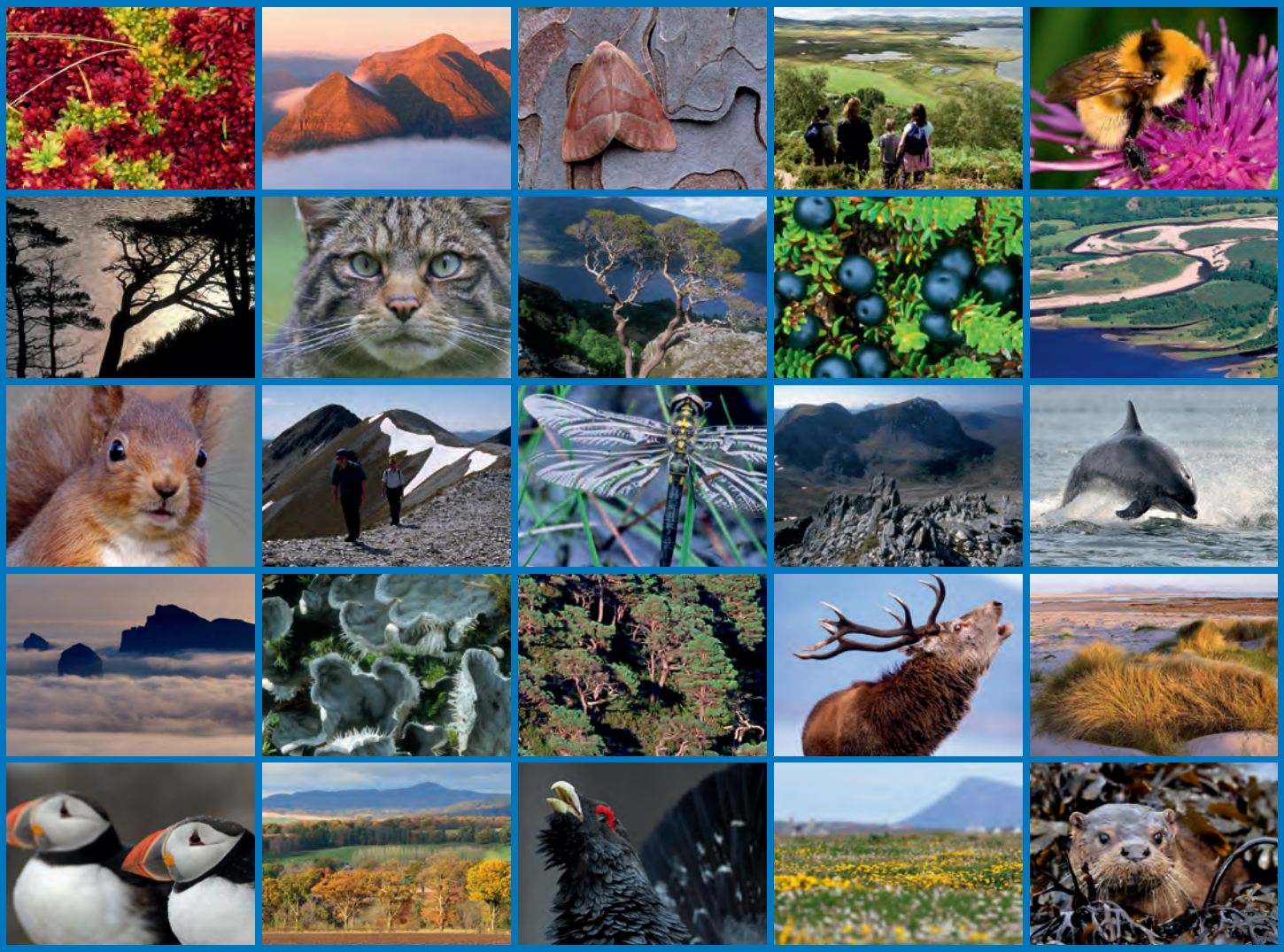
Scottish Natural Heritage
Commissioned Report No. 641

Site Condition Monitoring of invertebrates at Strath SSSI



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COMMISSIONED REPORT

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Site Condition Monitoring of invertebrates at Strath SSSI

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COMMISSIONED REPORT

Summary

Site Condition Monitoring of invertebrates at Strath SSSI

Commissioned Report No.: 641
Contractor: K.N.A. Alexander
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Background

An exceptional variety of mollusc species has been recorded from Strath SSSI, including the notable snails *Vertigo lilljeborgi* and *Acicula fusca*. This document reports on a contract established to carry out SCM at the site during 2010.

Main findings

- The number of mollusc species has increased by six, to 49 species. This is an outstanding result for a site, but this reflects the complex habitat mosaic across the SSSI; all new species are from the woodland areas.
- Wetland mollusc species richness and abundance have declined along the southern and western shores of Loch Cill Chriosd since the 2003 SCM.
- *Vertigo lilljeborgi* in particular appears now confined to a narrow strip of un-grazed fen along the inflow burn; this strip was notably species-rich in comparison to the grazed shore-line wetlands.
- The intensity of livestock grazing has clearly increased over the 10-year period and more of the fen along the inflow burn is now open to grazing; this is clearly the main cause for the decline of the wetland molluscs.
- Condition assessment is: unfavourable-declining.
- Livestock grazing, in particular along the southern and western shores, needs to be reduced.
- The area of fen vegetation along the inflow burn, which is fenced out from the main common grazing expanse, should be increased; a light grazing regime over this area should be considered. A hardy type of beef cattle would be the most sensitive livestock here as it creates a more heterogeneous sward than sheep.

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Acknowledgements

Athayde Tonhasca set up the contract and provided a summary compilation of invertebrate data for the site. Alex Turner (Area Officer, Skye and Lochalsh) arranged access permission with the land-owners and agricultural tenants, a copy of Richard Marriott's SCM report on molluscs from 2003 and extracts from an Environmental Statement carried out for Loch Lonachan on behalf of Scottish Water, which includes survey data on molluscs from Ian Killeen in 2011. Judith Hope (Senior Agricultural Officer, AFRC, RPID Estates Office, Portree) arranged permission from Scottish Ministers. Martin Willing (Conservation Officer, Conchological Society) was the original discoverer of the mollusc interests at Strath and provided helpful information on the site and suggested the most appropriate methodologies.

1. SITE DESCRIPTION

The Strath SSSI contains significant geological features relating to its volcanic history. The site is of international and national importance for its wide range of limestone and limestone-influenced habitats which has created exceptional ecological diversity. Coille Gaireallach is the best example on Skye of a birch/hazel wood developed on Durness limestone. The woods at Torrin are also a fine example of predominantly ash/hazel woodland with strong hawthorn and emergent ash components, also developed on Durness Limestone. The assemblage of upland habitats includes fine examples of clint and grike limestone pavement, calcareous chasmophytic vegetation, calcareous grasslands, montane heath, and fen, marsh and swamp habitats. Loch Cill Chriosd is a base-rich loch with an extensive fen which has developed around the inflow at the western end. The complex mosaic of habitats and associated communities in and around Loch Cill Chriosd has few parallels in Scotland and so are of national importance. An exceptional variety of mollusc species have been recorded from the site, including the notable snails *Vertigo lilljeborgi* and *Acicula fusca*. Three of the species recorded here are at their most northerly known locations in Europe.

2. SUMMARY OF KNOWN INVERTEBRATE INTERESTS

The target feature for Site Condition Monitoring at Strath SSSI is the mollusc fauna in general and, specifically, *V. lilljeborgi*. Following a 2003 SCM and a Loch Lonachan survey in 2011, the number of land and freshwater molluscs from the SSSI stands at 43 (Table 1). This is an exceptional number and reflects the high quality of the wetland habitats around Loch Cill Chriosd and the mosaic of habitats within the SSSI in general.

The rare *V. lilljeborgi* was discovered at Loch Cill Chriosd by Martin Willing on August 1979, when he noted it as 'very common'. Site Condition Monitoring in 2003 focused entirely on the presence of this species, which was found in 16 of 26 sample sites around the shores of the Loch over two days (Marriott, 2003). The population was assessed as being in a healthy state, with many juveniles present. The wetland fringes to the Loch were also found to support other uncommon specialist molluscs including *Stagnicola fusca*, *Vertigo antivertigo*, *V. substriata*, *V. pygmaea*, *Leiostyla anglica*, *Columella aspera* and *Euconulus alderi*. *Vertigo lilljeborgi* is restricted to saturated decaying vegetation in *Carex* and *Juncus* swamps that are subject to fluctuating water levels (Kerney, 1999). The species is tolerant of grazing provided patches of tall vegetation persist and retain permanently moist dead leaf litter.

Coille Gaireallach is also important for molluscs, with the nationally scarce *A. fusca* and two uncommon species, *L. anglica* and *Zonitoides excavatus.* The open limestone with rock rubble above the Loch supports specialists such as *Pyramidula pusilla* (formerly known as *P. rupestris*) and *Balea perversa*. *Balea* spp. has subsequently been shown to include two species, the true *B. perversa* and *B. heydeni*. *Balea perversa* is now recognised to be a ground-living species found amongst rocky rubble while *B. heydeni* lives on the branches of trees – both are specialist feeders on encrusting algae and lichens. All the 1979 records refer to ground-living snails in the open calcareous areas and in the woods, which suggests they are all *B. perversa*.

The wetlands surrounding Loch Lonachan were subject to specialist survey in 2011 and found to be much less interesting for molluscs than Loch Cill Chriosd. Some of the uncommon wetland species were present – *V. pygmaea, V. substriata, C. aspera* and *E. alderi* – but the rare *V. lilljeborgi* was not.

*Table 1 - Land and freshwater molluscs from Strath SSSI. ** = RDB (Red Data Book), * = NS (Nationally Scarce).*

Family	Species	Most recent report
Aciculidae	*Acicula fusca**	1979
Agriolimacidae	*Deroceras leave*	2003
Agriolimacidae	*Deroceras reticulatum*	1979
Arionidae	*Arion ater*	1996
Arionidae	*Arion intermedius*	2011
Carychiidae	*Carychium minimum*	2011
Carychiidae	*Carychium tridentatum*	2011
Clausilidae	*Balea heydeni/perversa*[1]	1979
Clausilidae	*Clausilia bidentata*	1979
Cochlicopidae	*Cochlicopa lubrica*	2011
Discidae	*Discus rotundatus*	1979
Euconulidae	*Euconulus alderi*	2011
Euconulidae	*Euconulus fulvus*	2011
Gastrodontidae	*Zonitoides excavatus*	1979
Helicidae	*Arianta arbustorum*	2011
Hygromiidae	*Ashfordia granulata*	2003
Lauriidae	*Lauria cylindracea*	1984
Lauriidae	*Leiostyla anglica*	2003
Lymnaeidae	*Galba truncatula*	2011
Lymnaeidae	*Lymnaea palustris/fuscus*[2]	2003
Lymnaeidae	*Radix balthica (peregra)*	2011
Oxychilidae	*Aegopinella pura*	1979
Oxychilidae	*Nesovitrea hammonis*	2011
Oxychilidae	*Oxychilus alliarius*	2011
Oxychilidae	*Oxychilus cellarius*	1979
Planorbidae	*Ancylus fluviatilis*	1994
Pristilomatidae	*Vitrea contracta*	1979
Pristilomatidae	*Vitrea crystallina*	2011
Punctidae	*Punctum pygmaeum*	2011
Pyramidulidae	*Pyramidula pusilla*	1979
Succineidae	*Oxyloma elegans (pfeifferi)*	2003
Valloniidae	*Acanthinula aculeata*	1979
Vertiginidae	*Columella aspera*	2011
Vertiginidae	*Vertigo antivertigo*	2003
Vertiginidae	*Vertigo lilljeborgi***	2003
Vertiginidae	*Vertigo pygmaea*	2011
Vertiginidae	*Vertigo substriata*	2011
Vitrinidae	*Vitrina pellucida*	1979
Sphaeriidae	*Pisidium casertanum*	2011
Sphaeriidae	*Pisidium milium*	2011
Sphaeriidae	*Pisidium nitidum*	2011
Sphaeriidae	*Pisidium personatum*	2011
Sphaeriidae	*Pisidium subtruncatum*	2011

[1] *Balea perversa* has been split into *B. heydeni* (a tree snail) and *B. perversa* (a rubble snail). [2]*Lymnaea palustris* has been split into *L. fuscus* and *L. palustris*

3. DESCRIPTION OF METHODOLOGY

Most land snails - including *Vertigo* species - that live in habitats such as fens, flushes and floodzones are very small (< 2-3 mm). They are, thus, difficult to find by hand searching and are easily overlooked. Samples of moss and decaying vegetation are, therefore, normally removed by "plucking", stored in plastic bags, and taken away for extraction. To avoid local destruction of the sward, material is collected by amalgamating small sub-samples from a relatively wide area (c. 5 x 5 m) within each habitat/location. In flood-zone habitats, a bagful of dead stems and moss may also be collected and 1 L polythene freezer bags were used for this survey. No specific protocol for the survey of *V. lilljeborgi* has been recommended by the UK *Vertigo* BAP Group.

The material was teased apart, spread onto a sieve over a collecting tray and left to dry. It was then shaken over a 5 mm mesh sieve to remove the bulk of the plant material but still allow molluscs to pass through. The residue was then examined with a field microscope at x 40 magnification.

The site was visited on 4 July 2013. Weather conditions were poor, with unrelenting strong gusting winds, frequent rain showers and periods of persistent drizzle. This was not a problem for taking the loch-side samples but was a limitation on exploratory recording elsewhere in the SSSI. Marriott (2003) had taken 26 samples from around the loch and shown the richest sections to be along the fen around the inflow end and the broader area of marshy grassland and fen along the south side, below Coille Gaireallach. The strategy adopted was therefore to take samples from 10 points along the southern side of the loch, from between the inlet burn Allt Srath Suardal and around to just beyond the road bridge over the Allt an Inbhire. Five were taken from the broadest sections of grazed marshy ground by the smaller burn and five between the road and the inlet burn. It was clear that livestock was removing much of the vegetation, leaving a predominantly short sward . Some samples were difficult to take as there was little structure and little litter debris to pluck up. An 11th sample was taken of strandline debris on a bay of the loch below the road, towards the outflow end.

Water levels were higher than those described by Marriott (2003). He noted that 'the loch was well filled; but with a strandline indicating that it was not at maximum level.' In June 2013 there was no marked strandline and the water level appeared 'normal' in relation to the dense marshy grassland vegetation, i.e., the transition was from marshy grassland into open water over a stony bed, with no strandline. Marriott described his samples as in the *Carex rostrata*/*Juncus acutiflorus* zone that lies between the grazed mire and the open water, but the *Carex rostrata* zone was inundated in June 2013. It was clear that the water level in June 2013 was the more typical level and that the level was relatively low in 2003. It was also clear that the shores were much less heavily grazed at that time – Marriott (2003) stated that the area sampled 'was less heavily grazed' and that the inlet fen section 'was not grazed'.

A brief exploratory foray was carried out amongst the hazels and other trees of Coille Gaireallach for searches under lying dead wood and rocks; more detailed searches were not possible because of strong winds that were making the woodland hazardous. Better structured woodland was also explored at Kilbride, and a foray was made into the limestone pavement area of Kilchrist.

4. EVALUATION OF SITE CONDITION

Fourteen mollusc species, including four specimens of *V. lilljeborgi,* were collected in the bulk samples (Table 2). This compares with 19 species noted by Marriott (2003), who found *V. lilljeborgi* in most of his samples, with a peak count of 68+ on the inlet fen. The missing species in 2013 include some of the uncommon site quality species: *Lymnaea fusca, Vertigo pygmaea* and *Leiostyla anglica*. This suggests a decline in species richness and abundance. Hand-searching through the flood debris before the sample was taken revealed two additional species: *Discus rotundatus* and *Deroceras reticulatum*. The conclusion is that the loch-side wetlands are currently in 'unfavourable-declining' condition for the mollusc interest feature.

Table 2 - Loch Cill Chriosd sampling results

	Sample										
Species	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**flood debris**
Carychium minimum	8	1						1	2		
Carychium tridentatum											1
Cochlicopa lubrica										1	
Euconulus fulvus agg	1					1				1	
Galba truncatula										2	
Aegopinella pura											1
Nesovitrea hammonis	3		3	2	2		1		1	2	1
Punctum pygmaeum	3	7				2	5	15	3	5	
Oxyloma elegans								1			
Columella aspera								1			
Vertigo antivertigo										1	
Vertigo lilljeborgi										4	
Vertigo substriata		1			1	1	1				
Vitrina pellucida					1						

The brief exploration of Coille Gaireallach revealed the presence of a number of common and widespread molluscs: *Arion ater, Cepaea nemoralis, Clausilia bidentata* and *Lehmannia marginata*. Surprisingly, *C. nemoralis* and *L. marginata* are additional species for the SSSI. A larva of the uncommon awl-fly *Xylophagus ater* was found beneath the bark of a fallen dead birch stem and the uncommon soldier beetle *Malthodes fuscus* was present in the woodland. These may be the first records of uncommon saproxylic (decaying wood) invertebrate species from this site. Wood-decay fungi noted were *Fomes fomentarius, Piptoporus betulinus, Stereum rugosum* and *Trametes versicolor*, all common and widespread species.

The Kilbride woodlands provided more sheltered habitat and are notable for the quantity of old growth lichens such as *Sticta* and *Lobaria* species. Molluscs found here were: *Aegopinella nitidula, A. ater, A. subfuscum, Balea heydeni, C. bidentata, Deroceras reticulatum, L. marginata* and *Limax maximus*. These are all mostly common and widespread species but *B. heydeni* is somewhat more localised. Of these species, *A. nitidula, A. subfuscum, B. heydeni* and *L. maximus* all appear to be additions to the previous lists (*L. marginata* was also found in Coille Gaireallach). This makes a total of six additions to the SSSI mollusc list arising from exploration of the woodlands, bringing the total for the

SSSI to 49 species. *Balea heydeni* is the arboreal species of the species recently split from *Balea perversa*: the previous records under that name were all of ground-living snails and so it is assumed that they refer to *B. perversa*, although this needs to be confirmed. One saproxylic beetle was also noted in a dead hazel stem, the widespread longhorn *Rhagium mordax*.

The brief exploration of the limestone pavement area of Kilchrist resulted on the specialist snail *Pyramidula pusilla*, which was present amongst the loose rocks of the drystone walls. The only other molluscs noted here were *A. ater* and *Cochlicopa lubrica*, both common and widespread species.

5. SITE MANAGEMENT RECOMMENDATIONS

According to the Site Management Statement (15 July 2010), the John Muir Trust is the site's principal landowner and manages its stock in a traditional manner. Sheep and cattle have grazed at Strath for many years and continue to have access to the site, which is part of six common grazing fields. However, the natural heritage features present on Strath SSSI have different and sometimes conflicting grazing management needs.

It is clear from Marriot (2003) that the shorelines to the west of Loch Cill Chriosd were not open to grazing at that time and that grazing intensity along the southern shorelines was also substantially lower than that noted in 2013. Grazing has clearly increased and most of the west shore has been opened up to grazing. The wetland mollusc fauna has clearly declined in species richness and abundance, and the rarest species *V. lilljeborgi* is now confined to a narrow section of un-grazed fen along the inlet burn. There is a clear case for a reduction in grazing intensity along the west and south shores of the loch, and for more of the western fen area to be protected from uncontrolled grazing. The mollusc fauna is likely to be tolerant of light grazing, especially by cattle, but is clearly intolerant of the present heavy grazing pressure. Cattle are preferred to sheep as they create a more diverse sward structure, while sheep maintain a uniform short sward that is poor for wetland molluscs. However, both may be damaging if grazing levels are high.

The woodlands and limestone pavement areas are also subject to heavy grazing pressure, and would doubtless benefit from a reduction in intensity. No data are available, however, to demonstrate damage.

6. REFERENCES

Kerney, M.P. 1999. *Atlas of the land and freshwater molluscs of Britain and Ireland*. Colchester: Harley Books.

Marriott, R.W. 2003. Site Condition Monitoring of molluscs on SSSIs: *Vertigo lilljeborgi* at Loch Cill Chriosd, Strath, West Highland. *Scottish Natural Heritage Commissioned Report FO2AC322.*

ANNEX A: LIST OF INVERTEBRATES & FUNGI

Order	Species		
Mollusca	*Aegopinella nitidula*	Diplopoda	*Cylindroiulus punctatus*
	Aegopinella pura		*Proteroiulus fuscus*
	Arion ater	Oniscidea	*Oniscus asellus*
	Arion subfuscus		*Porcellio scaber*
	Balea heydeni		*Trichoniscus pusillus sensu lato*
	Carychium minimum	Coleoptera	*Cantharis paludosa*
	Carychium tridentatum		*Malthodes fuscus*
	Cepaea nemoralis		*Malthodes marginatus*
	Clausilia bidentata		*Rhagonycha limbata*
	Cochlicopa lubrica		*Abax parallelepipedus*
	Columella aspera		*Pterostichus diligens*
	Deroceras reticulatum		*Pterostichus minor*
	Discus rotundatus		*Pterostichus niger*
	Euconulus sp.		*Rhagium mordax*
	Galba truncatula		*Actenicerus sjaelandicus*
	Lehmannia marginata		*Aplotarsus incanus*
	Limax maximus	Diptera	*Chrysotus gramineus*
	Nesovitrea hammonis		*Medetera* sp.
	Oxyloma elegans		*Sciapus platypterus*
	Punctum pygmaeum		*Psychoda phalaenoides*
	Pyramidula rupestris		*Chrysopilus cristatus*
	Vertigo antivertigo		*Bradysia placida*
	Vertigo lilljeborgi		*Melanostoma dubium*
	Vertigo substriata		*Neoascia tenur*
	Vitrina pellucida		*Herina frondescentiae*
			Xylophagus ater
		Heteroptera	*Acalypta* sp.
		Hymenoptera	*Leptothorax acervorum*
Fungi	*Fomes fomentarius*		
	Piptoporus betulinus		
	Stereum rugosum		
	Trametes versicolor		

ANNEX B: IMAGES

Balea heydeni at Kilbride

Close-cropped marshy grassland along southern shores of Loch Cill Chriosd

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