FRESHWATER PEARL MUSSEL SURVEY PROTOCOL
for use in site-specific projects.

Introduction

Standard survey methods have been developed for this species through a number of previous SNH-funded projects. These have been adapted for more site-specific projects and the following is a full version of methods for employing at specific sites:

Licensing and access permission

Freshwater pearl mussel is fully protected under the Wildlife and Countryside Act (1981) therefore all surveyors must be licensed by SNH. Surveyors must have secured access permission from land owners before any fieldwork is undertaken. Given the ongoing threat that illegal activity, including pearl fishing, poses to freshwater pearl mussels it is considered good practice that surveyors notify the nearest police station about their survey prior to going out on site. Further information about illegal activity affecting pearl mussels, and what to do if any is detected, is available from SNH.

Health and safety

All surveyors will have legal responsibilities under the Health and Safety at Work Act to ensure the health and safety of their employees and any other person who may be affected by their actions or omissions. All surveyors should be trained in safe working practices. It is recommended that thigh waders rather than chest waders are worn (to discourage work in deep, fast-flowing and dangerous water), surveyors should work in pairs, a special wading and mussel gathering staff is used, and a life jacket worn.

Field season

Survey work can only be undertaken in periods of low water flow. Generally survey work cannot be undertaken between October and March.

Site selection

The length of river to be surveyed will vary depending on the nature of the proposed project. Where there is river engineering proposed (such as bank protection or work on the river bed), then typically it will be the area of river bed directly affected by the project together with a minimum of 0.1 km upstream and 0.5 km downstream which may be indirectly affected (the 'survey site'). Where a development will result in reduced flows over a river reach, then the length of the affected reach (the 'survey site') should be surveyed for the presence of freshwater pearl mussels.

Survey of the area likely to be directly affected by proposed engineering project

The entire river bed should be surveyed in this part of the survey site. This can be done by laying out a 1 m x 1 m grid, and counting and measuring all mussels in each grid square. Searches for hidden and juvenile mussels should also be carried out in 20% of the squares in which visible mussels are recorded.

Survey of the downstream area likely to be indirectly affected by proposed project

A general survey is made of the river and its substrate types within the survey site, by walking along the river bank and/or by wading in the water. The aim is to identify specific areas that are most likely to harbour mussels using information on their habitat preferences from previous studies and experience. Information on the habitat preferences of mussels is available but it is important that surveyors have past experience of working with freshwater pearl mussels.

Once an apparently suitable area is found, the river is entered at the nearest point and a search conducted, concentrated in the most favourable substrate types so as to optimise search efficiency. To ensure compatibility with other surveys, searches are made:

- using a glass-bottomed viewing bucket.
- conducted under favourable conditions i.e. bright light, clear water, low 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.
- loose debris and trailing weed should be moved gently aside but no disturbance of the river bed is required.

Negative results: If no mussels are found in a specific search area, then the search is moved to other suitable areas within the survey site. Even if mussels are not found anywhere in the survey site, site information should still be recorded on a standard recording form as described below. A copy of the standard recording form is available in Appendix A of the method that describes how to survey designated sites.

Positive results: If a live mussel or dead shell is found then a systematic search should be made as follows. Within the area where mussels are found, one transect 50m long by 1m wide should be searched, laid out so as to traverse the main area of suitable habitat. If an initial search of the whole transect indicates that there are likely to be fewer than 250 mussels, all mussels should be counted.

If there are too many mussels in the transect to count accurately (i.e. >250), 1 m x 1 m quadrats should be laid at 10, 20, 30, 40, and 50 m intervals. Counts and measurements of the mussels in these five quadrats is used to provide an extrapolated estimate for the whole 50 m transect.

At 10, 20, 30, 40, and 50 m along the transect, a 1 m x 1 m quadrat is laid on the substrate. All mussels visible within the quadrat mussels are counted and then removed (to be replaced in the same quadrat later). Loose stones and debris are then dislodged to reveal any hidden mussels and in particular to search for any juveniles. All these mussels are measured along their longest dimension to the nearest 1 mm (using dial callipers). Measurement of the mussels allows a size/age profile to be produced. It is particularly important to establish whether juvenile mussels are present, indicating active recruitment at that location. A pearl mussel is considered 'juvenile' if it is ≤65 mm long; mussels ≤30 mm long are likely to be under 5 years old and their presence is especially important as they indicate *recent* recruitment.

For each 50 m transect, site details are recorded on a standard recording form. These include an eight figure grid reference, average width and depth(m), substrate composition (based on the widely used Wentworth Scale), main types of adjacent land-use, bankside vegetation, evidence of impacts, and details of any discussions with local people concerning the river. At least one photograph should be taken to indicate the position of the transect in relation to the river bank.

Standard abundance terms

Results should be reported using the following abundance categories A-E:

No. of live mussels per 50 m x 1 m transect	Abundance level
0	E
1 - 49	D
50 - 499	C
500 - 999	B
≥1000	A

Spreadsheets

Data should be provided in a spreadsheet form that is compatible with existing spreadsheets containing pearl mussel data. Therefore it is suggested that the following data about the pearl mussel survey is collated: mussel numbers in each 50m transect (sampling point code, date, grid reference, no. live mussels in each quadrat and total transect, no. dead shells, % of juvenile pearl mussels (≤65mm) in each 50m transect, number of pearl mussels ≤30mm in each 50m transect etc.); and measurements of pearl mussel shell dimensions (sampling point code, date, measurements etc.). Similar information should also be supplied for any area of riverbed that will be directly affected by a proposal.

A notes column should also be provided in the above spreadsheet that should include information about potential or actual threats, particularly evidence of recent, illegal pearl fishing, and management issues which may be relevant to the pearl mussel population. Any juvenile salmonids observed during pearl mussel surveys should also be recorded in the 'notes' column.

Summary habitat information principally describing the river width, water depth, and substrate types (linked to the sampling point code and grid reference), should also be included as a separate spreadsheet.

Deep water survey

Recently a technique has been developed for surveying visible mussels in deep water (>1 m). Information is available at http://www.snh.org.uk/pubs/detail.asp?id=950.