

# Geyer's whorl snail (*Vertigo geyeri*) surveillance on Islay 2012





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# COMMISSIONED REPORT

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**Commissioned Report No. 617**

**Geyer's whorl snail (*Vertigo geyeri*)  
surveillance on Islay 2012**

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# COMMISSIONED REPORT

# Summary

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## Geyer's whorl snail (*Vertigo geyeri*) surveillance on Islay

**Commissioned Report No.: 617**  
**Contractor: Dr. Martin J. Willing**  
**Year of publication: 2013**

### Background

This project was commissioned by SNH as part of its obligations to undertake periodic monitoring of species listed on the EC Habitats Directive annexes II and IV as part of Article 17 reporting to the European Commission. *Vertigo geyeri*, a mollusc listed on Annex II, was reported in 1996 and 1998 in a series of locations on the Island of Islay. These populations are one of the greatest concentrations of this species in the UK and the only ones confirmed from Western Scotland.

This work aimed to monitor and report on the condition of *V. geyeri* populations and their habitats on Islay. Surveying was therefore undertaken at sites on the north (near Bunnahabain, on the margins of Loch Lossit and at a series of sites to the west of Loch Finnlagan) and on the south Islay (Loch Ard Achadh on The Oa).

### Main findings

- Presence of *Vertigo geyeri* was confirmed at five of the former sites: Loch Smigedail, Margadale River, Loch Lossit, Loch Finnlagan and Loch Ard Achadh.
- In all five areas, numbers of *V. geyeri* extracted from samples were broadly similar to those from 1996 and 1998 surveys. Numbers were, however, markedly lower at Loch Ard Achadh when compared to a more recent survey undertaken in 2004.
- The snail was not found at the Ballachlaven sites, although habitat conditions at the main calcareous flushes did not seem to have changed since surveyed in 1996 and indeed appeared to be still ideal.
- At Loch Lossit, Loch Smigedail and the Margadale River, the habitat had changed little except that at the latter two areas ground moisture levels may be lower than when *V. geyeri* was first recorded.
- Some habitat deterioration was observed at Loch Ard Achadh and half of the Finlaggan sites; fen or flush habitat had been very closely grazed by cattle and 'poached' by hooves, which created large areas of bare ground. Lower flush water flows at both sites were considered to have contributed to this problem
- Measures to address habitat damage at Loch Ard Achadh and some of the Finlaggan sites are discussed, including the suggestion of a temporary electric fence around flush areas. For all sites, there should be clear and recorded communication with landowners/tenants to inform them of the presence of this vulnerable species on their land and measures to conserve it.

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## 1 INTRODUCTION

*Vertigo geyeri* is a rare, boreal species that was widespread in Britain in the pre-wooded late-glacial and early post-glacial eras (Kerney, 1999). This species is listed under Annex IIa of the EC Habitats Directive and is a UK Biodiversity Action Plan priority species (HMSO, 1995; Anon., 1998).

In the UK, it is only known from a few areas in upland regions and one small site in southern Britain (Kerney, 1999; Holyoak *et al.*, 2006). These are (number of 10-km squares occupied in brackets):

England: central Norfolk (1), central Pennines (3), North York Moors (2).

Wales: Anglesey (2), Llyn Peninsula (1) (reports of *V. geyeri* from the Brecon Beacons are misidentifications).

Scotland: Perthshire (5), Deeside (2), Black Isle (1), Islay (5).

In Scotland, *V. geyeri* was first discovered in Perthshire in 1995 and on Islay in 1996 (Willing, 1997). In 1998 and 2004, additional populations were discovered on the island (Willing, 1999, 2004). Elsewhere in Scotland the species has been recorded from Deeside and the Black Isle (Killeen & Colville, 1999a, 1999b; Littlewood & Stockan, 2013).

In Britain, *V. geyeri* lives in open, permanently wet calcareous flushes and fens. Sites are dominated by small sedges, rushes and mosses. Examples of typical associated plants include *Carex viridula* and *Schoenus nigricans*. The snail requires ground-level surface water for most of the year (Cameron *et al.*, 2003). On Islay, *V. geyeri* is found in two macro-habitat types: calcareous springs or flushes where tufa is deposited (all of the sites in North Islay) and alkaline fen (at a single loch-side site on The Oa).

## 2 METHODS

Survey for *Vertigo* species (with the exception of *V. moulinsiana*) is difficult to achieve by visual searches alone as these significantly under-estimate snail numbers or even fail to detect them. Additionally, *V. geyeri* is usually found in damp moss and sedges/rushes, which cannot be readily sieved in the field.

For this project, selective collection of material for bulk sample analysis was considered to be more suitable than the transect methods which were used to monitor *V. geyeri* populations in Eastern Scotland (e.g. Killeen & Colville, 1999b; see Annex 8.2 for a discussion on the use of transects on Islay). In order to make the surveillance results directly comparable with those of earlier surveys (Willing, 1997, 1999; Killeen & Colville, 1999a), the methods used previously were refined:

- Selection of suitable areas for material collection relied on detailed knowledge of sites where species had been recorded.
- At a series of sampling points (areas of low *Carex* and *Schoenus* sward and associated moss carpets near springs and seepages) of approximately 15 X 15 cm, vegetation (mosses, sedges and bryophytes) above about 5 cm was cut down and discarded. The remaining vegetation was cut just below ground level with a serrated kitchen knife and collected into a polythene bag, resulting in about 3 - 4 L of sample material.
- To avoid significant damage to sampling points, and to obtain representative samples within flushes, material was collected from a total of 0.25 m<sup>2</sup> (0.5 X 0.5 m) and combined from a series of points to about a 5 X 5 m area in each flush. Depending on the size of the site, two sub-samples were taken.
- Ground moisture levels at each survey site were measured with the scale used for assessing *V. moulinsiana* habitat (Killeen & Moorkens, 2003):
  1. DRY – no visible moisture on ground surface or felt if ground touched.
  2. DAMP – ground visibly damp but water does not rise if pressed.
  3. WET – water appears under light pressure.
  4. VERY WET – pools of water present but < 5 cm in depth.
  5. SUBMERGED – whole sample site under water > 5 cm in depth.

At each survey site the following information was also gathered:

- GPS locations at 10 figure level.
- Site descriptions related to vegetation type, levels of grazing, trampling and percentage of bare ground.
- Digital photographs to display site structure and location in relation to surrounding landscape features.
- Approximate altitude.

In the laboratory, samples were placed in fine muslin bags and air-dried to constant mass. Dried material was then passed through a series of sieves (5, 2 and 0.5 mm meshes), with most *Vertigo* specimens retained in the 0.5 mm mesh.

Adult and juvenile *V. geyeri* were counted with the aid of a binocular microscope (x7–50). Other mollusc species were recorded.

### 3 SITE DESCRIPTIONS AND RESULTS

#### 3.1 North Islay: Margadale River & Loch Smigeadail

##### 3.1.1 Margadale River

|                              |                |
|------------------------------|----------------|
| Grid reference:              | NR 40178 74093 |
| Survey date:                 | 03.06.2012     |
| Approximate altitude (m OD): | 100            |
| Aspect:                      | east           |
| Weather during sampling:     | dry            |

A small flush surrounded by heather moorland (*Calluna vulgaris* / *Erica tetralix*), sharply distinguished from the surrounding habitat by the presence of clumps of *Schoenus nigricans*. A detailed plant list for this site was given by Willing (1999). The flush area extends to about 18 m down the slope with an upper width of approximately 12 m decreasing to 3 m on the lower slope (Fig. 1). The flush area is bisected by a network of narrow, stony channels lined with tufa-encrusted stones. Between *S. nigricans* tussocks there is a mosaic of *Carex* spp. and *Juncus* spp. growing in a moss carpet and closely cropped by red deer, in places poached by their hooves. The ground moisture levels were 2–3 over much of the flush, with average vegetation height of about 10 cm; the area was drier than when last surveyed in 1998. It is noteworthy that the local and humidity-demanding *Acicula fusca* was, as in 1998, recorded at this site. Together with the presence of *V. geyeri*, this suggests that ground moisture levels have remained high at the site throughout this time.



Fig. 1. Margadale River site.

### 3.1.2 Loch Smigeadail

|                              |                |
|------------------------------|----------------|
| Grid reference:              | NR 38541 75617 |
| Survey date:                 | 03.06.2012     |
| Approximate altitude (m OD): | 185            |
| Aspect:                      | south          |
| Weather during sampling:     | Dry            |

A series of calcareous flushes intersected by tongues of acidic heath which runs for about 50–60 m parallel to the loch shore and extends back to a maximum of about 20 m (Figs 2 & 3). Like the Margadale site, the extent of the flush is marked by clumps of *Schoenus nigricans* set in a sward of *Carex* spp. and *Juncus* spp. growing in a moss carpet. Willing (1999) gave a detailed plant list for this site. The eastern areas of the flush were relatively dry (ground moisture levels 1–2), but with wetter conditions in the west (ground moisture levels 3 and 4). The site displayed signs of light deer grazing.



Fig. 2. Loch Smigeadail showing flush locations above northern shore.



Fig. 3. Flush at Loch Smigeadail.

Table 3.1 - Number of individuals recorded – Margadale & Loch Smigeadail

| Samples                      | Sites           |         |                 |    |
|------------------------------|-----------------|---------|-----------------|----|
|                              | Margadale Flush |         | Loch Smigeadail |    |
|                              | 1               | 1a      | 1               | 1a |
| <i>Vertigo geyeri</i>        | 10              | 2       | 14              | -  |
| (adult / juvenile)           | (6 / 4)         | (1 / 1) | (8 / 6)         |    |
| <i>Acicula fusca</i>         | 1               | 1       | -               | -  |
| <i>Carychium tridentatum</i> | -               | -       | -               | 3  |
| <i>Carychium minimum</i>     | 1               | -       | -               | 1  |
| <i>Cochlicopa lubrica</i>    | 1               | -       | -               | 2  |
| <i>Columella aspera</i>      | 2               | 3       | -               | -  |
| <i>Vertigo antivertigo</i>   | 4               | 3       | -               | -  |
| <i>Vertigo substriata</i>    | -               | 2       | -               | 1  |
| <i>Leiostyla anglica</i>     | 2               | 1       | 14              | 6  |
| <i>Punctum pygmaeum</i>      | 1               | -       | -               | -  |
| <i>Nesovitrea hammonis</i>   | 1               | 1       | -               | 1  |
| <i>Euconulus fulvus</i> agg  | 4               | 2       | -               | -  |
| <i>Potamopyrgus</i>          | 24              | 5       | -               | -  |
| <i>antipodarum</i>           |                 |         |                 |    |
| <i>Galba truncatula</i>      | 5               | 1       | 27              | 1  |
| <i>Pisidium personatum</i>   | 1               | -       | -               | 1  |

## 3.2 North Islay: Loch Lossit

### 3.2.1 Lossit 1

|                              |                |
|------------------------------|----------------|
| Grid reference:              | NR 40999 64967 |
| Survey date:                 | 05.06.2012     |
| Approximate altitude (m OD): | 95             |
| Aspect:                      | west           |
| Weather during sampling:     | dry            |

A small flush extending for about 20 x 10 m immediately above the loch shore, marked by the presence of occasional *Schoenus nigricans* tussocks (Fig. 4). The site is not grazed and has ground moisture levels of 2–3. The site has changed little since it was surveyed in 1996.



Fig. 4. Loch Lossit: Site 1

### 3.2.2 Lossit 2

|                              |                |
|------------------------------|----------------|
| Grid reference:              | NR 41184 65251 |
| Survey date:                 | 05.06.2012     |
| Approximate altitude (m OD): | 95             |
| Aspect:                      | west           |
| Weather during sampling:     | dry            |

This is a new site, not surveyed in 1996 (Fig. 5). Habitat conditions are much as in Site 1, with occasional clumps of *Schoenus nigricans* on an area not grazed (or very lightly grazed). A second sample (2b) was taken on the shore margins which had some flood debris.



Fig. 5. Loch Lossit: Site 2.

### 3.2.3 Lossit 3

|                              |                |
|------------------------------|----------------|
| Grid reference:              | NR 40944 65452 |
| Survey date:                 | 05.06.2012     |
| Approximate altitude (m OD): | 100            |
| Aspect:                      | South west     |
| Weather during sampling:     | dry            |

A series of small flushes (site 11 from Willing, 1997) with patches of *Schoenus nigricans* lying amongst *Carex* spp. and *Juncus* spp. growing in a moss carpet (Fig. 6). The site extends for approximately 10 X 20 m and has been maintained by either cutting or light grazing. Parts of the flush have been scarred by deep wheel tracks produced by timber transport vehicles. A large timber stack was present just above the flush area. Apart from the partial rutting of the site, it appears to have changed little.



Fig. 6. Loch Lossit: Site 3 (showing ruts caused by forestry vehicles).

Table 3.2 - Number of individuals recorded – Loch Lossit

|                              | Samples           |         |     |         |
|------------------------------|-------------------|---------|-----|---------|
|                              | *new site in 2012 |         |     |         |
|                              | 1                 | 2*      | 2a* | 3       |
| <i>Vertigo geyeri</i>        | 1                 | 1       | -   | 2       |
| (adult / juvenile)           | (0 / 1)           | (1 / 0) |     | (2 / 0) |
| <i>Carychium tridentatum</i> | -                 | 3       | 5   | -       |
| <i>Carychium minimum</i>     | 12                | 12      | 54  | 3       |
| <i>Oxyloma elegans</i>       | -                 | 11      | 5   | -       |
| <i>Cochlicopa lubrica</i>    | -                 | -       | -   | 1       |
| <i>Vertigo antivertigo</i>   | 3                 | -       | -   | -       |
| <i>Vertigo substriata</i>    | 2                 | 1       | 6   | 1       |
| <i>Leiostyla anglica</i>     | 1                 | 17      | 11  | -       |
| <i>Discus rotundatus</i>     | -                 | -       | 1   | -       |
| <i>Clausilia bidentata</i>   | -                 | -       | 1   | -       |
| <i>Balea heydeni</i>         | -                 | -       | 9   | -       |
| <i>Vitrea crystallina</i>    | -                 | -       | 3   | -       |
| <i>Nesovitrea hammonis</i>   | 1                 | -       | -   | 4       |
| <i>Aegopinella nitidula</i>  | -                 | 1       | 1   | -       |
| <i>Euconulus fulvus</i> agg  | -                 | 5       | 2   | 6       |
| <i>Ashfordia granulata</i>   | -                 | 4       | -   | -       |
| <i>Trochulus hispidus</i>    | -                 | -       | 4   | -       |
| <i>Potamopyrgus</i>          | 1                 | -       | 1   | -       |
| <i>antipodarum</i>           |                   |         |     |         |
| <i>Galba truncatula</i>      | 14                | 22      | -   | 7       |
| <i>Pisidium personatum</i>   | 1                 | -       | -   | 2       |
| <i>Pisidium casertanum</i>   | -                 | -       | -   | 3       |

### 3.3 North Islay: Loch Finlaggan & Ballachlaven

#### 3.3.1 Finlaggan 1

|                              |                                 |
|------------------------------|---------------------------------|
| Grid reference:              | NR 37999 67521 – NR 37979 67457 |
| Survey date:                 | 04.06.2012                      |
| Approximate altitude (m OD): | 85                              |
| Aspect:                      | South east                      |
| Weather during sampling:     | dry                             |

This site, sampled in 1996 (site 4 from Willing, 1997), occupies an area of about 20 X 30 m (Fig 7). The site was chiefly vegetated by *Iris pseudacorus* and *Juncus* spp. The ground surface was dry (moisture levels 1–2) and heavily poached by cattle, in places producing up to 50% bare ground which had dried to a hard crust in some places (Fig. 8). This site is very much drier than in 1996, heavily grazed and without the tall fen vegetation (e.g. *Filipendula ulmaria*) present then. There was another flush with slightly damper conditions a short distance down the slope, result of a series of small drainage channels (in 1996 this flush was contiguous with the first site sampled in 2012). This flush had a few clumps of *Schoenus nigricans*, but was also heavily poached, with ground moisture levels ranging from 2 to 3.



Fig. 7. Finlaggan Site 1.



Fig. 8. Finlaggan Site 1 showing dry ground and cattle-poach damage.

### 3.3.2 Finlaggan 2

|                              |                |
|------------------------------|----------------|
| Grid reference:              | NR 37886 67384 |
| Survey date:                 | 04.06.2012     |
| Approximate altitude (m OD): | 85             |
| Aspect:                      | South east     |
| Weather during sampling:     | dry            |

This flush site was not surveyed in 1996. It is marked by clumps of *Schoenus nigricans* alongside small drainage channels (Fig. 9). It has a maximum width of about 4 m extending down the slope for about 40 m. Ground moisture levels ranged from 2 to 3. Cattle poaching is evident, in places with up to 50% bare ground produced by hooves.



Fig. 9. Finlaggan Site 2.

### 3.3.3 *Finlaggan 3*

|                              |                                 |
|------------------------------|---------------------------------|
| Grid reference:              | NR 37749 67245 – NR 37800 67341 |
| Survey date:                 | 04.06.2012                      |
| Approximate altitude (m OD): | 85                              |
| Aspect:                      | South east                      |
| Weather during sampling:     | dry                             |

This flush extends for about 160 m north-south. It is marked by clumps of *Schoenus nigricans* in a mix of *Carex* spp. and *Juncus* spp. set amongst moss ground cover (Fig. 10). A number of shallow pools are present in the middle of this flush, which was only lightly poached around the margins, with ground moisture levels ranging between 3 and 5.



Fig. 10. *Finlaggan Site 3.*

### 3.3.4 *Finlaggan 4*

|                              |                                 |
|------------------------------|---------------------------------|
| Grid reference:              | NR 37504 67015 – NR 37503 66938 |
| Survey date:                 | 04.06.2012                      |
| Approximate altitude (m OD): | 85                              |
| Aspect:                      | South east                      |
| Weather during sampling:     | dry                             |

This is a series of flushes running north–south for about 50 m. These are the locations of sites 2, 2a and 2b from the 1996 surveys (Willing, 1997). The vegetation was very similar to that described in 1997 with *Schoenus nigricans* tussocks indicating the approximate extent of the base-rich flush (Fig. 11). Very slight poaching was evident, with small areas displaying up to 10% bare ground, although it was closely cropped. Ground moisture conditions throughout mostly ranged between 3 and 4.



Fig. 11. Finlaggan Site 4.

Table 3.3 - Number of individuals recorded – Finlaggan

|   | Sample |              |                         |              |              |              |
|---|--------|--------------|-------------------------|--------------|--------------|--------------|
|   | 1      | 1a           | 2*<br>*new site in 2012 | 3            | 3a           | 4            |
| <i>Vertigo geyeri</i><br>(adult / juvenile) | -      | 1<br>(0 / 1) | 6<br>(3 / 3)            | 1<br>(1 / 0) | 1<br>(0 / 1) | 3<br>(2 / 1) |
| <i>Carychium minimum</i>                    | 1      | 1            | 25                      | 7            | 4            | 15           |
| <i>Oxyloma elegans</i>                      | -      | 1            | -                       | -            | -            | 2            |
| <i>Cochlicopa lubrica</i>                   | -      | 2            | 3                       | 2            | 6            | 2            |
| <i>Vertigo antivertigo</i>                  | 2      | 4            | 9                       | 3            | -            | 15           |
| <i>Vertigo substriata</i>                   | 2      | 3            | 5                       | 4            | -            | 2            |
| <i>Vertigo pygmaea</i>                      | -      | -            | 1                       | -            | -            | 1            |
| <i>Leiostyla anglica</i>                    | -      | -            | 1                       | -            | -            | -            |
| <i>Punctum pygmaeum</i>                     | -      | -            | 2                       | 1            | -            | 1            |
| <i>Vitrea crystallina</i>                   | -      | -            | 2                       | -            | -            | -            |
| <i>Nesovitrea hammonis</i>                  | -      | -            | -                       | -            | 2            | 2            |
| <i>Euconulus fulvus</i> agg                 | -      | -            | 5                       | 6            | 2            | 3            |
| <i>Potamopyrgus antipodarum</i>             | 2      | -            | 9                       | 6            | -            | 4            |
| <i>Galba truncatula</i>                     | 4      | -            | 2                       | 2            | 2            | 12           |
| <i>Pisidium personatum</i>                  | -      | -            | 7                       | 1            | -            | -            |

### 3.3.5 Ballachlaven

|                              |                |
|------------------------------|----------------|
| Grid reference:              | NR 37313 68032 |
| Survey date:                 | 04.06.2012     |
| Approximate altitude (m OD): | 120 -140       |
| Aspect:                      | South east     |
| Weather during sampling:     | dry            |

This flush (Fig. 12) was surveyed in 1996 (Willing, 1997; site 5), and was described thus: “this flush, which is clearly visible from several hundred metres away, includes many small channels running down the hill and containing lime encrusted stones and pebbles. The vegetation was chiefly short sedges and rushes with patches of *Schoenus nigricans*”. The 1997 grid reference mistakenly places this site slightly further north than where it actually is. The 1997 Ballachlaven site 6, lying across a small glen from site 1, could not be located. When first surveyed, this small *S. nigricans* flush lay amongst tall, un-grazed vegetation; in 2012 the site was closely grazed with much drier ground conditions. It is possible that the spring source for this former flush may have dried (Fig. 13).



*Fig. 12. Ballachlaven flush.*



Fig. 13. Ballachlaven: looking across 1996 flush location which appears to have dried.

Table 3.4 - Number of individuals recorded – Ballachlaven

|   | Sample |    |
|---|--------|----|
|   | 1      | 1a |
| <i>Vertigo geyeri</i><br>(adult / juvenile) | -      | -  |
| <i>Acicula fusca</i>                        | 1      | -  |
| <i>Carychium minimum</i>                    | 3      | 2  |
| <i>Oxyloma elegans</i>                      | 1      | -  |
| <i>Cochlicopa lubrica</i>                   | -      | 1  |
| <i>Columella aspera</i>                     | 1      | 1  |
| <i>Vertigo antivertigo</i>                  | -      | 2  |
| <i>Vertigo substriata</i>                   | 3      | -  |
| <i>Potamopyrgus antipodarum</i>             | 3      | -  |
| <i>Galba truncatula</i>                     | 1      | 12 |
| <i>Pisidium personatum</i>                  | 2      | -  |

### 3.4 South Islay: Loch Ard Achadh

|                              |  |
|------------------------------|--|
| Grid reference:              | Central reference: NR 31491 43009                    |
| Survey date:                 | 02.06.2012   |
| Approximate altitude (m OD): | 95 (erroneously given as 105 in 1998)                |
| Aspect:                      | South-west (erroneously given as south east in 1998) |
| Weather during sampling:     | dry  |

Three zones were surveyed: the fen area visited in 1998 (Willing, 1999) and 2004 (Willing, 2004) and two other areas lying immediately adjacent to it (Fig. 14). These additional areas were surveyed to determine if *Vertigo geyeri* presence extends laterally at the site. The central fen area (samples 2a and 2b) has a width of about 23 m (parallel to the loch shore) and extends back approximately 30 m from the shore (Fig. 15). The 1998 report describes the vegetation as “marshy ground with moderately tall (up to 1 m) lightly grazed herbaceous vegetation. A rich mix of rushes, sedges, *Lychnis flos-cuculi*, *Equisetum* sp., *Filipendula ulmaria*, *Cirsium palustre* and *Iris pseudacorus*. No *Schoenus nigricans* was seen...”. When visited in 2004, the site was very much as described in 1999, but the 2012 visit revealed some significant changes: the vegetation on the main fen site was heavily grazed (maximum average height of 10 cm) and there were areas noticeably poached (ranging between 5 and 40% bare ground). The ground was also drier, ranging between 2 and 3.

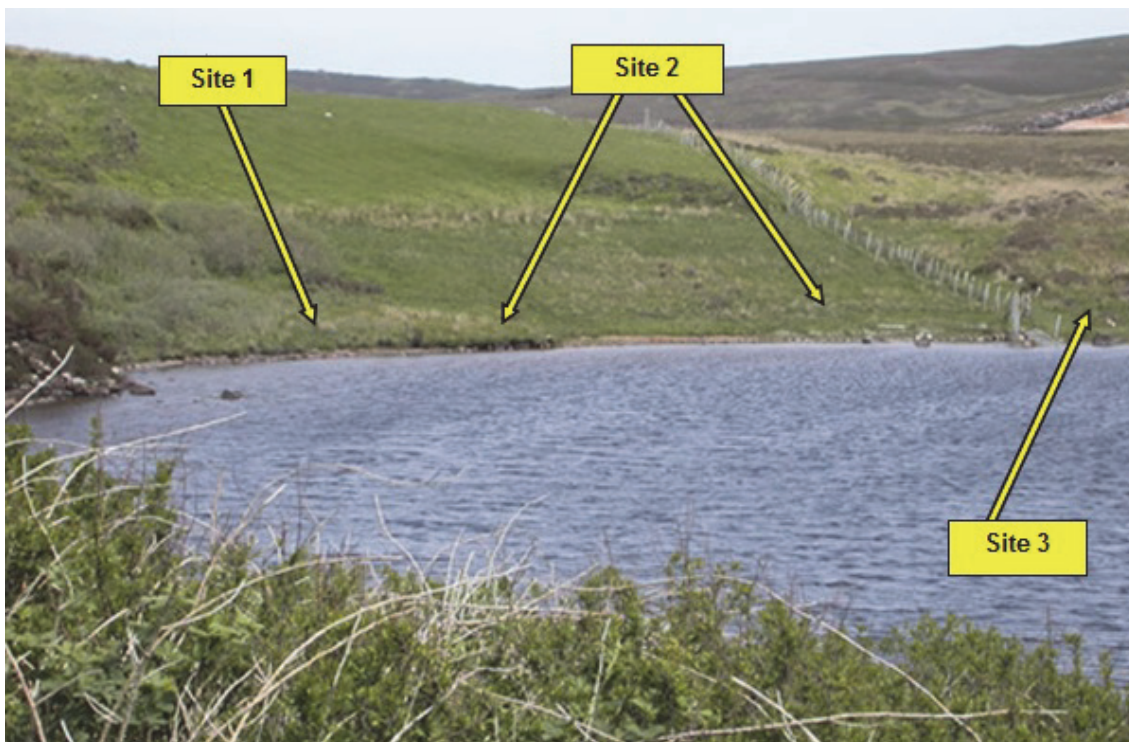


Fig. 14. Loch Ard Achadh: survey site locations.

Lying to the left (with fen site viewed from the lake), there is an area extending to approximately 12 x 10 m of rank *Juncus* sp. growing within moss dominated by *Sphagnum* sp. (Fig. 16). This rather acidic plant community (ground moisture levels 2–3) had an average vegetation height of about 40 cm and was only lightly grazed; the cattle appear to have selected the base-rich fen in preference to this area. It merges quite abruptly with bracken *Pteridium aquilinum* and low growing willows *Salix* sp. on the higher ground behind.



*Fig. 15. Loch Ard Achadh: site 2.*



*Fig. 16. Loch Ard Achadh: site 1.*

There is a double parallel fence line to the right of the fen site, and immediately to the right there is another flush area of 11 m approximate width, extending back from the loch for about 20 m (Fig. 17) . This closely grazed area (maximum vegetation height 8 cm) was not poached, and may be grazed by sheep. The low growing vegetation consists of a mix of *Carex* spp., *Juncus* spp., *Hydrocotyle vulgaris* and a carpet of mosses.



Fig. 17. Loch Ard Achadh: site 3.

Table 3.5 - Number of individuals recorded – Loch Ard Achadh

|   | Sample<br>*new sites in 2012 |     |              |              |    |
|---|------------------------------|-----|--------------|--------------|----|
|   | 1*                           | 1a* | 2            | 2a           | 3* |
| <i>Vertigo geyeri</i><br>(adult / juvenile) | -                            | -   | 4<br>(3 / 1) | 5<br>(5 / 0) | -  |
| <i>Carychium minimum</i>                    | 4                            | -   | 12           | 16           | 23 |
| <i>Columella aspera</i>                     | 1                            | -   | -            | -            | -  |
| <i>Vertigo antivertigo</i>                  | -                            | -   | 5            | 9            | 12 |
| <i>Vertigo substriata</i>                   | 5                            | -   | 6            | 1            | -  |
| <i>Vertigo pygmaea</i>                      | -                            | -   | -            | 1            | 5  |
| <i>Leiostryla anglica</i>                   | -                            | -   | 1            | -            | 5  |
| <i>Nesovitrea hammonis</i>                  | -                            | 1   | -            | -            | -  |
| <i>Euconulus fulvus</i> agg                 | -                            | -   | -            | 1            | 2  |
| <i>Potamopyrgus</i><br><i>antipodarum</i>   | 7                            | -   | -            | 5            | -  |
| <i>Galba truncatula</i>                     | 1                            | -   | 15           | 14           | 63 |
| <i>Pisidium personatum</i>                  | 5                            | -   | 17           | 25           | 23 |

## 4 DISCUSSION

### 4.1 General statement

Site conditions, judged by species trends, were based upon results from earlier surveys, all of which took place many years previously: 16 years for Loch Finlaggan, Loch Lossit and Ballachlaven, 14 years for Loch Smigeadail and Margadale River, and eight years for Loch Ard Achadh. As *Vertigo* population levels typically fluctuate seasonally and from year to year (e.g. Cameron, 2003; Killeen, 2003; Baker *et al.*, 2007), meaningful and statistically sound judgement of population levels at sites can only come from the accumulation of a series of repeat surveys undertaken over a period of at least several years and, ideally, incorporating annual changes. Therefore the results need to be treated with some caution as an assessment of habitat and population condition and population trends.

Nonetheless, general trends can be described:

- *Vertigo geyeri* is present at five of the six survey areas, only failing to be confirmed at Ballachlaven.
- Numbers of *V. geyeri* recovered in 2012 are closely similar to those obtained on the first surveys at Margadale River, Loch Smigeadail, Loch Lossit, Loch Finlaggan (except site 1) and Loch Ard Achadh.
- Numbers of *V. geyeri* were only lower at Loch Ard Achadh in comparison with results from 2004.
- Overall, *Vertigo geyeri* occurrence and numbers are broadly similar to earlier surveys; therefore *V. geyeri* population levels on Islay can be considered to be stable.

A feature affecting all study sites were the dry conditions preceding and during the surveys. The 2012 work was undertaken in early June, at a time when much of western Scotland was experiencing a prolonged period of untypically low rainfall, with near drought conditions in some locations.

### 4.2 North Islay: Margadale River & Loch Smigeadail

#### 4.2.1 Margadale River

The 2012 survey produced 10 and two *Vertigo geyeri*, respectively, from the two bulk samples taken from this small flush. This compares favourably with the seven individuals collected in 1998 (Table 4.1). The differences in snail numbers between the two 2012 samples suggests a patchy distribution on the flush. Ground moisture levels on much of the flush were possibly slightly lower than those noted in 1996. The most noticeable impact was from red deer; vegetation over much of the flush was very closely cropped and the ground surface poached in places (Fig.18). Numbers of *V. geyeri* at this site may increase if measures are taken to reduce deer impact; fencing this small area of moorland may be considered.



Fig. 18. Deer faeces and close-cropping at Magadale River site.

A possible future threat to the site may come from the invasive shrub *Rhododendron ponticum* (Fig 19), which is spreading over moorland between this site and Bunnahaibhain and appears to have advanced in the area since 1998.



Fig. 19. Encroaching rhododendron near Margadale River.

#### 4.2.2 Loch Smigeadail

The habitat at this site does not appear to have changed since 1998. *Vertigo geyeri* is still present in the flush, occurring locally in good numbers. The difference between the numbers of snails in the samples suggests, as also seen at the Margadale River site, that the

distribution of *V. geyeri* in the flush is patchy. There appear to be no particular threats to the site although deer grazing pressure, if increased, is a potential problem.

*Table 4.1 - Comparison of 2012 Margadale and Loch Smigeadail results with those from earlier surveys - Number of individuals recorded*

| Site (2012 numbering) | <i>V. geyeri</i> sample counts       |                                |
|-----------------------|--------------------------------------|--------------------------------|
|                       | 1998 survey<br>(one sample per site) | 2012<br>(two samples per site) |
| Margadale 1           | 7                                    | 10                             |
| Margadale 1a          | -                                    | 2                              |
| Smigeadail 1          | 1                                    | 14                             |
| Smigeadail 1a         | -                                    | 0                              |

### 4.3 Loch Lossit

The habitat appears to be largely unchanged since last surveyed in 1996. Site 1, on the far side of the loch (site 12 in the 1996 survey: Willing, 1997), appears similar to its 1996 condition and low numbers of *V. geyeri* are still present.

Site 3 (site 11 in 1996) has also changed little although forestry vehicles have caused rutted scars to part of the flush (Fig. 20), but these should re-vegetate naturally. The same low number of *V. geyeri* was recorded at this site as in 1996, so the habitat seems stable (Table 4.2). The small additional flush, lying between sites 1 and 3, produced a single *V. geyeri*. There appear to be no obvious threats to this site and so no specific conservation measures seem necessary.



*Fig. 20. Timber stacks on margins of Loch Lossit site 3.*

Table 4.2 - Comparison of 2012 Loch Lossit results with those from earlier surveys - Number of individuals recorded

| Site (2012 numbering) | <i>V. geyeri</i> sample counts       |      |
|-----------------------|--------------------------------------|------|
|                       | 1996 survey<br>(single site samples) | 2012 |
| 1                     | 2                                    | 1    |
| 2a                    | No 1996 survey                       | 1    |
| 2b                    | 0                                    | 0    |
| 3                     | 2                                    | 2    |

#### 4.4 Loch Finlaggan series

This series of base-rich flushes extends for about 1 km broadly following a spring line at the base of a low limestone ridge. All sites that produced *V. geyeri* in 1996 (2012 sites 1, 3 and 4) also support the snail in similarly low numbers in 2012 (Table 4.3). The extra small flush (site 2), not surveyed in 1996, produced the largest numbers of *V. geyeri* in this complex. Site 1 was very much drier than in 1996 and heavy cattle grazing had largely removed the rank fen, and also caused extensive poaching. Sites 3 and 4 produced low numbers of *V. geyeri* as in 1996; neither of these sites had low water flows, which appears to be a problem at site 1 only. The heavy grazing and cattle poaching at sites 1 and 2 may justify electric fencing around these areas to allow fen recovery and consequently a possible increase in *V. geyeri* population levels.

Table 4.3 - Comparison of 2012 Finlaggan results with those from earlier surveys - Number of individuals recorded

| Site (2012 numbering) | <i>V. geyeri</i> sample counts        |      |
|-----------------------|---------------------------------------|------|
|                       | 1996 survey<br>(single samples taken) | 2012 |
| 1                     | 1                                     | 0    |
| 1a                    | -                                     | 1    |
| 2                     | No survey 1996                        | 6    |
| 3                     | 4                                     | 1    |
| 3a                    | -                                     | 1    |
| 4                     | 6                                     | 3    |

#### 4.5 Ballachlaven

There were no noticeable changes at the main Ballachlaven site (site 1) from 1996 (Table 4.4). This large, *Schoenus nigricans*-dominated flush has good water flow and does not suffer from grazing and livestock poaching and so appears ideal for *V. geyeri*. It is therefore surprising that there were no *V. geyeri* in the two large bulk samples taken from this site, and also very low numbers of a few other mollusc species. There is no obvious reason for this; perhaps some undetected environmental factor is affecting the site, such as high levels of heavy metal ions from the former mine/quarry workings in this glen. Ground water testing could check this hypothesis. The second Ballachlaven site surveyed in 1996 on the far side of the glen could not be located. This area is now heavily grazed and ground moisture levels seem lower; the previous small flush may have dried.

Table 4.4 Comparison of 2012 Ballachlaven results with those from earlier surveys- Number of individuals recorded

| Site (2012 numbering) | <i>V. geyeri</i> sample counts       |      |
|-----------------------|--------------------------------------|------|
|                       | 1996 survey<br>(single sample taken) | 2012 |
| 1                     | 5                                    | 0    |
| 1a                    | -                                    | 0    |

#### 4.6 Loch Ard Achadh

The 2012 sampling produced nine *Vertigo geyeri* taken from two bulk samples, which is comparable to the four recorded from a single sample in 1998 (Table 4.5). This site was also sampled in 2004 when a single sample produced 37 *V. geyeri* (the highest number taken from a single sample on Islay) (Willing, 2004). In 2012 the fen site was drier than on previous occasions. The fen vegetation was grazed to a close sward, with much of the ground surface poached by cattle (Fig. 21). It seems likely that the drier conditions, heavy cattle grazing and poaching have made the site less suitable for *V. geyeri* (Fig. 22). A temporary electric fence is a possible conservation measure when cattle numbers are high. The absence of *V. geyeri* from the two blocks of habitat lying to either side of the fen shows that the presence of this snail is sharply localised at the head of Loch Ard Achadh.



Fig. 21. Dry ground and cattle poaching at Loch Ard Achadh site 2.



Fig. 22. Loch Ard Achadh sites 1 (left) & 2 illustrating the relatively un-grazed state in 2004.

Table 4.5 - Comparison of 2012 Loch Ard Achadh results with those from earlier surveys - Number of individuals recorded

| Site (2012 numbering) | <i>V. geyeri</i> sample counts       |                                      |      |
|-----------------------|--------------------------------------|--------------------------------------|------|
|                       | 1998 survey<br>(single sample taken) | 2004 survey (single<br>sample taken) | 2012 |
| 1                     | No survey in 1998                    | No previous survey                   | 0    |
| 1a                    | No survey in 1998                    | No previous survey                   | 0    |
| 2                     | 4                                    | 37                                   | 4    |
| 2a                    | -                                    | No previous survey                   | 5    |
| 3                     | No survey in 1998                    | No previous survey                   | 0    |

## 5 CONCLUSIONS

*Vertigo geyeri* is still present in five of the six areas surveyed, only absent in the flush site at Ballachlaven. The reasons for absence at this site are unknown, as the flush was not suffering from drought or damage from livestock or deer. It is not possible to know whether any event occurring in the 16 years since the initial survey has caused the loss or whether the snail is still present in numbers too low to be recorded in 2012.

Populations of *V. geyeri* and their small pockets of habitat seem largely unchanged at Margadale River/Loch Smigeadail and Loch Lossit since the snail was first recorded, respectively 14 and 16 years previously. The presence of a third population at Loch Lossit suggests that the site remains in good condition.

The suite of sites lying immediately west of Loch Finlaggan still supports low numbers of *V. geyeri* after 16 years. Populations may have been reduced at sites 1 and 2 due to a combination of low water levels and flow, and pressure from cattle which have damaged the delicate flush vegetation. Temporary electrical fencing which isolates small flush areas during times of large numbers of cattle may help these sites to recover.

At Loch Ard Achadh on the Oa, *V. geyeri* populations were considerably reduced compared to 2004. Sampling of habitat (sites 1 and 3) lying immediately adjacent to the *V. geyeri*-containing flush indicate that the area of snail occupancy is, as at most other Islay sites, very limited. The fall in *V. geyeri* numbers may be linked to relatively dry conditions in the flush at the time of survey, but probably is chiefly due to cattle grazing and poaching. As with some of the Finlaggan sites, temporary electrical fencing to isolate this small flush area during times of large numbers of cattle may help the site to recover. The snail decline at Loch Ard Achadh may also be due to natural population fluctuations; only more frequent regular surveillance or a system of common standards monitoring would allow such population changes to be better understood.

Table 4.6 provides a summary of the results of this surveillance study for each of the six areas where *V. geyeri* has been recorded on Islay. Conclusions and advice given in this table represent expert opinion based upon comparison of surveillance results.

*Table 4.6 - Summary: Vertigo geyeri status and conservation issues plus management advice.*

| Site            | Years since previous survey | <i>V. geyeri</i> population levels | Habitat quality & extent                                     | Specific threats to <i>V. geyeri</i> & actions to retain favourable condition   | Overall population and habitat condition in 2012 |
|-----------------|-----------------------------|------------------------------------|--|---|--|
| Loch Smigeadail | 14                          | Stable                             | Unchanged  | <u>At low risk</u> : potentially increased deer grazing and reduced flush water flow.<br><br><u>No specific action</u> currently required (but regular site inspection recommended) | Favourable                                       |
| Margadale River | 14                          | Stable                             | Unchanged (except possible slight lower ground water levels) | <u>At low risk</u> : potentially increased deer grazing and reduced flush water flow.<br><br><u>No specific action</u> currently required (but regular site inspection recommended) | Favourable                                       |
| Loch Lossit     | 16                          | Stable                             | Unchanged  | <u>At low risk</u> : potentially low water flow in flushes and scrub encroachment.  | Favourable                                       |

|                        |                              |  |  |  |  |
|------------------------|------------------------------|--|--|--|--|
|                        |                              |  |  | <u>No specific action</u> currently required (but regular site inspection recommended)   |  |
| <b>Loch Finlaggan</b>  | 16                           | Stable at sites 3 & 4;<br><br>decline at site 1 (site 2 new in 2012) | Site 1 much dried; site 1 & 2 heavily cattle-poached;<br><br>unchanged at 3 & 4                              | <b>Sites 3 &amp; 4:</b> <u>at low risk</u> : potentially low water flow in flushes and cattle grazing and poaching.<br><br><u>No specific action</u> currently required (but regular site inspection recommended)<br><br><b>Site 1:</b> <u>At risk</u> : low water flow in flushes and high cattle grazing and poaching.<br><br><u>Action required</u> : reduce cattle numbers or fence flush with temporary electrical fence when cattle in area. | Favourable at sites 3, 4;<br><br>unfavourable site 1 & 2 |
| <b>Ballachlaven</b>    | 16                           | Possible loss  | Main site habitat extent & quality stable.<br><br>Subsidiary site not located in 2012 – flush may have dried | <b>Main site:</b> threat unclear as habitat seems unchanged since initial survey.<br><br><u>No specific action</u> recommended.<br><br>Subsidiary former site: apparent site loss from low water flow.   | Unfavourable   |
| <b>Loch Ard Achadh</b> | 8<br>(14 since first survey) | Decrease   | Extent unchanged but deterioration   | <u>At risk</u> : heavy cattle grazing and poaching; low water flow in flush.<br><br><u>Action required</u> : reduce cattle numbers or fence flush with temporary electrical fence when cattle in area.   | Unfavourable   |
| <b>All sites</b>       | -                            | -  | -  | Notifications to landowners of site importance together with habitat management advice.  |  |

## **6 SURVEILLANCE AND CONSERVATION MANAGEMENT OF *VERTIGO GEYERI* ON ISLAY**

### **6.1 Surveillance and possible future monitoring**

In their report on the surveillance of priority terrestrial invertebrates in Scotland, Littlewood & Stockan (2013) recommend, in relation to *V. geyeri*, repeatable surveillance in four areas. These include, in eastern Scotland, sites in Perthshire (Tulach Hill and Glen Fender Meadows) and a site on Deeside (Morrone Birkwood, Braemar), whilst in western Scotland two sites on Islay near the Margadale River and at the head of Loch Ard Achadh.

As previously noted, the 2012 surveillance of all but one site (Loch Ard Achadh) took place between 14 and 16 years ago. For more reliable species condition assessments, site surveillance needs to be undertaken more often, perhaps every two or three years as proposed by Killeen (2002). As the 2012 surveillance took place following an unfavourable period of particularly low rainfall and drier ground conditions, it is suggested that for certain Islay sites where habitat conditions appeared to have deteriorated, another survey should be taken within a year (or after a period of more typical rainfall). Additionally, a selection of sites may be sampled at intervals throughout the year to try to determine annual life cycle changes, which may vary from site to site. Cameron (2003), in discussing *V. geyeri* management and monitoring, stated: "...it is necessary to take account of the following limitations...(1) Patterns of life history and population dynamics vary in site-specific ways, even in the same year. (2) Such patterns are weather dependent, and may vary between years at the same site. This may affect the reliability of a simple annual monitoring regime."

In relation to methodology, I believe that the surveillance procedures adopted in 2012 are both robust and repeatable. As a slight improvement, I suggest doubling the number of bulk samples taken per site (the selective aggregation technique outlined in Methods. The distribution of *V. geyeri* across sites is patchy, and this is believed to be due to small variations in grazing, poaching and ground-water levels (Cameron *et al.*, 2003), which may not be obvious during a survey. Such variations in numbers of *V. geyeri* from different bulk samples were clearly seen at some of the sites (e.g. Margadale river samples 1, 1a, Loch Smigeadail samples 1, 1a and Loch Ard Achadh 2, 2a).

### **6.2 Possible common standards monitoring**

For objective assessment of *V. geyeri* populations on Islay, a series of monitoring protocols could be devised to allow a degree of compliance with a set of norms. Individual protocols would be required because of the differences in site size and habitat types among the six known Islay sites (the Finlaggan complex is counted as one, but may be subdivided). Protocols would require further site surveillance in order to gather the additional data required for the formulation of monitoring parameter limits for both snail populations and habitat extent and condition. Transects have been used for the monitoring of some sites in Eastern Scotland (e.g. Killeen & Colville, 1999b). I suggest that transects are not appropriate on Islay because:

1. Most sites are too small for the establishment of meaningful transects.
2. At many of the flushes, there is a sharp boundary at their edges; transects mostly measure biological changes in relation to physical environmental variables (Annex 8.2).

In line with botanical surveys, it is suggested that a system of randomised quadrat placement be adopted, as in *V. geyeri* studies at Waun Eurad in N. Wales (Cameron, 2003). Due to the localised distribution of *V. geyeri* in most flushes, it may be necessary slight lateral adjustment of quadrat frames in order to avoid stony channels and to ensure that quadrats contained at least some suitable habitat (sedge/rush/moss tussocks). In order to

derive meaningful counts, the proportion or percentage of potentially suitable habitat within each frame would also need to be estimated.

### **6.3 Conservation management and protection**

Site management seems largely dependent upon maintaining suitable hydrological conditions. One of the most important requirements for *V. geyeri* is high groundwater levels throughout the year. Kuczyńska & Moorkens (2010), in a detailed study of micro-habitat requirements of *V. geyeri* in Ireland, found out that the snail requires soil moisture around 80% and water table of no more than 0.1 m below ground level. Cameron *et al.* (2003) concisely described the hydrological requirements of the snail: "It is found just at the interface between the water table and the base of the herb layer, at open spots where the surface substrates are continually at, or near field capacity, but not subject to seasonal flooding". Any changes (both on site or elsewhere in the catchment) to the flow of base rich waters could compromise the ability of sites to support the snail.

Other factors important in the maintenance of favourable microhabitat conditions for the species are:

1. Presence of light grazing by domestic stock (sheep/cattle/horses) or wild ungulates. Heavy grazing is as damaging as a complete cessation of grazing; Willing (1999, 2003) attributed the low numbers or apparent absence of *V. geyeri* at several Islay sites to overgrazing by red deer. Overgrazing is a damaging factor for *V. geyeri* populations elsewhere in Britain (Willing, 2011).
2. Nutrient enrichment is considered to be detrimental; some seemingly suitable sites in the vicinity of Ballachlaven appear to have been damaged by nutrient enrichment (Willing, 1997).
3. Contamination by pesticides (on Islay, perhaps by sheep dip) is considered to be damaging.
4. Disturbance by soil cultivation such as ploughing.
5. Scrub encroachment by native species and exotic conifers (a risk identified at certain sites in northern Islay; Willing, 1999) could damage or destroy *V. geyeri* sites by a combination of shading and water abstraction that lowers groundwater levels.

Site protection of *V. geyeri* would be greatly assisted if landowners and managers knew of the existence of this snail on their land and were given management help and advice. Land managers of two of the Islay sites were visited during the survey period; in neither case they were aware of the presence of *V. geyeri* on their land, its conservation importance or the SNH leaflet aimed at landowners about the snail and simple ways to conserve it. Perhaps this small, unpublished single page could be reworked as an enlarged document that also provides protection and management advice for *V. geyeri* populations elsewhere in Scotland. Natural England produced a series of Technical Information Leaflets (TINs) dealing with protected species in relation to land managers and developers. The one produced for the Roman snail *Helix pomatia* can be viewed at <http://publications.naturalengland.org.uk/publications/91033>.

### **6.4 Suggestions for possible site protection of *Vertigo geyeri* populations on Islay**

Islay supports one of the greatest concentrations of *V. geyeri* populations in Scotland and the UK, equalled in 10 km square occupancy only by the suite of sites in central Perthshire. The Islay populations are also the only ones known in Western Scotland and constitute 50%

of the surveillance sites recommended for this species in Scotland by Littlewood and Stockan (2013). Despite their recognised importance, the Islay *V. geyeri* sites are neither protected by SSSI or cSAC designations. It is suggested that SNH review this situation in order to provide greater recognition and safeguard for these important populations.

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## 8 ANNEXES

### 8.1 Site location maps

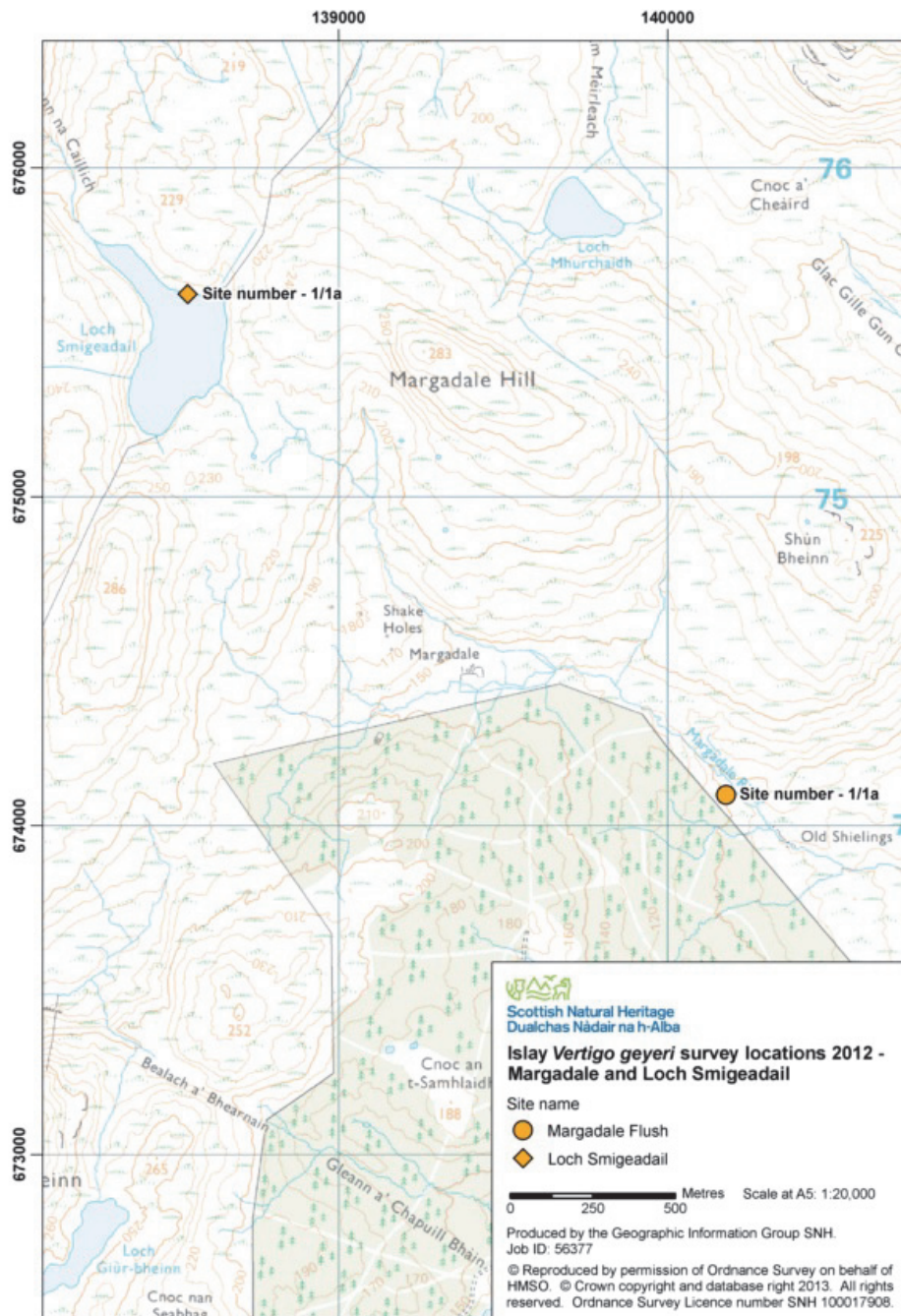


Fig. 23. Site locations on North Islay: Margadale River and Loch Smigeadail.



Fig. 24. Site locations at Loch Lossit, North Islay.

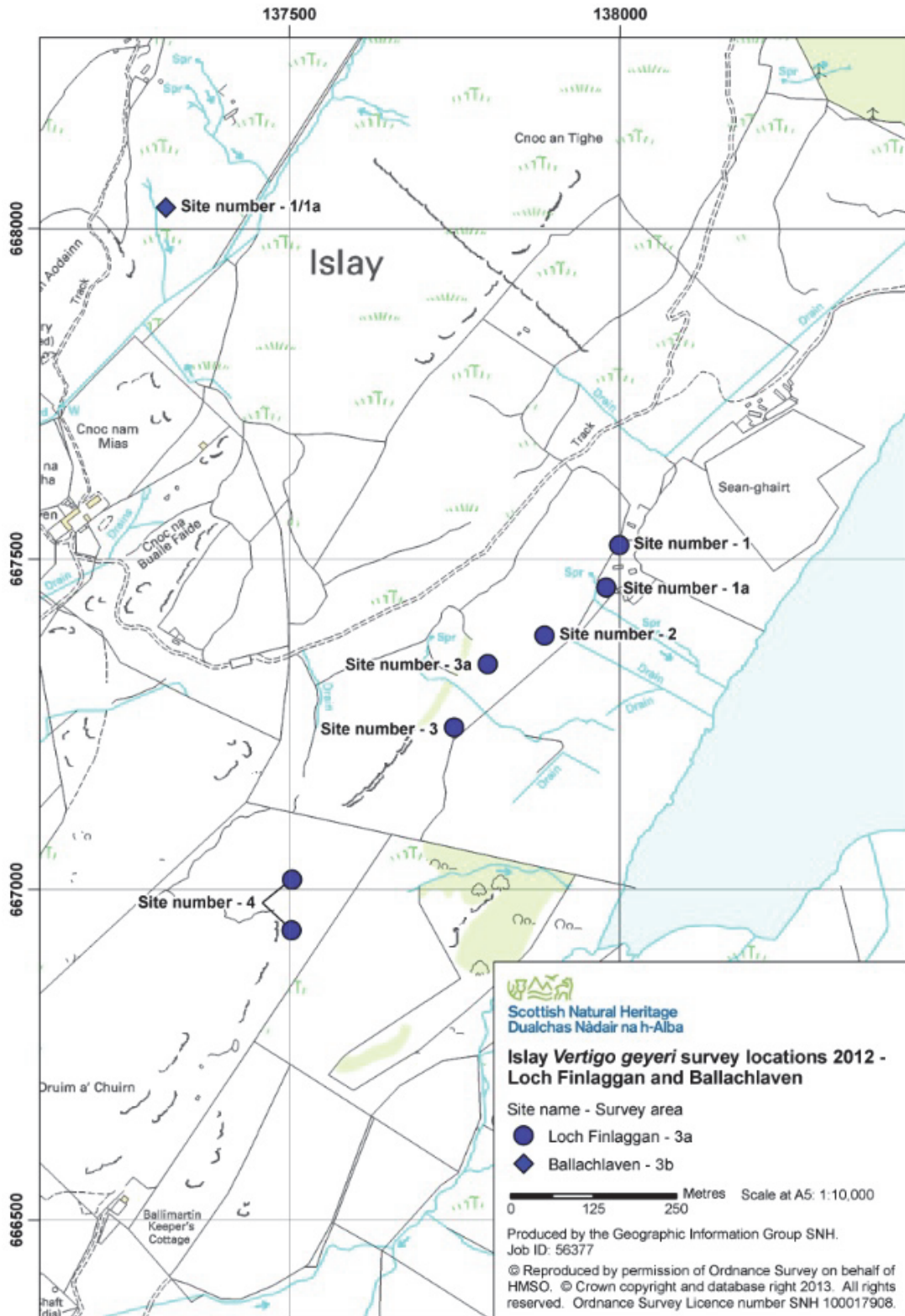


Fig. 25. Site locations near Loch Finlaggan and Ballachlaven.

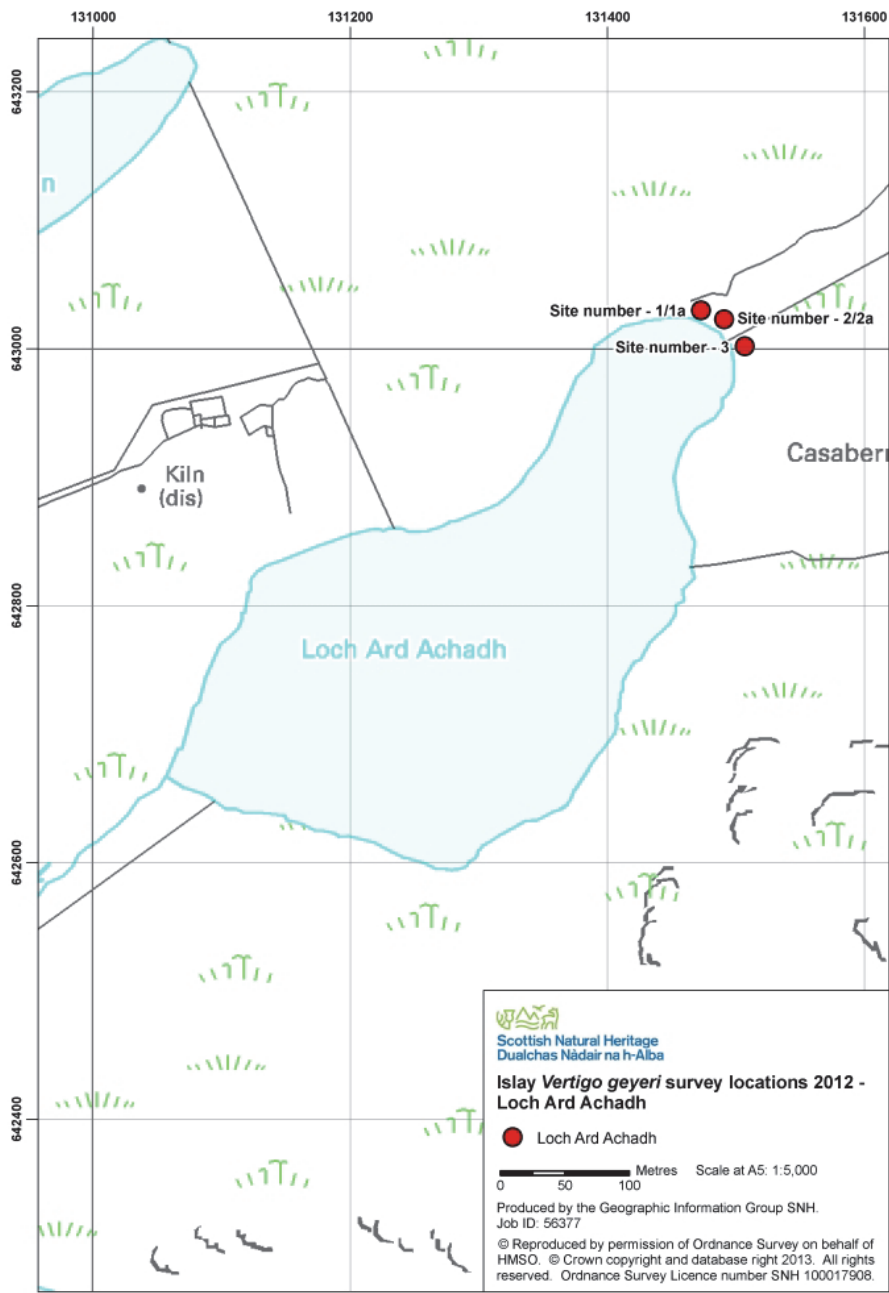


Fig. 26. Site locations at Loch Ard Achadh.

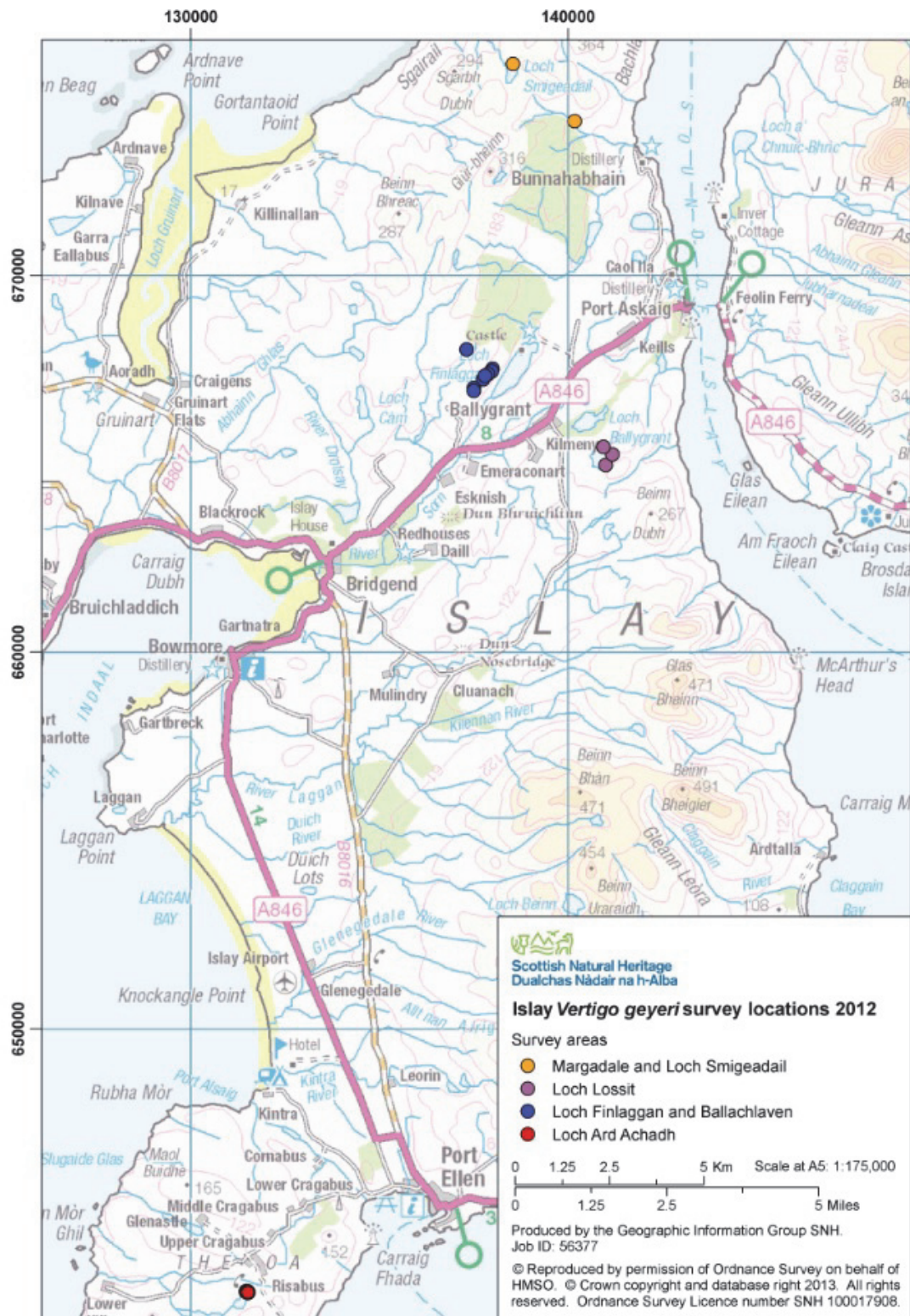


Fig. 27. Overview map displaying all site locations on Islay.

## 8.2 Use of transects for surveillance on Islay

In their work on monitoring of populations of *V. geyeri* and *V. genesii* within the Tulach Hill and Glen Fender Meadows cSAC in Perthshire, Killeen and Colville (1999a, 1999b) adopted transects to produce information on the distribution of *Vertigo* populations in individual flush areas. The use of transects was not judged appropriate for the Islay surveillance because:

The work on Islay required surveillance techniques broadly repeating previous surveys.

Most of the flush sites are extremely small, many barely more than a few metres wide. The Perthshire sites are far more extensive, in many cases allowing gaps of 10 m between transect poles.

In June 2012 the problem of small flush size was compounded by dry conditions and grazing at some sites (e.g. Margadale, Loch Ard Achadh) leaving only fragmented clumps of potentially suitable *V. geyeri* habitat to sample. Transect sampling in such a situation would have been inappropriate, particularly when one of the primary objectives was to determine the presence of *V. geyeri*.

In most flushes there was a sharp transition from wholly base-rich flush to either dry *Calluna*-dominated dry heath or *Erica/Sphagnum* acidic bog. Transects should ideally be employed to monitor biological changes along a gradient of some physical environmental factor. Most of the Islay flushes were very small and do not show a gradual transition in base-rich conditions, rather a relatively sudden change.

The long time periods since initial exploratory surveys made use of transects inappropriate, there being no preceding data set upon which to base any surveillance effort.

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