Interim protocol for Fish/Fish larvae by-catch observation in Krill fishery

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- ***Please note that this is an interim protocol for fish by-catch observation, and therefore only to be used for 2006/07 fishing season.***

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1 Introduction

Although the krill fishery has been relatively stable since 1992 with an annual catch of 100,000 to 120,000 tonnes, there are recent indications that this fishery is in the process of expanding.

Krill fishing has traditionally been undertaken using conventional mid-water trawl. However recently, a new fishing method using continuous pumping has also been employed. Following discussions over this new fishing technology during the 2006 CCAMLR meetings it was acknowledged that there is a general lack of information about all krill fishery operations.

As part of its ecosystem approach to management, CCAMLR needs to have an adequate assessment of the by-catch associated with each method of fishing. Currently there are a number of reports itemising bycatch from the trawl fishery but there has not been a broad-scale assessment of the seasonal and areal extent of fish or invertebrate by-catch in the krill fishery. There also needs to be a systematic assessment of the by-catch of seals and seabirds.

In particular, the CCAMLR Scientific Committee noted an urgent requirement for further information on the by-catch of larval and young fish in the krill fishery across nations and fishing methods. Given recent indications that this fishery is in the process of expanding, the Scientific Committee expressed a desire to develop a standardised protocol for the quantitative assessment of fish in the krill catch for use by observers on board krill fishing vessels as soon as possible (SC-CAMLR 2006).

This interim protocol has been developed in response to these recent requests by the CCAMLR Scientific Committee.

2 Observer Tasks

A) Sampling sites

Conventional trawl
1) Codend
2) Fishpound (Fish holding tank)
3) Conveyer belt

Continuous pumping
1) Primary discharge outlet of catch from the pump
2) Fishpound (Fish holding tank)
3) Conveyer belt

- **Routine sampling site should be selected from one of the above listed locations where possible considering safety.**
- **It is important that the observer should not hesitate to ask crew for help for sampling, if necessary (under condition that observer gives appropriate sampling instructions and quality check).**

B) Sampling procedures

Routine sampling (Figure 1)

- Collect 10 samples (5kg sub-samples, total 50kg); twice a day, preferably once at night, the other during the day.

Line sampling

- Collect 5 samples each (5kg subsamples, total 25kg) from sampling all sites 1, 2, and 3 listed in (A) for conventional trawl and/or continuous pumping; once every 10 days, preferably during night.

Instructions for routine and line samplings

- 5 minutes apart at the hose or conveyor; and/or
- At appropriately spaced intervals (beginning/middle/end) to reflect the entire catch at the codend or conveyor; and/or
- Randomly chosen sites within the fishpound.

C) Sorting and Processing (Figure 1)

1) Weigh each sub-sample and record.
2) A handful of a sub-sample will be put on one side of a wide working space with black background and gone through portion by portion to sort out any fish larvae

from the krill. The sorted krill will then be placed on a separate tray and the next handful placed on the work space and sorted. This process will be continued until the whole sub-sample has been sorted.

3) It is important that the observers try to maintain as even an effort as possible for sorting larvae throughout the trip. It is recommended that observer allocate roughly 8 minutes to sort a 5-kg sub-sample. It is also important that even if the observer thinks there may be no fish larvae in the sub-sample he / she must put same effort (8 minutes) to process the sub-sample. The observer must sort out all fish larvae sighted during this process, but at the same time he/she should not be afraid of missing out some larvae because of trying to keep up to this processing speed.
4) Once sorting of a sub-sample has finished, record the actual sorting time required from start to finish (actual time required to complete step 2).
5) At this point, the observer is required to roll **two dice**. It is critical that the dice are to be rolled after completion of sorting of each sub-sample.
    a. If the sum of the numbers of the two dice turns out to be equal to or more than 4 (>=4), then start the next sub-sample (back to step (3)).
    b. If the sum of the numbers of the two dice turns out to be equal to or less than 3 (=<3; combinations of 1-1, 1-2 or 2-1; the probability is expected to be 1/12), then the same krill sub-sample (remainders of sorting) must be re-observed a further two times in the same manner described in step (3) to (5).
        i. The remainder of the twice re-observed krill samples to kept frozen (see Section D for further instruction).
6) Continue the procedure above until observation of all the ten 5-kg sub-samples are completed from a haul.

D) Data recording and sample storage (Figure 1)

1) All sorted larvae must be lined up (both identified and unidentified ones) and their **digital images must be taken** (quality of 5-mega pixels or higher) with a reference ruler and a sample labels for each sub-sample.
2) Identify species and record their numbers in the logbook.
    a. If the dice =>4, then:
        i. All larvae from sub-samples of the same Trawl Number can then be amalgamated. Put in a plastic bag with a small amount of water and freeze.
    b. If the dice<=3, then:
        i. The data records, photographs, labelling and storing for the re-observed sub-samples (the first and the second re-observations) must not be amalgamated. They must each be dealt with as single sub-samples and recorded independently in the logbook as instructed.
        ii. The remainder of the twice re-observed krill samples must finally be labelled and securely kept frozen in plastic bags.
3) All frozen samples must be kept under responsibility of the flag states until further instructions are given through CCAMLR Secretariat.

E) Instruction for labeling

Samples

1) Vessel ID, Haul ID, sampling type, Site ID, and if applicable further sub-sample ID and repetition ID

Vessel ID---Vessel code
Trawl Number---the same Trawl Number used in observer's logbook
Sampling type---Routine/Line
Site ID---identifier of the sampling site
- If Dice>=4 no more to add.
- If Dice<=3 and did re-observations then further add
  - Sub-sample ID---a, b, c, d, e, f, g, h, i, or j
  - Repetition ID---1,2, or 3

Image File names

1) Vessel ID, Trawl Number, sampling type, Site ID, sub-sample ID and repetition ID

Vessel ID---Vessel code
Trawl Number---the same Trawl Number used in observer's logbook
Sampling type---Routine/Line
Site ID---identifier of the sampling site
Sub-sample ID---a, b, c, d, e, f, g, h, i, or j
Repetition ID---This will always be 1 if Dice>=4 but 1, 2 or 3 if Dice=<3.

F) Instruction for Bigger fish (>15cm) observation

- Whenever possible, the observer should monitor the conveyer belt or any other convenient location and extract any by-catch. Start and end time of this observation, Trawl Number (if at all possible) must be recorded on the logbook.
- Species should be identified and counted by the observer and recorded in the logbook. Digital images must also be taken (See Figure 2 for examples).
- The observers are also encouraged to arrange with the crew members to collect any by-catch fish (size of myctophiids and above) when observer cannot monitor by him/herself. Fish by-catch collected by the crew members can be kept aside separately for different trawls. Once everyday, the observer may identify species, count, and take digital images of the by-catch fish collected by the crew.
- File names of the digital images must include Vessel ID-Trawl Number, and also must be identifiable from the file name that the image is from opportunistic sampling and not from the routine or line sampling.

G) Submission of Data and Digital Image:

Logbook data together with all the image files must be submitted to the CCAMLR Secretariat together with the usual CCAMLR Observer data submission.

H) Summary instructions (Figure 1):

- Routine sampling---Collect 10 samples (5kg sub-samples); twice a day, preferably once at night, the other during the day or;.
- Line sampling---Collect 5 samples each (5kg subsamples) from sampling all sites 1, 2, and 3 listed in (A) for conventional trawl and/or continuous pumping; once every 10 days, preferably during night.

- Sort the first sample into krill and bycatch
    - This should must be done in small aggregations e.g. a handful
    - This must be completed in 8 minutes.

- Role a dice
    - 4 or more = record biometric characteristics as required by CCAMLR
    - Take an image
    - Move onto 2nd sample and repeat the steps above

    - 3 or less = repeat sorting process on the remaining krill.
    - Bycatch should be put to one side distinct from bycatch found in the first sorting and labeled observation no. 2.
    - Repeat sorting on the remaining krill
    - Bycatch should be put to one side distinct from bycatch found in the previous sortings and labeled observation no. 3
    - record biometric characteristics as required by CCAMLR
    - Move onto 2nd sample and repeat the steps above

- Repeat steps above as dictated by dice until all samples have been sorted at least once (**Note that the "repeat sorting process" may occur more than once within a single trawl depending on result of rolled dice**).

- Take an image

- For those samples sorted once
    - Group all sub samples of bycatch only and bag and tag.
    - Return krill to the production line.

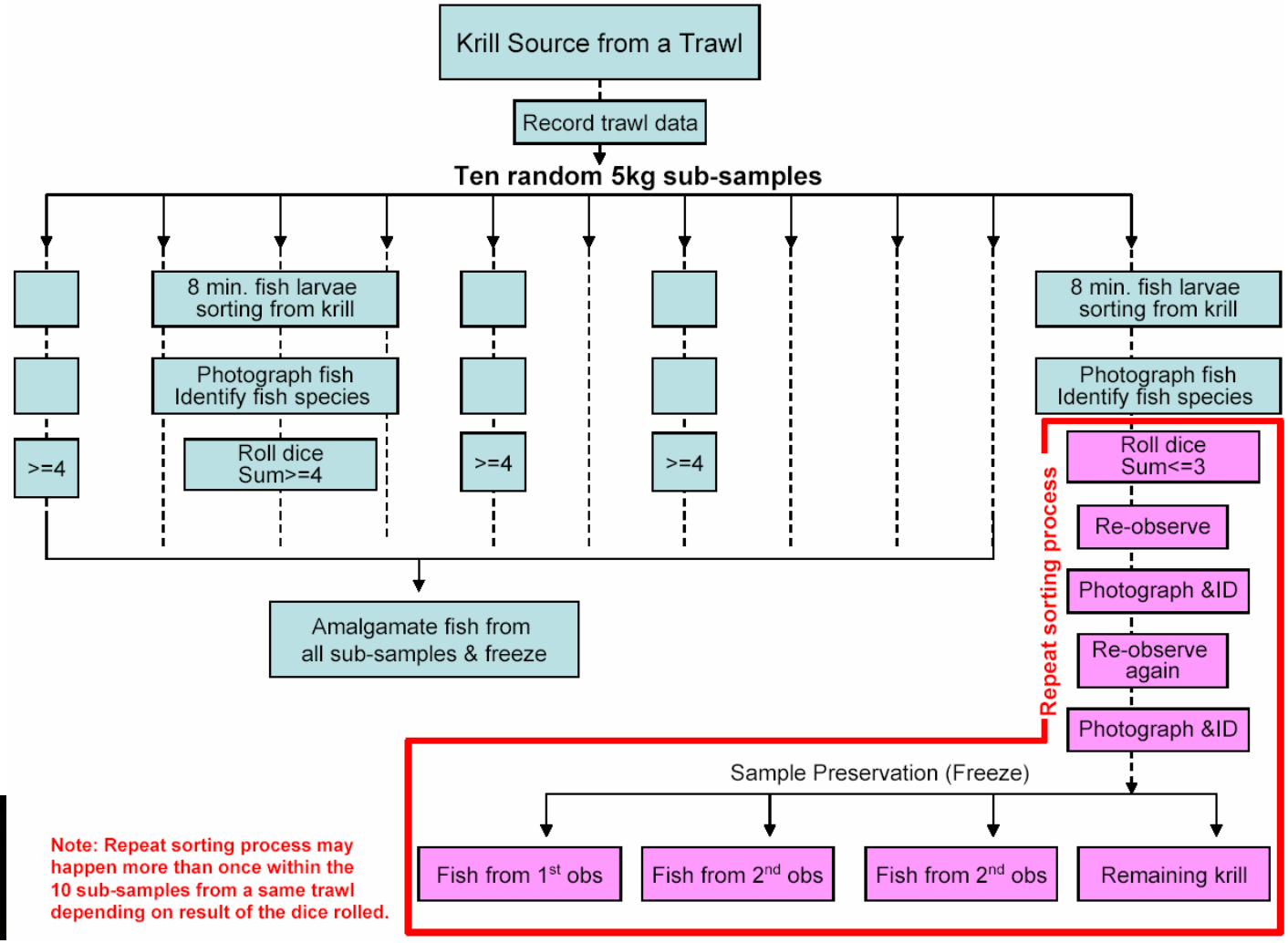
- For those samples sorted three times
    - Keep sub samples of bycatch distinct from one another and bag and tag separately.
    - Bag and tag remaining krill sample.

- Instructions for labeling
    - Need to include Vessel ID, Haul ID, sampling type, Site ID, sub-sample ID and repetition ID.

- Instructions for labeling
    - All frozen samples should be kept securely by responsibility of the flag states until further instruction is given by CCAMLR Secretariat.

I) Figures

Figure 1. Flow chart of sample processing for larval fish by-catch observation



Note: Repeat sorting process may happen more than once within the 10 sub-samples from a same trawl depending on result of the dice rolled.

Figure 2. Examples of larval fish by-catch image.