Biological assessment

Version: February 2018

Sampling fish communities using gill nets

1 Purpose and scope

This document describes the basic use of a gill net to provide a representative sample of the local fish community or to target individual species for specific purposes. This method does not collect very small fish (e.g. *Hypseleotris* spp.) and users should consider using a gill net as one component of a suite of different fishing gear types for sampling fish communities.

2 Associated documents

Sampling design and preparation:

- *Permits and approvals*
- *Record keeping, including taking field photographs and videos*

Biological assessment:

- *Background to fish sampling and index calculation*
- *Fish holding, identification and measurement of length and weight*

3 Health and safety

Before following the methods contained in this document, a detailed risk management (identification, assessment, control and review of the hazards and risks) must be undertaken. All work carried out must comply with Queensland Work Health and Safety legislative obligations.

4 Permits and approvals

A general fisheries permit is required for all work that involves 'fish' as defined in the *Fisheries Act 1994*. Note that early life stages such as eggs, spat or spawn of fish are considered as fish under the Act. Under the *Animal Care and Protection Act 2001*, prior approval in writing from an Animal Ethics Committee is required for the use of animals for scientific purposes. All work carried out must comply with Australian Code for the Care and Use of Animals for Scientific Purposes (National Health and Medical Research Council 2013).

Permits and approvals may be required to conduct activities involving animals, plants and/or in protected areas (for example National Park/Regional Park, State Forest or State Marine Park).

Note: The general fisheries permit will contain details on gill net length, drop and mesh sizes that can be used, and this must be followed. Additionally, the permit will describe how often the net must be checked and whether they can be left unattended (typically they cannot be left unattended). These instructions must be followed.

See *Permits and approvals* document for more information on requirements.

5 Skills, training and experience

Skills, training and/or experience required to understand and/or undertake this method include:

- prior experience in the use of gill nets
- ability to identify fish to species level.

If using a motorised boat, the driver must hold a recreational boat licence, be skilled in operation of craft while using this technique and the boat must be in survey.

6 Equipment

See Appendix 1 for example equipment checklist.

7 Procedure

7.1 Preparation for sampling

1. Check the specifications of the gill net to be used (i.e. length, drop and mesh size) are suitable for the aims of the sampling. The following provides examples of various gill net sizes to use for different purposes:
    - If targeting larger fish species (e.g. carp) a 150mm mesh size gill net may be the most suitable. If targeting a small to medium fish species (e.g. Hyrtl's catfish) a smaller mesh size of 25-31mm may be more suitable.
    - If sampling the fish community, use a range of mesh sizes (e.g. 25, 31, 44, 56, 75, 100, 125 and 150mm) to sample a size-range of fish.
    - Panel nets (containing randomly arranged various mesh sizes across the length of the net) are commonly used, and are useful to sample fish communities and target a range of sizes.
    - Length and drop of the net will depend upon the size of the area to be sampled and the habitat being targeted. For example, deep waters can be sampled using a gill net with a drop of up to 3m, whereas shallower waters can be sampled with a smaller drop (e.g. 1.5m). Longer gill net lengths (e.g. up to 30m) may be used in larger river systems, whereas smaller lengths (e.g. 10m) may be more suitable in creeks, streams or pools.
2. Determine if it is possible to use a boat to deploy the nets. The use of a boat is highly recommended, as deployment is extremely difficult without a boat and almost impossible in deep water. The person who holds the recreational boat licence should be dedicated to manoeuvring the boat into position. Another person should be responsible for deploying the net.
3. Check flow conditions prior to undertaking sampling—this type of sampling is not recommended in very strong flows. Before deploying nets, check each net to ensure it is free from debris and tangles.

7.2 Deployment of nets

1. Select a suitable location in the water body for deployment, avoiding areas with snags and rocks that may cause tangling of the net. If deploying more than one gill net, position the nets so that all nets are acting as independently as possible.
2. Tie off the upper float line of the net onto a fixed structure using a suitable knot that can be untied under load. Use additional rope where required.
3. Attach a weight to the lead line of the net before deploying in order to limit movement of the net during its deployment.
4. Begin deploying the net, while the person steering the boat slowly reverses the boat diagonally out into the current away from where the net was tied. Set the net perpendicular to the bank in still or slow-flowing water, or increasingly angled downstream with increasing flow velocity (Figure 1).
5. Attach a weight to the lead line before releasing the last section of the net. Attach a float to the float line to make it visible to other boaters. Include a flashing light if visibility is poor or if fishing at night.
6. Record deployment duration. The amount of time that the nets are deployed should be relatively similar for each site sampled.
7. Check the nets throughout deployment, at 30 minute or less intervals. Any captured fish should be carefully removed to minimise loss of scales and slime (a knife can be used to cut mesh if needed).

Figure 1: Setting a gill net that has been tied at one end to a snag

7.3 Retrieval of nets

1. Record retrieval time to assist in calculation of effort measures. If multiple nets are used, retrieve in the order they were deployed.
2. Begin to pull the net into the boat, working from the outer end of the net, removing any fish from the net as you do so.
3. Deposit fish catch in a holding container (e.g. Nally® bin) on the boat containing aerated stream water. If catch volume is small, it may be possible to process directly from the net.
4. Record details about the site such as the net measurements, number of nets used and where they were situated, habitat type and depth.

7.4 Catch processing

Complete processing as quickly as possible to minimise stress. See *Fish holding, identification and measurement of length and weight* document for further information.

7.5 Cleaning and maintenance of nets

Rinse the gill net after all of the fish have been released. To dry the net, tie each end to a raised structure or tree branch. Check the net often, as birds and other animals could possibly become tangled in the net. Take particular care to ensure no pest species or pathogens will be transferred between sites.

8 References and additional reading

Gray, CA, Jones, MV, Rotherham, D, Broadhurst, MK, Johnson, DD and Barnes, LM 2005, Utility and efficiency of multi-mesh gill nets and trammel nets for sampling assemblages and populations of estuarine fish, *Marine & Freshwater Research* 56, 1077-1088.

Marshall, J, Steward, A, McGregor, G, Marshall, C, Negus, P, Johnson, D, Lobegeiger, J, Davies, P, Harch, B, Winning, M, Choy, S, and Cockayne, B 2003*, Condamine-Balonne Integrated Monitoring Pilot Project: Methods, Aquatic Ecosystems Technical Report No. 41*, Department of Natural Resources and Mines, Brisbane.

Appendix 1

Table 1: Equipment checklist

Equipment	✓
Gill nets (number and size specifications depend upon sampling design)	
Net mending kit (including extra net mesh)	
Boat, outboard motor and safety gear	
Float and light (where needed) for the river end of each net	
Anchor for the river end of each net	
Net weight for the bank end of each net	
Large holding containers (e.g. Nally® bins)	
Portable aerator (with spare batteries) with air hose and stone	
Torches, headlamps (if night work)	
Gloves for handling fish (optional)	
Fisheries permit signs	
Fish measuring and sample processing equipment	
Fish identification field guide	
Field data sheets	
Waterproof marker, pens and pencils	

Note: Equipment numbers/amount to be determined by the study design.