoring period (i.e. six years from previous survey), unless any notable changes occur at the site in terms of the hydrology or ecology. The monitoring procedures should follow that of Moorkens & Killeen (2011), with some additions to take account of the new habitat areas now included:

- Repeat Transect 1, in field record: vegetation height, vegetation composition, ground moisture class, numbers of *Vertigo moulinsiana* (adult & juvenile) and other molluscs, minimum 15 samples from 5 separate sample sites
- Take samples from at least 6 different locations across the site, to include at least one from Polygon C, and record information as above.
- Re-determine boundary of the habitat polygons and assign habitat to either Optimal, Optimal-Suboptimal, Suboptimal, Suboptimal-Unsuitable, or Unsuitable. In particular, pay attention to the newly added Polygon C and re-assess both the boundary and habitat suitability.
- Assess the management regime and impacts upon the habitat for *Vertigo moulinsiana*
- Use results to determine overall condition assessment

Management recommendations:

There are useful management notes provided in Moorkens & Killeen (2011) for this site, and these should be read in conjunction with the notes provided here.

Apart from the hydrology, there is little to no management taking place at this site, and it is recommended to keep the status quo. The water levels are managed by a sluice, and this should continue. Information from local NPWS staff has indicated that silt run-off from nearby peat cutting may be accelerating the infilling, and hence drying out, of the lake. Therefore all possible actions should be taken to reduce/eliminate silt reaching the site in the first place. A variety of options are available - settlement ponds, filters, etc. The most suitable should be employed immediately, and preferably well outside the perimeters of the site to minimise direct disturbance due to installation or maintenance works.

A detailed hydrological monitoring regime should be instigated at this site to enable informed decision making regarding the water level and water quality management at the site. This should be accompanied with vegetation monitoring also. This is needed as this is a very important site for *Vertigo moulinsiana* (large population, including in an unusual habitat - shaded wet woodland), as well as being important for supporting a range of uncommon plant, animal, fungus and habitat types (see SAC site synopses for some further details).

It is understood that dredging of the middle of the lake is being considered based on the fact that siltation may be occurring. This would be very destructive, and it is not recommended as part of management of the site for *Vertigo moulinsiana* or its habitat. Should it be deemed necessary with other conservation considerations in mind, no such works should be undertaken without significant planning, and in particular, without significant input from a *Vertigo* expert.

Vertigo moulinsiana monitoring at Charleville Lake

2007-2012

Area of occupancy: The habitat that supports *Vertigo moulinsiana* within this cSAC is the fringe swamp habitat at the edge of Charleville Lake. Access is from the main road (N52), and a pedestrian route enters near the lake edge.

Discussion:

The Condition of the site and the feature based upon the 2010 survey has been assessed as Favourable. The targets have been passed for all of the 3 performance indicators. The results obtained in 2010 are very similar to those in 2006 (Appendix). This is an important site for *V. moulinsiana*, from its geographical location, the type of habitat, the absence of threats and the numbers of the snail present.

Monitoring recommendations:

Given the site is in good Condition, both in terms of habitat and *Vertigo moulinsiana* distribution and abundance, it is recommended that monitoring is carried out at 3 yearly intervals. This should be re-assessed in light of any deterioration of Condition or any changes to site management:

Frequency: Next monitoring due 2013

Methods (see Section 4 of main report for full details). Prescription as follows:

- Repeat transect 1, in field record: vegetation height, vegetation composition, ground moisture class, numbers of *V. moulinsiana* (adult & juvenile) and other molluscs, minimum 15 samples from 5 separate sample sites
- Re-determine boundary of the habitat polygons and assign habitat to either Optimal, Optimal & Sub-optimal, Sub-optimal, Sub-optimal and Unsuitable, or Unsuitable
- Assess the management regime and impacts upon the habitat for *V. moulinsiana*
- Use results to determine overall condition assessment

Management recommendations:

Charleville Lake lies within a larger deciduous woodland area, dominated by oak. Thus the important snail habitat area does not require to fit in with a wider grazing or agricultural regime. The area should remain unmanaged by grazing or other active management for the 2010-2013 period. The sluice gate management should not be changed from present.

The *Vertigo moulinsiana* habitat is maintained by its high groundwater table and by inundation of the lake water at wet times of year. The lack of grazing has led to a build up of deep litter which rises above the inundation at times of year when the snails are at litter level. During active periods, the snails are in humid conditions high on the stems of the swamp vegetation. The site would be vulnerable to long term hydrogeological changes, and any water abstraction from the lake or stream on the western perimeter that feeds it, or other change that would result in a lowering of the groundwater table at any time of year.

The very high numbers of the species present at the site during this survey and during all surveys in the past places a high level of importance on this site. The hydrological management needs to be maintained in a manner that does not interfere with the integrity of the site. The sluice should continue to let in the current level of water, and should not be opened or closed with any more frequency than at present. Rapid changes in water level can lead to snail kills from a loss of humidity (lowering of water) or drowning (flooding of litter during periods where the snail is inactive). A management agreement is recommended between NPWS and the landowner to manage this.

Site report - Vertigo Monitoring

Vertigo moulinsiana monitoring at Curragh Chase

1. SITE CODE AND LOCATION DETAILS

1.1 Site code and location

Vertigo Site Code: VmCAM12 **County:** Limerick

SAC Site Code: 000174 Curraghchase Woods

Location description (from baseline survey):

Monitoring period	Date surveyed	Recorders
2013-2018	3-4 October 2016	John Brophy & Maria Long
2007-2012	9 October 2010	Evelyn Moorkens & Ian Killeen

1.2 General Habitat Description (from baseline survey):

The general habitat in which *Vertigo moulinsiana* is present at Curragh Chase is a lake fringe area of swamp fen. The EU habitats that this relates to are water fringe vegetation comprising medium-tall waterside communities (CORINE 53.14) with some with some rich fen characteristics (CORINE 54.2, Annex I 7230) (Romão, 1996; Devillers et al., 1991). The snail is found typically on *Typha angustifolia*, *Carex riparia*, *Carex rostrata*, *C. acutiformis*, *Cladium mariscus* in association with *Equisetum fluviatile* and *Phragmites australis*. The water table was above ground surface level but with a litter layer in very humid conditions above the water table. The specific areas that are within a wider mosaic, but that form specific *V. moulinsiana* habitat fit the M27 Rodwell characteristic vegetation classification (Rodwell, 1991). This falls within the more general habitat of reed and large sedge swamps (FS1) and tall herb swamps (FS2) of Fossitt (2000).

1.3 Definition of Vegetation Classes (from baseline survey):

Class I: Tall <i>Carex</i> species	Class III: <i>Carex paniculata</i> , <i>Mentha aquatica</i> , <i>Schoenus nigricans</i> , <i>Iris pseudacorus</i>
Class II: <i>Cladium mariscus</i> , <i>Equisetum fluviatile</i> , <i>Glyceria maxima</i> , <i>Phragmites australis</i> , <i>Typha angustifolia</i> , <i>Sparganium erectum</i>	Class IV: All other species

1.4 Definition of Soil Moisture Classes (from baseline survey):

- 1: Dry. No visible moisture on ground surface.
- 2: Damp. Ground visibly damp, but water does not rise under pressure.
- 3: Wet. Water rises under light pressure.
- 4: Very wet. Pools of standing water, generally less than 5cm deep.
- 5: Site under water. Entire sampling site in standing or flowing water over 5cm deep.

2. SUMMARY:

The best habitat for *Vertigo moulinsiana* at Curraghchase Woods remains the fringing vegetation of the lakes in the forest park. The species is widely distributed around the lakes with the vegetation dominated by *Carex acutiformis*, with *Sparganium erectum*, *Carex paniculata* and *Iris pseudacorus*. The water levels in the lakes maintain a suitable wetness for *Vertigo moulinsiana* within the areas of suitable vegetation. There is no reason to think the species will not continue to occur around the lakes into the future. In contrast to this, the fen habitat to the south has been affected by cattle grazing, scrub clearance and the dumping of brash. The snail was not found here in the current survey and the habitat suitability has declined. Liaison with the landowner and changes to the grazing regime are required to allow the habitat to recover to a state that is more suitable for supporting *Vertigo moulinsiana*.

3. TRANSECT DETAILS

TRANSECT: 0	MONITORING PERIOD: 2013-2018
Start point:	NO TRANSECT RECORDED
End point:	
Transect length:	Direction:
Description:	
Sampling frequency:	

TRANSECT: 0	MONITORING PERIOD: 2007-2012
Start point:	NO TRANSECT RECORDED
End point:	
Transect length:	Direction:
Description:	
Sampling frequency:	

Vertigo moulinsiana monitoring at Curragh Chase

4. RESULTS

Polygon habitat characteristics

Monitoring Period: 2013-2018

Polygon	Habitat Type	Area (ha)	Comment
A	Optimal	0.3386	Polygon A status was upgraded from Suboptimal to Optimal. This change was due to interpretation rather than ecological change, as there is nothing to suggest that the habitat has changed. The habitat consists of tall sedges, with suitable wetness levels.
B	Optimal	0.4733	Polygon B status was upgraded from Suboptimal to Optimal. This change was due to interpretation rather than ecological change, as there is nothing to suggest that the habitat has changed. The habitat consists of tall sedges, with suitable wetness levels.
C	Optimal	0.3678	Polygon C status was upgraded from Suboptimal to Optimal. This change was due to interpretation rather than ecological change, as there is nothing to suggest that the habitat has changed. The habitat consists of tall sedges, with suitable wetness levels.
D	Optimal	0.2306	Polygon D status was upgraded from Suboptimal to Optimal. This change was due to interpretation rather than ecological change, as there is nothing to suggest that the habitat has changed. The habitat consists of tall sedges, with suitable wetness levels.
E	Suboptimal-Unsuitable	0.304	Polygon E status was dropped from Suboptimal to Suboptimal-Unsuitable. The reason for this change was ecological, as there have been negative effects from cattle grazing and dumping of brush.
F	Suboptimal-Unsuitable	0.3646	Polygon F status was dropped from Suboptimal to Suboptimal-Unsuitable. The reason for this change was ecological, as there have been negative effects from scrub clearance and dumping of brush.

Monitoring Period: 2007-2012

Polygon	Habitat Type	Area (ha)	Comment
A	Sub-optimal	0.3338	Polygon A - Southern margin of main lake
B	Sub-optimal	0.4732	Polygon B - Swamp at western end of main lake
C	Sub-optimal	0.3678	Polygon C - Southern margin of western part of lake
D	Sub-optimal	0.2307	Polygon D - Northern margin of western part of lake
E	Sub-optimal	0.3039	Polygon E - North-eastern part of fen site
F	Sub-optimal	0.3645	Polygon F - South-eastern part of fen site

Transect samples

Mon. period	Transect	Sample	Location	Adults	Juveniles	Total	Veg. class	Wetness	Habitat suitability
2007-2012	0	0	NO TRANSECT RECORDED						

Spot Samples

Mon. period	Sample	Grid ref.	Adults	Juveniles	Total	Veg. class	Wetness	Habitat suitability
Monitoring period 2013-2018 (30 samples)								
2013-2018	01a	R 41183 48521	0	0	0	III	3	Optimal-Suboptimal
2013-2018	01b	R 41183 48521	0	0	0	III	3	Optimal-Suboptimal
2013-2018	01c	R 41183 48521	0	0	0	II	4	Optimal-Suboptimal
2013-2018	01d	R 41183 48521	0	0	0	II	3	Optimal-Suboptimal
2013-2018	02a	R 41190 48546	0	0	0	III	4	Suboptimal
2013-2018	02b	R 41190 48546	0	0	0	III	3	Suboptimal
2013-2018	02c	R 41190 48546	0	0	0	II	3	Suboptimal
2013-2018	02d	R 41190 48546	0	0	0	II	3	Suboptimal
2013-2018	03a	R 41090 48487	0	0	0	II	4	Suboptimal

Vertigo moulinsiana monitoring at Curragh Chase

2013-2018	03b	R 41090 48487	0	0	0	II	4	Suboptimal
2013-2018	04a	R 41304 49178	0	0	0	III	4	Optimal-Suboptimal
2013-2018	04b	R 41304 49178	0	0	0	III	4	Optimal-Suboptimal
2013-2018	05a	R 41312 49231	0	0	0	I	4	Optimal
2013-2018	05b	R 41312 49231	0	0	0	I	4	Optimal
2013-2018	06a	R 41330 49273	1	0	1	III	4	Optimal
2013-2018	06b	R 41330 49273	0	2	2	I	5	Optimal
2013-2018	07a	R 41409 49336	2	0	2	II	5	Optimal
2013-2018	07b	R 41409 49336	5	1	6	II	5	Optimal
2013-2018	08a	R 41432 49287	0	0	0	I	3	Optimal
2013-2018	08b	R 41432 49287	0	0	0	I	5	Optimal
2013-2018	09a	R 41420 49152	0	0	0	I	5	Optimal
2013-2018	09b	R 41420 49152	0	0	0	I	5	Optimal
2013-2018	10a	R 41290 49035	6	3	9	I	4	Optimal
2013-2018	10b	R 41290 49035	2	14	16	I	4	Optimal
2013-2018	11a	R 41234 49008	3	16	19	I	4	Optimal
2013-2018	11b	R 41234 49008	8	51	59	I	5	Optimal
2013-2018	12a	R 41187 49111	9	4	13	I	5	Optimal
2013-2018	12b	R 41187 49111	7	1	8	I	5	Optimal
2013-2018	13a	R 41161 49007	0	0	0	I	5	Optimal
2013-2018	13b	R 41161 49007	0	0	0	I	5	Optimal

Monitoring period 2007-2012 (60 samples)

2007-2012	01	R 41077 48465	0	0	0		4	
2007-2012	02	R 41077 48465	0	0	0		4	
2007-2012	03	R 41077 48465	0	0	0		3	
2007-2012	04	R 41077 48465	0	0	0		4	
2007-2012	05	R 41077 48465	0	0	0		4	
2007-2012	06	R 41071 48472	0	0	0		3	
2007-2012	07	R 41071 48472	0	0	0		3	
2007-2012	08	R 41071 48486	0	0	0		4	
2007-2012	09	R 41070 48553	0	0	0		3	
2007-2012	10	R 41070 48553	0	0	0		3	
2007-2012	11	R 41070 48553	0	0	0		3	
2007-2012	12	R 41070 48553	0	0	0		3	
2007-2012	13	R 41070 48553	0	0	0		3	
2007-2012	14	R 41174 49127	0	0	0		4	
2007-2012	15	R 41174 49127	0	0	0		5	
2007-2012	16	R 41174 49127	0	0	0		4	
2007-2012	17	R 41174 49127	0	0	0		3	
2007-2012	18	R 41174 49127	0	0	0		3	

Vertigo moulinsiana monitoring at Curragh Chase

2007-2012	19	R 41161 48991	0	0	0	4
2007-2012	20	R 41161 48991	0	0	0	5
2007-2012	21	R 41161 48991	0	0	0	5
2007-2012	22	R 41158 48956	0	0	0	4
2007-2012	23	R 41158 48956	0	0	0	3
2007-2012	24	R 41158 48956	0	0	0	3
2007-2012	25	R 41282 49029	1	1	2	4
2007-2012	26	R 41282 49029	0	0	0	4
2007-2012	27	R 41282 49029	2	0	2	4
2007-2012	28	R 41282 49029	4	0	4	4
2007-2012	29	R 41282 49029	1	1	2	4
2007-2012	30	R 41242 49004	8	3	11	4
2007-2012	31	R 41242 49004	7	12	19	4
2007-2012	32	R 41242 49004	6	1	7	4
2007-2012	33	R 41242 49004	2	0	2	4
2007-2012	34	R 41242 49004	4	6	10	4
2007-2012	35	R 41298 49193	1	0	1	4
2007-2012	36	R 41298 49193	0	0	0	4
2007-2012	37	R 41298 49193	0	0	0	4
2007-2012	38	R 41298 49193	0	0	0	4
2007-2012	39	R 41298 49193	0	0	0	4
2007-2012	40	R 41409 49348	2	0	2	3
2007-2012	41	R 41409 49348	4	1	5	3
2007-2012	42	R 41409 49348	3	0	3	3
2007-2012	43	R 41451 49268	22	9	31	4
2007-2012	44	R 41451 49268	17	29	46	4
2007-2012	45	R 41451 49268	18	33	51	4
2007-2012	46	R 41424 49156	0	0	0	3
2007-2012	47	R 41424 49156	2	0	2	4
2007-2012	48	R 41424 49156	2	3	5	4
2007-2012	49	R 41343 49153	0	0	0	5
2007-2012	50	R 41343 49153	0	0	0	5
2007-2012	51	R 41185 48566	0	0	0	
2007-2012	52	R 41187 48517	1	0	1	
2007-2012	53	R 41177 48511	1	0	1	
2007-2012	54	R 41175 48521	0	0	0	
2007-2012	55	R 41160 48520	0	0	0	
2007-2012	56	R 41155 48537	0	0	0	
2007-2012	57	R 41093 48499	0	0	0	
2007-2012	58	R 41076 48495	0	0	0	

Vertigo moulinsiana monitoring at Curragh Chase

2007-2012	59	R 41089 48484	0	0	0
2007-2012	60	R 41073 48558	0	0	0

5. CONDITION ASSESSMENT

5.1 Population Assessment: 3 passes Favourable (green); 2 passes Unfavourable Inadequate (amber); 0-1 passes Unfavourable Bad (red)

Mon. period	Transect	Indicator	Target	Result	Pass/Fail
2013-2018	0	N/A	NO TRANSECT RECORDED		
2007-2012	0	N/A	NO TRANSECT RECORDED		

Mon. period	Indicator	Target	Result	Pass/Fail
2013-2018	Area of occupancy	Adult or sub-adult snails are present in at least two out of four locations in Polygons A and B (minimum 10 samples)	Present in 3 locations	Pass
2013-2018	Presence/Absence	Adult or sub-adult snails are present in at least two locations in the fen/swamp area in Polygons E and F (minimum 10 samples)	Adult or sub-adult snails absent	Fail
2013-2018	Species extent	Adult or sub-adult snails are present in at least one location in Polygons C and D (minimum 10 samples)	Present in 2 locations	Pass
2007-2012	Area of occupancy	Adult or sub-adult snails are present in at least one location along the southern side of the lake (sites 1-5 of this survey) (minimum 10 samples)	V. moulinsiana absent	Fail
2007-2012	Presence/Absence	Adult or sub-adult snails are present in at least 2 locations, one of which must be in the main swamp area (sites 20-24 of this survey) (minimum 10 samples) i	n 2 places at the E end, absent from main swamp	Fail
2007-2012	Species extent	Adult or sub-adult snails are present in at least 4 other locations around the lake (sites 6-13 of this survey) (minimum 10 samples)	Found at 6 other locations	Pass

Mon. period	Population Notes
2013-2018	In the monitoring period 2007-2012, Vertigo moulinsiana was found at two out of ten sample locations at the fen to the south of the Curragh Chase Forest Park lake. In the current survey, the snail was absent from all three sample locations (10 samples) in the fen. In the previous survey six out of 14 locations (43%) around the lakes were positive for the snail, and in the current survey five out of ten sample locations were positive (50%). It should be noted that there was considerable discrepancies between sample numbers and locations mentioned in Moorkens & Killeen (2011) and those mapped, resulting in the need for the criteria to be modified in the current survey to provide clarity. Based on the criteria of Moorkens & Killeen (2011), and with some modifications to clarify locations, the population assessment for Curragh Chase is Unfavourable Inadequate (amber).
2007-2012	the snail is scattered in its distribution, absent from places where it was formerly common, and where it was found, generally present in rather low numbers

5.2 Habitat Assessment: 3 passes Favourable (green); 2 passes Unfavourable Inadequate (amber); 0-1 passes Unfavourable Bad (red)

5.2.1 Transect level

Mon. period	Transect	Indicator	Target	Result	Pass/Fail
2013-2018	0	N/A	NO TRANSECT RECORDED		
2007-2012	0	N/A	NO TRANSECT RECORDED		

5.2.2 Site level

Mon. period	Indicator	Target	Result	Pass/Fail
2013-2018	Habitat extent	1.8-2.2 ha of the site sub-optimal with optimal areas	2.07ha with habitat Suboptimal or better	Pass
2007-2012	Habitat extent	1.8-2.2ha of the site sub-optimal with optimal areas	2.08 ha, all Sub-optimal	Pass

Vertigo moulinsiana monitoring at Curragh Chase

Mon. period	Indicator	Target	Result	Pass/Fail
2013-2018	Habitat extent	Over 80% of the samples at sites at the lakes (Polygons A, B, C and D) are dominated by suitable vegetation (Classes I & II) AND fall within soil moisture classes 3-5	80% dominated by suitable vegetation and 100% fall within soil moisture classes 3-5	Pass
2013-2018	Habitat type	Over 80% of the samples at sites at the fen/swamp (Polygons E and F) are dominated by suitable vegetation (Classes I & II) AND fall within soil moisture classes 3-5	60% dominated by suitable vegetation and 100% fall within soil moisture classes 3-5	Fail
2007-2012	Habitat extent	Over 80% of the samples at sites at the lake (minimum 10 sites to be sampled) are dominated by suitable vegetation (Classes I & II) and fall within soil moisture classes 3-5	100%	Pass
2007-2012	Habitat type	Over 80% of the samples at the fen (minimum 10 sites to be sampled) are dominated by suitable vegetation (Classes I & II) and fall within soil moisture classes 3-5	100%	Pass

Mon. period	Habitat Notes
2013-2018	In the monitoring period 2007-2012, four Suboptimal habitat polygons were delineated around the Curragh Chase Forest Park lakes, while two more Suboptimal polygons were located in the fen to the south. Following the current survey, the four polygons around the lake were raised to Optimal status due to the suitable nature of the vegetation and wetness. This change is considered one of interpretation, as there is no indication there has been ecological change in this area. The polygons in the fen are now classed as Suboptimal-Unsuitable, and have been impacted by grazing, clearance of scrub and dumping of brash. Based on the criteria of Moorkens & Killeen (2011), with some minor alterations, the habitat assessment for Curragh Chase is Unfavourable Inadequate (amber).
2007-2012	Much of the habitat at the site appears to be in good condition for <i>V. moulinsiana</i> ,

5.3 Future Prospects Assessment

Mon. period	Activity code	Activity description	Location	Intensity	Influence	Area affected	Comment
2013-2018	A04.02.01	non intensive cattle grazing	Inside	Medium	Negative	30%	Herd of 18 cattle with access to fen, but predominately graze grassland above
2013-2018	A10.01	removal of hedges and copses or scrub	Inside	Medium	Negative	3%	Scrub removal, with associated dumping in fen
2013-2018	H05.01	garbage and solid waste	Inside	High	Negative	5%	Dumping of spoil and cleared scrub
2007-2012	A04.02.01	non intensive cattle grazing	Inside	Low	Neutral	0.7ha	Cattle grazing only applies in the fen site. At present cattle trample and poach around the periphery of the suitable <i>V. moulinsiana</i> habitat, but with present stocking levels have very little (neutral) impact.
2007-2012	M01.01	temperature changes (e.g. rise of temperature & extremes)	Inside	Low	Negative	1.4ha	The suitable habitat around the lake margins is very narrow and thus susceptible to flooding and / or drying.
2007-2012	M01.02	droughts and less precipitations	Inside	Low	Negative	1.4ha	
2007-2012	M01.03	flooding and rising precipitations	Inside	Low	Negative	1.4ha	

Mon. period	Future Prospects Notes
-------------	------------------------

Vertigo moulinsiana monitoring at Curragh Chase

Mon. period	Future Prospects Notes
2013-2018	There are no imminent threats to the Vertigo moulinsiana habitat around the Curragh Chase Forest Park lakes, while cattle grazing, scrub clearance and associated dumping are having a negative effect on the fen/swamp area. Amenity grassland is managed right up to the edges of the polygons in some areas near the lakes, with associated practices such as fertiliser application and frequent mowing taking place. However, no effects of such management practices were noted (e.g. nutrient enrichment in the water). For the site as a whole, it is likely that the species will continue to be present at this site into the future. It is therefore considered that the Future Prospects for Curragh Chase are Favourable (green).
2007-2012	As the impacts in the foreseeable future are low, Future prospects have been assessed as Favourable

5.4 Overall Assessment

Mon. period	Population assessment	Area of suitable habitat	Future prospects	Overall assessment
2013-2018	Amber	Amber	Green	Amber
2007-2012	Red	Green	Green	Red

Mon. period	Overall Notes
2013-2018	With both the population and habitat assessments for Curragh Chase returning Unfavourable Inadequate (amber) results, and only the Future Prospects rated as Favourable (green), the Overall Assessment for Curragh Chase is Unfavourable Inadequate (amber).
2007-2012	

6. DISCUSSION

Monitoring period
2013-2018
<p>Area of occupancy: The main habitat that supports Vertigo moulinsiana within this site is the fringe swamp habitat at the edge of the lake in the Forest Park. Access is from the main Forest Park car park.</p> <p>Discussion:</p> <p>The best habitat for Vertigo moulinsiana at Curragh Chase remains the fringing vegetation of the lakes in the forest park. The species is widely distributed around the lakes with the vegetation dominated by Carex acutiformis, with Sparganium erectum, Carex paniculata and Iris pseudacorus. The water levels in the lakes maintain a suitable wetness for Vertigo moulinsiana within the areas of suitable vegetation. There is no reason to think the species will not continue to occur around the lakes into the future. In contrast to this, the fen habitat to the south has been affected by cattle grazing, scrub clearance and the dumping of brush. The snail was not found here in the current survey and the habitat suitability has declined. Liaison with the landowner and changes to the grazing regime are required to allow the habitat to recover to a state that is more suitable for supporting Vertigo moulinsiana.</p> <p>Monitoring recommendations:</p> <p>Given the decline in the Vertigo moulinsiana population and distribution in the fen area to the south, monitoring of Curragh Chase should be carried out on a three yearly basis. The monitoring protocol should follow that of Moorkens & Killeen (2011), with just some alterations to clarify sampling locations:</p> <ul style="list-style-type: none"> - Take samples at 5 locations in polygons A and B, in field record: vegetation height, vegetation composition, ground moisture class, numbers of Vertigo moulinsiana (adult & juvenile) and other molluscs, minimum 10 samples - Take samples at 5 locations in Polygons C and D, record as above, minimum 10 samples - Take samples at a minimum of 2 locations in the fen site, record as above, minimum 10 samples - Re-determine boundary of the habitat polygons and assign habitat to either Optimal, Optimal-Suboptimal, Suboptimal, Suboptimal-Unsuitable, or Unsuitable - Assess the management regime and impacts upon the habitat for Vertigo moulinsiana - Use results to determine overall condition assessment <p>Management recommendations:</p> <p>No changes to the management are required at the Curragh Chase Forest Park lakes to maintain suitable Vertigo moulinsiana habitat into the future. In the fen area, the level of cattle grazing should be reduced either by reducing the number of cattle with access to the area, or limiting the time for which cattle have access. The situation should be monitored to ensure any measures result in a recovery of the suitable vegetation in this area. No further scrub removal or dumping should be allowed to occur at the fen.</p>

Vertigo moulinsiana monitoring at Curragh Chase

2007-2012

Area of occupancy: The main habitat that supports *Vertigo moulinsiana* within this site is the fringe swamp habitat at the edge of the lake in the Forest Park. Access is from the main Forest Park carpark.

Discussion:

The Condition of the site and the feature based upon the 2010 survey has been assessed as Unfavourable. Although insufficient data was collected in 2005 to produce a retrospective Condition Assessment, there is clear evidence of a decline in the distribution and abundance of *V. moulinsiana* at both the lake and particularly the fen sites since 2005. It is highly unlikely that the decline results from lack of management.

Vertigo moulinsiana populations fluctuate naturally over time, and short term changes in environmental conditions can rapidly influence population size, especially if meteorological conditions have been extreme for the area in the months preceding the survey. The recent pattern of long dry summers followed by stormy wet winters may mean that the conditions for *V. moulinsiana* at Curragh Chase have become less favourable. Population size may be higher during wet, humid summers, whilst periods of drought can result in lower population levels. Population numbers for *V. moulinsiana* also vary considerably with season with low numbers in late winter and early spring to very high numbers in late summer and autumn when the snail's have reproduced (e.g. Killeen 2003a, b). Evidence from a UK SAC which had been monitored over a 10 year period showed the snail had declined (in both numbers and extent) in 4 of the 8 component sites within the larger SAC, and disappeared completely from two more, yet there was no clear evidence of any deterioration in the quality of the habitat (Tattersfield & Killeen, 2006). Some of these changes may be due to groundwater recharge changes over a large catchment scale, due to intensification of landuse in the wider area. The population at Curragh Chase should be monitored to see if it improves with better weather conditions, and if not then wider catchment issues will need to be investigated.

Monitoring recommendations:

Given the evidence for an overall deterioration in the Condition of the site, particularly in *Vertigo moulinsiana* distribution and abundance, it is recommended that monitoring is carried out at a minimum of 3 yearly intervals. This should be re-assessed in light of any deterioration of Condition or any changes to site management:

Frequency: Next monitoring due 2013

Methods (see Section 4 of main report for full details). Prescription as follows:

- Take samples at 5 locations on the southern side of the lake, in field record: vegetation height, vegetation composition, ground moisture class, numbers of *V. moulinsiana* (adult & juvenile) and other molluscs, minimum 10 samples
- Take samples at 4-5 locations elsewhere around the lake, record as above, minimum 10 samples
- Take samples at a minimum of 2 locations in the fen site, record as above, minimum 10 samples
- Re-determine boundary of the habitat polygons and assign habitat to either Optimal, Optimal & Sub-optimal, Sub-optimal, Sub-optimal and Unsuitable, or Unsuitable
- Assess the management regime and impacts upon the habitat for *V. moulinsiana*
- Use results to determine overall condition assessment

Management recommendations:

Existing Management

The swamp habitat around the lake margins are ungrazed. A few cattle are present in the fen but they do not have significant impact upon the wettest swamp areas.

Proposed management prescription for site

The *Vertigo moulinsiana* habitat is maintained by its high groundwater table and by inundation of the lake water at wet times of year. The absence of grazing at the lake has led to a build up of deep litter which rises above the inundation at times of year when the snails are at litter level. During active periods, the snails are in humid conditions high on the stems of the swamp vegetation. The site would be vulnerable to long term hydrogeological changes, and any water abstraction from the lake or stream on the western perimeter that feeds it, any eutrophication from inputs into the lake such as fertilizers or other change that would result in a lowering of the groundwater table at any time of year. The lake fringe vegetation should not be excessively managed, cut or removed, and should be allowed to naturally expand into transition swamp habitat as litter builds up.

Site report - Vertigo Monitoring

Vertigo moulinsiana monitoring at Kildallan Bridge

1. SITE CODE AND LOCATION DETAILS

1.1 Site code and location

Vertigo Site Code: VmCAM14 **County:** Westmeath

SAC Site Code: n/a Not in SAC

Location description (from baseline survey):

Monitoring period	Date surveyed	Recorders
2013-2018	19 October 2016	John Brophy & Maria Long
2007-2012	9 September 2010	Evelyn Moorkens & Ian Killeen

1.2 General Habitat Description (from baseline survey):

The general habitat in which *Vertigo moulinsiana* is present at Kildallan Bridge is low lying old canal area of swamp fen with some spring flushing. The snail is found typically on *Glyceria maxima* in association with *Phalaris arundinacea*, and *Iris pseudacorus* with some sub storey mosses. The water table was above ground surface level in places. There are no EU habitats that correspond to this habitat, the closest CORINE category would be Atlantic and sub-Atlantic humid meadows (37.21) (Devillers et al., 1991). This falls within the more general habitat of rich fen and flush (PF1), freshwater marsh (GM1), reed and large sedge swamps (FS1) and tall herb swamps (FS2) of Fossitt (2000). *Vertigo moulinsiana* is also found on marginal vegetation at the canal banks typically on *Carex riparia*, *Carex rostrata*, and *Phragmites australis* with a litter layer in very humid conditions above the water table. The EU habitats that this relates to are water fringe vegetation comprising medium-tall waterside communities (CORINE 53.14) (Romão, 1996; Devillers et al., 1991).

1.3 Definition of Vegetation Classes (from baseline survey):

Class I: <i>Glyceria maxima</i>	Class III: <i>Urtica dioica</i>
Class II: <i>Phragmites australis</i> , <i>Carex rostrata</i> , <i>Iris pseudacorus</i>	Class IV: All other species

1.4 Definition of Soil Moisture Classes (from baseline survey):

- 1: Dry. No visible moisture on ground surface.
- 2: Damp. Ground visibly damp, but water does not rise under pressure.
- 3: Wet. Water rises under light pressure.
- 4: Very wet. Pools of standing water, generally less than 5cm deep.
- 5: Site under water. Entire sampling site in standing or flowing water over 5cm deep.

2. SUMMARY:

The core of the *Vertigo moulinsiana* population at Kildallan Bridge is in the back-drain to the southeast of the bridge, but the species is also found in other locations in the back-drain and along the fringing vegetation of the canal itself, on both banks. *Glyceria maxima* is the dominant species in most of the locations where *Vertigo moulinsiana* is found. The fringing vegetation of the canal is shorter and sparser than during the previous survey, and has evidently been subject to clearance and cutting. The grass of the towpath is mown, and it appears that the fringing vegetation may be cut in a similar manner. This is reducing the available habitat for *Vertigo moulinsiana*, and is reducing the connectivity of habitat along the canal. The back-drain habitat is vulnerable to clearance by adjacent landowners or by Waterways Ireland as part of their regular maintenance, and the presence of the snail should be brought the attention of the appropriate staff within the organisation. Overall the *Vertigo moulinsiana* population at Kildallan Bridge is in reasonable condition, and is expected to continue to survive at the site into the future.

3. TRANSECT DETAILS

TRANSECT: 1	MONITORING PERIOD: 2013-2018
Start point:	N 34464 56315 As for 2007-2012
End point:	N 34411 56353 As for 2007-2012
Transect length:	As for 2007-2012 Direction: As for 2007-2012
Description:	As for 2007-2012
Sampling frequency:	As for 2007-2012
<hr/>	
TRANSECT: 1	MONITORING PERIOD: 2007-2012
Start point:	N 34464 56315 swamp
End point:	N 34411 56353
Transect length:	65 Direction:
Description:	
Sampling frequency:	

Vertigo moulinsiana monitoring at Kildallan Bridge

4. RESULTS

Polygon habitat characteristics

Monitoring Period: 2013-2018			
Polygon	Habitat Type	Area (ha)	Comment
	Suboptimal	5.7897	Polygon C is a new polygon. It was drawn as part of the current survey due to the fact that all non-transect sample points and most of the canal had not been included in a polygon by Moorkens and Killeen (2011). It has been classed as Suboptimal. It encompasses the entire canal channel and banks, as well as adjacent back drains (outside of Polygons A and B).
A	Optimal	0.2601	Polygon A status remains Optimal, comprising tall, suitable vegetation in the back drain of the canal.
B	Suboptimal-Unsuitable	0.211	Polygon B status drops from Optimal to Suboptimal-Unsuitable. This is due to ecological change, with a change in vegetation to less suitable species such as <i>Juncus acutifloris</i> , <i>Carex disticha</i> and <i>Filipendula ulmaria</i> .

Monitoring Period: 2007-2012			
Polygon	Habitat Type	Area (ha)	Comment
	Optimal	0.26	only 2 small areas with good swamp habitat were identified: just to the south-east of Kildallan Bridge (Polygon A, area 0.26ha) and to the north-east of Kill Bridge (polygon B, area 0.21ha).
B	Sub-optimal	0.21	to the north-east of Kill Bridge (polygon B, area 0.21ha).

Transect samples

Mon. period	Transect	Sample	Location	Adults	Juveniles	Total	Veg. class	Wetness	Habitat suitability
Monitoring period 2013-2018 Transect 1 (14 samples)									
2013-2018	1	1	0m	0	4	4	I	3	Optimal
2013-2018	1	2	5m	0	1	1	I	3	Optimal
2013-2018	1	3	10m	2	11	13	I	3	Optimal
2013-2018	1	4	15m	1	4	5	I	3	Optimal
2013-2018	1	5	20m	1	5	6	I	4	Optimal
2013-2018	1	6	25m	0	2	2	I	3	Optimal
2013-2018	1	7	30m	5	18	23	I	3	Optimal
2013-2018	1	8	35m	54	158	212	I	3	Optimal
2013-2018	1	9	40m	67	223	290	I	5	Optimal
2013-2018	1	10	45m	189	441	630	I	4	Optimal
2013-2018	1	11	50m	156	652	808	I	4	Optimal
2013-2018	1	12	55m	28	148	176	I	3	Optimal
2013-2018	1	13	60m	8	120	128	I	4	Optimal
2013-2018	1	14	65m	24	184	208	I	4	Optimal
Monitoring period 2007-2012 Transect 1 (15 samples)									
2007-2012	1	0	15m	0	0	0			
2007-2012	1	1	0m	8	7	15		4	
2007-2012	1	2	5m	28	6	34		4	
2007-2012	1	3	10m	9	11	20		4	
2007-2012	1	4	20m	38	20	58		3	
2007-2012	1	5	25m	5	3	8		3	
2007-2012	1	6	30m	19	6	25		4	
2007-2012	1	7	35m	7	1	8		4	
2007-2012	1	8	40m	44	17	61		4	
2007-2012	1	9	45m	12	3	15		3	

Vertigo moulinsiana monitoring at Kildallan Bridge

2007-2012	1	10	50m	5	5	10	4
2007-2012	1	11	55m	21	2	23	4
2007-2012	1	12	60m	7	0	7	4
2007-2012	1	13	65m	0	2	2	3
2007-2012	1	14	70m	0	0	0	3

Spot Samples

Mon. period	Sample	Grid ref.	Adults	Juveniles	Total	Veg. class	Wetness	Habitat suitability
Monitoring period 2013-2018 (24 samples)								
2013-2018	01a	N 34618 56066	0	0	0	I	4	Optimal-Suboptimal
2013-2018	01b	N 34618 56066	0	0	0	I	4	Optimal-Suboptimal
2013-2018	01c	N 34618 56066	0	0	0	I	4	Optimal-Suboptimal
2013-2018	02a	N 34660 55988	0	0	0	I	5	Suboptimal
2013-2018	02b	N 34660 55988	0	0	0	I	5	Suboptimal
2013-2018	02c	N 34660 55988	0	0	0	I	5	Suboptimal
2013-2018	03a	N 34115 56582	0	0	0	I	5	Suboptimal
2013-2018	03b	N 34115 56582	0	0	0	IV	5	Suboptimal
2013-2018	03c	N 34115 56582	0	0	0	IV	5	Suboptimal
2013-2018	04a	N 34019 56662	0	0	0	I	5	Optimal-Suboptimal
2013-2018	04b	N 34019 56662	3	7	10	I	5	Optimal-Suboptimal
2013-2018	04c	N 34019 56662	18	31	49	I	5	Optimal-Suboptimal
2013-2018	05a	N 33529 56829	0	1	1	IV	2	Suboptimal
2013-2018	05b	N 33529 56829	0	0	0	IV	2	Suboptimal
2013-2018	05c	N 33529 56829	0	0	0	I	3	Suboptimal
2013-2018	06a	N 33459 56777	0	0	0	I	2	Suboptimal-Unsuitable
2013-2018	06b	N 33459 56777	1	12	13	I	5	Suboptimal-Unsuitable
2013-2018	06c	N 33459 56777	1	5	6	I	3	Suboptimal-Unsuitable
2013-2018	07a	N 33267 56624	0	0	0	IV	3	Optimal-Suboptimal
2013-2018	07b	N 33267 56624	0	0	0	IV	3	Optimal-Suboptimal
2013-2018	07c	N 33267 56624	0	0	0	II	3	Optimal-Suboptimal
2013-2018	08a	N 33410 56749	0	0	0	IV	5	Suboptimal
2013-2018	08b	N 33410 56749	0	0	0	IV	5	Suboptimal
2013-2018	08c	N 33410 56749	0	0	0	II	5	Suboptimal
Monitoring period 2007-2012 (39 samples)								
2007-2012	01	N 34458 56322	2	0	2		3	
2007-2012	02	N 34458 56322	1	0	1		4	
2007-2012	03	N 34458 56322	0	0	0		4	
2007-2012	04	N 34484 56293	2	0	2		3	
2007-2012	05	N 34484 56293	5	1	6		3	
2007-2012	06	N 34484 56293	0	0	0		3	
2007-2012	07	N 34618 56100	0	0	0		4	

Vertigo moulinsiana monitoring at Kildallan Bridge

2007-2012	08	N 34618 56100	5	0	5	3
2007-2012	09	N 34618 56100	0	0	0	5
2007-2012	10	N 34641 56046	2	0	2	2
2007-2012	11	N 34641 56046	2	0	2	3
2007-2012	12	N 34641 56046	0	0	0	3
2007-2012	13	N 34646 55995	0	0	0	4
2007-2012	14	N 34646 55995	1	0	1	4
2007-2012	15	N 34646 55995	0	0	0	5
2007-2012	16	N 34664 55979	3	0	3	3
2007-2012	17	N 34664 55979	0	0	0	4
2007-2012	18	N 34664 55979	1	0	1	4
2007-2012	19	N 34699 55882	0	0	0	4
2007-2012	20	N 34699 55882	0	0	0	4
2007-2012	21	N 34699 55882	0	0	0	4
2007-2012	22	N 34206 56543	0	0	0	2
2007-2012	23	N 34206 56543	0	0	0	3
2007-2012	24	N 34206 56543	0	0	0	2
2007-2012	25	N 33696 56860	0	0	0	3
2007-2012	26	N 33696 56860	0	0	0	2
2007-2012	27	N 33696 56860	0	0	0	3
2007-2012	28	N 33518 56824	17	5	22	4
2007-2012	29	N 33518 56824	3	3	6	4
2007-2012	30	N 33518 56824	8	2	10	4
2007-2012	31	N 33445 56776	1	0	1	4
2007-2012	32	N 33445 56776	0	0	0	4
2007-2012	33	N 33445 56776	2	1	3	4
2007-2012	34	N 33255 56655	0	0	0	4
2007-2012	35	N 33255 56655	0	0	0	5
2007-2012	36	N 33255 56655	2	0	2	4
2007-2012	37	N 33185 56590	0	0	0	3
2007-2012	38	N 33185 56590	0	0	0	3
2007-2012	39	N 33185 56590	1	0	1	3

5. CONDITION ASSESSMENT

5.1 Population Assessment: 3 passes Favourable (green); 2 passes Unfavourable Inadequate (amber); 0-1 passes Unfavourable Bad (red)

Mon. period	Transect	Indicator	Target	Result	Pass/Fail
2013-2018	1	Density	At least 5 samples on Transect 1 should have >20 V. moulinsiana individuals	8 samples with >20 individuals	Pass
2013-2018	1	Presence/Absence	V. moulinsiana is present in 7 samples (minimum 14 taken) on Transect 1	Present in 14 samples	Pass
2007-2012	1	Density	At least 5 samples on Transect 1 should have >20 V. moulinsiana individuals	6 samples with >20 individuals	Pass

Vertigo moulinsiana monitoring at Kildallan Bridge

2007-2012	1	Presence/Absence	V. moulinsiana is present in 7 samples (minimum 14 taken) on Transect 1	Present in 13 samples	Pass
-----------	---	------------------	---	-----------------------	------

Mon. period	Indicator	Target	Result	Pass/Fail
2013-2018	Species extent	Adult or sub-adult snails are present in at least 4 other locations (minimum 8 locations sampled), one should be a canal margin, and the other in a marginal swamp (e.g. in Polygon B)	Present in 2 other locations	Fail
2007-2012	Species extent	Adult or sub-adult snails are present in at least 2 other locations (minimum 8 locations sampled), one should be a canal margin, and the other in a marginal swamp (e.g. at sites 10 or 11)	Present at 10 other locations	Pass

Mon. period	Population Notes
2013-2018	The distribution of the Vertigo moulinsiana population at Kildallan Bridge shows a reduction since the previous survey, with 14 out of 14 locations positive on Transect 1, and just two out of eight locations positive in the wider area in the current survey. This compares with 13 out of 14 locations positive on Transect 1, and 10 out of 13 locations positive in the wider area in 2007-2012. Numbers were high at many locations on the transect, with Vertigo moulinsiana numbering in the hundreds for seven of the 14 locations. Based on the criteria of Moorrens & Killeen (2011), with one modification made to take better account of the amount of habitat area outside of the transect, the Population Assessment is Unfavourable Inadequate (amber).
2007-2012	Patches of habitat on the landward side of the canal towpaths are in good condition for V. moulinsiana, the snail is scattered in its distribution and is locally common. Sections of habitat on the canal banks are also in relatively good condition, but V. moulinsiana is much more scattered and present in low numbers.

5.2 Habitat Assessment: 3 passes Favourable (green); 2 passes Unfavourable Inadequate (amber); 0-1 passes Unfavourable Bad (red)

5.2.1 Transect level

Mon. period	Transect	Indicator	Target	Result	Pass/Fail
2013-2018	1	Habitat extent	Over 50% of the samples (minimum 14 taken) on Transect 1 are dominated by suitable vegetation (Classes I & II)	100% dominated by suitable vegetation	Pass
2013-2018	1	Habitat quality	Over 80% of the samples on Transect 1 fall within soil moisture classes 3-5	100% fall within soil moisture classes 3-5	Pass
2007-2012	1	Habitat extent	Over 50% of the samples (minimum 14 taken) on Transect 1 are dominated by suitable vegetation (Classes I & II)	100% of samples	Pass
2007-2012	1	Habitat quality	Over 80% of the samples on Transect 1 fall within soil moisture classes 3-5	100% of samples	Pass

5.2.2 Site level

Mon. period	Indicator	Target	Result	Pass/Fail
2013-2018	Habitat extent	At least 4 other locations (minimum 8 sampled), which should include canal margins and marginal swamps (e.g. in Polygon B) are dominated by suitable vegetation (Classes I & II) and fall within soil moisture classes 3-5	4 other locations dominated by suitable vegetation and fall within soil moisture classes 3-5	Pass
2007-2012	Habitat extent	At least 4 other locations (minimum 8 sampled), which should include canal margins and marginal swamps (e.g. at sites 10 or 11 are dominated by suitable vegetation (Classes I & II) and fall within soil moisture classes 3-5	10 locations	Pass

Mon. period	Habitat Notes
2013-2018	In the monitoring period 2007-2012, two small polygons supporting suitable habitat for Vertigo moulinsiana were identified at Kildallan Bridge. Polygon A, which encompassed the transect was located in a back-drain to the southeast of the bridge, while Polygon B was an area of back-drain further to the west. Both polygons were classed as Optimal.

Vertigo moulinsiana monitoring at Kildallan Bridge

2013-2018	Unusually, no polygon was drawn to include the majority of the canal channel, in/near which 13 samples were taken. In the current monitoring period (2013-2018), Polygon A was again found to be Optimal, while Polygon B was classed as Suboptimal-Unsuitable due to the sparse nature of the vegetation here and the plant species present (not typically those associated with support <i>Vertigo moulinsiana</i>). Suitable patches of habitat were also present along the canal itself, with <i>Glyceria maxima</i> forming a narrow fringe in places. The newly drawn Polygon C, which takes in the canal and banks, was classed as being Suboptimal. Based on the criteria of Moorkens & Killeen (2011), the Habitat Assessment for Kildallan Bridge is Favourable (green).
2007-2012	Patches of habitat on the landward side of the canal towpaths are in good condition for <i>V. moulinsiana</i> , the snail is scattered in its distribution and is locally common. Sections of habitat on the canal banks are also in relatively good condition, but <i>V. moulinsiana</i> is much more scattered and present in low numbers.

5.3 Future Prospects Assessment

Mon. period	Activity code	Activity description	Location	Intensity	Influence	Area affected	Comment
2013-2018	A03.02	non intensive mowing	Inside	High	Negative	35%	Canal banks and emergent vegetation mown
2013-2018	A04.02.01	non intensive cattle grazing	Inside	-	Neutral	1%	Positive = Wider fringing vegetation due to bank slumping. Negative = Eutrophication and grazing
2013-2018	D01.01	paths, tracks, cycling tracks	Inside	Medium	Negative	10%	Recent, wide hardcore path constructed at SE end of site. Reduced connectivity of the back drain habitat and vegetation with that of the canal.
2013-2018	H01.05	diffuse pollution to surface waters due to agricultural and forestry activities	Outside	Low	Negative	2%	Silage bales stored in yard adjacent to, and above, Polygon A. Run-off is a potential issue
2013-2018	H05.01	garbage and solid waste	Inside	High	Negative	1%	Stone dumped from works in adjacent field = loss of habitat.
2007-2012	J02.10	management of aquatic and bank vegetation for drainage purposes	Inside	Medium	Negative		Potentially suitable canal side habitat for <i>V. moulinsiana</i> would comprise a zone of relatively dense sedge and <i>Glyceria maxima</i> at least 1.5m deep. Therefore, a 100m length of canal may have up to 150m ² of habitat along each bank which would be affected by these activities.
2007-2012	J02.11.01	Dumping, depositing of dredged deposits	Inside	Medium	Negative		

Mon. period	Future Prospects Notes
2013-2018	There are a number of activities/threats that may have an influence on the future occurrence of <i>Vertigo moulinsiana</i> at Kildallan Bridge. Where the core of the population is found, in Polygon A, there are no imminent threats, though the storage of silage in a compound on higher ground above this area has the potential to impact on the canal back-drain here, for example through nutrient enrichment from run-off, were this to occur. The mowing and removal of the fringing vegetation of the canal itself is the main threat to the site as a whole, with mowing deemed to be occurring in approximately 35% of the canal length. Where previously dense stands of tall reeds lined the canal banks, they are now sparse and cut short, reducing the suitability of the habitat for <i>Vertigo moulinsiana</i> . Taking into account the distribution of <i>Vertigo moulinsiana</i> at the site, and the numbers present, and in light of the activities and threats present, the Future Prospects for the species at Kildallan Bridge are considered to be Favourable (green).
2007-2012	As the impact is at present moderate rather than severe, Future prospects have been assessed as Favourable (green). However, this assessment is made on the basis of no significant recent management. If/when the canal is dredged again, future prospects could move to Unfavourable.

5.4 Overall Assessment

--

Vertigo moulinsiana monitoring at Kildallan Bridge

Mon. period	Population assessment	Area of suitable habitat	Future prospects	Overall assessment
2013-2018	Amber	Green	Green	Amber
2007-2012	Green	Green	Green	Green

Mon. period	Overall Notes
2013-2018	The Population Assessment is Unfavourable Inadequate (amber), and the Habitat Assessment and Future Prospects are Favourable (green), meaning that the Overall Assessment for Kildallan Bridge is Unfavourable Inadequate (amber).
2007-2012	

6. DISCUSSION

Monitoring period

2013-2018

Area of occupancy: The habitats that support *Vertigo moulinsiana* at this site are the marginal swamps on the landward side of the Royal Canal towpaths, and along the uncut canal margins. Access is from a minor road off the R393 Mullingar to Ballynacarrigy road.

Discussion:

The core of the *Vertigo moulinsiana* population at Kildallan Bridge is in the back-drain to the southeast of the bridge, but the species is also found in other locations in the back-drain and along the fringing vegetation of the canal itself, on both banks. *Glyceria maxima* is the dominant species in most of the locations where *Vertigo moulinsiana* is found. The fringing vegetation of the canal is shorter and sparser than during the previous survey, and has evidently been subject to clearance and cutting. The grass of the towpath is mown, and it appears that the fringing vegetation may be cut in a similar manner. This is reducing the available habitat for *Vertigo moulinsiana*, and is reducing the connectivity of habitat along the canal. The back-drain habitat is vulnerable to clearance by adjacent landowners or by Waterways Ireland as part of their regular maintenance, and the presence of the snail should be brought the attention of the appropriate staff within the organisation. Overall the *Vertigo moulinsiana* population at Kildallan Bridge is in reasonable condition, and is expected to continue to survive at the site into the future.

Monitoring recommendations:

Due to the active management of the site for recreational activities by Waterways Ireland, monitoring should be carried out at three-yearly intervals to ensure that no major negative changes occur at the site. The monitoring should follow that proposed by Moorkens & Killeen (2011):

- Repeat Transect 1, in field record: vegetation height, vegetation composition, ground moisture class, numbers of *Vertigo moulinsiana* (adult & juvenile) and other molluscs, minimum 14 samples
- Take at least 3 samples at each of at least 8 other locations with optimal habitat (should include marginal swamp at sites 10 or 11 of the 2010 survey), record information as above
- Re-determine boundary of the habitat polygons and assign habitat to either Optimal, Optimal-Suboptimal, Suboptimal, Suboptimal-Unsuitable, or Unsuitable
- Assess the management regime and impacts upon the habitat for *Vertigo moulinsiana*
- Use results to determine overall condition assessment

Management recommendations:

No management is required for Polygon A, where the transect is located, as this area is currently ungrazed and uncut. However, it may be necessary to flag this area to Waterways Ireland, who may undertake back-drain clearance in the future as part of their canal maintenance programme. Liaison with the landowner who stores silage nearby (above) this habitat patch is urgently needed to ensure that nutrient run-off does not occur.

The *Vertigo moulinsiana* habitat of tall fringing vegetation along the canal margins has been negatively affected by cutting. This has resulted in areas of previously dense, tall vegetation becoming sparse and generally low-growing, thus becoming much less suitable for supporting *Vertigo moulinsiana*. The cutting of emergent vegetation should be limited to that necessary to maintain the canal in a working state, and where possible the fringing vegetation should be allowed to develop further along the canal, thereby increasing the area of suitable habitat for *Vertigo moulinsiana*.

Vertigo moulinsiana monitoring at Kildallan Bridge

2007-2012

Area of occupancy: The habitats that support *Vertigo moulinsiana* at this site are the marginal swamps on the landward side of the Royal Canal towpaths, and along the uncut canal margins. Access is from a minor road off the R393 Mullingar to Ballynacarrigy road.

Discussion:

The Condition of the site and the feature based upon the 2010 survey has been assessed as Favourable.

In the swamp areas on the landward side of the towpaths (polygon areas A and B), the *Vertigo moulinsiana* habitat is maintained by its high groundwater table which in part is due to seepage from the canal. The absence of grazing has led to a build up of deep litter which rises above any inundation at times of year when the snails are at litter level. During active periods, the snails are in humid conditions high on the stems of the swamp vegetation. The site would be vulnerable to long term hydrogeological changes, and any water abstraction from the canal or streams and ditches that feed the swamps, or other change that would result in a lowering of the groundwater table at any time of year.

Vertigo moulinsiana was also found occasionally at locations on the canal banks where the habitat had become relatively dense. There are numerous records from the 1970s to the end of the century of the snail from bankside habitats on both the Royal and Grand Canals. However, work by Waterways Ireland to re-open the canals has resulted in loss of habitat and *V. moulinsiana* populations (Moorkens & Killeen 2005, Moorkens 2007e). Thus, through management, stable canalside habitat is becoming increasingly rare in Ireland.

Monitoring recommendations:

Although the Kildallan Bridge site has been assessed as Favourable, both in terms of habitat and *Vertigo moulinsiana* distribution and abundance, given the vulnerability of the canalside population to inappropriate management, it is recommended that monitoring is carried out at a minimum of 3 yearly intervals. This should be re-assessed in light of any deterioration of Condition or any changes to site management:

Frequency: Next monitoring due 2013

Methods (see Section 4 of main report for full details). Prescription as follows:

- Repeat transect 1, in field record: vegetation height, vegetation composition, ground moisture class, numbers of *V. moulinsiana* (adult & juvenile) and other molluscs, minimum 14 samples
- Take at least 3 samples at each from at least 8 other locations with optimal habitat (should include marginal swamp at sites 10 or 11 of the 2010 survey), record information as above
- Re-determine boundary of the habitat polygons and assign habitat to either Optimal, Optimal & Sub-optimal, Sub-optimal, Sub-optimal and Unsuitable, or Unsuitable
- Assess the management regime and impacts upon the habitat for *V. moulinsiana*
- Use results to determine overall condition assessment

Management recommendations:

Existing Management

The 2 areas of swamp on the south side of the towpaths are unmanaged and the condition of the habitat is maintained by local hydrology. The canal is subject to intermittent dredging and cutting of bankside vegetation.

Proposed management prescription for site

No grazing regime is appropriate for this site; the site needs to be managed so that there is sufficient transition vegetation at the fringe of the canal. It is essential that canal fringe management and weed control is carried out in a manner that is not damaging to this rare area of *V. moulinsiana* habitat, and that there is an instigation of a programme of expansion of fringe habitat that can be sustained and allow the species to spread back into the 10km squares that are currently lost to the species from their previous range. It is recommended that NPWS and Waterways work together to protect *V. moulinsiana* along the Royal Canal.

Site report - Vertigo Monitoring

Vertigo moulinsiana monitoring at Lisbigney Bog

1. SITE CODE AND LOCATION DETAILS

1.1 Site code and location

Vertigo Site Code: VmCAM15 **County:** Laois

SAC Site Code: 000869 Lisbigney Bog

Location description (from baseline survey):

Monitoring period	Date surveyed	Recorders
2013-2018	05 October 2016	John Brophy & Maria Long
2007-2012	10 May 2010	Evelyn Moorkens & Ian Killeen

1.2 General Habitat Description (from baseline survey):

In 1998 there was a good population of *V. moulinsiana* in wet swamp conditions. However, the land to the north of the habitat area had been drained. Some of the drained land had been planted with conifers and the rest was being used for grazing. In 2006 the general habitats in which *Vertigo moulinsiana* were previously present were visible but were much drier. They were then wet grassland grading into some rich fen characteristic habitat (CORINE 54.2, Annex I 7230) (Romão, 1996; Devillers et al., 1991). This included *Carex paniculata*, *C. acutiformis* and *Filipendula ulmaria* in low lying patches, but with *Agrostis stolonifera*, *Festuca ovina*, *Vicia cracca*, *Deschampsia*, and *Phragmites australis*. There was a little *Mentha*, but interspersed with *Ranunculus*. This drier habitat was that present in 2010. The habitat area falls between tall herb swamps (FS2) and wet grassland (GS4) of Fossitt (2000). While the habitat in 1998 would have related to M27 of Rodwell (1991), in 2006 it is closer to MG9 of Rodwell (1992).

1.3 Definition of Vegetation Classes (from baseline survey):

Class I: Not defined	Class III: Not defined
Class II: Not defined	Class IV: Not defined

1.4 Definition of Soil Moisture Classes (from baseline survey):

- 1: Dry. No visible moisture on ground surface.
- 2: Damp. Ground visibly damp, but water does not rise under pressure.
- 3: Wet. Water rises under light pressure.
- 4: Very wet. Pools of standing water, generally less than 5cm deep.
- 5: Site under water. Entire sampling site in standing or flowing water over 5cm deep.

2. SUMMARY:

The suitability of Lisbigney Bog for supporting *Vertigo moulinsiana* has declined since the species was first discovered there in 1998. Large drains in the area have dropped the groundwater level, and previously suitable areas of swamp are now too dry to support the snail. Even former smaller drains on the site are now completely dry. Succession is also occurring with trees and scrub species spreading at this site, and there has been a significant shift towards more acid-loving heath species (e.g. *Molinia caerulea*, *Myrica gale*, etc.). No suitable habitat for the snail was found in the 2010 survey and there has been no improvement since. Even with serious intervention in the form of drain-blocking and scrub removal, the site would be unlikely to recover to a state which will allow it to support habitat suitable for *Vertigo moulinsiana*, such are the changes which have taken place. Given the distance from the next nearest site supporting the snail, even if the habitat were to recover, it is likely that a re-introduction programme for the species at Lisbigney Bog would be necessary.

3. TRANSECT DETAILS

TRANSECT: 0	MONITORING PERIOD: 2013-2018		
Start point:	NO TRANSECT RECORDED		
End point:			
Transect length:	Direction:		
Description:			
Sampling frequency:			
TRANSECT: 0	MONITORING PERIOD: 2007-2012		
Start point:	NO TRANSECT RECORDED		
End point:			
Transect length:	Direction:		
Description:			
Sampling frequency:			

Vertigo moulinsiana monitoring at Lisbigney Bog

4. RESULTS

Polygon habitat characteristics

Monitoring Period: 2013-2018			
Polygon	Habitat Type	Area (ha)	Comment
A	Unsuitable	5.7796	Polygon A status remains Unsuitable. Area includes dried out areas of swamp and wet woodland. Large drains are present. However, the polygon consists mostly of heathy grassland with a high cover of woody species such as Myrica gale and Ulex europaeus.
Monitoring Period: 2007-2012			
Polygon	Habitat Type	Area (ha)	Comment
	Unsuitable	5.78	

Transect samples

Mon. period	Transect	Sample	Location	Adults	Juveniles	Total	Veg. class	Wetness	Habitat suitability
2007-2012	0	0	NO TRANSECT RECORDED						

Spot Samples

Mon. period	Sample	Grid ref.	Adults	Juveniles	Total	Veg. class	Wetness	Habitat suitability
Monitoring period 2013-2018 (4 samples)								
2013-2018	01a	S 45020 79057	0	0	0		1	Unsuitable
2013-2018	01b	S 45020 79057	0	0	0		1	Unsuitable
2013-2018	02a	S 44950 79053	0	0	0		2	Unsuitable
2013-2018	02b	S 44950 79053	0	0	0		1	Unsuitable
Monitoring period 2007-2012 (1 sample)								
2007-2012	01	S 44900 78900	0	0	0			

5. CONDITION ASSESSMENT

5.1 Population Assessment: 1 pass Favourable (green); 0 passes Unfavourable Bad (red)

Mon. period	Transect	Indicator	Target	Result	Pass/Fail
2013-2018	0	N/A	NO TRANSECT RECORDED		
2007-2012	0	N/A	NO TRANSECT RECORDED		

Mon. period	Indicator	Target	Result	Pass/Fail
2013-2018	Presence/Absence	Adult or sub-adult snails are present at the site	Adult or sub-adult snails absent	Fail
2007-2012	Presence/Absence	Adult or sub-adult snails are present at the site	V. moulinsiana absent	Fail

Mon. period	Population Notes
2013-2018	Vertigo moulinsiana was not found at Lisbigney Bog in 2006 or 2010, and again has not been found in the current survey. Based on the criteria of Moorkens & Killeen (2011), the site Population Assessment for Lisbigney Bog is Unfavourable Bad (red).
2007-2012	V. moulinsiana could not be found

5.2 Habitat Assessment: 1 pass Favourable (green); 0 passes Unfavourable Bad (red)

5.2.1 Transect level

Mon. period	Transect	Indicator	Target	Result	Pass/Fail
2013-2018	0	N/A	NO TRANSECT RECORDED		
2007-2012	0	N/A	NO TRANSECT RECORDED		

Vertigo moulinsiana monitoring at Lisbigney Bog

5.2.2 Site level

Mon. period	Indicator	Target	Result	Pass/Fail
2013-2018	Habitat extent	At least 1 ha of the site sub-optimal with optimal areas	No suitable habitat present	Fail
2007-2012	Habitat extent	At least 1 ha of the site sub-optimal with optimal areas	Total 5.78 ha of former habitat now unsuitable	Fail

Mon. period	Habitat Notes
2013-2018	Vertigo moulinsiana was originally recorded from wet swamp areas; however, the site has dried out since then and in 2010 there was no suitable habitat present at the site. There has been no change in the current monitoring period, with no suitable habitat recorded at the site. Based on the criteria of Moorkens & Killeen (2011), the Habitat Assessment for Lisbigney Bog is Unfavourable Bad (red).
2007-2012	All of the formerly suitable habitat has become unsuitable

5.3 Future Prospects Assessment

Mon. period	Activity code	Activity description	Location	Intensity	Influence	Area affected	Comment
2013-2018	J02.15	Other human induced changes in hydraulic conditions	Inside	High	Negative	100%	Drains allowing drying out of habitat
2013-2018	K02.01	species composition change	Inside	Medium	Negative	100%	Scrubbing over with Salix spp. and Ulex europeaus
2007-2012	J02.01.02	reclamation of land from sea, estuary or marsh	Inside	High	Negative	5.78ha	Resulted in drying out of habitat

Mon. period	Future Prospects Notes
2013-2018	Vertigo moulinsiana has not been recorded in the last three surveys of the site and no suitable habitat remains. The loss of suitable habitat is due to drying out (caused by drains) and consequent succession to a heathy/woody vegetation. The Future Prospects for Lisbigney Bog are Unfavourable Bad (red).
2007-2012	As the impact is severe, and there is no nearby population of V. moulinsiana from which Lisbigney could recolonise if the habitat improved, Future prospects have been assessed as Unfavourable Bad

5.4 Overall Assessment

Mon. period	Population assessment	Area of suitable habitat	Future prospects	Overall assessment
2013-2018	Red	Red	Red	Red
2007-2012	Red	Red	Red	Red

Mon. period	Overall Notes
2013-2018	Population Assessment, Habitat Assessment and Future Prospects for Lisbigney Bog are all Unfavourable Bad (red); therefore, the Overall Assessment for this site is Unfavourable Bad (red).
2007-2012	

6. DISCUSSION

Monitoring period
2013-2018
<p>Area of occupancy: The habitat known to have supported Vertigo moulinsiana within this cSAC is the fen swamp habitat at the south of this site (Moorkens 1998). Access is from the road east of Durrow and south west of Ballinakill at S 449 789</p> <p>Discussion:</p> <p>The suitability of Lisbigney Bog for supporting Vertigo moulinsiana has declined since the species was first discovered there in 1998. Large drains in the area have dropped the groundwater level, and previously suitable areas of swamp are now too dry to support the</p>

Vertigo moulinsiana monitoring at Lisbigney Bog

snail. Even former smaller drains on the site are now completely dry. Succession is also occurring with trees and scrub species spreading at this site, and there has been a significant shift towards more acid-loving heath species (e.g. *Molinia caerulea*, *Myrica gale*, etc.). No suitable habitat for the snail was found in the 2010 survey and there has been no improvement since. Even with serious intervention in the form of drain-blocking and scrub removal, the site would be unlikely to recover to a state which will allow it to support habitat suitable for *Vertigo moulinsiana*, such are the changes which have taken place. Given the distance from the next nearest site supporting the snail, even if the habitat were to recover, it is likely that a re-introduction programme for the species at Lisbigney Bog would be necessary.

Monitoring recommendations:

Unless clear management actions are taken in order to restore the habitat at Lisbigney Bog to one that supports suitable vegetation and wetness, no further monitoring of the site is recommended.

Management recommendations:

As noted above, it would appear that the target species has been lost from this site and that the site has changed dramatically in terms of wetness and vegetation cover, such that it is no longer suitable for supporting the species. Even with considerable management effort, it is unlikely that this site would again support *Vertigo moulinsiana*, and certainly not without a re-introduction programme. Thus there are no management recommendations.

2007-2012

Area of occupancy: The habitat known to have supported *Vertigo moulinsiana* within this cSAC is the fen swamp habitat at the south of this site (Moorkens 1998). Access is from the road east of Durrow and south west of Ballinakill at S 449 789

Discussion:

The discussion from Moorkens (2007) is still pertinent:

"The good population of *V. moulinsiana* from Lisbigney appears to have either dramatically declined or has been lost from the site. The site was recommended as an SAC in 1998 because of the good population, and in order to act as a potential reservoir for increasing its distribution in the area, considering the large distance between this and other sites (Moorkens, 1998). Although the summer of 2006 was dry it is not likely that this is the cause of the decline, as the snail was in high numbers at other sites that had the same weather conditions. In 2001, the site was revisited and the habitat was still wet (Moorkens, 2001). This site visit included a check of the drains that influence the snail habitat. The main road drain in the area follows the main road in a south west direction away from Ballinakill and towards Rosconnell Glebe. There are three drains flowing into this from the site. One cuts off the north east top of the snail habitat, another meets this and flows to the south west outside the snail habitat. The third follows the land boundary division at the far north of the snail habitat and flows towards the road drain in a direction that is perpendicular to the road drain. During the visit it was noted that the north east drain had been deepened, and was approximately 1 metre lower than the other drains within the property. In the time that has elapsed between 2001 and 2006 this may have facilitated the gradual drying out of the habitat beyond the levels that *V. moulinsiana* can cope with. It is recommended that a further study of the drainage of the site is carried out with a view to restoring the necessary wetness to the habitat. In particular, the blockage of the lowered drain should be used as a management measure in order to halt the unfavourable condition that this site is in and to restore the habitat that is needed to support the species that the site is designated for"

The results from the 2010 survey show that the situation remains unchanged. Major effort would be required to return the site back into a wetland with the habitat that is able to support *V. moulinsiana*. Even if it could be restored, there is no nearby snail population from which Lisbigney may naturally recolonise. Thus a re-introduction programme would be necessary.

Monitoring recommendations:

Further monitoring or prescriptions for management are not merited until it is determined whether a restoration and re-introduction programme is possible.

Management recommendations:

Site report - Vertigo Monitoring

Vertigo moulinsiana monitoring at Lisduff Fen

1. SITE CODE AND LOCATION DETAILS

1.1 Site code and location

Vertigo Site Code: VmCAM16 **County:** Offaly

SAC Site Code: 002147 Lisduff Fen

Location description (from baseline survey):

Monitoring period	Date surveyed	Recorders
2013-2018	19-20 September 2016	John Brophy & Maria Long
2007-2012	15 September 2010	Ian Killeen & Maria Long

1.2 General Habitat Description (from baseline survey):

The site comprises a wet calcareous fen, with typical fen and marsh species such as Black Bog-rush (*Schoenus nigricans*), Common Reed (*Phragmites australis*), Few-flowered Spike Rush (*Eleocharis quinqueflora*) and Grass of Parnassus (*Parnassia palustris*). EU habitats present at V. moulinsiana habitat are Alkaline fens: low sedge-rich communities (Annex I Habitat 7230), rich fens of CORINE 54.2 and fen-sedge beds of CORINE 53.3 (Romão, 1996; Devillers et al., 1991). They fall within the more general habitat of rich fen and flush (PF1) of Fossitt (2000). The areas that lie within a wider mosaic, but that form specific V. moulinsiana habitat fit the Rodwell M13 characteristic vegetation classification (Rodwell, 1991) within the Schoenetum nigricantis mire group, with *Schoenus nigricans*, *Juncus articulatus*, *Briza media*, *Parnassia palustris* and *Juncus subnodulosus* being most characteristic of positive habitat.

1.3 Definition of Vegetation Classes (from baseline survey):

Class I: <i>Schoenus nigricans</i>	Class III: <i>Molinia caerulea</i> , <i>Menyanthes trifoliata</i> , <i>Cladium mariscus</i>
Class II: <i>Phragmites australis</i> , <i>Carex rostrata</i> , <i>Carex viridula</i> , <i>Eriophorum</i> spp. <i>Equisetum fluviatile/palustre</i> , <i>Mentha aquatica</i>	Class IV: All other species

1.4 Definition of Soil Moisture Classes (from baseline survey):

- 1: Dry. No visible moisture on ground surface.
- 2: Damp. Ground visibly damp, but water does not rise under pressure.
- 3: Wet. Water rises under light pressure.
- 4: Very wet. Pools of standing water, generally less than 5cm deep.
- 5: Site under water. Entire sampling site in standing or flowing water over 5cm deep.

2. SUMMARY:

Lisduff Fen is an important site - it supports both *Vertigo moulinsiana* and *Vertigo geyeri* (though only *Vertigo moulinsiana* was recorded in the current survey), and inhabited marsh fritillary (*Euphydryas aurinia*) larval webs were also recorded here as part of the current survey (apparently a new record). While the habitat appears to still be suitable for *Vertigo moulinsiana* across most of the habitat polygon, some declines were noted, with a cluster of negative samples towards the southern end. It is not clear why this apparent decline has occurred, and it may be due to natural population fluctuations, but given the drastic decline recorded for *Vertigo geyeri* at this site, it is important not to be complacent.

At first, the pressures and threats to the site appeared to be relatively limited, but given the declines recorded for the species, these impacts may be acting either more strongly or in combination to affect the site in ways that are not yet clearly apparent.

In terms of management, grazing levels are near ideal in the southern section of the fen. Activities happening directly adjacent to the fen, and relating to agriculture, may be combining to alter conditions in the fen just enough to make it less suitable to *Vertigo geyeri*, and may also, in time, affect *Vertigo moulinsiana*. These activities include scrub removal, silage production, water abstraction, drain modification, habitat reclamation and dumping of brush and spoil. While none are very dramatic if taken in isolation, all have the potential to negatively impact on the delicate balance that always exists in a calcareous fen. Silt run-off, chemical run-off, hydrological regime alteration, etc. may all be happening.

This is an important site, and action is needed to reduce the intensive agricultural activity happening within the SAC boundaries. It needs careful liaison with landowners, including time spent explaining the importance of the site as well as the rationale for management changes, and then dedicated monitoring when changes are implemented.

3. TRANSECT DETAILS

TRANSECT: 0	MONITORING PERIOD: 2013-2018
Start point:	NO TRANSECT RECORDED
End point:	
Transect length:	Direction:
Description:	
Sampling frequency:	

Vertigo moulinsiana monitoring at Lisduff Fen

TRANSECT:	0	MONITORING PERIOD:	2007-2012
Start point:	NO TRANSECT RECORDED		
End point:			
Transect length:	Direction:		
Description:			
Sampling frequency:			

4. RESULTS

Polygon habitat characteristics

Monitoring Period: 2013-2018			
Polygon	Habitat Type	Area (ha)	Comment
A	Optimal-Suboptimal	1.4802	Polygon A status remains Optimal-Suboptimal. Suitable habitat for Vertigo moulinsiana continues to occur.
Monitoring Period: 2007-2012			
Polygon	Habitat Type	Area (ha)	Comment
	Sub-optimal with optimal areas	1.48	The entire Vertigo moulinsiana habitat at Lisduff Fen is enclosed along the springline on the western margin of the southern part of the site (Figure 1). This is 1.48 ha in area and is classed as a mosaic of Optimal and Sub-optimal habitat.

Transect samples

Mon. period	Transect	Sample	Location	Adults	Juveniles	Total	Veg. class	Wetness	Habitat suitability
2007-2012	0	0	NO TRANSECT RECORDED						

Spot Samples

Mon. period	Sample	Grid ref.	Adults	Juveniles	Total	Veg. class	Wetness	Habitat suitability
Monitoring period 2013-2018 (52 samples)								
2013-2018	01a	S 08176 99934	1	1	2	I	4	Optimal
2013-2018	02a	S 08185 99960	1	0	1	I	3	Optimal-Suboptimal
2013-2018	02b	S 08185 99960	0	0	0	I	3	Optimal-Suboptimal
2013-2018	02c	S 08185 99960	0	0	0	I	3	Optimal-Suboptimal
2013-2018	03a	S 08191 99978	0	0	0	I	4	Optimal
2013-2018	03b	S 08191 99978	0	0	0	I	4	Optimal
2013-2018	03c	S 08191 99978	0	0	0	I	4	Optimal
2013-2018	04a	S 08215 99987	0	0	0	I	4	Optimal
2013-2018	04b	S 08215 99987	0	0	0	I	4	Optimal
2013-2018	04c	S 08215 99987	0	0	0	I	4	Optimal
2013-2018	05a	N 08181 00010	0	0	0	I	3	Optimal-Suboptimal
2013-2018	05b	N 08181 00010	0	0	0	I	3	Optimal-Suboptimal
2013-2018	05c	N 08181 00010	0	0	0	I	4	Optimal-Suboptimal
2013-2018	06a	N 08211 00036	0	1	1	I	4	Optimal
2013-2018	06b	N 08211 00036	0	0	0	I	4	Optimal
2013-2018	06c	N 08211 00036	0	1	1	I	4	Optimal
2013-2018	07a	N 08190 00054	0	0	0	I	3	Optimal-Suboptimal

Vertigo moulinsiana monitoring at Lisduff Fen

2013-2018	07b	N 08190 00054	0	0	0	I	3	Optimal-Suboptimal
2013-2018	07c	N 08190 00054	0	0	0	I	3	Optimal-Suboptimal
2013-2018	08a	N 08178 00039	0	0	0	I	4	Optimal
2013-2018	08b	N 08178 00039	0	0	0	I	4	Optimal
2013-2018	08c	N 08178 00039	0	0	0	I	4	Optimal
2013-2018	09a	N 08177 00096	0	0	0	I	4	Optimal
2013-2018	09b	N 08177 00096	0	0	0	I	4	Optimal
2013-2018	09c	N 08177 00096	0	0	0	I	4	Optimal
2013-2018	10a	N 08186 00104	0	0	0	I	3	Suboptimal
2013-2018	10b	N 08186 00104	0	0	0	I	3	Suboptimal
2013-2018	10c	N 08186 00104	0	0	0	I	3	Suboptimal
2013-2018	11a	N 08177 00137	0	1	1	I	3	Optimal-Suboptimal
2013-2018	11b	N 08177 00137	0	1	1	I	4	Optimal-Suboptimal
2013-2018	11c	N 08177 00137	1	3	4	I	3	Optimal-Suboptimal
2013-2018	12a	N 08170 00147	4	11	15	I	3	Optimal-Suboptimal
2013-2018	12b	N 08170 00147	4	10	14	I	3	Optimal-Suboptimal
2013-2018	12c	N 08170 00147	1	6	7	I	3	Optimal-Suboptimal
2013-2018	13a	N 08165 00186	2	9	11	I	4	Optimal
2013-2018	13b	N 08165 00186	1	0	1	I	3	Optimal
2013-2018	13c	N 08165 00186	5	3	8	I	4	Optimal
2013-2018	14a	N 08173 00218	7	11	18	I	4	Optimal
2013-2018	14b	N 08173 00218	2	8	10	I	4	Optimal
2013-2018	14c	N 08173 00218	4	16	20	I	4	Optimal
2013-2018	15a	N 08170 00223	0	7	7	II	4	Optimal
2013-2018	15b	N 08170 00223	1	70	71	I	4	Optimal
2013-2018	15c	N 08170 00223	9	26	35	I	4	Optimal
2013-2018	16a	N 08175 00265	2	8	10	I	4	Optimal
2013-2018	16b	N 08175 00265	1	2	3	I	4	Optimal
2013-2018	16c	N 08175 00265	2	19	21	I	4	Optimal
2013-2018	17a	N 08177 00283	4	9	13	I	4	Optimal
2013-2018	17b	N 08177 00283	7	13	20	I	4	Optimal
2013-2018	17c	N 08177 00283	4	15	19	II	4	Optimal
2013-2018	18a	N 08203 00314	1	2	3	I	4	Optimal
2013-2018	18b	N 08203 00314	0	5	5	I	4	Optimal
2013-2018	18c	N 08203 00314	1	6	7	I	4	Optimal

Monitoring period 2007-2012 (54 samples)

2007-2012	01a	S 08173 99934	8	3	11		3	
2007-2012	01b	S 08173 99934	13	9	22		3	
2007-2012	01c	S 08173 99934	5	7	12		4	
2007-2012	02a	S 08181 99960	1	2	3		4	

Vertigo moulinsiana monitoring at Lisduff Fen

2007-2012	02b	S 08181 99960	2	6	8	4
2007-2012	02c	S 08181 99960	0	0	0	3
2007-2012	03a	S 08181 99978	0	1	1	4
2007-2012	03b	S 08181 99978	0	0	0	4
2007-2012	03c	S 08181 99978	2	3	5	4
2007-2012	04a	S 08213 99988	0	0	0	4
2007-2012	04b	S 08213 99988	1	1	2	4
2007-2012	04c	S 08213 99988	2	0	2	4
2007-2012	05a	N 08176 00010	0	7	7	4
2007-2012	05b	N 08176 00010	1	8	9	4
2007-2012	05c	N 08176 00010	5	1	6	4
2007-2012	06a	N 08211 00035	0	3	3	3
2007-2012	06b	N 08211 00035	0	0	0	3
2007-2012	06c	N 08211 00035	0	0	0	4
2007-2012	07a	N 08242 00062	0	0	0	3
2007-2012	07b	N 08242 00062	0	0	0	3
2007-2012	07c	N 08242 00062	0	0	0	3
2007-2012	08a	N 08175 00045	11	4	15	4
2007-2012	08b	N 08175 00045	0	6	6	4
2007-2012	08c	N 08175 00045	0	0	0	4
2007-2012	09a	N 08178 00084	0	0	0	4
2007-2012	09b	N 08178 00084	0	0	0	4
2007-2012	09c	N 08178 00084	1	0	1	4
2007-2012	10a	N 08187 00103	0	0	0	4
2007-2012	10b	N 08187 00103	0	0	0	3
2007-2012	10c	N 08187 00103	0	0	0	3
2007-2012	11a	N 08176 00134	2	6	8	4
2007-2012	11b	N 08176 00134	8	6	14	4
2007-2012	11c	N 08176 00134	5	2	7	4
2007-2012	12a	N 08166 00142	7	7	14	4
2007-2012	12b	N 08166 00142	2	0	2	4
2007-2012	12c	N 08166 00142	2	9	11	4
2007-2012	13a	N 08162 00183	4	1	5	5
2007-2012	13b	N 08162 00183	5	2	7	4
2007-2012	13c	N 08162 00183	0	3	3	4
2007-2012	14a	N 08171 00213	9	6	15	4
2007-2012	14b	N 08171 00213	1	1	2	4
2007-2012	14c	N 08171 00213	0	0	0	4
2007-2012	15a	N 08229 00207	0	0	0	4
2007-2012	15b	N 08229 00207	0	0	0	4

Vertigo moulinsiana monitoring at Lisduff Fen

2007-2012	15c	N 08229 00207	0	0	0	4
2007-2012	16a	N 08176 00230	6	19	25	4
2007-2012	16b	N 08176 00230	6	14	20	4
2007-2012	16c	N 08176 00230	7	14	21	4
2007-2012	17a	N 08174 00286	0	0	0	4
2007-2012	17b	N 08174 00286	0	0	0	4
2007-2012	17c	N 08174 00286	2	0	2	4
2007-2012	18a	N 08204 00315	3	2	5	5
2007-2012	18b	N 08204 00315	0	1	1	5
2007-2012	18c	N 08204 00315	2	2	4	5

5. CONDITION ASSESSMENT

5.1 Population Assessment: 3 passes Favourable (green); 2 pass Unfavourable Inadequate (amber); 0-1 passes Unfavourable Bad (red)

Mon. period	Transect	Indicator	Target	Result	Pass/Fail
2013-2018	0	N/A	NO TRANSECT RECORDED		
2007-2012	0	N/A	NO TRANSECT RECORDED		

Mon. period	Indicator	Target	Result	Pass/Fail
2013-2018	Area of occupancy	Adult or sub-adult snails are present in at least 5 of the 9 sample sites in the northern half of the site	Present in 8 out of 9 sites	Pass
2013-2018	Density	25% of the samples have at least 5 individuals (minimum 40 samples)	35% of samples with at least 5 individuals	Pass
2013-2018	Presence/Absence	Adult or sub-adult snails are present in at least 6 of the 9 sample sites in the southern half of the site	Present in 3 out of 9 sites	Fail
2007-2012	Area of occupancy	Adult or sub-adult snails are present in at least 5 of the 9 sample sites in the northern half of the site	Present in 7 of the 9 sites	Pass
2007-2012	Density	25% of the samples have at least 5 individuals (minimum 40 samples)	41% of samples with at least 5 individuals	Pass
2007-2012	Presence/Absence	Adult or sub-adult snails are present in at least 6 of the 9 sample sites in the southern half of the site	Present in 8 of the 9 sites	Pass

Mon. period	Population Notes
2013-2018	The 2007-2012 monitoring survey recorded <i>Vertigo moulinsiana</i> at 15 out of 18 survey locations, with 41% of the samples containing >5 individuals. The current monitoring survey recorded <i>Vertigo moulinsiana</i> at 11 out of 18 survey locations, with 35% of the samples containing >5 individuals. The number of positive sample locations in the southern half of the site has dropped noticeably (from eight to three), while in the northern half, the number of positive sample locations has increased slightly (from seven to eight). Based on the criteria of Moorkens & Killeen (2011), the Population Assessment of Lisduff Fen is Unfavourable Inadequate (amber).
2007-2012	The snail is scattered in its distribution and present in rather low numbers

5.2 Habitat Assessment: 4 passes Favourable (green); 2-3 passes Unfavourable Inadequate (amber); 0-1 passes Unfavourable Bad (red)

5.2.1 Transect level

Mon. period	Transect	Indicator	Target	Result	Pass/Fail
2013-2018	0	N/A	NO TRANSECT RECORDED		
2007-2012	0	N/A	NO TRANSECT RECORDED		

5.2.2 Site level

Mon. period	Indicator	Target	Result	Pass/Fail
-------------	-----------	--------	--------	-----------

Vertigo moulinsiana monitoring at Lisduff Fen

2013-2018	Habitat extent	Over 80% of the samples in at least 6 of the 9 sample sites in the southern half of the site are dominated by suitable vegetation (Classes I & II)	100% dominated by suitable vegetation	Pass
2013-2018	Habitat quality	Over 80% of the samples in at least 6 of the 9 sample sites in the northern half of the site fall within soil moisture classes 3-5	100% fall within soil moisture classes 3-5	Pass
2013-2018	Habitat type	Over 80% of the samples in at least 6 of the 9 sample sites in the northern half of the site are dominated by suitable vegetation (Classes I & II)	100% dominated by suitable vegetation	Pass
2013-2018	Soil moisture	Over 80% of the samples in at least 6 of the 9 sample sites in the southern half of the site fall within soil moisture classes 3-5	100% fall within soil moisture classes 3-5	Pass
2007-2012	Habitat extent	Over 80% of the samples in at least 6 of the 9 sample sites in the southern half of the site are dominated by suitable vegetation (Classes I & II)	100%	Pass
2007-2012	Habitat quality	Over 80% of the samples in at least 6 of the 9 sample sites in the northern half of the site fall within soil moisture classes 3-5	100%	Pass
2007-2012	Habitat type	Over 80% of the samples in at least 6 of the 9 sample sites in the northern half of the site are dominated by suitable vegetation (Classes I & II)	100%	Pass
2007-2012	Soil moisture	Over 80% of the samples in at least 6 of the 9 sample sites in the southern half of the site fall within soil moisture classes 3-5	100%	Pass

Mon. period	Habitat Notes
2013-2018	The <i>Vertigo moulinsiana</i> habitat at Lisduff Fen comprised a 1.48ha area of Optimal and Sub-optimal habitat. The current survey found no overall change to the suitability of the habitat polygon. The vegetation and wetness continues to be suitable for supporting <i>Vertigo moulinsiana</i> . Based on the criteria of Moorkens & Killeen (2011), the Habitat Assessment for Lisduff Fen is Favourable (green).
2007-2012	Although it is fragmented and relatively small in extent, the suitable habitat at the site appears to be in good condition for <i>V. moulinsiana</i> .

5.3 Future Prospects Assessment

Mon. period	Activity code	Activity description	Location	Intensity	Influence	Area affected	Comment
2013-2018	A04.02.05	non intensive mixed animal grazing	Inside	Medium	Positive	100%	Cattle & horse grazing appears to be stopping scrubbing over (contrast with fenced northern part of fen).
2013-2018	A08	Fertilisation	Outside	Medium	Negative	50%	Fertilisation of fields for silage production.
2013-2018	A10.01	removal of hedges and copses or scrub	Outside	Medium	Negative	10%	Clearance of hawthorn and other scrub.
2013-2018	H05.01	garbage and solid waste	Inside	High	Negative	2%	Dumping of brash and remains of cleared scrub.
2013-2018	H05.01	garbage and solid waste	Outside	High	Negative	5%	Dumping of spoil, including Construction & Demolition waste.
2013-2018	J02.06.01	surface water abstractions for agriculture	Outside	High	Negative	50%	Tractors pumping water from stream into tank. Permanent fixture.

Vertigo moulinsiana monitoring at Lisduff Fen

2013-2018	J02.07.01	groundwater abstractions for agriculture	Outside	Medium	Negative	20%	Drain clearance.
2013-2018	K02.01	species composition change	Inside	Low	Negative	1%	Seedlings of ash, sycamore, hazel, holly, oak.
2007-2012	A04.02.05	non intensive mixed animal grazing	Inside	Low	Neutral	1.48ha	The present low level of cattle and horse grazing is not having any impact (positive or negative) on the <i>V. moulinsiana</i> habitat, but would become negative if the level increased.

Mon. period	Future Prospects Notes
2013-2018	The Future Prospects for Lisduff Fen following the 2007-2012 monitoring period were considered to be Favourable (green) with the only activity identified as occurring within the site being non-intensive mixed animal grazing. Mixed animal grazing (cattle and horses) continues across the habitat polygon, and is considered to be having a positive impact by keeping the vegetation relatively open and preventing the spread of scrub species, such as Gorse and Willow, as seen in areas to the north and east. The spread of trees such as Ash, Sycamore, Hazel, Holly and Oak into the fen was noted. Other, activities/threats noted directly adjacent to the fen include scrub clearance, dumping of brash and spoil, drain clearance, land 'reclamation', intensive agriculture including silage production, and water abstraction from the highly calcareous stream which flows into the fen at the southern tip. Taking into account all the various factors affecting Lisduff Fen, and the fact that the population of <i>Vertigo geyeri</i> at the site appears to have dropped sharply - perhaps an indication of subtle but important changes to the ecology of the site, the Future Prospects are considered to be Unfavourable Inadequate (amber).
2007-2012	As the impact is low, Future prospects have been assessed as Favourable

5.4 Overall Assessment

Mon. period	Population assessment	Area of suitable habitat	Future prospects	Overall assessment
2013-2018	Amber	Green	Amber	Amber
2007-2012	Green	Green	Green	Green

Mon. period	Overall Notes
2013-2018	Due to the Unfavourable Inadequate (amber) population Assessment and Future Prospects results, the Overall Assessment for Lisduff Fen is Unfavourable Inadequate (amber).
2007-2012	

6. DISCUSSION

Monitoring period
2013-2018
<p>Area of occupancy: The <i>Vertigo moulinsiana</i> habitat is restricted to the wet calcareous fen with <i>Schoenus nigricans</i> at the southern part of the site. It is not a named feature of the SAC.</p> <p>Discussion:</p> <p>Lisduff Fen is an important site - it supports both <i>Vertigo moulinsiana</i> and <i>Vertigo geyeri</i> (though only <i>Vertigo moulinsiana</i> was recorded in the current survey), and inhabited marsh fritillary (<i>Euphydras aurinia</i>) larval webs were also recorded here as part of the current survey (apparently a new record). While the habitat appears to still be suitable for <i>Vertigo moulinsiana</i> across most of the habitat polygon, some declines were noted, with a cluster of negative samples towards the southern end. It is not clear why this apparent decline has occurred, and it may be due to natural population fluctuations, but given the drastic decline recorded for <i>Vertigo geyeri</i> at this site, it is important not to be complacent.</p> <p>At first, the pressures and threats to the site appeared to be relatively limited, but, given the declines recorded for the species, these impacts may be acting either more strongly or in combination to affect the site in ways that are not yet clearly apparent.</p> <p>In terms of management, grazing levels are near ideal in the southern section of the fen. Activities happening directly adjacent to the fen, and relating to agriculture, may be combining to alter conditions in the fen just enough to make it less suitable to <i>Vertigo geyeri</i>, and may also, in time, affect <i>Vertigo moulinsiana</i>. These activities include scrub removal, silage production, water abstraction, drain modification, habitat reclamation and dumping of brash and spoil. While none are very dramatic if taken in isolation, all have the potential to negatively impact on the delicate balance that always exists in a calcareous fen. Silt run-off, chemical run-off, hydrological regime alteration, etc. may all be happening.</p>

Vertigo moulinsiana monitoring at Lisduff Fen

This is an important site, and action is needed to reduce the intensive agricultural activity happening within the SAC boundaries. It needs careful liaison with landowners, including time spent explaining the importance of the site as well as the rationale for management changes, and then dedicated monitoring when changes are implemented.

Monitoring recommendations:

Given the apparent large decline in the population of *Vertigo geyeri* at this site, perhaps indicating ecological change, it is recommended that monitoring for *Vertigo moulinsiana* is carried out at a minimum of 3 yearly intervals. This is particularly important given that a decline in *Vertigo moulinsiana* at the southern end of the site was picked up in 2016. The monitoring regime needs to be reviewed frequently and should be re-assessed in light of any deterioration of condition or any changes to site management, or in the event of any further decline in the population. The monitoring should be carried out as per Moorkens & Killeen (2011):

- Take 3 samples at each from 9 locations with optimal habitat in the southern half of the site, in field record: vegetation height, vegetation composition, ground moisture class, numbers of *Vertigo moulinsiana* (adult & juvenile) and other molluscs
- Take 3 samples at each from 9 locations with optimal habitat in the northern half of the site, record as above
- Re-determine boundary of the habitat polygons and assign habitat to either Optimal, Optimal-Suboptimal, Suboptimal, Suboptimal-Unsuitable, or Unsuitable
- Assess the management regime and impacts upon the habitat for *Vertigo moulinsiana*
- Use results to determine overall condition assessment

Management recommendations:

Useful notes on the management regime at the site can be found in Moorkens & Killeen (2011). These should be referred to in conjunction with the recommendations made below.

The habitat polygon for *Vertigo moulinsiana* is grazed by cattle and horses. The level of grazing is close to ideal for *Vertigo geyeri*, and it has been recommended that it should be maintained. This habitat type is not typical for *Vertigo moulinsiana*, which is more frequently found on tall sedges and other tall wetland plants, but here it appears to be supported adequately by the occurrence of *Schoenus nigricans* tussocks. Thus any changes in grazing/management regime should be mindful of this niche. Thus no change is recommended currently to grazing levels.

The scattered scrub in the fen is acceptable at current levels, but requires monitoring to identify if its spread needs to be addressed in the future. Should some scrub control be deemed necessary, this should be done with extreme care, and by hand. Access routes to the scrub should be chosen to avoid the best and most vulnerable areas of *Vertigo moulinsiana* habitat.

Management of areas directly adjacent to the fen (and lying within the Lisduff Fen 002147 SAC) are also of crucial importance. The removal of scrub and trees outside the fen, and the dumping of brash, should cease, as should dumping of spoil to the south of the site. The abstraction of water from the roadside section of the highly calcareous stream, which flows into the fen at the south of the site, should cease immediately, and the pipe that exists in the stream for easy attachment to tractors/tankers should be removed. Liaison with local landowners to make alternative arrangements and to explain the reason behind the change should be done immediately by local NPWS staff.

No further habitat modification (e.g. re-seeding, drain modification, scrub removal, etc.) should take place in the fields adjacent to the fen and lying with the SAC boundary. Again, liaison with the landowners concerned is needed immediately. Application of fertiliser or other chemicals associated with intensive farming (e.g. silage production in the south-eastern part of the site) should cease immediately within the SAC boundary.

This is an important site, and action is needed to reduce the intensive agricultural activity happening within the SAC boundaries. It needs careful liaison with landowners, including time spent explaining the importance of the site as well as the rationale for management changes, followed by dedicated monitoring when changes are implemented.

Vertigo moulinsiana monitoring at Lisduff Fen

2007-2012

Area of occupancy: The *Vertigo moulinsiana* habitat is restricted to the wet calcareous fen with *Schoenus nigricans* at the southern part of the site. It is not a named feature of the SAC.

Discussion:

This is a small site with a rather small amount of habitat (probably as little as 200m² is optimal). However, it is in good condition with a relatively good *V. moulinsiana* population. There are few threats - the *Vertigo moulinsiana* habitat is maintained by its high groundwater table from the springs along the western margin of the site. Lisduff Fen is also an unusual site for *V. moulinsiana* in that the snail is more or less found only on *Schoenus nigricans* tussocks in springs, rather than tall *Carex* species, *Phragmites* or *Glyceria maxima* at the edge of lakes or watercourses which would be more typical. To some extent this accounts for the generally low abundance of the snail: 123 adults and 256 juveniles were retrieved from 54 samples, with an average of 7 individuals per sample. The juvenile to adult ratio of 2.1 is typical of that found in autumn after the species' main breeding event.

Monitoring recommendations:

Although the Condition of the site, both in terms of habitat and *Vertigo moulinsiana* distribution and abundance, was assessed as Favourable, because the area of occupation and the good habitat is rather fragmented, it is recommended that monitoring is carried out at a minimum of 3 yearly intervals. This should be re-assessed in light of any deterioration of Condition or any changes to site management:

Frequency: Next monitoring due 2013

Methods (see Section 4 of main report for full details). Prescription as follows:

- Take 3 samples at each from 9 locations with optimal habitat in the southern half of the site, in field record: vegetation height, vegetation composition, ground moisture class, numbers of *V. moulinsiana* (adult & juvenile) and other molluscs
- Take 3 samples at each from 9 locations with optimal habitat in the northern half of the site, record as above
- Re-determine boundary of the habitat polygons and assign habitat to either Optimal, Optimal & Sub-optimal, Sub-optimal, Sub-optimal and Unsuitable, or Unsuitable
- Assess the management regime and impacts upon the habitat for *V. moulinsiana*
- Use results to determine overall condition assessment

Management recommendations:

The management and recommendations are the same as for the site (for *Vertigo geyeri*) in 2005 (Moorkens 2006d).

Existing Management

Lisduff Fen is lightly grazed by cattle and horses that move freely into the fen from the fields above. This system of extensive grazing appears to be well established and is working well.

There are four landowners farming at Lisduff Fen. The north east area is not grazed much, but is not suitable habitat for the snail and is not an issue. The south east area has had some infilling in the early 1990s, where areas were dug, roots of trees removed and infilled, and this area now has some cattle grazing and some silage cutting. The main area of interest for *V. moulinsiana* is on the west of the fen. The north-west quadrant is lightly grazed by a few horses and ponies at present and by a small number of cattle in the summer. The south-west quadrant is on a long term lease since the late 1980s. It is currently managed by grazing, generally by two horses and by low numbers of cattle in dry spells of the summer.

Proposed management prescription for site

It is proposed that the current management regime of extensive cattle grazing continue for the next 5 years. There should be no lowering or intensifying of this regime. There should be no supplementary feeding of animals within the *Vertigo moulinsiana* habitat.

It is difficult to prescribe exact numbers of cattle or to assess the number of grazing days in the current regime. This is because animals are constantly being moved in and out of the grazing areas. Often cattle are not grazing for longer than two weeks at a time. This is because of the risk of tick infection and red water fever in the cattle, which can occur even in summer periods if the fen is excessively wet. If animal husbandry issues are limiting the grazing on the fen, then it is effectively acting as a better ecological control than exact number prescriptions would, as the conditions that promote red water fever risks would be the same as would promote excessive poaching if cattle were to remain in place.

Any further management to improve habitat for *V. moulinsiana* would be detrimental to the *V. geyeri* habitat. As both are in stable and sustainable condition at present, the status quo is suiting both species and should be maintained.

Site report - Vertigo Monitoring

Vertigo moulinsiana monitoring at The Murrough

1. SITE CODE AND LOCATION DETAILS

1.1 Site code and location

Vertigo Site Code: VmCAM17 **County:** Wicklow

SAC Site Code: 002249 The Murrough Wetlands

Location description (from baseline survey):

Monitoring period	Date surveyed	Recorders
2013-2018	14-15 September 2016	John Brophy & Maria Long
2007-2012	02 November 2010	Ian Killeen & Maria Long

1.2 General Habitat Description (from baseline survey):

The general habitats in which *Vertigo moulinsiana* is present at The Murrough are vegetated ditches and pockets of sedge swamp habitat within larger scrub areas, and *Cladium* fen, marsh with permanent pools and *Schoenus* fen. The EU habitats that this relates to are water fringe vegetation comprising medium-tall waterside communities (CORINE 53.14) with some with some rich fen characteristics (CORINE 54.2, Annex I 7230) (Romão, 1996; Devillers et al., 1991) and Calcareous Fen with *Cladium mariscus* (HD Annex I Habitat 7210; CORINE 53.3). The snail is found typically on *Typha angustifolia*, *Carex riparia*, *Carex rostrata*, *C. acutiformis* in association with *Equisetum fluviatile* and *Phragmites australis*. The water table was above ground surface level but with a litter layer in very humid conditions above the water table. The specific areas that are within a wider mosaic, but that form specific *V. moulinsiana* habitat fit the M27 Rodwell characteristic vegetation classification (Rodwell, 1991). This falls within the more general habitat of reed and large sedge swamps (FS1) and tall herb swamps (FS2) of Fossitt (2000).

1.3 Definition of Vegetation Classes (from baseline survey):

Class I: Tall *Carex* species, *Phragmites australis*

Class III: *Iris pseudacorus*, *Typha angustifolia*, *Sparganium erectum*, *Schoenoplectus*

Class II: *Cladium mariscus*, *Carex paniculata*, *Schoenus nigricans*, *Glyceria maxima*

Class IV: All other species

1.4 Definition of Soil Moisture Classes (from baseline survey):

- 1: Dry. No visible moisture on ground surface.
- 2: Damp. Ground visibly damp, but water does not rise under pressure.
- 3: Wet. Water rises under light pressure.
- 4: Very wet. Pools of standing water, generally less than 5cm deep.
- 5: Site under water. Entire sampling site in standing or flowing water over 5cm deep.

2. SUMMARY:

This is a very important site, being the only east coast site for *Vertigo moulinsiana* in Ireland. The population of *Vertigo moulinsiana* at The Murrough, within the original area defined by Moorkens & Killeen (2011) (Polygons A and B), has shown some decline. The habitat here is subject to various pressures including pony grazing, drying out and scrub encroachment. Additional polygons have been added to the north (Polygon C) and to the south (D and E) of these. It is in Polygons D and E that the highest numbers of *Vertigo moulinsiana* have been found. In these areas management is for hunting/shooting, and also cattle grazing, and it is, broadly speaking, appropriate for the species. Given the numbers of the target species found, particularly when compared to all previous surveys at Five Mile Point, it would appear that this is the core of the population at The Murrough. Further investigations to the south of this area may reveal further habitat that supports the species.

It should be noted that in Long & Brophy (2013) a different polygon naming system was used to that employed here.

3. TRANSECT DETAILS

TRANSECT: 0	MONITORING PERIOD: 2013-2018
Start point:	NO TRANSECT RECORDED
End point:	
Transect length:	Direction:
Description:	
Sampling frequency:	

Vertigo moulinsiana monitoring at The Murrough

TRANSECT:	0	MONITORING PERIOD:	2007-2012
Start point:	NO TRANSECT RECORDED		
End point:			
Transect length:	Direction:		
Description:			
Sampling frequency:			

4. RESULTS

Polygon habitat characteristics

Monitoring Period: 2013-2018

Polygon	Habitat Type	Area (ha)	Comment
A	Suboptimal-Unsuitable	3.0737	Polygon A status remains Suboptimal-Unsuitable. This is an area of fen which is grazed tight by ponies in places, but has scrub encroaching in others. Some areas are wet, particularly near drains, but mostly the ground is quite dry underfoot.
B	Optimal-Suboptimal	6.3582	Polygon B status was upgraded from Suboptimal (Moorkens & Killeen, 2011) to Optimal-Suboptimal. This is noted as a change in interpretation, rather than an ecological change. The area is very wet in places, and so parts are inaccessible, but appear likely to support pockets of habitat (e.g. tall sedges) suitable for <i>Vertigo moulinsiana</i> .
C	Suboptimal	4.534	Polygon C was created by Long & Brophy (2013), and the boundary was expanded in 2016. The status was dropped from Optimal-Suboptimal to Suboptimal for reasons of interpretation, as the boundary was expanded to include additional habitat. This is an area of fen with scrub encroaching in places, but also with wet areas with <i>Schoenus nigricans</i> , <i>Molinia caerulea</i> and reeds, grading into an area dominated by <i>Cladium mariscus</i> at the northern end.
D	Optimal-Suboptimal	3.7843	Polygon D is newly created in 2016 (but formed part of a polygon surveyed by Long & Brophy (2013)). It has remained classed as Optimal-Suboptimal, and consists of a long narrow strip of habitat fringing a large drain.
E	Optimal-Suboptimal	14.7813	Polygon E is a new polygon created during the 2016 survey, which was classed as Optimal-Suboptimal. It consists of a large area of tall-growing vegetation (mainly reeds), which appears to be managed for hunting/shooting.

Monitoring Period: 2007-2012

Polygon	Habitat Type	Area (ha)	Comment
A	Sub-optimal with unsuitable areas	3.074	Polygon A - North side of road – sub-optimal and unsuitable habitat. Small pockets of sedge swamp habitat within larger area of scrub and dry fen. Lots of recent scrub clearance.
B	Sub-optimal	6.358	Polygon B - South side of road – sub-optimal. Extensive area of very wet fen and marsh, permanent pools with <i>Cladium</i> , gorse banks.

Transect samples

Mon. period	Transect	Sample	Location	Adults	Juveniles	Total	Veg. class	Wetness	Habitat suitability
2007-2012	0	0	NO TRANSECT RECORDED						

Spot Samples

Mon. period	Sample	Grid ref.	Adults	Juveniles	Total	Veg. class	Wetness	Habitat suitability
Monitoring period 2013-2018 (69 samples)								
2013-2018	01a	O 31338 02592	0	0	0	I	2	Suboptimal-Unsuitable
2013-2018	01b	O 31338 02592	0	0	0	I	2	Suboptimal-Unsuitable
2013-2018	01c	O 31338 02592	0	0	0	I	2	Suboptimal-Unsuitable
2013-2018	01d	O 31338 02592	0	0	0	I	4	Suboptimal-Unsuitable

Vertigo moulinsiana monitoring at The Murrough

2013-2018	01e	O 31338 02592	0	0	0	I	2	Suboptimal-Unsuitable
2013-2018	02a	O 31288 02577	0	0	0	I	2	Optimal-Suboptimal
2013-2018	02b	O 31288 02577	0	0	0	I	2	Optimal-Suboptimal
2013-2018	02c	O 31288 02577	0	0	0	I	2	Optimal-Suboptimal
2013-2018	02d	O 31288 02577	0	0	0	I	5	Optimal-Suboptimal
2013-2018	02e	O 31288 02577	0	0	0	I	5	Optimal-Suboptimal
2013-2018	03a	O 31165 02715	0	0	0	I	3	Suboptimal
2013-2018	03b	O 31165 02715	0	0	0	I	3	Suboptimal
2013-2018	03c	O 31165 02715	0	0	0	I	3	Suboptimal
2013-2018	03d	O 31165 02715	0	0	0	I	2	Suboptimal
2013-2018	03e	O 31165 02715	1	0	1	I	2	Suboptimal
2013-2018	04a	O 31144 02817	0	0	0	II	3	Suboptimal-Unsuitable
2013-2018	04b	O 31144 02817	0	0	0	II	3	Suboptimal-Unsuitable
2013-2018	04c	O 31144 02817	0	0	0	II	4	Suboptimal-Unsuitable
2013-2018	04d	O 31144 02817	0	0	0	II	3	Suboptimal-Unsuitable
2013-2018	04e	O 31144 02817	0	0	0	II	2	Suboptimal-Unsuitable
2013-2018	05a	O 31379 03043	0	0	0	III	3	Optimal-Suboptimal
2013-2018	05b	O 31379 03043	0	0	0	III	3	Optimal-Suboptimal
2013-2018	05c	O 31379 03043	0	0	0	III	3	Optimal-Suboptimal
2013-2018	05d	O 31379 03043	0	0	0	III	3	Optimal-Suboptimal
2013-2018	05e	O 31379 03043	0	0	0	III	3	Optimal-Suboptimal
2013-2018	06a	O 31420 03154	0	0	0	I	3	Optimal-Suboptimal
2013-2018	06b	O 31420 03154	0	0	0	I	3	Optimal-Suboptimal
2013-2018	06c	O 31420 03154	0	0	0	III	2	Optimal-Suboptimal
2013-2018	06d	O 31420 03154	0	0	0	III	2	Optimal-Suboptimal
2013-2018	06e	O 31420 03154	0	0	0	III	2	Optimal-Suboptimal
2013-2018	07a	O 31037 02471	0	0	0	IV	4	Suboptimal-Unsuitable
2013-2018	07b	O 31037 02471	0	0	0	II	4	Suboptimal-Unsuitable
2013-2018	07c	O 31037 02471	0	0	0	IV	3	Suboptimal-Unsuitable
2013-2018	07d	O 31037 02471	0	0	0	II	4	Suboptimal-Unsuitable
2013-2018	07e	O 31037 02471	0	0	0	IV	4	Suboptimal-Unsuitable
2013-2018	08a	O 31026 02511	0	0	0	I	3	Optimal-Suboptimal
2013-2018	08b	O 31026 02511	0	0	0	I	3	Optimal-Suboptimal
2013-2018	08c	O 31026 02511	0	0	0	I	3	Optimal-Suboptimal
2013-2018	08d	O 31026 02511	0	0	0	I	2	Optimal-Suboptimal
2013-2018	08e	O 31026 02511	0	0	0	I	3	Optimal-Suboptimal
2013-2018	09a	O 31110 02495	0	0	0	I	4	Optimal
2013-2018	09b	O 31110 02495	0	0	0	I	4	Optimal
2013-2018	09c	O 31110 02495	0	0	0	I	4	Optimal
2013-2018	09d	O 31110 02495	0	0	0	I	4	Optimal

Vertigo moulinsiana monitoring at The Murrough

2013-2018	09e	O 31110 02495	0	0	0	I	4	Optimal
2013-2018	10a	O 31157 02488	0	0	0	III	4	Optimal-Suboptimal
2013-2018	10b	O 31157 02488	0	0	0	III	4	Optimal-Suboptimal
2013-2018	10c	O 31157 02488	1	0	1	III	4	Optimal-Suboptimal
2013-2018	10d	O 31157 02488	0	0	0	III	4	Optimal-Suboptimal
2013-2018	10e	O 31157 02488	0	0	0	III	4	Optimal-Suboptimal
2013-2018	11a	O 31250 01777	0	0	0	I	4	Suboptimal-Unsuitable
2013-2018	11b	O 31250 01777	0	0	0	I	4	Suboptimal-Unsuitable
2013-2018	11c	O 31250 01777	0	0	0	I	4	Suboptimal-Unsuitable
2013-2018	11d	O 31250 01777	0	0	0	I	3	Suboptimal-Unsuitable
2013-2018	11e	O 31250 01777	0	0	0	I	3	Suboptimal-Unsuitable
2013-2018	12a	O 31239 01808	3	3	6	III	3	Optimal
2013-2018	12b	O 31239 01808	8	2	10	I	3	Optimal
2013-2018	12c	O 31239 01808	1	0	1	I	3	Optimal
2013-2018	12d	O 31239 01808	7	2	9	I	3	Optimal
2013-2018	12e	O 31239 01808	4	3	7	I	3	Optimal
2013-2018	13a	O 31102 01606	7	13	20	I	3	Optimal-Suboptimal
2013-2018	13b	O 31102 01606	3	1	4	I	4	Optimal-Suboptimal
2013-2018	13c	O 31102 01606	4	9	13	I	3	Optimal-Suboptimal
2013-2018	13d	O 31102 01606	3	5	8	I	4	Optimal-Suboptimal
2013-2018	13e	O 31102 01606	9	15	24	I	3	Optimal-Suboptimal
2013-2018	14a	O 31056 08158	0	0	0	I	2	Suboptimal-Unsuitable
2013-2018	14b	O 31056 08158	0	0	0	I	2	Suboptimal-Unsuitable
2013-2018	15a	O 31063 08175	0	0	0	I	2	Suboptimal
2013-2018	15b	O 31063 08175	0	0	0	I	2	Suboptimal

Monitoring period 2007-2012 (40 samples)

2007-2012	01	O 31334 02583	0	0	0		4	
2007-2012	02	O 31334 02583	3	0	3		4	
2007-2012	03	O 31334 02583	1	1	2		4	
2007-2012	04	O 31334 02583	0	0	0		4	
2007-2012	05	O 31334 02583	2	0	2		4	
2007-2012	06	O 31287 02588	0	0	0		5	
2007-2012	07	O 31287 02588	0	0	0		5	
2007-2012	08	O 31287 02588	0	0	0		5	
2007-2012	09	O 31244 02597	0	0	0		3	
2007-2012	10	O 31244 02597	0	0	0		4	
2007-2012	11	O 31211 02608	0	0	0		3	
2007-2012	12	O 31211 02608	0	0	0		4	
2007-2012	13	O 31205 02670	0	0	0		5	
2007-2012	14	O 31205 02670	0	0	0		4	

Vertigo moulinsiana monitoring at The Murrough

2007-2012	15	O 31155 02746	0	0	0	4
2007-2012	16	O 31155 02746	0	0	0	4
2007-2012	17	O 31154 02727	4	0	4	5
2007-2012	18	O 31154 02727	6	0	6	5
2007-2012	19	O 31154 02727	12	9	21	5
2007-2012	20	O 31094 02821	0	0	0	4
2007-2012	21	O 31094 02821	0	0	0	3
2007-2012	22	O 31094 02821	0	0	0	3
2007-2012	23	O 31162 02666	1	3	4	4
2007-2012	24	O 31162 02666	0	1	1	4
2007-2012	25	O 31162 02666	3	5	8	5
2007-2012	26	O 31013 02501	0	2	2	4
2007-2012	27	O 31013 02501	0	2	2	4
2007-2012	28	O 31013 02501	0	0	0	4
2007-2012	29	O 31013 02501	0	2	2	4
2007-2012	30	O 31013 02501	0	0	0	4
2007-2012	31	O 31026 02473	0	0	0	4
2007-2012	32	O 31026 02473	1	0	1	4
2007-2012	33	O 31026 02473	2	1	3	4
2007-2012	34	O 31102 02496	2	0	2	5
2007-2012	35	O 31102 02496	0	6	6	5
2007-2012	36	O 31102 02496	1	0	1	5
2007-2012	37	O 31102 02496	0	0	0	5
2007-2012	38	O 31120 02482	0	0	0	5
2007-2012	39	O 31120 02482	0	0	0	5
2007-2012	40	O 31120 02482	0	0	0	5

5. CONDITION ASSESSMENT

5.1 Population Assessment: 3 passes Favourable (green); 1-2 pass Unfavourable Inadequate (amber); 0 passes Unfavourable Bad (red)

Mon. period	Transect	Indicator	Target	Result	Pass/Fail
2013-2018	0	N/A	NO TRANSECT RECORDED		
2007-2012	0	N/A	NO TRANSECT RECORDED		

Mon. period	Indicator	Target	Result	Pass/Fail
2013-2018	Presence/Absence	Adult or sub-adult snails are present in at least 5 samples (or 25% - minimum 20 samples) with a geographical spread on the north side of the road at Five Mile Point (= sites 1-9 Polygons A and C)	Present in 1 sample (3%)	Fail
2013-2018	Presence/Absence ¹	Adult or sub-adult snails are present in at least 5 samples (or 25% - minimum 20 samples) with a geographical spread in Polygons D and E	Present in 10 samples	Pass

Vertigo moulinsiana monitoring at The Murrough

2013-2018	Species extent	Adult or sub-adult snails are present in at least 5 samples (or 25% - minimum 20 samples) with a geographical spread on the south side of the road at Five Mile Point (= sites 10-13 Polygon B)	Present in 1 sample (5%)	Fail
2007-2012	Presence/Absence	Adult or sub-adult snails are present in at least 5 samples (or 25% - minimum 20 samples) with a geographical spread on the north side of the road at Five Mile Point (= sites 1-9)	Present in 9 out of 27 samples (33%)	Pass
2007-2012	Species extent	Adult or sub-adult snails are present in at least 5 samples (or 25% - minimum 20 samples) with a geographical spread on the south side of the road at Five Mile Point (= sites 10-13)	Present in 8 out of 15 samples	Pass

Mon. period	Population Notes
2013-2018	In the monitoring period 2007-2012, <i>Vertigo moulinsiana</i> were found in nine out of 27 samples to the north of the road at Five Mile Point. In the monitoring period 2013-2018, <i>Vertigo moulinsiana</i> was found in one sample out of 30 to the north of the road, illustrating a decline. For the area south of the road, the species was found in eight out of 15 samples in 2007-2012. In the monitoring period 2013-2018, <i>Vertigo moulinsiana</i> was found in one sample out of 20 within the same area. However, sampling by Long & Brophy (2013) extended the known area of distribution of <i>Vertigo moulinsiana</i> further south at the site, and sampling in this extended area in the current survey recorded the species at two locations (out of three) with 10 positive samples (out of 15), and in good numbers. Based on the current criteria of Moorkens & Killeen (2011), and with an additional criterion added to take account of the new polygons (D and E), the Population Assessment for The Murrough is Unfavourable Inadequate (amber).
2007-2012	the snail is scattered in its distribution but present in rather low numbers

5.2 Habitat Assessment: 4 passes Favourable (green); 2-3 passes Unfavourable Inadequate (amber); 0-1 passes Unfavourable Bad (red)

5.2.1 Transect level

Mon. period	Transect	Indicator	Target	Result	Pass/Fail
2013-2018	0	N/A	NO TRANSECT RECORDED		
2007-2012	0	N/A	NO TRANSECT RECORDED		

5.2.2 Site level

Mon. period	Indicator	Target	Result	Pass/Fail
2013-2018	Habitat extent	At least 6ha of the site sub-optimal with optimal areas	6.4ha Suboptimal	Pass
2007-2012	Habitat extent	At least 6ha of the site sub-optimal with optimal areas	6.4 ha sub-optimal	Pass

Mon. period	Indicator	Target	Result	Pass/Fail
2013-2018	Habitat extent	Over 75% of the samples (minimum 20) at sites on the north side of the road at Five Mile Point (= sites 1-9 Polygons A and C) are dominated by suitable vegetation (Classes I & II) AND fall within soil moisture classes 3-5	100% dominated by suitable vegetation and 45% fall within soil moisture classes 3-5	Fail
2013-2018	Habitat extent1	Over 75% of the samples (minimum 20) at sites on the south side of the road at Five Mile Point (= sites 10-13 Polygon B) are dominated by suitable vegetation (Classes I & II) AND fall within soil moisture classes 3-5	85% dominated by suitable vegetation and 95% fall within soil moisture classes 3-5	Pass
2013-2018	Habitat extent2	Over 75% of the samples (minimum 20) in Polygons D and E are dominated by suitable vegetation (Classes I & II) AND fall within soil moisture classes 3-5	95% dominated by suitable vegetation and 100% fall within soil moisture classes 3-5	Pass

Vertigo moulinsiana monitoring at The Murrough

2007-2012	Habitat extent	Over 75% of the samples (minimum 20) at sites on the north side of the road at Five Mile Point (= sites 1-9) are dominated by suitable vegetation (Classes I & II) and 100% fall within soil moisture classes 3-5	100% of samples	Pass
2007-2012	Habitat quality	Over 75% of the samples (minimum 20) at sites on the south side of the road at Five Mile Point (= sites 10-13) are dominated by suitable vegetation (Classes I & II) and 100% fall within soil moisture classes 3-5	100% of samples	Pass

Mon. period	Habitat Notes
2013-2018	Moorkens & Killeen (2011) identified two polygons which support some suitable habitat for <i>Vertigo moulinsiana</i> at The Murrough. Polygon A to the north of the road at Five Mile Point, which was Sub-optimal and Unsuitable, and Polygon B to the south of the road at Five Mile Point, which was Suboptimal. Following surveys by Long & Brophy (2013) and the current survey, three additional polygons with suitable habitat were added - Polygon C to the north, and polygons D and E to the south. Based on the criteria of Moorkens & Killeen (2011), with an additional criterion added to take account of new areas added at the south, the Habitat Assessment for The Murrough is Unfavourable Inadequate (amber).
2007-2012	Much of the habitat at the site appears to be in good condition for <i>V. moulinsiana</i>

5.3 Future Prospects Assessment

Mon. period	Activity code	Activity description	Location	Intensity	Influence	Area affected	Comment
2013-2018	A03	mowing / cutting of grassland	Inside	Low	Negative	10%	
2013-2018	A04.02.01	non intensive cattle grazing	Inside	Low	Positive	10%	
2013-2018	F06	Hunting, fishing or collecting activities not referred to above	Inside	Low	Positive	10%	Minimal management with mown strips at high level
2013-2018	G05.07	missing or wrongly directed conservation measures	Inside	High	Negative	2%	Overgrazing by ponies in small area of Birdwatch Ireland reserve
2013-2018	K04.05	damage by herbivores (including game species)	Inside	Low	Positive	75%	Very small impact of deer trampling across site
2007-2012	A04.02.01	non intensive cattle grazing	Inside	Low	Neutral	6.36ha	Cattle have access to all of the potential habitat on the south side of the road but given that the site is so wet (which means the cattle tend not to poach much of the good habitat), and the head numbers are relatively low, the impact of non intensive cattle grazing is considered to be neutral.
2007-2012	A04.02.03	non intensive horse grazing	Inside	Low	Positive	3.07ha	Abandonment has been compensated for by the introduction of pony grazing (plus significant mechanical scrub clearance) which is considered a positive impact.

Vertigo moulinsiana monitoring at The Murrough

2007-2012	A04.03	abandonment of pastoral systems, lack of grazing	Inside	Medium	Negative	3.07ha	The abandonment of the habitat on the north side of the road has had a negative impact on the quality of the habitat such that scrub invasion had become a serious issue.
-----------	--------	--	--------	--------	----------	--------	---

Mon. period	Future Prospects Notes
2013-2018	Polygon A has been affected negatively by overgrazing by Kerry bog ponies that have been brought in as conservation grazers, and also by drying out in places - evidenced by scrub encroachment and low soil moisture underfoot. Polygon B, at least in the drier western end, is grazed by cattle, but the effect of this is considered to be positive in that it prevents scrubbing over. The <i>Vertigo moulinsiana</i> population in these sections of the site appears to be sparsely distributed and in low numbers, meaning that the drop in the number of positive samples seen between 2010 and 2016 remains a concern. In the new polygons at the south (D and E), mowing and management for hunting are the main land uses, with mowing to a low vegetation height in some areas having a negative effect. Considering the various factors, the Future Prospects for <i>Vertigo moulinsiana</i> population at The Murrough is rated as Unfavourable Inadequate (amber).
2007-2012	As the impacts are low to moderate rather than severe, Future prospects have been assessed as Favourable

5.4 Overall Assessment

Mon. period	Population assessment	Area of suitable habitat	Future prospects	Overall assessment
2013-2018	Amber	Amber	Amber	Amber
2007-2012	Green	Green	Green	Green

Mon. period	Overall Notes
2013-2018	With both the population and habitat assessments for The Murrough returning results of Unfavourable Inadequate (amber), the Overall Assessment for The Murrough is Unfavourable Inadequate (amber).
2007-2012	

6. DISCUSSION

Monitoring period
2013-2018
<p>Area of occupancy: The habitat that supports <i>Vertigo moulinsiana</i> within this site is areas of fen and swamp on the north and south sides of the road leading to Five Mile Point. Access is from this road and by walking southwards along the shoreline and railway track for the most southerly areas.</p> <p>Discussion:</p> <p>This is a very important site, being the only east coast site for <i>Vertigo moulinsiana</i> in Ireland. The population of <i>Vertigo moulinsiana</i> at The Murrough, within the original area defined by Moorkens & Killeen (2011) (polygons A and B), has shown some decline. The habitat here is subject to various pressures including pony grazing, drying out and scrub encroachment. Additional polygons have been added to the north (Polygon C) and to the south (D and E) of these. It is in polygons D and E that the highest numbers of <i>Vertigo moulinsiana</i> have been found. In these areas management is for hunting/shooting, and also cattle grazing, and it is, broadly speaking, appropriate for the species. Given the numbers of the target species found, particularly when compared to all previous surveys at Five Mile Point, it would appear that this is the core of the population at The Murrough. Further investigations to the south of this area may reveal further habitat that supports the species.</p> <p>It should be noted that in Long & Brophy (2013) a different polygon naming system was used to that employed here.</p> <p>Monitoring recommendations:</p> <p>The <i>Vertigo moulinsiana</i> population in polygons A and B at The Murrough has shown decline. For this reason, regular monitoring is required at this site (i.e. every three years, with next monitoring due in 2019) to track any further change, along with the fact that additional areas have been found that support the species and these need further investigation. Monitoring should follow that of Moorkens & Killeen (2011), with some additions based on the newly added polygons:</p> <ul style="list-style-type: none"> - Take a minimum of 30 samples in total from at least 6 separate locations with optimal habitat to the north of the road at Five Mile Point (from polygons A and C), in field record: vegetation height, vegetation composition, ground moisture class, numbers of <i>Vertigo moulinsiana</i> (adult & juvenile) and other molluscs - Take a minimum of 20 samples in total from at least 4 separate locations with optimal habitat to the south of the road at Five Mile Point (Polygon B), record as above - Take a minimum of 20 samples in total from at least 4 separate locations with optimal habitat to the south of the road at Five Mile Point (polygons D and E), record as above

Vertigo moulinsiana monitoring at The Murrrough

- Re-determine boundary of the habitat polygons and assign habitat to either Optimal, Optimal-Suboptimal, Suboptimal, Suboptimal-Unsuitable, or Unsuitable
- Assess the management regime and impacts upon the habitat for Vertigo moulinsiana
- Use results to determine overall condition assessment

The opportunity should also be taken to survey new areas to the south of polygons D and E to improve the knowledge of the population of Vertigo moulinsiana at The Murrrough.

Management recommendations:

Given the large extent of the site, the management recommendations vary in different areas. In Polygon A, the grazing by ponies should be closely monitored and prevented from having a negative effect on suitable Vertigo moulinsiana habitat. This almost certainly involves reducing the current grazing impact - either through lesser numbers of grazers, or removal of grazers for periods of the year. Some further scrub clearance and rewetting (if possible) would also benefit the species in this area. However, this of course needs to be weighed against the other conservation priorities at the site. Polygon C, particularly the southern section, is suffering from abandonment and lack of grazing, and would benefit from the introduction of light grazing - however this would need to be carefully monitored. While BirdWatch Ireland staff are aware of the presence of the species at their reserve, liaison should be initiated with the manager of the 'East Coast Nature Reserve' immediately in order to inform any plans for managing the areas.

In Polygon B, the current grazing level is considered appropriate for maintaining the habitat. In Polygon D, mowing to a low vegetation height in the vicinity of the large drain should be stopped if possible, to allow tall wetland vegetation to develop once again. Mowing (at a level of ~1m) and cattle grazing occurs in Polygon E, and some of this area would benefit from a reduction in both; however a mosaic of grazing and management effects occurs, which at current levels allows good areas of suitable habitat to persist. It is likely that management in Polygon D is for agricultural purposes, and in Polygon E is for shooting/hunting purposes. Local NPWS staff should endeavour to contact landowners/users of the area, both to inform them of the presence of the rare and protected species on their land, and also to discuss management, both current and future.

Vertigo moulinsiana monitoring at The Murrough

2007-2012

Area of occupancy: The habitat that supports *Vertigo moulinsiana* within this site is areas of fen and swamp on the north and south sides of the road leading to Five Mile Point. Access is from this road.

Discussion:

Vertigo moulinsiana was confirmed living at The Murrough for the first time in over 50 years, close to the location given by Stelfox in 1954. With the information gathered during the 2010 survey, the Condition of the site has been assessed as Favourable. This is an important site for the species as it is the only known site on the east coast of Ireland, and therefore significant in terms of national Range but also the area of occupancy appears to be relatively large.

Much of the habitat on the south side of the road was inaccessible due to high water levels at the time of survey (early November 2010). Whilst the entire habitat has been identified as potentially suitable for *V. moulinsiana* (sub-optimal), a more thorough survey should be carried out in drier conditions to determine the full distribution and abundance of the snail.

Parts of the habitat on the north side of the road were also inaccessible but this was mainly due to scrub and density of suitable habitat. It is likely that this part of the site had deteriorated over the last 25 years due to scrub invasion and subsequent drying. However, it may improve following the recent programme of scrub clearance and introduction of pony grazing.

Vertigo moulinsiana was not found at any other locations other than at Five Mile Point. Potentially suitable habitat was identified at other places throughout the Murrough but a combination of factors such as hydrogeology, and current and past management are likely reasons for the absence of the snail.

Monitoring recommendations:

Although the Condition of the site, both in terms of habitat and *Vertigo moulinsiana* distribution and abundance has been assessed as Favourable, it is recommended that monitoring is carried out at a minimum of 3 yearly intervals. This should be re-assessed after a more detailed survey has been carried out and also in light of any deterioration of Condition or any changes to site management:

Frequency: Next monitoring due 2013

Methods (see Section 4 of main report for full details). Prescription as follows:

- Take a minimum of 30 samples in total from at least 6 separate locations with optimal habitat to the north of the road at Five Mile Point, in field record: vegetation height, vegetation composition, ground moisture class, numbers of *V. moulinsiana* (adult & juvenile) and other molluscs
- Take a minimum of 30 samples in total from at least 6 separate locations with optimal habitat to the south of the road at Five Mile Point, record as above
- Re-determine boundary of the habitat polygons and assign habitat to either Optimal, Optimal & Sub-optimal, Sub-optimal, Sub-optimal and Unsuitable, or Unsuitable
- Assess the management regime and impacts upon the habitat for *V. moulinsiana*
- Use results to determine overall condition assessment

A more thorough survey should be carried out on the south side of the road at Five Mile Point in drier conditions to determine the full distribution and abundance of the snail.

Management recommendations:

Existing Management

There has been extensive scrub clearance in the fen on the north side of the road and the site is now being grazed by ponies. It is not known if the clearance work has finished or is to continue. The fen on the south side of the road is grazed by cattle.

Proposed management prescription for site

It is recommended that the present management in both areas of habitat at Five Mile Point continues at present until more information is obtained on the full extent of the *Vertigo moulinsiana* population.

Site report - Vertigo Monitoring

Vertigo moulinsiana monitoring at Pollardstown Fen

1. SITE CODE AND LOCATION DETAILS

1.1 Site code and location

Vertigo Site Code: VmCAM18 **County:** Kildare

SAC Site Code: 000396 Pollardstown Fen

Location description (from baseline survey):

Monitoring period	Date surveyed	Recorders
2013-2018	5 September & 1 October 2014	John Brophy & Maria Long
2007-2012	12 September 2010	Evelyn Moorkens & Ian Killeen

1.2 General Habitat Description (from baseline survey):

The general habitat in which *Vertigo moulinsiana* is present at Pollardstown Fen is Calcareous Fen (HD Annex I Habitat 7230; CORINE 54.2), Calcareous Fen with *Cladium mariscus* (HD Annex I Habitat 7210; CORINE 53.3), petrifying springs with tufa formation (HD Annex I Habitat 7220; CORINE 54.12), ditch and waterside communities including most communities of CORINE 53 (Romão, 1996; Devillers et al., 1991). The snail is widespread around the wetter ditch areas, becoming less dense as habitat becomes drier away from saturated groundwater. The specific areas that are within a wider mosaic, but that form specific *V. moulinsiana* habitat fit the *Cladium* and *Schoenus* communities of M13, *Filipendula* mire of the M27 and the tall *Carex* M9 Rodwell characteristic vegetation classification (Rodwell, 1991). This falls within the more general habitat of rich fen and flush (PF1), reed and large sedge swamps (FS1) and tall herb swamps (FS2) of Fossitt (2000).

1.3 Definition of Vegetation Classes (from baseline survey):

Class I: Tall <i>Carex</i> species, <i>Schoenus nigricans</i> , <i>Phragmites australis</i>	Class III: <i>Juncus subnodulosus</i> , <i>Menyanthes trifoliata</i> , <i>Mentha aquatica</i> , <i>Angelica sylvestris</i>
Class II: <i>Cladium mariscus</i> , <i>Equisetum fluviatile</i>	Class IV: All other species

1.4 Definition of Soil Moisture Classes (from baseline survey):

- 1: Dry. No visible moisture on ground surface.
- 2: Damp. Ground visibly damp, but water does not rise under pressure.
- 3: Wet. Water rises under light pressure.
- 4: Very wet. Pools of standing water, generally less than 5cm deep.
- 5: Site under water. Entire sampling site in standing or flowing water over 5cm deep.

2. SUMMARY:

Vertigo moulinsiana is present all across this site, albeit in low numbers in places. All six polygons sampled in 2014 were positive for the species. However, numbers of individuals recorded were much lower than in the previous survey (2010). This is particularly evident on the transect where hundreds of individuals were counted in 2010, but only one adult was found in 2014. It is much more difficult to draw comparisons across the remainder of the site – Polygon B had good results (though lower abundances) in 2014; all other areas were not sampled in 2010. Overall, there is some evidence to suggest that both drying out and vegetation change caused by lack of grazing may both be occurring in parts of this site. Recommendations for both of these issues have been made, and recommendations in Moorkens and Killeen (2011) still stand also. The dry year in 2014 may also have had an impact on numbers of snails recorded. Because this is such an important site, and there are a number of unknowns, it is crucially important that this site be re-surveyed in three years' time.

3. TRANSECT DETAILS

TRANSECT: 1	MONITORING PERIOD: 2013-2018
Start point:	N 76320 16015 Fence post by canal feeder
End point:	N 76417 15964
Transect length: 110	Direction: WNW-ESE
Description:	
Sampling frequency:	

TRANSECT: 1	MONITORING PERIOD: 2007-2012
Start point:	N 76320 16015 Fence post by canal feeder
End point:	N 76417 15964
Transect length: 110	Direction:
Description:	
Sampling frequency:	

Vertigo moulinsiana monitoring at Pollardstown Fen

4. RESULTS

Polygon habitat characteristics

Monitoring Period: 2013-2018			
Polygon	Habitat Type	Area (ha)	Comment
A	Optimal-Suboptimal	3.908	Polygon A status remains Optimal-Suboptimal. The habitat comprises tall-reed swamp dominated by <i>Phragmites australis</i> , as well as areas of lower-growing fen vegetation with <i>Juncus</i> spp. and <i>Schoenus nigricans</i> . The boundary was redrawn to better reflect the extent of the habitat and the boundary features on the ground.
B	Optimal-Suboptimal	2.4895	Polygon B status remains Optimal-Suboptimal. The habitat is dominated by tall <i>Carex</i> species. The boundary was redrawn to better reflect the extent of the habitat and the boundary features on the ground.
C	Not visited 2014	0.8755	Polygon C was not visited in 2014.
D	Suboptimal-Unsuitable	0.477	Polygon D status has decreased from Sub-optimal to Suboptimal-Unsuitable due to an apparent change in vegetation. The habitat is now wet grassland dominated by <i>Juncus subnodulosus</i> , with some <i>Phragmites australis</i> .
F	Suboptimal	9.7503	Polygon F status remains Suboptimal. Polygon E was merged with Polygon F due to the similarity of the habitat present, which consisted of tall reed swamp containing a mosaic of <i>Cladium mariscus</i> and <i>Phragmites australis</i> , grading into lower fen vegetation.
G	Not visited 2014	1.644	Polygon G was not surveyed in 2014.
H	Suboptimal-Unsuitable	2.9562	Polygon H status has decreased from Sub-optimal to Suboptimal-Unsuitable as it is too dry and grassy or heathy. The habitat includes areas of tall reed swamp with <i>Cladium mariscus</i> and <i>Phragmites australis</i> . The boundary was redrawn to better reflect the habitat and boundary features on the ground.
I	Suboptimal	3.8774	Polygon I status remains Suboptimal. Polygon J was merged with Polygon I due to the similarity of the habitat present, which is tall reed swamp dominated by <i>Phragmites australis</i> .
K	Not visited 2014	0.5948	Polygon K was not visited in 2014.
Monitoring Period: 2007-2012			
Polygon	Habitat Type	Area (ha)	Comment
	Sub-optimal	17.43	All other areas - Wide range of habitats with <i>V. moulinsiana</i> habitat including ditches, open fen and flushes, with <i>Schoenus</i> , tall <i>Carex</i> spp. and <i>Cladium</i>
A	Sub-optimal with optimal areas	3.029	Polygon A - Network of ditches and wet <i>Schoenus</i> -dominated fen
B	Sub-optimal with optimal areas	0.8533	Polygon B - Flush area with dense stands of <i>Carex acutiformis</i>

Transect samples

Mon. period	Transect	Sample	Location	Adults	Juveniles	Total	Veg. class	Wetness	Habitat suitability
Monitoring period 2013-2018 Transect 1 (15 samples)									
2013-2018	1	1	6m	0	0	0		4	Suboptimal/Unsuitable
2013-2018	1	2	8m	0	0	0		3	Optimal
2013-2018	1	3	10m	0	0	0		3	Optimal
2013-2018	1	4	15m	1	0	1		4	Suboptimal
2013-2018	1	5	20m	0	0	0		4	Suboptimal
2013-2018	1	6	25m	0	0	0		3	Suboptimal
2013-2018	1	7	30m	0	0	0		3	Suboptimal
2013-2018	1	8	40m	0	0	0		3	Optimal
2013-2018	1	9	50m	0	0	0		3	Optimal
2013-2018	1	10	60m	0	0	0		3	Suboptimal
2013-2018	1	11	70m	0	0	0		3	Suboptimal
2013-2018	1	12	80m	0	0	0		3	Optimal
2013-2018	1	13	90m	0	0	0		3	Suboptimal
2013-2018	1	14	100m	0	0	0		3	Suboptimal

Vertigo moulinsiana monitoring at Pollardstown Fen

2013-2018	1	15	110m	0	0	0	4	Suboptimal
Monitoring period 2007-2012 Transect 1 (15 samples)								
2007-2012	1	1	6m	0	0	0	3	
2007-2012	1	2	8m	11	61	72	3	
2007-2012	1	3	10m	16	27	43	4	
2007-2012	1	4	15m	4	18	22	3	
2007-2012	1	5	20m	11	88	99	4	
2007-2012	1	6	25m	95	220	315	4	
2007-2012	1	7	30m	27	70	97	4	
2007-2012	1	8	40m	26	9	35	3	
2007-2012	1	9	50m	19	82	101	4	
2007-2012	1	10	60m	3	7	10	4	
2007-2012	1	11	70m	0	0	0	4	
2007-2012	1	12	80m	9	6	15	3	
2007-2012	1	13	90m	6	9	15	4	
2007-2012	1	14	100m	4	0	4	3	
2007-2012	1	15	110m	9	17	26	4	

Spot Samples

Mon. period	Sample	Grid ref.	Adults	Juveniles	Total	Veg. class	Wetness	Habitat suitability
Monitoring period 2013-2018 (75 samples)								
2013-2018	01a	N 77128 15636	1	0	1	III	3	Suboptimal
2013-2018	01b	N 77128 15636	0	0	0	III	3	Suboptimal
2013-2018	01c	N 77128 15636	0	0	0	III	3	Suboptimal
2013-2018	01d	N 77128 15636	0	0	0	III	3	Suboptimal
2013-2018	01e	N 77128 15636	0	0	0	III	3	Suboptimal
2013-2018	02a	N 77081 15678	0	0	0	III	3	Suboptimal
2013-2018	02b	N 77081 15678	0	0	0	III	3	Suboptimal
2013-2018	02c	N 77081 15678	0	0	0	III	3	Suboptimal
2013-2018	02d	N 77081 15678	0	0	0	III	3	Suboptimal
2013-2018	02e	N 77081 15678	0	0	0	III	3	Suboptimal
2013-2018	03a	N 77052 15693	0	0	0	III	3	Suboptimal
2013-2018	03b	N 77052 15693	0	0	0	III	3	Suboptimal
2013-2018	03c	N 77052 15693	0	0	0	III	3	Suboptimal
2013-2018	03d	N 77052 15693	0	0	0	III	3	Suboptimal
2013-2018	03e	N 77052 15693	0	0	0	III	3	Suboptimal
2013-2018	04a	N 77751 15837	0	0	0	II	2	Suboptimal
2013-2018	04b	N 77751 15837	0	0	0	II	2	Suboptimal
2013-2018	04c	N 77751 15837	0	0	0	II	2	Suboptimal
2013-2018	04d	N 77751 15837	0	0	0	II	2	Suboptimal
2013-2018	04e	N 77751 15837	0	0	0	II	2	Suboptimal
2013-2018	05a	N 77912 15641	1	5	6	I	3	Optimal

Vertigo moulinsiana monitoring at Pollardstown Fen

2013-2018	05b	N 77912 15641	0	2	2	I	3	Optimal
2013-2018	05c	N 77912 15641	1	3	4	I	3	Optimal
2013-2018	05d	N 77912 15641	1	0	1	I	3	Optimal
2013-2018	05e	N 77912 15641	0	0	0	I	3	Optimal
2013-2018	06a	N 77955 15577	2	4	6	IV	2	Optimal-Suboptimal
2013-2018	06b	N 77955 15577	5	0	5	IV	2	Optimal-Suboptimal
2013-2018	06c	N 77955 15577	3	1	4	IV	2	Optimal-Suboptimal
2013-2018	06d	N 77955 15577	2	3	5	IV	2	Optimal-Suboptimal
2013-2018	06e	N 77955 15577	2	0	2	IV	2	Optimal-Suboptimal
2013-2018	07a	N 77657 15280	0	0	0	I	5	Optimal-Suboptimal
2013-2018	07b	N 77657 15280	0	0	0	I	5	Optimal-Suboptimal
2013-2018	07c	N 77657 15280	1	0	1	I	5	Optimal-Suboptimal
2013-2018	07d	N 77657 15280	0	0	0	I	5	Optimal-Suboptimal
2013-2018	07e	N 77657 15280	0	0	0	I	5	Optimal-Suboptimal
2013-2018	08a	N 77857 15208	0	0	0	I	4	Optimal
2013-2018	08b	N 77857 15208	1	0	1	I	4	Optimal
2013-2018	08c	N 77857 15208	0	0	0	I	4	Optimal
2013-2018	08d	N 77857 15208	2	0	2	I	4	Optimal
2013-2018	08e	N 77857 15208	0	0	0	I	4	Optimal
2013-2018	09a	N 77943 15275	1	0	1	I	3	Optimal
2013-2018	09b	N 77943 15275	1	1	2	I	3	Optimal
2013-2018	09c	N 77943 15275	0	0	0	I	3	Optimal
2013-2018	09d	N 77943 15275	0	0	0	I	3	Optimal
2013-2018	09e	N 77943 15275	0	0	0	I	3	Optimal
2013-2018	10a	N 77974 15179	0	0	0	I	2	Suboptimal
2013-2018	10b	N 77974 15179	0	0	0	I	2	Suboptimal
2013-2018	10c	N 77974 15179	0	0	0	I	2	Suboptimal
2013-2018	10d	N 77974 15179	0	0	0	I	2	Suboptimal
2013-2018	10e	N 77974 15179	0	0	0	I	2	Suboptimal
2013-2018	11a	N 77645 15350	0	0	0	IV	2	Suboptimal-Unsuitable
2013-2018	11b	N 77645 15350	0	0	0	IV	2	Suboptimal-Unsuitable
2013-2018	11c	N 77645 15350	0	0	0	IV	2	Suboptimal-Unsuitable
2013-2018	11d	N 77645 15350	0	0	0	IV	2	Suboptimal-Unsuitable
2013-2018	11e	N 77645 15350	0	0	0	IV	2	Suboptimal-Unsuitable
2013-2018	12a	N 77564 15389	0	0	0	I	5	Suboptimal
2013-2018	12b	N 77564 15389	0	0	0	I	5	Suboptimal
2013-2018	12c	N 77564 15389	0	0	0	I	5	Suboptimal
2013-2018	12d	N 77564 15389	0	0	0	I	5	Suboptimal
2013-2018	12e	N 77564 15389	0	0	0	I	5	Suboptimal
2013-2018	13a	N 77142 16726	0	0	0	II	3	Optimal-Suboptimal

Vertigo moulinsiana monitoring at Pollardstown Fen

2013-2018	13b	N 77142 16726	0	0	0	II	3	Optimal-Suboptimal
2013-2018	13c	N 77142 16726	0	0	0	II	3	Optimal-Suboptimal
2013-2018	13d	N 77142 16726	0	0	0	II	3	Optimal-Suboptimal
2013-2018	13e	N 77142 16726	0	0	0	II	3	Optimal-Suboptimal
2013-2018	14a	N 77225 16674	0	0	0	I	2	Suboptimal-Unsuitable
2013-2018	14b	N 77225 16674	0	0	0	I	2	Suboptimal-Unsuitable
2013-2018	14c	N 77225 16674	0	0	0	I	2	Suboptimal-Unsuitable
2013-2018	14d	N 77225 16674	0	0	0	I	2	Suboptimal-Unsuitable
2013-2018	14e	N 77225 16674	0	0	0	I	2	Suboptimal-Unsuitable
2013-2018	15a	N 77331 16602	0	0	0	I	3	Optimal-Suboptimal
2013-2018	15b	N 77331 16602	0	0	0	I	3	Optimal-Suboptimal
2013-2018	15c	N 77331 16602	0	0	0	I	3	Optimal-Suboptimal
2013-2018	15d	N 77331 16602	0	1	1	I	3	Optimal-Suboptimal
2013-2018	15e	N 77331 16602	0	0	0	I	3	Optimal-Suboptimal
Monitoring period 2007-2012 (10 samples)								
2007-2012	01	N 77870 15209	9	23	32		4	
2007-2012	02	N 77870 15209	29	18	47		4	
2007-2012	03	N 77870 15209	0	0	0		3	
2007-2012	04	N 77870 15209	14	66	80		4	
2007-2012	05	N 77870 15209	7	3	10		4	
2007-2012	06	N 77870 15209	35	40	75		4	
2007-2012	07	N 77870 15209	0	0	0		3	
2007-2012	08	N 77870 15209	11	19	30		4	
2007-2012	09	N 77870 15209	6	29	35		4	
2007-2012	10	N 77870 15209	18	35	53		4	

5. CONDITION ASSESSMENT

5.1 Population Assessment: 3 passes Favourable (green); 2 passes Unfavourable Inadequate (amber); 0-1 passes Unfavourable Bad (red)

Mon. period	Transect	Indicator	Target	Result	Pass/Fail
2013-2018	1	Density	At least 7 (50% of a minimum of 15) samples on Transect 1 should have >20 V. moulinsiana individuals	No samples on Transect 1 have >20 V. moulinsiana individuals	Fail
2013-2018	1	Presence/Absence	V. moulinsiana is present in 11 samples (or 75% of a minimum of 15 samples) on Transect 1	V. moulinsiana is present in 1 sample (or 7% of 15 samples) on Transect 1	Fail
2007-2012	1	Density	At least 7 (50% of a minimum of 15) samples on Transect 1 should have >20 V. moulinsiana individuals	9 samples with >20 individuals	Pass
2007-2012	1	Presence/Absence	V. moulinsiana is present in 11 samples (or 75% of a minimum of 15 samples) on Transect 1	Present in 13 samples	Pass

Mon. period	Indicator	Target	Result	Pass/Fail
2013-2018	Area of occupancy	Adult or sub-adult snails are present in 9 out of 15 sample locations from across the site and this must include at least 3 positive samples from Polygon B.	Present in 7 out of 15 sample locations, including 2 from Polygon B.	Fail

Vertigo moulinsiana monitoring at Pollardstown Fen

2007-2012	Area of occupancy	Adult or sub-adult snails are present in 6 of the samples at Site 1 (minimum 10	Present in 8 of the 10 samples	Pass
-----------	-------------------	---	--------------------------------	------

Mon. period	Population Notes
2013-2018	There has been a dramatic decrease in the number of positive samples and the number of <i>Vertigo moulinsiana</i> individuals recorded per sample at Pollardstown Fen. In particular, the samples taken on Transect 1 had 13 positive out of 15 in 2007-2012, with counts of over 300 adults and juveniles, while only a single adult <i>Vertigo moulinsiana</i> was found in 15 samples taken on the transect in the current survey. Outside of the transect area, in Polygon B, 8 out of 10 locations were positive in 2007-2012 compared with 2 out of 3 in the current survey. A further 12 locations were sampled in 2014 across the site, and 5 of these were positive. The southern end of Polygon F had the highest numbers, but these were still modest. Based on the criteria of Moorkens & Killeen (2011), the Population Assessment is Unfavourable Bad (red).
2007-2012	the snail is scattered in its distribution and is locally common.

5.2 Habitat Assessment: 3 passes Favourable (green); 2 passes Unfavourable Inadequate (amber); 0-1 passes Unfavourable Bad (red)

5.2.1 Transect level

Mon. period	Transect	Indicator	Target	Result	Pass/Fail
2013-2018	1	Habitat extent	Over 75% of the samples on Transect 1 are dominated by suitable vegetation (Classes I & II)	33% of the samples on Transect 1 are dominated by suitable vegetation (Classes I & II)	Fail
2013-2018	1	Habitat quality	Over 75% of the samples on Transect 1 fall within soil moisture classes 3-5	100% of the samples on Transect 1 fall within soil moisture classes 3-5	Pass
2007-2012	1	Habitat extent	Over 75% of the samples on Transect 1 are dominated by suitable vegetation (Classes I & II)	93% of samples	Pass
2007-2012	1	Habitat quality	Over 75% of the samples on Transect 1 fall within soil moisture classes 3-5	100% of samples	Pass

5.2.2 Site level

Mon. period	Indicator	Target	Result	Pass/Fail
2013-2018	Habitat extent	Over 80% of the sample locations across the site are dominated by suitable vegetation (Classes I & II) and fall within soil moisture classes 3-5, and this must include 3 sample locations in Polygon B.	47% (7 out of 15) sample locations dominated by suitable vegetation and fall within the moisture classes 3-5	Fail
2007-2012	Habitat extent	Over 80% of the samples at site 1 are dominated by suitable vegetation (Classes I & II) and fall within soil moisture classes 3-5	100%	Pass

Mon. period	Habitat Notes
2013-2018	There has been an apparently dramatic change in the dominant vegetation type in the area of the transect in Polygon A. Moorkens and Killeen (2011) report <i>Phragmites australis</i> , <i>Carex acutiformis</i> or <i>Schoenus nigricans</i> as the dominants along the transect, whereas in 2014, <i>Juncus subnodulosus</i> has become the dominant species at 9 of the 15 sample locations. This has resulted in a dramatic decrease in the proportion of the transect with Class I or II vegetation (from 93% down to 33%). Similarly, in Polygon B (Moorkens & Killen Site 1), has seen <i>Juncus subnodulosus</i> dominate in 2014, where previously <i>Carex acutiformis</i> was dominant. Comparisons of the vegetation types recorded are not possible for the remaining 12 sample points taken from across this site in 2014, as these areas were not sampled by Moorkens and Killeen in 2010. Based on the assessment criteria, the Habitat Assessment for Pollardstown Fen is Unfavourable Bad (red).
2007-2012	Much of the habitat at the site appears to be in good condition for <i>V. moulinsiana</i>

5.3 Future Prospects Assessment

Mon. period	Activity code	Activity description	Location	Intensity	Influence	Area affected	Comment
2013-2018	A04.03	abandonment of pastoral systems, lack of grazing	Inside	Medium	Negative	60%	
2013-2018	H07	Other forms of pollution	Inside	Low	Negative	1%	Dog fouling

Vertigo moulinsiana monitoring at Pollardstown Fen

2013-2018	K01.03	Drying out	Inside	Medium	Negative	25%	Ground moisture levels declining compared to previous surveys
2013-2018	K02.01	species composition change	Inside	High	Negative	75%	Spread of <i>Juncus subnodulosus</i>
2007-2012	A04.03	abandonment of pastoral systems, lack of grazing	Inside	Low	Negative	100%	Pollardstown Fen has had reduced grazing levels in recent years, but the affects of this on <i>V. moulinsiana</i> would be lower than they would be on <i>V. geyeri</i> and open habitats, as <i>V. moulinsiana</i> can live in rank vegetation as long as the habitat remains wet enough.
2007-2012	J02.02.01	dredging/ removal of limnic sediments	Inside	Medium	Negative	100%	The level of drainage from the fen into the canals has been maintained in a state of equilibrium that has kept a sustainable population of this species at the fen. However, if abstraction of water from the greater aquifer catchment were to increase, this may cease to be the case.
2007-2012	J02.03	Canalisation & water deviation	Inside	Medium	Negative	100%	In addition, previous drainage maintenance within the fen site has been carried out in a damaging manner with loss of <i>V. moulinsiana</i> habitat as a result. It remains to be concluded whether this was temporary and recovery occurs.

Mon. period	Future Prospects Notes
2013-2018	Threats to the continued presence of <i>Vertigo moulinsiana</i> at Pollardstown Fen include succession (spread of <i>Juncus subnodulosus</i>), drying out and pollution from dog fouling. The changes to the habitat along the transect and in other locations throughout the <i>Vertigo moulinsiana</i> habitat suggests a negative trend at the site. The Future Prospects are therefore assessed as Unfavourable Inadequate (amber).
2007-2012	For the present, all the impacts remain within the tolerance of the snail, and Future prospects have been assessed as Favourable

5.4 Overall Assessment

Mon. period	Population assessment	Area of suitable habitat	Future prospects	Overall assessment
2013-2018	Red	Red	Amber	Red
2007-2012	Green	Green	Green	Green

Mon. period	Overall Notes
2013-2018	The negative changes in relation to population and habitat suitability result, as well as decreased Future Prospects, result in an Overall Assessment for Pollardstown Fen of Unfavourable Bad (red).
2007-2012	

6. DISCUSSION

Monitoring period
2013-2018
Area of occupancy: As in 2007-2012, the habitat that supports <i>Vertigo moulinsiana</i> within this cSAC is the tall fen habitat including shallow ditches from the fen margin into the centre of the fen. Access is from the public entrance at the south of the fen.

Vertigo moulinsiana monitoring at Pollardstown Fen

Discussion:

Vertigo moulinsiana is present all across this site, albeit in low numbers in places. All six polygons sampled in 2014 were positive for the species. However, numbers of individuals recorded were much lower than in the previous survey (2010). This is particularly evident on the transect where hundreds of individuals were counted in 2010, but only one adult was found in 2014. It is much more difficult to draw comparisons across the remainder of the site - Polygon B had good results (though lower abundances) in 2014; all other areas were not sampled in 2010. Overall, there is some evidence to suggest that both drying out and vegetation change caused by lack of grazing may both be occurring in parts of this site. Recommendations for both of these issues have been made, and recommendations in Moorkens and Killeen (2011) still stand also. The dry year in 2014 may also have had an impact on numbers of snails recorded. Because this is such an important site, and there are a number of unknowns, it is crucially important that this site be re-surveyed in three years' time.

Monitoring recommendations:

Due to the overall assessment for Pollardstown Fen of Unfavourable Bad (red), monitoring should be carried out on a 3 yearly basis, as per the recommendations of Moorkens & Killeen (2011):

- Repeat Transect 1. In field record: vegetation height, vegetation composition, ground moisture class, numbers of Vertigo moulinsiana (adult & juvenile) and other molluscs, minimum 15 samples
- Take 15 samples from other locations within the site, at least 3 to be in Polygon B, record information as above
- Re-determine boundary of the habitat polygons and assign habitat to either Optimal, Optimal Sub-optimal, Suboptimal, Suboptimal-Unsuitable, or Unsuitable
- Assess the management regime and impacts upon the habitat for Vertigo moulinsiana
- Use results to determine overall condition assessment

Management recommendations:

Soil wetness is a critical factor in maintaining habitat suitability for Vertigo moulinsiana and drying out appears to be an issue in some areas of Pollardstown Fen, in conjunction with succession/vegetation change. Action should be taken to maintain water levels within the fen. This may include the partial or complete blocking of drains and the downstream management of the Milltown Feeder to maintain higher water levels in the fen. It is possible that the apparent drying out is due to annual variations in rainfall and this should be borne in mind during future monitoring surveys.

Based on conversations with local NPWS staff and landowners, as well as the notes provided in Moorkens & Killeen (2011), there has almost certainly been a decrease in grazing across much of this site. Goats and the occasional, and temporary, escapees (cattle, horses, sheep) seem to have, in the past, fulfilled an important function through their ad hoc grazing. It would appear that this does not happen at the site now and the signs of a lack of grazing are evident in many places (e.g. dense mats of Juncus subnodulosus or large tussocks of sedges/grasses). A monitored grazing regime needs to be introduced, but (and in particular for Vertigo moulinsiana) this should avoid the wettest areas and areas by drains. The prescriptions given in Moorkens & Killeen (2011) should also be referred to.

Vertigo moulinsiana monitoring at Pollardstown Fen

2007-2012

Area of occupancy: The habitat that supports *Vertigo moulinsiana* within this cSAC is the tall fen habitat including shallow ditches from the fen margin into the centre of the fen. Access is from the public entrance at the south of the fen.

Discussion:

Pollardstown Fen is currently in excellent condition for *Vertigo moulinsiana*. If the fen was to be maintained solely for the conservation of this species, it would be quite easy, as the snail favours wet, humid conditions in ungrazed tall vegetation habitats. However, Pollardstown Fen is a very important site for a number of Annex I habitats and Annex II species. Species such as *V. geyeri* require short open alkaline fen habitat, dominated by yellow *Carex* species and brown mosses, and these are generally best managed by sheep grazing, so some compromise in management between the two qualifying features is needed. In the best habitats for these species, they rarely coincide in area of occupancy, except in very wet conditions when *V. moulinsiana* spreads over shorter vegetation. *Vertigo moulinsiana* is less demanding in constancy of supply of water compared with *V. geyeri*, yet it will live in wetter conditions than the latter if there is enough build up of litter, as it has good climbing abilities. It can also live in drier conditions than *V. geyeri* if there is enough humidity in autumn to allow it to climb and reproduce. The very favourable conditions therefore at Pollardstown must be taken in the context that a spread of *V. moulinsiana* into habitat formally occupied by *V. geyeri* can be a negative trend that indicates an active transition towards drier conditions which would ultimately end up with the collapse both snail populations. There is evidence that some negative changes have occurred at the southern margin of the fen. However, in the *V. moulinsiana* habitat to the north and more central areas of the fen there does not appear to be any tendency towards succession to dryness. Due to the importance of the fen internationally and the fact that the species can be rapidly lost from sites when the groundwater recedes below surface levels, regular monitoring is recommended. Ongoing interpretation of the changes in the populations of the Habitats Directive Annex II *Vertigo* species have been aided by studies over the last 10 years as part of the Kildare Town Bypass project (e.g. Anon., 2004). These have included regular groundwater monitoring across the fen, which currently indicate that water levels are suitable for *V. moulinsiana* occur.

Monitoring recommendations:

Although Pollardstown Fen has been assessed as Favourable, both in terms of habitat and *Vertigo moulinsiana* distribution and abundance, it is still recommended that monitoring is carried out at a minimum of 3 yearly intervals. This should be re-assessed in light of any deterioration of Condition or any changes to site management:

Frequency: Next monitoring due 2011

Methods (see Section 4 of main report for full details). Prescription as follows:

- Repeat transect 1, in field record: vegetation height, vegetation composition, ground moisture class, numbers of *V. moulinsiana* (adult & juvenile) and other molluscs, minimum 15 samples
- Take 10 samples from Site 1 of this survey, record information as above
- Re-determine boundary of the habitat polygons and assign habitat to either Optimal, Optimal & Sub-optimal, Sub-optimal, Sub-optimal and Unsuitable, or Unsuitable
- Assess the management regime and impacts upon the habitat for *V. moulinsiana*
- Use results to determine overall condition assessment

Additional surveillance at 6 yearly intervals:

Frequency: Next monitoring due 2011

Methods (see Section 4 of main report for full details) Prescription as follows:

- In all other polygon areas not covered by the regular monitoring - Take 5 samples at each from at least 3 other locations with optimal habitat within each polygon areas at the site, record information as above

Management recommendations:

Existing Management

Polygon Area A is intermittently grazed by cattle and sheep, for no more than 2 weeks of cattle grazing and occasional wandering sheep grazing in any one year. Polygon area B has occasional cattle grazing and some horse grazing by wandering individual animals. Most other areas on the south side of the main feeder have been ungrazed for 20 years, apart from occasional wandering goats. The area at the northern end is largely ungrazed except for occasional wandering livestock. The main block on the north side of the main feeder has had extensive low density sheep grazing until 2006, when cattle were introduced for summer and autumn grazing. The remaining ditch habitats are unaffected by grazing.

Proposed management prescription for site

The management requirements at Pollardstown Fen for *V. moulinsiana* are largely dependant on the ability of the habitat to be maintained by wetness alone. The ditch areas and their immediate surroundings do not need grazing, and animals tend to avoid these areas at wet times, but at very dry times the succulent wet ditch areas can prove very attractive to a group of grazers that could otherwise be more extensively distributed. The current levels of grazing in different management blocks is not causing any damage to the snail.

The best management for *V. moulinsiana* is by wetness, where water levels are wet enough to prevent succession of habitat. The species is best managed in areas that are completely free of grazing animals, as the vegetation needs to remain high and very wet during the climbing season (Spring to Autumn). Where grazing is needed for other purposes (e.g. for nearby *V. geyeri* habitats), the very vulnerable wet areas of *V. moulinsiana* habitat may need to be fenced off during dry periods.

Vertigo moulinsiana monitoring at Pollardstown Fen

The management prescription for 2010 - 2013 is therefore no introduction of further active grazing management for *V. moulinsiana*, but if the area needs grazing to be introduced for other purposes, its effects on *V. moulinsiana* should be monitored and temporary fencing introduced where necessary.

Site report - Vertigo Monitoring

Vertigo moulinsiana monitoring at Portumna

1. SITE CODE AND LOCATION DETAILS

1.1 Site code and location

Vertigo Site Code: VmCAM19 **County:** Galway

SAC Site Code: 002241 Lough Derg, North-East Shore

Location description (from baseline survey):

Monitoring period	Date surveyed	Recorders
2013-2018	26-27 October 2016	John Brophy & Maria Long
2007-2012	1 November 2010	Ian Killeen & Maria Long

1.2 General Habitat Description (from baseline survey):

The general habitat in which *Vertigo moulinsiana* is present at Portumna is a fringe area of swamp fen at the edge of Lough Derg. The EU habitats that this relates to are water fringe vegetation comprising medium-tall waterside communities (CORINE 53.14) with some with some rich fen characteristics (CORINE 54.2, Annex I 7230) (Romão, 1996; Devillers et al., 1991). The snail is found typically on *Typha angustifolia*, *Carex riparia*, *Carex rostrata*, *C. acutiformis* in association with *Equisetum fluviatile* and *Phragmites australis*. The water table was above ground surface level but with a litter layer in very humid conditions above the water table. The specific areas that are within a wider mosaic, but that form specific *V. moulinsiana* habitat fit the M27 Rodwell characteristic vegetation classification (Rodwell, 1991). This falls within the more general habitat of reed and large sedge swamps (FS1) and tall herb swamps (FS2) of Fossitt (2000).

1.3 Definition of Vegetation Classes (from baseline survey):

Class I: Tall <i>Carex</i> species, <i>Glyceria maxima</i> , <i>Phragmites australis</i>	Class III: <i>Carex paniculata</i> , <i>Mentha aquatica</i> , <i>Schoenus nigricans</i> , <i>Typha angustifolia</i> , <i>Sparganium erectum</i>
Class II: <i>Cladium mariscus</i> , <i>Carex rostrata</i> , <i>Equisetum fluviatile</i>	Class IV: All other species

1.4 Definition of Soil Moisture Classes (from baseline survey):

- 1: Dry. No visible moisture on ground surface.
- 2: Damp. Ground visibly damp, but water does not rise under pressure.
- 3: Wet. Water rises under light pressure.
- 4: Very wet. Pools of standing water, generally less than 5cm deep.
- 5: Site under water. Entire sampling site in standing or flowing water over 5cm deep.

2. SUMMARY:

The habitats of the northern areas of lakeshore of Lough Derg, and its hinterland, supports abundant suitable habitat for *Vertigo moulinsiana* in the form of fens and reedbeds, including areas forming a mosaic with the woodland habitats of Portumna Forest Park. The species continues to be widely present within the original area surveyed by Moorkens & Killeen (2011), and has also been found further south on the eastern shores of Lough Derg by Long & Brophy (2013) and again in the current survey. Further exploratory surveys would be likely to extend the range still further, on both the east and west shores of the lake – though much of the habitat is difficult to access (often consisting of floating vegetation, and/or deep standing water, or located beyond impassable drains/channels). While the water levels of Lough Derg are regulated by the ESB at Parteen Weir, balancing various social, economic and ecological pressures, flooding can be an issue on the lake and this may impact on the *Vertigo moulinsiana* habitat. In the longer term, the proposed extraction of water from Lough Derg to supply the Greater Dublin Area, is something which has the potential to affect the *Vertigo moulinsiana* habitat and should be closely monitored. Overall, this is a very important site for this species given its scale and the scope for further expansion of the known range of the species there.

3. TRANSECT DETAILS

TRANSECT: 1	MONITORING PERIOD: 2013-2018
Start point:	M 85080 03729 Adjacent to N-S embankment
End point:	M 85125 03701
Transect length: 60	Direction: NW-SE
Description:	
Sampling frequency:	Approximately every 10-25m

TRANSECT: 0	MONITORING PERIOD: 2007-2012
Start point:	NO TRANSECT RECORDED
End point:	
Transect length:	Direction:
Description:	
Sampling frequency:	

Vertigo moulinsiana monitoring at Portumna

4. RESULTS

Polygon habitat characteristics

Monitoring Period: 2013-2018

Polygon	Habitat Type	Area (ha)	Comment
A	Optimal	2.0923	Polygon A status was classed as Suboptimal by Moorkens & Killeen (2011), while Long & Brophy (2013) classed it as Optimal. Similarly, it has been classed as Optimal in the current survey. There does not appear to have been an ecological change, and so it is likely to be due to interpretation. Interestingly, Moorkens & Killeen (2011) noted suitable vegetation as well as wetness at all nine of their sample points in this polygon. This polygon consists of tall, wet swamp vegetation for the most part. [Note that for many polygons at this site, new letters were assigned in Long & Brophy (2013) due to significant changes and additions to the known area of occupation of the snail in the area. These have mostly not been retained here, but instead we reverted to follow Moorkens & Killeen (2011), to allow for easiest comparison with that study.]
B	Optimal-Suboptimal	0.2552	Polygon B status remains Optimal-Suboptimal.
C	Optimal-Suboptimal	0.4525	Polygon C status remains Optimal-Suboptimal.
D	Optimal	0.2066	Polygon D is a new polygon created by Long & Brophy (2013). It was classed as Optimal, and remains Optimal in the current survey. It consists of a fringe of floating species-rich reed bed on the bank of the River Shannon, where it enters Lough Derg.
E	Suboptimal	0.6191	Polygon E is a new polygon created by Long & Brophy (2013) (though labelled Polygon A in that survey). It was classed as Suboptimal. This polygon was not visited in the current survey due to access permission issues. It consists of an area of reed bed.
F	Optimal-Suboptimal	0.24	Polygon F is a new polygon created by Long & Brophy (2013) and was classified as Suboptimal. This has increased to Optimal-Suboptimal in the current study, due to being quite wet and dominated by Class II vegetation. This is likely to be a change in interpretation rather than ecological change. It consists of drains and depressions filled with tall-growing vegetation.
G	Suboptimal	2.2462	Polygon G is a new polygon created by Long & Brophy (2013), and was classed as Suboptimal. It remains Suboptimal in the current study. It is a large area of reed bed.
H	Suboptimal	0.2986	Polygon H is a new polygon created by Long & Brophy (2013), and was classed as Suboptimal. It remains Suboptimal in the current study. It is a patch of wet ground with tall growing sedges and reeds in a woodland clearing.
I	Suboptimal-Unsuitable	1.988	Polygon I is a new polygon created by Long & Brophy (2013), and was classed as Suboptimal-Unsuitable. It remains Suboptimal-Unsuitable in the current study.
J	Suboptimal	3.1296	Polygon J is a new polygon created by Long & Brophy (2013) (though labelled Polygon B in that survey), and was classed as Suboptimal. It remains Suboptimal in the current study. It consists of species-rich reed bed.
K	Optimal-Suboptimal	0.0955	Polygon K is a newly digitised polygon, created to ensure that sample point 17 of Moorkens & Killeen (2011) falls within a polygon. It was not visited in the current study, and so a small indicative polygon was created, encircling the sample point. As this consists of Class I vegetation and has a wetness level of 4 (from Moorkens & Killeen, 2011), this small polygon is likely to be Optimal-Suboptimal at least.

Monitoring Period: 2007-2012

Polygon	Habitat Type	Area (ha)	Comment
A	Sub-optimal	2.092	Polygon A - Sub-optimal habitat – open fen and swamp at Portumna
B	Sub-optimal with optimal areas	0.255	Polygon B - small area of swamp in the forest
C	Sub-optimal with optimal areas	0.452	Polygon C - fen bordering the forest

Transect samples

Mon. period	Transect	Sample	Location	Adults	Juveniles	Total	Veg. class	Wetness	Habitat suitability
Monitoring period 2013-2018 Transect 1 (12 samples)									
2013-2018	1	1	01a; 0m	2	19	21	II	5	Optimal

Vertigo moulinsiana monitoring at Portumna

2013-2018	1	2	01b; 0m	4	4	8	II	5	Optimal
2013-2018	1	3	02a; 10m	7	15	22	II	5	Optimal
2013-2018	1	4	02b; 10m	3	14	17	II	5	Optimal
2013-2018	1	5	03a; 20m	17	18	35	II	5	Optimal
2013-2018	1	6	03b; 20m	5	14	19	II	5	Optimal
2013-2018	1	7	04a; 30m	4	6	10	II	5	Optimal
2013-2018	1	8	04b; 30m	6	4	10	II	5	Optimal
2013-2018	1	9	05a; 40m	4	12	16	II	5	Optimal
2013-2018	1	10	05b; 40m	7	7	14	II	5	Optimal
2013-2018	1	11	06a; 60m	0	0	0	I	5	Optimal
2013-2018	1	12	06b; 60m	0	1	1	I	5	Optimal
2007-2012	0	0	NO TRANSECT RECORDED						

Spot Samples

Mon. period	Sample	Grid ref.	Adults	Juveniles	Total	Veg. class	Wetness	Habitat suitability
Monitoring period 2013-2018 (20 samples)								
2013-2018	01a	M 83486 0308	7	32	39	I	3	Optimal
2013-2018	01b	M 83486 0308	3	24	27	II	5	Optimal
2013-2018	02a	M 83164 0288	0	1	1	II	5	Optimal
2013-2018	02b	M 83164 0288	2	1	3	II	5	Optimal
2013-2018	03a	M 83097 0266	0	0	0	I	2	Optimal
2013-2018	03b	M 83097 0266	0	0	0	IV	3	Optimal
2013-2018	04a	M 83812 0308	2	14	16	II	4	Optimal
2013-2018	04b	M 83812 0308	16	67	83	II	4	Optimal
2013-2018	05a	M 84119 0329	1	4	5	II	5	Optimal
2013-2018	05b	M 84119 0329	0	2	2	II	5	Optimal
2013-2018	06a	R 82750 96604	0	0	0	II	4	Optimal-Suboptimal
2013-2018	06b	R 82750 96604	0	0	0	I	4	Optimal-Suboptimal
2013-2018	07a	R 82735 96628	1	1	2	I	4	Optimal-Suboptimal
2013-2018	07b	R 82735 96628	1	2	3	I	4	Optimal-Suboptimal
2013-2018	08a	M 87096 0420	0	0	0	I	3	Optimal
2013-2018	08b	M 87096 0420	0	0	0	I	3	Optimal
2013-2018	09a	M 87098 0422	0	0	0	IV	3	Optimal
2013-2018	09b	M 87098 0422	0	0	0	IV	3	Optimal
2013-2018	10a	M 85017 0366	0	0	0	IV	5	Suboptimal-Unsuitable
2013-2018	10b	M 85017 0366	1	1	2	IV	5	Suboptimal-Unsuitable
Monitoring period 2007-2012 (57 samples)								
2007-2012	01a	M 85217 0367	0	0	0		4	
2007-2012	01b	M 85217 0367	0	0	0		5	
2007-2012	02a	M 85094 0377	0	0	0		3	
2007-2012	02b	M 85094 0377	0	0	0		3	

Vertigo moulinsiana monitoring at Portumna

2007-2012	03a	M 85086 0375	0	0	0	4
2007-2012	03b	M 85086 0375	0	0	0	3
2007-2012	03c	M 85086 0375	0	0	0	3
2007-2012	04a	M 85080 0376	0	0	0	3
2007-2012	05a	M 85086 0374	0	0	0	3
2007-2012	05b	M 85086 0374	0	0	0	4
2007-2012	05c	M 85086 0374	0	0	0	4
2007-2012	06a	M 85081 0372	0	4	4	4
2007-2012	06b	M 85081 0372	0	2	2	4
2007-2012	06c	M 85081 0372	1	3	4	4
2007-2012	06d	M 85081 0372	2	8	10	4
2007-2012	06e	M 85081 0372	3	11	14	4
2007-2012	07a	M 85090 0370	8	17	25	4
2007-2012	07b	M 85090 0370	14	12	26	5
2007-2012	07c	M 85090 0370	8	19	27	5
2007-2012	08a	M 85082 0370	0	9	9	5
2007-2012	08b	M 85082 0370	1	5	6	5
2007-2012	08c	M 85082 0370	6	14	20	5
2007-2012	08d	M 85082 0370	0	22	22	5
2007-2012	08e	M 85082 0370	0	3	3	5
2007-2012	09a	M 85024 0366	35	9	44	5
2007-2012	09b	M 85024 0366	22	65	87	5
2007-2012	09c	M 85024 0366	16	43	59	5
2007-2012	10a	M 84960 0365	0	4	4	5
2007-2012	10b	M 84960 0365	0	2	2	5
2007-2012	10c	M 84960 0365	1	2	3	5
2007-2012	11a	M 84132 0329	3	4	7	5
2007-2012	11b	M 84132 0329	1	0	1	5
2007-2012	11c	M 84132 0329	17	4	21	5
2007-2012	11d	M 84132 0329	6	6	12	5
2007-2012	11e	M 84132 0329	7	3	10	5
2007-2012	11f	M 84132 0329	23	8	31	5
2007-2012	12a	M 83462 0310	2	11	13	4
2007-2012	12b	M 83462 0310	4	12	16	4
2007-2012	12c	M 83462 0310	6	26	32	4
2007-2012	12d	M 83462 0310	5	14	19	3
2007-2012	12e	M 83462 0310	14	4	18	3
2007-2012	13a	M 83334 0301	2	2	4	3
2007-2012	13b	M 83334 0301	3	7	10	4
2007-2012	13c	M 83334 0301	0	6	6	4

Vertigo moulinsiana monitoring at Portumna

2007-2012	14a	M 83153 0288	5	0	5	4
2007-2012	14b	M 83153 0288	9	1	10	4
2007-2012	14c	M 83153 0288	9	9	18	4
2007-2012	15a	M 83034 0292	4	2	6	5
2007-2012	15b	M 83034 0292	8	29	37	5
2007-2012	16a	M 80888 0368	0	0	0	3
2007-2012	16b	M 80888 0368	0	0	0	3
2007-2012	16c	M 80888 0368	0	0	0	4
2007-2012	17a	M 79583 0226	0	0	0	4
2007-2012	17b	M 79583 0226	0	0	0	4
2007-2012	17c	M 79583 0226	3	0	3	4
2007-2012	17d	M 79583 0226	2	0	2	4
2007-2012	17e	M 79583 0226	0	0	0	4

5. CONDITION ASSESSMENT

5.1 Population Assessment: 3 passes Favourable (green); 1-2 pass Unfavourable Inadequate (amber); 0 passes Unfavourable Bad (red)

Mon. period	Transect	Indicator	Target	Result	Pass/Fail
2013-2018	1	Presence/Absence	Adult or sub-adult snails are present in at least nine samples (or 75% from a minimum of 12 samples) on the transect	Present in 13 samples	Pass
2007-2012	0	N/A	NO TRANSECT RECORDED		

Mon. period	Indicator	Target	Result	Pass/Fail
2013-2018	Presence/Absence	Adult or sub-adult snails are present in a least nine samples (or 75% from a minimum of 12 samples) from three other locations in Portumna Forest Park (potentially including Polygons B, C, F, G, H and I, but not necessarily limited to these areas)	Present in 8 out of 10 samples (80%)	Pass
2013-2018	Presence/Absence ¹	Adult or sub-adult snails are present in one other location around the northern shores of Lough Derg (may include Polygons D, E, J or K but not necessarily limited to these)	Present in 1 other location	Pass
2007-2012	Presence/Absence	Adult or sub-adult snails are present in at least 10 samples (or 75% from a minimum of 15 samples) with a geographical spread near Portumna marina (= sites 2-10)	Present in 19 out of 28 samples	Pass
2007-2012	Species extent	Adult or sub-adult snails are present in at least 9 samples (or 75% from a minimum of 12 samples) from 3 locations at the edge of the Forest Park (= sites 12-15)	Present in 13 out of 13 samples	Pass

Mon. period	Population Notes
2013-2018	<p>In the monitoring period 2007-2012, <i>Vertigo moulinsiana</i> was present in 19 out of 28 samples in Polygon A (adjacent to the marina at Portumna) and 11 out of 11 samples in Polygons B and C (in Portumna Forest Park). In the current monitoring period (2013-2018), adult <i>Vertigo moulinsiana</i> were found in 10 out of 12 samples in Polygon A and three out of four samples in Polygons B and C. Long & Brophy (2013) set up a monitoring transect in Polygon A, which was re-surveyed in the during the current survey.</p> <p>Moorkens & Killeen (2011) had positive samples (but no polygons digitised) in three other locations within Portumna Forest Park. In the current survey, we revisited some of these areas, as well as adding new locations. There were positive samples in all areas.</p> <p>Long & Brophy (2013) extended the known distribution of <i>Vertigo moulinsiana</i> at Lough Derg, recording the species at</p>

Vertigo moulinsiana monitoring at Portumna

2013-2018	Kilgarven Quay/Brockagh, approximately 17km south of Portumna, and on the eastern bank of the Shannon just downstream of Portumna Bridge. The current survey re-recorded the species from Kilgarven Quay, but not from the site at Portumna Bridge.
	Based on the criteria of Moorkens & Killeen (2011), with additions to take account of the new survey areas added by Long & Brophy (2013), the Population Assessment for Portumna is Favourable (green).
2007-2012	the snail is scattered in its distribution and is locally frequent

5.2 Habitat Assessment: 3-4 passes Favourable (green); 1-2 passes Unfavourable Inadequate (amber); 0 passes Unfavourable Bad (red)

5.2.1 Transect level

Mon. period	Transect	Indicator	Target	Result	Pass/Fail
2013-2018	1	Habitat extent	Over 80% of the samples on the Transect in Polygon A are dominated by suitable vegetation (Classes I & II) and fall within soil moisture classes 3-5	85% dominated by suitable vegetation and 100% fall within soil moisture classes 3-5	Pass
2007-2012	0	N/A	NO TRANSECT RECORDED		

5.2.2 Site level

Mon. period	Indicator	Target	Result	Pass/Fail
2013-2018	Habitat extent	At least 2.5ha of habitat within polygon areas A-C sub-optimal with optimal areas	2.8ha Optimal-Suboptimal or better	Pass
2013-2018	Habitat extent1	At least 3ha of habitat within Polygons D, E, J and K classed as Suboptimal or better	4ha Suboptimal or better	Pass
2007-2012	Habitat extent	At least 2.5ha of habitat within polygon areas A-C sub-optimal with optimal areas	2.79 ha	Pass

Mon. period	Indicator	Target	Result	Pass/Fail
2013-2018	Habitat quality	Over 80% of the samples at sites in the Forest Park (Polygons B, C, F, G, H and I) are dominated by suitable vegetation (Classes I & II) and fall within soil moisture classes 3-5	75% dominated by suitable vegetation and 92% fall within soil moisture classes 3-5	Fail
2007-2012	Habitat extent	Over 80% of the samples at sites near Portumna marina (sites 2-10) are dominated by suitable vegetation (Classes I & II) and fall within soil moisture classes 3-5	100% of samples	Pass
2007-2012	Habitat quality	Over 80% of the samples at sites in the Forest Park (sites 12-15) are dominated by suitable vegetation (Classes I & II) and fall within soil moisture classes 3-5	100% of samples	Pass

Mon. period	Habitat Notes
2013-2018	<p>Following the monitoring period 2007-2012, the known area of habitat at Portumna suitable for supporting <i>Vertigo moulinsiana</i> was encompassed by three polygons: Polygon A at Portumna Marina, at two polygons in Portumna Forest Park (B & C). Polygon A was classed as Suboptimal, while both polygons B and C were classed as Optimal-Suboptimal in 2007-2012. In the current monitoring period, Polygon A was upgraded to Optimal, while polygons B and C remained Optimal-Suboptimal. The upgrading of Polygon A was due to interpretation rather than any ecological change, as abundant habitat with suitable vegetation and wetness was present in the polygon, with no indication that change had occurred. A monitoring transect was set up by Long & Brophy (2013) in Polygon A.</p> <p>Long & Brophy (2013) added additional polygons around Lough Derg that supported habitat that could support <i>Vertigo moulinsiana</i>. Based on the criteria of Moorkens & Killeen (2011), with some additions to take account of the new polygons, the Habitat Assessment for Portumna is Favourable (green).</p>
2007-2012	Much of the habitat at the site appears to be in good condition for <i>V. moulinsiana</i>

5.3 Future Prospects Assessment

Mon. period	Activity code	Activity description	Location	Intensity	Influence	Area affected	Comment
-------------	---------------	----------------------	----------	-----------	-----------	---------------	---------

Vertigo moulinsiana monitoring at Portumna

2013-2018	A03	mowing / cutting of grassland	Inside	Low	Negative	0.1% Strip at edge of Polygon J only
2013-2018	A04.02.02	non intensive sheep grazing	Inside	Low	Negative	2% Polygon D
2013-2018	A04.02.03	non intensive horse grazing	Inside	Low	Negative	22% Grazing mostly at edge of polygons. Polygons F&G
2013-2018	K02.01	species composition change	Inside	Medium	Negative	15% Scrub and trees developing in places
2013-2018	K04.05	damage by herbivores (including game species)	Inside	Low	Negative	100% Potential for deer grazing in most areas, especially in forest park
2013-2018	L08	inundation (natural processes)	Inside	-	Neutral	25% Seasonal flooding
2007-2012	A04.02.03	non intensive horse grazing	Inside	Low	Neutral	>2ha applies mostly at the Bonaveen site. The horse grazing has very little impact on the V. moulinsiana habitat and therefore the impact is neutral.
2007-2012	M01.01	temperature changes (e.g. rise of temperature & extremes)	Inside	Low	Negative	? Given the susceptibility of the entire margins of Lough Derg to flooding, future potential impacts from climate change are likely to be negative.
2007-2012	M01.02	droughts and less precipitations	Inside	Low	Negative	?
2007-2012	M01.03	flooding and rising precipitations	Inside	Low	Negative	?

Mon. period Future Prospects Notes

2013-2018 A number of factors are affecting *Vertigo moulinsiana* habitat at Portumna. In places there is cattle, sheep, horse and deer grazing. However, the main threats of concern are succession in small areas of suitable habitat in Portumna Forest Park, where trees and scrub are encroaching on *Vertigo moulinsiana* habitat, and flooding, which could affect most of the suitable habitat around the site were the hydrological regime at the site to change (either due to man's activities, or due to climate change). In the longer term, the proposed extraction of water from Lough Derg to supply the Greater Dublin Area, is something which has the potential to affect the *Vertigo moulinsiana* habitat and should be closely monitored. However, this is not yet occurring, and so it not factored in our assessment here. Given the current status of the site, and factoring in the impacts noted as well as their scale, the Future Prospects for Portumna are considered to be Favourable (green).

2007-2012 As the impacts are low, Future prospects have been assessed as Favourable

5.4 Overall Assessment

Mon. period	Population assessment	Area of suitable habitat	Future prospects	Overall assessment
2013-2018	Green	Green	Green	Green
2007-2012	Green	Green	Green	Green

Mon. period Overall Notes

2013-2018 Due to the Favourable (green) results for Population Assessment, Habitat Assessment and Future Prospects, the Overall Assessment for Portumna is Favourable (green).

2007-2012

6. DISCUSSION

Monitoring period

Vertigo moulinsiana monitoring at Portumna

2013-2018

Area of occupancy: The habitat that supports *Vertigo moulinsiana* within this site is mostly the fringe swamp habitat at the edge of Lough Derg. Access is mostly from the trails in the Forest Park. Other locations around Lough Derg that support the species were identified by Long & Brophy (2013).

Discussion:

The habitats of the northern areas of lakeshore of Lough Derg, and its hinterland, supports abundant suitable habitat for *Vertigo moulinsiana* in the form of fens and reedbeds, including areas forming a mosaic with the woodland habitats of Portumna Forest Park. The species continues to be widely present within the original area surveyed by Moorkens & Killeen (2011), and has also been found further south on the eastern shores of Lough Derg by Long & Brophy (2013) and again in the current survey. Further exploratory surveys would be likely to extend the range still further, on both the east and west shores of the lake - though much of the habitat is difficult to access (often consisting of floating vegetation, and/or deep standing water, or located beyond impassable drains/channels). While the water levels of Lough Derg are regulated by the ESB at Parteen Weir, balancing various social, economic and ecological pressures, flooding can be an issue on the lake and this may impact on the *Vertigo moulinsiana* habitat. In the longer term, the proposed extraction of water from Lough Derg to supply the Greater Dublin Area, is something which has the potential to affect the *Vertigo moulinsiana* habitat and should be closely monitored. Overall, this is a very important site for this species given its scale and the scope for further expansion of the known range of the species there.

Monitoring recommendations:

The Portumna *Vertigo moulinsiana* site is currently in favourable condition, with few imminent threats identified. However, the development of Lough Derg as a water supply for the Greater Dublin Area poses a long-term threat to the species, which will depend on the effects of the project on lake water levels and flooding regime. For this reason, along with the fact that additional areas have been found that support the species around the lake, regular monitoring is required to track any change and to extend knowledge about the site. Monitoring should follow that of Moorkens & Killeen (2011) with some significant changes based on the new polygons and enhanced information on the species at the site:

- Repeat Transect 1, in field record: vegetation height, vegetation composition, ground moisture class, numbers of *Vertigo moulinsiana* (adult & juvenile) and other molluscs, minimum 12 samples from six separate samples locations along transect.
- Take samples from at least 3 other locations (minimum 12 samples) with optimal habitat in the Forest Park (potentially including Polygons B, C, F, G, H and I, but not necessarily limited to these areas), record information as above
- Take samples from at least 3 other locations (minimum 12 samples) with optimal habitat around the northern shores of Lough Derg (may include Polygons D, E, J or K, but not necessarily limited to these), record information as above. (Consider prioritising Polygon K for a re-visit, and if so, pay particular attention to the extent of potentially suitable habitat and re-map - see notes on this polygon above.)
- Continue to investigate new habitat areas for the target species around the shores of Lough Derg, and in particular, endeavour to sample beyond the known extent of the distribution of the target species at the site.
- Re-determine boundary of the habitat polygons and assign habitat to Optimal, Optimal-Suboptimal, Suboptimal, Suboptimal-Unsuitable, or Unsuitable
- Assess the management regime and impacts upon the habitat for *Vertigo moulinsiana*
- Use results to determine overall condition assessment

Management recommendations:

It is recommended that no changes are made with regard to the current management of the site. The site currently comprises an extensive largely semi-natural system, with grazing by sheep, cattle and horses limited to certain areas. The hydrological regime of the *Vertigo moulinsiana* sites is tied in with the levels of Lough Derg, and so there should be no significant changes made to the pattern of water levels within and across years. This will be more important than ever should water abstraction for the Greater Dublin Area come to pass.

Vertigo moulinsiana monitoring at Portumna

2007-2012

Area of occupancy: The habitat that supports *Vertigo moulinsiana* within this site is mostly the fringe swamp habitat at the edge of Lough Derg. Access is mostly from the trails in the Forest Park.

Discussion:

The Condition of the site and the feature based upon the 2010 survey has been assessed as Favourable.

This survey has shown that *Vertigo moulinsiana* is much more widely spread along the northern end of Lough Derg than was previously known, with a new site located some 7km to the south-west of Portumna. Much of the marginal habitat is very difficult to access and, therefore, it is likely that *V. moulinsiana* occurs much more widely within this area. Most of the habitat lies well away from the shoreline of the lough where a dense fen with a more stable hydrology has developed. In zones nearer the lough, the habitat is especially susceptible to inundation and the habitat is less stable.

The *Vertigo moulinsiana* habitat is maintained by its high groundwater table and by inundation of the lough water at wet times of year. The lack of grazing has led to a build up of deep litter which rises above the inundation at times of year when the snails are at litter level. During active periods, the snails are in humid conditions high on the stems of the swamp vegetation. The site would be vulnerable to long term hydrological changes and potential effects of climate change.

This is an important site for the species as it is significant in terms of national Range but also the area of occupancy appears to be relatively large. As only a fraction of the area which supports potentially suitable *V. moulinsiana* habitat has been surveyed, it is recommended a more wide-ranging survey is carried out to determine the full distribution and abundance of the snail.

Monitoring recommendations:

Although the Condition of the site, both in terms of habitat and *Vertigo moulinsiana* distribution and abundance has been assessed as Favourable, it is recommended that monitoring is carried out at a minimum of 3 yearly intervals. This should be re-assessed after a more detailed survey has been carried out and also in light of any deterioration of Condition or any changes to site management:

Frequency: Next monitoring due 2011

Methods (see Section 4 of main report for full details). Prescription as follows:

- Take at least 3 samples at each from at least 5 locations with optimal habitat near Portumna marina (e.g. sites 2-10 from the 2010 survey), in field record: vegetation height, vegetation composition, ground moisture class, numbers of *V. moulinsiana* (adult & juvenile) and other molluscs, minimum 10 samples
- Take at least 4 samples at each from at least 3 locations with optimal habitat at the edge of the Forest Park (e.g. sites 12-15 from the 2010 survey), record information as above
- Re-determine boundary of the habitat polygons and assign habitat to either Optimal, Optimal & Sub-optimal, Sub-optimal, Sub-optimal and Unsuitable, or Unsuitable
- Assess the management regime and impacts upon the habitat for *V. moulinsiana*
- Use results to determine overall condition assessment

Management recommendations:

Existing Management

Most of the habitat within the site is unmanaged. The area at Bonaveen is subject to some horse grazing which could become a problem if the intensity was increased.

Proposed management prescription for site

No change is recommended from the existing management.

Site report - Vertigo Monitoring

Vertigo moulinsiana monitoring at Royal Canal, Longford Branch

1. SITE CODE AND LOCATION DETAILS

1.1 Site code and location

Vertigo Site Code: VmCAM21 County: Longford

SAC Site Code: n/a Not in SAC

Location description (from baseline survey):

Monitoring period	Date surveyed	Recorders
2013-2018	12-14 October 2015	John Brophy & Maria Long

1.2 General Habitat Description (from baseline survey):

(Habitat description written as part of 2014-17 survey) The general habitat in which *Vertigo moulinsiana* is present is low lying old canal bed with swamp/fen and some spring flushing. The snail is found typically on *Glyceria maxima* in association with *Phalaris arundinacea*, and *Iris pseudacorus* and a number of other tall-growing species, mainly sedges. The vegetation present has affinities with NVC communities S5 *Glyceria maxima* swamp, S9 *Carex rostrata* swamp (S9b *Menyanthes trifoliata*-*Equisetum fluviatile* sub-community) and S14 *Sparganium erectum* swamp (Rodwell, 1995). The water table was above ground surface level in places. There are no EU habitats that correspond to this habitat, and it falls within the more general habitat of rich fen and flush (PF1), freshwater marsh (GM1), reed and large sedge swamps (FS1) and tall herb swamps (FS2) of Fossitt (2000).

1.3 Definition of Vegetation Classes (from baseline survey):

Class I: Tall <i>Carex</i> species, <i>Glyceria maxima</i> , <i>Sparganium erectum</i> , <i>Typha latifolia</i>	Class III: <i>Menyanthes trifoliata</i> , <i>Berula erecta</i> , <i>Mentha aquatica</i> , <i>Carex disticha</i>
Class II: <i>Phragmites australis</i> , <i>Carex rostrata</i> , <i>Equisetum fluviatile</i> , <i>Equisetum variegatum</i>	Class IV: All other species

1.4 Definition of Soil Moisture Classes (from baseline survey):

- 1: Dry. No visible moisture on ground surface.
- 2: Damp. Ground visibly damp, but water does not rise under pressure.
- 3: Wet. Water rises under light pressure.
- 4: Very wet. Pools of standing water, generally less than 5cm deep.
- 5: Site under water. Entire sampling site in standing or flowing water over 5cm deep.

2. SUMMARY:

The habitat for *Vertigo moulinsiana* is in the canal bed of the disused Longford Branch of the Royal Canal. The canal bed supports extensive areas of suitable vegetation (including *Sparganium erectum*, *Glyceria maxima* and tall *Carex* species) and wetness, though shading and scrubbing over is occurring where *Salix cinerea* subsp. *oleifolia* and *Alnus glutinosa* have become established. The site supports a good population of *Vertigo moulinsiana* along its length and sensitive management is required to maintain the habitat in favourable condition though scrub control and clearance. Hydrological monitoring is also recommended in order to understand if the habitat is drying out, or if there is enough water seepage to maintain current wetness levels.

3. TRANSECT DETAILS

TRANSECT: 1	MONITORING PERIOD: 2013-2018
Start point:	N 11538 72629 Middle of canal bed
End point:	N 11530 27245 Middle of canal bed
Transect length: 120	Direction: S-N
Description:	Middle of canal bed, with <i>Glyceria maxima</i> , <i>Sparganium erectum</i> and <i>Berula erecta</i>
Sampling frequency:	Ten samples were taken at 10-20m intervals

4. RESULTS

Polygon habitat characteristics

Monitoring Period: 2013-2018

Polygon	Habitat Type	Area (ha)	Comment
A	Optimal-Suboptimal	1.1101	Polygon A is a newly defined polygon, classified as Optimal-Suboptimal. This stretch of disused canal bed has a number of vegetation types, and these vary in suitability for <i>Vertigo moulinsiana</i> from Optimal (e.g. tall sedges with standing water, no shading) to Suboptimal and Unsuitable (e.g. quite dry and heavily shaded by trees, with little suitable tall sedge vegetation). Overall, however, good stretches of potential habitat.

Vertigo moulinsiana monitoring at Royal Canal, Longford Branch

Monitoring Period: 2013-2018

Polygon	Habitat Type	Area (ha)	Comment
B	Optimal	1.9093	Polygon B is a newly defined polygon, classified as Optimal. Long stretches of optimal vegetation consisting of species such as <i>Typha latifolia</i> , <i>Sparganium erectum</i> , <i>Glyceria maxima</i> , etc.
C	Suboptimal	0.6317	Polygon C is a newly defined polygon, classified as Suboptimal. Long stretches of this polygon are suffering from shading by trees, meaning that the understorey vegetation is not very suitable for <i>Vertigo moulinsiana</i> .
D	Optimal	1.1448	Polygon D is a newly defined polygon, classified as Optimal. Wetness levels good through most of this section of disused canal bed, and vegetation suitable (i.e. consisting of tall growing sedges and other wetland plants such as <i>Sparganium erectum</i> and <i>Carex rostrata</i>).

Transect samples

Mon. period	Transect	Sample	Location	Adults	Juveniles	Total	Veg. class	Wetness	Habitat suitability
Monitoring period 2013-2018 Transect 1 (10 samples)									
2013-2018	1	1	0m	1	3	4	I	5	Optimal
2013-2018	1	2	10m	19	11	30	I	5	Optimal
2013-2018	1	3	20m	2	0	2	I	5	Optimal
2013-2018	1	4	30m	5	12	17	I	5	Optimal
2013-2018	1	5	40m	5	4	9	I	5	Optimal
2013-2018	1	6	50m	10	6	16	I		Optimal
2013-2018	1	7	60m	0	0	0	I	5	Optimal
2013-2018	1	8	70m	1	0	1	I	5	Optimal
2013-2018	1	9	90m	0	0	0	I	5	Optimal
2013-2018	1	10	110m	1	0	1	I	5	Optimal

Spot Samples

Mon. period	Sample	Grid ref.	Adults	Juveniles	Total	Veg. class	Wetness	Habitat suitability
Monitoring period 2013-2018 (23 samples)								
2013-2018	01a	N 09680 69569	1	9	10	I	5	Optimal
2013-2018	01b	N 09680 69569	1	8	9	I	5	Optimal
2013-2018	01c	N 09680 69569	0	1	1	I	5	Optimal
2013-2018	02a	N 09743 69575	2	8	10	I	5	Optimal
2013-2018	02b	N 09743 69575	1	1	2	I	5	Optimal
2013-2018	02c	N 09743 69575	0	1	1	I	5	Optimal
2013-2018	03a	N 09934 69973	6	10	16	I	2	Suboptimal
2013-2018	03b	N 09934 69973	2	4	6	I	2	Suboptimal
2013-2018	03c	N 09934 69973	3	4	7	I	2	Suboptimal
2013-2018	04a	N 10177 70118	16	70	86	I	4	Optimal
2013-2018	04b	N 10177 70118	8	100	108	I	4	Optimal
2013-2018	05a	N 10643 70563	0	0	0	I	5	Optimal-Suboptimal
2013-2018	05b	N 10643 70563	0	0	0	I	5	Optimal-Suboptimal
2013-2018	06a	N 10787 70839	100	110	210	I	4	Optimal
2013-2018	06b	N 10787 70839	64	40	104	I	4	Optimal
2013-2018	07a	N 11074 71151	2	42	44	I	5	Optimal
2013-2018	07b	N 11074 71151	3	80	83	I	5	Optimal

Vertigo moulinsiana monitoring at Royal Canal, Longford Branch

2013-2018	08a	N 11557 71844	0	0	0	I	5	Optimal-Suboptimal
2013-2018	08b	N 11557 71844	6	4	10	I	5	Optimal-Suboptimal
2013-2018	09a	N 11778 72237	3	12	15	I	4	Suboptimal
2013-2018	09b	N 11778 72237	8	6	14	I	4	Suboptimal
2013-2018	10a	N 11720 73249	0	15	15	I	5	Optimal
2013-2018	10b	N 11720 73249	0	48	48	I	5	Optimal

5. CONDITION ASSESSMENT

5.1 Population Assessment: 2 passes Favourable (green); 1 pass Unfavourable Inadequate (amber); 0 passes Unfavourable Bad (red)

Mon. period	Transect	Indicator	Target	Result	Pass/Fail
2013-2018	1	Presence/Absence	At least five positive samples (with adult or sub-adult snails) from a minimum of ten samples taken from along the transect	Eight positive samples	Pass

Mon. period	Indicator	Target	Result	Pass/Fail
2013-2018	Presence/Absence	At least two positive samples (with adult or sub-adult snails) from each of Polygons A, B and C, with a minimum of ten sample locations surveyed from across these polygons	Two positive sample locations in each of Polygons A, B and C.	Pass

Mon. period	Population Notes
2013-2018	A previous survey of this section of the Royal Canal (Moorkens, 2012) recorded <i>Vertigo moulinsiana</i> at 29 out of 34 (85%) locations. The current survey recorded the species at 17 out of 20 locations (85%) (28/33 samples). This includes eight out of ten locations on a newly established transect. Based on the assessment criteria defined as part of this survey, the Population Assessment for the Royal Canal (Longford Branch) is Favourable (green).

5.2 Habitat Assessment: 3 passes Favourable (green); 2 passes Unfavourable Inadequate (amber); 0-1 passes Unfavourable Bad (red)

5.2.1 Transect level

Mon. period	Transect	Indicator	Target	Result	Pass/Fail
2013-2018	1	Habitat extent	Over 50% of the samples along the transect are dominated by suitable vegetation (Classes I & II)	100% of samples are dominated by suitable vegetation (Class I)	Pass
2013-2018	1	Habitat quality	Over 75% of the samples fall within soil moisture classes 3-5	100% of samples have a soil moisture of 5	Pass

5.2.2 Site level

Mon. period	Indicator	Target	Result	Pass/Fail
2013-2018	Habitat extent	At least three of the four polygons classed as Optimal-Suboptimal or better	Two polygons Optimal, one polygon Optimal-Suboptimal	Pass

Mon. period	Habitat Notes
2013-2018	The current survey defined four polygons stretching the length of the site. Polygon A starts at the Royal Canal Main Line end and Polygon D finishes at Churchland Bridge, just south-west of Longford Town. Due to the extent of Optimal and Suboptimal habitat present at the site, and based on the criteria defined as part of this survey, the Habitat Assessment is Favourable (green).

5.3 Future Prospects Assessment

Mon. period	Activity code	Activity description	Location	Intensity	Influence	Area affected	Comment
2013-2018	K02.01	species composition change (succession)	Inside	Medium	Negative	25%	Shading by trees along bank (<i>Salix cinerea</i> subsp. <i>oleifolia</i> & <i>Alnus glutinosa</i>) shading out wetland vegetation in places. At least 35% additional area at risk in near future.

Vertigo moulinsiana monitoring at Royal Canal, Longford Branch

Mon. period	Future Prospects Notes
2013-2018	Succession was identified as a potential threat to the future survival of <i>Vertigo moulinsiana</i> across 25% of the site due to the shading caused by species such as <i>Salix cinerea</i> subsp. <i>oleifolia</i> and <i>Alnus glutinosa</i> , with an additional 35% at risk in the near future. There are currently, however, still long stretches which are in good condition, and based on this, the Future Prospects for the Royal Canal (Longford Branch) are assessed as Favourable (green).

5.4 Overall Assessment

Mon. period	Population assessment	Area of suitable habitat	Future prospects	Overall assessment
2013-2018	Green	Green	Green	Green

Mon. period	Overall Notes
2013-2018	The population and habitat assessments returned results of Favourable (green), as did the Future Prospects, resulting in an Overall Assessment of Favourable (green).

6. DISCUSSION

Monitoring period
<p>2013-2018</p> <p>Area of occupancy: The site is the canal bed of the disused Longford Branch of the Royal Canal, beginning close to its junction with the Royal Canal Main Line. Access is via the towpath from where the N63 Longford - Lanesborough Road crosses the Royal Canal Main Line.</p> <p>Discussion:</p> <p>The habitat for <i>Vertigo moulinsiana</i> is in the canal bed of the disused Longford Branch of the Royal Canal. The canal bed supports extensive areas of suitable vegetation (including <i>Sparganium erectum</i>, <i>Glyceria maxima</i> and tall <i>Carex</i> species) and wetness, though shading and scrubbing over is occurring where <i>Salix cinerea</i> subsp. <i>oleifolia</i> and <i>Alnus glutinosa</i> have become established. The site supports a good population of <i>Vertigo moulinsiana</i> along its length and sensitive management is required to maintain the habitat in favourable condition though scrub control and clearance. Hydrological monitoring is also recommended in order to understand if the habitat is drying out, or if there is enough water seepage to maintain current wetness levels.</p> <p>Monitoring recommendations:</p> <p>It is recommended that monitoring is carried out at a minimum of three-yearly intervals at this site as it is of high conservation importance. This should be re-assessed in light of any deterioration of condition or any changes to site management. The monitoring should be carried out as follows:</p> <ul style="list-style-type: none"> - Repeat Transect 1, recording vegetation height, vegetation composition, ground moisture class, numbers of <i>Vertigo moulinsiana</i> (adult & juvenile) and other molluscs, minimum 10 samples - Take at least 10 samples spread across the remaining habitat polygons recording vegetation height, vegetation composition, ground moisture class, numbers of <i>Vertigo moulinsiana</i> (adult & juvenile) and other molluscs - Re-determine boundary of the habitat polygons and assign habitat to either Optimal, Optimal-Suboptimal, Suboptimal, Suboptimal-Unsuitable, or Unsuitable - Assess the management regime and impacts upon the habitat for <i>Vertigo moulinsiana</i> - Use results to determine overall condition assessment <p>Management recommendations:</p> <p>It is recommended that scrub/tree control measures be implemented in places along the site. The focus should be on areas where good <i>Vertigo moulinsiana</i> habitat is being shaded by trees growing on the canal bed or banks, or will be if action is not taken. These areas should be prioritised above densely shaded areas which have already lost suitable vegetation under deep shade. All scrub control should be carried out in an environmentally sensitive manner which minimises impacts on this sensitive habitat. For example, cuttings should be removed from the site; trampling or damage of the canal bed habitat should be avoided.</p> <p>In addition to scrub/tree control, hydrological monitoring should be instigated to understand if the canal bed is drying out, or if there is adequate water seepage to maintain current wetness levels. Should the habitat be found to be drying out, immediate measures will be needed to halt this.</p>

Site report - Vertigo Monitoring

Vertigo moulinsiana monitoring at Fiagh Bog

1. SITE CODE AND LOCATION DETAILS

1.1 Site code and location

Vertigo Site Code: VmCAM22 County: Tipperary

SAC Site Code: n/a Not in SAC

Location description (from baseline survey):

Monitoring period	Date surveyed	Recorders
2013-2018	8 August 2016	John Brophy & Maria Long

1.2 General Habitat Description (from baseline survey):

1.3 Definition of Vegetation Classes (from baseline survey):

Class I:	Class III:
Class II:	Class IV:

1.4 Definition of Soil Moisture Classes (from baseline survey):

- 1: Dry. No visible moisture on ground surface.
- 2: Damp. Ground visibly damp, but water does not rise under pressure.
- 3: Wet. Water rises under light pressure.
- 4: Very wet. Pools of standing water, generally less than 5cm deep.
- 5: Site under water. Entire sampling site in standing or flowing water over 5cm deep.

2. SUMMARY:

This site was included in the current monitoring round due to a record of *Vertigo moulinsiana* from the road margin in 1970. Moorkens recorded a dead *Vertigo moulinsiana* shell in 1995, but no live snails. The site has undergone extensive drainage and reclamation for agricultural land over the last number of years, particularly in the vicinity of the 1970 record, and this work is on-going. In terms of possible habitat, extensive stands of *Sparganium erectum* were recorded in a stream to the west of Fiagh Bog in the current survey. The stream had a water depth of over 50cm and steep banks, so had limited ability to support the target species. Sparse stands of *Phragmites australis* were recorded from drains towards the east end of the bog (and the area of active reclamation), but these are likely to represent recent growth following the excavation of the drains. The site no longer appears to have any population of *Vertigo moulinsiana*, does not support any area of potentially suitable habitat, and future surveys are not recommended.

3. TRANSECT DETAILS

TRANSECT: 0	MONITORING PERIOD: 2013-2018
Start point:	NO TRANSECT RECORDED
End point:	
Transect length:	Direction:
Description:	
Sampling frequency:	

4. RESULTS

Polygon habitat characteristics

Monitoring Period: 2013-2018

Polygon	Habitat Type	Area (ha)	Comment
	Unsuitable	0	No habitat polygons had been previously defined, and due to the fact that no suitable habitat was found in 2016, no habitat polygons have been drawn.

Transect samples

Spot Samples

Mon. period	Sample	Grid ref.	Adults	Juveniles	Total	Veg. class	Wetness	Habitat suitability
Monitoring period 2013-2018 (4 samples)								
2013-2018	01	R 93423 96890	0	0	0			Suboptimal
2013-2018	02	R 93527 96777	0	0	0			Suboptimal
2013-2018	03	R 93774 96751	0	0	0			Suboptimal

Vertigo moulinsiana monitoring at Fiagh Bog

2013-2018	04	R 95103 97666	0	0	0	Optimal-Suboptimal
-----------	----	---------------	---	---	---	--------------------

5. CONDITION ASSESSMENT

5.1 Population Assessment:

Mon. period	Transect	Indicator	Target	Result	Pass/Fail
2013-2018	0	N/A	NO TRANSECT RECORDED		

Mon. period	Population Notes
2013-2018	No live <i>Vertigo moulinsiana</i> have been found at this site since 1970, with one dead shell found by Moorkens in 1995. No positive samples for <i>Vertigo moulinsiana</i> were found at the site in the course of the current survey. The Population Assessment must therefore be Unfavourable Bad (red).

5.2 Habitat Assessment:

5.2.1 Transect level

Mon. period	Transect	Indicator	Target	Result	Pass/Fail
2013-2018	0	N/A	NO TRANSECT RECORDED		

5.2.2 Site level

Mon. period	Habitat Notes
2013-2018	There are no defined habitat polygons for the site, with the last live record of <i>Vertigo moulinsiana</i> being from the road margin. Limited areas of tall reed and sedge vegetation were recorded in drains and streams, but large areas of the site, including the 100m square where the snail was previously found, has been subject to drainage, levelling and reseeded. Even within the drains, which hold the last possibility for potentially suitable habitat, they are too steep-sided to be suitable - with water too deep at the bottom, and sides too dry. The Habitat Assessment for Fiagh Bog is Unfavourable Bad (red).

5.3 Future Prospects Assessment

Mon. period	Activity code	Activity description	Location	Intensity	Influence	Area affected	Comment
2013-2018	J02.01	Landfill, land reclamation and drying out, general	Inside	High	Negative	20%	Land drained, levelled and reseeded

Mon. period	Future Prospects Notes
2013-2018	<i>Vertigo moulinsiana</i> has not been recorded alive at this site since 1970. Based on this, the lack of suitable habitat, and the on-going reclamation of land for cattle grazing, the Future Prospects for the site are considered to be Unfavourable Bad (red).

5.4 Overall Assessment

Mon. period	Population assessment	Area of suitable habitat	Future prospects	Overall assessment
2013-2018	Red	Red	Red	Red

Mon. period	Overall Notes
2013-2018	Considering the results for the Population and Habitat Assessments, and the Future Prospects, the Overall Assessment for Fiagh Bog is Unfavourable Bad (red).

6. DISCUSSION

Monitoring period
2013-2018
Area of occupancy:
Discussion:
This site was included in the current monitoring round due to a record of <i>Vertigo moulinsiana</i> from the road margin in 1970. Moorkens recorded a dead <i>Vertigo moulinsiana</i> shell in 1995, but no live snails. The site has undergone extensive drainage and reclamation for agricultural land over the last number of years, particularly in the vicinity of the 1970 record, and this work is on-going. In terms of possible habitat, extensive stands of <i>Sparganium erectum</i> were recorded in a stream to the west of Fiagh Bog in the current survey.

Vertigo moulinsiana monitoring at Fiagh Bog

The stream had a water depth of over 50cm and steep banks, so had limited ability to support the target species. Sparse stands of *Phragmites australis* were recorded from drains towards the east end of the bog (and the area of active reclamation), but these are likely to represent recent growth following the excavation of the drains. The site no longer appears to have any population of *Vertigo moulinsiana*, does not support any area of potentially suitable habitat, and future surveys are not recommended.

Monitoring recommendations:

Given the time that has passed since the last live record at this site, and the continued reclamation of land for agriculture, it is not considered a good use of resources to carry out monitoring at this site into the future.

Management recommendations:

Given the extensive and long-running land-reclamation and drainage which has occurred (and is still occurring) at this site, it is extremely damaged. With the possible exception of a large-scale programme of drain-blocking and re-wetting, it is unlikely that any management actions would result in a return of the site to conditions that would provide suitable habitat for *Vertigo moulinsiana*. Thus from the point of view of the occurrence of *Vertigo moulinsiana* at the site at least, there are no management recommendations.

Site report - Vertigo Monitoring

Vertigo moulinsiana monitoring at Castletown

1. SITE CODE AND LOCATION DETAILS

1.1 Site code and location

Vertigo Site Code: VmCAM23 County: Waterford

SAC Site Code: n/a Not in SAC

Location description (from baseline survey):

Monitoring period	Date surveyed	Recorders
2013-2018	1-2 November 2016	John Brophy & Maria Long
2007-2012	15 October & 20 November 2012	John Brophy & Maria Long

1.2 General Habitat Description (from baseline survey):

There are three parcels of wetland, mainly swamp and reedbed, and some wet grassland. Much of the vegetation conforms to 'reed and large sedge swamp' (FS1) of Fossitt (2000), with some areas being classified as wet grassland (GS4). The most commonly recorded NVC vegetation category present was S14 (Sparganium erectum swamp), with S4 (Phragmites australis swamp and reed-beds), MG10 (Holcus lanatus-Juncus effusus rush-pasture) and MG13 (Agrostis stolonifera-Alopecurus geniculatus grassland) all also present.

1.3 Definition of Vegetation Classes (from baseline survey):

Class I: Class III:
Class II: Class IV:

1.4 Definition of Soil Moisture Classes (from baseline survey):

- 1: Dry. No visible moisture on ground surface.
- 2: Damp. Ground visibly damp, but water does not rise under pressure.
- 3: Wet. Water rises under light pressure.
- 4: Very wet. Pools of standing water, generally less than 5cm deep.
- 5: Site under water. Entire sampling site in standing or flowing water over 5cm deep.

2. SUMMARY:

Castletown was first surveyed specifically for *Vertigo moulinsiana* in 2012 by Long & Brophy. Castletown is unusual among *Vertigo moulinsiana* sites for a few reasons. It is one of two recently discovered sites in Co. Waterford, and so is an outlier in terms of the species' known distribution in Ireland. It is a small, isolated wetland, and has no conservation designation. The vegetation in Polygon A, the biggest area supporting the species at the site, is very grassy (it was unusually grassy even in 2012, but had become more so in 2016). This vegetation is atypical for *Vertigo moulinsiana*, the species being more usually associated with tall-growing sedges and reeds. The site was also quite dry underfoot throughout polygons A and B in 2016. And yet the species was found to be common, widespread and abundant throughout polygons A and C in both years, and in small pockets in Polygon B. Based on a broader understanding of both the wetness and vegetation conditions thought to be necessary to support populations of *Vertigo moulinsiana*, this site has dropped in status from Favourable (green) to Unfavourable Bad (red). However, given that the species is present in high quantities throughout, this result may need to be interpreted with some caution. Repeat monitoring within two years is a priority at this site to assess if observed changes in habitat will begin to be reflected in decreasing snail numbers, or if indeed the species is surviving well in the apparently less than ideal conditions. Liaison with landowners is needed immediately to ensure no further drainage occurs. Some partial drain blocking may be necessary to slow the flow of water from this site. Liaison with Waterford County Council, Coillte and/or The Forest Service is also needed to ensure no inappropriate development or planting occurs at this site. Consideration should also be given to the fact that nutrient run-off from adjacent forestry or agricultural land may also be a contributory factor in the dense growth of *Holcus lanatus* seen in Polygon A in particular.

3. TRANSECT DETAILS

TRANSECT: 1	MONITORING PERIOD: 2013-2018
Start point:	S 61907 05122
End point:	S 62023 05128
Transect length: 120	Direction: W-E
Description:	
Sampling frequency:	Approximately every 10m

4. RESULTS

Polygon habitat characteristics

Monitoring Period: 2013-2018
Polygon Habitat Type Area (ha) Comment
A Suboptimal 7.8913 Polygon A status drops from Optimal and Suboptimal (Long & Brophy, 2013)

Vertigo moulinsiana monitoring at Castletown

Monitoring Period: 2013-2018

Polygon	Habitat Type	Area (ha)	Comment
B	Suboptimal	10.6102	to Suboptimal. The habitat here is swamp with unusually high cover of grasses, which suggests drying out and/or nutrient enrichment, and so this is seen as an ecological change. Polygon expanded in 2016 to include trackside drain at the southern side which supports <i>Vertigo moulinsiana</i> . Polygon B status drops from Optimal and Suboptimal to Suboptimal. Reed bed, with encroaching bramble in places, which suggests drying out, and so this is an ecological change in the habitat.
C	Optimal-Suboptimal	2.0343	Polygon C status remains Optimal-Suboptimal. Swamp with mixed vegetation, some areas grassy, some areas with high herb cover, others dominated by tall sedges.

Transect samples

Mon. period	Transect	Sample	Location	Adults	Juveniles	Total	Veg. class	Wetness	Habitat suitability
Monitoring period 2013-2018 Transect 1 (16 samples)									
2013-2018	1	1	01a; 0m	7	20	27	IV	2	Suboptimal
2013-2018	1	2	01b; 0m	3	21	24	IV	2	Suboptimal
2013-2018	1	3	02a; 15m	19	41	60	IV	2	Suboptimal
2013-2018	1	4	02b; 15m	13	48	61	IV	2	Suboptimal
2013-2018	1	5	03a; 30m	9	18	27	IV	2	Suboptimal
2013-2018	1	6	03b; 30m	0	1	1	IV	2	Suboptimal
2013-2018	1	7	04a; 45m	33	96	129	IV	2	Suboptimal
2013-2018	1	8	04b; 45m	43	39	82	IV	2	Suboptimal
2013-2018	1	9	05a; 75m	83	214	297	I	2	Optimal-Suboptimal
2013-2018	1	10	05b; 75m	80	203	283	IV	2	Optimal-Suboptimal
2013-2018	1	11	06a; 85m	28	132	160	I	2	Optimal-Suboptimal
2013-2018	1	12	06b; 85m	44	139	183	IV	2	Optimal-Suboptimal
2013-2018	1	13	07a; 105m	7	24	31	II	2	Suboptimal-Unsuitable
2013-2018	1	14	07b; 105m	10	27	37	IV	2	Suboptimal-Unsuitable
2013-2018	1	15	08a; 120m	8	53	61	IV	3	Suboptimal-Unsuitable
2013-2018	1	16	08b; 120m	16	100	116	IV	3	Suboptimal-Unsuitable

Spot Samples

Mon. period	Sample	Grid ref.	Adults	Juveniles	Total	Veg. class	Wetness	Habitat suitability
Monitoring period 2013-2018 (16 samples)								
2013-2018	01a	S 61954 04871	0	0	0	I	2	Suboptimal
2013-2018	01b	S 61954 04871	0	0	0	I	2	Suboptimal
2013-2018	02a	S 61927 04818	0	6	6	I	3	Optimal-Suboptimal
2013-2018	02b	S 61927 04818	1	5	6	I	3	Optimal-Suboptimal
2013-2018	03a	S 61960 04738	0	0	0	I	3	Optimal-Suboptimal
2013-2018	03b	S 61960 04738	0	0	0	I	3	Optimal-Suboptimal
2013-2018	04a	S 62004 04650	0	0	0	I	3	Optimal-Suboptimal
2013-2018	04b	S 62004 04650	0	0	0	I	3	Optimal-Suboptimal
2013-2018	05a	S 62092 04694	0	0	0	I	3	Optimal-Suboptimal
2013-2018	05b	S 62092 04694	0	0	0	I	3	Optimal-Suboptimal
2013-2018	06a	S 62128 04805	53	363	416	I	5	Optimal-Suboptimal

Vertigo moulinsiana monitoring at Castletown

2013-2018	06b	S 62128 04805	92	756	848	I	5	Optimal-Suboptimal
2013-2018	07a	S 61833 05107	2	12	14	III	3	Optimal-Suboptimal
2013-2018	07b	S 61833 05107	8	17	25	I	3	Optimal-Suboptimal
2013-2018	08a	S 62045 05016	0	3	3	IV	3	Suboptimal-Unsuitable
2013-2018	08b	S 62045 05016	3	16	19	IV	3	Suboptimal-Unsuitable

5. CONDITION ASSESSMENT

5.1 Population Assessment: 2 passes Favourable (green); 1 pass Unfavourable Inadequate (amber); 0 passes Unfavourable Bad (red)

Mon. period	Transect	Indicator	Target	Result	Pass/Fail
2013-2018	1	Presence/Absence	Adult or sub-adult snails are present in samples on the transect, with a minimum of 4 positive samples out of 8	Samples at all 8 sample locations positive	Pass
2007-2012	1	Presence/Absence	Adult or sub-adult snails are present in samples on the transect, with a minimum of 4 positive samples out of 8	All 8 samples positive	Pass

Mon. period	Indicator	Target	Result	Pass/Fail
2013-2018	Presence/Absence	Adult or sub-adult snails are present in all three polygons, with additional samples from Polygon A being >100m from the transect	Present in all three polygons	Pass
2007-2012	Presence/Absence	Adult or sub-adult snails are present in all three polygons, with additional samples from Polygon A being >100m from the transect	Present in all three polygons	Pass

Mon. period	Population Notes
2013-2018	The target species was found at all sample locations in Polygon A in 2016 (eight samples on the transect, and two others, including one which was outside the original boundary of the polygon). This compares well with the situation recorded by Long & Brophy in 2012 (eight positive on transect, and six out of seven off the transect). In Polygon B, results are a little lower in 2016, with one positive out of five, compared to two positive out of four in 2012. Sampling in Polygon C was interrupted in 2016 (by hunter), but the one sample taken was positive, and this compares to three out of three positive in 2012. Overall, therefore, results compare favourably with 2012 findings. Based on the criteria of Long and Brophy (2013), the Population Assessment is Favourable (green).
2007-2012	

5.2 Habitat Assessment: 3 passes Favourable (green); 2 passes Unfavourable Inadequate (amber); 0-1 passes Unfavourable Bad (red)

5.2.1 Transect level

Mon. period	Transect	Indicator	Target	Result	Pass/Fail
2013-2018	1	Habitat extent	At least one habitat zone on the transect is classed as Optimal-Suboptimal or better AND 60m of habitat along the transect is classed as Suboptimal or better	No Optimal-Suboptimal habitat present AND 88m Suboptimal habitat	Fail
2013-2018	1	Habitat quality	Soils, at time of sampling, are saturated (Optimal wetness) for 60m along the transect	88m of transect too dry	Fail
2007-2012	1	Habitat extent	At least one habitat zone on the transect is classed as Optimal-Suboptimal or better AND 60m of habitat along the transect is classed as Suboptimal or better	Optimal-Suboptimal habitat present AND 88m Suboptimal or better	Pass
2007-2012	1	Habitat quality	Soils, at time of sampling, are saturated (Optimal wetness) for 60m along the transect	Entire transect (88m) of Optimal wetness	Pass

5.2.2 Site level

Mon. period	Indicator	Target	Result	Pass/Fail

Vertigo moulinsiana monitoring at Castletown

2013-2018	Habitat extent	At least 10ha of the most suitable habitat includes some areas classed as Optimal-Suboptimal or better	Only 2ha (Polygon C) remains Optimal-Suboptimal	Fail
2012	Habitat extent	At least 10ha of the most suitable habitat includes some areas classed as Optimal-Suboptimal or better	19.5ha classed as Optimal	Pass

Mon. period	Habitat Notes
2013-2018	In Polygon A, there appears to have been a change in vegetation and wetness since 2012. The polygon is drier in many areas and much more grassy (with a dense mat of <i>Holcus lanatus</i> covering much of the area). In Polygon B, there appears to be more bramble, another sign of drying out, but the change is less clearly obvious. Polygon C appears to be in similar condition to 2012. It should be noted that the autumn of 2016 was an exceptionally dry one, and this may have had an effect on ground moisture and therefore on wetness results. Equally important, however, is likely to be the very large and recently cleared drain which runs along the road-side of polygons A and B. Based on the criteria of Long and Brophy (2013), the Habitat Assessment is Unfavourable Bad (red).
2007-2012	

5.3 Future Prospects Assessment

Mon. period	Activity code	Activity description	Location	Intensity	Influence	Area affected	Comment
2013-2018	A04.03	abandonment of pastoral systems, lack of grazing	Inside	Medium	Negative	50%	Very dense mats of <i>Holcus lanatus</i> in Polygon A likely to impede growth of tall vegetation suitable for <i>Vertigo moulinsiana</i>
2013-2018	J02.01	Landfill, land reclamation and drying out, general	Outside	High	Negative	60%	Very large drains cleared along north and west boundaries. Road drain cleared since previous survey.

Mon. period	Future Prospects Notes
2013-2018	A large drain has been recently cleared, and is now possibly removing more water from the site. There has been an observed decrease in wetness levels across polygons A and B. The unusually dense and large mats of <i>Holcus lanatus</i> in Polygon A may impede the growth of species more typical of <i>Vertigo moulinsiana</i> habitat (e.g. <i>Sparganium erectum</i> , <i>Typha latifolia</i>), and the lack of management of that area means that there is little likelihood of this mat being broken up (as would happen if grazers were present). For these reasons, the Future Prospects at the site are deemed to be Unfavourable Inadequate (amber).
2007-2012	

5.4 Overall Assessment

Mon. period	Population assessment	Area of suitable habitat	Future prospects	Overall assessment
2013-2018	Green	Red	Amber	Red
2007-2012	Green	Green	Green	Green

Mon. period	Overall Notes
2013-2018	The autumn of 2016 was an exceptionally dry one, but the clearance of a very large drain running along polygons A and B is also likely to be a contributory factor in the drying of the habitat which was evident. These changes in wetness have had a big impact on the potential suitability for <i>Vertigo moulinsiana</i> and so there has been a drop from Favourable (green) to Unfavourable Bad (red) in the Habitat Assessment. This means that the Overall Assessment also drops from Favourable (green) to Unfavourable Bad (red).
2007-2012	

6. DISCUSSION

Monitoring period
2013-2018
Area of occupancy: Castletown is a small site located just west of Waterford Airport, and approximately 3km north-east of Tramore. It consists of three parcels of wetland supporting <i>Vertigo moulinsiana</i> , mainly swamp and reed-bed,

Vertigo moulinsiana monitoring at Castletown

with some wet grassland on either side of the road at S614044.

Discussion:

Castletown was first surveyed specifically for *Vertigo moulinsiana* in 2012 by Long & Brophy (2013). Castletown is unusual among *Vertigo moulinsiana* sites for a few reasons. It is one of two recently discovered sites in Co. Waterford, and so is an outlier in terms of the species' known distribution in Ireland. It is a small, isolated wetland, and has no conservation designation. The vegetation in Polygon A, the biggest area supporting the species at the site, is very grassy (it was unusually grassy even in 2012, but had become more so in 2016). This vegetation is atypical for *Vertigo moulinsiana*, the species being more usually associated with tall-growing sedges and reeds. The site was also quite dry underfoot throughout polygons A and B in 2016. And yet the species was found to be common, widespread and abundant throughout polygons A and C in both years, and in small pockets in Polygon B. Based on a broader understanding of both the wetness and vegetation conditions thought to be necessary to support populations of *Vertigo moulinsiana*, this site has dropped in status from Favourable (green) to Unfavourable Bad (red). However, given that the species is present in high quantities throughout, this result may need to be interpreted with some caution. Repeat monitoring within two years is a priority at this site to assess if observed changes in habitat will begin to be reflected in decreasing snail numbers, or if indeed the species is surviving well in the apparently less than ideal conditions. Liaison with landowners is needed immediately to ensure no further drainage occurs. Some partial drain blocking may be necessary to slow the flow of water from this site. Liaison with Waterford County Council, Coillte and/or The Forest Service is also needed to ensure no inappropriate development or planting occurs at this site. Consideration should also be given to the fact that nutrient run-off from adjacent forestry or agricultural land may also be a contributory factor in the dense growth of *Holcus lanatus* seen in Polygon A in particular.

Monitoring recommendations:

As a priority, this site should be monitored again in two years' time, i.e. in 2018, due to the observed drying out which is potentially due to increased drainage.

- Repeat Transect 1, in field record: vegetation height, vegetation composition, ground moisture class, numbers of *Vertigo moulinsiana* (adult & juvenile) and other molluscs, minimum 16 samples from eight separate samples locations along transect.
- Take samples from at least 3 other locations in Polygon A, record information as above.
- Take samples from at least 3 locations in each of Polygons B and C, record information as above.
- Re-determine boundary of the habitat polygons and assign habitat to Optimal, Optimal-Suboptimal, Suboptimal, Suboptimal-Unsuitable, or Unsuitable
- Assess the management regime and impacts upon the habitat for *Vertigo moulinsiana*
- Use results to determine overall condition assessment

Management recommendations:

This site has no conservation designation and it is unlikely that the landowners are aware of the conservation importance of their land (they were away from home at time of 2016 survey). This means that it is vulnerable to destruction or change. Thus a priority at this site is to make contact with landowners.

A large drain which runs along the road side of polygons A and B has been cleared and opened up between 2012 and 2016, and it is likely that this is removing more water more quickly from the site, resulting in drying out. A large pond was dug (in late 1990s) to the north of Polygon B resulting in the loss of habitat. All such drainage and habitat removal works should cease at this site, and liaison with landowners will be necessary to ensure this.

There are coniferous forestry plantations at the south-west and north-east of this site, suggesting that planting up for forestry is another potential threat. Liaison with Coillte and/or the Forest Service about the importance of this site is also therefore needed. Given the fact that there is a vast dense mat of *Holcus lanatus* across much of Polygon A, the main area for the snail at the site, it may be possible that both drying out and some nutrient run-off (from adjacent agricultural land or forestry) are feeding into this. Polygon A would benefit from some short-term grazing in order to break up the mat of grass, but this type of habitat, if functioning properly, would not usually need grazers - it would be managed simply by the wetness, i.e. only wetland species would survive if it were consistently wet enough.

This site should be considered for designation as a Natural Heritage Area (NHA) or Special Area of Conservation (SAC) by NPWS, and it should be made known to Waterford County Council as an important area for biodiversity. In this way, possible future planning decisions can be made in an informed way, and any proposals for a change in land-use can be assessed properly.

2007-2012

Area of occupancy:

Discussion:

Monitoring recommendations:

Management recommendations:

