



Scottish Fisheries Co-ordination Centre

Sea trout netting and sea lice sampling: a standard sweep netting protocol for management

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Acknowledgements

This protocol results from the "Sea Trout Netting & Sea Lice Sampling Workshop" organised by the SFCC and held in Fort William, from 5th-6th November 2008. The SFCC would like to thank Lochaber Fisheries Trust Ltd for hosting the event, in particular the contribution made by Diane Baum and Lucy Smith. The SFCC also

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Contact

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Aims and purposes of the protocol

One of the aims of the Fort William workshop was to bring together practitioners and scientists working in different sectors in the aquatic environment to establish standard protocols for sea trout netting and sea lice sampling. The resulting protocol is aimed primarily at the needs of fisheries managers seeking to assess the health and condition of sea trout in their local area, for example as part of long term monitoring. Moreover, it is intended that by using standardised data collection methods for measuring sea lice infestation parameters¹ on sea trout in their local area, national compatibility and comparability among regional datasets will be possible.

¹ Sea lice infestation parameters include: (1) **prevalence**-the percentage of infested fish in the sample; (2) **abundance**-the average (mean) number of lice in the sample; and (3) **intensity**-the average (mean) number of lice per infected fish.

Structure of the protocol

The protocol is structured to address issues in a logical progression:

- (1) Sea trout netting: When, where and how to catch sea trout for sea lice sampling.
- (2) Sea lice sampling: How to process the captured sea trout to enable calculation of lice infestation parameters.

The SFCC recognises that the process of catching sea trout is dictated to a large degree by the physical nature of the location that one may wish to sample. It is therefore virtually impossible to impose strict constraints as to the specifics of capture techniques, and this is reflected in the first part of the protocol which regards, in the main, the factors that should be considered in a sampling programme. The process of sampling sea lice is, however, far easier to standardise, and this is reflected in the second part of the protocol. With this in mind, it is important to consider that this standard protocol should be sufficiently simple to apply so as to meet the aims for which it has been conceived as defined above in section.

The protocol

Sea trout netting

Site selection

Site selection should consider the following questions:

- Are there any sea trout there? If so, do they occur in sufficient numbers to enable to meaningful sample size to be caught? Knowledge of habitat usage by sea trout in the local area will be crucial in this regard.
- Can I fish at this site safely and effectively?
- What is the aim of the study? Is the study part of a long term monitoring programme, or research-driven, aiming to test a specific hypothesis?
- What sort of fish are being targeted? Do you wish to target post-smolts, finnock or early returning fish?

Site selection is likely to be fairly constrained due to the high number of factors that must be considered including:

- Ease of access (logistical-road/shoreline profile/launch amenities for a boat)
- Ease of access (legal-permission of owner/proprietor/District Salmon Fishery Board)
- Health and safety of personnel
- Location of fish farm sites (potential for cherry picking vs. strategic aim of the sampling)
- Historical sampling
- Water currents
- Random selection

The SFCC encourages the continuation of sampling at well established and reliable sites. When new sites are established, a degree of trial and error and learning from experiences at similar sites will be required, for example establishing whether a site is best sampled at high or low tide. A walkover survey should be carried out at low tide to assess the feasibility of possible approaches to sampling and appropriate visual and

mental risk assessments should be made with regards routes of retreat from the site, wave action, strong currents, exposure, suitability for processing fish post capture etc.

Site attributes to be recorded

The following details should be recorded for each sampling event:

Date

Time

Water temperature

Air temperature

Salinity

Catching the fish

A number of methods for catching sea trout exist, with the method used typically varying according to factors such as the location of the sampling site, water depth, accessibility, speed of the tide and current strength etc.

When fishing for sea trout in freshwater (upstream of the mean high water spring tide), standard SFCC electrofishing protocols and record sheets as detailed in the SFCC Electrofishing Team Leader Training Manual <http://www.sfcc.co.uk/protocols.asp> should be applied, in conjunction with the sea lice sampling protocol detailed below.

When fishing for sea trout in estuarine (< 35 ppm salinity) or marine environments, sweep netting is a widely used and well practised technique among practitioners that enables assessment of the condition of fish caught at a defined location. This protocol concerns specifically the application of sweep netting as the standard preferred method by which sea trout are sampled for the purposes of assessing sea lice infestation parameters. However, the SFCC appreciates that sweep netting will not be an appropriate sampling method in all situations, and as such, priorities for local management may dictate that sampling by other methods is necessary.

In appreciation of the highly variable characteristics of sweep netting sites, the SFCC does not intend to dictate the specifics of netting equipment or procedures as this would be impossible. The physical procedure of sweep netting should be carried out

using a method appropriate to the characteristics of the site being fished, for example by wading, and/or by deploying a rowing or motor boat.

However, to enable calculations of catch per unit effort, the number of sweeps carried out and the number of fish caught in each sweep should be recorded.

Sampling frequency and timing

Due to differing requirements for local management, research, monitoring, and obligations to fulfil Area Management Agreements, biologists, scientists and Regional Development Officers have, to date, not had a need to co-ordinate sea lice sampling strategies among different practitioners. Sweep netting for sea trout and the associated sampling of sea lice have therefore been carried out at varying intensities among regions, typically from May to July, but occasionally throughout the year.

To gain the greatest possible value resulting from the application of a standardised sampling protocol, the SFCC requests that sampling should be carried out on three days in May and June. This sampling strategy fits the period of greatest sampling intensity currently in operation, enabling all practitioners to collect data to a standard protocol while not compromising local priorities.

Over these three days in May and June, the sampling strategy should:

- Aim to catch a minimum of 30 fish (either post-smolt, finnock, or a combination of the two). Traditional methods of splitting fish into categories (using 260 mm fork length as the threshold) should be avoided unless the results are confirmed by ageing from scales. Individual fish lengths should be measured (rather than assigning to categories) to allow data to be pooled for fish of all lengths if subsequently required.
- Repeat sampling at the same site(s). Limitations of time and personnel may mean that practitioners are limited to sampling a single site in any given area. In such a situation, priority should be given to sampling this single site a number of times, rather than sampling (for example) once only at three different sites over this two month period.

This sampling strategy can be most helpfully viewed as an acceptable minimum. The SFCC strongly recommends that this same protocol be applied for the remainder of the sweep netting season/year where practically possible.

Sea lice sampling

1. Anaesthetise the fish (preferably using neutral-buffered MS222 at a dose of 100mg l^{-1}). To ensure no lice are lost in the anaesthetising process, the water may be sieved with a $100\mu\text{m}$ mesh.
2. Record fork length (to the nearest mm) and wet weight (to the nearest g). *Given that it may be logistically unfeasible to weigh fish under certain conditions, for example in strong winds, recording wet weight may be considered as optional. However, it is strongly encouraged that wet weight be recorded if at all possible to further strengthen the validity of the data, for example by allowing the calculation of condition factor and the number of lice per gram of fish.*
3. Place the anaesthetised fish into water against a light background.

L. salmonis

4. Count and record: (a) the number of lice present on the fish; and (b) at what developmental stage the lice are at. The developmental stages are classified into three categories:

Category 1: Early stages-attached copepodids and chalimus

Category 2: Mobile stages: pre-adults and adults including mature males and non-ovigerous females

Category 3: Gravid stages: ovigerous females

Copepodids are reasonably difficult to count, partly due to their size, and partly because they are easily knocked off the fish. One method is to run a pair of watchmaker's forceps gently over the surface of the fish to disturb the lice. They may also be spotted by the way the water sits on the body, with "water bumps" resulting

where the lice are not flush with the body surface of the fish. The use of a binocular microscope, magnifying glass or a hand lens is helpful. Particular attention should be given to the dorsal surface and the caudal fin due to the darker coloration in these areas making lice more difficult to spot.

Chalimus are easier to spot and sample because they are larger than the copepodids and because forceps can be used to move them without knocking them off the fish. Careful attention must still be given, however, as they can appear a little transparent and therefore easily missed.

Caligus

5. Count and record the number of *Caligus* present on the fish.

6. Note lice damage to the dorsal fin, classified into four categories:

0: No damage

1: < 33 % damage

2: 33-66 % damage

3: > 66 % damage

7. Note the presence or absence of attachment spots.

8. Note the presence or absence of *Cryptocotyle lingua* as a useful indicator of whether or not the fish has been to sea.

9. Note whether or not scales have been taken for ageing purposes.

10. Note whether or not the fish is a recapture.

11. Record any other information (e.g. tag number, any other parasites present) in the “notes” column.

General notes

Although this protocol is aimed at the specifics of sweep netting for sea trout and the associated sampling of sea lice, all other aspects of good practice normally associated with fisheries management activities should be adhered to. Life jackets must be worn at all times when operating boats, or when wearing chest waders. The SFCC recommends that lifejackets be worn by all personnel operating in the vicinity of water.