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

John T. Brophy and Maria P. Long

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

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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 Polaguil Bay (VgCAM14), Co. Donegal, August 2015, John T. Brophy

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

John T. Brophy and Maria P. Long

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

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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

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Introduction

This Appendix to the main report on the *Vertigo* habitat and site monitoring project contains the individual reports for *Vertigo geyeri* 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 geyeri monitoring at Meenaphuil

1. SITE CODE AND LOCATION DETAILS

1.1 Site code and location

Vertigo Site Code: VgCAM01 **County:** Leitrim

SAC Site Code: 000623 Ben Bulben, Gleniff and Glenade Complex

Location description (from baseline survey):

Monitoring period	Date surveyed	Recorders
2013-2018	7 September 2015	John Brophy & Maria Long
2007-2012	17 August 2008	Evelyn Moorkens & Ian Killeen

1.2 General Habitat Description (from baseline survey):

The general habitats in which Vertigo geyeri is present are upland spring seepages, with sheep-grazed sedge-rich and mossy seepage zones in open situations. EU habitats present at V. geyeri habitat are Alkaline fens: low sedge-rich communities (Annex I Habitat 7230), rich fens of CORINE 54.2, and petrifying springs with tufa formation (Annex I Habitat 7220), or CORINE 54.12 (Romão, 1996; Devillers et al., 1991). The specific areas that are within a wider mosaic, but that form specific V. geyeri habitat fit the Rodwell characteristic vegetation classification (Rodwell, 1991) within the Caricion davallianae alliance, characteristically being distinguished by Carex viridula, Parnassia palustris, Campylium stellatum, Pinguicula vulgaris, Selaginella selaginoides and Scorpidium scorpiodes. This falls within the more general habitat of rich fen and flush (PF1) of Fossitt (2000).

1.3 Definition of habitat types (from baseline survey):

Optimal	5-15cm tall, containing species such as Carex viridula, other short sedges, Pinguicula vulgaris, Equisetum palustre, Juncus articulatus, Eriophorum angustifolium, Parnassia palustris and the mosses Drepanocladus revolvens, Campylium stellatum. During sampling the water table should be between 0- 5cm of the soil surface, but not above ground level.
Sub-optimal	Vegetation composition as above but either vegetation height is less than 5cm or greater than 15cm, or the water table is below 5cm or ground is flooded at the time of sampling.
Unsuitable	Habitat different from that above, wetlands dominated by tall Juncus species, or less calcareous indicators such as Carex panicea

2. SUMMARY:

The Overall Assessment for Meenaphuil in 2007-2012 was Favourable (green), and this remains unchanged for the 2013-2018 monitoring period. Vertigo geyeri was found in both samples along the transect located on a north-facing, flushed slope. The habitat along the transect improved from Suboptimal in 2005 to Optimal in 2008, due to reduced grazing, and remains Optimal in the current survey. Sheep grazing was the only activity noted in the area, and was considered to be at a level that was having a positive effect. A nearby small quarry, accessed by a recently cleared and sprayed track, presents a potential future impact on the flush site, though currently no issues were noted.

3. TRANSECT DETAILS

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

Start point:	G 75104 42237	Grassy hummock	
End point:	G 75083 42263	The end of the flush habitat	
Transect length:	32.5	**Direction:**	As for 2007-2012
Description:	As for 2007-2012		
Sampling frequency:	As for 2007-2012		

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

Start point:	G 75098 42241	Base of a grassy knoll marked by a peg.	
End point:	G 75077 42266	The end of the flush habitat	
Transect length:	32.5	**Direction:**	SE-NW
Description:	The transect runs down a gentle flush slope with mossy lawns and a mosaic of habitat. The transect crosses a fence at 15m distance.		
Sampling frequency:	3 samples were taken from zones with optimal habitat		

4. RESULTS

Polygon habitat characteristics

Monitoring Period: 2013-2018

Polygon	Habitat Type	Area (ha)	Comment

Vertigo geyeri monitoring at Meenaphuil

Monitoring Period: 2013-2018

Polygon	Habitat Type	Area (ha)	Comment
A	Optimal-suboptimal	0.4006	Polygon A status remains Optimal-Suboptimal. The boundary of the polygon was revised slightly to better reflect the extent of the habitat on the ground; this was not considered to reflect ecological change, but rather corrected a mapping issue. An area to the north was removed as it was a non-flushed, south-facing slope. All of the Vertigo geyeri habitat is on the north-facing slope.

Monitoring Period: 2007-2012

Polygon	Habitat Type	Area (ha)	Comment
	Sub-optimal with optimal areas	0.48	Mosaic of optimal and sub-optimal habitat - flushed fen grassland with sedge/moss lawns

Transect habitat characteristics (Note: only three habitat categories were used in 2007-2012 survey)

Monitoring period: 2013-2018

Transect	Optimal habitat	Optimal/Subopt.	Sub-optimal	Subopt/Unsuitable	Unsuitable	Optimal wetness	Too Wet	Too Dry
1	32.5m					32.5 m		

Monitoring period: 2007-2012

Transect	Optimal habitat	Optimal/Subopt.	Sub-optimal	Subopt/Unsuitable	Unsuitable	Optimal wetness	Too Wet	Too Dry
1	32.5m	NA		NA		32.5m		

Transect samples

Mon. period	Transect	Sample	Location	Adults	Juveniles	Total		Habitat suitability
Monitoring period 2013-2018 Transect 1 (2 samples)								
2013-2018	1	1	12m	6	1	7	Count	Optimal
2013-2018	1	2	24m	2	0	2	Count	Optimal
Monitoring period 2007-2012 Transect 1 (2 samples)								
2007-2012	1	1	9m	0	0	9		
2007-2012	1	2	25m	0	0	8		

Spot Samples

Mon. period	Sample	Grid ref.	Adults	Juveniles	Total	Habitat suitability
Monitoring period 2013-2018 (1 sample)						
2013-2018	..		0	0	0	NO SPOT SAMPLES RECOR

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	1	Presence/Absence	Adult or sub-adult snails are present in the 2 major botanical zones on the Transect (one either side of the fence at 15m)	Present in 2 zones	Pass
2007-2012	1	Presence/Absence	Adult or sub-adult snails are present in the 2 major botanical zones on the Transect (one either side of the fence at 15m)	Present in 2 zones	Pass

Mon. period	Population Notes
2013-2018	The 2007-2012 monitoring survey recorded Vertigo geyeri from two out of two samples along the transect, resulting in a Population Assessment of Favourable (green). In the current survey, Vertigo geyeri was again recorded from two out of two samples. Based on the criteria of Moorkens & Killeen (2011), the Population Assessment for Meenaphuil is Favourable (green).
2007-2012	the snail is present throughout the transect in good 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

Vertigo geyeri monitoring at Meenaphuil

Mon. period	Transect	Indicator	Target	Result	Pass/Fail
2013-2018	1	Habitat extent	30m of habitat along the Transect is classed as suitable (Optimal or Sub-optimal habitat)	32.5m is suitable	Pass
2013-2018	1	Habitat quality	Soils, at time of sampling, are saturated (optimal wetness) for 30m along the Transect	32.5m is Optimal wetness	Pass
2007-2012	1	Habitat extent	30m of habitat along the Transect is classed as suitable (Optimal or Sub-optimal habitat)	32.5m is suitable	Pass
2007-2012	1	Habitat quality	Soils, at time of sampling, are saturated (optimal wetness) for 30m along the Transect	32.5m is optimal wetness	Pass

5.2.2 Site level

Mon. period	Indicator	Target	Result	Pass/Fail
2013-2018	Habitat extent	At least 0.4ha of the site with optimal and sub-optimal areas	0.4ha Optimal-Suboptimal	Pass
2007-2012	Habitat extent	At least 0.4 ha of the site with optimal and sub-optimal areas	0.48 ha	Pass

Mon. period	Habitat Notes
2013-2018	The Vertigo geyeri habitat polygon remains classed as Optimal-Suboptimal, as it was in the previous monitoring period. The polygon boundary was redrawn to remove the area north of the stream as this does not support any suitable habitat. This reduced the area from 0.48ha to 0.4ha. Based on the criteria of Moorkens & Killeen (2011), the Habitat Assessment for Meenaphuil is Favourable (green).
2007-2012	The habitat at the site is in good condition for V. geyeri,

5.3 Future Prospects Assessment

Mon. period	Activity code	Activity description	Location	Intensity	Influence	Area affected	Comment
2013-2018	A04.02.02	non intensive sheep grazing	Inside	High	Positive	100%	Lower grazing level on northern side, but still more or less adequate for snail
2007-2012	A04.02.02	non intensive sheep grazing	Inside	Low	Neutral	0.48ha	The present levels of low intensity sheep grazing is not having a negative impact on the quality of the habitat. However, if the levels of sheep stocking increase or cattle were introduced then the impact would be severely negative.

Mon. period	Future Prospects Notes
2013-2018	The Future Prospects for Meenaphuil were classed as Favourable (green) for the monitoring period 2007-2012. Non-intensive sheep grazing was the only activity recorded within site, and it is considered to be having a positive effect across the whole polygon by helping to maintain a low open sward. There is a small quarry near the site, accessed by a track which has been recently cleared and sprayed with weed killer. These activities are not currently impacting on the site, but may do so in the future, particularly if intensified. Based on the currently occurring activities, the Future Prospects for Meenaphuil are considered to be Favourable (green).
2007-2012	On the basis of the status quo being maintained, 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	The Population Assessment, Habitat Assessment and Future Prospects for Meenaphuil all returned Favourable results, resulting in an Overall Assessment of Favourable (green).
2007-2012	The results obtained in the 2008 survey are generally better than those obtained in 2005 (Appendix 1). The numbers of V. geyeri are higher than in 2005. Also in 2005, all of the habitat along the transect was classed as sub-optimal (in terms of both vegetation) whereas in 2008 it was all classified as optimal. It appears as though this might be due to a less intensive grazing regime possibly arising out of the recommendations made in 2006.

6. DISCUSSION

Monitoring period

2013-2018

Area of occupancy: Meenaphuil, south of Glencar Lough, from G 7506 4233 to G 75303 42199. A track from the N16 up the lower slope below Crockauns Mountain leads to the site. The track is east of the scenic view parking overlooking Glencar Lake.

Discussion:

The Overall Assessment for Meenaphuil in 2007-2012 was Favourable (green), and this remains unchanged for the 2013-2018 monitoring period. Vertigo geyeri was found in both samples along the transect located on a north-facing, flushed slope. The habitat along the transect improved from Suboptimal in 2005 to Optimal in 2008, due to reduced grazing, and remains Optimal in the current survey. Sheep grazing was the only activity noted in the area, and was considered to be at a level that was having a positive effect. A nearby small quarry, accessed by a recently cleared and sprayed track, presents a potential future impact on the flush site, though currently no issues were noted.

Monitoring recommendations:

Because the Overall Assessment of the site is Favourable, with no damaging activities noted, it is recommended that monitoring is carried out at six-yearly intervals. This should be re-assessed in light of any deterioration of condition or any changes to site management. Monitoring should follow that of Moorkens & Killeen (2011):

- Repeat Transect 1, delineate the plant community/habitat zones, and assign the habitat and wetness in each zone as Optimal, Optimal-Suboptiml, Suboptimal, Suboptimal-Unsuitable or Unsuitable, and Too dry, Optimal wetness or Too wet, respectively
- Take at least 1 samples from the most suitable habitat in each of the two main zones on the transect and analyse for molluscan composition
- Re-determine boundary of the habitat polygon and assign habitat to Optimal, Optimal-Suboptimal, Suboptimal, Suboptimal-Unsuitable, or Unsuitable
- Assess the management regime and impacts upon the habitat for Vertigo geyeri
- Use results to determine overall condition assessment

Management recommendations:

The current management of the site by means of non-intensive sheep grazing is creating an open, low sward suitable for supporting Vertigo geyeri. The stocking regime should remain unchanged in order to maintain the site in favourable condition. No further track creation, vegetation spraying, or quarrying should take place in the vicinity of this small, but valuable site.

Vertigo geyeri monitoring at Meenaphuil

2007-2012

Area of occupancy: Meenaphuill, south of Glencar Lough, from G 7506 4233 to G 75303 42199. A track from the N16 up the lower slope below Crockauns Mountain leads to the site. The track is east of the scenic view parking overlooking Glencar Lake.

Discussion:

The potential Vertigo geyeri habitat is restricted in area but the habitat is in good condition and the snail is present in relatively high numbers.

The results obtained in the 2008 survey are generally better than those obtained in 2005 (Appendix 1). The numbers of V. geyeri are higher than in 2005. Also in 2005, all of the habitat along the transect was classed as sub-optimal (in terms of both vegetation) whereas in 2008 it was all classified as optimal. It appears as though this might be due to a less intensive grazing regime possibly arising out of the recommendations made in 2006.

Monitoring recommendations:

Frequency: Next monitoring due 2011
Methods (see Section 2 of main report for full details). Prescription as follows:
- Repeat transect 1, delineate the plant community/habitat zones, and assign the habitat and wetness in each zone as Optimal, Sub-optimal or Unsuitable
- Take at least 1 samples from the most suitable habitat in each of the main zones on the transect and analyse for molluscan composition
- Re-determine boundary of the habitat polygon 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. geyeri
- Use results to determine overall condition assessment

Management recommendations:

Existing Management

The Meenaphuill site has a total of two management units (one either side of the fence line), each being managed with the same low intensity sheep grazing. Although no animals were present in the area on the day of the visit to the site, there was evidence of recent sheep grazing.

Proposed management prescription for site

The two management units at the Meenaphuill site should be managed at the stocking rate of sheep grazing that is currently being utilized (in 2008). In this site, fields are smaller, non-linear units and the landowner appears to rotate his stock from field to field. In 2006 it was recommended that he site may benefit from a very slight lowering of animals, i.e. one animal less per block - this may have been implemented. It is important that no enrichment with fertiliser is allowed, and no drainage or alteration of the vegetation in any way takes place.

Site report - Vertigo Monitoring

Vertigo geyeri monitoring at Tievebaun

1. SITE CODE AND LOCATION DETAILS

1.1 Site code and location

Vertigo Site Code: VgCAM02 **County:** Leitrim

SAC Site Code: 000623 Ben Bulben, Gleniff and Glenade Complex

Location description (from baseline survey):

Monitoring period	Date surveyed	Recorders
2013-2018	8-9 September 2015	John Brophy & Maria Long
2007-2012	18 August 2008	Evelyn Moorkens & Ian Killeen

1.2 General Habitat Description (from baseline survey):

The general habitats in which Vertigo geyeri is present are upland spring seepages, with sheep-grazed sedge-rich and mossy seepage zones in open situations. There are areas of tufa formation along the spring line. EU habitats present at V. geyeri habitat are Alkaline fens: low sedge-rich communities (Annex I Habitat 7230), rich fens of CORINE 54.2, and petrifying springs with tufa formation (Annex I Habitat 7220), or CORINE 54.12 (Romão, 1996; Devillers et al., 1991). The specific areas that are within a wider mosaic, but that form specific V. geyeri habitat fit the Rodwell characteristic vegetation classification (Rodwell, 1991) within the Caricion davallianae alliance, characteristically being distinguished by Carex viridula, Parnassia palustris, Campylium stellatum, Pinguicula vulgaris, Selaginella selaginoides and Scorpidium scorpiodes. This falls within the more general habitat of rich fen and flush (PF1) of Fossitt (2000).

1.3 Definition of habitat types (from baseline survey):

Optimal	Springs, seepages, some with tufa deposition, flushed fen grassland and shallow runnels with sedge/moss lawns 5-15cm tall, containing species such as Carex viridula and other short sedges, Pinguicula vulgaris, Parnassia palustris, Equisetum palustre, Juncus articulatus and the mosses (often in mounds) Drepanocladus revolvens, Campylium stellatum, and Cratoneuron spp. During sampling the water table should be between 0- 5cm of the soil surface, but not above ground level.
Sub-optimal	Vegetation composition as above but either vegetation height is less than 5cm or greater than 15cm, or the water table is below 5cm or ground is flooded at the time of sampling.
Unsuitable	Habitat different from that above, wetlands dominated by tall Juncus species, or less calcareous indicators such as Carex panicea

2. SUMMARY:

The Overall Assessment for Tievebaun in the monitoring period 2007-2012 was Favourable (green) and in the current monitoring period (2013-2018) the site remains Favourable (green). Vertigo geyeri was recorded at all nine locations sampled, and in good numbers throughout, and suitable habitat is found across the site in the form of numerous often expansive flushes, seepages, springs and lawns. The current level of sheep grazing is considered to be having a positive effect on the Vertigo geyeri habitat, by maintaining a short, open sward, but without any signs of overgrazing. As long as conditions remain as they are, this is an important site for Vertigo geyeri, and is likely to remain so.

3. TRANSECT DETAILS

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

Start point:	G 77735 48656	Edge of track	
End point:	G 77700 48722	V. tall, dense tussocks of Juncus effusus.	
Transect length:	80	**Direction:**	As for 2007-2012
Description:	As for 2007-2012		
Sampling frequency:	As for 2007-2012		

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

Start point:	G 77736 48654	Trackway opposite a stone wall	
End point:	G 77700 48726	Ends at 79.6m at a “rustic” fence post that stands out from regular fence poles around it at G7770 48726	
Transect length:	79.6	**Direction:**	SE-NW
Description:	The transect starts at the track and runs up a gentle slope across a series of flushing runnels and higher ‘ridges’ and a large patch of mossy/sedge lawn. The latter part of the transect comprises rough Juncus effusus dominated grassland.		
Sampling frequency:	Starting at the 0 metre end, the habitat (at the plant community level) along the tape was described and the linear distance of that habitat type measured. This was repeated every time the habitat changed, thereby delineating uniform plant community zones along the transect. 3 samples were taken from areas of optimal habitat and analysed in the laboratory for their snail composition.		

4. RESULTS

Polygon habitat characteristics

Monitoring Period: 2013-2018

Polygon	Habitat Type	Area (ha)	Comment
A	Optimal-Suboptimal	5.4527	Polygon A: No change to polygon status or boundaries. Large polygon with numerous flushes and springs, and extensive areas of suitable habitat.
B	Optimal-Suboptimal	0.5439	Polygon B: No change to polygon status or boundaries. Small polygon with small but good quality habitat present.
C	Optimal-Suboptimal	1.5433	Polygon C: No change to polygon status or boundaries. Excellent quality habitat here, consisting of numerous flushes, runnels and lawns.
D	Optimal-Suboptimal	0.8367	Polygon D: No change to polygon status or boundaries. Good quality flushed habitat present.
E	Optimal-Suboptimal	5.054	Polygon E: No change to polygon status or boundaries. Large polygon with flushes, runnels and springs, and good areas of suitable habitat.

Monitoring Period: 2007-2012

Polygon	Habitat Type	Area (ha)	Comment
A	Sub-optimal with optimal areas	5.4527	Polygon area A
B	Sub-optimal with optimal areas	0.5439	Polygon B
C	Sub-optimal with optimal areas	1.5433	Polygon C
D	Sub-optimal with optimal areas	0.8367	Polygon D
E	Sub-optimal with optimal areas	5.054	Polygon E

Transect habitat characteristics (Note: only three habitat categories were used in 2007-2012 survey)

Monitoring period: 2013-2018

Transect	Optimal habitat	Optimal/Subopt.	Sub-optimal	Subopt/Unsuitable	Unsuitable	Optimal wetness	Too Wet	Too Dry
1	16m	4m	0.5m		59.5m	20.5m		59.5m

Monitoring period: 2007-2012

Transect	Optimal habitat	Optimal/Subopt.	Sub-optimal	Subopt/Unsuitable	Unsuitable	Optimal wetness	Too Wet	Too Dry
1	21.3m	NA		NA	58.3m	17.8m	3.5m	58.3m

Transect samples

Mon. period	Transect	Sample	Location	Adults	Juveniles	Total		Habitat suitability
Monitoring period 2013-2018 Transect 1 (3 samples)								
2013-2018	1	1	4m	1	0	1	Count	Optimal-Suboptimal
2013-2018	1	2	22m	21	1	22	Count	Optimal
2013-2018	1	3	27m	8	1	9	Count	Optimal
Monitoring period 2007-2012 Transect 1 (3 samples)								
2007-2012	1	1	8m	0	0	18		
2007-2012	1	2	22m	0	0	8		
2007-2012	1	3	28m	0	0	7		

Spot Samples

Mon. period	Sample	Grid ref.	Adults	Juveniles	Total		Habitat suitability
Monitoring period 2013-2018 (6 samples)							
2013-2018	01	G 77976 49379	6	1	7	Count	Optimal
2013-2018	02	G 77952 49276	3	1	4	Count	Optimal
2013-2018	03	G 77919 49192	8	0	8	Count	Optimal
2013-2018	04	G 78331 50037	9	2	11	Count	Optimal
2013-2018	05	G 78158 50066	7	1	8	Count	Optimal
2013-2018	06	G 78133 49886	9	14	23	Count	Optimal
Monitoring period 2007-2012 (8 samples)							

2007-2012	C1	G 77975 49391	0	0	5
2007-2012	C2	G 77962 49362	0	0	21
2007-2012	C3	G 77971 49350	0	0	2
2007-2012	C4	G 77952 49267	0	0	11
2007-2012	E5	G 78331 50035	0	0	11
2007-2012	E6	G 78222 50079	0	0	0
2007-2012	E7	G 78150 50069	0	0	26
2007-2012	E8	G 78137 50067	0	0	26

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 3 of the zones on the Transect which support optimal or sub-optimal habitat	Present in 3 zones	Pass
2007-2012	1	Presence/Absence	Adult or sub-adult snails are present in 3 of the zones on the Transect which support optimal or sub-optimal habitat	Present in 3 zones	Pass

Mon. period	Indicator	Target	Result	Pass/Fail
2013-2018	Presence/Absence	Adult or sub-adult snails are present in 2 locations within Polygon C, and 2 locations within Polygon E which support optimal or sub-optimal habitat	Present in 2 samples in Polygon C and 2 samples in Polygon E	Pass
2007-2012	Presence/Absence	Adult or sub-adult snails are present in 2 locations within Polygon C, and 2 locations within Polygon E which support optimal or sub-optimal habitat	in 4 samples in Polygon C, and 3 in Polygon E	Pass

Mon. period	Population Notes
2013-2018	In the previous monitoring round, 2007-2012, Vertigo geyeri was recorded from three out of three samples along Transect 1 and from seven out of eight samples split evenly between polygons C and E. The current survey recorded Vertigo geyeri at three locations along the transect from three samples, and from all six spot samples taken. This includes at two locations in each of polygons C and E, as well as additional samples in B and D. Numbers were moderate to high throughout, indicating a healthy population. Based on the criteria of Moorkens & Killeen (2011), the Population Assessment for Tievebaun is Favourable (green).
2007-2012	the snail is present on the transect and at other locations in good 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	At least 20m of habitat along the Transect is classed as suitable (Optimal or Sub-optimal habitat)	20.5m is suitable	Pass
2013-2018	1	Habitat quality	Soils, at time of sampling, are saturated (optimal wetness) for at least 20m along the Transect	20.5m is Optimal wetness	Pass
2007-2012	1	Habitat extent	At least 20m of habitat along the Transect is classed as suitable (Optimal or Sub-optimal habitat)	21.3m is suitable	Pass
2007-2012	1	Habitat quality	Soils, at time of sampling, are saturated (optimal wetness) for at least 20m along the Transect	21.3m is optimal wetness	Pass

5.2.2 Site level

Mon. period	Indicator	Target	Result	Pass/Fail
2013-2018	Habitat extent	At least 12ha of the site within the polygons (A to E) should support areas of optimal and sub-optimal habitat	13.4ha Optimal-Suboptimal	Pass
2007-2012	Habitat extent	At least 12 ha of the site within the polygons (A to E) should support areas of optimal and sub-optimal habitat	13.4 ha with areas of optimal and sub-optimal	Pass

Mon. period	Habitat Notes
2013-2018	The five habitat polygons were all classified as Optimal and Sub-optimal in the 2007-2012 monitoring round, comprising 13.4ha. No change was recorded in the current survey, with 13.4ha still classified as Optimal-Suboptimal. Transect 1 continues to support sufficient suitable habitat and wetness along its length. Based on the criteria of Moorkens & Killeen (2011), the Habitat Assessment for Tievebaun is Favourable (green).
2007-2012	The habitat throughout the site is in good condition for V. geyeri

5.3 Future Prospects Assessment

Mon. period	Activity code	Activity description	Location	Intensity	Influence	Area affected	Comment
2013-2018	A04.02.02	non intensive sheep grazing	Inside	High	Positive	100%	Current grazing levels ideal throughout
2007-2012	A04.02.02	non intensive sheep grazing	Inside	Low	Neutral	13.4ha	The present levels of low intensity sheep grazing is not having a negative impact on the quality of the habitat. However, if the levels of sheep stocking increase or cattle were introduced then the impact would be severely negative.

Mon. period	Future Prospects Notes
2013-2018	The only activity noted within the Tievebaun site influencing the Vertigo geyeri habitat is non-intensive sheep grazing, which was considered to be having a positive effect by maintaining a short, open sward suitable for the snail. Based on this, the Future Prospects for Tievebaun are considered to be Favourable (green).
2007-2012	On the basis of the status quo being maintained, 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 results for the population and habitat assessments, as well as the Future Prospects, the Overall Assessment for Tievebaun is Favourable (green).
2007-2012	Tievebaun is a very good site for Vertigo geyeri. Optimal and sub-optimal habitat occurs over a wide area. The snail is present in good numbers throughout, and there appear to be few imminent threats. The quality of the habitat along the transect was virtually unchanged from 2005. The habitat elsewhere was also unchanged although in Polygon E the condition of the habitat appeared to be better. Generally the numbers of V. geyeri at other locations were higher in 2008 than in previous surveys.

6. DISCUSSION

Monitoring period

2013-2018

Area of occupancy: Seepages along the eastern slopes of Tievebaun Mountain, from G 78263 49860 to G 7778 4854. Following the R280 north of Glenade Lough, take the left turn at Glenade, and the small road left after crossing the Black River.

Discussion:

The Overall Assessment for Tievebaun in the monitoring period 2007-2012 was Favourable (green) and in the current monitoring period (2013-2018) the site remains Favourable (green). Vertigo geyeri was recorded at all nine locations sampled, and in good numbers throughout, and suitable habitat is found across the site in the form of numerous often expansive flushes, seepages, springs and lawns. The current level of sheep grazing is considered to be having a positive effect on the Vertigo geyeri habitat, by maintaining a short, open sward, but without any signs of overgrazing. As long as conditions remain as they are, this is an important site for Vertigo geyeri, and is likely to remain so.

Monitoring recommendations:

Due to the Favourable status of the site, monitoring should be repeated six-yearly intervals. Monitoring should follow that set out in Moorkens & Killen (2011):

- Repeat Transect 1, delineate the plant community/habitat zones, and assign the habitat and wetness in each zone as Optimal, Optimal-Suboptimal, Suboptimal, Suboptimal-Unsuitable or Unsuitable, and Too dry, Optimal wetness or Too wet, respectively
- Take at least 3 samples from the most suitable habitat on the transect and analyse for molluscan composition
- Describe habitat and take at least 2 samples from the most suitable habitat in each of polygon areas C and E of this survey and analyse for molluscan composition
- Re-determine boundary of all 5 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 geyeri
- Use results to determine overall condition assessment

Management recommendations:

No change to the management of the site is needed. Non-intensive sheep grazing at the current level is ideal for maintaining the Vertigo geyeri habitat at the site.

Vertigo geyeri monitoring at Tievebaun

2007-2012

Area of occupancy: Seepages along the eastern slopes of Tievebaun Mountain, from G 78263 49860 to G 7778 4854. Following the R280 north of Glenade Lough, take the left turn at Glenade, and the small road left after crossing the Black river.

Discussion:

Monitoring recommendations:

Frequency: Next monitoring due 2011
Methods (see Section 2 of main report for full details). Assessment of the transect and other locations with snail sampling, plus assessment of condition of polygon. Prescription as follows:
- Repeat transect 1, delineate the plant community/habitat zones, and assign the habitat and wetness in each zone as Optimal, Sub-optimal or Unsuitable
- Take at least 3 samples from the most suitable habitat on the transect and analyse for molluscan composition
- Describe habitat and take at least 2 samples from the most suitable habitat in each of Polygon areas C and E of this survey and analyse for molluscan composition
- Re-determine boundary of all 5 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. geyeri
- Use results to determine overall condition assessment

Additional surveillance is recommended at 6 yearly intervals

Frequency: Next monitoring due 2014
Methods (see Section 2 of main report for full details). Prescription as follows:
- Describe habitat and take 3 samples from the most suitable habitat in each of Polygons B and D of this survey) and analyse for molluscan composition

Management recommendations:

Existing Management

The management of the Tievebaun area is complex, being a series of long linear fields running from the higher altitude hill slopes down towards the road below. Information was not forthcoming from the landowners of this complex, so information had to be gained from observations on site visits, but the past management and current management are unlikely to be very different. Within the five polygons with Vertigo geyeri habitat, the current management is extensive low density sheep grazing. However, extensive medium density cattle grazing is prevalent in the fields adjacent to the polygons and in surrounding areas. Details of the management over the wider area are given in Moorkens (2006).

Proposed management prescription for site

The management at Tievebaun should remain the same as the present regimes within each management unit for the 2008-2011 period. There is no V. geyeri habitat in the blocks that are being grazed by cattle, but the habitat is unsuitable for the snail, being dense Juncus tussocks without open grassland. There does not appear to be any preferential spring line or flushing in those areas. In contrast, the 5 habitat polygons have spring lines of wet, open low fen sward, which is tufaceous in places. It is important that grazing is neither lowered nor intensified, that no enrichment with fertiliser is allowed, no drainage or alteration of the vegetation in any way takes place. Sheep density was observed to be between 8 and 15 animals per block, and this is equivalent to 1 - 1.5 ewes per hectare. The variations in the linear grazing units from very high moor to lowland semi-improved field below provide the sheep with suitable year-long grazing areas. The narrow spring flushes that constitute the V. geyeri habitats do not appear to be preferentially grazed, although in very dry conditions they may be more in demand, so it is important that stocking levels remain low to prevent trampling damage during drought conditions.

Site report - Vertigo Monitoring

Vertigo geyeri monitoring at Brackloon

1. SITE CODE AND LOCATION DETAILS

1.1 Site code and location

Vertigo Site Code: VgCAM03 **County:** Mayo

SAC Site Code: 001922 Bellacorick Bog Complex

Location description (from baseline survey):

Monitoring period	Date surveyed	Recorders
2013-2018	27 August 2015	John Brophy & Maria Long
2007-2012	n/a	Ian Killeen

1.2 General Habitat Description (from baseline survey):

The habitat associated with Vertigo geyeri within this cSAC is the fragments of rich fen, the poor fen and transition mire, where they are associated with spring-fed (often iron-influenced) flushes at Fermoyle and Brackloon within the wider bog complex. Many of these flushes are very large. The vegetation supported by these flushes includes areas dominated by Sedges (Carex viridula and C. limosa are most associated with V. geyeri) with Black Bog-rush (Schoenus nigricans) and mosses (Drepanocladus revolvens and Homalothecium nitens being most commonly associated with the snail). Common Reed (Phragmites australis) occurs where V. geyeri is present, and the habitat is at the wet and less calcareous edge of its tolerance range. This is compensated for in the Fermoyle flush area by the large amount of habitat present. The Brackloon site in contrast is marginal with little suitable habitat. EU habitats present at V. geyeri habitat are Transition Mires and Quaking Bogs (Code 7140), and in very small areas, vegetation associated with Alkaline fens: low sedge-rich communities (Annex I Habitat 7230) (Romão, 1996; Devillers et al., 1991). The specific areas that are within a wider mosaic, but that form specific V. geyeri habitat fit the Rodwell M9 characteristic vegetation classification (Rodwell, 1991) with affinities to the Phragmitetum mosaics. Species that occur in this group and have been found in association with V. geyeri at Bellacorick are Eriophorum angustifolium, Menyanthes trifoliata, Calliergon cuspidatum, Campylium stellatum, Scorpidium scorpiodes, Drepanocladus revolvens, Carex limosa, Carex viridula, Eleocharis quinqueflora, Potentilla erecta, Pinguicula vulgaris, and Schoenus nigricans. The V. geyeri habitat also falls within the more general habitat of rich fen and flush (PF1) of Fossitt (2000).

1.3 Definition of habitat types (from baseline survey):

Optimal	Mosaic of spring flush vegetation 5-55cm tall, containing species such as Carex viridula, Equisetum spp., Menyanthes trifoliate, Platanthera bifolia, and mosses, with scattered tussocks of Schoenus nigricans no greater than 50cm tall. During sampling the water table should be between 0- 5cm of the soil surface, but not above ground level.
Sub-optimal	Vegetation composition as above (or with Myrica gale, Hydrocotyle, Eriophorum angustifolium, Drosera rotundifolia and D. internedia) but either vegetation height is greater than 50cm, or the water table is below 5cm or ground is flooded at the time of sampling.
Unsuitable	Not defined

2. SUMMARY:

The Vertigo geyeri site at Brackloon has dropped from Unfavourable Inadequate (amber) status to Unfavourable Bad (red). This drop results from the Population Assessment, where only one of four samples was positive for Vertigo geyeri. The site is limited in size, and comprises an area of calcareous flushing on the margins of an almost infilled lake, in an otherwise acid bog habitat. As the lake continues to infill, natural succession processes mean that some areas are becoming drier, and consequently dominated by vegetation unsuited to supporting Vertigo geyeri. Thus the polygon currently includes areas that are too dry for the snail, and dominated by species such as Molinia caerulea and Calluna vulgaris, and also very wet areas of quaking vegetation. While the site requires continued monitoring, no management recommendations are made and the snail's future survival will depend to a large extent on natural factors. As succession continues at this site, the condition of the habitat on the transect in particular is likely to deteriorate in terms of suitability for Vertigo geyeri. For this reason, effort may be better diverted to an increased number of spot samples in future years. Exploration of the nearby record at G072180 (Holyoak, 2005) is recommended.

3. TRANSECT DETAILS

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

Start point:	G 08044 18695	Isolated Salix sp. near Salix spp. clump	
End point:	G 08033 18671		
Transect length:	30	**Direction:**	NE-SW
Description:	As for 2007-2012		
Sampling frequency:	As for 2007-2012		

Vertigo geyeri monitoring at Brackloon

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

Start point:	G 08044 18701	A conspicuous willow tree (1.3m high)
End point:	G 08031 18675	It continues in the direction towards the double telegraph pole to the south-west and finishes where mounds of Calluna vulgaris begin.
Transect length:	30	**Direction:** NE-SW
Description:	The transect crosses a mosaic of flushes, runnels, hummocks with Molinia and heather. Very little of the habitat would be considered as optimal for Vertigo geyeri.	
Sampling frequency:	Starting at the 0 metre end, the habitat (at the plant community level) along the tape was described and the linear distance of that habitat type measured. This was repeated every time the habitat changed, thereby delineating uniform plant community zones along the transect. 2 samples were taken from the best of the sub-optimal habitat and analysed in the laboratory for their snail composition.	

4. RESULTS

Polygon habitat characteristics

Monitoring Period: 2013-2018

Polygon	Habitat Type	Area (ha)	Comment
A	Optimal-Suboptimal	0.616	Polygon A - No change to polygon boundary, but status increased from Suboptimal, to Optimal-Suboptimal. This is based on the occurrence of relatively extensive areas, at the northern end of the polygon in particular, which appear to be suitable for Vertigo geyeri.

Monitoring Period: 2007-2012

Polygon	Habitat Type	Area (ha)	Comment
	Sub-optimal	0.616	All in one habitat polygon - very little scope for improvement or expansion

Transect habitat characteristics (Note: only three habitat categories were used in 2007-2012 survey)

Monitoring period: 2013-2018

Transect	Optimal habitat	Optimal/Subopt.	Sub-optimal	Subopt/Unsuitable	Unsuitable	Optimal wetness	Too Wet	Too Dry
1			10.5m	5.5m	14m	16m		14m

Monitoring period: 2007-2012

Transect	Optimal habitat	Optimal/Subopt.	Sub-optimal	Subopt/Unsuitable	Unsuitable	Optimal wetness	Too Wet	Too Dry
1		NA	24.2m	NA	5.8m	15.9m		14.1m

Transect samples

Mon. period	Transect	Sample	Location	Adults	Juveniles	Total	Habitat suitability
Monitoring period 2013-2018 Transect 1 (2 samples)							
2013-2018	1	1	7m	0	0	0	Suboptimal-Unsuitable
2013-2018	1	2	18m	0	0	0	Suboptimal-Unsuitable
Monitoring period 2007-2012 Transect 1 (2 samples)							
2007-2012	1	1	7m	0	0	0	
2007-2012	1	2	18m	0	0	0	

Spot Samples

Mon. period	Sample	Grid ref.	Adults	Juveniles	Total		Habitat suitability
Monitoring period 2013-2018 (2 samples)							
2013-2018	01	G 08059 18685	1	0	1	Count	Optimal
2013-2018	02	G 08086 18714	0	0	0		Optimal
Monitoring period 2007-2012 (2 samples)							
2007-2012	01	G 08073 18662	0	0	8		
2007-2012	02	G 08086 18725	0	0	1		

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 at least one location on the Transect	V. geyeri not found on transect	Fail
2007-2012	1	Presence/Absence	Adult or sub-adult snails are present in at least one location on the Transect	V. geyeri not found	Fail

Mon. period	Indicator	Target	Result	Pass/Fail
2013-2018	Presence/Absence	Adult or sub-adult snails are present in both suitable flush areas at G0807 1866 and at G0808 1872	Present in 1 flush area	Fail
2007-2012	Presence/Absence	Adult or sub-adult snails are present in both suitable flush areas at G0807 1866 and at G0808 1872	Present in both flush areas	Pass

Mon. period	Population Notes
2013-2018	In the monitoring period 2007-2012, Vertigo geyeri was recorded at both spot sample locations, but at neither transect sample location, resulting in a Population Assessment of Unfavourable Inadequate (amber). The current survey recorded the species at only one spot sample point (out of two spots, and two on the transect). Based on the criteria of Moorkens & Killeen (2011), the Population Assessment for Brackloon is Unfavourable Bad (red).
2007-2012	V. geyeri was not found in the transect. In the 2 other flush areas V. geyeri was present in low to moderate 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	20m of habitat along the Transect is classed as suitable (Suboptimal or better) and soils, at time of sampling, are saturated (optimal wetness) for 20m along the Transect	10.5 m is suitable AND 16 m is Optimal wetness	Fail
2007-2012	1	Habitat extent	20m of habitat along the Transect is classed as Suitable (Optimal or Sub-optimal habitat) and soils, at time of sampling, are saturated (optimal wetness) for 20m along the Transect	24.2m is suitable, 15.9m is optimal wetness	Fail

5.2.2 Site level

Mon. period	Indicator	Target	Result	Pass/Fail
2013-2018	Habitat extent	>0.6 ha of the site within the polygon should support areas of optimal and sub-optimal habitat	0.62ha Optimal-Suboptimal	Pass
2007-2012	Habitat extent	>0.6 ha of the site within the polygon should support areas of optimal and sub-optimal habitat	0.616 ha with areas of optimal and sub-optimal	Pass

Mon. period	Indicator	Target	Result	Pass/Fail
2013-2018	Habitat extent	The habitat in the 2 flush areas at G0807 1866 and at G0808 1872 is classed as suitable (Optimal or Sub-optimal habitat) and Soils, at time of sampling, in the 2 flush areas are saturated (optimal wetness)	Habitat in both flush areas is Optimal and saturated (Optimal wetness)	Pass
2007-2012	Habitat extent	The habitat in the 2 flush areas at G0807 1866 and at G0808 1872 is classed as suitable (Optimal or Sub-optimal habitat) and soils, at time of sampling, in the 2 flush areas are saturated (optimal wetness	Habitat is optimal and is optimal wetness	Pass

Mon. period	Habitat Notes
2013-2018	The polygon containing the Vertigo geyeri habitat at Brackloon consisted of 0.6ha of Suboptimal habitat in the monitoring period 2007-2012, with Habitat Assessment of Unfavourable Inadequate (amber). The polygon area remains unchanged in

2013-2018	the current survey, but is classed as Optimal-Suboptimal due to the presence of areas of potentially suitable habitat. This change is considered interpretive rather than indicating actual ecological change. As in the 2007-2012 period, the site fails the criteria of length of Optimal-Suboptimal habitat, as well as soil wetness, along the transect. As succession continues at this infilling lake site, the suitability of the habitat along the transect for Vertigo geyeri is likely to continue to decrease. Based on the criteria of Moorkens & Killeen (2011), the Habitat Assessment for Brackloon is Unfavourable Inadequate (amber).
2007-2012	The habitat along the transect is marginal.The habitat in the 2 other flush areas is in better condition for V. geyeri

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	50%	As lake continues to infill, scraw being colonised by Molinia, Calluna, etc. (However, at least some areas flushed - may be ok. i.e. no succession)
2007-2012	K02.01	species composition change (succession)	Inside	Medium	Negative	0.616	As the impact is a slow successional change, which may reach an equilibrium based on groundwater influences and/or rainfall patterns, the future is uncertain for the snail at this site. The slow change in groundwater influence may be increasing the acid influence that keeps most of the habitat unsuitable for the species.

Mon. period	Future Prospects Notes
2013-2018	The Future Prospects from the monitoring period 2007-2012 were classed as Unfavourable Inadequate (amber) due to succession across the site. Succession remains the only recognised threat to the suitability of the site for Vertigo geyeri and so the Future Prospects for Brackloon remain Unfavourable Inadequate (amber).
2007-2012	As the impact is a slow successional change, which may reach an equilibrium based on groundwater influences and/or rainfall patterns, the future is uncertain for the snail at this site. The slow change in groundwater influence may be increasing the acid influence that keeps most of the habitat unsuitable for the species. Future prospects have been assessed as Unfavourable inadequate (amber).

5.4 Overall Assessment

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

Mon. period	Overall Notes
2013-2018	While the Habitat Assessment and Future Prospects for Brackloon are classed as Unfavourable Inadequate (amber), the fact that the Population Assessment returned a result of Unfavourable Bad (red) results in an Overall Assessment for the site of Unfavourable Bad (red).
2007-2012	The results obtained in the 2008 survey are generally very similar to those obtained in 2005 . There was a small increase in the amount of Sub-optimal habitat (in terms of both vegetation and wetness level) on the Transect. Overall, the Condition of the site remains Unfavourable Inadequate.

6. DISCUSSION

Monitoring period

2013-2018

Area of occupancy: The Brackloon Vertigo geyeri habitat lies to the western margin of the now dried-up Brackloon Lake, at G080187. Access is from a minor road/track to the north of the site, and requires an approximately 200m walk across cutover bog.

Discussion:

The Vertigo geyeri site at Brackloon has dropped from Unfavourable Inadequate (amber) status to Unfavourable Bad (red). This drop results from the Population Assessment, where only one of four samples was positive for Vertigo geyeri. The site is limited in size, and comprises an area of calcareous flushing on the margins of an almost infilled lake, in an otherwise acid bog habitat. As the lake continues to infill, natural succession processes mean that some areas are becoming drier, and consequently dominated by vegetation unsuited to supporting Vertigo geyeri. Thus the polygon currently includes areas that are too dry for the snail, and dominated by species such as Molinia caerulea and Calluna vulgaris, and also very wet areas of quaking vegetation. While the site requires continued monitoring, no management recommendations are made and the snail's future survival will depend to a large extent on natural factors. As succession continues at this site, the condition of the habitat on the transect in particular is likely to deteriorate in terms of suitability for Vertigo geyeri. For this reason, effort may be better diverted to an increased number of spot samples in future years. Exploration of the nearby record at G072180 (Holyoak, 2005) is recommended.

Monitoring recommendations:

While the site is assessed as Unfavourable Bad (red), the fact that there are no management options available that are likely to improve the suitability of the habitat for Vertigo geyeri, means that one monitoring visit per six-year cycle is adequate. Monitoring should follow that of Moorkens & Killeen (2011), with some additional elements to consider also:

- Repeat Transect 1, delineate the plant community/habitat zones, and assign the habitat and wetness in each zone as Optimal, Optimal-Suboptimal, Suboptimal, Suboptimal-Unsuitable or Unsuitable, and Too wet, Optimal wetness or Too wet, respectively
- Take 2 samples from the most Optimal habitat on the transect and analyse for molluscan composition
- Describe habitat and take 1 sample from the most Optimal habitat in each of 2 other locations (sites S01 and S02 of this survey) and analyse for molluscan composition
- Re-determine boundary of the habitat polygon and assign habitat to Optimal, Optimal-Suboptimal, Suboptimal, Suboptimal-Unsuitable, or Unsuitable
- Assess the management regime and impacts upon the habitat for Vertigo geyeri
- Use results to determine overall condition assessment

Management recommendations:

The site at Brackloon is marginal land that would be hard to access for management, as it is very wet with floating scraw in places. For this reason, no management recommendations are made and the future survival of Vertigo geyeri at this site will be largely dependent on natural factors, particularly related to the continued succession as the lake continues to infill and dry. The presence of flushes will mitigate these processes to some extent, but probably in a limited area.

Vertigo geyeri monitoring at Brackloon

2007-2012

Area of occupancy: Bellacorick Bog Complex is a large peatland site complex consisting of two large areas separated by an area of forestry. The Brackloon V. geyeri habitat lies to the western margin of the now dried-up Brackloon Lake, at G080187.

Discussion:

The actual and potential Vertigo geyeri (i.e. Optimal and Sub-optimal) habitat is restricted to a few patches of where there is calcareous flushing on the western margins of the dried-up lake. Thus it is considered as a marginal site for the species.

Monitoring recommendations:

Given the Unfavourable Condition of the site, 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: Every 3 years (next monitoring due 2011)
Methods (see Section 2 of main report for full details). Assessment of the transect and other sites with snail sampling, plus assessment of condition of polygon. Prescription as follows:
- Repeat transect 1, delineate the plant community/habitat zones, and assign the habitat and wetness in each zone as Optimal, Sub-optimal or Unsuitable
- Take 2 samples from the most Optimal habitat on the transect and analyse for molluscan composition
- Describe habitat and take 1 sample from the most Optimal habitat in each of 2 other locations (sites 1 and 2 of this survey) and analyse for molluscan composition
- Re-determine boundary of the habitat polygon 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. geyeri
- Use results to determine overall condition assessment

Management recommendations:

Existing Management

The Brackloon flush area is not managed by grazing but extensive areas close by have been cut over for peat. From observations in the field and comparisons with maps, it appears that the lake area has reduced in size or is shallower and drier than in the past.

Proposed management prescription

The Brackloon site was so marginal that it would not be appropriate to prescribe specified management for it, as its marginality is mainly due to acidic influences. Therefore, neither the status quo nor grazing management is likely to conserve, improve, or ensure the long term survival of the population at Brackloon. Some drain blockage may be necessary in the future, but not at present.

Site report - Vertigo Monitoring

Vertigo geyeri monitoring at Clonaslee Eskers

1. SITE CODE AND LOCATION DETAILS

1.1 Site code and location

Vertigo Site Code: VgCAM04 **County:** Laois

SAC Site Code: 000859 Clonaslee Eskers and Derry Bog

Location description (from baseline survey):

Vertigo geyeri was known at Clonaslee Eskers from a small spring-seepage area at N 2712 1219. Access to the site from Clonaslee is via the R 4222. A right turn is taken onto the R421 towards Tullamore. After approximately one kilometre, a track from the road into the esker gravel pits should be taken. The small area of V. geyeri habitat is on the left hand side of this track, before it splits in two.

Monitoring period	Date surveyed	Recorders
2013-2018	24 July 2014	John Brophy & Maria Long
2007-2012	10 August 2008	Evelyn Moorkens & Ian Killeen

1.2 General Habitat Description (from baseline survey):

The alkaline fen supported by spring seepages along the base of the esker line provides the calcareous influence for Vertigo geyeri. EU habitats present at potential V. geyeri habitat are Alkaline fens: low sedge-rich communities (Annex I Habitat 7230), and rich fens of CORINE 54.2 (Romão, 1996; Devillers et al., 1991). They fall within the more general habitat of rich fen and flush (PF1) of Fossitt (2000). The specific areas within this small fen that form potential V. geyeri habitat fit the Caricion davallianae group, characteristically featuring Schoenus nigricans, Carex viridula, Campylium stellatum, Ophrys insectifera, Eleocharis quinqueflora and Carex flacca, without falling into any distinctive category, having elements of Rodwell M10 and M13 characteristic vegetation classifications (Rodwell, 1991). The presence of Hypericum maculatum, Potentilla erectum, Potentilla anserina and considerable incursions of Ulex demonstrates that the majority of habitat cannot sustain the sensitive snail. Parts of the habitat edge may have been subject to disturbance and some improvement with fertiliser.

1.3 Definition of habitat types (from baseline survey):

Optimal	As described in Section 3. Flushed fen grassland or with sedge/moss lawns, hollows and mounds, with tufa deposition. 5-15cm tall, containing species such as Carex viridula subsp. brachyrrhyncha, Pinguicula vulgaris, Briza media, Equisetum palustre, Juncus articulatus and the mosses Campylium stellatum, with scattered tussocks of Schoenus nigricans no greater than 80cm tall. During sampling the water table should be between 0-5cm of the soil surface, but not above ground level.
Sub-optimal	Vegetation composition as above but either vegetation height is less than 5cm or greater than 15cm, or the water table is below 5cm or ground is flooded at the time of sampling.
Unsuitable	Not defined

2. SUMMARY:

In 2014, this site was found to be too dry and too overgrown to be suitable for V. geyeri. However, very small remnants of suitable habitat patches were evident. These were generally between and/or shaded by large Schoenus tussocks. Some areas appeared not to be grazed and some grazing is necessary in most cases to maintain habitat suitable for V. geyeri. Other areas appear to receive some grazing, but nonetheless tussocks of Schoenus were very large. This site was characterised by large tussocks, which in ungrazed areas were growing close together and thus completely shading out the ground underneath, and in grazed areas were separated by areas of nearly bare ground with some water movement. Neither situation is suitable for V. geyeri. Drying out appears to be an issue at the site, and this was noted by Moorkens & Killeen (2011). A hydrological study is needed to assess the hydrological situation, particularly with regard to a drain which has been dug in recent years.
A careful grazing regime is required to return this habitat to suitable condition, removing the large Schoenus tussocks now present, but without resulting in poaching.

3. TRANSECT DETAILS

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	0.0899	Polygon A status dropped to Suboptimal-Unsuitable as now very dry with rank vegetation. The boundary was redrawn to better encompass appropriate

Vertigo geyeri monitoring at Clonaslee Eskers

Monitoring Period: 2013-2018

Polygon	Habitat Type	Area (ha)	Comment
			habitat.
B	Suboptimal	0.1123	Polygon B status remains Suboptimal. Was dry at time of sampling, but vegetation was not rank. The boundary was redrawn to better reflect appropriate habitat.
C	Suboptimal-Unsuitable	0.0833	Polygon C status dropped to Suboptimal-Unsuitable. Now rank with species such as Myrica gale, Phragmites australis, Agrostis stolonifera. The boundary was redrawn to better reflect appropriate habitat.
D	Suboptimal-Unsuitable	0.2723	Polygon D - Status dropped to SO/US. Now very rank with tall, dense vegetation and scrub.
E	Suboptimal-Unsuitable	0.2554	Polygon E - Status dropped to SO/US. Most of polygon now rank with frequent Fraxinus excelsior saplings.

Monitoring Period: 2007-2012

Polygon	Habitat Type	Area (ha)	Comment
A	Sub-optimal	0.0867	Polygon A
B	Sub-optimal	0.0784	Polygon B
C	Sub-optimal	0.0796	Polygon C
D	Sub-optimal	0.0327	Polygon D
E	Sub-optimal	0.1839	Polygon E

Transect habitat characteristics (Note: only three habitat categories were used in 2007-2012 survey)

Monitoring period: 2007-2012

Transect	Optimal habitat	Optimal/Subopt.	Sub-optimal	Subopt/Unsuitable	Unsuitable	Optimal wetness	Too Wet	Too Dry
0								

Transect samples

Mon. period	Transect	Sample	Location	Adults	Juveniles	Total	Habitat suitability
Monitoring period 2007-2012 Transect 0 (1 sample)							
2007-2012	0	0	NO TRANSECT RECORDED	0	0	0	

Spot Samples

Mon. period	Sample	Grid ref.	Adults	Juveniles	Total	Habitat suitability
Monitoring period 2013-2018 (6 samples)						
2013-2018	01	N 27134 12195	0	0	0	Suboptimal
2013-2018	02	N 27187 12212	0	0	0	Suboptimal-Unsuitable
2013-2018	03	N 27038 12248	0	0	0	Suboptimal
2013-2018	04	N 26946 12115	0	0	0	Suboptimal
2013-2018	05	N 27020 12348	0	0	0	Suboptimal-Unsuitable
2013-2018	06	N 27088 12344	0	0	0	Suboptimal
Monitoring period 2007-2012 (9 samples)						
2007-2012	01	N 27048 12242	0	0	0	
2007-2012	02	N 27018 12223	0	0	0	
2007-2012	03	N 27037 12252	0	0	0	
2007-2012	04	N 27192 12222	0	0	0	
2007-2012	05	N 27107 12172	0	0	0	
2007-2012	06	N 27006 12339	0	0	0	
2007-2012	07	N 27090 12342	0	0	0	
2007-2012	08	N 27127 12374	0	0	0	
2007-2012	09	N 26928 12078	0	0	0	

5. CONDITION ASSESSMENT

5.1 Population Assessment: 1 passes 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 in at least one of the most favourable flush areas (areas 1, 3, 4, 5, 6, 7 or 9 of the 2008 survey)	Absent from all flush areas	Fail
2007-2012	Presence/Absence	Adult or sub-adult snails are present in at least one of the most favourable flush areas (areas 1, 3, 4, 5, 6, 7 or 9 of the 2008 survey)	Absent in all flush areas	Fail

Mon. period	Population Notes
2013-2018	Vertigo geyeri was not found at any sample location in the current study, which shows no change from the 2007-2012 period. The snail has not been refound in the last three surveys. Based on the criteria of Moorkens & Killeen (2011), the Population Assessment is Unfavourable Bad (red).
2007-2012	the snail could not be found either in the present survey or in 2005

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	As for 2007-12	0.112ha	Fail
2007-2012	Habitat extent	>0.7 ha of the site within the polygons (A to E) should support areas of habitat classed as optimal and sub-optimal	0.078 ha classed as Sub-optimal	Pass

Mon. period	Indicator	Target	Result	Pass/Fail
2013-2018	Habitat extent	Habitat in 6 of the most favourable flush areas (areas 1, 3, 4, 5, 6, 7 or 9 of the 2008 survey) is classed as suitable (Optimal or Sub-optimal habitat)	4 of 6 flush areas are suitable (Suboptimal)	Fail
2013-2018	Habitat quality	Soils, at time of sampling, are saturated (optimal wetness) in 6 of the most favourable flush areas (areas 1, 3, 4, 5, 6, 7 or 9 of the 2008 survey)	2 of 6 flush areas are Optimal wetness	Fail
2007-2012	Habitat extent	Habitat in the 6 most favourable flush areas (areas 1, 3, 4, 5, 6, 7 or 9 of the 2008 survey) is classed as suitable (Optimal or Sub-optimal habitat)	All 7 flush areas are suitable	Pass
2007-2012	Habitat quality	Soils, at time of sampling, are saturated (optimal wetness) in the 6 most favourable flush areas (areas 1, 3, 4, 5, 6, 7 or 9 of the 2008 survey)	All 7 flush areas are optimal wetness	Pass

Mon. period	Habitat Notes
2013-2018	Four out of five habitat polygons at Clonaslee were downgraded from Sub-optimal to Suboptimal-Unsuitable following the current survey. This is due to drying out of the habitat and flushes, and vegetation becoming rank, including areas of scrub

2013-2018	encroachment. It was in the vicinity of Polygon B that the species was originally recorded in 1998, and this remains the best potential area for the species at the site. Based on the criteria of Moorkens & Killeen (2011), the habitat assessment is Unfavourable Bad (red).
2007-2012	Only small areas of the habitat are in good condition for V. geyeri

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	High	Negative	90%	
2013-2018	I02	problematic native species	Inside	Medium	Negative	50%	Myrica gale, Ulex spp. (latter low impact, only 10% of site)
2013-2018	K01.03	Drying out	Inside	Medium	Negative	20%	
2013-2018	K02.01	species composition change	Inside	High	Negative	20%	Fraxinus excelsior
2007-2012	A04.02.01	non intensive cattle grazing	Inside	Medium	Negative	22%	Parts of the tufaceous areas of polygons A and B showed trampling damage with bare tufaceous mud, suggesting that cattle are encroaching at damaging levels on the spring seepage areas, which they are likely to select in preference during dry weather periods. While the numbers of cattle are in non-intensive levels, their management in the most sensitive areas needs to be improved.
2007-2012	J02.01.02	reclamation of land from sea, estuary or marsh	Inside	High	Negative	76%	There is evidence in all of the habitat polygons of scrub encroachment, and the Schoenus tussocks are over 1m in height in places, which is a negative indicator in V. geyeri habitat. In saturated seepage conditions, growth of Schoenus would be curtailed by wetness. The vegetation response suggests that the area may be slowly drying out. Ditching activities
2007-2012	M01	Changes in abiotic conditions	Outside	Medium	Negative	100%	Climate change, where it leads to changes in the intensity and duration of rainfall and results in alternating periods of drought and flooding will result in a compounding negative effect. Where there is robust habitat with a good amplitude of wetness levels such that climatic effects may not result in difficulties, but where drainage is already compromising a site, the problems are likely to be exacerbated and intensified.

Mon. period	Future Prospects Notes
2013-2018	Due to abandonment this site is being negatively impacted by excessive and unchecked growth of tussocky species such as Schoenus nigricans, by succession (Fraxinus excelsior) and problematic native species (Myrica gale). As well as this, the site is much drier than it should be. Due to the negative effects visible at the site the Future Prospects are assessed as Unfavourable Bad (red).

Mon. period	Future Prospects Notes
2007-2012	Future prospects under the present management are negative but may be reversible through management improvements, and be reassessed to determine whether the species has survived at this site. As the drainage impact is severe, Future prospects have been assessed as 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
2007-2012	Red	Green	Red	Red

Mon. period	Overall Notes
2013-2018	Only very small areas of the habitat could potentially support Vertigo geyeri at present due to dense, rank vegetation and a general drying out of the site. The species was not found in 2014, 2008 or 2005. The Overall Assessment is Unfavourable Bad (red).
2007-2012	

6. DISCUSSION

Monitoring period

2013-2018

Area of occupancy: Vertigo geyeri was found at Clonaslee Eskers in a small spring-seepage area at N 2712 1219 in 1998. It has not been found at the site during subsequent surveys in 2005, 2008 and 2014. All polygons except B were downgraded from being Suboptimal to Suboptimal-Unsuitable in 2014. It was in the vicinity of polygon B that the species was originally recorded in 1998, and this remains the best potential area for the species at the site.

Discussion:

In 2014, this site was found to be too dry and too overgrown to be suitable for Vertigo geyeri. However, very small remnants of suitable habitat patches were evident (e.g. small pockets of typical mosses, small areas of tufa, and patchy low-growing sedges). These were generally between and/or shaded by large Schoenus nigricans tussocks. Some areas (polygons C, D and E) appeared not to be grazed. Some grazing is necessary in most cases to maintain habitat suitable for Vertigo geyeri. Other areas (polygons A and B) appear to receive some grazing (though no evidence was seen at the time of survey), but nonetheless tussocks of Schoenus nigricans were very large. Vertigo geyeri requires open habitats, with low-growing sedge/moss lawns. This site was characterised by large tussocks, which in ungrazed areas were growing close together and thus completely shading out the ground underneath, and in grazed areas were separated by areas of nearly bare ground with some water movement. Neither situation is suitable for Vertigo geyeri.

It is unclear to what extent drying (due to the drain noted in Moorkens & Killeen, 2011) and grazing regime have interacted to produce this result, and thus it is difficult to make management recommendations. As noted in Moorkens & Killeen (2011), a hydrological study is needed to confirm the hydrological situation. A drain was recently dug, and they noted that this may be directly drying the site, or may have caused changes in the seepage springs.

Grazing needs to be introduced to the areas not currently grazed, but great care needs to be taken that poaching is not occurring and damaging the remnant potentially suitable pockets. This is an issue particularly because when large tussocks exist, animals often move between tussocks causing excessive poaching in between, but leaving the tussocks themselves largely unchanged.

Monitoring recommendations:

Due to the poor condition of this site monitoring needs to be carried out regularly. Management interventions are needed immediately, and once implemented, monitoring for the snail should take place yearly. The sampling regime can remain the same as for 2014. Site visits to monitor the grazing management will need to be regular, at least for the initial few years.

Given the Unfavourable Condition of the site, it is recommended that monitoring is carried out at appropriate intervals, as per recommendations by Moorkens & Killeen (2011). This should be re-assessed in light of any deterioration of Condition or any changes to site management:

Prescription as follows:

- Describe habitat and take 1 sample from each of the 7 most favourable flush areas (areas 1, 3, 4, 5, 6, 7 and 9 of the 2008 survey) and analyse for molluscan composition
- Re-determine boundary of the habitat polygon and assign habitat to Optimal, Optimal-Suboptimal, Suboptimal, Suboptimal-Unsuitable, or Unsuitable
- Assess the management regime and impacts upon the potential habitat for Vertigo geyeri
- Use results to determine overall condition assessment

Management recommendations:

Drying out had been identified as a problem at Clonaslee by Moorkens & Killeen (2011), along with scrubbing over and the development of large tussocks. This was confirmed in 2014, but in addition, most of the areas of the site had become very rank due to the lack of grazing. In some areas, this vegetation change has been brought about by the exclusion of grazers, which may be the result of misdirected conservation efforts, though this has not been confirmed. The timing of grazing periods should be carefully managed so that grazers are only present in appropriate conditions such as spring and autumn, rather than very wet or very dry periods. Cattle should not be given supplementary feed within the Vertigo geyeri habitat area. This area should also not be enriched with fertiliser. The introduction of grazers to areas with large tussocks may be of limited value without first cutting back the tussocks, as without doing so, grazing may be concentrated in the low-growing areas of the springs and flushes causing further damage.

As noted, the reason for the drying of the site is unclear, so a study aimed at investigating the hydrological situation, and assessing the impact of drains near the site (as mentioned by Moorkens & Killeen (2011)), should be carried out. No maintenance dredging of drains should be carried out as long as they remain a potential cause of hydrological change.

Vertigo geyeri monitoring at Clonaslee Eskers

2007-2012

Area of occupancy: Vertigo geyeri was known at Clonaslee Eskers from a small spring-seepage area at N 2712 1219. Access to the site from Clonaslee is via the R 4222.

Discussion:

No detailed monitoring protocol was established in the 2005 survey, although several of the same flush areas were surveyed, and samples were taken.

There are several spring flush areas with apparently suitable habitat at the site but Vertigo geyeri has not been found at Clonaslee since 1998. Following the negative survey in 2005 it was speculated that the spring seepage system dries during drought conditions (there had been low rainfall in 2005 and the previous winter), whereupon the V. geyeri becomes restricted to very small refugia, and is unlikely to be found in the field or in individual samples. In 1998 when the snail was found in good numbers there was high rainfall from winter 1997 through to summer 1998. However, both 2007 and 2008 were very wet years, and, therefore, the reasons for the absence of the species from the sample sites in 2008 are likely to be due to severely unsuitable conditions during extreme periods of weather and lack of recovery during favourable conditions.

Recent work, including genetic studies, on European populations of Pupilla have shown Pupilla pratensis (Clessin, 1871) to be distinct from Pupilla muscorum (L., 1758) (Proschwitz et al. 2009). The shells are rather similar in morphology but P. pratensis differs from P. muscorum in having a taller and darker shell, a blunter apex, and more weakly developed apertural teeth. However, there are significant differences in ecological requirements. P. pratensis has been reported only from calcareous wetlands whereas P. muscorum is very typical of dry (especially maritime in Ireland) calcareous grasslands.

Clonaslee Eskers is one of only 2 known sites in Ireland for Pupilla pratensis (the other is Waterstown Lough, Co Westmeath). It was first recognised in Ireland during this survey from Clonaslee having previously been recorded as P. muscorum (Moorkens & Killeen 2009). The species occurs in the transition zone between the botanically diverse spring seepage with some patches of tufa formation and wet Festuca rubra and Potentilla anserina grassland. 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. As further work is carried out internationally, the significance of the Irish populations will become clearer, and the species may need to be added to the molluscan red list and considered for protection.

Monitoring recommendations:

Given the Unfavourable 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: Nvery 3 years (next monitoring due 2011)
Methods (see Section 2 of main report for full details). Prescription as follows:
- Describe habitat and take 1 sample from each of the 7 most favourable flush areas (areas 1, 3, 4, 5, 6, 7 and 9 of the 2008 survey and analyse for molluscan composition
- Re-determine boundary of the habitat polygon 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 potential habitat for V. geyeri
- Use results to determine overall condition assessment

Management recommendations:

Existing Management

The area is grazed by 6-8 mature cattle during the winter, and the landowner claims that this regime has been in place for many years (Colm Malone, pers. comm). A ring feeder was used to provide supplementary feed during the winter in the past.

Proposed management prescription

The proposals remain as for those set in 2005 (Moorkens 2006d). While it appears that parts of this site are being encroached by scrub, and that the Schoenus tussocks are over 1m in height in places, presenting unduly high levels of shade beyond the tolerance of V. geyeri, there is no evidence that the area is being undergrazed. On the contrary, other parts of this small area appear considerably disturbed and have the appearance of ground that has been bare but is now recovering. These may be areas where cattle have congregated near supplementary feeders in the past. This combination of vegetation responses suggest that the area may be slowly drying out. There is a drain present at the site, which was not noted in the 1994 NHA survey (Colm Malone, pers. comm.). This was dug at some stage between the 1994 survey and SAC designation, and the habitat may be responding to this influence by drying out.

There is no recommendation for change to the intensity of the grazing regime, but the timing of grazing periods should be carefully managed so that they are only present in appropriate conditions such as spring and autumn rather than very wet or very dry periods. Cattle should not be given supplementary feed within the V. geyeri habitat area. Neither should anywhere in this area be enriched with fertiliser. The drain should not be dug out or lowered. It is unclear whether the drain is directly causing the drying out, or whether there has been an indirect drying due to a change in the hydrological pathway of the spring seepage system. A study of the effects of drainage and potential mitigation of negative effects is recommended.

Site report - Vertigo Monitoring

Vertigo geyeri monitoring at Dooaghtry

1. SITE CODE AND LOCATION DETAILS

1.1 Site code and location

Vertigo Site Code: VgCAM05 **County:** Mayo

SAC Site Code: 001932 Mweelrea/Sheeffry/Erriff Complex

Location description (from baseline survey):

Monitoring period	Date surveyed	Recorders
2013-2018	10-11 June 2014	John Brophy & Maria Long
2007-2012	Week beginning 05 August 2008	Evelyn Moorkens & Ian Killeen

1.2 General Habitat Description (from baseline survey):

While the general area in the vicinity of the Vertigo geyeri habitat consists of the wettest part of the Annex I priority habitat Machair (Annex I Habitat 21A0), the specific habitat where the snail is located is Alkaline fens: low sedge-rich communities (Annex I Habitat 7230), and rich fens of CORINE 54.2 (Romão, 1996; Devillers et al., 1991). They fall within the more general habitat of rich fen and flush (PF1) of Fossitt (2000). The specific patches of small fen that form V. geyeri habitat fit the Caricion davallianae group, characteristically featuring Schoenus nigricans, Carex viridula, Calliergonella cuspidata, Drepanocladus revolvens, Eleocharis quinqueflora, Eriophorum angustifolium, Carex flacca, C. dioica, C. hostiana, C. pulicaria, and Parnassia palustris (Rodwell, 1991). Although the V. geyeri habitat is patchy in its distribution over a wide area in this large site, the wider seepage areas close by are extremely important habitat for the rare succinid snail Quickella arenaria, which is very localised and threatened throughout its European range (Wells & Chatfield, 1992).

1.3 Definition of habitat types (from baseline survey):

Optimal	Flushed fen grassland with sedge/moss lawns 5-30cm tall, containing a high diversity with species such as Carex viridula, Parnassia palustris, Pinguicula vulgaris, Juncus articulatus, Eriophorum and the mosses Drepanocladus revolvens, Campylium stellatum, with scattered tussocks of Schoenus nigricans no greater than 80cm tall. During sampling the water table should be between 0- 5cm of the soil surface, but not above ground level.
Sub-optimal	Vegetation composition similar to above but more dominated by Schoenus tussocks with mosses between the tussocks, or overall sward height is >30cm, or the water table is below 5cm or ground is flooded at the time of sampling.
Unsuitable	Not defined

2. SUMMARY:

Overall Dooaghtry is a good site for Vertigo geyeri, with extensive areas of flushes and fen capable of supporting the species. Extensive areas of habitat such as this are uncommon. The site is sheep grazed, and the key to the continued survival of V. geyeri at the site will be the continuation of an appropriate level of grazing. Over much of the site, grazing has probably been too heavy in the past, although the wetter fens and flushes, which support V. geyeri, have been the least affected. In Polygon F, however, the reverse is the case, with undergrazing being a severe issue, in terms of V. geyeri at least. The area is so undergrazed and overgrown that the flushes were no longer visible in 2014. Much of the characteristic flora, and dependent fauna species such as V. geyeri, are being squeezed out. This is the area that needs the largest and quickest intervention at this site.

3. TRANSECT DETAILS

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

Start point:	L 73941 69356	Start at rocky outcrop.	
End point:	L 73947 69280	Ends at reedbed at edge of lake. Quaking.	
Transect length:	77.5	**Direction:**	As for 2007-2012
Description:	As for 2007-2012		
Sampling frequency:	As for 2007-2012		

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

Start point:	L 73940 69361	at the right of a large boulder at the top of the machair transition to fen and lake margin	
End point:		Lake edge with Phragmites australis, Equisetum fluviatile, and Sparganium erectum.	
Transect length:	80	**Direction:**	N-S
Description:	The transect runs through transitions from machair grassland to short sedge and moss flush sward to taller fen with Eriophorum to the lake margin with taller vegetation		
Sampling frequency:	Starting at the 0 metre end, the habitat (at the plant community level) along the tape was described and the linear distance of that habitat type measured. This was repeated every time the habitat changed, thereby delineating uniform plant community zones along the transect. Four samples were taken at various intervals along the transect principally from zones with optimal and sub-optimal habitat and analysed in the laboratory for their snail composition		

4. RESULTS

Polygon habitat characteristics

Monitoring Period: 2013-2018

Polygon	Habitat Type	Area (ha)	Comment
A	Optimal-Suboptimal	19.1759	Polygon A - Polygon B was merged with Polygon A. The combined polygon is Optimal-Suboptimal, unchanged from their separate status. The area supports extensive flush areas with Schoenus nigricans and mosses.
C	Optimal-Suboptimal	4.7408	Polygon C status remains unchanged as Optimal-Suboptimal. The polygon is an extensive hilltop flush area.
D	Optimal-Suboptimal	3.0034	Polygon D status remains unchanged as Optimal-Suboptimal. The habitat is calcareous grassland grading to rich fen at the edge of the lake.
E	Optimal-Suboptimal	5.8315	Polygon E status remains unchanged as Optimal-Suboptimal. The habitat sampled was a rich fen or flush.
F	Unsuitable	10.1553	Polygon F status was dropped to Unsuitable. The vegetation is undergrazed Molinia caerulea tussocks, Schoenus nigricans and Calluna vulgaris.
G	Suboptimal-Unsuitable	10.031	Polygon G status remains unchanged as Suboptimal-Unsuitable. The vegetation is tussocky Molinia caerulea grassland, with a small area of rich flush and also base poor runnels.

Monitoring Period: 2007-2012

Polygon	Habitat Type	Area (ha)	Comment
A	Sub-optimal with optimal areas	13.6363	Polygon A
B	Sub-optimal with optimal areas	4.4604	Polygon B
C	Sub-optimal with optimal areas	4.7416	Polygon C
D	Sub-optimal with optimal areas	2.9666	Polygon D
E	Sub-optimal with optimal areas	5.6799	Polygon E
F	Sub-optimal with unsuitable areas	10.0593	Polygon F
G	Sub-optimal with unsuitable areas	9.808	Polygon G

Transect habitat characteristics (Note: only three habitat categories were used in 2007-2012 survey)

Monitoring period: 2013-2018

Transect	Optimal habitat	Optimal/Subopt.	Sub-optimal	Subopt/Unsuitable	Unsuitable	Optimal wetness	Too Wet	Too Dry
1	20m	14m	35m	8.5m		20m	26.5m	31m

Monitoring period: 2007-2012

Transect	Optimal habitat	Optimal/Subopt.	Sub-optimal	Subopt/Unsuitable	Unsuitable	Optimal wetness	Too Wet	Too Dry
1	26.5m	NA	22.5m	NA	31m	60.5m	2.5m	17m

Transect samples

Mon. period	Transect	Sample	Location	Adults	Juveniles	Total	Habitat suitability
Monitoring period 2013-2018 Transect 1 (3 samples)							
2013-2018	1	1	L 73943 69326	0	0	0	Optimal-Suboptimal
2013-2018	1	2	L 73943 69315	0	0	0	Optimal
2013-2018	1	3	L 73945 69306	4	5	9	Optimal

Monitoring period 2007-2012 Transect 1 (4 samples)						
2007-2012	1	1	25m			0
2007-2012	1	2	40m	0	0	2
2007-2012	1	3	50m	0	0	2
2007-2012	1	4	60m	0	0	0

Spot Samples

Mon. period	Sample	Grid ref.	Adults	Juveniles	Total	Habitat suitability
Monitoring period 2013-2018 (4 samples)						
2013-2018	01	L 75441 68988	3	0	3	Optimal
2013-2018	02	L 74637 69022	4	2	6	Optimal
2013-2018	03	L 74181 68954	0	1	1	Optimal
2013-2018	04	L 74362 68732	0	0	0	Optimal
Monitoring period 2007-2012 (9 samples)						
2007-2012	01	L 75567 68706	0	0	0	
2007-2012	02	L 75411 69000	0	0	9	
2007-2012	03	L 75329 68760	0	0	0	
2007-2012	04	L 74692 69024	0	0	2	
2007-2012	05	L 74469 69102	0	0	3	
2007-2012	06	L 74361 69061	0	0	0	
2007-2012	07	L 74187 68972	0	0	0	
2007-2012	08	L 74205 68962	0	0	0	
2007-2012	09	L 74359 68728	0	0	3	

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 at least 2 of the main habitat zones after 17m on the Transect	Present in 1 of the main habitat zones after 17m on the Transect	Fail
2007-2012	1	Presence/Absence	Adult or sub-adult snails are present in at least 2 of the main habitat zones after 17m on the Transect	Present in 2 zones	Pass

Mon. period	Indicator	Target	Result	Pass/Fail
2013-2018	Presence/Absence	Adult or sub-adult snails are present in 2 other polygon areas which support optimal or sub-optimal habitat	Present in 3 other polygon areas	Pass
2007-2012	Presence/Absence	Adult or sub-adult snails are present in 2 other polygon areas which support optimal or sub-optimal habitat	Present in 4 locations (in 3 polygons)	Pass

Mon. period	Population Notes
2013-2018	The snail was found in four out of seven samples (57%) compared with six out of thirteen (46%) in the previous round of sampling. Only one sample on the transect was positive, as compared to two in 2007-2012. Based on the criteria of Moorkens & Killeen (2011), the Population assessment is Unfavourable Inadequate (amber).
2007-2012	the snail is scattered in its distribution but is 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	At least 20m of habitat along the Transect is classed as Optimal and ≥30m of habitat along the Transect is classed as Optimal or sub-optimal	20m of habitat along the Transect is classed as Optimal and 69m of habitat along the Transect is classed as Optimal or sub-optimal	Pass
2013-2018	1	Habitat quality	Soils, at time of sampling, are saturated (optimal wetness) for >30m along the Transect	Soils, at time of sampling, are saturated (optimal wetness) for 20m along the Transect	Fail
2007-2012	1	Habitat extent	At least 20m of habitat along the Transect is classed as Optimal and >30m of habitat along the Transect is classed as Optimal or sub-optimal	23.5m is optimal and 43m is optimal or sub-optimal	Pass
2007-2012	1	Habitat quality	Soils, at time of sampling, are saturated (optimal wetness) for >30m along the Transect	42.1m is optimal wetness	Pass

5.2.2 Site level

Mon. period	Indicator	Target	Result	Pass/Fail
2013-2018	Habitat extent	At least 30ha of the site should support areas of habitat classed as optimal and sub-optimal	32.8ha Optimal-Suboptimal	Pass
2007-2012	Habitat extent	At least 30 ha of the site should support areas of habitat classed as optimal and sub-optimal	31.67 ha with areas of optimal and sub-optimal	Pass

Mon. period	Habitat Notes
2013-2018	The habitat suitability classification for all the polygons remains the same as for 2007-2012, with the exception of Polygon F, which dropped from Sub-optimal and unsuitable to Unsuitable due to a lack of grazing causing the vegetation to become rank. Based on the criteria of Moorkens & Killeen (2011), the Habitat Assessment is Unfavourable Inadequate (amber).
2007-2012	Much of the habitat at the site appears to be in good condition for V. geyeri,

5.3 Future Prospects Assessment

Mon. period	Activity code	Activity description	Location	Intensity	Influence	Area affected	Comment
2013-2018	A04.01.02	intensive sheep grazing	Inside	Low	Negative	70%	
2013-2018	A04.03	abandonment of pastoral systems, lack of grazing	Inside	High	Negative	30%	
2013-2018	I02	problematic native species	Inside	Low	Negative	1%	Pteridium aquilinum
2007-2012	A04.01.02	intensive sheep grazing	Inside	Low	Neutral	41.28ha	As this is a large site, and is in the majority managed by extensive sheep grazing, this balances the negative impacts of the abandonment in the 10ha Polygon F and the intrusive leisure usage with quad bikes that appeared to be a common summer occurrence.
2007-2012	A04.03	abandonment of pastoral systems, lack of grazing	Inside	Medium	Negative	10ha	Polygon F
2007-2012	G01.03	motorised vehicles	Inside	Medium	Negative	25ha	

Mon. period	Future Prospects Notes

Mon. period	Future Prospects Notes
2013-2018	Moorkens & Killeen (2011) assessed the Future Prospects of Dooaghtry as Favourable (green), based mainly on the appropriate level of grazing by sheep across the site (despite identifying a lack of grazing as an issue in Polygon F, which is enclosed and un-grazed). The lack of grazing in Polygon F has continued into the current study period and the polygon is now assessed as Unsuitable, down from Suboptimal and unsuitable in 2009. Sheep grazing across the site continues to be at a level suitable for the maintenance of Vertigo geyeri habitat in fens and flushes throughout the site. The spread of the native invasive species Bracken (Pteridium aquilinum) poses a risk into the future, but at the moment it is only affecting a very limited area (1%). Based on the condition of the habitat and the activities carried out on the site, in particular the appropriate grazing level by sheep across the majority of the site, the Future Prospects for Dooaghtry are assessed as Favourable (green).
2007-2012	If the management balance changes in the future, the sustainability of the site may not be secure, but for the moment the future prospects seem favourable and 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

Mon. period	Overall Notes
2013-2018	The population and habitat assessments returned results of Unfavourable Inadequate (amber) due to the transect having insufficient areas of Optimal wetness (specifically, some sections were deemed too wet) and an insufficient number of positive samples (two positive samples were needed, while only one was positive). Therefore, while the Future Prospects of the site are considered Favourable (green), the Overall Assessment is Unfavourable Inadequate (amber).
2007-2012	

6. DISCUSSION

Monitoring period

2013-2018

Area of occupancy: As for 2007-2012, Dooaghtry is a 518 hectare coastal machair and wetland complex. Access to the transect site is from Killadoon towards the mouth of the Owennadornann River. For the southern part of the complex, access is from the beach carpark at Trawleckachoolia.

Discussion:

Overall, Dooaghtry is a good site for Vertigo geyeri, with extensive areas of flushes and fen capable of supporting the species. Extensive areas of habitat such as this are uncommon. The site is sheep grazed, and the key to the continued survival of Vertigo geyeri at the site will be the continuation of an appropriate level of grazing. Over much of the site, grazing has probably been too heavy in the past, although the wetter fens and flushes, which support Vertigo geyeri, have been the least affected. In Polygon F, however, the reverse is the case, with undergrazing being a severe issue, in terms of Vertigo geyeri at least. The area is so undergrazed and overgrown that the flushes were no longer visible in 2014. Much of the characteristic flora, and dependent fauna species such as Vertigo geyeri, are being squeezed out. This is the area that needs the largest and quickest intervention at this site.

Monitoring recommendations:

Monitoring should be carried out on a 3-yearly basis, following a modified version of the prescription of Moorkens & Killeen (2011), which now includes a slightly higher number of samples:

- Repeat Transect 1, delineate the plant community/habitat zones, and assign the habitat and wetness in each zone as Optimal, Optimal-Suboptimal, Suboptimal, Suboptimal-Unsuitable, or Unsuitable, and Too dry, Optimal wetness or Too wet, respectively
- Take at least 3 samples from the most suitable habitat on the transect and analyse for molluscan composition
- Describe habitat and take at least 1 sample from the most suitable habitat in each of 4 other locations (e.g. in polygons A, C and E of this survey) and analyse for molluscan composition
- 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 geyeri
- Use results to determine overall condition assessment

Management recommendations:

As noted by Moorkens & Killeen (2011), an appropriate level of sheep grazing is required to maintain the habitat in a condition suitable for Vertigo geyeri in the fens and flushes within the site. The proposed grazing level of 0.85 - 1.0 sheep per hectare should be implemented, but the condition of the sensitive Vertigo geyeri habitats monitored regularly to identify whether this level is appropriate or if it needs to be increased or decreased. Grazing should be reintroduced to Polygon F, as the current un-grazed state makes it largely unsuitable for Vertigo geyeri. Contact should immediately be made with the landowner here, as it is understood that

he is supportive of nature conservation.

2007-2012

Area of occupancy: Dooaghtry is a 518 hectare coastal machair and wetland complex. Access to the transect site is from Killadoon towards the mouth of the Owennadornann River. For the southern part of the complex, access is from the beach carpark at Trawleckachoolia.

Discussion:

Suitable habitat for V. geyeri at Dooaghtry is found over an extensive area from Dooagh Lough, south to near Trawleckachoolia. This mostly comprises the hillside flushing runnels and flush sward, areas to the south east of this lake, and fen pockets and lake edges in the wider site, most especially pockets of tufaceous spring flushes. Open water margins and slacks, and valley floor wetlands have swamp to marsh transitions, suggesting regular inundation rather than fen margins with groundwater seepage or flushing, such unstable inundation being unsuitable for the species.

During the site visits both in 2005 and 2008, V. geyeri was very locally distributed and could not be found (by field searching) in a number of locations with apparently suitable habitat. It should be noted that the fen form of Vertigo pygmaea is very common and widely distributed at Dooaghtry. It is smaller than the typical grassland form, with a weak lip and 4 small teeth, and is very easily mistaken for V. geyeri unless examined microscopically.

The sandbowl snail Quickella arenaria was found throughout the range of the transect from 31m to the lake shore, and also the various hillside flushes that featured a mosaic of cropped sedge and moss carpet and patches of bare ground.

Monitoring recommendations:

Although the Condition of the site, both in terms of habitat and Vertigo geyeri 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 2011
Methods (see Section 2 of main report for full details). Assessment of the transect and other locations with snail sampling, plus assessment of condition of polygon. Prescription as follows:
- Repeat transect 1, delineate the plant community/habitat zones, and assign the habitat and wetness in each zone as Optimal, Sub-optimal or Unsuitable
- Take at least 2 samples from the most suitable habitat on the transect and analyse for molluscan composition
- Describe habitat and take at least 1 sample from the most suitable habitat in each of 3 other locations (e.g. in polygons A, C and E of this survey) and analyse for molluscan composition
- 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. geyeri
- Use results to determine overall condition assessment

Management recommendations:

Existing Management

The long term management regime at Dooaghtry has been a mixture of commonage and private sheep grazing. The entire site has been heavily grazed for many years, resulting in a tightly cropped sward in all but the wettest areas.

In the area around the Transect (polygon A), a recent fence (2004) has separated the commonage area from the private ownership, thus dividing the site into two management units. The Vertigo geyeri habitat falls entirely within the newly fenced-off area. While the commonage area outside the fence was due to be de-stocked by 45.8% under the recent Commonage Framework Plan, it still appears to be heavily grazed. In contrast, the fenced-off area has had light grazing since fencing, and the vegetation is recovering, except for Polygon F, from which grazers have been completely removed.

Proposed management prescription for site

A regime of low intensity, extensive sheep grazing is ideal for both V.geyeri and the rare Quickella arenaria. This is particularly important in maintaining the open transition habitat for V. geyeri in dry years, and at all times for the sand bowl snail Q. arenaria.

It is recommended that conservation grazing of no less than 0.85 sheep per hectare and no more than 1 sheep per hectare. This is taking into consideration that the habitat for V. geyeri is in the fragile flushing hillsides and not the machair plain, the grazing level of which is not relevant to V. geyeri as long as the sub-sites can be separated and the consequences of one grazing level does not impinge on the other. The management of the entire site should be carefully assessed for all qualifying interests for which the site is designated, as ideal management for some qualifying interests may conflict with others. A cross discipline meeting (ideally a site meeting) within NPWS is recommended to address this issue.

Site report - Vertigo Monitoring

Vertigo geyeri monitoring at Drimmon Lough

1. SITE CODE AND LOCATION DETAILS

1.1 Site code and location

Vertigo Site Code: VgCAM06 **County:** Roscommon

SAC Site Code: n/a Not in SAC

Location description (from baseline survey):

Monitoring period	Date surveyed	Recorders
2013-2018	30 June 2014	John Brophy & Maria Long
2007-2012	21 July 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, and bog. EU habitats present at Vertigo geyeri 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). The specific areas that are within a wider mosaic, but that form specific V. geyeri habitat fit the Rodwell M13 characteristic vegetation classification (Rodwell, 1991) within the Schoenetum nigricantis mire group, and specifically the Briza media – Pinguicula vulgaris sub-community, that includes the presence of Schoenus nigricans, Juncus articulatus, Selaginella selaginoides and Triglochin palustris. In areas of lower and more tightly cropped sward, the habitat falls into the Rodwell M10 Pinguiculo-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). Also present on site are 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)

1.3 Definition of habitat types (from baseline survey):

Optimal	Flushed fen grassland with sedge/moss lawns 5-20cm tall, containing a high diversity with species such as Carex viridula, C.dioica, C. rostrata, Briza media, Equisetum palustre, Juncus articulatus and the mosses Drepanocladus revolvens, Campylium stellatum, with scattered tussocks of Schoenus nigricans no greater than 80cm tall. During sampling the water table should be between 0- 5cm of the soil surface, but not above ground level.
Sub-optimal	Vegetation composition as above but either vegetation height is less than 5cm or greater than 20cm, or the Schoenus tussocks are >1m tall, or the water table is below 5cm or ground is flooded at the time of sampling.
Unsuitable	Not defined

2. SUMMARY:

This is a small site, but one which is very important as it supports populations of both Vertigo geyeri and Vertigo angustior. It is vulnerable because of its small size, and because the ground is very wet – thus any changes in management could quickly have detrimental effects (e.g. a reduction in grazing could quickly render the site too over-grown to support either species, whereas an increase in grazing pressure would quickly damage the fragile vegetation and soil in such a wet location). However, the current grazing levels appear to be striking the balance well. Vertigo angustior was found here unexpectedly by Moorkens & Killeen (2011). It was not sampled for specifically in 2014 (and fieldwork was disturbed by arrival of bullocks), but it is recommended that this be prioritised.

Overall the assessment of the suitability of this site for Vertigo geyeri has dropped significantly (from Green in Moorkens & Killeen, 2011, to Red in 2014). This is mainly due to the much reduced numbers of Vertigo geyeri individuals found in the samples. A re-survey of this site is recommended immediately in order to assess if the low numbers represent a trend. An increase in the monitoring frequency to every two years is also recommended based on its vulnerability as outlined above.

3. TRANSECT DETAILS

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

Start point:	M 93272 87400	At west point of gorse bushes	
End point:	M 93320 87380	End transect at fence post with nail in top.	
Transect length:	50.4	**Direction:**	As for 2007-2012
Description:	As for 2007-2012		
Sampling frequency:	As for 2007-2012		

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

Start point:	M 93270 87398	At a large Schoenus tussock just to the SW of a gorse bush
End point:	M 93318 87385	At a fence post near the lake margin
Transect length:	50.4	**Direction:** NW-SE
Description:	The transect starts on a higher slope with wet grassland vegetation and then crosses zones of wet, species-rich calcareous fen with sedges and mosses. It runs in line with a distant telegraph pole.	
Sampling frequency:	Starting at the 0 metre end, the habitat (at the plant community level) along the tape was described and the linear distance of that habitat type measured. This was repeated every time the habitat changed, thereby delineating uniform plant community zones along the transect. 3 samples taken, one from each of the main zones with optimal habitat, and analysed in the laboratory for their snail composition	

4. RESULTS

Polygon habitat characteristics

Monitoring Period: 2013-2018

Polygon	Habitat Type	Area (ha)	Comment
A	Optimal-Suboptimal	1.1211	The polygon status remains the same at Optimal-Suboptimal. The habitat is a small flushed area with low sedges and mosses, and some patches of taller Schoenus nigricans and some tufa formation. The polygon boundary was redrawn to match the fenceline, excluding unsuitable habitat, hence the area reduction.

Monitoring Period: 2007-2012

Polygon	Habitat Type	Area (ha)	Comment
	Sub-optimal with optimal areas	1.42	All of the suitable, mostly optimal and sub-optimal habitat for Vertigo geyeri is contained within one polygon area of 1.42 ha at the northern end of the lough (Figure 1). Within this polygon, 3 smaller units of Schoenus dominated habitat are recognized with the following areas: West (586m2), South (972m2), East (319m2). It should be noted that all of the flush habitat is contained within the boundaries of these polygons, but because of the patchy and discontinuous nature of the flushes, not all of the total area of each will be optimal or sub-optimal habitat.

Transect habitat characteristics (Note: only three habitat categories were used in 2007-2012 survey)

Monitoring period: 2013-2018

Transect	Optimal habitat	Optimal/Subopt.	Sub-optimal	Subopt/Unsuitable	Unsuitable	Optimal wetness	Too Wet	Too Dry
1	7.9m	17.5m	25m			25.4m		25m

Monitoring period: 2007-2012

Transect	Optimal habitat	Optimal/Subopt.	Sub-optimal	Subopt/Unsuitable	Unsuitable	Optimal wetness	Too Wet	Too Dry
1	43.1	NA	6.5	NA	0.8	43.1	3.3	4m

Transect samples

Mon. period	Transect	Sample	Location	Adults	Juveniles	Total	Habitat suitability
Monitoring period 2013-2018 Transect 1 (3 samples)							
2013-2018	1	1	17m	0	0	0	Optimal-Suboptimal
2013-2018	1	2	27m	1	0	1	Optimal
2013-2018	1	3	38m	1	0	1	Optimal-Suboptimal
Monitoring period 2007-2012 Transect 1 (3 samples)							
2007-2012	1	1	18m	0	0	3	
2007-2012	1	2	29m	0	0	7	
2007-2012	1	3	42m	0	0	15	

Spot Samples

Mon. period	Sample	Grid ref.	Adults	Juveniles	Total	Habitat suitability
Monitoring period 2013-2018 (2 samples)						

2013-2018	01	M 93236 87347	0	0	0	Optimal
2013-2018	02	M 93238 87424	0	0	0	Suboptimal
Monitoring period 2007-2012 (3 samples)						
2007-2012	01	M 93311 87452	0	0	0	
2007-2012	02	M 93238 87425	0	0	31	
2007-2012	03	M 93242 87354	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	Presence/Absence	Adult or sub-adult snails are present in the 3 major habitat zones after 6.5m on the Transect	Present in 2 of the major habitat zones after 6.5m on the transect	Fail
2007-2012	1	Presence/Absence	Adult or sub-adult snails are present in the 3 major habitat zones after 6.5m on the Transect	Present in all 3 zones	Pass

Mon. period	Indicator	Target	Result	Pass/Fail
2013-2018	Presence/Absence	Adult or sub-adult snails are present in 2 other locations off transect (e.g. corresponding to sample areas 2 and 3) which support optimal or sub-optimal habitat	Vertigo geyeri not found in samples off the transect	Fail
2007-2012	Presence/Absence	Adult or sub-adult snails are present in 2 other locations off transect (e.g. corresponding to sample areas 2 and 3) which support optimal or sub-optimal habitat	Present in 2 samples	Pass

Mon. period	Population Notes
2013-2018	The Population Assessment for Drimmon Lough shows a reduction in the number of positive samples from five out of six, to two out of five (with both of the latter being on the transect both). There were also many fewer snails (down from a total of 61 to 2). Based on the criteria of Moorkens & Killeen (2011), the Population assessment is Unfavourable Bad (red).
2007-2012	the snail is present on the transect and at other locations in good 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	45m of habitat along the Transect is classed as suitable (Optimal or Sub-optimal habitat)	50.4m of habitat is classed as suitable	Pass
2013-2018	1	Habitat quality	Soils, at time of sampling, are saturated (optimal wetness) for 45m along the Transect	Soils are saturated for 25.4m	Fail
2007-2012	1	Habitat extent	45m of habitat along the Transect is classed as suitable (Optimal or Sub-optimal habitat)	50m is suitable	Pass
2007-2012	1	Habitat quality	Soils, at time of sampling, are saturated (optimal wetness) for 45m along the Transect	46.8m is optimal wetness	Pass

5.2.2 Site level

Mon. period	Indicator	Target	Result	Pass/Fail
2013-2018	Habitat extent	>1.1ha of the site should comprise optimal and sub-optimal habitat (polygon redrawn, therefore target area	1.12ha Optimal-Suboptimal	Pass

2013-2018	Habitat extent	changed)		Pass
2007-2012	Habitat extent	>1.4ha of the site should comprise optimal and sub-optimal habitat	1.23 ha Optimal/Sub-optimal, 0.19 ha Schoenus	Pass

Mon. period	Habitat Notes
2013-2018	The habitat for Vertigo geyeri at Drimmon Lough remains in reltively good condition, but was deemed too dry underfoot along parts of the transect. Based on the criteria of Moorkens & Killeen (2011), the Habitat Assessment is Unfavourable Inadequate (amber).
2007-2012	The habitat throughout the site is in good condition for V. geyeri

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	Positive	100%	There is a moderate level of cattle grazing (bullocks) at the site
2007-2012	A04.02.01	non intensive cattle grazing	Inside	Low	Positive	1.42ha	

Mon. period	Future Prospects Notes
2013-2018	Moorkens & Killeen (2011) assessed the Future Prospects for Drimmon Lough as Favourable (green), with low-intensity cattle grazing considered be having a positive effect on the habitat for Vertigo geyeri. At the time of the current sampling, there were seven young cattle present in the site and this level of grazing appears to be maintaining the habitat in good condition, but the balance is a delicate one. The Future Prospects for Drimmon Lough are considered to be Favourable (green).
2007-2012	The present levels and timing of low intensity cattle grazing are having a positive impact on the quality of the habitat by maintaining the ideal levels of vegetation height. However, if the levels stocking were to increase or their timing prolonged or lessened then the impact could be negative. On the basis of the status quo being maintained, Future prospects have been assessed as Favourable (green).

5.4 Overall Assessment

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

Mon. period	Overall Notes
2013-2018	The limited distribution of Vertigo geyeri at the site and the very low number of snails found results in an Overall Assessment for this site of Unfavourable Bad (red).
2007-2012	

6. DISCUSSION

Monitoring period

2013-2018

Area of occupancy: As in 2007-2012, Drimmon Lough lies in the townland of Cordrumman, c. 5km east of Elphin. Access is from a minor public road. The V. geyeri habitat is the rich fen at the northern end of the lough.

Discussion:

This is a small site, but one which is very important as it supports populations of both Vertigo geyeri and Vertigo angustior. It is vulnerable because of its small size, and because the ground is very wet - thus any changes in management could quickly have detrimental effects (e.g. a reduction in grazing could quickly render the site too over-grown to support either species, whereas an increase in grazing pressure would quickly damage the fragile vegetation and soil in such a wet location). However, the current grazing levels appear to be striking the balance well. Vertigo angustior was found here unexpectedly by Moorkens & Killeen (2011). It was not sampled for specifically in 2014 (and fieldwork was disturbed by arrival of bullocks), but it is recommended that this be prioritised.

Overall the assessment of the suitability of this site for Vertigo geyeri has dropped significantly (from green in Moorkens & Killeen (2011), to red in 2014). This is mainly due to the much reduced numbers of Vertigo geyeri individuals found in the samples. A re-

survey of this site is recommended immediately in order to assess if the low numbers represent a trend. An increase in the monitoring frequency to every two years is also recommended based on its vulnerability as outlined above.

Monitoring recommendations:

A re-survey of this site is recommended immediately in order to assess if the low numbers of V. geyeri recorded in 2014 represent a trend. An increase in the monitoring frequency to every two years is also recommended based on its vulnerability as outlined above.

The monitoring recommendation for Drimmon Lough is as per Moorkens & Killeen (2011), as follows:

- Repeat Transect 1, delineate the plant community/habitat zones, and assign the habitat and wetness in each zone as Optimal, Optimal-Suboptimal, Suboptimal, Suboptimal-Unsuitable, or Unsuitable, and Too dry, Optimal wetness or Too wet, respectively
- Take at least 3 samples from the most suitable habitat on the transect and analyse for molluscan composition
- Describe habitat and take 1 sample from the most suitable habitat in each of 2 other locations (e.g. corresponding to sample areas 2 and 3 of this survey) and analyse for molluscan composition
- 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 geyeri
- Use results to determine overall condition assessment

It is recommended that the site also be fully assessed for Vertigo angustior. This will involve the delineation of polygons, setting up of a transect (if deemed applicable at this site) and the taking of an appropriate number of samples (minimum 3, based on total area deemed potentially suitable). This needs to be done immediately.

Management recommendations:

It is recommended that the status quo remains with regards to grazing levels and timing, but as this site is extremely vulnerable due to its size and wetness, it should be monitored every two years as detailed above.

2007-2012

Area of occupancy: Drimmon Lough lies in the townland of Cordrumman, c.5km east of Elphin. Access is from a minor public road. The V. geyeri habitat if the rich fen at the northern end of the lough.

Discussion:

This is a small but high quality site for Vertigo geyeri. Also present at the site is the Annex II whorl snail Vertigo angustior, which was found at the edge of the north east Schoenus area. The combination of these two rare snails in one area is unusual and is a further indication of the high quality in which this wetland has been maintained.

Monitoring recommendations:

Although the Condition of the site for Vertigo geyeri and its habitat is 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 2011
Methods (see Section 2 of main report for full details). Assessment of the transect and other locations with snail sampling, plus assessment of condition of polygon. Prescription as follows:
- Repeat transect 1, delineate the plant community/habitat zones, and assign the habitat and wetness in each zone as Optimal, Sub-optimal or Unsuitable
- Take at least 3 samples from the most suitable habitat on the transect and analyse for molluscan composition
- Describe habitat and take 1 sample from the most suitable habitat in each of 2 other locations (e.g. corresponding to sample areas 2 and 3 of this survey) and analyse for molluscan composition
- 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. geyeri
- Use results to determine overall condition assessment

It is also recommended that the distribution of Vertigo angustior at the site is more fully investigated.

Management recommendations:

Existing Management

The existing management is low intensity cattle grazing throughout the habitat for this species. At the times visited, the habitat was in good condition, indicating that the land management of cattle numbers and grazing periods is sustainable and sympathetic to the habitat present.

Proposed management prescription for site

The status quo of cattle numbers and grazing periods should be maintained at this site.

Site report - Vertigo Monitoring

Vertigo geyeri monitoring at Sheskinmore Lough

1. SITE CODE AND LOCATION DETAILS

1.1 Site code and location

Vertigo Site Code: VgCAM08 **County:** Donegal

SAC Site Code: 000197 West of Ardara/Maas Road

Location description (from baseline survey):

Monitoring period	Date surveyed	Recorders
2013-2018	18-19 August 2014	John Brophy & Maria Long
2007-2012	2 August 2008	Evelyn Moorkens & Ian Killeen

1.2 General Habitat Description (from baseline survey):

The general habitats in which Vertigo geyeri is present are the topogenous open water transition fen that occupies Sheskinmore Lough edge. This habitat is unusual for V. geyeri in that it consists of the sandy calcareous infilling of the lake, tempered with an input of acidic water from the local igneous rocks, rather than a largely acidic peat structure receiving calcareous spring influences. The result is an unusual vegetation community, an iron influenced marsh meadow fen transition. It is interesting to note that the microhabitat of V. geyeri within the rather unusual fen is actually very typical for the animal, grazing among the roots of Carex viridula and mosses Drepanocladus revolvens, Campylium stellatum, and Scorpidium scorpioides and amongst the decaying roots of the cropped Schoenus nigricans. Within this specific habitat there appeared to be some flushing with calcareous deposition, suggesting that there is some complex groundwater interaction with the surface. The EU habitats present at V. geyeri habitat therefore fit the category of Alkaline fens: low sedge-rich communities (Annex I Habitat 7230), rich fens of CORINE 54.2 (Romão, 1996; Devillers et al., 1991). This falls within the more general habitat of rich fen and flush (PF1) of Fossitt (2000). The specific areas that are within a wider mosaic, but that form specific V. geyeri habitat fit the Campylium stellatum - Scorpidium scorpioides sub-community of the M9 Rodwell characteristic vegetation classification (Rodwell, 1991).

1.3 Definition of habitat types (from baseline survey):

Optimal	Flushed fen sward with sedge and densely mossy areas 5-15cm tall, containing species such as Carex viridula and other short sedges, Pinguicula vulgaris, Parnassia palustris, Equisetum palustre, Juncus articulatus, Epipactis palustris, Eriophorum angustifolium and the mosses Drepanocladus revolvens, Campylium stellatum, with scattered tussocks of Schoenus nigricans no greater than 50cm tall.. During sampling the water table should be between 0- 5cm of the soil surface, but not above ground level.
Sub-optimal	Vegetation composition as above but either vegetation height is less than 5cm or greater than 15cm, or the water table is below 5cm or ground is flooded at the time of sampling.
Unsuitable	Habitat different from that above, swampy lake margins dominated by Phragmites, machair, rough grazed Juncus dominated grassland

2. SUMMARY:

This site hosts an extensive area of suitable habitat for Vertigo geyeri, and this current survey has further extended the already significant area identified by Moorkens & Killeen (2011). Thus this site is a very important one in a national and even international context. Good numbers of Vertigo geyeri were found along the transect (five positive samples out of five), and in two of the three spot samples taken, indicating a healthy population. However, the site has dropped in conservation status from Green to Red. This is because of the poaching damage in the vicinity of the transect. Some areas here are very heavily poached, and now consist of bare mud and open water – clearly not suitable for Vertigo geyeri. The damage is localised, but severe, and resulted in both the habitat assessment and the future prospects assessments being poorer than previous. Immediate action is needed at this part of this site to allow recovery, but in doing so managers must be mindful of the continued need for light grazing across the remainder of the site (specifically, those areas that are currently grazed). This site is managed for conservation (understood to be jointly by National Parks and Wildlife Service and BirdWatch Ireland), and thus making the necessary changes should be possible. There appears to have been a change from cattle to horse grazing in recent years, but this should not be an issue in relation to Vertigo geyeri – rather it is the levels and timing of grazing that matter.

3. TRANSECT DETAILS

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

Start point:	G 69363 95669	Fenceline running along bank.	
End point:	G 69244 95726	Corner of old stone wall	
Transect length:	128	**Direction:**	As for 2007-2012
Description:	As for 2007-2012		
Sampling frequency:	As for 2007-2012		

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

Start point:	G 69361 95673	Sprayed white fencepost with a coin hammered into a crack near the top
End point:	G 69246 95736	The place where the wall meets the fence post in the field corner.
Transect length:	131	**Direction:**
Description:		
Sampling frequency:		

4. RESULTS

Polygon habitat characteristics

Monitoring Period: 2013-2018

Polygon	Habitat Type	Area (ha)	Comment
A	Suboptimal	2.6128	Polygon A has dropped in status to Suboptimal due to poaching, a high water level, and a consequent decrease in potential suitability.
B	Suboptimal	12.8999	Polygon B has increased in status to Suboptimal due to the identification of large areas which are potentially suitable for the species (e.g. Schoenus nigricans fen). Boundary altered to include area of Shoenus nigricans fen to the south.

Monitoring Period: 2007-2012

Polygon	Habitat Type	Area (ha)	Comment
A	Sub-optimal with optimal areas	2.4627	Optimal and sub-optimal flushing moss/sedge sward and fen meadow
B	Sub-optimal with unsuitable areas	12.8974	Mostly unsuitable habitat with swampy lake margins, or cattle grazed rough pasture (Juncus grassland), some patches of sub-optimal fen meadow

Transect habitat characteristics (Note: only three habitat categories were used in 2007-2012 survey)

Monitoring period: 2013-2018

Transect	Optimal habitat	Optimal/Subopt.	Sub-optimal	Subopt/Unsuitable	Unsuitable	Optimal wetness	Too Wet	Too Dry
1	33m	42m	23m	17m	13m	75m	30m	23m

Monitoring period: 2007-2012

Transect	Optimal habitat	Optimal/Subopt.	Sub-optimal	Subopt/Unsuitable	Unsuitable	Optimal wetness	Too Wet	Too Dry
1	49m	NA	75.5m	NA	3.5m	120.5m	4m	3.5m

Transect samples

Mon. period	Transect	Sample	Location	Adults	Juveniles	Total	Habitat suitability
Monitoring period 2013-2018 Transect 1 (5 samples)							
2013-2018	1	1	26m	4	0	4	Suboptimal-Unsuitable
2013-2018	1	2	37.5m	4	2	6	Optimal
2013-2018	1	3	47.5m	11	1	12	Optimal
2013-2018	1	4	67m	2	0	2	Optimal
2013-2018	1	5	87m	1	0	1	Optimal
Monitoring period 2007-2012 Transect 1 (5 samples)							
2007-2012	1	1	27m	0	0	16	
2007-2012	1	2	38m	0	0	12	
2007-2012	1	3	49m	0	0	16	
2007-2012	1	4	65m	0	0	12	
2007-2012	1	5	90m	0	0	6	

Spot Samples

Mon. period	Sample	Grid ref.	Adults	Juveniles	Total	Habitat suitability
Monitoring period 2013-2018 (3 samples)						
2013-2018	01	G 69765 95627	0	0	0	Optimal-Suboptimal

2013-2018	02	G 69499 95680	14	0	14	Optimal
2013-2018	03	G 69459 95766	8	0	8	Optimal

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	1	Presence/Absence	Adult or sub-adult snails are present in 4 of the delineated vegetation zones after 10m on the Transect (minimum 5 samples)	Present in 5 of the delineated vegetation zones after 10m (5 samples)	Pass
2007-2012	1	Presence/Absence	Adult or sub-adult snails are present in 4 of the delineated vegetation zones after 10m on the Transect (minimum 5 samples)	Present in 5 zones	Pass

Mon. period	Population Notes
2013-2018	In 2007-2012, all five samples taken on the transect (Polygon A) were positive, as was the case in 2014. In addition, two positive samples were taken in Polygon B in 2014. Based on the criterion of Moorkens & Killeen (2011), the Population Assessment is Favourable (green).
2007-2012	the snail is present on the transect and at other locations in good 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	At least 120m of habitat along the Transect is classed as suitable (Optimal or Sub-optimal habitat)	98m of habitat is classed as suitable	Fail
2013-2018	1	Habitat quality	Soils, at time of sampling, are saturated (optimal wetness) for at least 100m along the Transect	Soils are saturated for 62m	Fail
2007-2012	1	Habitat extent	At least 120m of habitat along the Transect is classed as suitable (Optimal or Sub-optimal habitat)	124.5m is suitable	Pass
2007-2012	1	Habitat quality	Soils, at time of sampling, are saturated (optimal wetness) for at least 100m along the Transect	120.5m is optimal wetness	Pass

5.2.2 Site level

Mon. period	Indicator	Target	Result	Pass/Fail
2013-2018	Habitat extent	At least 2.25ha of the site within Polygon A should be optimal and sub-optimal habitat	2.61ha Suboptimal	Pass
2007-2012	Habitat extent	At least 2.25 ha of the site within polygons A should be optimal and sub-optimal habitat	2.46 ha with areas of optimal and sub-optimal	Pass

Mon. period	Habitat Notes
2013-2018	Across the site as a whole, the area of potentially suitable habitat has increased; however, the area in which the transect is located has seen a deterioration. The area is quite wet and has suffered from poaching, making some stretches unsuitable for Vertigo geyeri. Based on the criteria of Moorkens & Killeen (2011), the Habtiat Assessment for Sheskinmore Lough is Unfavourable Bad (red).
2007-2012	The habitat throughout the site is in good condition for V. geyeri

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	High	Negative	25%	Heavy poaching and grazing on very wet ground. Large area of mud & open water. V. damaged.

2013-2018	A04.03	abandonment of pastoral systems, lack of grazing	Inside	Low	Negative	50%	Suitable habitat largely managed by wetness. Light grazing may be of benefit.
2007-2012	A04.02.01	non intensive cattle grazing	Inside	Low	Neutral	13.4ha	The present level of low intensity cattle grazing is not having a negative impact on the quality of the habitat, but some localised damage due to excessive trampling was evident in the 2008 survey. This is balanced by the maintenance of ideal vegetation height through grazing management. Therefore, if the levels or time periods of cattle stocking increase then the impact would be negative.

Mon. period	Future Prospects Notes
2013-2018	Non-intensive cattle or horse grazing occurs within Polygon A and parts of Polygon B. Some level of grazing required, but this must be carefully managed to prevent damage to the sensitive habitat of Vertigo geyeri. Moorkens & Killeen (2011) assessed the Future Prospects for Sheskinmore Lough as Favourable (green); however, the current level of grazing/poaching in Polygon A poses a threat to the persistence of the snail in Polygon A, which contains much of the suitable Vertigo geyeri habitat at the site. Consequently, the current study assesses the Future Prospects to be Unfavourable Inadequate (amber).
2007-2012	On the basis of the status quo being carefully maintained, 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	Red	Amber	Red
2007-2012	Green	Green	Green	Green

Mon. period	Overall Notes
2013-2018	Despite the favourable result of the Population Assessment, with Vertigo geyeri found along the transect and in Polygon B, and the Unfavourable Inadequate (amber) result for Future Prospects, the reduction in the suitability of the habitat along the transect has resulted in an Overall Assessment for Sheskinmore Lough of Unfavourable Bad (red).
2007-2012	

6. DISCUSSION

Monitoring period

2013-2018

Area of occupancy: As in 2007-2012, the habitat that supports Vertigo geyeri within this cSAC is the fen habitat at the western edge of Sheskinmore Lough. Access is form the pedestrian routes through the Nature Reserve, or from the caravan park.

Discussion:

This site hosts an extensive area of suitable habitat for Vertigo geyeri, and this current survey has further extended the already significant area identified by Moorkens & Killeen (2011). Thus this site is a very important one in a national and even international context. Good numbers of Vertigo geyeri were found along the transect (five positive samples out of five), and in two of the three spot samples taken, indicating a healthy population. However, the site has dropped in conservation status from Favourable (green) to Unfavourable Bad (red). This is because of the poaching damage in the vicinity of the transect. Some areas here are very heavily poached, and now consist of bare mud and open water - clearly not suitable for Vertigo geyeri. The damage is localised, but severe, and resulted in both the Habitat Assessment and the Future Prospects assessment being poorer than previous. Immediate action is needed at this part of this site to allow recovery, but in doing so managers must be mindful of the continued need for light grazing across the remainder of the site (specifically, those areas that are currently grazed). This site is managed for conservation (understood to be jointly by National Parks and Wildlife Service and BirdWatch Ireland), and thus making the necessary changes should be possible. There appears to have been a change from cattle to horse grazing in recent years, but this should not be an issue in relation to Vertigo geyeri - rather it is the levels and timing of grazing that matter.

Monitoring recommendations:

It is recommended that monitoring be carried out as per Moorkens & Killeen (2011), with the following carried out on a 3 yearly basis:

- Repeat Transect 1, delineate the plant community/habitat zones, and assign the habitat and wetness in each zone as Optimal, Optimal-Suboptimal, Suboptimal, Suboptimal-Unsuitable, or Unsuitable, and Too dry, Optimal wetness or Too dry, respectively
- Take at least 5 samples from the most suitable habitat on the transect and analyse for molluscan composition
- 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 geyeri
- Use results to determine overall condition assessment

On a 6 yearly basis, the following should be added:

- Describe habitat and take 3 samples from the most suitable habitat in Polygon B of this survey and analyse for molluscan composition
- Use results to determine if the habitat within this polygon has improved

Management recommendations:

While grazing is important in maintaining good Vertigo geyeri habitat in many places, it is important that the stocking level or timing of grazing does not result in poaching and damage to the sensitive habitat. Polygon A has been subjected to an inappropriate level of grazing/poaching which has resulted in the loss of much of the moss layer, particularly in the wetter areas. Grazing pressure should be reduced on this part of the site at least to allow the vegetation to recover. As noted by Moorkens & Killeen (2011):

"Cattle grazing on wet sites needs expert husbandry, and cattle need to be moved at signs of hunger or during periods of extreme drought and wet, both of which can lead to excessive trampling damage in the sensitive areas. On a site as important as Sheskinmore, this management must be carefully monitored"

Full management prescriptions detailed by Moorkens & Killleen (2011) are presented below and should continue to be adhered to.

2007-2012

Area of occupancy: The habitat that supports Vertigo geyeri within this cSAC is the fen habitat at the western edge of Sheskinmore Lough. Access is from the pedestrian routes through the nature reserve, or from the caravan park.

Discussion:

The lake margin fen at Sheskinmore, like the habitat throughout this varied and attractive site, is botanically of high diversity and quality. Vertigo geyeri was found to be widespread and relatively common throughout the transect and the wider area of occupancy (polygon A). In all there is 2.5 hectares of habitat for this species, which is a very large area in terms of continuous habitat for this species. This puts Sheskinmore at the highest level of international importance for V. geyeri conservation.

There has been no change in the proportions of optimal and sub-optimal habitat along the transect from 2005 to 2007 and the present 2008 survey. However, in 2008, there was some localised but severe damage to some of the wetter habitat in the lower zones due to cattle trampling. Numbers of Vertigo geyeri have remained high throughout.

While the vegetation is zoned with a suggestion of a transition to drier habitat upslope, this is not borne out by the molluscan species found, with the wettest habitat molluscs (Vertigo antivertigo and Carychium minimum) as well as V. geyeri occurring commonly to the top of the transect. The combination of sandy machair and peat appears to be providing the optimum saturated ground without flooding that allows V. geyeri to spread with ease throughout a wide area of suitability. It is important to ensure that no drainage or other adverse changes are allowed to occur in the area, and that the requirements of the snail habitat are not compromised for other conservation priorities.

Monitoring recommendations:

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 2 of main report for full details) Prescription as follows:
- Repeat transect 1, delineate the plant community/habitat zones, and assign the habitat and wetness in each zone as Optimal, Sub-optimal or Unsuitable
- Take at least 5 samples from the most suitable habitat on the transect and analyse for molluscan composition
- 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. geyeri
- Use results to determine overall condition assessment

Additional surveillance is recommended at 6 yearly intervals

Frequency: Next monitoring due 2014
Methods (see Section 2 of main report for full details). Prescription as follows:
- Describe habitat and take 3 samples from the most suitable habitat in Polygon B of this survey) and analyse for molluscan composition
- Use results to determine if the habitat within this polygon has improved

Management recommendations:

Existing Management

In the 2006 report, the V. geyeri habitat was divided into three management units. These were based on wall and fence divisions that were gated and could be opened and closed to cattle. Within these units are some smaller divisions but these have not been closed off in recent times. During the survey period (August 2005) there were 16 adult and suckler Friesian cattle in the central management unit, the same again in the western management unit and an absence of grazing in the eastern management unit. The cattle grazing appears to be regular in the western unit, and the same cattle tend to be rotated in an ad hoc manner, based presumably on growth conditions and perceived hunger in the cattle by the farmer. This practice has resulted in excellent open vegetation, without hummock forming tussocks, resulting in a molluscan fauna of open ground, which are not suffering from competition from shade loving species. In 2008, 25 cattle were seen on the site, mostly heavy animals but with some young calves. It appeared as though the cattle had been put into the area relatively close to the time of survey and had caused severe localised damage (trampling) to the flush areas.

Proposed management prescription for Vertigo geyeri

The management at Sheskinmore should be reviewed for the 2008-2011 period given the damage observed at the time of the 2008 survey. Ideally there should be no more than 1 livestock unit per hectare, and grazing periods should typically be in the Spring and summer periods, with animals removed for the winter. The grazing at dry times should be very low intensity summer grazing, no more than a week at a time, no more than twice a year, of no more than 0.8 livestock unit per hectare. Livestock should be young suckler or mixed age cattle. There should be no lowering or intensifying of this regime. There should be no supplementary feeding of animals within the Vertigo geyeri habitat. There should be no improvement with fertiliser or drainage of any of the habitat area.

Site report - Vertigo Monitoring

Vertigo geyeri monitoring at Annaghmore Lough

1. SITE CODE AND LOCATION DETAILS

1.1 Site code and location

Vertigo Site Code: VgCAM09 **County:** Roscommon

SAC Site Code: 001626 Annaghmore Lough (Roscommon)

Location description (from baseline survey):

Monitoring period	Date surveyed	Recorders
2013-2018	4-5 November 2015	John Brophy & Maria Long
2007-2012	20 August 2009	Ian Killeen & Maria Long

1.2 General Habitat Description (from baseline survey):

The general habitats in which Vertigo geyeri is present at Annaghmore are the alkaline fen habitats dominated by Schoenus nigricans, lying above the Scirpus lacustris and Phragmites australis reedbeds of the shore. Vertigo geyeri was recorded in 2001 from "the base of low Carex and on the sides of and within Schoenus tussocks" (Holyoak, 2005). This was found to still be the case in 2006, with mossy tufa deposits providing good microhabitat, which is typical for the animal, which grazes among the roots of Carex viridula and mosses Drepanocladus revolvens, Campylium stellatum, and Scorpidium scorpioides and amongst the decaying roots of Schoenus nigricans. Within this specific habitat there was flushing with calcareous deposition, suggesting continuous groundwater interaction with the surface. The EU habitats present at V. geyeri habitat therefore fit the category of Alkaline fens: low sedge-rich communities (Annex I Habitat 7230), rich fens of CORINE 54.2 (Romão, 1996; Devillers et al., 1991). This falls within the more general habitat of rich fen and flush (PF1) of Fossitt (2000). The specific areas that are within a wider mosaic, but that form specific V. geyeri habitat fit the Campylium stellatum - Scorpidium scorpioides sub-community of the M9 Rodwell characteristic vegetation classification (Rodwell, 1991).

1.3 Definition of habitat types (from baseline survey):

Optimal	Flushed fen grassland with sward lawns 10-30cm tall, stony ground with tufa, containing species such as Carex viridula, Equisetum palustre, Juncus articulatus, Pinguicula vulgaris, Schoenus nigricans and the mosses Drepanocladus revolvens, Campylium stellatum. During sampling the water table should be between 0- 5cm of the soil surface, but not above ground level.
Sub-optimal	Vegetation composition as above or including very large Schoenus tussocks >50cm tall, but rest of the vegetation height is less than 5cm or greater than 30cm, or the water table is below 5cm or ground is flooded at the time of sampling, or there are extensive areas of bare ground
Unsuitable	Not defined

2. SUMMARY:

The overall conservation assessment for Annaghmore Lough has dropped from Favourable (green) in 2007-2012 to Unfavourable Bad (red) in 2013-2018. This is due to the fact that it failed the Population Assessment, as no Vertigo geyeri were recorded from the site. Much of the habitat continues to be apparently suitable for supporting the species, so it is unclear what is happening to result in the population suffering such a drop. The overall habitat suitability of the site's polygons has remained unchanged, though localised effects have seen the habitat deteriorate in some places, in particular overgrazing at Transect 3. The vegetation at Transect 4 was covered in unidentified slimy substance (likely to be largely algal), which may have been deposited by receding flood waters, and if so, this flooding may have had a negative effect on the Vertigo geyeri population. Some changes to the grazing regime at the site are recommended in order to combat the effects of overgrazing and undergrazing. Until a clearer picture emerges of the status of the species at this site, repeat surveying is recommended immediately, and within three years at the latest.

3. TRANSECT DETAILS

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

Start point: M 89800 83823 2m East of Hazel tree.

End point: M 89801 83796

Transect length: 26 **Direction:** N-S

Description:

Sampling frequency:

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

Start point: M 89465 83794 Old rotting hawthorn stump is start point

End point: M 89472 83775

Transect length: 20 **Direction:** N-S

Description:

Sampling frequency:

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

Start point:	M 89442 83770	Base of old stone wall.
End point:	M 89451 83758	
Transect length:	16.5	**Direction:** N-S
Description:		
Sampling frequency:		

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

Start point:	M 90982 83899	Start point 7.5 m north of drain.
End point:	M 90931 83992	
Transect length:	122.5	**Direction:** S-N
Description:		
Sampling frequency:		

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

Start point:	M 89806 83824	At the junction of the bracken and Schoenus zones
End point:	M 89806 83797	On the lakeshore
Transect length:	27	**Direction:**
Description:		
Sampling frequency:		

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

Start point:	M 89466 83791	At an old hawthorn
End point:	M 89476 83773	On the lakeshore
Transect length:	21	**Direction:**
Description:		
Sampling frequency:		

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

Start point:	M 89440 83766	At base of wall
End point:	M 89453 83754	At water's edge
Transect length:	18	**Direction:**
Description:		
Sampling frequency:		

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

Start point:	M 90986 83886	Near ditch with gorse bush
End point:	M 90929 83994	Base of slope towards hedgeline
Transect length:	122	**Direction:**
Description:		
Sampling frequency:		

4. RESULTS

Polygon habitat characteristics

Monitoring Period: 2013-2018

Polygon	Habitat Type	Area (ha)	Comment
A	Optimal-Suboptimal	2.3508	Polygon A status remains Optimal-Suboptimal. This is a long, relatively narrow section of lake shore habitat with fen and flushes. There are differing land management regimes, meaning that some areas are grazed bare so as to be devoid of vegetation, whereas other areas are rank and under-grazed.

Vertigo geyeri monitoring at Annaghmore Lough

Monitoring Period: 2013-2018

Polygon	Habitat Type	Area (ha)	Comment
B	Suboptimal	2.912	Polygon B status remains Suboptimal. This is another long section of lake shore, with fen and flush habitat. Again, there is a range of management regimes, with some areas being scrubby and rank, and others somewhat overgrazed.
C	Optimal-Suboptimal	4.8544	Polygon C status remains Optimal-Suboptimal. This large block of habitat consists of Schoenus nigricans fen, which is quite wet in places.
D	Unsuitable	18.1371	Polygon D status remains Unsuitable. This is a very large polygon and does not support habitat which is likely to support Vertigo geyeri populations.
E	Unsuitable	1.0831	Polygon E status remains Unsuitable. This area is drier, and has outcropping rock (limestone pavement), and thus does not represent suitable habitat for Vertigo geyeri.

Monitoring Period: 2007-2012

Polygon	Habitat Type	Area (ha)	Comment
	Unsuitable	18.137	
	Sub-optimal with optimal areas	7.348	
	Sub-optimal	2.912	

Transect habitat characteristics (Note: only three habitat categories were used in 2007-2012 survey)

Monitoring period: 2013-2018

Transect	Optimal habitat	Optimal/Subopt.	Sub-optimal	Subopt/Unsuitable	Unsuitable	Optimal wetness	Too Wet	Too Dry
1		7m		7m	12m	22m		4m
2		10m	6m		4m	20m		
3				16.5m		16.5m		
4		116.5m		6m		116.5m		6m

Monitoring period: 2007-2012

Transect	Optimal habitat	Optimal/Subopt.	Sub-optimal	Subopt/Unsuitable	Unsuitable	Optimal wetness	Too Wet	Too Dry
1	7.1m	NA	7.1m	NA	11.8	14.2m	5.5m	6.3m
2	11m	NA	6m	NA	5.7m	16.7m	0	6m
3	16.5m	NA		NA		16.5m		
4	29.5m	NA	87m	NA	6m	116.5m		6m

Transect samples

Mon. period	Transect	Sample	Location	Adults	Juveniles	Total	Habitat suitability
Monitoring period 2013-2018 Transect 1 (3 samples)							
2013-2018	1	1	6m	0	0	0	Optimal-Suboptimal
2013-2018	1	2	10m	0	0	0	Optimal-Suboptimal
2013-2018	1	3	17m	0	0	0	Suboptimal-Unsuitable
Monitoring period 2013-2018 Transect 2 (2 samples)							
2013-2018	2	1	6m	0	0	0	Optimal-Suboptimal
2013-2018	2	2	11m	0	0	0	Optimal-Suboptimal
Monitoring period 2013-2018 Transect 3 (1 sample)							
2013-2018	3	1	10m	0	0	0	Suboptimal-Unsuitable
Monitoring period 2013-2018 Transect 4 (3 samples)							
2013-2018	4	1	13m	0	0	0	Optimal-Suboptimal
2013-2018	4	2	84m	0	0	0	Optimal
2013-2018	4	3	101m	0	0	0	Optimal
Monitoring period 2007-2012 Transect 1 (3 samples)							
2007-2012	1	1	6m	0	0	0	

2007-2012	1	2	11m	0	0	0
2007-2012	1	3	16.6m	0	0	0
Monitoring period 2007-2012 Transect 2 (2 samples)						
2007-2012	2	1	7m	0	0	0
2007-2012	2	2	13.5m	0	0	1
Monitoring period 2007-2012 Transect 3 (1 sample)						
2007-2012	3	1	8m	0	0	3
Monitoring period 2007-2012 Transect 4 (3 samples)						
2007-2012	4	1	20m	0	0	2
2007-2012	4	2	83m	0	0	0
2007-2012	4	3	109m	0	0	3

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	Presence/Absence	Adult or sub-adult snails are present in at least one sample from Optimal or Sub-optimal habitat on 2 of Transects 1-3	No Vertigo geyeri found in Transects 1-3	Fail
2013-2018	2	Presence/Absence	Included in Transect 1 target		
2013-2018	3	Presence/Absence	Included in Transect 1 target		
2013-2018	4	Presence/Absence	Adult or sub-adult snails are present in at least 2 samples on Transect 4	No Vertigo geyeri found	Fail
2007-2012	1	Presence/Absence	Adult or sub-adult snails are present in at least one sample from Optimal or Sub-optimal habitat on 2 of Transects 1-3	V. geyeri found on 2 transects (T2 & T3)	Pass
2007-2012	2	Presence/Absence	Adult or sub-adult snails are present in at least one sample from Optimal or Sub-optimal habitat on 2 of Transects 1-3	V. geyeri found on 2 transects (T2 & T3)	Pass
2007-2012	3	Presence/Absence	Adult or sub-adult snails are present in at least one sample from Optimal or Sub-optimal habitat on 2 of Transects 1-3	V. geyeri found on 2 transects (T2 & T3)	Pass
2007-2012	4	Presence/Absence	Adult or sub-adult snails are present in at least 2 samples on Transect 4	V. geyeri found in 4 samples	Pass

Mon. period	Population Notes
2013-2018	In the monitoring period 2007-2012, Vertigo geyeri was recorded from five out of nine locations across four transects, leading to a Population Assessment of Favourable (green). There were no positive sample locations from any of the nine samples on the four transects in the current survey. Based on the criteria of Moorkens & Killeen (2011), the Population Assessment for Annaghmore Lough is Unfavourable Bad (red).
2007-2012	the snail is scattered in its distribution and present in rather low numbers

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	>50% of the habitat along Transects 1 and 2 as Sub-Optimal or Optimal	33% of T1 and 80% of T2 is Optimal or Suboptimal	Fail
2013-2018	1	Habitat quality	Soils, at time of sampling, are optimal wetness) for >50% of the length of Transects 1 and 2	85% of T1 and 100% of T2 is Optimal wetness	Pass
2013-2018	2	Habitat extent	Included in Transect 1 target		

2013-2018	2	Habitat quality	Included in Transect 1 target		
2013-2018	3	Habitat extent	>90% of the habitat along Transects 3 and 4 classed as Sub-Optimal or Optimal	0% of T3 and 96% of T4 is Optimal or Suboptimal	Fail
2013-2018	3	Habitat quality	Soils, at time of sampling, are optimal wetness for >90% of the length of Transects 3 and 4	100% of T3 and 96% of T4 is Optimal wetness	Pass
2013-2018	4	Habitat extent	Included in Transect 3 target		
2013-2018	4	Habitat quality	Included in Transect 3 target		
2007-2012	1	Habitat extent	>50% of the habitat along Transects 1 as Sub-Optimal or Optimal	54% of T1 is optimal or sub-optimal	Pass
2007-2012	1	Habitat quality	Soils, at time of sampling, are optimal wetness) for >50% of the length of Transects 1	54% of T1 is optimal wetness	Pass
2007-2012	2	Habitat extent	>50% of the habitat along Transect 2 is classed as Sub-Optimal or Optimal	75% of T2 is optimal or sub-optimal	Pass
2007-2012	2	Habitat quality	Soils, at time of sampling, are optimal wetness for >50% of the length of Transect 2	73% of T2 is optimal wetness	Pass
2007-2012	3	Habitat extent	>90% of the habitat along Transects 3 classed as Sub-Optimal or Optimal	100% of T3 is optimal or sub-optimal	Pass
2007-2012	3	Habitat quality	Soils, at time of sampling, are optimal wetness for >90% of the length of Transect 3	100% of T3 is optimal wetness	Pass
2007-2012	4	Habitat extent	>90% of the habitat along Transect 4 is classed as Sub-Optimal or Optimal	95% of T4 is optimal or sub-optimal	Pass
2007-2012	4	Habitat quality	Soils, at time of sampling, are optimal wetness) for >90% of the length of Transects 3 and 4	95% of T4 is optimal wetness	Pass

5.2.2 Site level

Mon. period	Indicator	Target	Result	Pass/Fail
2013-2018	Habitat extent	>7ha of the habitat at the site Optimal and sub-optimal mosaic	7.2ha Optimal-Suboptimal and 10.25 ha Suboptimal or above	Pass
2007-2012	Habitat extent	>7 ha of the habitat at the site Optimal and sub-optimal mosaic	7.74 ha Opt/Sub-opt, 2.9 ha Sub-opt=10.25 ha total	Pass

Mon. period	Habitat Notes
2013-2018	There are five polygons defined along the north and east of Annaghmore Lough, and the overall Habitat Assessment result for the monitoring period 2007-2012 was Favourable (green). None of the five polygons have changed in their suitability classification in the current survey. However, the length of Optimal and Suboptimal habitat has reduced along transects 1 and 3, from 50% to 33% and 100% to 0%, respectively. The reduction at Transect 3 was the result of the field being extremely heavily grazed and poached, with almost no vegetation of any sort remaining. Based on the criteria of Moorkens & Killeen (2011), the Habitat Assessment for Annaghmore Lough is Unfavourable Inadequate (amber).
2007-2012	much of the habitat at the site appears to be in good condition for V. geyeri

5.3 Future Prospects Assessment

Mon. period	Activity code	Activity description	Location	Intensity	Influence	Area affected	Comment
2013-2018	A03.03	abandonment / lack of mowing	Inside	Medium	Negative	15%	Some areas rank due to lack of grazing
2013-2018	A04.02	non intensive grazing	Inside	High	Negative	5%	Donkeys - Small area very overgrazed. Almost no vegetation remaining

2013-2018	A04.02.03	non intensive horse grazing	Inside	Medium	Positive	20%	Some areas grazed, a few heavily, but mostly ok
2013-2018	H05.01	garbage and solid waste	Inside	High	Negative	1%	Dumping of garden waste
2013-2018	J02.01	Landfill, land reclamation and drying out, general	Inside	High	Negative	3%	Some small areas infilled to provide access to boats and allow mowable lawns
2007-2012	A04.02.01	non intensive cattle grazing	Inside	Low	Neutral	<2.5	Non intensive cattle grazing is an issue in the western part of habitat polygon A. In some places the impact is neutral whereas in other places it is positive. However, as this is incidental and not due to positive management intervention, grazing (A04.02.01) should be considered neutral
2007-2012	A04.03	abandonment of pastoral systems, lack of grazing	Inside	Low	Negative	<2.5ha	The abandonment is having a negative impact on the quality of the habitat around the area of Transect 1.

Mon. period	Future Prospects Notes
2013-2018	The Future Prospects for Annaghmore Lough were deemed to be Favourable (green) for the 2007-2012 monitoring period. Despite the fact that the habitat appears to remain, for the most part, suitable for supporting Vertigo geyeri, there are a number of issues. Foremost is the fact that the snail was not found in any of the nine samples taken from across the site. The lack of grazing in some areas, and overgrazing by donkeys in particular in another, are among the most notable threats to the species at the site. These alone, however, may not account for the decrease in the population, and another variable such as the hydrological/flooding regime may also be a factor. In light of this, the Future Prospects for the Annaghmore Lough are considered to be Unfavourable Inadequate (amber).
2007-2012	The abandonment is having a negative impact on the quality of the habitat around the area of Transect 1. Non intensive cattle grazing is an issue in the western part of habitat polygon A. In some places the impact is neutral whereas in other places it is positive. However, as this is incidental and not due to positive management intervention, grazing (A04.02.01) should be considered neutral.

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	Due to the Population Assessment result being Unfavourable Bad (red), the Overall Assessment is Unfavourable Bad (red).
2007-2012	

6. DISCUSSION

Monitoring period

2013-2018

Area of occupancy: The habitat that supports Vertigo geyeri within this cSAC is the fen habitat surrounding the shores of Annaghmore Lake. Access is from the car park off the Dunmurraghoe to Killynagh Beg Road.

Discussion:

The Overall Conservation Assessment for Annaghmore Lough has dropped from Favourable (green) in 2007-2012 to Unfavourable Bad (red) in 2013-2018. This is due to the fact that it failed the Population Assessment, as no Vertigo geyeri were recorded from the site. Much of the habitat continues to be apparently suitable for supporting the species, so it is unclear what is happening to result in the population suffering such a drop. The overall habitat suitability of the site's polygons has remained unchanged, though localised effects have seen the habitat deteriorate in some places, in particular overgrazing at Transect 3. The vegetation at Transect 4 was covered in unidentified slimy substance (likely to be largely algal), which may have been deposited by receding flood waters, and if so,

this flooding may have had a negative effect on the Vertigo geyeri population. Some changes to the grazing regime at the site are recommended in order to combat the effects of overgrazing and undergrazing. Until a clearer picture emerges of the status of the species at this site, repeat surveying is recommended immediately, and within three years at the latest.

Monitoring recommendations:

Given the unfavourable assessment status of the site, particularly given the lack of any positive Vertigo geyeri samples, it is recommended that monitoring is carried out immediately, or within three years at the latest. The monitoring regime should be re-assessed in light of the findings. Monitoring should follow that of Moorkens & Killeen (2011):

- Assessment of all 4 transects with snail sampling, plus assessment of condition of polygons.
- Repeat transects 1 to 4, delineate the plant community/habitat zones, and assign the habitat and wetness in each zone as Optimal, Optimal-Suboptimal, Suboptimal, Suboptimal-Unsuitable or Unsuitable, and Too dry, Optimal wetness or Too wet, respectively
- Take samples from Optimal-Suboptimal habitat on each transect and analyse for molluscan composition - 3 samples on T1, 2 on T2, 1 on T3, 3 on T4
- Re-determine boundary of each habitat polygon and assign habitat to Optimal, Optimal-Suboptimal, Suboptimal, Suboptimal-Unsuitable, or Unsuitable
- Assess the management regime and impacts upon the habitat for Vertigo geyeri
- Use results to determine overall condition assessment

Management recommendations:

Changes to the grazing regime of a number of areas are required in order to increase habitat suitability for Vertigo geyeri across this site. There are a large number of different management units, meaning that implementing such changes will be challenging. It will require dedicated liaison with a number of landowners, and careful monitoring after any changes are made to ensure the desired results are obtained, and to avoid any unintended damage (e.g. from overgrazing where grazers are introduced to new areas).
In Polygon A, grazing needs to be reduced in some areas at the western end, whereas grazing needs to be introduced to some eastern areas. The area where Transect 3 is located needs to have grazing ceased completely for a year or two to allow recovery (at the time of survey, this area was grazed bare by donkeys, with almost no vegetation at all remaining). In Polygon B, it is the western areas which need re-introduction of grazing, and the eastern areas could benefit from a slight relaxation in grazing pressure. Some areas may need some manual cutting of scrub. Polygon C currently requires no change in management regime.

Liaison with local residents is needed immediately to stop the dumping of garden waste along the roadside. Liaison with owners/managers/users of the boating access areas is needed to ensure no further infilling or development of car parks, slip ways or re-seeded lawns/amenity areas.

Hydrological monitoring of this site (including accessing past data, should this exist) is urgently needed in order to investigate if the flooding/hydrological regime has changed, and may therefore be behind the decrease in the Vertigo geyeri population.

2007-2012

Area of occupancy: The habitat that supports Vertigo geyeri within this cSAC is the fen habitat surrounding the shores of Annaghmore Lake. Access is from the car park off the Dunmurraghoe to Killynagh Beg Road.

Discussion:

V. geyeri could not be found in any of the 3 samples on Transect 1 and only 1 individual was found in the 2 samples on Transect 2. Low numbers were found in the samples from Transects 3 and 4, but overall snail numbers and diversity was low at the time of sampling. However, there was considerable evidence of the habitat having been subject to flood inundations. Such flooding is part of the normal cycle and is likely to have had a short term negative effect on the snails rather than the habitat. It would be expected that snails would retreat to refugia on slightly higher tussocks and mounds and then expand back into a wider area during periods of normal lake levels.

There has been a small deterioration in extent of habitat on Transects 1 and 2 since 2006. On both transects, one habitat zone has changed from being Sub-optimal to Unsuitable. Although this does not affect the overall habitat condition part of the assessment, it demonstrates the need for ongoing monitoring at this site.

The lack of grazing in some areas of the north shore, especially around Transect 1, has resulted in dense, tall growth of Schoenus tussocks in places, which have shaded out the V. geyeri habitat. It would be difficult to address this (except by cropping the Schoenus e.g. by strimming), as the introduction of animals would require fencing and would most likely result in trampling damage to the wettest part of the habitat. Restricting animals to small spaces in fen habitats can result in serious damage unless watched on a daily basis, so micro-management of these areas is not a very feasible option. Cattle do have occasional access to the area by Transect 3 (from the small field above) which has resulted in a much better composition and structure of the fen habitat. However, the frequency of access, time of year and number of animals needs to be carefully monitored to ensure that the current balance is maintained.

This is an important site for V. geyeri as the shore fen is quite widespread, and with the correct management should be sustainable into the future. Correct management is vital for the protection of these lowland alkaline fen populations of V. geyeri.

Monitoring recommendations:

Although the overall assessment of the Condition of the habitat and the feature of the site is Favourable, 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: Every 3 years (next monitoring due 2012)
Methods (see Section 2 of main report for full details). Assessment of all 4 transects with snail sampling, plus assessment of condition of polygons. Prescription as follows:
- Repeat transects 1 to 4, delineate the plant community/habitat zones, and assign the habitat and wetness in each zone as Optimal, Sub-optimal or Unsuitable
- Take samples from Optimal and Sub-optimal habitat on each transect and analyse for molluscan composition - 3 samples on T1, 2 on T2, 1 on T3, 3 on T4
- Re-determine boundary of each habitat polygon 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. geyeri
- Use results to determine overall condition assessment

Management recommendations:

Existing Management

The most intensely grazed areas lie along the western, southern and eastern shores of the lough. They are fenced off and grazed heavily with cattle. The habitat in these areas is hydrologically marginal for V. geyeri and it is unlikely that this could be improved by changing grazing management.

The areas of fen habitat along the north shore, identified in this assessment as Optimal and Sub-optimal habitat have some light grazing by cattle in summer. Some new fencing was evident, which suggests this area may have undergone a recent change in grazing practice, and may be recovering from heavier grazing in the past. The areas in the vicinity of Transect 1 are ungrazed apart from occasional stray animals and are open to the car park and road.

Proposed management prescription for site

The management of the spring line habitat at this site is of the utmost importance. The management at Annaghmore should remain the same as the present regimes within the fen units along the north shore, for the 2011 - 2014 period. Ideally, this is no more than 0.5 livestock units per hectare for summer grazing by cattle between 1st July and 1st October. There should be no lowering or intensifying of this regime. There should be no supplementary feeding of animals within the Vertigo geyeri habitat. There should be no improvement with fertiliser or drainage of any of the habitat area.

The mainly unsuitable areas elsewhere have very marginal habitat and this is not likely to be improved by changing management use. The areas around Transect 1 are mainly ungrazed, and consequently V. geyeri is usually present in only the wettest end of the V. geyeri hydrological gradient as this is where the vegetation is managed by wetness rather than grazing. This management by lack of grazing can continue from 2009 - 2012, but the dense Schoenus beds in the drier areas would benefit from an annual cut (by strimmer or brush cutting where necessary, with subsequent vegetation removal). Spring would be a suitable time for this to take place. Regular

monitoring is recommended to assess the management success.

Site report - Vertigo Monitoring

Vertigo geyeri monitoring at Ballyness Bay

1. SITE CODE AND LOCATION DETAILS

1.1 Site code and location

Vertigo Site Code: VgCAM10 **County:** Donegal

SAC Site Code: 001090 Ballyness Bay

Location description (from baseline survey):

Monitoring period	Date surveyed	Recorders
2013-2018	25 August 2015	John Brophy & Maria Long
2007-2012	n/a	Ian Killeen and Maria Long

1.2 General Habitat Description (from baseline survey):

The general habitats in which Vertigo geyeri is present are the spring and flush line that slopes down towards an Iris marsh within this coastal machair hill. EU habitats present at V. geyeri habitat are Alkaline fens: low sedge-rich communities (Annex I Habitat 7230), rich fens of CORINE 54.2 or CORINE 54.12 (Romão, 1996; Devillers et al., 1991). The habitat is restricted to the spring line and transitional in nature with Carex viridula, Eleocharis quinquefolia, Eriophorum angustifolium and Juncus articulatus. This falls within the more general habitat of rich fen and flush (PF1) of Fossitt (2000).

1.3 Definition of habitat types (from baseline survey):

Optimal	Flushed fen grassland with sward lawns 10-30cm tall, containing species such as Carex viridula, Equisetum palustre, Juncus articulatus, Menyanthes trifoliata and the mosses Drepanocladus revolvens, Campylium stellatum. During sampling the water table should be between 0-5cm of the soil surface, but not above ground level.
Sub-optimal	Vegetation composition as above or including Filipendula ulmaria and Equisetum fluviatile, but either vegetation height is less than 5cm or greater than 30cm, or the water table is below 5cm or ground is flooded at the time of sampling.
Unsuitable	Not defined

2. SUMMARY:

The Overall Conservation Assessment for Ballyness Bay was Favourable (green) in the monitoring period 2007-2012, but has dropped to Unfavourable Bad (red) in the current monitoring period (2013-2018) due to finding the species at only one (rather than two) samples out of four on the transect. However, this site appears to be in good condition and so this result may be a little harsh. Light grazing needs to be maintained to keep the vegetation open, particularly as signs of rankness were noted. The site is currently grazed by cattle, and any increase in grazing level would risk poaching damage. The desired habitat conditions would probably be best achieved by sheep grazing at this site, due to their light weight. It is recommended that Polygon B should be dropped from future monitoring as the habitat is too acid to support Vertigo geyeri, and to the best of our knowledge, the species has not been recorded there.

3. TRANSECT DETAILS

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

Start point: B 92442 33475

End point: B 92365 33512

Transect length: 80 **Direction:** SE-NW

Description: Transect by Moorkens & Killeen (2011) report was 80.3m. 64m shown below is error in original database

Sampling frequency:

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

Start point: B 92413 33468 At a large boulder near the top of the slope

End point: B 92368 33514 Near the telegraph pole in the floor of the valley

Transect length: 64 **Direction:**

Description:

Sampling frequency:

4. RESULTS

Polygon habitat characteristics

Monitoring Period: 2013-2018

Polygon	Habitat Type	Area (ha)	Comment
A	Optimal-Suboptimal	0.5462	Polygon A status emains Optimal-Suboptimal. Boundary redrawn to better

Vertigo geyeri monitoring at Ballyness Bay

Monitoring Period: 2013-2018

Polygon	Habitat Type	Area (ha)	Comment
			reflect the extent of potentially suitable habitat on the ground. The habitat consists of a sloping wet grassland with a number of flushes and runnels.
B	Unsuitable	0.291	Polygon B has been dropped as it does not support habitat suitable for Vertigo geyeri (too acid), and the species has not been recorded from there in this or two previous Moorkens & Killeen surveys.

Monitoring Period: 2007-2012

Polygon	Habitat Type	Area (ha)	Comment
	Sub-optimal with optimal areas	0.466	The main part of the site comprises one polygon of optimal and sub-optimal habitat with an area of 0.4662 ha.

Transect habitat characteristics (Note: only three habitat categories were used in 2007-2012 survey)

Monitoring period: 2013-2018

Transect	Optimal habitat	Optimal/Subopt.	Sub-optimal	Subopt/Unsuitable	Unsuitable	Optimal wetness	Too Wet	Too Dry
1	9m	11m	15m	7m	38m	63m		17m

Monitoring period: 2007-2012

Transect	Optimal habitat	Optimal/Subopt.	Sub-optimal	Subopt/Unsuitable	Unsuitable	Optimal wetness	Too Wet	Too Dry
1	17.5m	NA	20.7m	NA	42.1m	24.2	49.3m	6.8m

Transect samples

Mon. period	Transect	Sample	Location	Adults	Juveniles	Total	Habitat suitability
Monitoring period 2013-2018 Transect 1 (4 samples)							
2013-2018	1	1	9m	0	0	0	Optimal-Suboptimal
2013-2018	1	2	20m	0	0	0	Optimal
2013-2018	1	3	25m	4	1	5	Optimal
2013-2018	1	4	36m	0	0	0	Suboptimal
Monitoring period 2007-2012 Transect 1 (4 samples)							
2007-2012	1	1	9m	0	0	0	
2007-2012	1	2	18m	0	0	4	
2007-2012	1	3	25.6m	0	0	4	
2007-2012	1	4	42m	0	0	0	

Spot Samples

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	1	Presence/Absence	Adult or sub-adult snails are present in at least 2 of the 4 samples taken from Optimal or Sub-optimal habitat on the Transect	Vertigo geyeri found in 1 of the 4 samples	Fail
2007-2012	1	Presence/Absence	Adult or sub-adult snails are present in at least 2 of the 4 samples taken from Optimal or Sub-optimal habitat on the Transect	V. geyeri found in 2 of the 4 samples	Pass

Mon. period	Population Notes
2013-2018	In the monitoring period 2007-2012, Vertigo geyeri was recorded at two of four locations on the transect in Polygon A, with a negative sample taken in Polygon B. Overall, this resulted in a Population Assessment of Favourable (green). In the current survey, the target species was recorded at only one location on the transect. (Note that no samples were taken in Polygon B due to a lack of suitable habitat). Based on the criteria of Moorkens & Killeen (2011), the Population Assessment for Ballyness Bay is Unfavourable Bad (red).
2007-2012	low numbers of V. geyeri were present in 2 of the 4 samples

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	17m of habitat along the first 45m of the Transect is classed as Optimal or Optimal-Suboptimal, and at least 34m is classed as Suboptimal or better	20m of habitat along the Transect is classed as Optimal or Optimal-Suboptimal and 35m of habitat along the Transect is classed as Suboptimal or higher. NOTE: Pass based on reworded criterion due to change to 5-point scale	Pass
2013-2018	1	Habitat quality	Soils, at time of sampling, are saturated (optimal wetness) for at least 24m of the first 45m of the Transect	25m is Optimal wetness	Pass
2007-2012	1	Habitat extent	17m of habitat along the first 45m of the Transect is classed as Optimal, and at least 34m is classed as Optimal or Sub-optimal habitat)	17.5m is Optimal, and 38.2m is Optior Sub-opt	Pass
2007-2012	1	Habitat quality	Soils, at time of sampling, are saturated (optimal wetness) for at least 24m of the first 45m of the Transect	24.2m is Optimal wetness	Pass

5.2.2 Site level

Mon. period	Indicator	Target	Result	Pass/Fail
2013-2018	Habitat extent	At least 0.4-0.5ha of the site optimal and sub-optimal habitat mosaic	0.55ha Optimal-Suboptimal	Pass
2007-2012	Habitat extent	At least 0.4-0.5 ha of the site optimal and sub-optimal habitat mosaic	0.466 ha	Pass

Mon. period	Habitat Notes
2013-2018	In the monitoring period 2007-2012, Polygon A was classed as Optimal and Suboptimal, and Polygon B as Suboptimal and Unsuitable, with an overall Habitat Assessment of Favourable (green) for the site. In the current survey, Polygon B was classed as Unsuitable on the basis of the presence of acid vegetation and a lack of suitable Vertigo geyeri habitat. This is not considered to be ecological change, but rather due to interpretation of suitability. Polygon B should be dropped from the site in future. Polygon A remains Optimal-Suboptimal, with the boundary redrawn to better define the habitat, resulting in an increase in the area from 0.47ha to 0.55ha. During this survey, some changes were made to the status levels of certain zones along the transect, at least some of which due to the use of a five-point suitability scale in the current survey, compared to a three-point one used by Moorkens & Killeen (2011). This means that a slight re-interpretation of the first habitat assessment criterion was needed. Based on the criteria of Moorkens & Killeen (2011), with the slight changed noted here, the Habitat Assessment for Ballyness Bay is Favourable (green).
2007-2012	The habitat 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	Medium	Positive	100%	Very low grazing occuring. Possibly slightly more needed, but ground very fragile => cattle not great.
2007-2012	A04.02.01	non intensive cattle grazing	Inside	Low	Negative	0.466ha	As the site is so small and the spring area is very fragile, the cattle grazing is having a negative impact on the quality of the habitat.

Mon. period	Future Prospects Notes
2013-2018	The Future Prospects for Ballyness Bay in the monitoring period 2007-2012 was Favourable (green) due to the negative (but reducing) impact of non-intensive cattle grazing. In the current survey period, cattle grazing continues to occur at the site,

Mon. period	Future Prospects Notes
2013-2018	but at a level that is considered to be positive in that it prevents the vegetation from becoming rank, while not damaging the habitat through excessive poaching. Thus the Future Prospects of the site are considered to be Favourable (green).
2007-2012	In 2009, whilst cattle were still present on site, the spring area was much less trampled and was showing signs of recovery – hence, the impact is considered low to moderate rather than severe, and therefore Future prospects have been assessed as Favourable (green).

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	Even though both habitat and Future Prospects assessments at this site are Favourable (green), the unfavourable result for the Population Assessment means that an Overall Assessment of Unfavourable Bad (red) applies to the site.
2007-2012	The Condition of the site and the feature based upon the 2009 survey has been assessed as Favourable. The targets have been passed for all of the 3 performance indicators. The results obtained in 2009 show a slight improvement from those in 2006. This is due primarily to the recovery of the habitat around the springhead (zones 6.8-13.5m). One of these zones has improved from Unsuitable to Sub-Optimal habitat, and the other from Sub-Optimal to Sub-Optimal with Optimal patches. In 2006 these zones had been severely damaged by cattle trampling. In 2009, this pressure appears to have been alleviated.

6. DISCUSSION

Monitoring period

2013-2018

Area of occupancy: The habitat that supports Vertigo geyeri within this cSAC is the spring and flush slope north-east of Black Rock (B923335). Access is from the R256 just before the pier at Black Rock.

Discussion:

The Overall Conservation Assessment for Ballyness Bay was Favourable (green) in the monitoring period 2007-2012, but has dropped to Unfavourable Bad (red) in the current monitoring period (2013-2018) due to finding the species at only one (rather than two) samples out of four on the transect. However, this site appears to be in good condition and so this result may be a little harsh. Light grazing needs to be maintained to keep the vegetation open, particularly as signs of rankness were noted. The site is currently grazed by cattle, and any increase in grazing level would risk poaching damage. The desired habitat conditions would probably be best achieved by sheep grazing at this site, due to their light weight. It is recommended that Polygon B should be dropped from future monitoring as the habitat is too acid to support Vertigo geyeri, and to the best of our knowledge, the species has not been recorded there.

Monitoring recommendations:

It is recommended that monitoring at this site is carried out at a minimum of three-yearly intervals, owing to the small area, which is susceptible to change related to grazing pressure. This should be re-assessed in light of any deterioration of condition or any changes to site management. Monitoring should follow that of Moorkens & Killeen (2011):

Assessment of the transect with snail sampling, plus assessment of condition of polygon.

- Repeat Transect 1, delineate the plant community/habitat zones, and assign the habitat and wetness in each zone as Optimal, Optimal-Suboptimal, Suboptimal, Suboptimal-Unsuitable or Unsuitable, and Too dry, Optimal wetness or Too wet, respectively
- Take 4 samples from Optimal-Suboptimal habitat on the transect and analyse for molluscan composition
- Re-determine boundary of the habitat polygon and assign habitat to Optimal, Optimal-Suboptimal, Suboptimal, Suboptimal-Unsuitable, or Unsuitable
- Assess the management regime and impacts upon the habitat for Vertigo geyeri
- Use results to determine overall condition assessment

Management recommendations:

In the monitoring period 2007-2012, Moorkens & Killeen (2011) noted that the habitat had improved due to a reduction in cattle grazing pressure between the 2006 and the 2009 survey. It was recommended that cattle be replaced with sheep at an appropriate stocking level to maintain the low, open sedge-rich sward required by Vertigo geyeri, without the poaching associated with cattle. Appropriate stocking was considered to be 0.8 livestock units per hectare during the summer. It is recommended that this management change be implemented, if possible. This is in order to stop the vegetation becoming rank, which, although not yet a serious issue, was noted in places in the current survey. If cattle do remain as the grazers on the site, then it must be closely monitored to ensure trampling damage does not occur to the fragile spring and flush habitat, and the use of temporary electric fences should be considered to protect the spring zones.

Vertigo geyeri monitoring at Ballyness Bay

2007-2012

Area of occupancy: The habitat that supports Vertigo geyeri within this cSAC is the spring and flush slope north east of Black Rock (B923335). Access is from the R256 just before the pier at Black Rock.

Discussion:

Monitoring recommendations:

Although the overall assessment of the Condition of the habitat and the feature of the site is Favourable, 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: Every 3 years (next monitoring due 2012)
Methods (see Section 2 of main report for full details). Assessment of the transect with snail sampling, plus assessment of condition of polygon. Prescription as follows:
- Repeat transect 1, delineate the plant community/habitat zones, and assign the habitat and wetness in each zone as Optimal, Sub-optimal or Unsuitable
- Take 4 samples from Optimal and Sub-optimal habitat on the transect and analyse for molluscan composition
- Re-determine boundary of the habitat polygon 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. geyeri
- Use results to determine overall condition assessment

Management recommendations:

Existing Management

In 2006 the V. geyeri habitat was being grazed by cattle during the time of the survey (Moorkens 2007a). Summer grazing in the pasture habitat by cattle is common in the general area, but it is not appropriate management for the V. geyeri habitat here. The spring line had become significantly trampled with loss of low sedge community that is necessary for this species.

In 2009, whilst cattle were still present on site, the spring area was much less trampled and was showing signs of recovery – hence, this zone being upgraded from Unsuitable to Sub-Optimal.

Proposed management prescription for site (from 2006 survey)

As part of the Ballyness Bay SAC and as one of the few known sites in County Donegal for V. geyeri, the management of the spring line habitat at this site is of the utmost importance. It is considered that cattle are not the best choice of grazing animal for these slopes, and that sheep would be better as they would cause less trampling damage than cattle. An ideal management prescription for 2007-2011 would be low intensity extensive summer sheep grazing, of no more than 0.8 livestock unit per hectare. Otherwise management of the cattle away from the spring zones by electric fencing, or by careful husbandry with their removal from site at the first sign of pressure on the habitat should be employed.

Site report - Vertigo Monitoring

Vertigo geyeri monitoring at Easkey Valley

1. SITE CODE AND LOCATION DETAILS

1.1 Site code and location

Vertigo Site Code: VgCAM13 **County:** Sligo

SAC Site Code: 002006 Ox Mountains Bogs

Location description (from baseline survey):

Monitoring period	Date surveyed	Recorders
2013-2018	20 August 2015	Rory Hodd & Maria Long
2007-2012	8 August 2009	Evelyn Moorkens & Ian Killeen

1.2 General Habitat Description (from baseline survey):

The habitat associated with Vertigo geyeri within the Easkey Valley are the spring lines and flush zones with associated runnels of low mossy vegetation that are rich in yellow sedges, including Carex viridula, with mosses Drepanocladus revolvens, Campylium stellatum. These runnels are typically close to the Easkey River in wet pockets of habitat that slope down toward river. Some of the richer areas have dense Schoenus tussocks. The EU habitats present at V. geyeri habitat therefore fit the category of Alkaline fens: low sedge-rich communities (Annex I Habitat 7230), rich fens of CORINE 54.2 (Romão, 1996; Devillers et al., 1991). This falls within the more general habitat of rich fen and flush (PF1) of Fossitt (2000).

1.3 Definition of habitat types (from baseline survey):

Optimal	Flushed fen grassland with sward lawns 10-30cm tall, stony ground with tufa, containing species such as Carex viridula, Equisetum palustre, Juncus articulatus, Pinguicula vulgaris, Menyanthes trifoliata, Parnassia palustris and the mosses Drepanocladus revolvens, Campylium stellatum. During sampling the water table should be between 0- 5cm of the soil surface, or in very small pools. OR In site 6, steep slope with tufa and terraces of Schoenus nigricans, Equisetum, Epipactis, mosses, to 0.5m tall
Sub-optimal	Vegetation composition as above or including large Molinia tussocks >40cm tall, but rest of the vegetation height is less than 5cm or greater than 30cm, or the water table is below 5cm or ground is flooded at the time of sampling, or there are extensive areas of bare ground
Unsuitable	Not defined

2. SUMMARY:

The Vertigo geyeri site at Easkey Valley had a conservation assessment of Favourable (green) for the monitoring period 2007-2012, but this has dropped to Unfavourable Bad (red) for the current monitoring period (2013-2018). This is due to a drop in the number of positive samples for Vertigo geyeri. The Habitat Assessment and Future Prospects continue to be Favourable (green), and it is unclear why a lower proportion of samples were positive. While some parts of the site have seen significant changes (e.g. Polygon A – presumed recent agricultural improvement; Polygon I – land clearance), most of the site appears to have remained the same. Future monitoring may benefit from an increased number of samples, but this needs to be weighed against the potential impacts of over-sampling or trampling damage in the most sensitive and/or smaller habitat areas.

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 geyeri monitoring at Easkey Valley

Polygon habitat characteristics

Monitoring Period: 2013-2018

Polygon	Habitat Type	Area (ha)	Comment
A	Suboptimal-Unsuitable	0.2534	Polygon A status remains Suboptimal-Unsuitable. Intensively farmed, with some flushes. Agricultural improvement appears to have taken place since 2009 survey by Moorkens & Killeen (2011).
B	Optimal-Suboptimal	0.1493	Polygon B status increases in status to Optimal-Suboptimal. This polygon includes roadside flushes, and some areas of very good Vertigo geyeri habitat. This change is not thought to be due to ecological improvement, but rather relates to interpretation.
C	Suboptimal-Unsuitable	0.1842	Polygon C status remains Suboptimal-Unsuitable. Grassland with flushes. Suitable habitat of moderate quality, but limited in extent.
D	Suboptimal	0.3355	Polygon D status remains Suboptimal. Grassland with flushes. Suitable habitat of moderate quality, but very limited in extent.
E	Unsuitable	4.1124	Polygon E status remains Unsuitable.
F	Suboptimal-Unsuitable	1.6666	Polygon F status remains Suboptimal-Unsuitable. Grassland with flushes. Suitable habitat of moderate quality, but limited in extent.
G	Unsuitable	3.2351	Polygon G status remains Unsuitable.
H	Unsuitable	0.1253	Polygon H status remains Unsuitable.
I	Suboptimal-Unsuitable	0.3347	Polygon I status remains Suboptimal-Unsuitable. To the east, grassland with flushes, where suitable habitat is of moderate quality, but limited in extent. In the western half of the polygon, the ground had been completely cleared (evident from aerial photography) and is now re-vegetated with Juncus effusus and Cirsium arvensis. This is clearly no longer suitable for Vertigo geyeri.
J	Unsuitable	1.8706	Polygon J status remains Unsuitable.
K	Optimal-Suboptimal	0.5816	Polygon K status remains Optimal-Suboptimal. This consists of a long strip of habitat, most likely formed in an old cart track. It is lower than the surrounding bog/heath/grassland on both sides, and is very wet underfoot due to springs and flushing.
L	Suboptimal-Unsuitable	0.4723	Polygon L status remains Suboptimal-Unsuitable. Grassy heath with flushes. Suitable habitat of moderate quality, but limited in extent.
M	Unsuitable	6.6243	Polygon M status remains Unsuitable.
N	Suboptimal	0.0981	Polygon N status remains Suboptimal. This polygon consists of an unusual habitat of terraced tufaceous slope with Schoenus nigricans tussocks.

Monitoring Period: 2007-2012

Polygon	Habitat Type	Area (ha)	Comment
A-C,F,I,L	Sub-optimal with unsuitable areas	3.06	Polygons A, B, C, F, I, L
D & N	Sub-optimal	0.433	Polygons D and N
K	Sub-optimal with optimal areas	0.582	Polygon K - old trackway with flushes throughout

Transect habitat characteristics (Note: only three habitat categories were used in 2007-2012 survey)

Monitoring period: 2013-2018

Transect	Optimal habitat	Optimal/Subopt.	Sub-optimal	Subopt/Unsuitable	Unsuitable	Optimal wetness	Too Wet	Too Dry
0								

Monitoring period: 2007-2012

Transect	Optimal habitat	Optimal/Subopt.	Sub-optimal	Subopt/Unsuitable	Unsuitable	Optimal wetness	Too Wet	Too Dry
0								

Transect samples

Mon. period	Transect	Sample	Location	Adults	Juveniles	Total	Habitat suitability
Monitoring period 2013-2018 Transect 0 (1 sample)							
2013-2018	0	0	NO TRANSECT RECORDED				
Monitoring period 2007-2012 Transect 0 (1 sample)							
2007-2012	0	0	NO TRANSECT RECORDED				

Spot Samples

Vertigo geyeri monitoring at Easkey Valley

Mon. period	Sample	Grid ref.	Adults	Juveniles	Total	Habitat suitability
Monitoring period 2013-2018 (5 samples)						
2013-2018	01	G 39436 25954	0	0	0	Optimal
2013-2018	02	G 40011 25633	0	0	0	Optimal
2013-2018	03	G 40139 25608	0	0	0	Optimal
2013-2018	04	G 39990 25594	5	1	6	Optimal
2013-2018	05	G 39489 27895	0	0	0	Optimal-Suboptimal
Monitoring period 2007-2012 (6 samples)						
2007-2012	01	G 39986 25593	0	0	8	
2007-2012	02	G 40220 25442	0	0	0	
2007-2012	03	G 40130 25610	2	0	2	
2007-2012	04	G 39441 25948	0	0	1	
2007-2012	05	G 39431 26026	0	0	0	
2007-2012	06	G 39484 27897	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 in 2 locations (or 50% - minimum 4 sampled) with optimal or sub-optimal habitat	Present in 1 location out of 6	Fail
2007-2012	Presence/Absence	Adult or sub-adult snails are present in 2 locations (or 50% - minimum 4 sampled) with optimal or sub-optimal habitat	Present in 3 locations out of 6	Pass

Mon. period	Population Notes
2013-2018	In survey from the 2007-2012 monitoring period, Vertigo geyeri was recorded at three out of six sample locations. Based on this, the Population Assessment was given as Favourable (green). In the current survey, one out of five sample locations was positive. Based on the criteria of Moorkens & Killeen (2011), the Population Assessment is Unfavourable Bad (red).
2007-2012	the abundance of Vertigo geyeri is rather low

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	At least 0.4ha of habitat polygon areas D and N is classed as Optimal and sub-optimal and soils, at time of sampling, are damp (optimal wetness) throughout the area	0.43ha Suboptimal	Pass

2013-2018	Habitat quality	At least 0.5ha of habitat in the trackway (polygon K) is classed as Optimal and sub-optimal and soils, at time of sampling, are damp (optimal wetness) throughout the area	0.58ha Optimal-Suboptimal	Pass
2013-2018	Habitat type	Some suitable (sub-optimal) habitat is present in at least 3 other polygon areas	Present in 6 other polygons	Pass
2007-2012	Habitat extent	At least 0.4ha of habitat polygons areas D and N is classed as Optimal and sub-optimal and soils, at time of sampling, are damp (optimal wetness) throughout the area	0.433 ha	Pass
2007-2012	Habitat quality	At least 0.5ha of habitat in the trackway (polygon K) is classed as Optimal and sub-optimal and soils, at time of sampling, are damp (optimal wetness) throughout the area	0.58 ha	Pass
2007-2012	Habitat type	Some suitable (sub-optimal) habitat is present in at least 3 other polygon areas	5 Sub-opt/Unsuitable, 1 Sub-optimal	Pass

Mon. period	Habitat Notes
2013-2018	Fourteen polygons were defined in the 2007-2012 monitoring survey (polygons A - N). All suitability classes remained the same with the exception of Polygon B, which was upgraded from Suboptimal and Unsuitable to Optimal-Suboptimal. This was due to a revised interpretation of the suitability of the habitat, rather than a noted ecological change. Based on the criteria of Moorkens & Killeen (2011), the Habitat Assessment for Easkey Valley is Favourable (green).
2007-2012	the places with optimal habitat are very small in area

5.3 Future Prospects Assessment

Mon. period	Activity code	Activity description	Location	Intensity	Influence	Area affected	Comment
2013-2018	A02.01	agricultural intensification	Inside	High	Negative	5%	Polygon A has been improved
2013-2018	A04.02.01	non intensive cattle grazing	Inside	Medium	Positive	1%	Moderate cattle grazing necessary in North
2013-2018	A04.02.02	non intensive sheep grazing	Inside	High	Positive	95%	Extensive sheep grazing necessary to keep vegetation open
2013-2018	E01.03	dispersed habitation	Inside	High	Negative	10%	Large area was cleared and dug out; now abandoned (Polygons H & J)
2007-2012	A04.02.02	non intensive sheep grazing	Inside	Low	Neutral	>3ha	
2007-2012	B01	forest planting on open ground	Inside	High	Negative	>3ha	
2007-2012	C03.03	wind energy production	Inside	High	Negative	>3ha	
2007-2012	D01.01	paths, tracks, cycling tracks	Inside	High	Negative	>2ha	
2007-2012	J02.01.02	reclamation of land from sea, estuary or marsh	Inside	High	Negative	>3ha	

Mon. period	Future Prospects Notes
2013-2018	While a number of activities/impacts were recorded in the period 2007-2012, most of them were for nearby areas, rather than for the site itself, and thus the Future Prospects for Easkey Valley were Favourable (green). In the current survey, positive effects were being caused by widespread non-intensive sheep grazing and limited non-intensive cattle grazing.

Mon. period	Future Prospects Notes
2013-2018	Negative impacts include agricultural improvement (Polygon A) and site clearance (Polygon I). Any further activities like these would pose a large risk to the site, however the rate of re-vegetation of previously cleared areas suggest that further clearance or other works are not immediately planned. On balance, and based on the likely continuance of sheep grazing, the Future Prospects for Easkey Valley are Favourable (green).
2007-2012	to date there have been no negative developments on site so 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	Due to the unfavourable Population Assessment (and in spite of the habitat and Future Prospects results), the Overall Assessment for Easkey Valley is Unfavourable Bad (red).
2007-2012	

6. DISCUSSION

Monitoring period

2013-2018

Area of occupancy: The site comprises a series of small flushes along the river in the upper part of the Easkey valley in the townland of Letterunshin (G40-25-). Access is from minor public roads from Dromore West and then from forestry tracks.

Discussion:

The Vertigo geyeri site at Easkey Valley had an Overall Conservation Assessment of Favourable (green) for the monitoring period 2007-2012, but this has dropped to Unfavourable Bad (red) for the current monitoring period (2013-2018). This is due to a drop in the number of positive samples for Vertigo geyeri. The Habitat Assessment and Future Prospects continue to be Favourable (green), and it is unclear why a lower proportion of samples were positive. While some parts of the site have seen significant changes (e.g. Polygon A - presumed recent agricultural improvement; Polygon I - land clearance), most of the site appears to have remained the same. Future monitoring may benefit from an increased number of samples, but this needs to be weighed against the potential impacts of over-sampling or trampling damage in the most sensitive and/or smaller habitat areas.

Monitoring recommendations:

It is recommended that monitoring is carried out at a minimum of three-yearly intervals at this site due to the apparent drop in the population. This should be re-assessed in light of any deterioration of condition or any changes to site management. Monitoring should follow that of Moorkens & Killeen (2011):

- Describe habitat and take 1 sample from the most suitable habitat in each of 5 locations/polygon areas (must include polygons D, K and N of this survey) and analyse for molluscan composition
- Re-determine boundary of all habitat polygons identified as having some Optimal-Suboptimal habitat in the 2009 survey and assign habitat to Optimal, Optimal-Suboptimal, Suboptimal, Suboptimal-Unsuitable, or Unsuitable
- Assess the management regime and impacts upon the habitat for Vertigo geyeri
- Use results to determine overall condition assessment

Management recommendations:

Polygon A appears to have undergone agricultural improvement since the visit of Moorkens & Killeen in 2009 and so the flushes should be fenced to protect them from over-grazing and to allow some regeneration of semi-natural vegetation. Polygon N might benefit from a slight increase in sheep grazing, but the habitat is very fragile and so this must be undertaken with great care, especially as this is a very unusual habitat type. No management is needed for polygons B and K, and it is important that current land use is not changed - e.g. the roadside flushes in Polygon B could be vulnerable to road widening or other works associated with the road. For the remaining polygons, non-intensive sheep grazing at the current level should be continued.

Vertigo geyeri monitoring at Easkey Valley

2007-2012

Area of occupancy: The site comprises a series of small flushes along the river in the upper part of the Easkey valley in the townland of Letterunshin (G40-25-). Access is from minor public roads from Dromore West and then from forestry tracks.

Discussion:

Although small in size, the habitat at this site forms part of a wider excellent necklace of spring seepage sites across County Sligo, which are collectively of major international importance. However, many sites such as these that are marginal for agricultural purposes have been developed in recent years, with new once off housing, recent afforestation and a number of wind turbine projects now present of in progress that were not present 10 years ago. Therefore, it is very important to be mindful of the dangers of developments that would lead to direct destruction or indirect drainage damage to these spring seepage sites. As the habitat is fragile and vulnerable to new development, Sligo County Council should also be asked to be aware of its fragility when dealing with planning applications.

Monitoring recommendations:

Although the overall assessment of the Condition of the habitat and the feature of the site is Favourable, 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 2012
Methods (see Section 2 of main report for full details). Prescription as follows:
- Describe habitat and take 1 sample from the most suitable habitat in each of 5 locations/polygon areas (must include polygons D, K and N of this survey) and analyse for molluscan composition
- Re-determine boundary of all habitat polygons identified as having some Optimal & Sub-optimal in the 2009 survey 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. geyeri
- Use results to determine overall condition assessment

Management recommendations:

Existing Management

Current management is by natural wetness and through extensive sheep grazing.

Proposed management prescription for site

The management at this site should remain the same as the present regime until the next round of monitoring is due in 2012. There should be no increase in livestock, nor fencing off of areas that would lead to any increase of concentration within the V. geyeri zone. Supplementary feeding or fertilising should not be allowed, nor drainage of any kind. No increase in coniferous plantation or other development that would impinge on habitat should be permitted within the V. geyeri habitat area or where it could affect the hydrogeological regime at the V. geyeri habitat area.

Site report - Vertigo Monitoring

Vertigo geyeri monitoring at Polaguil Bay

1. SITE CODE AND LOCATION DETAILS

1.1 Site code and location

Vertigo Site Code: VgCAM14 **County:** Donegal

SAC Site Code: 000147 Horn Head and Rinclevan

Location description (from baseline survey):

Monitoring period	Date surveyed	Recorders
2013-2018	26 August 2015	John Brophy & Maria Long
2007-2012	7 September 2009	Ian Killeen & Maria Long

1.2 General Habitat Description (from baseline survey):

The general habitats in which Vertigo geyeri is present are a series of tufa spring and flush lines that slope down within this coastal machair hillside. The microhabitat of V. geyeri within the machair is very typical for the animal, grazing among the roots of Carex viridula and mosses Drepanocladus revolvens, Campylium stellatum, and Selaginella selaginoides and amongst the decaying roots of Schoenus nigricans. Within this specific habitat there was flushing with calcareous deposition, suggesting that there is some complex groundwater interaction with the surface. This habitat fits the Rodwell characteristic vegetation classification (Rodwell, 1991) within the Caricion davallianae alliance, characteristically being distinguished by Carex viridula, Parnassia palustris, Campylium stellatum, Pinguicula vulgaris, and Selaginella selaginoides. The EU habitats present at V. geyeri habitat therefore fit the category of Alkaline fens: low sedge-rich communities (Annex I Habitat 7230), petrifying springs with tufa formation (Annex I Habitat 7220), and rich fens of CORINE 54.2 (Romão, 1996; Devillers et al., 1991). This falls within the more general habitat of rich fen and flush (PF1) of Fossitt (2000).

1.3 Definition of habitat types (from baseline survey):

Optimal	Flushed fen grassland with sward lawns 10-30cm tall, (or on the transect, runnels), stony ground with tufa, containing species such as Carex viridula, Equisetum palustre, Juncus articulatus, Pinguicula vulgaris, Schoenus nigricans and the mosses Drepanocladus revolvens, Campylium stellatum. During sampling the water table should be between 0- 5cm of the soil surface, but not above ground level.
Sub-optimal	Vegetation composition as above or including Molinia caerulea and Juncus, but either vegetation height is less than 5cm or greater than 30cm, or the water table is below 5cm or ground is flooded at the time of sampling, or there are extensive areas of bare ground
Unsuitable	Not defined

2. SUMMARY:

Polaguil Bay was assessed as Favourable (green) for the monitoring period 2007-2012, but has dropped to Unfavourable Inadequate (amber) for the monitoring period 2013-2018. This drop is due to the results of the population and habitat assessments for the transect area (Polygon E). There has been a decline in habitat quality here (related to past fencing out of grazers), and this has had a negative effect on the Vertigo geyeri population, with no positive samples recorded in 2015. With abundant Optimal habitat across other polygons (notably B and C), the weighting of the transect in the population and habitat assessment may paint a slightly unfair picture of the site. Because of the good condition of most of the site, the Future Prospects continue to be Favourable (green), as there is no reason to think that the continued presence of Vertigo geyeri at this site is at risk. The current management is ideal for maintaining the habitat for Vertigo geyeri across most of the site, though some intervention in the form of hand cutting or grazing is required to improve areas that have become rank (Polygon E and parts of Polygons A and D). This should be instigated immediately, and the landowner is amenable to taking conservation management actions with some supports.

3. TRANSECT DETAILS

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

Start point:	C 00029 38966	At rock	
End point:	C 00118 39009	Fence post one down from corner field.	
Transect length:	99	**Direction:**	As for 2007-2012
Description:	As for 2007-2012		
Sampling frequency:	As for 2007-2012		

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

Start point:	C 00031 38972	A lichen covered boulder	
End point:	C 00122 39014	Fence	
Transect length:	100	**Direction:**	
Description:			
Sampling frequency:			

4. RESULTS

Polygon habitat characteristics

Monitoring Period: 2013-2018

Polygon	Habitat Type	Area (ha)	Comment
A	Suboptimal	0.4147	Polygon A status drops from Optimal to Suboptimal. Runnel on slope, with dense mats of rushes in places.
B	Optimal	4.0597	Polygon B status remains Optimal. Expansive area with flushing.
C	Optimal	4.6662	Polygon C status increases to Optimal. Expansive area with flushing. (Change in status not thought to be related to an ecological change at the site.)
D	Suboptimal-Unsuitable	1.1627	Polygon D status remains Suboptimal-Unsuitable. Hillside runnels with Schoenus nigricans, and dense mats of rushes on lower slope.
E	Suboptimal-Unsuitable	0.8698	Polygon E status remains Suboptimal-Unsuitable. Located at base of hillslope, dominated by rank, vegetation that is more typical of acid habitats. Punctuated by runnels with calcareous flushing, but these quite over-shadowed by tall tussocky species (mainly Schoenus nigricans and Molinia caerulea).

Monitoring Period: 2007-2012

Polygon	Habitat Type	Area (ha)	Comment
A	Optimal	0.415	Polygon A
B	Optimal	4.06	Polygon B
C	Sub-optimal with unsuitable areas	4.666	Polygon C
D	Sub-optimal with unsuitable areas	1.163	Polygon D
E	Sub-optimal with unsuitable areas	0.87	Polygon E

Transect habitat characteristics (Note: only three habitat categories were used in 2007-2012 survey)

Monitoring period: 2013-2018

Transect	Optimal habitat	Optimal/Subopt.	Sub-optimal	Subopt/Unsuitable	Unsuitable	Optimal wetness	Too Wet	Too Dry
1		9m	6m	7m	77m	27.5m		71.5m

Monitoring period: 2007-2012

Transect	Optimal habitat	Optimal/Subopt.	Sub-optimal	Subopt/Unsuitable	Unsuitable	Optimal wetness	Too Wet	Too Dry
1	5.7m	NA	11.9m	NA	81.5m	17.6m		81.5m

Transect samples

Mon. period	Transect	Sample	Location	Adults	Juveniles	Total	Habitat suitability
Monitoring period 2013-2018 Transect 1 (4 samples)							
2013-2018	1	1	31m	0	0	0	Suboptimal-Unsuitable
2013-2018	1	2	39.5m	0	0	0	Suboptimal
2013-2018	1	3	58.5m	0	0	0	Optimal-Suboptimal
2013-2018	1	4	71.5m	0	0	0	Optimal-Suboptimal
Monitoring period 2007-2012 Transect 1 (4 samples)							
2007-2012	1	1	29m	0	0	0	
2007-2012	1	2	39m	0	0	0	
2007-2012	1	3	58m	0	0	2	
2007-2012	1	4	71m	0	0	1	

Spot Samples

Mon. period	Sample	Grid ref.	Adults	Juveniles	Total		Habitat suitability
Monitoring period 2013-2018 (4 samples)							
2013-2018	01	B 99442 38663	1	0	1	Count	Optimal
2013-2018	02	B 99619 38692	1	0	1	Count	Optimal
2013-2018	03	B 99673 38646	2	0	2	Count	Optimal
2013-2018	04	B 99904 38596	7	0	7	Count	Optimal

Monitoring period 2007-2012 (7 samples)					
2007-2012	01	B 99484 38647	0	0	0
2007-2012	02	B 99416 38655	0	0	12
2007-2012	03	B 99673 38620	0	0	21
2007-2012	04	B 99618 38696	0	0	2
2007-2012	05	B 99688 38742	0	0	0
2007-2012	06	B 99764 38817	0	0	7
2007-2012	07	B 99697 38864	0	0	14

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 at least 2 of the 4 samples taken from Optimal or Sub-optimal habitat on the Transect	V. geyeri not found on Transect	Fail
2007-2012	1	Presence/Absence	Adult or sub-adult snails are present in at least 2 of the 4 samples taken from Optimal or Sub-optimal habitat on the Transect	V. geyeri found in 2 of the 4 samples	Pass

Mon. period	Indicator	Target	Result	Pass/Fail
2013-2018	Presence/Absence	Adult or sub-adult snails are present in at least 2 locations (minimum 4 samples) of the other main flush areas (Polygons A and B)	Vertigo geyeri found in 4 other locations (3 in Polygons A and B)	Pass
2007-2012	Presence/Absence	Adult or sub-adult snails are present in at least 2 locations (minimum 4 samples) of the other main flush areas (Polygons A and B)	found in 6 locations within flush areas A and B	Pass

Mon. period	Population Notes
2013-2018	The survey carried out for the 2007-2012 monitoring period recorded Vertigo geyeri at two out of four locations on the transect and at five out of seven other sample locations, resulting in a Population Assessment of Favourable (green). In the current survey, Vertigo geyeri was not recorded from any of the four samples taken on the transect, while the species was recorded at four out of four spot sample locations. Based on the criteria of Moorkens & Killeen (2011), because of the negative results on the transect, the Population Assessment for Polaguil Bay is Unfavourable Inadequate (amber).
2007-2012	Much of the habitat at the site is in good condition for V. geyeri

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	There are 5 zones of habitat along the Transect classed as Optimal or Sub-Optimal AND 18m of habitat along the Transect is classed as Sub-Optimal or Optimal	There are 4 zones classed as Suboptimal or above AND 15m is Suboptimal or above	Fail
2013-2018	1	Habitat quality	Soils, at time of sampling, are damp (optimal wetness) and covered with a layer of humid thatch for 18m of the Transect	27.5m is Optimal wetness	Pass
2007-2012	1	Habitat extent	There are 5 zones of habitat along the Transect classed as Optimal or Sub-optimal and 18m of habitat along the Transect is classed as Sub-Optimal or Optimal	5 zones AND 20.6m is Sub-Optimal or Optimal	Pass
2007-2012	1	Habitat quality	Soils, at time of sampling, are damp (optimal wetness) and covered with a layer of humid thatch for 18m of the Transect	20.6m is optimal wetness	Pass

5.2.2 Site level

Mon. period	Indicator	Target	Result	Pass/Fail
2013-2018	Habitat extent	At least 4ha of the site classed as optimal with a further 6 ha supporting some sub-optimal habitat	10.1ha Optimal, with 2.5 ha supporting some Suboptimal	Pass
2007-2012	Habitat extent	At least 4ha of the site classed as optimal with a further 6 ha supporting some sub-optimal habitat	4.4 ha optimal with a further 6.69 ha supporting some sub-optimal habitat	Pass

Mon. period	Habitat Notes
2013-2018	Five habitat polygons were defined for Polaguil Bay, with a Habitat Assessment result for the monitoring period 2007-2012 of Favourable (green). In the current survey, Polygon A was reduced from Optimal to Suboptimal due to ecological change in the form of a rank Juncus sward having developed; however, Polygon C was upgraded from Suboptimal and Unsuitable to Optimal on the basis of extensive suitable habitat within the polygon. This change is considered to be one of interpretation rather than the result of actual ecological change. Polygons D and E both remain Suboptimal/Unsuitable. Based on the criteria of Moorkens & Killeen (2011), because of deterioration in habitat quality on the transect, the Habitat Assessment for Polaguil Bay is Unfavourable Inadequate (amber).
2007-2012	the snail occurs throughout the suitable habitat and is locally common

5.3 Future Prospects Assessment

Mon. period	Activity code	Activity description	Location	Intensity	Influence	Area affected	Comment
2013-2018	A04.02.02	non intensive sheep grazing	Inside	High	Positive	70%	All of Polygons B &C and southern lobe of Polygon D - Here sheep grazing is at a level which keeps vegetation in runnels/wet areas open enough for Vertigo geyeri, but does not cause damage (e.g. poaching)
2013-2018	K02.01	species composition change (succession)	Inside	High	Negative	30%	Some areas have been fenced previously (see Moorkens & Killeen, 2011) and are now rank with large tussocks of Molinia caerulea, Schoenus nigricans or large, dense stands of rushes. This applies to Polygons E, A & northern lobe of Polygon D.
2007-2012	A04.02.02	non intensive sheep grazing	Inside	Low	Negative	10.3ha	The present levels of low intensity sheep grazing are having a slight negative impact on the quality of the habitat and the flush areas are preferentially grazed and cropped to a very low height. At present this grazing level is not considered intense enough to affect Future Prospects. However, if the levels of sheep stocking increase or cattle were introduced then the impact would be severely negative.
2007-2012	A04.03	abandonment of pastoral systems, lack of grazing	Inside	Medium	Negative	0.87ha	The lack of grazing (A04.03) caused by fencing off in polygon area E is a negative impact but the V. geyeri habitat is in runnels which are maintained by the hydrogeology. However, in time the area is likely to deteriorate as a result of shading and drying out.

Mon. period	Future Prospects Notes

Mon. period	Future Prospects Notes
2013-2018	The Future Prospects for Polaguil Bay for the monitoring period 2007-2012 were rated as Favourable (green), with sheep grazing and abandonment listed as impacts. In the current survey, non-intensive sheep grazing was considered to be having a positive effect on about 70% of the habitat by maintaining a low, open sward. Succession, as a result of previous fencing out of grazers, was identified as having a negative impact with areas of the site becoming rank, in particular in the area of the transect. Overall, however, the Future Prospects for Polaguil Bay are considered to be Favourable (green).
2007-2012	the impacts are low to moderate rather than severe

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

Mon. period	Overall Notes
2013-2018	There were no positive records for the target species on the transect (resulting in a Population Assessment of Unfavourable Inadequate (amber)), and the habitat quality had deteriorated in this area (more rank and shaded, meaning a Habitat Assessment of Unfavourable Inadequate (amber)). Overall, however, the Future Prospects remain Favourable (green) for the site. This means that the, the Overall Assessment for Polaguil Bay is Unfavourable Inadequate (amber).
2007-2012	

6. DISCUSSION

Monitoring period

2013-2018

Area of occupancy: The habitat that supports Vertigo geyeri within this cSAC is the fen habitat at the west side of the peninsula at Pollaguil Bay B9938. Access is from the Dunfanaghy to Crockaclogher Road (private access).

Discussion:

Polaguil Bay was assessed as Favourable (green) for the monitoring period 2007-2012, but has dropped to Unfavourable Inadequate (amber) for the monitoring period 2013-2018. This drop is due to the results of the population and habitat assessments for the transect area (Polygon E). There has been a decline in habitat quality here (related to past fencing out of grazers), and this has had a negative effect on the Vertigo geyeri population, with no positive samples recorded in 2015. With abundant Optimal habitat across other polygons (notably B and C), the weighting of the transect in the population and habitat assessment may paint an unfair picture of the site. Because of the good condition of most of the site, the Future Prospects continue to be Favourable (green), as there is no reason to think that the continued presence of Vertigo geyeri at this site is at risk. The current management is ideal for maintaining the habitat for Vertigo geyeri across most of the site, though some intervention in the form of hand cutting or grazing is required to improve areas that have become rank (Polygon E and parts of polygons A and D). This should be instigated immediately, and the landowner is amenable to taking conservation management actions with some supports.

Monitoring recommendations:

It is recommended that monitoring be carried out at Polaguil Bay at a minimum of three-yearly intervals, given the drop in population in the transect area. This should be re-assessed in light of any deterioration of condition or any changes to site management. In particular, if conservation actions are taken in terms of grazing or hand cutting/removal of vegetation, then monitoring should be yearly. The assessment of the transect and other locations with snail sampling, plus assessment of condition of polygon should generally follow that of Moorkens & Killeen (2011), with some minor changes:

- Repeat Transect 1, delineate the plant community/habitat zones, and assign the habitat and wetness in each zone as Optimal, Optimal-Suboptimal, Suboptimal-Unsuitable or Unsuitable, and Too dry, Optimal wetness or Too dry, respectively
- Take at least 4 samples from the most suitable (runnel) habitat on the transect and analyse for molluscan composition
-Describe habitat and take 1 sample from the most suitable habitat in at least 4 other locations (spread across polygon areas A, B, C and D) and analyse for molluscan composition
- 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 geyeri
- Use results to determine overall condition assessment

Management recommendations:

The site at Polaguil Bay is currently subject to non-intensive grazing by sheep. The levels of grazing across much of the site (polygons B and C) are appropriate to maintaining the Vertigo geyeri habitat and should be continued. Polygon E (location of the transect) has become rank, and it is noted in Moorkens & Killeen (2011) that this area was fenced off and becoming tussocky in 2009. While the fence has been removed in the interim, the habitat remains rank and is not sufficiently grazed. The runnels are choked and over-shadowed by tall, tussocky vegetation. Appropriate action is required to break up the existing dense vegetation (e.g. tussocks of Schoenus nigricans and Molinia caerulea >1m tall) without damaging the Vertigo geyeri habitat along the runnels. This may take the

form of conservation cutting by hand, or the creation of a temporary enclosure to fence sheep in and allow targeted grazing. Once the vegetation has been brought under control, the enclosure should be removed, allowing regular access to the sheep grazing the rest of the site. Polygons A and D include areas covered by dense mats of rushes, resulting in habitat unsuitable for Vertigo geyeri. As in Polygon E, conservation cutting or targeted grazing is required to break up the dense vegetation and create habitat more suitable for Vertigo geyeri.

2007-2012

Area of occupancy: The habitat that supports Vertigo geyeri within this cSAC is the fen within machair habitat at the west side of the peninsula at Pollaguil Bay B9938. Access is from the Dunfanaghy to Crockaclogher Road (private access).

Discussion:

The Condition of the site and the feature based upon the 2009 survey has been assessed as Favourable and there is no evidence of any change since the previous (2006) survey.

At Polaguil, the flush habitat is spread over a distance of approximately 0.65km along the contour above the east valley of the Polaguil Burn. The series of parallel flushes mainly start high on the hillside at approximately 50m altitude and follow the flushing slope down to its base.

In the field and in samples, Vertigo geyeri was found to be locally common in all of the calcareous flushes, which were considered to be both faunistically and floristically diverse.

A total of 21 molluscan species were found at this site, and in the context of its location within the important Horn Head and Ringclevan cSAC, and as one of the few known sites in County Donegal for V. geyeri, and being within the priority Annex I habitats of machair (21A0) and of petrifying springs with tufa formation (7220), the management of the spring line habitat at this site is of the utmost importance. With the likelihood of climate change leading to increased threat of wetland flushes, the ongoing protection of this large and northerly site is essential. It is recommended that the fenced area is appropriately grazed as soon as possible.

Monitoring recommendations:

Although the overall assessment of the Condition of the habitat and the feature of the site is Favourable, 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 2012
Methods (see Section 2 of main report for full details). Assessment of the transect and other locations with snail sampling, plus assessment of condition of polygon. Prescription as follows:
- Repeat transect 1, delineate the plant community/habitat zones, and assign the habitat and wetness in each zone as Optimal, Sub-optimal or Unsuitable
- Take at least 4 samples from the most suitable (runnel) habitat on the transect and analyse for molluscan composition
- Describe habitat and take 1 sample from the most suitable habitat in each of 4 other locations (within polygon areas A and B of this survey) and analyse for molluscan composition
- 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. geyeri
- Use results to determine overall condition assessment

Management recommendations:

Existing Management

There are two management units at this site. The open slopes of the area of the V. geyeri habitat form one large management unit which is subject to extensive, low intensity sheep grazing, except for one fenced area which contains the Transect within polygon E. The Schoenus fen vegetation within this management unit was much higher than that outside, due to the exclusion of the area from grazing animals. This practice has resulted in the loss of V. geyeri habitat within the fenced area. In contrast, the excellent open habitat has ideal vegetation, without hummock forming tussocks, resulting in a molluscan fauna of open ground, which are not suffering from competition from shade loving species.

Proposed management prescription for site

The management at Polaguil Bay should remain the same as the present regimes within the open slopes with extensive sheep grazing of no more than 0.5 livestock unit per hectare for the 2011-2014 period. A small number of horses are also acceptable, but cattle should not be introduced. For the fenced area, some grazing management is recommended. Ideally, if it is not needed, the fence should be removed. If it is used for intermittent corralling e.g. of horses, 2-3 sheep should be placed in there at regular intervals to prevent further shading and reduce the build up of vegetation that has occurred. There should be no supplementary feeding of animals within the Vertigo geyeri habitat.

It is strongly recommended that management of the fenced area is introduced as soon as possible before the site becomes too rank and there is loss of suitable V. geyeri habitat that may not return after management as happened at other sites.

Site report - Vertigo Monitoring

Vertigo geyeri monitoring at Silver River

1. SITE CODE AND LOCATION DETAILS

1.1 Site code and location

Vertigo Site Code: VgCAM15 **County:** Laois

SAC Site Code: 000412 Slieve Bloom Mountains

Location description (from baseline survey):

Monitoring period	Date surveyed	Recorders
2013-2018	22-23 August 2016	John Brophy & Maria Long
2007-2012	20 July 2010	Evelyn Moorkens and Ian Killeen

1.2 General Habitat Description (from baseline survey):

The alkaline fen supported by spring seepages along the slopes down to the Silver River provides the calcareous influence for Vertigo geyeri. EU habitats present at the V. geyeri habitat are Alkaline fens: low sedge-rich communities (Annex I Habitat 7230), and rich fens of CORINE 54.2 (Romão, 1996; Devillers et al., 1991). They fall within the more general habitat of rich fen and flush (PF1) of Fossitt (2000). The specific areas within this rich area of fen that support V. geyeri habitat are highly tufaceous seepages that fit the Caricion davallianae group, characteristically featuring Schoenus nigricans, Carex viridula, Campylium stellatum, Ophrys insectifera, Eleocharis quinqueflora and Carex flacca, and fit into the base-rich Rodwell M10 and M13 characteristic vegetation classifications (Rodwell, 1991).

1.3 Definition of habitat types (from baseline survey):

Optimal	Tufa terraces with gentle slope, covered in lush flushing sedge and moss sward 25-30cm high, with high plant diversity: Briza, Equisetum telmateia, E. palustre, Pinguicula, Juncus articulatus, orchids, Cratoneuron moss, Epipactis palustris, Eriophorum latifolium, Mentha etc. Deep humid moss and litter layer. Habitat mosaic with height ranging from 5-30cm.
Sub-optimal	Vegetation composition similar to above but height is 5-10cm or >30cm, or the water table is below 5cm or ground is flooded at the time of sampling.
Unsuitable	Not defined

2. SUMMARY:

This is an important site for Vertigo geyeri, with extensive areas of potentially suitable habitat, and being one of the most southerly sites in Ireland for the species. The site at Silver River has shown some reduction in habitat quality on the tufaceous slope within Polygon A, but this area is very limited in extent relative to the size of the site as a whole. This decline in quality is reflected in the result of the Habitat Assessment.

In the previous survey, only dead Vertigo geyeri shells were found in Polygon B, but this result was still used to give a pass for the related Population Assessment criteria. While the habitat quality of Polygon B remains unchanged (being quite heavily poached), no Vertigo geyeri (alive or dead) were recorded here in 2016. In 2016, an additional area of suitable habitat was discovered upslope and to the south-east of the existing polygons. While optimal habitat appears to be limited here, nonetheless, Vertigo geyeri was recorded.

Current activities at the site are limited to cattle, horse and deer grazing. Future management of the site should aim at reducing the impact of cattle grazing in Polygon B. It is important to note that Polygon C may be at risk from future land-use change as a result of an on-going land dispute. It is also important to note that this site is not within an SAC/NHA.

3. TRANSECT DETAILS

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	0.3407	Polygon A status drops to Optimal-Suboptimal. This polygon comprises steep, tufaceous terraces giving way to gently sloping, very wet flush. Woodland occurs on either side of the slope, with Salix aurita, Alnus glutinosa and Salix cinerea subsp. oleifolia saplings evident on the slope. The drop in status is due to the fact that it appears drier at the top of the slope, with less suitable vegetation (e.g. typical bryophytes or sedges), and so represents ecological

Vertigo geyeri monitoring at Silver River

Monitoring Period: 2013-2018

Polygon	Habitat Type	Area (ha)	Comment
			change.
B	Suboptimal-Unsuitable	1.6831	Polygon B status remains Suboptimal-Unsuitable. This polygon comprises sloping, flushed wet grassland to the south and Schoenus nigricans fen to the north. It is overgrazed and heavily poached, with low moss cover, particularly at the northern end. Tufa is present in places.
C	Suboptimal-Unsuitable	1.4782	Polygon C is a newly created polygon in 2016 with a status of Suboptimal-Unsuitable. It is located in an area of grassland with extensive flushing, but only limited areas appear to be sufficiently calcareous for Vertigo geyeri (based on the presence of indicator plant species).

Monitoring Period: 2007-2012

Polygon	Habitat Type	Area (ha)	Comment
	Sub-optimal with unsuitable areas	1.683	Currently in this condition because of heavy grazing and trampling
	Optimal	0.3	East part of site in perfect condition, west part could be restored if grazing was addressed

Transect habitat characteristics (Note: only three habitat categories were used in 2007-2012 survey)

Monitoring period: 2007-2012

Transect	Optimal habitat	Optimal/Subopt.	Sub-optimal	Subopt/Unsuitable	Unsuitable	Optimal wetness	Too Wet	Too Dry
0								

Transect samples

Mon. period	Transect	Sample	Location	Adults	Juveniles	Total	Habitat suitability
Monitoring period 2007-2012 Transect 0 (1 sample)							
2007-2012	0	0	NO TRANSECT RECORDED				

Spot Samples

Mon. period	Sample	Grid ref.	Adults	Juveniles	Total		Habitat suitability
Monitoring period 2013-2018 (8 samples)							
2013-2018	01	N 23736 07183	0	0	0		Suboptimal-Unsuitable
2013-2018	02	N 23739 07182	0	0	0		Optimal-Suboptimal
2013-2018	03	N 23732 07181	1	0	1	Count	Optimal-Suboptimal
2013-2018	04	N 23716 07181	5	0	5	Count	Optimal
2013-2018	05	N 23717 07150	9	1	10	Count	Suboptimal
2013-2018	06	N 23800 06943	1	0	1	Count	Suboptimal
2013-2018	07	N 23568 07126	0	0	0		Suboptimal
2013-2018	08	N 23602 07291	0	0	0		Optimal-Suboptimal
Monitoring period 2007-2012 (8 samples)							
2007-2012	01	N 23740 07178	0	0	0		
2007-2012	02	N 23737 07182	0	0	2		
2007-2012	03	N 23730 07181	0	0	8		
2007-2012	04	N 23712 07186	0	0	25		
2007-2012	05	N 23725 07142	0	0	23		
2007-2012	06	N 23606 07241	0	0	0		
2007-2012	07	N 23615 07273	0	0	1		
2007-2012	08	N 23607 07297	0	0	1		

5. CONDITION ASSESSMENT

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

Vertigo geyeri monitoring at Silver River

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	Area of occupancy	Adult or sub-adult snails are present in 2 other locations which support optimal or sub-optimal habitat (1 from Polygon A and 1 from Polygons B or C)	Present in 2 locations (1 from Polygon A and one from Polygon C)	Pass
2013-2018	Presence/Absence	Adult or sub-adult snails are present in at least 2 of the habitat zones in the main site (4 samples to be taken)	Present in 2 zones	Pass
2007-2012	Area of occupancy	Adult or sub-adult snails are present in 2 other locations which support optimal or sub-optimal habitat (site 5 and one other site in polygon B)	at site 5 and shells at 2 other locations	Pass
2007-2012	Presence/Absence	Adult or sub-adult snails are present in at least 2 of the habitat zones in the main site (4 samples to be taken)	Present in 3 zones	Pass

Mon. period	Population Notes
2013-2018	In the monitoring period 2007-2012, Vertigo geyeri was found at three out of five locations in Polygon A and only single dead shells found at two locations in Polygon B. In the current monitoring period, three out of five locations were positive in Polygon A, while both samples taken in Polygon B were negative. A third polygon, Polygon C, was added during the current monitoring period, and Vertigo geyeri was recorded from there. A slight change was made to the wording of the assessment criterion to reflect both the addition of Polygon C to the site, and also the fact that dead shells were previously erroneously counted as positive results for Polygon B. Based on the amended criteria, and Population Assessment result for Silver River is Favourable (Green).
2007-2012	the snail 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
2007-2012	0	N/A	NO TRANSECT RECORDED		

5.2.2 Site level

Mon. period	Indicator	Target	Result	Pass/Fail
2013-2018	Habitat extent	>0.25ha of habitat classed as Optimal-Suboptimal or better	0.3ha Optimal-Suboptimal	Pass
2007-2012	Habitat extent	>0.25ha of habitat classed as optimal	0.3 ha optimal	Pass

Mon. period	Indicator	Target	Result	Pass/Fail
2013-2018	Habitat extent	3 out of 4 habitat zones in the main site should be classed as Optimal-Suboptimal or better	3 zones are Optimal	Pass
2013-2018	Habitat quality	Soils, at time of sampling, are saturated (optimal wetness) in all 4 zones of the main site	3 zones are Optimal wetness	Fail
2007-2012	Habitat extent	All 4 habitat zones in the main site should be classed as Optimal	All 4 are Optimal	Pass
2007-2012	Habitat quality	Soils, at time of sampling, are saturated (optimal wetness) in all 4 zones of the main site	All 4 are Optimal	Pass

Mon. period	Habitat Notes
2013-2018	In the monitoring period 2007-2012, Polygon A was classed as Optimal, while Polygon B was classed as Suboptimal and Unsuitable. In the current survey, Polygon A dropped to Optimal-Suboptimal due to a slight change in the upper part of the tufaceous slope, while Polygon B remained unchanged. A new polygon (C) was added to the site, which was classified as Suboptimal-Unsuitable. Changes have been made to the criteria to reflect the new five-point (rather than three-point)

2013-2018	habitat suitability scale in use. Based on the criteria, the Habitat Assessment is Unfavourable Inadequate (amber).
2007-2012	although the eastern part is small in area, virtually all of the 0.3ha is optimal for the snail

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	60%	Polygons B and A only
2013-2018	A04.02.03	non intensive horse grazing	Inside	Low	Negative	40%	Polygon C
2013-2018	K04.05	damage by herbivores (including game species)	Inside	Low	Negative	100%	Grazing by deer
2007-2012	A04.02.01	non intensive cattle grazing	Inside	Medium	Negative	1.68ha	Grazing principally affects the flush areas on the western part of the site. Although the number of cattle appears to be relatively low, because the hillside is steep and most of the main flushes are small in extent, the trampling causes relatively severe damage. The smaller, eastern part of the site is much less affected by the grazing.

Mon. period	Future Prospects Notes
2013-2018	The only pressures and threats identified at the site are cattle grazing (polygons A and B), horse grazing (Polygon C) and deer grazing (all polygons). While cattle-grazing is considered negative due to the effects of poaching, horse- and deer-grazing are considered positive and neutral, respectively. Based on the current status of the site and the pressures occurring, the Future Prospects are considered to be Favourable (green).
2007-2012	Although the impact is locally relatively severe, the situation could be easily remedied by positive management 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	Green	Amber	Green	Amber
2007-2012	Green	Green	Green	Green

Mon. period	Overall Notes
2013-2018	While the Population Assessment and Future Prospects returned favourable results, the Unfavourable Inadequate (amber) Habitat Assessment leads to an Overall Assessment for Silver River of Unfavourable Inadequate (amber).
2007-2012	This is an excellent site for Vertigo geyeri

6. DISCUSSION

Monitoring period

2013-2018

Area of occupancy: The site lies in the townland of Magherabane, 2km south-east of Cadamstown. Access is along a farm track. The Vertigo geyeri habitat is on either side of the river crossing at N236073, and also upslope, accessed by following the track and turning in left.

Discussion:

This is an important site for Vertigo geyeri, with extensive areas of potentially suitable habitat, and being one of the most southerly sites in Ireland for the species. The site at Silver River has shown some reduction in habitat quality on the tufaceous slope within Polygon A, but this area is very limited in extent relative to the size of the site as a whole. This decline in quality is reflected in the result of the Habitat Assessment.

In the previous survey, only dead Vertigo geyeri shells were found in Polygon B, but this result was still used to give a pass for the related Population Assessment criteria. While the habitat quality of Polygon B remains unchanged (being quite heavily poached), no Vertigo geyeri (alive or dead) were recorded here in 2016. In 2016, an additional area of suitable habitat was discovered upslope and to the south-east of the existing polygons. While Optimal habitat appears to be limited here, nonetheless, Vertigo geyeri was recorded.

Current activities at the site are limited to cattle, horse and deer grazing. Future management of the site should aim at reducing the impact of cattle grazing in Polygon B. It is important to note that Polygon C may be at risk from future land-use change as a result of an on-going land dispute. It is also important to note that this site is not within an SAC/NHA.

Monitoring recommendations:

Monitoring should be carried out at three-yearly intervals to ensure that no major negative changes occur at the site, particularly in terms of the management activities. The monitoring should follow that proposed by Moorkens & Killeen (2011), with some additions:

- Describe habitat and take 1 sample from the most suitable habitat in each of the 4 main habitat zones in Polygon A and analyse for molluscan composition
- Describe habitat and take 1 sample from the most suitable habitat in the following locations: 1 from Polygon A, two from B and at least one from C, and analyse for molluscan composition.
- Investigate if further areas of good Vertigo geyeri habitat exist in the vicinity of Polygon C. If found, describe the habitat, delineate a polygon, and take an appropriate number of samples.
- 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 geyeri
- Use results to determine overall condition assessment

Management recommendations:

Polygon A is an extremely delicate habitat, consisting of a steep, tufaceous slope, with very wet flushed habitat at the base. It is presumed that low-level grazing occurs. No management changes should take place in this area.

The level of cattle grazing in Polygon B should be reduced significantly in order to reduce the relatively severe damage which has been caused by poaching and to allow the development of a good bryophyte layer.

The ownership of Polygon C is understood to be currently under dispute and so the current suitable management through non-intensive horse grazing could change in the future. The site has conifer plantation and improved grassland adjacent, and so both of these options may be considered by a future landowner/manager. Furthermore, a local person mentioned the possibility of the site being 'developed' - it is understood that this may have meant erecting buildings. Clearly this would be completely inappropriate for this site. Even minor changes, such as a change in grazing regime, to the management of Polygon C should be monitored for impact on the flush/fen habitat.

Particularly as this site does not fall within an SAC or NHA (though it does fall within an SPA), NPWS local staff should liaise with the land owners and managers immediately to communicate the importance of the site, and the importance of keeping management 'as is' in Polygons A and C. If a reduction in grazing could be negotiated for Polygon B, it would greatly increase the chances of the habitat improving for the target species.

Vertigo geyeri monitoring at Silver River

2007-2012

Area of occupancy: The site lies in the townland of Magherabane, 2km south-east of Cadamstown. Access is along a forest track. The Vertigo geyeri habitat is on either side of the river crossing at N236073.

Discussion:

The Condition of the site and the feature based upon the 2009 survey has been assessed as Favourable. This is an excellent site for Vertigo geyeri, and although the eastern part is small in area, virtually all of the 0.3ha is optimal for the snail. Even in sites where there are larger areas classed as optimal, the actual area of top quality habitat is usually much less. The terraces of tufa with flushing, and the high botanical and high molluscan diversity, combine to make this a site of international importance. The mollusc fauna comprises 24 species and includes the plaited snail Spermodea lamellata which has recently been classified in the Irish Red Data Book (Byrne et al. 2009) as Endangered. The occurrence of the species in this open calcareous wetland rather than old broadleaved woodland is notable. It is essential that this site receives full protection and is well deserving of SAC status for the snail.

Monitoring recommendations:

Although the Condition of the site, both in terms of habitat and Vertigo geyeri distribution and abundance is Favourable, 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 2012
Methods (see Section 2 of main report for full details). Prescription as follows:
- Describe habitat and take 1 sample from the most suitable habitat in each of the 4 main habitat zones in Polygon area A and analyse for molluscan composition
- Describe habitat and take 1 sample from the most suitable habitat in location of sample site 5 of this survey, plus 2 samples from flushes in Polygon area B and analyse for molluscan composition
- 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. geyeri
- Use results to determine overall condition assessment

Management recommendations:

Existing Management

A management system of extensive cattle grazing is practiced at the site.

Proposed management prescription for site

Well managed light grazing is essential for the correct maintenance of the site. While the snail is doing well at the site and the habitat is largely in excellent condition, it is managed to a certain extent by wetness, and the habitat is at the wetter end of the scale of V. geyeri sites, which is positive, but it means that grazing needs to be monitored carefully and short bursts of low intensity grazing should be interspersed by periods where the habitat remains ungrazed. This is compatible with ongoing good husbandry at the site.

Site report - Vertigo Monitoring

Vertigo geyeri monitoring at Fermoyle

1. SITE CODE AND LOCATION DETAILS

1.1 Site code and location

Vertigo Site Code: VgCAM16 **County:** Mayo

SAC Site Code: 001922 Bellacorick Bog Complex

Location description (from baseline survey):

Monitoring period	Date surveyed	Recorders
2013-2018	13 July 2017	John Brophy & Maria Long
2007-2012	29 April 2010	Ian Killeen & Maria Long

1.2 General Habitat Description (from baseline survey):

The habitat associated with Vertigo geyeri within the Fermoyle part of the SAC is the fragments of rich fen, the poor fen and transition mire, where they are associated with spring-fed (often iron-influenced) flushes within the wider bog complex. Many of these flushes are very large. The vegetation supported by these flushes includes areas dominated by sedges (Carex viridula and C. limosa are most associated with V. geyeri) with Black Bog-rush (Schoenus nigricans) and mosses (Drepanocladus revolvens and Homalothecium nitens being most commonly associated with the snail). Common Reed (Phragmites australis) occurs where V. geyeri is present, and the habitat is at the wet and less calcareous edge of its tolerance range. This is compensated for in the Fermoyle flush area by the large amount of habitat present. EU habitats present at V. geyeri habitat are Transition Mires and Quaking Bogs (Code 7140), and in very small areas, vegetation associated with Alkaline fens: low sedge-rich communities (Annex I Habitat 7230) (Romão, 1996; Devillers et al., 1991). The areas which form specific V. geyeri habitat are within a wider mosaic, but fit the Rodwell M9 characteristic vegetation classification (Rodwell, 1991) with affinities to the Phragmitetum mosaics. Species that occur in this group and have been found in association with V. geyeri at Bellacorick are Eriophorum angustifolium, Menyanthes trifoliata, Calliergon cuspidatum, Campylium stellatum, Scorpidium scorpiodes, Drepanocladus revolvens, Carex limosa, Carex viridula, Eleocharis quinqueflora, Potentilla erecta, Pinguicula vulgaris, and Schoenus nigricans. The V. geyeri habitat also falls within the more general habitat of rich fen and flush (PF1) of Fossitt (2000).

1.3 Definition of habitat types (from baseline survey):

Optimal	Flush areas in larger areas of fen and bog with Schoenus, Carex viridula, C. pulicaria, other low carices, Menyanthes, Campylium stellatum, Juncus articulatus, Eriophorum angustifolium, Carex rostrata, orchids. Vegetation height mostly 10-30cm with higher Schoenus tussocks. During sampling the water table should be between 0- 5cm of the soil surface, but not above ground level.
Sub-optimal	Vegetation composition less diverse than above (mostly Schoenus and Menyanthes), or vegetation height is all over 30cm, or the water table is below 5cm or ground is flooded at the time of sampling
Unsuitable	Not defined

2. SUMMARY:

The Population Assessment and Future Prospects for Fermoyle remain Green across the monitoring periods 2007-2012 and 2013-2018, while the Habitat Assessment drops from Green to Amber. The Overall Conservation Assessment drops from Green to Amber. This drop is due to a decline in the habitat suitability at the site.

The broader landscape at Fermoyle comprises blanket bog (with peat extraction occurring nearby), with localised alkaline and iron-rich influences which create habitat suitable for V. geyeri. The nearby farm had cattle, and some extensive grazing of the bog and fen habitat was apparent. The habitat supporting V. geyeri would be considered atypical, being relatively acid and with few of the normal indicator species of vascular plants or mosses present (e.g. low-growing sedges such as Carex viridula subsp. brachyrrhyncha were uncommon, and typical 'brown mosses' were similarly patchy in occurrence). In many of the areas highlighted in the previous survey for sampling, the flushes consisted of tall, dense vegetation (e.g. stands of Juncus subnodulosus). V. geyeri needs open habitats, usually with short vegetation, or at least a mosaic, with some areas short/low. It is unclear what has caused the changes, though a change in grazing regime is one possible explanation. With all this said, however, the species continues to be present across the site.

While the threats and pressures identified do not appear to pose an immediate risk to the continued presence of the snail at the site, some actions should be considered. Invasive species should be removed from the habitat, and no further drainage should occur within or adjacent. The grazing regime should be queried, and if changes have been implemented in recent years, perhaps these could be reversed. Grazing management should be aimed at ensuring low, open vegetation at the flushes which are mostly at the edge of the floating mire, but great care must be taken to avoid over-grazing and trampling. A delicate balance is required, and local land-owners, in tandem with NPWS staff, are well-placed to implement such a regime. This site is important not just for Vertigo geyeri¸ but also for other species (e.g. Saxifraga hirculus, and a suite of rare bryophytes), and in general, management recommendations are likely to be similar for these species and mutually beneficial.

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

Polygon habitat characteristics

Monitoring Period: 2013-2018

Polygon	Habitat Type	Area (ha)	Comment
A	Suboptimal	5.7058	Polygon A status was dropped from Optimal and Suboptimal to Suboptimal. The reason for this is assumed to be ecological as the vegetation appears to be too tall and dense, with areas dominated by Juncus subnodulosus, compared to the definition of optimal habitat for this site, and for Vertigo geyeri more generally.
B	Suboptimal	15.5812	Polygon B status was dropped from Optimal and Suboptimal to Suboptimal. This change is due to interpretation, rather than an observed ecological difference. The habitat is very different from that typically thought to be suitable for Vertigo geyeri. The vegetation is relatively acid, with species such as Menyanthes trifoliata and Myrica gale being common. In general, there was little bryophyte cover other than small patches of Campylium stellatum, while Carex lepidocarpa (formerly Carex viridula ssp. brachyrrhyncha) was noted in any abundance only at sample location S6. The boundary was also altered to remove areas of unsuitable habitat.

Monitoring Period: 2007-2012

Polygon	Habitat Type	Area (ha)	Comment
A	Sub-optimal with optimal areas	5.7058	Polygon A - has a relatively high percentage of optimal
B	Sub-optimal with optimal areas	21.1047	Polygon B - good habitat widespread but fragmented

Transect habitat characteristics (Note: only three habitat categories were used in 2007-2012 survey)

Monitoring period: 2013-2018

Transect	Optimal habitat	Optimal/Subopt.	Sub-optimal	Subopt/Unsuitable	Unsuitable	Optimal wetness	Too Wet	Too Dry
0								

Monitoring period: 2007-2012

Transect	Optimal habitat	Optimal/Subopt.	Sub-optimal	Subopt/Unsuitable	Unsuitable	Optimal wetness	Too Wet	Too Dry
0								

Transect samples

Mon. period	Transect	Sample	Location	Adults	Juveniles	Total	Habitat suitability
Monitoring period 2013-2018 Transect 0 (1 sample)							
2013-2018	0	0	NO TRANSECT RECORDED				
Monitoring period 2007-2012 Transect 0 (1 sample)							
2007-2012	0	0	NO TRANSECT RECORDED				

Spot Samples

Mon. period	Sample	Grid ref.	Adults	Juveniles	Total		Habitat suitability
Monitoring period 2013-2018 (6 samples)							
2013-2018	01	G 05036 22490	0	0	0		Suboptimal
2013-2018	02	G 05014 22615	1	0	1	Count	Suboptimal
2013-2018	03	G 05206 22521	1	0	1	Count	Suboptimal-Unsuitable

2013-2018	04	G 05328 22429	0	0	0		Suboptimal
2013-2018	05	G 05485 22423	0	0	0		Suboptimal-Unsuitable
2013-2018	06	G 05666 22216	5	0	5	Count	Suboptimal-Unsuitable
Monitoring period 2007-2012 (9 samples)							
2007-2012	01	G 05015 22452	0	0	0		
2007-2012	02	G 05036 22499	0	0	4		
2007-2012	03	G 05018 22615	0	0	2		
2007-2012	04	G 05206 22526	0	0	5		
2007-2012	05	G 05335 22428	0	0	0		
2007-2012	06	G 05495 22429	0	0	0		
2007-2012	07	G 05555 22262	0	0	0		
2007-2012	08	G 05664 22218	0	0	6		
2007-2012	09	G 05305 22022	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	Area of occupancy	Adult or sub-adult snails are present in at least one site in Polygon B (minimum 4 samples)	Present at 1 site in Polygon B	Pass
2013-2018	Presence/Absence	Adult or sub-adult snails are present in 2 sites (50%) within Polygon A	Present in 2 sites in Polygon A	Pass
2007-2012	Area of occupancy	Adult or sub-adult snails are present in at least one site in polygon area B (minimum 4 samples)	Present at 1 other location	Pass
2007-2012	Presence/Absence	Adult or sub-adult snails are present in 2 sites (50%) within polygon area A	Present in 3 of the 4 sample sites	Pass

Mon. period	Population Notes
2013-2018	In the monitoring period 2007-2012, Vertigo geyeri was recorded at three out of four locations in Polygon A, and one out of five locations in Polygon B. A similar result was recorded in the current monitoring, with two out of three locations positive for the target species in Polygon A and one out of three positive in Polygon B. Based on the criteria of Moorkens & Killeen (2011), the Population Assessment for Fermoyle is Favourable (green).
2007-2012	the abundance of Vertigo geyeri is rather low

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

5.2.2 Site level

Mon. period	Indicator	Target	Result	Pass/Fail
2013-2018	Habitat extent	>20ha of the site Suboptimal or better	21.29ha Suboptimal	Pass

2007-2012	Habitat extent	>25 ha of the site sub-optimal with optimal areas	5.7 ha Opt/Sub-opt, 21.1 ha Sub-opt/Unsuitable	Pass

Mon. period	Indicator	Target	Result	Pass/Fail
2013-2018	Habitat extent	Polygon area supports at least 3 discrete flush areas with Optimal habitat	No flush areas identified as Optimal	Fail
2007-2012	Habitat extent	Polygon area supports at least 3 discrete flush area with optimal habitat	3 optimal flushes	Pass

Mon. period	Habitat Notes
2013-2018	Based on the 2007-2012 monitoring survey, both Polygon A and Polygon B were Optimal and Suboptimal. In the current monitoring period, they have both been reduced to Suboptimal. In Polygon A, the vegetation has become taller and denser than would generally be suitable for Vertigo geyeri, while much of the habitat in Polygon B shows acidic influence with limited suitable vegetation. Based on the criteria of Moorkens & Killeen (2011), with slight changes to take account of more accurate mapping, the Habitat Assessment for Fermoyle is Unfavourable Inadequate (amber).
2007-2012	the places with optimal habitat are very small in area

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	Positive	100%	Some areas a bit trampled, but grazing valuable to maintaining habitat overall
2013-2018	B07	Forestry activities not referred to above	Inside	Low	Negative	0.1%	Self-seeding pine spreading from nearby forestry into bog/fen
2013-2018	C01.03	Peat extraction	Outside	Low	Negative	100%	Extraction has approached to within 500m of Polygon A
2013-2018	I01	invasive non-native species	Outside	Low	Negative	0.1%	Rhododendron in adjacent field and blanket bog
2013-2018	J02.15	Other human induced changes in hydraulic conditions	Inside	Low	Negative	10%	Drain clearance/creation
2007-2012	A04.02.01	non intensive cattle grazing	Inside	Low	Negative	>25ha	Cattle grazing is likely to have the most impact in polygon area A which supports a concentration of flushes.
2007-2012	B02	Forest and Plantation management & use	Outside	Low	Negative	>25ha	Forestry and peat extraction, and ditching activities may have negative effects in the future. However, at present the impact from all of these sources is considered to be minimal.
2007-2012	C01.03	Peat extraction	Outside	Low	Negative	>25ha	
2007-2012	J02.01.02	reclamation of land from sea, estuary or marsh	Inside	Low	Negative	>25ha	

Mon. period	Future Prospects Notes
2013-2018	In the previous monitoring period, 2007-2012, activities identified as impacting negatively on the Future Prospects of Vertigo geyeri at Fermoyle were cattle grazing, forestry, peat extraction and land reclamation. Cattle grazing, forestry and peat extraction are all still occurring at the site, while invasive species in the form of Rhododendron ponticum and the creation/clearance of drains was now noted at the site. With the exception of cattle-grazing, which is considered positive in the current assessment as it keeps the vegetation open, all activities recorded are considered to be negative, though of low intensity. Taking into account the activities present at the site, the Future Prospects for Fermoyle continue to be Favourable

Mon. period	Future Prospects Notes
2013-2018	(green).
2007-2012	the impact from all of these sources is considered to be minimal.

5.4 Overall Assessment

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

Mon. period	Overall Notes
2013-2018	Based on the Favourable (green) result for the Population Assessment and Future Prospects, and the Unfavourable Inadequate (amber) Habitat Assessment, the Overall Assessment for Fermoyle is Unfavourable Inadequate (amber).
2007-2012	

6. DISCUSSION

Monitoring period

2013-2018

Area of occupancy: Bellacorick Bog Complex is a large peatland site complex consisting of two large areas separated by an area of forestry. The Fermoyle Vertigo geyeri site is within the flushing slopes in the vicinity of G051226.

Discussion:

The Population Assessment and Future Prospects for Fermoyle remain Green across the monitoring periods 2007-2012 and 2013-2018, while the Habitat Assessment drops from Green to Amber. The Overall Conservation Assessment drops from Green to Amber. This drop is due to a decline in the habitat suitability at the site.
The broader landscape at Fermoyle comprises blanket bog (with peat extraction occurring nearby), with localised alkaline and iron-rich influences which create habitat suitable for V. geyeri. The nearby farm had cattle, and some extensive grazing of the bog and fen habitat was apparent. The habitat supporting V. geyeri would be considered atypical, being relatively acid and with few of the normal indicator species of vascular plants or mosses present (e.g. low-growing sedges such as Carex viridula subsp. brachyrrhyncha were uncommon, and typical 'brown mosses' were similarly patchy in occurrence). In many of the areas highlighted in the previous survey for sampling, the flushes consisted of tall, dense vegetation (e.g. stands of Juncus subnodulosus). V. geyeri needs open habitats, usually with short vegetation, or at least a mosaic, with some areas short/low. It is unclear what has caused the changes, though a change in grazing regime is one possible explanation. With all this said, however, the species continues to be present across the site.

While the threats and pressures identified do not appear to pose an immediate risk to the continued presence of the snail at the site, some actions should be considered. Invasive species should be removed from the habitat, and no further drainage should occur within or adjacent. The grazing regime should be queried, and if changes have been implemented in recent years, perhaps these could be reversed. Grazing management should be aimed at ensuring low, open vegetation at the flushes which are mostly at the edge of the floating mire, but great care must be taken to avoid over-grazing and trampling. A delicate balance is required, and local land-owners, in tandem with NPWS staff, are well-placed to implement such a regime. This site is important not just for Vertigo geyeri¸ but also for other species (e.g. Saxifraga hirculus, and a suite of rare bryophytes), and in general, management recommendations are likely to be similar for these species and mutually beneficial.

Monitoring recommendations:

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:

- Describe habitat and take 1 sample from the most suitable habitat in each of 6 locations/polygon areas (must include sites 2, 3, 4 and 8 of the Moorkens & Killeen (2011) survey) and analyse for molluscan composition
- Re-determine boundary of all habitat polygons identified as having some Optimal-Suboptimal in the 2009 survey and assign habitat to Optimal, Optimal-Suboptimal, Suboptimal, Suboptimal-Unsuitable, or Unsuitable
- Assess the management regime and impacts upon the habitat for Vertigo geyeri
- Use results to determine overall condition assessment

Management recommendations:

Due to the nature of the site, there is limited scope for the implementation of management to support the continued presence of V. geyeri at the site. Invasive species should be removed from the habitat, and no further drainage should occur within or adjacent. The grazing regime should be queried, and if changes have been implemented in recent years, perhaps these could be reversed. Grazing management should be aimed at ensuring low, open vegetation at the flushes which are mostly at the edge of the floating mire, but great care must be taken to avoid over-grazing and trampling. A delicate balance is required, and local land-owners, in tandem with NPWS staff, are well-placed to implement such a regime. This site is important not just for V. geyeri¸ but also for other species (e.g. Saxifraga hirculus, and a suite of rare bryophytes), and in general, management recommendations are likely to be similar for these species and mutually beneficial.

Vertigo geyeri monitoring at Fermoyle

2007-2012

Area of occupancy: Bellacorick Bog Complex is a large peatland site complex consisting of two large areas separated by an area of forestry. The Fermoyle V. Geyeri site is within the flushing slopes in the vicinity of G 051226.

Discussion:

The Condition of the site and the feature based upon the 2010 survey has been assessed as Favourable, and has not changed since the last (2005) survey. Note that insufficient data was collected in 2006 to allow a retrospective Condition Assessment for that year.

At Fermoyle, potentially suitable V. geyeri habitat may occur within an area covering some 30 hectares. However, the V. geyeri microhabitat is very restricted by topography, hydrology, and alkalinity. The current combination of habitats are such that support opportunistic booms in population for the species in some years (warm, humid and relatively dry), and a retreat to refugia in less favourable years for the snail. Therefore this fragmented population is more likely than the other sites of displaying stochastic variation over time, and it may be vulnerable because of this, and to long term changes that may further reduce the favourability of molluscan habitat on the site.

Monitoring recommendations:

Although the Condition of the site has been assessed as Favourable, given the extent of optimal habitat and low abundance of Vertigo geyeri, 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 2 of main report for full details). Prescription as follows:
- Describe habitat and take 1 sample from the most suitable habitat in each of 5 locations/polygon areas (must include sites 2, 3, 4 and 8 of this survey) and analyse for molluscan composition
- Re-determine boundary of all habitat polygons identified as having some Optimal & Sub-optimal in the 2009 survey 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. geyeri
- Use results to determine overall condition assessment

Management recommendations:

Existing Management

The Fermoyle flush area is mainly ungrazed. While cattle are able to get into the extensive area for at least part of the year, it is unlikely that they ever choose to enter deeply enough into the site to encroach the V. geyeri habitat, apart from the small hillside flushes around sites 1-3. A ditch newly excavated in 2005 was thought to be likely to dry out the habitat to some extent over the following years, but the ditch has revegetated and has a higher water level than was found in 2005 such that it is not, at present, a problem. The effects of peat cutting to the west of the site and forestry to the east of the site may also be seen within the V. geyeri habitat in the future.

Proposed management prescription for site

It is proposed that the current management regime of no corralled grazing be continued at Fermoyle for the next 5 years. There should be no further drainage or incursions of cutting or forestry. It is recommended that both sites are revisited once a year by NPWS staff to check for habitat change. This is particularly important for the ditches that can influence the site. Where possible, internal ditches should be blocked and external ditches should not be deepened or widened. Where ditches are to be maintained, they should only be very minimally maintained with weed removal and not with machines that could deepen their profile.

Site report - Vertigo Monitoring

Vertigo geyeri monitoring at Fin Lough (Offaly)

1. SITE CODE AND LOCATION DETAILS

1.1 Site code and location

Vertigo Site Code: VgCAM18 **County:** Offaly

SAC Site Code: 000576 Fin Lough (Offaly)

Location description (from baseline survey):

Monitoring period	Date surveyed	Recorders
2013-2018	5-6 May 2016	John Brophy & Maria Long
2007-2012	6 May 2010	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 geyeri 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 Pinguiculo-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). The specific areas that are within a wider mosaic, but that form specific V. geyeri habitat fit the Rodwell M13 characteristic vegetation classification (Rodwell, 1991) within the Schoenetum nigricantis mire group, and specifically the Briza media – Pinguicula vulgaris sub-community, that includes the presence of Schoenus nigricans, Juncus articulatus, Selaginella selaginoides and Triglochin palustris. In areas of lower and transitional sward, the habitat falls into the Rodwell M10 Pinguiculo-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 habitat types (from baseline survey):

Optimal	Flushed fen grassland with sedge/moss lawns 5-20cm tall, containing a high diversity with species such as Carex viridula, C.dioica, C. rostrata, Briza media, Equisetum palustre, Juncus articulatus and the mosses Drepanocladus revolvens, Campylium stellatum, with scattered tussocks of Schoenus nigricans no greater than 80cm tall. During sampling the water table should be between 0- 5cm of the soil surface, but not above ground level.
Sub-optimal	Vegetation composition as above but either vegetation height is less than 5cm or greater than 20cm, or the Schoenus tussocks are >1m tall, or the water table is below 5cm or ground is flooded at the time of sampling.
Unsuitable	Not defined

2. SUMMARY:

Fin Lough continues to support a population of Vertigo geyeri across the site, and has many areas of good quality habitat. A decrease in the numbers of Vertigo geyeri was noted however, as well as in the number of positive sample locations. This means that this site is in need of careful monitoring.

Some parts of the site are grazed, and some are not (one land parcel is abandoned, and other areas are fenced off). In places the wetness at the edge of the infilling lake maintains an open vegetation sward, but in others where there is no grazing, the Schoenus nigricans tussocks are tall, rank and dense. Throughout, there are patches, though often small and sparse, of suitable moss and low vegetation. The extent and quality of these varies between polygons. The grazing at this site requires a delicate and careful balance – it would be very easy to overgraze and hence poach and damage the delicate tufa springs. Communication with the landowner/manager and detailed monitoring is needed. Within the relatively large Polygon C, it is suggested that trial plots for manual cutting of tall tussocks of Schoenus nigricans could be carried out. This should only be done if the resources are available to allow detailed monitoring of the outcome, and repeat the management actions if necessary.

There is a sizeable drain running into the lake (between Polygons D/E and B/C) which has dense algal growth suggestive of high nutrient levels, or perhaps of silt run-off. This issue is likely to be emanating from outside the SAC boundary (e.g. scrub clearance has occurred on the nearby esker, and some nearby grasslands are likely to be fertilised) and requires liaison between local NPWS staff and local landowners.

Of note is the fact that one of the positive samples at Fin Lough (in Polygon A) is outside the SAC boundary. Also, a small area of fen habitat at the northern side of the access road/track, which has apparently previously had a positive sample for Vertigo geyeri, was not included for survey. It is recommended to include it in future monitoring.

3. TRANSECT DETAILS

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

Start point: N 03611 29727 Large boulder fronted by gorse

End point:	N 03613 29703	Presumed former lake edge. Gradation Schoenus fen to floating swamp.	
Transect length:	25.5	**Direction:**	As for 2010
Description:	As for 2010		
Sampling frequency:	As for 2010		

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

Start point:	N 03611 29729	front of a large boulder at the top of the flush and the base of the gorse scrub
End point:	N 03615 29702	where tall swamp vegetation begins at O 03615 29702
Transect length:	27	**Direction:**
Description:		
Sampling frequency:		

4. RESULTS

Polygon habitat characteristics

Monitoring Period: 2013-2018

Polygon	Habitat Type	Area (ha)	Comment
A	Optimal-Suboptimal	0.095	Polygon A status remains unchanged from the 2007-2012 survey, i.e. Optimal-Suboptimal. This is a small area of fen habitat in the corner of an otherwise relatively well-drained, grazed grassland.
B	Suboptimal	0.1941	Polygon B status drops from Optimal to Suboptimal due to the high water levels across much of the polygon resulting in limited suitable habitat for Vertigo geyeri; this is not considered to reflect ecological change.
C	Suboptimal	0.7201	Polygon C status increases to Suboptimal (up from Suboptimal and Unsuitable in 2007-2012) due to the presence of areas of optimal wetness and indicator mosses between Schoenus nigricans tussocks, though this change is considered to be due to interpretation rather than representing ecological change.
D	Suboptimal	0.5635	Polygon D had its boundary redrawn to include the full extent of Schoenus nigricans tussocks (and to better delineate it from the adjacent but different low, open, sedge and moss sward) following the description given in Moorkens & Killeen (2011) for the polygon. It is classified as Suboptimal; an increase from Suboptimal and Unsuitable in 2007-2012, and this change is considered to be based on interpretation/mapping, rather than ecological change.
E	Optimal	0.1796	Polygon E, which runs directly adjacent, but lower (closer to the infilling lake), to Polygon D, has also consequently had its boundary redrawn (see notes for Polygon D). Polygon E is classified as Optimal (and increase from Optimal and Suboptimal in 2007-2012), which is an interpretive change based on the redrawn boundary and the habitat present.
F	Suboptimal-Unsuitable	0.0549	Polygon F has been reduced in size due to the removal of areas that were considered to be permanently unsuitable (e.g. Phragmites australis swamp with open water) and is classified as Suboptimal-Unsuitable, down from Suboptimal in 2007-2012. This change in classification is based on a presumed ecological change - the growth of more dense and taller Schoenus nigricans tussocks within the remainder of the polygon.

Monitoring Period: 2007-2012

Polygon	Habitat Type	Area (ha)	Comment
A	Sub-optimal with optimal areas	0.083	Polygon A - Small Schoenus fen near railway and ditch
B	Optimal	0.194	Polygon B - between large Schoenus area and lake transition margin
C	Sub-optimal with unsuitable areas	0.72	Polygon C - Large area of tall Schoenus tussocks
D	Sub-optimal with unsuitable areas	0.36	Polygon D - damaged habitat along springline - could be improved to sub-optimal if grazing was addressed
E	Sub-optimal with optimal areas	0.294	Polygon E - Habitat between Schoenus zone and lake transition margin
F	Sub-optimal	0.208	Polygon F - mostly fenced off, ungrazed Schoenus fen

Transect habitat characteristics (Note: only three habitat categories were used in 2007-2012 survey)

Monitoring period: 2013-2018

Vertigo geyeri monitoring at Fin Lough (Offaly)

Transect	Optimal habitat	Optimal/Subopt.	Sub-optimal	Subopt/Unsuitable	Unsuitable	Optimal wetness	Too Wet	Too Dry
1		2 m	9.5m	1m		18m	2m	5.5m

Monitoring period: 2007-2012

Transect	Optimal habitat	Optimal/Subopt.	Sub-optimal	Subopt/Unsuitable	Unsuitable	Optimal wetness	Too Wet	Too Dry
1	6m	NA	8m	NA	11.5	18.5m		7m

Transect samples

Mon. period	Transect	Sample	Location	Adults	Juveniles	Total		Habitat suitability
Monitoring period 2013-2018 Transect 1 (2 samples)								
2013-2018	1	1	14.5m	0	0	0		Suboptimal
2013-2018	1	2	22.5m	1	0	1	Count	Optimal-Suboptimal
Monitoring period 2007-2012 Transect 1 (2 samples)								
2007-2012	1	1	14m	0	0	1		
2007-2012	1	2	21m	0	0	7		

Spot Samples

Mon. period	Sample	Grid ref.	Adults	Juveniles	Total		Habitat suitability
Monitoring period 2013-2018 (6 samples)							
2013-2018	01	N 03419 29729	1	0	1	Count	Suboptimal-Unsuitable
2013-2018	02	N 03461 29864	1	2	3	Count	Optimal
2013-2018	03	N 03816 29599	0	0	0		Optimal
2013-2018	04	N 03875 29534	1	0	1	Count	Optimal-Suboptimal
2013-2018	05	N 03866 29595	1	0	1	Count	Suboptimal
2013-2018	06	N 03661 29710	0	0	0		Suboptimal
Monitoring period 2007-2012 (7 samples)							
2007-2012	01	N 03467 29866	0	0	3		
2007-2012	02	N 03860 29584	0	0	9		
2007-2012	03	N 03878 29534	0	0	24		
2007-2012	04	N 03878 29608	0	0	2		
2007-2012	05	N 03760 29618	0	0	3		
2007-2012	06	N 03700 29667	0	0	7		
2007-2012	07	N 03427 29732	0	0	2		

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	Presence/Absence	Adult or sub-adult snails are present in at least 1 of the main habitat zones after 11.5m on the Transect (minimum 2 samples)	Present in 1 other location	Pass
2007-2012	1	Presence/Absence	Adult or sub-adult snails are present in at least 1 of the main habitat zones after 11.5m on the Transect (minimum 2 samples)	Present in 2 zones	Pass

Mon. period	Indicator	Target	Result	Pass/Fail
2013-2018	Area of occupancy	Adult or sub-adult snails are present in 1 other location at the eastern end of the site (e.g. corresponding to Polygons B and C, or samples areas 2, 3 and 4 of Moorkens & Killeen) which support optimal or sub-	Present in 1 other location	Pass

2013-2018		optimal habitat		Pass
2013-2018	Presence/Absence	Adult or sub-adult snails are present in 1 other location at the western end of the site (e.g. corresponding to Polygons A and F, or samples areas 1 and 7 of Moorkens & Killeen) which support optimal or sub-optimal habitat	Present in 2 other locations	Pass
2007-2012	Area of occupancy	Adult or sub-adult snails are present in 1 other location at the eastern end of the site (e.g. corresponding to sample areas 2, 3 or 4) which support optimal or sub-optimal habitat	Present in 3 locations	Pass
2007-2012	Presence/Absence	Adult or sub-adult snails are present in 1 other location at the western end of the site (e.g. corresponding to sample areas 1 and 7) which support optimal or sub-optimal habitat	present in 2 locations	Pass

Mon. period	Population Notes
2013-2018	In the monitoring period 2007-2012, Vertigo geyeri was found in both samples on Transect 1 and at all seven other locations sampled. Numbers ranged from one to 24 individuals, with an average of 6.5 per sample. In the current monitoring period, one out of two samples on Transect 1 was positive, along with three other locations across the site (out of six sampled). Numbers ranged from one to three, with an average of 1.2. Even though this would appear to suggest a decrease in the population, based on the criteria of Moorkens & Killeen (2011), the Population Assessment for Fin Lough is Favourable (green).
2007-2012	the snail is present on the transect and at other locations in good 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	10m of habitat along the Transect is classed as Optimal or sub-optimal	11.5m is Suboptimal or better	Pass
2013-2018	1	Habitat quality	Soils, at time of sampling, are saturated (optimal wetness) for 15m along the Transect	18m is Optimal wetness	Pass
2007-2012	1	Habitat extent	10m of habitat along the Transect is classed as Optimal or sub-optimal	14m is suitable	Pass
2007-2012	1	Habitat quality	Soils, at time of sampling, are saturated (optimal wetness) for 15m along the Transect	18.5m is optimal wetness	Pass

5.2.2 Site level

Mon. period	Indicator	Target	Result	Pass/Fail
2013-2018	Habitat extent	At least 0.7ha of the habitat within the polygons should be classed as Optimal and sub-optimal	1.8ha classed as Suboptimal or better	Pass
2007-2012	Habitat extent	At least 0.7ha of the habitat within the polygons (A, B, E and F) should be classed as optimal and sub-optimal habitat	0.79 ha classed as optimal and sub-optimal	Pass

Mon. period	Habitat Notes
2013-2018	While it would appear that there have been a lot of changes in the status of habitat polygons at this site (only one remained the same: Polygon A at Optima-Suboptimal), in fact all changes were considered likely to be due to differences in interpretation (e.g. mapping) rather than ecological changes. Only Polygon F, one of the smallest at the site, showed what appeared to be a clear ecological decrease in quality. On the transect, habitat quality and extent remain similar to 2010. Based on the criteria of Moorkens & Killeen (2011), with the small adjustment of including polygons C and D in the assessment, the Habitat Assessment for Fin Lough is Favourable (green).
2007-2012	The habitat throughout most of the site is in good condition for V. geyeri

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	10%	Poaching & introduction of nutrients
2013-2018	A04.03	abandonment of pastoral systems, lack of grazing	Inside	Low	Negative	60%	Dense Schoenus tussocks
2013-2018	A10.01	removal of hedges and copses or scrub	Outside	Low	Negative	1%	Removal of Gorse above east end of Polygon D
2013-2018	H01.05	diffuse pollution to surface waters due to agricultural and forestry activities	Inside	Medium	Negative	25%	Eutrophication of drain from run-off. Cattle and fertiliser?
2013-2018	H05.01	garbage and solid waste	Inside	High	Negative	1%	Blocks and other (old) construction waste between polygons D and C
2007-2012	A04.02.01	non intensive cattle grazing	Inside	Medium	Negative	0.44ha	Polygons A & D
2007-2012	A04.03	abandonment of pastoral systems, lack of grazing	Inside	Medium	Negative	0.72ha	Polygon C - Overgrown Schoenus fen

Mon. period	Future Prospects Notes
2013-2018	The Future Prospects for Fin Lough in 2010, as assigned by Moorkens & Killeen (2011), were Favourable (green). One of the threats to the Vertigo geyeri population at Fin Lough is lack of grazing, with 60% of the site considered to be affected (with effects particularly noticeable in polygons C and F). A smaller area (approx. 10%) is affected by overgrazing and associated poaching (in Polygon D). Negative water quality effects of runoff are evident in the drain (between polygons D/E and B/C), and other localised places in the form of dense algal growth (perhaps from dunging, rather than run-off). Small areas are affected by dumping of solid waste (rock) and scrub clearance (again, in the area between polygons D/E and B/C). Based on the current suitability status of the polygons containing habitat for the target species (and in particular the fact that one has dropped in status due to ecological change), and on the fact that nutrient/silt run-off (presumably from adjacent land) is continuing to be seen at the site, the Future Prospects are classed as Unfavourable Inadequate (amber).
2007-2012	On the basis of the status quo being maintained, 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	Amber	Amber
2007-2012	Green	Green	Green	Green

Mon. period	Overall Notes
2013-2018	The population and habitat assessments were Favourable (green), but the Future Prospects were Unfavourable Inadequate (amber). This results in an Overall Assessment for Fin Lough of Unfavourable Inadequate (amber).
2007-2012	

6. DISCUSSION

Monitoring period

2013-2018

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:

Fin Lough continues to support a population of Vertigo geyeri across the site, and has many areas of good quality habitat. A decrease

in the numbers of Vertigo geyeri was noted however, as well as in the number of positive sample locations. This means that this site is in need of careful monitoring.

Some parts of the site are grazed, and some are not (one land parcel is abandoned, and other areas are fenced off). In places the wetness at the edge of the infilling lake maintains an open vegetation sward, but in others where there is no grazing, the Schoenus nigricans tussocks are tall, rank and dense. Throughout, there are patches, though often small and sparse, of suitable moss and low vegetation. The extent and quality of these varies between polygons. The grazing at this site requires a delicate and careful balance - it would be very easy to overgraze and hence poach and damage the delicate tufa springs. Communication with the landowner/land manager and detailed monitoring is needed. Within the relatively large Polygon C, it is suggested that trial plots for manual cutting of tall tussocks of Schoenus nigricans could be carried out. This should only be done if the resources are available to allow detailed monitoring of the outcome, and repeat the management actions if necessary.

There is a sizeable drain running into the lake (between polygons D/E and B/C) which has dense algal growth suggestive of high nutrient levels, or perhaps of silt run-off. This issue is likely to be emanating from outside the SAC boundary (e.g. scrub clearance has occurred on the nearby esker, and some nearby grasslands are likely to be fertilised) and requires liaison between local NPWS staff and local landowners.

Of note is the fact that one of the positive samples at Fin Lough (in Polygon A) is outside the SAC boundary. Also, a small area of fen habitat at the northern side of the access road/track, which has apparently previously had a positive sample for Vertigo geyeri, was not included for survey. It is recommended to include it in future monitoring.

Monitoring recommendations:

Monitoring should be carried out at three-yearly intervals, in particular to assess any changes made to the management of the site on foot of the current survey, and to ascertain if the lower numbers recorded in 2016 represent a downward trend. The monitoring should follow that proposed by Moorkens & Killeen (2011) with only minor changes, and the addition of a new small area:

- Repeat Transect 1. Delineate the plant community/habitat zones, and assign the habitat and wetness in each zone as Optimal, Optimal-Suboptimal, Suboptimal, Suboptimal-Unsuitable or Unsuitable,and Too dry, Optimal wetness or Too wet, respectively
- Take at least 2 samples from the most suitable habitat on the transect (Moorkens & Killeen recommend going beyond 11.5m to take samples) and analyse for molluscan composition
- Describe habitat and take 1 sample from the most suitable habitat in each of 2 other locations at the western end of the site (i.e.polygons A and F) and analyse for molluscan composition
- Describe habitat and take 1 sample from the most suitable habitat in each of 3 other locations at the eastern end of the site (i.e. polygons B, C and D or E of this survey) and analyse for molluscan composition
- Based on information received from landowners Bord na Móna, a small area of fen habitat to the north of the access track/road should be sampled. Take one sample here from the most suitable habitat, and analyse for molluscan composition. Assess quality of habitat, and in next round of monitoring, make a decision on whether to include this area within the site for future surveying.
- 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 geyeri
- Use results to determine overall condition assessment

Management recommendations:

Note that this site also supports Vertigo moulinsiana, and therefore management needs to be sensitive to the needs of both species. The management required at this site varies depending on the polygon in question. Valuable notes on management are also available in Moorkens & Killeen (2011).

Polygon A requires no change in management, with the current level of grazing maintaining a generally open sward with only some poaching damage. This needs to be carefully monitored however, as the area is very small and animals have unrestricted access, thus damage could happen easily (e.g. in a dry spell animals may congregate here due to it being the wettest part of the field).

Polygon B consists of a strip of low, open, mostly floating, sedge and moss vegetation in the zone between the Schoenus nigricans fen and the infilling lake itself, and as such, it does not lend itself to grazing management. No management is recommended here.

Polygon C is an area of abandoned land, consisting mostly of large, sometimes dense, Schoenus nigricans tussocks with a substratum of bare tufa and moss in places. As noted in Moorkens & Killeen (2011), grazing is not occurring in Polygon C and the introduction of grazing may negatively impact on suitable habitat (which occurs only as small and limited moss patches between Schoenus nigricans tussocks in places) as cattle are likely to avoid grazing the large tussocks, and more detrimentally, are likely to move between them and damage the intervening delicate moss and tufa areas. At present, management intervention is not considered absolutely necessary, but conservation cutting may be required at a future date to keep the Schoenus nigricans tussocks in check. This would be a good candidate site for a trial of this method, and it is recommended that small areas be cut and subsequently monitored for any potential increase in suitable Vertigo geyeri habitat. Any such management intervention should only be done with the input of a Vertigo geyeri expert, to avoid inadvertently damaging this fragile habitat, and monitoring would be needed on a yearly basis to ensure the desired results were forthcoming.

At the time of survey in 2016, Polygon D was divided lengthways by a fence (consisting of a strip of electric wire). Above the fence, cattle have access and there is some poaching, which is worst along the fence line itself, with many areas consisting of puddles with Glyceria fluitans and Veronica beccabunga, and some with algal growth (none of which is typical nor desirable in Vertigo geyeri habitat). This area quickly grades into drier ground upslope, which is largely unsuitable for the target species, so habitat is limited in extent above the fence. The habitat below the fence is dominated by dense Schoenus nigricans tussocks, with areas of moss and tufa

between tussocks. Moss cover is good, in spite of a dense Schoenus nigricans sward, but this may not continue to be the case without management intervention. This area would benefit from some grazing, but extreme care is needed to keep levels low enough to not damage the delicate moss and tufa areas. It is suggested that the electric fence could be moved to the lower end of the Schoenus nigricans zone in this area to allow some grazer access – but this should be monitored regularly (i.e. multiple times per season) to ensure no damage is caused. It is understood (from the notes in Moorkens & Killeen, 2011) that the landowner does periodically move this fence in response to changes in the habitat. Continued liaison with the landowner/manager is needed, along with continued encouragement and support for conservation driven decision-making.

Polygon E is not currently grazed, and is likely to be too wet and fragile to support grazing, therefore the management should not be changed. This follows a similar rationale as for Polygon B, but this polygon contains more suitable habitat.

Polygon F is a small area which is currently mostly fenced off from the cattle pasture. This polygon would benefit from some grazing by moving the fence down to the edge of the Phragmites australis fringe.

Land management outside the polygons also needs to be considered. From the north, a small amount of nutrient and/or silt run-off may be reaching the site. There has been scrub clearance on the nearby esker (which may have released silt), and some areas of nearby grassland are likely to receive fertiliser. Liaison between local NPWS staff and landowners should take place immediately so that the importance of the site can be explained, as well as the implications of some types of management. To the south is a large expanse of Bord na Móna-owned cutover raised bog, some of which is still in active production. In the 1990s a berm and constructed wetland were constructed to the south-west of Fin Lough, and these may afford some protection to the site from the effects of the large-scale peat-cutting nearby (e.g. drying out from drainage, siltation, etc.). Constant liaison with Bord na Móna staff (particularly the ecologists) is recommended.

Vertigo geyeri 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:

There was found to be widespread occurrence of V. geyeri throughout the suitable habitat at Fin Lough, and it was especially abundant in the zone between the large eastern Schoenus fen and the lake below (Polygon area B). The quality of the habitat along the transect and elsewhere was virtually unchanged from 2005. The V.geyeri population at Fin Lough remains one of the most important sites for the species in the country and has extensive Annex I habitat. Its favourable maintenance is of the utmost importance.

Monitoring recommendations:

Frequency: Next monitoring due 2013
Methods (see Section 2 of main report for full details). Assessment of the transect and other locations with snail sampling, plus assessment of condition of polygon. Prescription as follows:
- Repeat transect 1, delineate the plant community/habitat zones, and assign the habitat and wetness in each zone as Optimal, Sub-optimal or Unsuitable
- Rake at least 2 samples from the most suitable habitat on the transect and analyse for molluscan composition
- Describe habitat and take 1 sample from the most suitable habitat in each of 2 other locations at the western end of the site (e.g. corresponding to sample areas 1 and 7 of this survey) and analyse for molluscan composition
- Describe habitat and take 1 sample from the most suitable habitat in each of 3 other locations at the eastern end of the site (e.g. corresponding to sample areas 2, 3 and 4 of this survey) and analyse for molluscan composition
- 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. geyeri
- Use results to determine overall condition assessment

Management recommendations:

The information on management is based on that obtained from the 2005 survey (Moorkens 2006d). This is repeated with minor modifications.

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 was part of 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. There are two main management units concerning the V. geyeri habitats at Fin Lough. The first is the eastern block (Polygon areas B and C), which is fenced off and ungrazed. Most of polygon area F is also fenced and therefore ungrazed, however, the eastern margin of this spring area is grazed. At the time of the present survey, Polygon area E was also fenced off and ungrazed, but it is an area which has been formerly grazed when the fence is moved. The second block is a large open area that takes in the esker slopes and field areas to fence edges at the lake and ditch boundaries – Polygon areas A and D and part of F lie within this grazed area.

The management history of the grazed areas for the lifetime of the current landowner has been low intensity cattle and horses, generally between May and September and never over-wintered.

Proposed management prescription for site

The sloping Schoenus fen at the east of the site (polygon area C) has been excluded from grazing for a number of years. As a result, the tussocks have grown high in most of the block, except where the spring areas have restricted growth by their wetness. These wet and more open areas retain good V. geyeri habitat, as does the wet area towards the base of the slope that forms the transition zone with the lake. In the rest of the area a molluscan community of woodland and shaded species are overtaking fen species. If grazing was reintroduced into these areas it is likely that animals would favour the more tender open low species in the wetter parts of the block, and ignore the higher tussocks, thus exacerbating the problem. To control the tussocks, a specific cutting event would be needed, before reintroducing grazing. However, it is likely that even in this situation, the animals would favour the sensitive spring line and the best of the habitat would deteriorate. It is therefore proposed that the current management regime of no grazing remain in place, and that the area is resurveyed in 3 years to determine if the hydrological regime is enough to keep the current mosaic of V. geyeri habitat in favourable condition or whether conservation cutting may be needed.

The rest of the site is managed by extensive cattle grazing, with a wide range of movement open to the grazers, from the top of the esker slopes down to the fence towards the lake edge. Most of this grazing is not interfering with the V. geyeri habitat, however, there is quite serious damage in the wettest spring lines where habitat has been heavily trampled (Polygon areas A and especially D). This is demonstrated in the description of the first 7 metres of the surveillance transect. The locations of the fences at the margin of the block should be raised out of the wet V. geyeri habitat, to allow for recovery of this zone. The cattle are currently using these wettest areas preferentially, suggesting that they require the moisture from this area in dry times. An adequate source of drinking water should be provided away from the edge habitat areas. In moving the fence upslope, the entire V. geyeri habitat would become excluded from grazers. The site should be resurveyed after a full year of the new regime to assess if the wetness of the hydrological regime is enough to keep the V. geyeri habitat in favourable condition. A stricter management prescription is not possible as different weather conditions require different responses. The success of this population is due to sensitive farming methods over years of

experience, and fences have been moved in anticipation of the animals' husbandry needs. It is recommended that NPWS staff liaise with the landowner to maintain this sensitivity of grazing rotation while pointing out the most important spring line habitats.

Site report - Vertigo Monitoring

Vertigo geyeri monitoring at Lisduff Fen

1. SITE CODE AND LOCATION DETAILS

1.1 Site code and location

Vertigo Site Code: VgCAM20 **County:** Offaly

SAC Site Code: 002147 Lisduff Fen

Location description (from baseline survey):

Monitoring period	Date surveyed	Recorders
2013-2018	20-21 September 2016	John Brophy & Maria Long
2007-2012	29 April 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. geyeri 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 particular habitat mosaics that support V. geyeri are the elements of the fen and fen-grassland transition away from the areas encroached by birch (Betula pubescens) willow (Salix sp.), heather (Calluna vulgaris), bog myrtle (Myrica gale) and Scots pine (Pinus sylvestris). The areas that lie within a wider mosaic, but that form specific V. geyeri habitat fit the Rodwell M13 characteristic vegetation classification (Rodwell, 1991) within the Schoenetum nigricantis mire group, with Schoenus nigricans, Juncus articulatus, Drepanocladus revolvens, Briza media, Parnassia palustris and Juncus subnodulosus being most characteristic of positive habitat.

1.3 Definition of habitat types (from baseline survey):

Optimal	Flushed fen grassland with sedge/moss lawns 5-20cm tall, containing a high diversity with species such as Carex viridula, Parnassia palustris, Equisetum palustre, Juncus articulatus and the mosses Drepanocladus revolvens, Campylium stellatum, with scattered tussocks of Schoenus nigricans no greater than 80cm tall. During sampling the water table should be between 0- 5cm of the soil surface, but not above ground level.
Sub-optimal	Vegetation composition similar to above but more dominated by Schoenus tussocks with mosses between the tussocks, or the water table is below 5cm or ground is flooded at the time of sampling.
Unsuitable	Not defined

2. SUMMARY:

Lisduff Fen is an important site - it supports both Vertigo moulinsiana and Vertigo geyeri (though only V. moulinsiana was recorded in the current survey), and inhabited marsh fritillary (Euphydras aurinia) larval webs were also recorded here as part of the current survey (apparently a new record). While the habitat appears to be still suitable for Vertigo geyeri across most of the site (i.e. wetness was optimal, typical associated plant species were present, habitat structure looked good), the snail was not found in the course of the current monitoring period. It is not clear why this apparent decline in the population of Vertigo geyeri has occurred. At first, the pressures and threats to the site appeared to be relatively limited, but given the apparent large decline (or even loss) of the species at the site, 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, but the northern section appears to be abandoned, and grazing needs to be re-introduced. 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. 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.

This is an important site, and urgent 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.

Of interest is the fact that the Vertigo moulinsiana population has not seen such a drastic decline. It was found to be widespread along the spring-line habitat that runs along the south-western section of the site, though with a cluster of negative samples in one area.

3. TRANSECT DETAILS

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

Start point:	S 08148 99998	Large Hawthorn that served as original start point now felled. Start point 4m west of spoil heap.	
End point:	N 08204 00008		
Transect length:	60	**Direction:**	As for 2010
Description:	As for 2010		

Sampling frequency: As for 2010

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

Start point:	N 08148 00000	at the front of a large hawthorn tree in the field at the top of the fen
End point:	N 08202 00012	at the first gorse bush at
Transect length:	55	**Direction:**
Description:		
Sampling frequency:		

4. RESULTS

Polygon habitat characteristics

Monitoring Period: 2013-2018

Polygon	Habitat Type	Area (ha)	Comment
A	Optimal-Suboptimal	2.823	Polygon A status remains Optimal-Suboptimal.

Monitoring Period: 2007-2012

Polygon	Habitat Type	Area (ha)	Comment
	Sub-optimal with optimal areas	2.1848	The entire Vertigo geyeri habitat at Lisduff Fen is enclosed along the springline on the western margin of the southern part of the site. This is 2.1848 ha in area and is classed as a mosaic of Optimal and Sub-optimal habitat.

Transect habitat characteristics (Note: only three habitat categories were used in 2007-2012 survey)

Monitoring period: 2013-2018

Transect	Optimal habitat	Optimal/Subopt.	Sub-optimal	Subopt/Unsuitable	Unsuitable	Optimal wetness	Too Wet	Too Dry
1	3 m	30m	9.5m		17.5m	40m		20m

Monitoring period: 2007-2012

Transect	Optimal habitat	Optimal/Subopt.	Sub-optimal	Subopt/Unsuitable	Unsuitable	Optimal wetness	Too Wet	Too Dry
1	26.5	NA	19.5	NA	17	39.1m	3m	17.9m

Transect samples

Mon. period	Transect	Sample	Location	Adults	Juveniles	Total	Habitat suitability
Monitoring period 2013-2018 Transect 1 (3 samples)							
2013-2018	1	1	23.5m	0	0	0	Optimal-Suboptimal
2013-2018	1	2	26m	0	0	0	Optimal
2013-2018	1	3	40m	0	0	0	Optimal-Suboptimal
Monitoring period 2007-2012 Transect 1 (4 samples)							
2007-2012	1	1	24m	0	0	1	
2007-2012	1	2	34m	0	0	2	
2007-2012	1	3	49m	0	0	0	
2007-2012	1	4	55m	0	0	0	

Spot Samples

Mon. period	Sample	Grid ref.	Adults	Juveniles	Total	Habitat suitability
Monitoring period 2013-2018 (3 samples)						
2013-2018	01	N 08170 00115	0	0	0	Optimal
2013-2018	02	N 08227 00438	0	0	0	Optimal-Suboptimal
2013-2018	03	N 08220 00480	0	0	0	Suboptimal
Monitoring period 2007-2012 (4 samples)						
2007-2012	01	N 08171 00112	0	0	1	
2007-2012	02	N 08178 00191	0	0	0	

2007-2012	03	N 08228 00445	0	0	4
2007-2012	04	N 08206 00487	0	0	3

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 at least 2 of the main habitat zones after 17m on the Transect	Adult or subadult snails absent	Fail
2007-2012	1	Presence/Absence	Adult or sub-adult snails are present in at least 2 of the main habitat zones after 17m on the Transect	Present in 2 zones	Pass

Mon. period	Indicator	Target	Result	Pass/Fail
2013-2018	Presence/Absence	Adult or sub-adult snails are present in 2 other locations which support optimal or sub-optimal habitat	Adult or sub-adult snails absent	Fail
2007-2012	Presence/Absence	Adult or sub-adult snails are present in 2 other locations which support optimal or sub-optimal habitat	Present in 3 locations	Pass

Mon. period	Population Notes
2013-2018	In the monitoring period 2007-2012, Vertigo geyeri was recorded from two out of four sample locations on Transect 1 and at three out of four other sample locations across the site. In the current monitoring period, the target species was not found at the three sample locations on the transect or the three sample locations across the site. Based on the criteria of Moorkens & Killeen (2011), the Population Assessment for Lisduff Fen is Unfavourable Bad (red).
2007-2012	The snail is widespread in its distribution within the optimal habitat but 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	At least 20m of habitat along the Transect is classed as Optimal-Suboptimal or better AND >30m of habitat along the Transect is classed Suboptimal or better	29m Optimal or Optimal-Suboptimal AND 56m Suboptimal or better	Pass
2013-2018	1	Habitat quality	Soils, at time of sampling, are saturated (optimal wetness) for >30m along the Transect	35.5m is Optimal wetness	Pass
2007-2012	1	Habitat extent	At least 20m of habitat along the Transect is classed as Optimal and >30m of habitat along the Transect is classed as Optimal or sub-optimal	23.5m is optimal and 43m is optimal or sub-optimal	Pass
2007-2012	1	Habitat quality	Soils, at time of sampling, are saturated (optimal wetness) for >30m along the Transect	42.1m is optimal wetness	Pass

5.2.2 Site level

Mon. period	Indicator	Target	Result	Pass/Fail
2013-2018	Habitat extent	At least 2ha of the site should support optimal and sub-optimal habitat	2.8ha Suboptimal or better	Pass
2007-2012	Habitat extent	At least 2 ha of the site should support optimal and sub-optimal habitat	2.816 ha with optimal and sub-optimal	Pass

Mon. period	Habitat Notes
2013-2018	In the monitoring period 2007-2012, Polygon A was classed as Optimal and Sub-optimal and is unchanged in the current monitoring period. During this survey, some changes were made to the status levels of certain zones along the transect, at least some of which were because of the use of a five-point suitability scale in the current survey, compared to a three-

2013-2018	point one used by Moorkens & Killeen (2011). The target has been reworded slighted to take account of this, and to bring it into line with assessment criteria at other sites, and in light of this, the Habitat Assessment for Lisduff Fen is Favourable (green).
2007-2012	Although it is relatively small in extent, the suitable habitat at the site appears to be in good condition for V. geyeri.

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	60%	Cattle & horse grazing appears to be stopping scrubbing over (contrast with fenced northern part of fen)
2013-2018	A04.03	abandonment of pastoral systems, lack of grazing	Inside	High	Negative	40%	Northern section fenced off and scrubbing over with Bog Myrtle and Willow
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 tankers. Permanent fixture. i.e.flexible pipe at roadside for each attachment to tankers
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	>2ha	The present low level of cattle and horse grazing is not having any impact (positive or negative) on the V. geyeri habitat, but would become negative if the level increased.

Mon. period	Future Prospects Notes
2013-2018	A number of impacts were noted at Lisduff Fen. The most widespread activity within the site is cattle and horse grazing, which is considered to be having a positive effect by maintaining an open sward and preventing scrub encroachment within the grazed areas. The northern section, however, is suffering from the effects of abandonment, with rank vegetation present and scrub encroachment occurring. Other issues include dumping of brash and spoil, and the spread of tree seedlings within the fen. Impacts occurring adjacent to the fen, but not within the Vertigo geyeri habitat polygons include scrub removal, drain clearance/habitat modification, water abstraction and intensive farming (e.g. silage production). All of these latter activities are happening so close to the fen that they are likely to be having a negative impact. While it is unclear what exactly is behind the apparent large decline in the population of Vertigo geyeri at this site, and a number of impacts and pressures were noted, nonetheless the habitat appears in relatively good condition. It may be that the snail is acting as an early indicator of habitat change that is not yet apparent. Until further surveys are conducted to help elucidate this, the Future Prospects for the site are considered to be Unfavourable Inadequate (amber).
2007-2012	The present low level of cattle and horse grazing is not having any impact (positive or negative) on the V. geyeri habitat, but would become negative if the level increased. As the impact is low, Future prospects have been assessed as Favourable (green).

5.4 Overall Assessment

Vertigo geyeri monitoring at Lisduff Fen

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

Mon. period	Overall Notes
2013-2018	While the Habitat Assessment returned a Favourable (green) result and the Future Prospects are considered to be Unfavourable Inadequate (amber), the Unfavourable Bad (red) result for the Population Assessment means the Overall Assessment for Lisduff Fen is Unfavourable Bad (red).
2007-2012	

6. DISCUSSION

Monitoring period

2013-2018

Area of occupancy: Lisduff Fen is located approximately 4 km south-east of Birr in County Offaly. It is the fen at the north-east quarter of Kilcolman crossroads. Access is via a farm gate opposite at the south-west of the fen.

Discussion:

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 (Euphydras aurinia) larval webs were also recorded here as part of the current survey (apparently a new record). While the habitat appears to be still suitable for Vertigo geyeri across most of the site (i.e. wetness was optimal, typical associated plant species were present, habitat structure looked good), the snail was not found in the course of the current monitoring period. It is not clear why this apparent decline in the population of Vertigo geyeri has occurred. At first, the pressures and threats to the site appeared to be relatively limited, but given the apparent large decline (or even loss) of the species at the site, 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, but the northern section appears to be abandoned, and grazing needs to be re-introduced. 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. 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.

This is an important site, and urgent 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.

Of interest is the fact that the Vertigo moulinsiana population has not seen such a drastic decline. It was found to be widespread along the spring-line habitat that runs along the south-western section of the site, though with a cluster of negative samples in one area.

Monitoring recommendations:

Given that the site appears to have deteriorated, particularly in terms of Vertigo geyeri distribution and abundance, it is recommended that monitoring is carried out immediately, and then at yearly intervals until an improvement is seen. Monitoring should follow that proposed by Moorkens & Killeen (2011), with only minor alterations:

- Repeat Transect 1, delineate the plant community/habitat zones, and assign the habitat and wetness in each zone as Optimal, Optimal-Suboptimal, Suboptimal, Suboptimal-Unsuitable or Unsuitable, and Too dry, Optimal wetness or Too wet, respectively
- Take at least 2 samples from the most suitable habitat on the transect and analyse for molluscan composition
- Describe habitat and take 1 sample from the most suitable habitat in each of 3 other locations (e.g. corresponding to sample areas 1, 2 and 3 of Moorkens & Killeen survey - i.e. one in southern section of site but not on transect, and two in northern section) and analyse for molluscan composition
- 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 geyeri
- 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 site at Lisduff Fen is divided into two management units; north and south of the fence-line. The southern section (approximately 60% of the site) is grazed by cattle and horses and the level of grazing is close to ideal and should be maintained. While grazing could potentially be increased to open up areas of the fen where vegetation is becoming dense and scrub is encroaching (i.e. as one moves east across the southern section), this could impact negatively on Vertigo moulinsiana and the edge of the fen where Vertigo geyeri

was previously found. 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 geyeri habitat.

The northern section (approximately 40% of the site) is rank and scrubbing over. Moorkens & Killeen (2011) note that light grazing was occurring here in 2010, but it would appear that this is no longer the case. The Vertigo geyeri habitat would benefit from grazing here, but it should be at appropriate levels and should not cause unintended damage. It is recommended that light grazing be re-introduced here, but that its effects be carefully monitored.

Management of areas directly adjacent to the fen (and lying within the Lisduff Fen 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 which 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 urgent 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 geyeri monitoring at Lisduff Fen

2007-2012

Area of occupancy: Lisduff Fen is located approximately 4 km south-east of Birr in County Offaly. It is the fen at the north-east quarter of Kilcolman crossroads. Access is via a farm gate opposite at the south-west of the fen.

Discussion:

The Condition of the site and the feature based upon the 2010 survey has been assessed as Favourable. There are small differences in the transect zone widths of optimal and sub-optimal habitat and wetness compared to 2005 but overall the results are very similar.

Vertigo geyeri is widespread in low abundance at Lisduff Fen, the most optimal of the habitat for the snail lying along the south-western margin of the fen. It comprises a mosaic of short bryophyte rich sedge lawn that then gently transitions into taller Schoenus fen. The best of the habitat follows the spring seepage line. The most optimal area is probably less than 0.5 hectares in area. The remaining suitable area of the fen (c. 1.5ha) has a mosaic of habitats and while this section is sub-optimal habitat for V. geyeri, the spread of excellent pockets of habitat ensure that the snail is very widely distributed and locally common. Such mosaics of habitat are excellent protection against weather extremes, allowing the snail plenty of wet and drought-weather refugia from which to recover from extreme events.

This site also supports the Annex II species Vertigo moulinsiana. Overall, it is an excellent site for the two species and the Annex I habitat at the spring lines. It deserves the highest level of protection.

Monitoring recommendations:

Although the Condition of the site, both in terms of habitat and Vertigo geyeri distribution and abundance, was assessed as Favourable, because the area of good habitat is rather small, 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 2 of main report for full details). Assessment of the transect and other locations with snail sampling, plus assessment of condition of polygon. Prescription as follows:
- Repeat transect 1, delineate the plant community/habitat zones, and assign the habitat and wetness in each zone as Optimal, Sub-optimal or Unsuitable
- Take at least 2 samples from the most suitable habitat on the transect and analyse for molluscan composition
- Describe habitat and take 1 sample from the most suitable habitat in each of 3 other locations (e.g. corresponding to sample areas 1, 3 and 4 of this survey) and analyse for molluscan composition
- 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. geyeri
- Use results to determine overall condition assessment

Management recommendations:

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. geyeri 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 geyeri 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.

Site report - Vertigo Monitoring

Vertigo geyeri monitoring at Ox Mountains

1. SITE CODE AND LOCATION DETAILS

1.1 Site code and location

Vertigo Site Code: VgCAM21 **County:** Sligo

SAC Site Code: 002006 Ox Mountains Bogs

Location description (from baseline survey):

Monitoring period	Date surveyed	Recorders
2013-2018	28 June 2016	John Brophy & Maria Long
2007-2012	28 May 2010	Ian Killeen & Maria Long

1.2 General Habitat Description (from baseline survey):

The general habitats in which Vertigo geyeri is present are the spring lines and flush zones with associated Schoenus tussocks and runnels of low mossy vegetation that are rich in yellow sedges, including Carex viridula, with mosses Drepanocladus revolvens, Campylium stellatum. These runnels are typically close to hummocks of acid species, including Sphagnum mosses. The wider habitat is therefore upland blanket bog, with V. geyeri occupying specific micro-habitat of alkaline fen seepage within. The site was found by Holyoak (2005) in 2002, and the snails were described as being found "in the base of low sedges, especially C. dioica".
The EU habitats present at V. geyeri habitat therefore fit the category of Alkaline fens: low sedge-rich communities (Annex I Habitat 7230), rich fens of CORINE 54.2 (Romão, 1996; Devillers et al., 1991). This falls within the more general habitat of rich fen and flush (PF1) of Fossitt (2000).

1.3 Definition of habitat types (from baseline survey):

Optimal	Flushed fen with sedge/moss lawns and mounds 5-20cm tall, containing a high diversity with species such as Carex viridula, Parnassia palustris, Equisetum palustre, Juncus articulatus and the mosses Drepanocladus revolvens, Campylium stellatum, with scattered tussocks of Schoenus nigricans no greater than 80cm tall. During sampling the water table should be between 0- 5cm of the soil surface, but not above ground level.
Sub-optimal	Vegetation composition similar to above sedge/moss lawns and mounds >20cm tall, and the Schoenus tussocks >80cm tall, or the water table is below 5cm or ground is flooded at the time of sampling.
Unsuitable	Not defined

2. SUMMARY:

The Vertigo geyeri habitat in the Ox Mountains site comprises a wet runnel, with side channels, set in a matrix of wet heath. Suitable habitat for Vertigo geyeri occurs in the base of the runnel and along the terraced sides, supporting 'brown mosses', low sedges and Schoenus nigricans tussocks. The habitat continues to be suitable for supporting the target species, though lower numbers were recorded in the current survey than in 2010. It cannot be determined whether this reflects a real drop in the population or is the result of natural fluctuations, which are common in small invertebrate populations. Based on the existing criteria, the Population Assessment has dropped from Favourable (green) to Unfavourable Inadequate (amber), but this result should be reviewed following future Population Assessments.

A windfarm has recently been built on the site. It is unknown whether the existence of Vertigo geyeri was taken into account when permission was granted, or during construction (in terms of appropriate mitigation measures). In spite of the huge disturbance and changes which have occurred on the site, when results from 2010 and 2016 are compared, there is no indication of a negative effect on the Vertigo geyeri habitat. Given that some impacts may be delayed in becoming apparent, more regular monitoring is recommended. Some limited re-seeding and herbicide use were noted in nearby areas, as well as alteration to drains and the building of tracks. To ensure that the site is managed as well as possible for Vertigo geyeri, as well as meeting the needs of the windfarm, a meeting between NPWS staff and the site managers is recommended immediately. The site is also sheep-grazed, which is having a positive effect on the habitat by maintaining a short, open sward, and it is important that this agricultural management is continued.

3. TRANSECT DETAILS

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	0.3351	Polygon A status remains Optimal. The polygon comprises one main runnel

Vertigo geyeri monitoring at Ox Mountains

Monitoring Period: 2013-2018

Polygon	Habitat Type	Area (ha)	Comment
			supporting calcareous flush vegetation, with some side channels, surrounded by wet heath. There is no evidence of any change to the habitat of Vertigo geyeri at the site in spite of the recent construction of a windfarm at the site.

Monitoring Period: 2007-2012

Polygon	Habitat Type	Area (ha)	Comment
	Optimal	0.335	The highest quality flush habitat at the Ox Mountains site is very well defined, being confined to a wide south/north runnel. At the northern end a flush joins from the east. The total area of Optimal habitat is 0.335 ha. Small fragments of sub-optimal habitat were found on nearby slopes during the 2006 survey but have not been included in the present assessment.

Transect habitat characteristics (Note: only three habitat categories were used in 2007-2012 survey)

Monitoring period: 2007-2012

Transect	Optimal habitat	Optimal/Subopt.	Sub-optimal	Subopt/Unsuitable	Unsuitable	Optimal wetness	Too Wet	Too Dry
0								

Transect samples

Mon. period	Transect	Sample	Location	Adults	Juveniles	Total	Habitat suitability
Monitoring period 2007-2012 Transect 0 (1 sample)							
2007-2012	0	0	NO TRANSECT RECORDED				

Spot Samples

Mon. period	Sample	Grid ref.	Adults	Juveniles	Total		Habitat suitability
Monitoring period 2013-2018 (5 samples)							
2013-2018	01	G 44419 29924	1	0	1	Count	Optimal
2013-2018	02	G 44409 29913	5	1	6	Count	Optimal
2013-2018	03	G 44402 29868	3	0	3	Count	Optimal
2013-2018	04	G 44394 29811	3	0	3	Count	Optimal
2013-2018	05	G 44374 29766	4	0	4	Count	Optimal
Monitoring period 2007-2012 (5 samples)							
2007-2012	01	G 44419 29923	0	0	11		
2007-2012	02	G 44406 29909	0	0	15		
2007-2012	03	G 44373 29765	0	0	6		
2007-2012	04	G 44393 29815	0	0	6		
2007-2012	05	G 44401 29864	0	0	11		

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
2007-2012	0	N/A	NO TRANSECT RECORDED		

Mon. period	Indicator	Target	Result	Pass/Fail
2013-2018	Density	At least 2 samples should contain >5 V. geyeri individuals	1 sample with > 5 individuals	Fail
2013-2018	Presence/Absence	Adult or sub-adult snails are present in 3 locations which support optimal or sub-optimal habitat	Present in 5 locations	Pass
2007-2012	Density	At least 2 samples should contain >5 V. geyeri individuals	All 5 samples with > 5 individuals	Pass

2007-2012	Presence/Absence	Adult or sub-adult snails are present in 3 locations which support optimal or sub-optimal habitat	Present in 5 locations	Pass

Mon. period	Population Notes
2013-2018	In the monitoring period 2007-2012, Vertigo geyeri was recorded at all five sample locations in the runnel in the Ox Mountains site. In the current survey, Vertigo geyeri was again recorded at all five sample locations, however, in lower numbers. Based on the criteria of Moorkens & Killeen (2011), the Population Assessment for Ox Mountains is Unfavourable Inadequate (amber).
2007-2012	the snail occurs throughout the flush system and 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
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 0.3ha of the habitat in the site is classed as optimal	0.335ha is Optimal	Pass
2007-2012	Habitat extent	At least 0.3ha of the habitat in the site is classed as optimal	0.335 ha with optimal habitat	Pass

Mon. period	Indicator	Target	Result	Pass/Fail
2013-2018	Habitat extent	Habitat classed as Optimal is present at all 5 sample locations	All 5 are Optimal	Pass
2013-2018	Habitat quality	Soils, at time of sampling, are saturated (optimal wetness) at all 5 sample locations	All 4 are Optimal wetness	Pass
2007-2012	Habitat extent	Habitat classed as Optimal is present at all 5 sample locations	All 5 are Optimal	Pass
2007-2012	Habitat quality	Soils, at time of sampling, are saturated (optimal wetness) at all 5 sample locations	All 5 are Optimal	Pass

Mon. period	Habitat Notes
2013-2018	The polygon comprises one main runnel, with some side channels, surrounded by wet heath. The runnel is approximately 4 m wide and suitable habitat is found in the runnel bed and on terraced sides. The low open sedge sward includes abundant indicator mosses (the so-called 'brown mosses'), with some areas supporting large Schoenus nigricans tussocks. The area is very botanically diverse. The polygon containing the Vertigo geyeri habitat was classified as Optimal in the 2007-2012 monitoring period and continues to be Optimal. Based on the criteria of Moorkens & Killeen (2011), the habitat assessment is Favourable (green).
2007-2012	Within the confined area of habitat the site appears to be in good condition for V. geyeri

5.3 Future Prospects Assessment

Mon. period	Activity code	Activity description	Location	Intensity	Influence	Area affected	Comment
2013-2018	A04.02.02	non intensive sheep grazing	Inside	Low	Positive	100%	Wetness is main limitation on vegetation growth, but sheep grazing helps maintain nearby/overhanging vegetation
2013-2018	C03.03	wind energy production	Outside	-	Neutral	100%	Habitat appears to be unaffected by windfarm, when compared to 2009
2007-2012	A04.02.02	non intensive sheep grazing	Inside	Low	Neutral	0.335ha	The present level of sheep grazing is having little impact on the site.

2007-2012	C03.03	wind energy production	Outside	Low	Negative	The impact of the recently constructed windfarm is difficult to assess as the potential impacts of e.g. grassland reseeding or modification of nearby drainage ditches have yet to manifest themselves.

Mon. period	Future Prospects Notes
2013-2018	In the monitoring period 2007-2012, the recent construction of a wind farm (probably 2009) was considered to have the potential to impact negatively on the survival of Vertigo geyeri on the site, though the Future Prospects were still considered to be Favourable (green). Seven years on from construction, the wind farm does not appear to have had a negative effect on Vertigo geyeri habitat. The runnel is still wet, nutrient poor and calcareous, and appears just as suitable for the target species, and so the Future Prospects continue to be Favourable (green).
2007-2012	At presents the impacts are 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 returned Favourable (green) results, the Population Assessment was Unfavourable Inadequate (amber) giving an Overall Assessment for the Ox Mountains of Unfavourable Inadequate
2007-2012	The Condition of the site and the feature based upon the 2010 survey has been assessed as Favourable. The spring lines and flush habitat in this area of the Ox Mountains is varied and attractive, and is botanically of high diversity and quality. V. geyeri was found to be widespread in suitable habitat areas.

6. DISCUSSION

Monitoring period

2013-2018

Area of occupancy: The habitat that supports Vertigo geyeri within this SAC is a small north/south runnel with numerous calcareous flushes within the wider acid environment of the Ox Mountains.There is parking along an old farm track to the east of the site.

Discussion:

The Vertigo geyeri habitat in the Ox Mountains site comprises a wet runnel, with side channels, set in a matrix of wet heath. Suitable habitat for Vertigo geyeri occurs in the base of the runnel and along the terraced sides, supporting 'brown mosses', low sedges and Schoenus nigricans tussocks. The habitat continues to be suitable for supporting the target species, though lower numbers were recorded in the current survey than in 2010. It cannot be determined whether this reflects a real drop in the population or is the result of natural fluctuations, which are common in small invertebrate populations. Based on the existing criteria, the Population Assessment has dropped from Favourable (green) to Unfavourable Inadequate (amber), but this result should be reviewed following future population assessments.

A windfarm has recently been built on the site. It is unknown whether the existence of Vertigo geyeri was taken into account when permission was granted, or during construction (in terms of appropriate mitigation measures). In spite of the huge disturbance and changes which have occurred on the site, when results from 2010 and 2016 are compared, there is no indication of a negative effect on the Vertigo geyeri habitat. Given that some impacts may be delayed in becoming apparent, more regular monitoring is recommended. Some limited re-seeding and herbicide use were noted in nearby areas, as well as alteration to drains and the building of tracks. To ensure that the site is managed as well as possible for Vertigo geyeri, as well as meeting the needs of the windfarm, a meeting between NPWS staff and the site managers is recommended immediately. The site is also sheep-grazed, which is having a positive effect on the habitat by maintaining a short, open sward, and it is important that this agricultural management is continued.

Monitoring recommendations:

Monitoring should be carried out at two-yearly intervals at this site to ensure that no major changes occur, particularly as a result of the wind farm and its continued management and in light of the apparent slight drop in population. The monitoring should follow that proposed by Moorkens & Killeen (2011):

- Describe habitat and take 1 sample from the most suitable habitat in each of 5 locations within the flush runnel (approximately corresponding to sample sites 1 to 5 of this survey) and analyse for molluscan composition
- Re-determine boundary of the habitat polygon and assign habitat to Optimal, Optimal-Suboptimal, Suboptimal, Suboptimal-

Unsuitable, or Unsuitable
- Assess the management regime and impacts upon the habitat for Vertigo geyeri
- Use results to determine overall condition assessment

Management recommendations:

The current level of non-intensive sheep grazing, along with the wetness of the runnel, is maintaining an open sward suitable for supporting Vertigo geyeri. Thus no change to the current agricultural management of the site is needed. Indeed, it is important that the current sheep grazing is continued.

In terms of the windfarm, no further re-seeding or herbicide spraying should take place (both have occurred on the site and were seen in 2016). No dumping of material into drains, and no further alteration to drains or tracks should occur. Any works planned or needed at the windfarm should be subject to an Appropriate Assessment given the presence of Vertigo geyeri at this site, a qualifying interest for the Ox Mountains SAC.

As mentioned above, regular (two-yearly) monitoring of the population and habitat is required at this site in case impacts due to the windfarm and associated loss/change to habitat are delayed in becoming apparent. For example, changes in nutrient levels, run-off from works, treated areas, etc. may take time to impact on the hydrological regime or water quality in the runnel and associated flushes. Similarly, drying caused by drain alteration may be slight and slow to impact.

To ensure that the site is managed properly into the future, a meeting between NPWS staff and the windfarm site managers is needed, so that everyone is clear on what activities are occurring, what the plans are for ongoing access and maintenance, and most importantly, how best to manage the site into the future to ensure that the calcareous runnel and flushes remain intact and functioning.

Vertigo geyeri monitoring at Ox Mountains

2007-2012

Area of occupancy: The habitat that supports Vertigo geyeri within this SAC is a small north/south runnel with numerous calcareous flushes within the wider acid environment of the Ox Mountains.There is parking along an old farm track to the east of the site.

Discussion:

Between the 2006 and the present survey, a windfarm has been constructed within the site. There are turbines on the slopes to the south, west and east of the flush runnel. It is believed construction took place in 2009. There does not appear to have any direct impact on the flush habitat in the main runnel or the flush at the northern end. However, there have been impacts at the locations of the nearby turbines (see database photos 29-41) which may have a knock-on effect in the future. Of greatest concern is the modification of drains or their infilling with road construction materials, particularly in the drain which leads into the southern end of the flush runnel. Access roads to the turbines have had an impact on some of the small sub-optimal flushes outside of the main site. Areas around the turbines have been seeded with grasses such as Lolium, but it is not known whether any fertiliser was used and whether leaching will have an impact on the V. geyeri habitat. It is essential that this site is monitored regularly so that any adverse impacts are quickly identified. A resurvey should take place in 2012 at the latest.

Monitoring recommendations:

This site need to be carefully monitored to determine whether there is any impact on the small flush habitat from the windfarm. Whilst the Condition of the site, both in terms of habitat and Vertigo geyeri distribution and abundance was Favourable in 2010 (~ 1 year after construction), it is recommended that monitoring is carried out again in 2012. The frequency of monitoring can then be re-assessed in light of any deterioration of Condition or any other changes:

Frequency: Next monitoring due 2012
Methods (see Section 2 of main report for full details). Prescription as follows:
- Describe habitat and take 1 sample from the most suitable habitat in each of 5 locations within the flush runnel (approximately corresponding to sample sites 1 to 5 of this survey) and analyse for molluscan composition
- Re-determine boundary of the habitat polygon 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. geyeri
- Use results to determine overall condition assessment

Management recommendations:

Existing Management

The site that encompasses the V. geyeri habitat can be treated as one management area. The area is managed by sheep grazing. During the survey there were no animals within the habitat, but sheep were higher in the mountains, although not physically curtailed from entering the habitat in question. The sheep tend to return to these lower levels during poorer weather, and are nearer the farm buildings during lambing periods (R. Lundy, pers. comm.). There is some coniferous plantation nearby, and any former habitat that would have existed within this part of the area has now been lost.

Since the 2006 survey a large windfarm has been built on the site and whilst there are no turbines directly on the flush habitat, any management of drains and grassland surrounding the turbines could adversely affect the V. geyeri habitat.

Proposed management prescription for site

The management at this site should remain the same as the present regime for the 2010-2013 period. There should be no increase in livestock, nor fencing off of areas that would lead to any increase of concentration within the V. geyeri zone. Supplementary feeding or fertilising should not be allowed, nor drainage of any kind. No increase in coniferous plantation should be permitted within the area.

Site report - Vertigo Monitoring

Vertigo geyeri monitoring at Pollardstown Fen

1. SITE CODE AND LOCATION DETAILS

1.1 Site code and location

Vertigo Site Code: VgCAM22 **County:** Kildare

SAC Site Code: 000396 Pollardstown Fen

Location description (from baseline survey):

Monitoring period	Date surveyed	Recorders
2013-2018	4 Sept & 1 Oct 2014	John Brophy & Maria Long
2007-2012	29 June 2010	Evelyn Moorkens & Ian Killeen

1.2 General Habitat Description (from baseline survey):

Pollardstown Fen is a very large fen, the area of which extends to 235 hectares, of which approximately 60% is state owned. The main habitat in the central area is tall fen with Cladium mariscus, but it is the shorter alkaline fen in the spring seepage margins of the site that support V. geyeri. EU habitats present at V. geyeri 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). The specific areas that are within a wider mosaic, but that form specific V. geyeri habitat are mostly around Schoenus nigricans growth, fitting the Rodwell M13 characteristic vegetation classification (Rodwell, 1991). The best V. geyeri habitat is in areas of lower and more tightly cropped sward, where the habitat falls into the Rodwell M10 Pinguiculo-Caricetum dioicae Caricion davallianae group, characteristically being distinguished by Carex viridula, C. panicea, Parnassia palustris, Campylium stellatum, Pinguicula vulgaris, and Drepanocladus revolvens. They fall within the more general habitat of rich fen and flush (PF1) of Fossitt (2000).

1.3 Definition of habitat types (from baseline survey):

Optimal	Flushed fen grassland with sedge/moss lawns 5-20cm tall, containing a high diversity with species such as Carex viridula, C. rostrata, Equisetum palustre, Juncus articulatus and the mosses Drepanocladus revolvens, Campylium stellatum, with scattered tussocks of Schoenus nigricans no greater than 80cm tall. During sampling the water table should be between 0-5cm of the soil surface, or in small scattered pools.
Sub-optimal	Vegetation composition as above but either vegetation height is less than 5cm or greater than 20cm, or the Schoenus tussocks are >1m tall, or the water table is below 5cm or ground is flooded at the time of sampling.
Unsuitable	Not defined

2. SUMMARY:

Pollardstown Fen is one of the most important and extensive fen sites in the country, and is exceptionally important for its populations of all three protected Vertigo species. Six of the eight polygons identified by Moorkens & Killeen (2011) as containing Vertigo geyeri habitat were surveyed in 2014, and all are suffering from undergrazing, or more likely, abandonment. Three of the six had their suitability for the target species down-graded. As a result, broad-scale habitat management changes are needed across this site in order to prevent the loss of Vertigo geyeri. This means that grazing needs to be introduced across the site as a matter of urgency. Moorkens & Killeen have given detailed information on past and recommended grazing management, and this continues to be relevant.

3. TRANSECT DETAILS

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

Start point:	N 76396 15907	Westerly post of dipwell enclosure	
End point:	N 76417 15965	Shallow, vegetated drain; Moss & veg layer quaking.	
Transect length:	59.7	**Direction:**	As for 2007-2012
Description:	As for 2007-2012		
Sampling frequency:	As for 2007-2012		

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

Start point:	N 77747 16037	Spring flush at edge of field; sloping SW	
End point:	N 77689 16013		
Transect length:	60	**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 76399 15911	at the corner of the southernmost wooden fence which protects a dipwell
End point:	N 76417 15966	ditch
Transect length:	58	**Direction:**
Description:		
Sampling frequency:		

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

Start point:	N 77747 16039	at a spring seepage
End point:	N 77695 16018	A clump of gorse bushes at N77695 16018
Transect length:	55	**Direction:**
Description:		
Sampling frequency:		

4. RESULTS

Polygon habitat characteristics

Monitoring Period: 2013-2018

Polygon	Habitat Type	Area (ha)	Comment
A	Suboptimal	0.8812	Polygon A status unchanged from Suboptimal. Polygon consists of Schoenus nigricans fen habitat and is undergrazed. However plans are in place to introduce grazers to this area. The polygon boundary was altered slightly to follow drains.
B	Not visited 2014	0.4786	Polygon B not surveyed in 2014.
C	Not visited 2014	1.6921	Polygon C not surveyed in 2014.
D	Suboptimal-Unsuitable	0.2596	Polygon D status dropped from Sub-ptimal, to Suboptimal-Unsuitable. Area of rough wetland vegetation which is rank and quite dry, but contains drain/depression with depauperate suite of indicator plant species. Moorkens & Killeen (2011) note that the ditch (a spring line) is maintained by wetness levels caused by the continuously flowing springs, but given its current condition (i.e. too dry and too rank) the potential for Vertigo geyeri to continue to exist here is low.
E	Unsuitable	0.668	Polygon E status dropped from Suboptimal, to Unsuitable. This polygon is almost entirely dominated by very rank stands of the tall rush Juncus subnodulosus. This is so dense and rank that it has fallen over and forms a dense carpet, effectively smothering out all other vegetation. Moorkens & Killeen note that this area has been disturbed by fire and floods, and has seen periodic horse grazing. It is clear that none of these impacts have re-occurred since their visit in 2010. The polygon boundary was altered to remove unsuitable habitat.
F	Suboptimal-Unsuitable	7.7921	Polygon F status dropped from Suboptimal, to Suboptimal-Unsuitable. Vegetation here is quite rank and lacks open, mossy areas which Vertigo geyeri needs. Moorkens & Killeen note that this area was grazed by sheep and horses, but it is clear that it is no longer grazed. The boundary was extended to include areas of potentially suitable habitat.
G	Suboptimal	0.2174	Polygon G status unchanged from Suboptimal. Good cover of mosses here, but vegetation too tall and dense to be ideal.
H	Suboptimal	3.8234	Polygon H status unchanged from Suboptimal. Some areas with calcareous water upwelling, but others show distinct acid influence (e.g. Sphagnum flush, presence of heathers). The boundary was extended to include areas of flush.

Monitoring Period: 2007-2012

Polygon	Habitat Type	Area (ha)	Comment
A	Sub-optimal	0.747	Polygon A
B	Sub-optimal	0.479	Polygon B is mainly unmanaged, but is occasionally trampled by cattle that move across the soldiers bridge from their grazing zone to the south.

Vertigo geyeri monitoring at Pollardstown Fen

Monitoring Period: 2007-2012

Polygon	Habitat Type	Area (ha)	Comment
C	Sub-optimal	1.692	Polygon C has very little V. geyeri habitat, is further towards the fen flat, and is unmanaged by grazing, but the habitat present is maintained by wetness from the hydrogeological conditions present.
D	Sub-optimal	0.259	Polygon Dis a shallow ditch along a spring line. It is unmanaged and maintained by wetness levels of the continuously flowing springs.
E	Sub-optimal	0.942	Polygon E is towards the eastern margin of the fen and has had disruption by both fire and flooding over the last ten years. It is managed by occasional grazing of horses from the fields nearby.
F	Sub-optimal	4.333	Polygon F has widespread V. geyeri habitat. It has in the past been managed by sheep grazing and low numbers of horses.
G	Sub-optimal	0.217	Polygon G is a small area which has been unmanaged in recent years.
H	Sub-optimal	3.041	Polygon H is a large area of Schoenus-dominated fen margin.

Transect habitat characteristics (Note: only three habitat categories were used in 2007-2012 survey)

Monitoring period: 2013-2018

Transect	Optimal habitat	Optimal/Subopt.	Sub-optimal	Subopt/Unsuitable	Unsuitable	Optimal wetness	Too Wet	Too Dry
1		4.5m	25m	3.2m	27m	29.5m	3.2m	27m
2			26m	34m		56m	4m	

Monitoring period: 2007-2012

Transect	Optimal habitat	Optimal/Subopt.	Sub-optimal	Subopt/Unsuitable	Unsuitable	Optimal wetness	Too Wet	Too Dry
1	9.3m	NA	3m	NA	47.4m	12.3m		47.4m
2		NA	60m	NA		51.5m	8.5m	

Transect samples

Mon. period	Transect	Sample	Location	Adults	Juveniles	Total	Habitat suitability
Monitoring period 2013-2018 Transect 1 (4 samples)							
2013-2018	1	1	23m	0	0	0	Optimal-Suboptimal
2013-2018	1	2	36.5m	0	0	0	Suboptimal
2013-2018	1	3	52m	0	0	0	Suboptimal
2013-2018	1	4	58m	1	1	2	Suboptimal-Unsuitable
Monitoring period 2013-2018 Transect 2 (2 samples)							
2013-2018	2	1	11m	0	0	0	Optimal-Suboptimal
2013-2018	2	2	58m	0	0	0	Suboptimal-Unsuitable
Monitoring period 2007-2012 Transect 1 (5 samples)							
2007-2012	1	1	17m	0	0	0	
2007-2012	1	2	24m	0	0	12	
2007-2012	1	3	33m	0	0	2	
2007-2012	1	4	53m	0	0	7	
2007-2012	1	5	57m	0	0	6	
Monitoring period 2007-2012 Transect 2 (3 samples)							
2007-2012	2	1	26m	0	0	0	
2007-2012	2	2	35m	0	0	1	
2007-2012	2	3	57m	0	0	0	

Spot Samples

Mon. period	Sample	Grid ref.	Adults	Juveniles	Total	Habitat suitability
Monitoring period 2013-2018 (4 samples)						
2013-2018	01	N 77015 15720	0	0	0	Suboptimal-Unsuitable

2013-2018	02	N 76958 16872	0	0	0	Suboptimal-Unsuitable
2013-2018	03	N 77039 16841	0	0	0	Suboptimal
2013-2018	04	N 77314 16611	0	0	0	Suboptimal
Monitoring period 2007-2012 (2 samples)						
2007-2012	01	N 76913 16900	0	0	9	
2007-2012	02	N 76908 16503	0	0	8	

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 2 samples on Transect 1 (minimum 4 samples taken)	Vertigo geyeri present in 1 sample on Transect 1 (4 samples taken)	Fail
2013-2018	2	Presence/Absence	Adult or sub-adult snails are present in 1 sample on Transect 2 (minimum 2 samples taken)	Adult or sub-adult snails Absent from Transect 2 (2 samples taken)	Fail
2007-2012	1	Presence/Absence	Adult or sub-adult snails are present in 2 samples on Transect 1 (minimum 4 samples taken)	Present in 4 samples on T1	Pass
2007-2012	2	Presence/Absence	Adult or sub-adult snails are present in 1 sample on Transect 2 (minimum 2 samples taken)	Present in 1 sample on T2	Pass

Mon. period	Indicator	Target	Result	Pass/Fail
2013-2018	Presence/Absence	Adult or sub-adult snails are present in at least two other polygons at this site	Adult or sub-adult snails not found in two other polygons (0 out of 4 samples)	Fail
2007-2012	Presence/Absence	Adult or sub-adult snails are present in sites 1 and 2	Present in 2 other locations	Pass

Mon. period	Population Notes
2013-2018	There has been a dramatic reduction in the number of positive sample points for Vertigo geyeri at Pollardstown Fen between 2007-2012 (seven in ten) and the current survey (one in ten). Based on the criteria of Moorkens & Killeen (2011) the Population Assessment is Unfavourable Bad (red).
2007-2012	the snail is present over a wide area and mostly in rather low numbers

5.2 Habitat Assessment: 3 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 quality	At least 30m of Transect 1 is classed as Optimal and sub-optimal and soils, at time of sampling, are optimal wetness for 30m of the transect	29.5m of Transect 1 is classed as Optimal and sub-optimal AND soils, at the time of sampling, are optimal wetness for 29.5m of the Transect (rounded)	Pass
2013-2018	2	Habitat extent	50m of Transect 2 is classed as Suboptimal or better and soils, at time of sampling, are Optimal wetness for 50m of the transect	26m of Transect 2 is classed as Optimal or sub-optimal AND Soils, at time of sampling, are optimal wetness for 56m of the	Fail
2007-2012	1	Habitat quality	At least 30m of Transect 1 is classed as Optimal and sub-optimal and soils, at time of sampling, are optimal wetness for 30m of the transect	12.3m is opti/sub-opt and 12.3m is opt wetness	Fail

2007-2012	2	Habitat extent	50m or Transect 2 is classed as Otptimal or Sub-optimal and soils, at time of sampling, are optimal wetness for 50m of the transect	60m is sub-opt habitat and 50m is opt wetness	Pass

5.2.2 Site level

Mon. period	Indicator	Target	Result	Pass/Fail
2013-2018	Habitat extent	At least 2ha or 2 habitat polygons are dominated by optimal habitat	0ha Optimal	Fail
2007-2012	Habitat extent	At least 2ha or 2 habitat polygons are dominated by optimal habitat	0 ha and no polygons dominated by optimal habitat	Fail

Mon. period	Habitat Notes
2013-2018	The habitat suitability classifications for polygons A, G and H remain unchanged from 2007-2012 (Suboptimal). Polygons D and F have dropped from Suboptimal to Suboptimal-Unsuitable due to the vegetation becoming too dense and rank. Polygon E dropped from Suboptimal to Unsuitable as dense mats of Juncus subnodulosus has resulted in the area supporting no suitable habitat. Polygons B and C were not surveyed in 2014. Based on the habitat at transects 1 and 2, and the polygon habitat suitability classifications, using the criteria of Moorkens & Killeen (2011), the Habitat Assessment is Unfavourable Inadequate (amber).
2007-2012	Whilst potential V. geyeri habitat occurs over a wide area, very little is in good condition for V. geyeri.

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	High	Negative	95%	
2013-2018	J01.01	burning down	Inside	Low	Neutral	10%	

Mon. period	Future Prospects Notes
2013-2018	A lack of grazing due to abandonment (A04.03) over 95% of the Vertigo geyeri habitat at the Pollardstown Fen site has resulted in the vegetation becoming rank and unsuitable for Vertigo geyeri. This is reflected in the low number of positive samples for the species. Moorkens & Killeen (2011) assessed the Future Prospects of the site as Unfavourable Inadequate (amber), and given its further deterioration in quality since then, the Future Prospects are considered Unfavourable Bad (red).
2007-2012	Future prospects should balance positives and negatives to determine whether the species will survive at this site for the foreseeable future. As the impacts are all negative, 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	Amber	Red	Red
2007-2012	Green	Amber	Amber	Amber

Mon. period	Overall Notes
2013-2018	Low numbers of Vertigo geyeri recorded at the site in 2014, combined with the continued effects of lack of grazing management, result in an overall assessment of Unfavourable Bad (red).
2007-2012	

6. DISCUSSION

Monitoring period

2013-2018

Area of occupancy: As in 2007-2012, the habitat that supports Vertigo geyeri within this cSAC is the fen margin habitat along the calcareous spring seepage lines to the north and south of this large fen area. The main access to Pollardstown Fen is via the Nature Reserve entrance.

Discussion:

Pollardstown Fen is one of the most important and extensive fen sites in the country, and is exceptionally important for its populations of all three protected Vertigo species. Six of the eight polygons identified by Moorkens & Killeen (2011) as containing Vertigo geyeri habitat were surveyed in 2014, and all are suffering from undergrazing or, more likely, abandonment. Three of the six had their suitability for the target species down-graded. As a result, broad-scale habitat management changes are needed across this site in order to prevent the loss of Vertigo geyeri. This means that grazing needs to be introduced across the site as a matter of urgency. Moorkens & Killeen have given detailed information on past and recommended grazing management, and this continues to be relevant.

Monitoring recommendations:

Due to the poor condition of Pollardstown Fen, monitoring should be carried out, at minimum, on a 3 yearly basis following the prescription of Moorkens & Killeen (2011):

- Repeat Transect 1, delineate the plant community/habitat zones, and assign the habitat and wetness in each zone as Optimal, Optimal-Suboptimal, Suboptimal, Suboptimal-Unsuitable, or Unsuitable, and Too dry, Optimal wetness or Too wet, respectively
- Take at least 4 samples from the most suitable habitat on Transect 1and analyse for molluscan composition
- Repeat tTransect 2, delineate the plant community/habitat zones, and assign the habitat and wetness in each zone as Optimal, Optimal-Suboptimal, Suboptimal, Suboptimal-Unsuitable or Unsuitable, and Too dry, Optimal wetness or Too wet, respectively
- Take at least 2 samples from the most suitable habitat on Transect 2 and analyse for molluscan composition
- Describe habitat and take 1 sample from the most suitable habitat in each of polygons B and H of this survey and analyse for molluscan composition
-Re-determine boundary of habitat polygons A, B and H and assign habitat to either Optimal, Optimal-Suboptimal, Suboptimal, Suboptimal-Unsuitable, or Unsuitable
- Assess the management regime and impacts upon the habitat for Vertigo geyeri
- Use results to determine overall condition assessment

On a 6 yearly basis, the following should be carried out:

- Describe habitat and take 1 sample from the most suitable habitat in each of the other 5 polygons (C, D, E, F, G) of this survey and analyse for molluscan composition
- Re-determine boundary of these 5 habitat polygons and assign habitat to either Optimal, Optimal-Suboptimal, Suboptimal, Suboptimal-Unsuitable, or Unsuitable

Management recommendations:

Broadscale habitat management changes need to be implemented immediately at this site if Vertigo geyeri is not to be lost. It is recommended that grazing be introduced to all polygons where Vertigo geyeri was previously recorded. Detailed management recommendations were made by Moorkens & Killeen (2011) following intensive work on the site at this should continue be the basis of any future management actions.

2007-2012

Area of occupancy: The habitat that supports Vertigo geyeri within this cSAC is the fen margin habitat, along the calcareous spring seepage lines to the north and south of this large fen area. The main access to Pollardstown Fen is via the public Nature Reserve entrance.

Discussion:

The Condition of the site and the feature based upon the 2010 survey has been assessed as Unfavourable (declining).

Pollardstown Fen is a very large and ecologically significant natural resource that is located in what is becoming an increasingly urbanised area close to Dublin. The suites of rare habitats and plant species, and the rare invertebrate species that are characteristic of these habitats, are reliant on the continuation of both the hydrogeological conditions that allow the spring seepages to saturate the fen margin, and the grazing management that optimizes the low growing moss-rich alkaline fen zones. To date, Pollardstown has not suffered from significant scrub encroachment due to the combination of wetness and management within these habitat areas.

Grazing management at Pollardstown Fen is currently unfavourable due to lack of management in areas where it is needed, and use of cattle in areas where sheep would be preferable.

Further intensification of land use in the zone of influence of the regional aquifer feeding the springs to Pollardstown Fen may result in a lowering of the water table to such an extent that water may no longer emerge at current spring lines. This would result in a loss of V. geyeri habitat. If the SAC is to be protected and remain sustainable for the species and its interrelated community of species, it will be necessary to understand the activities that would influence drawdown of water feeding these springs and protect this resource. The legacy of the Kildare Bypass construction, the ongoing demands on the Kildare aquifer, coupled with future demands for the Grand Canal, means that understanding the wider hydrogeological catchment and protecting hydrogeological consistency and water levels are essential to the continuing function of a sustainable V. geyeri population, along with the suite of Annex I habitats and Annex II species that this rich site supports.

Some of the V.geyeri habitat is owned by the nation as a Statutory Nature Reserve. In acquiring land, the responsibility for its management through grazing or otherwise falls to the public owners. The Department of the Environment, heritage and Local Government have instigated a series of experimental vegetation cutting and removal to assess which management tools are most appropriate for the habitats at the fen margins.

There are many reports documenting the baseline and monitoring that has taken place at Pollardstown Fen over the years, and on the results of the experimental conservation cutting measures. A bibliography is presented below.

Monitoring recommendations:

Given the evidence for an overall deterioration in the Condition of the site, both in terms of habitat and Vertigo geyeri 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 2 of main report for full details). Assessment of the transect and other locations with snail sampling, plus assessment of condition of polygon. Prescription as follows:
- Repeat transect 1, delineate the plant community/habitat zones, and assign the habitat and wetness in each zone as Optimal, Sub-optimal or Unsuitable
- Take at least 4 samples from the most suitable habitat on Transect 1and analyse for molluscan composition
- Repeat transect 2, delineate the plant community/habitat zones, and assign the habitat and wetness in each zone as Optimal, Sub-optimal or Unsuitable
- Take at least 2 samples from the most suitable habitat on Transect 2 and analyse for molluscan composition
- Describe habitat and take 1 sample from the most suitable habitat in each of polygons B and H of this survey and analyse for molluscan composition
- Re-determine boundary of habitat polygons A, B and H 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. geyeri
- Use results to determine overall condition assessment

Additional work in 2015

Frequency: Monitoring for 2015 and at subsequent 5 yearly intervals
Methods (see Section 2 of main report for full details). Prescription as follows:
- Describe habitat and take 1 sample from the most suitable habitat in each of the other 5 polygons (C, D, E, F, G) of this survey and analyse for molluscan composition
- Re-determine boundary of these 5 habitat polygons and assign habitat to either Optimal, Optimal & Sub-optimal, Sub-optimal, Sub-optimal and Unsuitable, or Unsuitable
- Assess the management regime in these 5 polygons and impacts upon the habitat for V. geyeri
- Use results to determine overall condition assessment

Management recommendations:

Existing Management

The V. geyeri habitat has been divided for the purposes of this report into eight management units, marked 1-8 in Figure 1. These are areas of different ownership, although within the larger areas are further fence divisions that are opened and closed to animals at various times.

Area A is currently owned by the farmer that also owns the fields upslope, but may be subject to a forthcoming land swap to NPWS. Currently, some of the area is fenced off as part of a research project, and the rest has had both sheep and cattle grazing in the past, most recently grazing has been by occasional straying sheep and goats. The upper margin is currently drier than in the recent past.

Area B is mainly unmanaged, but is occasionally trampled by cattle that move across the soldiers bridge from their grazing zone to the south.

Area C has very little V. geyeri habitat, is further towards the fen flat, and is unmanaged by grazing, but the habitat present is maintained by wetness from the hydrogeological conditions present.

Area D is a shallow ditch along a spring line. It is unmanaged and maintained by wetness levels of the continuously flowing springs.

Area E is towards the eastern margin of the fen and has had disruption by both fire and flooding over the last ten years. It is managed by occasional grazing of horses from the fields nearby.

Area F has widespread V. geyeri habitat. It has in the past been managed by sheep grazing and low numbers of horses. These animals were freely able to move between the drier fields above the margin down to the fen, therefore the grazing in the delicate habitat was sporadic. In the last year cattle grazing has been introduced with resultant trampling to the delicate spring line.

Area G is a small area which has been unmanaged in recent years. The V. geyeri habitat consists of a short margin of ideal habitat, with a much wetter area just down slope where, depending on the prevailing conditions, V. geyeri can be eradicated by excess wetness, or spread and thrive.

Area H is a large area of Schoenus-dominated fen margin. It has a number of barbed wire fences, some of which are lowered at different times of year to allow cattle access. The upper slope area is maintained by cattle grazing, but much of the uppermost potential habitat is over cropped and trampled. The lower slope areas are maintained by wetness, and the western end of the area has very little grazing and is essentially unmanaged.

Proposed management prescription for site

Pollardstown Fen is currently (as a general rule) under-grazed, but over-trampled in places where cattle are being used as grazers. Thus it is important that a five year grazing plan is carefully implemented and documented so that the ideal regime can be reached in the shortest possible time.

In the wettest part of the V. geyeri habitat, grazing is not an issue as the habitat is maintained by the hydrogeological regime. However, closer to the margin where the ideal wetness should be saturation without inundation, the nutrient levels allow higher vegetation to grow and out-compete the yellow sedge and moss habitat that is required by the snail. Therefore appropriate grazing is essential to maintain this low growth. This is best carried out by sheep, although low numbers of horses can be an alternative. Cattle are not beneficial to V. geyeri habitats such as this, as they trample between the Schoenus tussocks and destroy the saturated delicate moss and yellow sedge runnels. The most ideal sheep grazing regime is one in which there is open movement between the field above and the fen below, i.e. the animals should never be corralled into sensitive fen habitat. Longer periods of extensive grazing are better than shorter periods of intensive grazing. Thus summer sheep grazing by fence removal (between the fen and upper field) from approximately June to October should be started, but carefully monitored. This is particularly recommended for areas 1, 2, 6, 7 and 8. Areas 3 and 4 are likely to be marginal and could be damaged by grazing management. Area 5 is likely to be satisfactorily maintained by the current regime of occasional horse grazing. The wettest parts of Areas 7 and 8 could remain fenced off, but it is likely that in an extensive regime that sheep would avoid these wettest areas anyway.

There should be no supplementary feeding of animals. There should be no improvement with fertiliser or drainage of any of the habitat area.

Site report - Vertigo Monitoring

Vertigo geyeri monitoring at Waterstown Lough

1. SITE CODE AND LOCATION DETAILS

1.1 Site code and location

Vertigo Site Code: VgCAM23 **County:** Westmeath

SAC Site Code: n/a Not in SAC

Location description (from baseline survey):

Monitoring period	Date surveyed	Recorders
2013-2018	23 September 2016	John Brophy & Maria Long

1.2 General Habitat Description (from baseline survey):

(Habitat description written as part of 2014-17 survey) The lake and its surrounding wetland communities are arranged in distinct zones across a hydrological transition. They include open water, reed swamp, tall sedge/alkaline fen mosaic, fen-grassland transition and wet grassland. The area of habitat in which Vertigo geyeri is present at this site consists of calcareous fen. Much of this area conforms with the EU habitat Alkaline fens (7230). The habitats present contain elements of the Rodwell M13 vegetation classification within the Schoenetum nigricantis mire group, and specifically the Briza media – Pinguicula vulgaris sub-community, that includes the presence of Schoenus nigricans, Juncus subnodulosus, Succisa pratensis, Selaginella selaginoides and Pedicularis palustris (Rodwell, 1991). In areas of lower and transitional sward, the habitat falls into the Rodwell M10 Pinguiculo-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 throughout the habitat. They fall within the more general habitat of rich fen and flush (PF1) of Fossitt (2000).

1.3 Definition of habitat types (from baseline survey):

Optimal	Flushed fen vegetation with tufa in places. Areas with sedge/moss lawns, and/or tussocks to offer refuge. Species such as Carex viridula and Schoenus nigricans may be common. Indicator bryophytes such as Campylium stellatum and Drepanocladus sp. should be present. Vegetation height typically 5 to 50cm. During sampling the water table should be between 0- 5cm of the soil surface, but not above ground level
Sub-optimal	Vegetation composition not as above, or including very large Schoenus nigricans tussocks >75cm tall. Or large areas of bare ground, without lawns or tussocks to offer refuge. Or the water table is below 5cm or ground is flooded at the time of sampling
Unsuitable	Not defined

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. Vertigo geyeri is found in the alkaline fen habitat between the grassland-fen transition zone and the reed beds at the lake shore, extending around to the east where it borders woodland. The species is distributed across much of the site, and was found in moderate numbers. While the Future Prospects for the site are considered to be good, drying out of the habitat and grazing/poaching by cattle is something that must be monitored closely. Some grazing is required, however, to prevent the spread of species such as Phragmites australis and Salix cinerea subsp. oleifolia, and to maintain an open sward suitable for Vertigo geyeri.

3. TRANSECT DETAILS

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

Start point:	N 10215 46019	Lone Hawthorn just outside garden fence.	
End point:	N 10160 45914	Fence-post at right side of causeway/boat slip	
Transect length:	100	**Direction:**	NE-SW
Description:			
Sampling frequency:			

4. RESULTS

Polygon habitat characteristics

Monitoring Period: 2013-2018

Polygon	Habitat Type	Area (ha)	Comment
A	Optimal	0.1976	Polygon A status is Suboptimal. Lobe at northern end with mix of vegetation types - e.g. low sedges, Cladium mariscus, and bryophyte-rich fen. Some areas badly poached.
B	Optimal-Suboptimal	1.5791	Polygon B status is Optimal-Suboptimal. Stretch of lake-side fen, very good quality in places.
C	Optimal-Suboptimal	1.0674	Polygon C status is Optimal-Suboptimal. Further stretch of lake-side fen, but more diverse in vegetation and also wetness than Polygon B.

Vertigo geyeri monitoring at Waterstown Lough

Transect habitat characteristics (Note: only three habitat categories were used in 2007-2012 survey)

Monitoring period: 2013-2018

Transect	Optimal habitat	Optimal/Subopt.	Sub-optimal	Subopt/Unsuitable	Unsuitable	Optimal wetness	Too Wet	Too Dry
1		36.5m	9.5m	37m	17m	53.5m	37m	9.5m

Transect samples

Mon. period	Transect	Sample	Location	Adults	Juveniles	Total		Habitat suitability
Monitoring period 2013-2018 Transect 1 (3 samples)								
2013-2018	1	1	24.5m	0	0	0	Count	Optimal-Suboptimal
2013-2018	1	2	41m	0	0	0	Count	Optimal-Suboptimal
2013-2018	1	3	53m	7	5	12	Count	Optimal-Suboptimal

Spot Samples

Mon. period	Sample	Grid ref.	Adults	Juveniles	Total		Habitat suitability
Monitoring period 2013-2018 (4 samples)							
2013-2018	01	N 10264 45860	4	2	6	Count	Optimal
2013-2018	02	N 10326 45888	6	2	8	Count	Optimal
2013-2018	03	N 10100 46098	0	0	0		Optimal
2013-2018	04	N 10043 46133	0	0	0		Suboptimal

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 one positive sample (with adult or sub-adult snails) from a minimum of three samples taken from along the transect	1 positive sample on transect	Pass

Mon. period	Indicator	Target	Result	Pass/Fail
2013-2018	Presence/Absence	At least one positive sample (with adult or sub-adult snails) from a minimum of four samples taken from across the site	2 positive samples	Pass

Mon. period	Population Notes
2013-2018	Vertigo geyeri was found at three out of seven locations sampled at Waterstown Lough, including one sample out of three on the transect. Two positive samples were recorded in Polygon C at the south-east of the site, while the positive transect sample is located within Polygon B along the lower half of the transect. Based on the criteria developed during this survey, the Population Assessment 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	At least one-quarter (approx. 25m) of habitat along the transect classed as Optimal/Suboptimal or better	46m Suboptimal or better	Pass
2013-2018	1	Habitat quality	At least one-third (approx. 35m) of habitat along the transect classed as being of Optimal wetness	53.5m Optimal wetness	Pass

5.2.2 Site level

Mon. period	Habitat Notes
2013-2018	The Vertigo geyeri habitat is divided across three polygons. Based on the assessment criteria developed during this survey the Habitat Assessment result is Favourable (green).

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	20%	Some areas very poached
2013-2018	F06.01	game/ bird breeding station	Inside	Low	Negative	1%	Pheasantry on edge of site with some loss of habitat
2013-2018	J02.07	Water abstractions from groundwater	Inside	Medium	Negative	5%	Very difficult to assess what, if any, effect the water abstraction may be having
2013-2018	K01.03	Drying out	Inside	Low	Negative	50%	Site may be drying as lake fills with reeds (but springs are still present)
2013-2018	K02.01	species composition change (succession)	Inside	Medium	Negative	5%	Phragmites australis, Betula pubescens, Salix cinerea all found in places

Mon. period	Future Prospects Notes
2013-2018	There are a number of activities or impacts that may affect the Future Prospects for Vertigo geyeri at Waterstown Lough. Cattle grazing is having localised negative effects due to poaching. While this has been classed as a negative impact, it needs to be noted that cattle grazing is helping to maintain an open habitat at this site for both Vertigo geyeri and Vertigo angustior. The pheasantry has resulted in some loss of habitat, but the area in question is small. Water abstraction is occurring from a spring to provide water to a nearby house, and while it is unclear how much of an effect this is having on the habitat, it is likely to be quite localised. In terms of the hydrology at the site overall - 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 surveyed for Vertigo geyeri in 2015 were adequately wet for the species. The final impact is succession. Species such as Salix cinerea subsp. oleifolia and Betula pubescens were noted in the fen, and Phragmites australis may also be spreading. The occurrence of these species needs to be carefully monitored. If the hydrological and grazing regimes are suitable for the site, these species will be kept more or less in check. Monitoring will be important in determining this. Overall, none of these impacts are widespread in their effects, or currently serious in their intensity, and so the Future Prospects for Waterstown Lough are considered to be 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, along with the Future Prospects, have all been assessed as Favourable (green), and so the Overall Assessment for this site is also Favourable (green).

6. DISCUSSION

Monitoring period

2013-2018

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

Discussion:

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. Vertigo geyeri is found in the alkaline fen habitat between the grassland-fen transition zone and the reed beds at the lake shore, extending around to the east where it borders woodland. The species is distributed across much of the site, and was found in moderate numbers. While the Future Prospects for the site are considered to be good, drying out of the habitat and grazing/poaching by cattle is something that must be monitored closely. Some grazing is required, however, to prevent the spread of species such as Phragmites australis and Salix cinerea subsp. oleifolia, and to maintain an open sward suitable for Vertigo geyeri.

Monitoring recommendations:

Given the limited information available on the status of Vertigo geyeri at this site, and its importance for supporting all three Annex II Vertigo species, it is recommended that a minimum of three-yearly monitoring be undertaken. The following actions should be undertaken:

- Repeat Transect 1, delineate the plant community/habitat zones, and assign the habitat and wetness in each zone as Optimal, Optimal-Suboptimal, Suboptimal-Unsuitable or Unsuitable, and Too dry, Optimal wetness or Too wet, respectively
-Take 3 samples from the most suitable habitat on the transect and analyse for molluscan composition
-Take 4 samples spread across polygons A, B and C and analyse for molluscan composition
- 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 geyeri
- Use results to determine overall condition assessment

Management recommendations:

The current cattle-grazing level in some areas of the fen is too high and is resulting in poaching and bare ground. A slight reduction in grazing is recommended to allow the vegetation suitable for Vertigo geyeri to recover. A continuance of grazing is required, however, in order to prevent the spread of unsuitable species such as Phragmites australis and Salix cinerea subsp. oleifolia, and to maintain an open habitat. An improvement may be achieved by either reducing the number of animals grazing, or by changing the timing of grazing (e.g. by avoiding very wet or very dry times of the year), or by using movable electric fencing to exclude stock from the poached areas temporarily to allow recovery. Close liaison with landowner/manager will be required.

Site report - Vertigo Monitoring

Vertigo geyeri monitoring at Duleek Commons

1. SITE CODE AND LOCATION DETAILS

1.1 Site code and location

Vertigo Site Code: VgCAM24 **County:** Meath

SAC Site Code: n/a Not in SAC

Location description (from baseline survey):

Monitoring period	Date surveyed	Recorders
2013-2018	29 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 geyeri is present at this site is flushed areas within grassland, with areas of fen vegetation, typically associated with runnels and depressions. These are typically associated with Schoenus nigricans tussocks and areas of low mossy vegetation that are rich in yellow sedges, including Carex viridula, with mosses Drepanocladus cossonii and Campylium stellatum. The limited suitable vegetation falls into the NVC community M10 (Rodwell, 1991). The wider habitat is relatively species-rich wet grassland, with Vertigo geyeri occupying specific micro-habitat of alkaline fen seepage within. The EU habitats present could fit the category of Alkaline fen (7230), but are limited in extent, and so are not of great quality comparatively. The habitats also fall within the more general habitat of rich fen and flush (PF1) of Fossitt (2000).

1.3 Definition of habitat types (from baseline survey):

Optimal	Flushed grassland with areas of fen vegetation, typically associated with runnels and depressions. Sward in these areas 10-30cm tall (or up to 75cm where Schoenus nigricans occurs), containing species such as Carex viridula and S. nigricans, and indicator mosses such as Drepanocladus/Scorpidium spp. and Campylium stellatum. During sampling the water table should be between 0-5cm of the soil surface, but not above ground level.
Sub-optimal	Vegetation composition not as above, and in particular, including agricultural species (e.g. grasses, clovers, etc.). Also, vegetation height less than 5cm or greater than 30cm (or >75cm, where S. nigricans occurs), or the water table is below 5cm or ground is flooded at the time of sampling.
Unsuitable	Not defined

2. SUMMARY:

The Vertigo geyeri population distribution and abundance at Duleek Commons is extremely limited, with potentially suitable habitat found only in flushed areas in the fen south of the stream, and only one individual snail recorded in 2015. Many of the flushes appeared quite dry. However, this site is extremely important in a national context, being the most easterly known site for Vertigo geyeri in the country. The cattle grazing level at the site is currently a little too high, and this is having a negative impact on the suitable habitat due to poaching, excessive dunging and tight grazing of vegetation. The site was also quite dry at the time of surveying, and so the hydrological regime at the site needs investigation.

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
A	Suboptimal-Unsuitable	11.0911	Polygon A is a newly created polygon, classified as Suboptimal-Unsuitable. A large area to the north was investigated as part of the 2015 survey, but no flushes or other suitable habitat was found there. Therefore stream taken as boundary at north and north-east. Habitat within Polygon A consists of wet grassland (which is quite species poor and semi-improved at the west) grading in a number of places in the centre and east of the polygon into species-rich calcareous fen where flushing occurs. There are at least four distinct flushes present.

Transect habitat characteristics (Note: only three habitat categories were used in 2007-2012 survey)

Monitoring period: 2013-2018

Vertigo geyeri monitoring at Duleek Commons

Transect	Optimal habitat	Optimal/Subopt.	Sub-optimal	Subopt/Unsuitable	Unsuitable	Optimal wetness	Too Wet	Too Dry
0								

Transect samples

Mon. period	Transect	Sample	Location	Adults	Juveniles	Total	Habitat suitability
Monitoring period 2013-2018 Transect 0 (1 sample)							
2013-2018	0	0	NO TRANSECT RECORDED				

Spot Samples

Mon. period	Sample	Grid ref.	Adults	Juveniles	Total		Habitat suitability
Monitoring period 2013-2018 (4 samples)							
2013-2018	01	O 04327 69165	0	0	0		Suboptimal
2013-2018	02	O 04198 69142	0	0	0		Suboptimal
2013-2018	03	O 04146 69099	1	0	1	Count	Suboptimal
2013-2018	04	O 04154 69142	0	0	0		Suboptimal

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		

Mon. period	Indicator	Target	Result	Pass/Fail
2013-2018	Presence/Absence	At least one positive sample (with adult or sub-adult snails) from a minimum of four samples taken from across the site	One positive sample	Pass

Mon. period	Population Notes
2013-2018	The 2015 survey of Duleek Commons recorded Vertigo geyeri at one out of four sample locations, and at that spot, just one individual. Based on the criteria developed during this survey, the Population Assessment is Favourable (green).

5.2 Habitat Assessment: 2 passes Favourable (green); 1 pass Unfavourable Inadequate (amber); 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		

5.2.2 Site level

Mon. period	Indicator	Target	Result	Pass/Fail
2013-2018	Habitat extent	At least 10ha of the site supporting habitat classed as Suboptimal or better	11.1ha classed as Suboptimal-Unsuitable	Fail

Mon. period	Indicator	Target	Result	Pass/Fail
2013-2018	Habitat quality	At least two (from a minimum of four) sample points classified as being of Optimal wetness	One sample point classed as Optimal wetness	Fail

Mon. period	Habitat Notes
2013-2018	The potential Vertigo geyeri habitat at Duleek Commons is limited to the Rich Fen (PF1) habitat associated with flushing, which is found in a number of areas south of the stream that flows west-east across the site. The habitat polygon (A) is classed as Suboptimal-Unsuitable due to the limited suitable habitat present, and due to the fact that it is grazed a little too heavily at present (poaching in places, and vegetation cropped extremely tight - e.g. Schoenus nigricans tussocks <10cm tall). The habitat is also quite dry (three out of four sample points classed as 'Too dry'). Based on the assessment criteria developed during this survey the Habitat Assessment result is Unfavourable Bad (red).

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	100%	High numbers of cattle mean low veg height and an increase in nutrients and poaching
2013-2018	H05.01	garbage and solid waste	Inside	High	Negative	1%	Blocks and other (old) construction waste near road at western edge. Small in extent.
2013-2018	J01.01	burning down	Inside	High	Negative	1%	Few small fire sites noted near southern hedgerow

Mon. period	Future Prospects Notes
2013-2018	Of principal concern in relation to the Future Prospects for Vertigo geyeri at Duleek Commons is the level of grazing by cattle across the site, which although by broader standards is probably at a non-intensive level, is having a negative effect on this vulnerable habitat. At the time of survey there were 55 cattle and calves recorded in the area, though they had access to a much larger area rather than just this habitat polygon. Lesser impacts include bonfires and dumping, which are having a high impact, but over a very small area. Based on these activities, the Future Prospects for Duleek Commons are Unfavourable Inadequate (amber).

5.4 Overall Assessment

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

Mon. period	Overall Notes
2013-2018	While the Population Assessment for this site was Favourable (green) and the Future Prospects were deemed to be Unfavourable Inadequate (amber), the Habitat Assessment result of Unfavourable Bad (red) results in an Overall Assessment of Unfavourable Bad (red).

6. DISCUSSION

Monitoring period

2013-2018

Area of occupancy: Duleek Commons is located immediately to the north of the village of Duleek, Co. Meath. The Vertigo geyeri habitat can be accessed from the Longford Road to the west of the site.

Discussion:

The Vertigo geyeri population distribution and abundance at Duleek Commons is extremely limited, with potentially suitable habitat found only in flushed areas in the fen south of the stream, and only one individual snail recorded in 2015. Many of the flushes appeared quite dry. However, this site is extremely important in a national context, being the most easterly known site for Vertigo geyeri in the country. The cattle grazing level at the site is currently a little too high, and this is having a negative impact on the suitable habitat due to poaching, excessive dunging and tight grazing of vegetation. The site was also quite dry at the time of surveying, and so the hydrological regime at the site needs investigation.

Monitoring recommendations:

Given the limited information available on the status of Vertigo geyeri at this site (including the hydrological regime of the site), as well as the management issues and apparently low population size, it is recommended that a minimum of three-yearly monitoring be undertaken. The following actions should be undertaken:

- Take a minimum of four samples in the most suitable habitat in Polygon A and analyse for molluscan composition
- Re-determine boundary of the habitat polygon and assign habitat to Optimal, Optimal-Suboptimal, Suboptimal, Suboptimal-Unsuitable, or Unsuitable
- Assess the management regime and impacts upon the habitat for Vertigo geyeri
- Use results to determine overall condition assessment

Management recommendations:

A reduction in the level of cattle grazing within Polygon A is needed to reduce the amount of poaching and dunging in the wettest areas, and also to allow the development of the vegetation (e.g. to allow at least some areas of Schoenus nigricans to grow above c.10cm tall as they can provide a valuable refuge for the species in very dry or very wet weather). This could be facilitated by erecting a temporary electric fence along the stream to the north of the polygon, thereby allowing grazing to continue as normal on the north of the commons. Alternatively, temporary electric fencing could be used to fence off the best and wettest areas of the flushes for certain parts of the year at least, thereby providing protection for the most valuable areas of habitat. A longer-term exclusion of grazers is not desirable, however, as Vertigo geyeri require an open habitat. If possible, the replacement of cattle with sheep within Polygon A could have a beneficial effect through a reduction in poaching. In order to discuss the above options, contact needs to be made immediately by local NPWS staff with the landowner.

In terms of the hydrology at the site, given that three of the four sample points were deemed to be 'Too dry' in 2015, a more detailed understanding of water movements and of any recent changes to the hydrological regime at the site is needed, and a hydrological study should be initiated if the information is not currently available from other sources.