



PROTOCOL FOR COLLECTION OF TTD DATA IN WHALE HUNTS WITH DECK MOUNTED HARPOON GUN

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Collecting TTD data in whaling

Background

Time to death (TTD) or Survival time (ST) and the Instantaneous death rate (IDR) are terms that are used to measure and to quantify the killing efficiency and the state of art of current killing methods and practices used in whaling operations. Collection and analysis of TTD/ST and IDR data in a standardised manner with covariates that may influence TTD/ST and IDR make it possible to compare how rapidly whales are killed using different techniques and gears. Standardised collection methods and analyses of TTD make it possible to calculate impacts on TTD and IDR of new developments, modifications or changes in hunting practices and the impact also on efficiency of systematic training of hunters.

In Norway (1981-2012) TTD of more than 5000 minke whales killed using different types of hunting gears were collected and analysed with the covariates animal size, shooting distance and angle of harpoon gun shot, hit region and detonation area. The results were used to document the need for innovations like development of new and improved weapons, consecutive modifications and testing of gears and hunting techniques and practices, training of hunters etc. During these 21 years IDR increased by 65% from 17% to 82% and the average TTD was reduced from 11.5 min to 1 min.

The NAMMCO Expert Group Meeting on Assessment of Large Whale Killing Data in 2010 underscored the importance of recording TTD/ST/IDR and recommended the use of the Norwegian way of collecting and analysing for all hunts to identify needs for improvements.

Why record TTD

To document killing efficiency

To discover potential ways to improve the killing

To follow improvements or other issues relevant for killing over time

How to sample TTD data – “the Norwegian Way”

It is very important that the personnel collecting data are independent and are able to concentrate on data collection and not have other tasks to attend to in the killing and flensing (butchering) phase.

Who should sample/collect – required qualifications prioritised

1. Veterinarians
2. Large mammal biologist and large whale physiologist
3. Hunt- and fisheries inspectors

The profession of the veterinarians makes them able to better understand and assess the behaviour of the animal when hit, and relate the animal's reaction to the death criteria. Large mammal biologists and physiologist may also have this understanding. Anatomical and pathological knowledge is important when assessing damage to organs and gross (macroscopic) changes in vital organs, which can be studied during flensing.



If it is not possible to have dedicated personnel that only collect TTD data, scientists/hunt-fisheries inspectors (preferably with biological background) carrying out research/inspection on board but with necessary time off from his/her own research/inspection during killing and flensing may be used.

Generally, all personnel should receive special training PRIOR to collecting TTD data for whales – category 3 above will generally need more training than categories 1 and 2. Such training course should cover *inter alia*:

A general introduction on whales, whaling and management of whales (abundance estimates, quota setting, national and international management systems)

National laws and regulations – implications for the hunting practise with respect to

- equipment (review of gear and equipment – functions and correct use and maintenance)
- the hunt itself (searching for whales, shot, hauling, flensing and correct treatment of edible products)
- criteria of death

Description of why data is collected and how it is collected Utensils: watch for measuring TTD

- anatomy and physiology relevant for estimating TTD
- examination of detonation area
- reporting: how to fill out the forms and how to deliver them

Reporting form

The attached form with guidelines is the one used in the Norwegian minke whale hunt.

For practical reasons the form should be limited to one page. To the extent possible the form should be designed with only “yes/no/unknown” options to tick off.

Comments or circumstances not covered by the form and which the inspector wants to inform about may be written either on the back of the form or on a separate sheet.

It is a prerequisite to fill out the report immediately after the kill has taken place and observations of organ damages have been identified. It is very easy to forget details after a short while.

The form shall cover information on I. Primary observations/findings and II. Secondary observations/findings.

I. Primary observations/finding are factors that are used directly to determine or that upon review may be used to support, nuance or disprove the given TTD estimate in the report.

Important primary observations are (but not excluding other):

- a. Reaction patterns in whales in connection when struck/hit (whale dives, sinks, turns over on its back, swims, etc.)
- b. Slackening or movements in mouth, flipper or tail
- c. Hit area (harpoon)
- d. Detonation site (grenade)
- e. Gross organ damages - bleedings
- f. Estimated TTD



II. Secondary observations/findings are related to aspects of the hunt that may impact the TTD (like but not excluding other):

- g. Animal size
- h. Weapon type
- i. Shooting distance
- j. Shooting angle

Criteria of death

The International Whaling Commission in 1980 recognized that it is difficult to decide exactly the moment of death of a whale as it is more or less under water when it happens. It therefore recommended the use of behavioural cues as indicators of death. These diagnostic criteria of death in whales, known as the “IWC criteria”, were set to “...the time taken for the mouth to slacken, the flipper to slacken or all movements to cease”. These signs, which can be observed during practical whaling, are to be used in conjunctions with pathological findings made during necropsy. It has been recognized that when TTD are solely determined on the basis of IWC criteria, a significant portion of animals will be recorded as being sensible or alive when they are actually unconscious or dead.

Quality control of data

The importance of filling out the form *immediately* during the hunt cannot be stressed enough. The likelihood of remembering details and circumstances correctly after time has passed is low and may normally result in invalid and incorrect information.

Before statistically analysing the data each separate reporting form must be examined closely with respect to errors and possible falsifications of facts.

When in doubt it may be necessary to acquire additional information through interviewing the inspector and hunters, or checking catch data from the existing reporting systems.

To be able to carry out this kind of quality control satisfactorily it is a prerequisite to have the necessary biological knowledge in addition to detailed knowledge of, and experience from, whaling.



GUIDELINES FOR THE COMPLETION OF THE CATCH FORM

Fill out all questions as thoroughly as possible.

If uncertain what to write or if information is missing, note this down. Likewise, give additional comments of any kind.

Death criteria are slackened mouth, flippers slackened (along the sides) and that whales are at rest. It is not always that all of these criteria are present even though the whale is dead. For example, the jaw will not be open when the animal is on its back. Currents and waves can provide movements of the tail. Flippers will not immediately lie completely along the side when the whale dies.

If the whale is conscious or waking up again, it will try to straighten up, move the flippers outwards, close the jaw and give blow and try to dive. Movements in the tail will be clear and coordinated with the other signs of consciousness.

Survival time/ TTD: The time it takes from firing the shot to the whale's death. Instantaneous kill is specified as 0 or instantaneous in the form. If one is unsure of the time, for example if not all criteria are fulfilled, indicate why and what kind of uncertainty in the form.

In order to verify stated survival time in retrospect, it is very important that the following information is noted as accurately as possible:

- did the grenade work normally?,
- place for recoveries of any grenade remnants,
- shot reactions,
- organ damages,
- mark the harpoon hit area in the figure
- shot angle information.

Shot direction indicates the direction where the harpoon comes from in relation to the whale's long axis. The direction is indicated by the numbers 1-5:

- 1 = directly from the front (0°)
- 2 = diagonally from the front (above 0° to 45°)
- 3 = sideways (45° to 135°)
- 4 = diagonally from the back (135° to 180°)
- 5 = directly from the back (180°)

Shot Distance is estimated without any technical aid.

Grenade detonated: It is very rare that the grenade does not detonate due to technical error. If the grenade did not detonate this may be because the harpoon has not penetrated far enough into the whale body (65-70 cm in minke whale) or because the trigger line is cut off. In the case of malfunctioning, indicate probable cause for the malfunction, grenade production number and year.

Loss notes loss of struck and dead or hurt whale. The cause(s) are described under comments. If possible note where the harpoon hit the whale and if the grenade detonated or not.



Reaction harpoon hit/detonation: This information is important for the assessment of the effects of shot/detonation, and is used when evaluating the survival time.

Visible organ damages after the detonation

This is important information when assessing final survival time.

The grenade detonates approximately 65-70 cm inside the whale (minke whale). Often there will be remains of the grenade on the detonation site such as residual from the aluminium capsule and one or more pieces of black polyethylene. Damages to organs are observed during flensing or when organs are removed. In the area where the grenade exploded, the tissues and organs will be torn up and there is substantial accumulation of blood in the area. Detonation in the musculature causes massive injuries to muscle tissue and transforms it into a jellylike mass without normal tissue structure up to 20 – 30 cm from the detonation site.



REPORTING FORM NORWEGIAN MINKE WHALING (YEAR)

Date: Vessel: Whale no in hunting logbook:

Survival time:

Harpoon in (Figure 1-9): Harpoon out (Figure 1-9): Shot through: Yes/No

Shot direction (1-5): Shot distance: Grenade detonated: Yes/No

Lost animal: Yes/No

Reshot canon: Yes/No Gunshot: Yes/No Alongside of boat (time):

Reaction from harpoon shot (mark X):

Turned over/ sank Dived and sank Swimming movements in tail: Yes/No

Mouth: open/closed Flippers: laying by the side/stood partly out/completely out

Visible grenade damages to organs taken when flensing :

Hearth: Yes/No Lung(s): One lung Yes/No /both lungs: Yes/No

Large veins in chest cavity: Yes/No Large veins in abdominal cavity: Yes/No

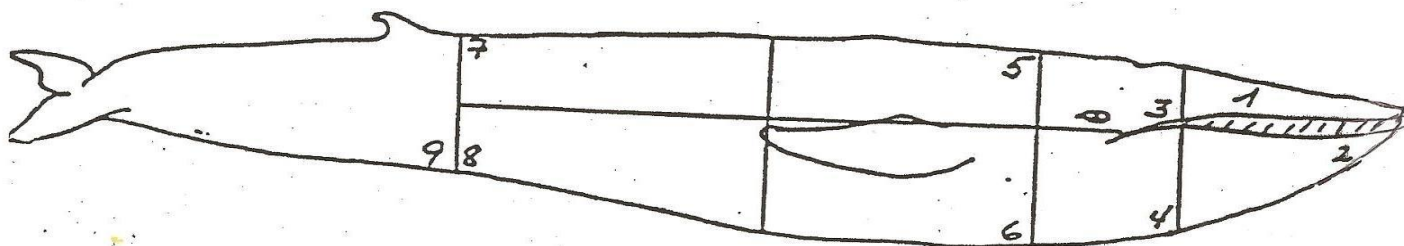
Spine/neck/skull: Yes/No Indicate damage area:

Organs in abdominal cavity: Yes/No Indicate organ(s) damaged:

Blubber/muscles: Yes/No Indicate damaged area (Figure 1-9):

Remains of grenade: Yes/No Indicate area of discovery:

Inngang harpun ⊕
 Utgang harpun ⊙
 Harpunbane - - - -



Comments (use back of form or separate sheet)