

NatureScot Research Report 1353 – Site Condition Monitoring of freshwater pearl mussel in the River Dee 2022–2023

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Background

The River Dee, Aberdeenshire is designated a Special Area of Conservation (SAC) under the European Union Habitats Directive. The critically endangered freshwater pearl mussel (*Margaritifera margaritifera*) is one of the species covered by this designation. In accordance with the Directive, routine Site Condition Monitoring (SCM) is undertaken to assess the state of the species. This report covers the monitoring survey commissioned by NatureScot and the Cairngorms National Park Authority and included the Dee Catchment Partnership's delivery plan. The survey was conducted between August 2022 and April 2023 and was the first to be done since the December 2015 channel-changing flood caused by Storm Frank. To understand the current status of the freshwater pearl mussel population and to illustrate any changes in it, the methods used in the 2002 baseline survey were repeated.

Main findings

- The River Dee between the Bridge of Dee, Aberdeen and the Quoich Water, Braemar was surveyed under licence for freshwater pearl mussels. The survey methods described in the Joint Nature Conservation Committee's Common Standard's Monitoring Guidance for Freshwater fauna were applied.
- 985 5 m x 1 m spot-checks were conducted. A total of 172 live freshwater pearl mussels was found. No freshwater pearl mussels were recorded in the vast majority (c.95%) of these spot-checks.
- 27 50 m x 1 m transects were surveyed, which held 771 visible freshwater pearl mussels. Where live pearl mussels were found in a transect, the relative abundance code was generally D (Rare).
- All freshwater pearl mussels were recorded close to, i.e. less than 5 m from, the bank edge. In 28 spot-checks they were recorded within 0–3 m of the bank edge, and in 20 spot-checks they were recorded within 3–5 m of the bank edge. In all circumstances,

freshwater pearl mussels were highly localised and within a narrow c.2–3 m wide corridor close and parallel to one bank edge. In 2002 the width of suitable habitat was estimated to be c.20 m.

- There has been a c.90% decline in overall freshwater pearl mussel abundance in the River Dee SAC between the 2002 and 2022–2023 SCM surveys.
- The catastrophic decrease in the number of freshwater pearl mussels is unprecedented. The $\geq 90\%$ decrease is attributed primarily to the effects of Storm Frank; no evidence was recorded of any other immediate significant threat or pressure that could have caused a rapid population loss of such magnitude. However, it is recognised that other climate change-related factors, not just an increase in extreme spates such as that caused by Storm Frank, are also likely to be contributing to the freshwater pearl mussel population collapse. These include land management in the middle to upper catchment, droughts, warmer water temperatures, and declining numbers of host fish.
- Storm Frank caused large changes to freshwater pearl mussel habitat and is thought to be the most likely cause of the unprecedented freshwater pearl mussel population decline. The substrate of most of the River Dee now appears to be highly unstable and so unsuitable for freshwater pearl mussels.
- No evidence of other direct threats was recorded, such as illegal pearl fishing which was previously considered to be a significant and preventable cause of mortality.
- Catchment-wide restoration is needed, to mitigate the effects of climate change, and to halt the decline and ensure the recovery of the River Dee SAC's freshwater pearl mussel population.