

Appendix 7.8: Sallachy Freshwater Pearl Mussel Survey



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Introduction

Objective

In 2020 Alba Ecology Ltd. was commissioned by WKN GmbH to undertake a freshwater pearl mussel survey within the Site boundary of Sallachy Wind Farm (the Proposed Development) near Loch Shin, in Sutherland.

Background

Scotland is a global stronghold for the freshwater pearl mussel (hereafter 'pearl mussel'), a species now fully protected under the Wildlife and Countryside Act (1981) (as amended) of Great Britain and the Nature Conservation (Scotland) Act (2004). It is also listed on Annexes II and V of the EC Habitats Directive (Council Directive 92/43/EEC) and Appendix III of the Bern Convention. Scotland's extant freshwater pearl mussel populations are of international importance (Cosgrove *et al.*, 2016).

Estimates suggest that Scotland holds an important proportion of the world's known remaining viable populations. However, the species has declined in Scotland, with gross industrial and agricultural pollution, over-exploitation by pearl fishers, decline in salmonid host stocks (the short parasitic larval stage of freshwater pearl mussels is entirely dependent upon Atlantic salmon *Salmo salar* and brown trout *Salmo trutta* fry) and physical river bed habitat degradation due to hydro-electric operations and small-scale river engineering works predominantly responsible (Cosgrove *et al.*, 2000a; Cosgrove *et al.*, 2016).

Freshwater pearl mussels are known to be present within the wider Oykel/Shin catchment (Technical Appendix 7.1: Natural Heritage Desk Study) and so were considered a potentially important ecological receptor within the Study Area.

Habitat requirements

Freshwater pearl mussels are typically found in fast-flowing rivers and streams, with detailed studies on Scottish freshwater pearl mussel populations suggesting that optimum water depths of 0.3-0.4 m and optimum current velocities of 0.25-0.75 ms⁻¹ at intermediate water levels are most suitable (Hastie *et al.*, 2000). River bed substratum characteristics appear to be the best physical parameters for describing freshwater pearl mussel habitat. Freshwater pearl mussels prefer stable cobble/boulder dominated substrate with some fine substrate that allows the mussels to burrow (Cosgrove *et al.*, 2000b). Adult and juvenile mussels tend to have similar habitat 'preferences', although adults are found over a wider range of physical conditions and juveniles appear to be more exacting in their requirements and sensitivity to environmental disturbance (Hastie *et al.*, 2000). Juvenile mussels prefer finer stable sediments than adults, particularly clean sand and gravel.

Freshwater pearl mussels live buried or partly buried in the beds of clean, fast-flowing unpolluted streams and rivers and subsist by inhaling and filtering for the minute organic particles on which they feed (Cosgrove *et al.*, 2000b). Of specific importance to freshwater pearl mussel survival are levels of silt, algae, suspended solids, calcium and chemical compounds generally associated with enrichment i.e. nitrate, phosphate and high biological

oxygen demand (Bauer, 1983). Various types of river engineering work can detrimentally impact the habitat of freshwater pearl mussels and directly kill them (Cosgrove and Hastie, 2001).

Freshwater pearl mussels have a short parasitic larval phase on the gills of suitable host fish. The larvae (glochidia) of pearl mussels are very host-specific and can only complete their development on Atlantic salmon or brown trout. Usually juvenile fish (fry and parr) are utilised (Young and Williams, 1984). The presence of freshwater pearl mussels in any river therefore depends on salmonid host fish availability. It is usually considered necessary for migratory salmonids to be present within a catchment for freshwater pearl mussels to also be present.

Methods

Study Area

For the purpose of this survey, the Study Area was divided into two elements (Table 1).

Table 1. Site and Study Area Definitions

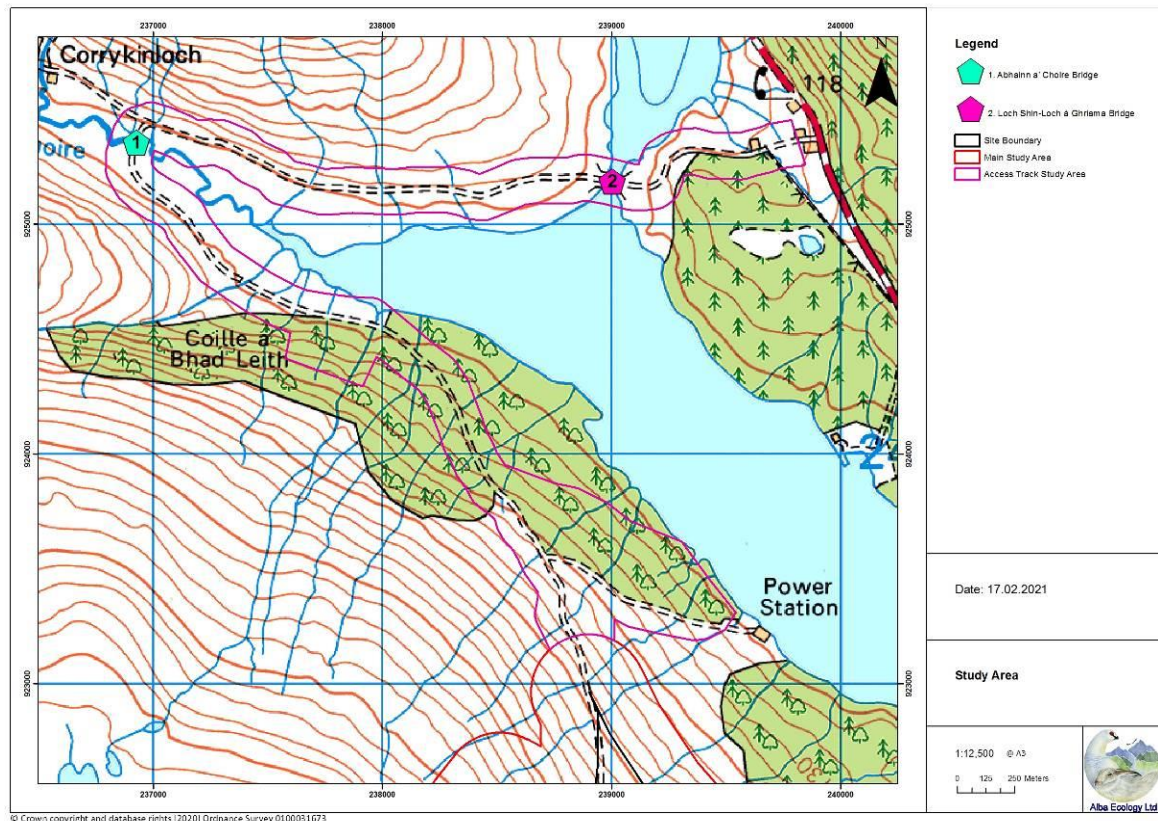
Term	Definition
The Study Area	<p>The Study Area equates to all the land within the Proposed Development site boundary which was considered to have potential for development, plus an appropriate survey buffer.</p> <p>For freshwater pearl mussel surveys there were considered to be two parts to the Study Area.</p> <ol style="list-style-type: none"> 1. The Main Study Area equates to the Site, not including the existing access track. The watercourses within the Main Study Area had previously been assessed for suitability by Alba Ecology (Cosgrove, 2011) on behalf of WKN, AG. The 2011 reported concluded “<i>Many small watercourses are present in the proposed Sallachy wind farm site, none of which appears suitable and therefore capable of holding a population of freshwater pearl mussels. Therefore, there is no evidence that the proposed wind farm poses a significant threat to any freshwater pearl mussel populations</i>”. At the time, survey work along the planned access track was not commissioned and so the 2011 work focussed entirely on watercourses within the Main Study Area, all of which were assessed as unsuitable and so are dropped from further consideration within the current study. 2. The Access Track Study Area (focussed along the existing access track which is planned to be widened) had not previously been assessed or surveyed and so this formed the basis of 2020 freshwater pearl mussel survey area and of this report.

Survey site selection

Survey site selection was based around the Access Track Study Area and whether any watercourses along the proposed access route potentially held suitable pearl mussel habitats.

Two permanent watercourses within the Access Track Study Area were identified as holding potentially suitable habitats: Abhainn a' Choire (watercourse 1) and the short, but wide unnamed watercourse between Loch a' Ghriama and Loch Shin (watercourse 2) (Figure 1).

Figure 1. Access Track Study Area for freshwater pearl mussel surveys



Survey Methods

Abhainn a' Choire and the short unnamed watercourse between Loch a' Ghriama and Loch Shin were entered and searched for freshwater pearl mussels, where health and safety conditions allowed, using an amended version of the standardised methodology for site specific projects, as recommended by NatureScot (SNH, no date). Given the situation with COVID-19, the Chartered Institute of Ecology and Environmental Management (CIEEM) 2020 'Guidance on Ecological Survey and Assessment in the UK During the Covid-19 Outbreak' was also followed.

The entire area likely to be directly impacted by the planned bridge expansion works along the access track was thoroughly searched, along with 500 m downstream and 100 m upstream reaches, or as far as nearby lochs.

At the beginning of each survey reach the watercourse was entered by a surveyor and a search conducted in the following manner to ensure compatibility with other surveys and the standard NatureScot recommended methodology. The aim was to identify specific areas that were most likely to harbour mussels using information on their habitat preferences from previous studies and experience. Once apparently suitable habitats were found, surveys

concentrated in the most favourable substrate types so as to optimise search efficiency. Searches were:

- Made using a glass-bottomed viewing bucket;
- Conducted under favourable conditions i.e. bright light, clear water, low-moderate flow regime;
- In water sufficiently shallow for safe wading;
- In an upstream direction, checking favourable sites e.g. in the shelter of cobbles, boulders or overhanging banks; and
- Loose debris and trailing weed were moved gently aside. Where potentially suitable juvenile habitats were present, disturbance of the river bed was undertaken to search for small and difficult to see juvenile pearl mussels.

A series of notes on standard habitat parameters were recorded and substrates were recorded using the Wentworth Scale (1922).

Results

The Abhainn a' Choire and the short unnamed watercourse between Loch a' Ghriama and Loch Shin were surveyed for freshwater pearl mussels in June 2020 by a team of highly experienced, licensed surveyors (Licence No: 123301) led by Dr Peter Cosgrove, FCIEEM. Surveys were conducted during an extended period of suitable weather when the water levels were low and clear and the weather bright providing optimal surveying conditions.




No live or dead freshwater pearl mussels were recorded in either watercourse and no substantial areas of suitable in-stream habitats were present either. No reaches were too deep to survey.



Watercourse 1. Abhainn a' Choire @ NN 369 254.

Typical width 4-5m, depth 0.25m.

In-stream habitats characterised by shiny and mobile mixed sized substrates, e.g. Boulder 5%, Cobble 35%, Pebble 40%, Granule 10% and collapsed peat 10%. Host fish (trout) present. Unstable and wholly unsuitable.

	<p>Watercourse 1. Abhainn a' Choire @ NN 368 254.</p> <p>In-stream habitats characterised by shiny and mobile mixed sized substrates. Wholly unsuitable.</p> <p>Same unstable substrate as previous photo.</p>
	<p>Watercourse 2. Unnamed watercourse between Loch a' Ghriama and Loch Shin @ NN 389 251 looking upstream from bridge. Typical width 15m, depth 0.4m.</p> <p>Channel very heavily modified, with in-stream deflectors, walls and croys. Host fish present.</p> <p>Dominated by bedrock. A lack of small, suitable substrates.</p>
	<p>Watercourse 2. Unnamed watercourse between Loch a' Ghriama and Loch Shin NN 389 251 looking downstream from bridge.</p> <p>Channel very heavily modified, with in-stream deflectors and walls. Downstream reach into loch searched.</p> <p>In-stream habitats characterised by large sized substrates, e.g. Bedrock (much shattered) 60% Boulder 20%, Cobble 20%. Lack of small substrates.</p>

Discussion

The areas of Abhainn a' Choire and the short unnamed watercourse between Loch a' Ghriama and Loch Shin were searched upstream and downstream of the planned bridge widening works (as well as underneath the existing bridges) and all survey reaches were shallow enough to search safely and survey conditions were ideal. No live or dead mussels were recorded in any of the reaches surveyed.

The vast majority of the surveyed reaches had habitats which were wholly unsuitable for freshwater pearl mussels. These were due to a lack of both stability and suitable substrates. Some tiny patches of potentially suitable, though sub-optimal habitat were occasionally recorded, but these were not considered sufficient to provide enough suitable habitat for a freshwater pearl mussel population to establish.

River engineering work has historically been responsible for the decline and extinction of a number of pearl mussel populations in Scotland (Cosgrove and Hastie, 2001). Therefore, river engineering operations likely to harm pearl mussels need careful consideration and scrutiny. Following the surveys conducted on the Abhainn a' Choire and the short unnamed watercourse between Loch a' Ghriama and Loch Shin, it is considered that there are no issues or sensitivities with regard to freshwater pearl mussels from proposed bridge widening works within the Access Track Study Area.

As no evidence of pearl mussels were found, it is considered acceptable for this 'negative' survey report to enter the public domain and not be considered confidential.

References

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