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Tagging program purpose

• CCAMLR tagging programmes are the primary means of abundance estimation.

• Additional data on fish movements and growth are also utilized.

• More than 40,000 toothfish tags have been released and more than 2000 have been recaptured (as of 2013).
Data quality

**Do not waste your time and effort.**

- Data that cannot be matched between release and recapture cannot be used.
- Recaptures are relatively rare, so every fish is important.

- Use a tag release data sheet to record data
- Accuracy is critical (tag code and length).
- Check data with observer records per shift.
  - Tag release sheets checked with tag codes used.
  - Notify observer of all recaptured tags and show them the fish before processing.
- Use comment field to identify any data issues.
Requirements to tag

- Vessels must meet the required tagging **RATE**
- must match the **SIZE** distribution of captured fish;
- and accomplish this with **HIGH SURVIVAL** of tagged fish.

*These are requirements of the Conservation Measure 41-01.*
Proportion of sizes matches Total catch.

Proportion of sizes **DOES NOT** match Total catch.
Tagging programme administration

- Tagging programmes are coordinated by the CCAMLR Secretariat
  - Tagging supplies
  - Protocols and Forms
  - Data reporting
- All recaptured tags and unused tags should be returned to:
  CCAMLR Tagging Program Coordinator, PO Box 213, North Hobart, Tasmania 7002, Australia.
- General requirements for tagging programmes conducted under New and Exploratory Fisheries are detailed in CM 41-01/Annex C. (e.g., Tagging rate, tagging suitability criteria)
- Additional tagging programmes are specified in CMs 41-02 through 41-09.
Tasks

• **Members:**
  – Ensure vessel compliance
  – Report tagging programme data to the Secretariat.

• **Vessel operators:**
  – Ensure tagging supplies are obtained
  – Ensure taggers are appropriately trained to tag fish (toothfish and skates)
  – Ensure fish are tagged following CCAMLR protocols and Conservation Measures (Tagging suitability criteria, tagging rate and fish size as indexed by the tag size overlap statistic)
  – Check all fish for tags
  – Report tag release and recapture data to CCAMLR through the Member.

• **Observers:**
  – Keep a record of tag releases, tag recaptures, and tracking unused tags
  – Biological sampling of recaptured fish and managing collected tags otoliths
  – CCAMLR observers are responsible for returning recaptured tags and unused tags to CCAMLR.
Tagging objectives

Tagging needs to minimize

• Handling of the fish
• Time out of water

While having

• Optimum tag placement
• No effect on fish health
• Accurate records
Tagging supplies
Station layout

Location and layout for large fish handling
  • Weather protection and stability
  • Handling time and distance (including tank)

Station layout
  • Fixed measuring board (not a tape) wide enough for skates too.
  • Pre-loaded tagging gun with sharp needle
  • Tag release sheet
  • Pencil

Have nearby:
  • Handling gear for large fish
  • Tools for hook removal
  • Haul number
  • Storage place for broken tags
  • Spare pencils and tag release sheets
  • Tagging suitability checklist
Applicator maintenance

• Tagging applicator must be kept clean, rinsed, free from tissue, blood, grease, or contaminants
  • Do not use oil-based lubricants on needle
• Replace dull needles with sharp needles
• Insert correct end of tag strip (colour it) into applicator
Fish landing

• Identify the fish as a tagging target before it arrives (*i.e.*, “Decide to tag the next fish”)
  • This prepares for:
    – no gaff, use net if fish is large
    – minimising time out of water,
    – gently handing the fish, and
    – immediately assessing suitability to tag.

• Once the fish is on board
  – Use wet gloves and surfaces (to reduce scale loss and abrasion)
  – Do not drop (minimize shocks)

• Avoid
  • Touching gills or eyes
  • Hanging fish vertically (stretches backbone)
Landing large fish

- DO NOT GAFF!
- Use handling aids

- (knotless dip net, custom fish containers, slings)
  - Hold fish horizontally
  - Support length of fish
  - Caution bumping or dragging fish to the tagging station
Getting large fish on board
Good handling technique
Poor handling technique
Handling slings
Holding tanks

Pros/Cons

– Convenience
  • Batch tagging
  • Suitability assessment
  • Avoiding predators

– Poor design or operation can reduce survival
Holding tanks

Construction and operation

• Large clean tank (2x fish average fish length: 2+ m)
• Smooth walled
• Circular if possible
• Flow through with high rate of clean water
• Not crowded
• Short term (< 3 h)
## Suitability assessment

<table>
<thead>
<tr>
<th>Assessment category</th>
<th>Do not tag</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hook injuries</td>
<td>Hook injury outside the mouth area (outside the lips, jaw, or cheek), or in the back of the mouth.</td>
</tr>
<tr>
<td>Gills</td>
<td>Gills pink or white</td>
</tr>
<tr>
<td>Bleeding</td>
<td>Any visible bleeding from gills, or excessive bleeding elsewhere</td>
</tr>
<tr>
<td>Body</td>
<td>Visible damage to fish body with open wounds</td>
</tr>
<tr>
<td>Organs</td>
<td>Visible damage to eye or penetration of body cavity, including by crustaceans (amphipods/lice)</td>
</tr>
<tr>
<td>Scales</td>
<td>Abrasions or single area of recent scale loss equal to or exceeding the area equivalent to the fish tail</td>
</tr>
</tbody>
</table>
Identify fish with no serious injuries

Do not tag with these injuries
Gills

Note the hook!
Hooking injuries
Bleeding

Pic of bleeding needed
Organs
Scales
Skate suitability assessment

EXPLORATORY FISHERIES – SOUTH OF 60°S

SKATE CONDITION 1 (dead) or 2 (poor health)

RECORD as RETAINED - Do Not DISCARD

skates with severe injuries, which are unlikely to survive or are already dead

Broken jaw bone (1 or 2)

Corner of jaw exposed (1 or 2)

Corner of jaw exposed (1 or 2)

Extensive damage to mouth (soft tissue & jaw bone) (1 or 2)

Large part of intestine visible (1 or 2)

External organs protruding from body cavity (1 or 2)
SKATE CONDITION 3 (average) or 4 (good health)

RECORD as RELEASED

skates that have minor injuries to improve their chances of survival

No apparent damage (4)

Minor hook damage, no other injuries (4)

More extensive hook damage (3)

Minor damage to skin, not penetrating body cavity (4)

Small part of intestine exposed (3)

Soft tissue damage, corner of jaw bone not exposed (3)

PLEASE RETURN ALL TAGS AND RECORD TAG NUMBERS ACCURATELY.
Removing the hook

Have appropriate tool ready to remove hook.

Note: If hook is in gills or throat – DO NOT TAG
Applying tags

- Memorize a routine
  - Evaluate suitability to tag
  - Record length
  - Apply two tags
  - Record tag codes, fish length
  - Double check tag codes
  - Release fish
  - Record remaining information or use 2 people
- Using an applicator gun, insert tags into the dorsal muscle at the dorsal fin angled downward so that the bar is firmly lodged behind the forward edge of the second dorsal fin rays, and backwards to reduce effects of drag on the tag.
- Pull trigger, rotate applicator ¼ turn, withdraw needle.
Proper tag placement
Note tags insert at dorsal fin
Tag placement problems

- Common problems tagging
  Scale interference
  - Inappropriate placement
    - Angle
    - Depth too shallow
    - Location
  - Applicator tissue damage
  - Broken or immediately shed tags
Tagging skates

- Avoid tagging near body cavity
- Place 1 tag in muscle of each wing on eyed side
- Tag straight down to anchor the tag between fin rays.
A properly tagged skate
Video guide to tagging toothfish
Tagging a large fish
Handle fish properly
Headfirst into the water
Release with a sling
Watch the fish swim away
Tagged fish fate

- Leave blank if all was OK
- If tagged fish does not swim away, choose appropriate code:
  - S: Seal Predation
  - T: Both tags detached
  - D: Dead at surface but no predator
  - K: Killed by whale
- If code used, make note in comment field
Recording data

Unless accurate tag data are recorded there is nothing gained from tagging a fish.

• Use two people if at all possible – one recording and checking data, one completing the tasks.
• Evaluate each tagging suitability criterion, but quickly.
• Double check tag codes, length, and haul number.
• Release gently, headfirst, into water.
• Note fate at release only if not successful.
• Do not release tagged fish if predator is present
• Compare logbook and used tags each shift.
## CCAMLR tag release sheet

<table>
<thead>
<tr>
<th>Set Number</th>
<th>Species Code</th>
<th>E.g. A123456</th>
<th>Tag 1</th>
<th>Tag 2</th>
<th>Tagger (OBS#/Crew)</th>
<th>Hook removed?</th>
<th>Total length (cm)</th>
<th>Release Fate (S,K,T,D)</th>
<th>Comment</th>
<th>Pelvic length (cm)</th>
<th>Wing span (cm)</th>
<th>Sex</th>
</tr>
</thead>
<tbody>
<tr>
<td>001</td>
<td>TOA</td>
<td>A123456</td>
<td>A123457</td>
<td>crew</td>
<td>Y</td>
<td>111</td>
<td>S</td>
<td>eaten</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
When things go wrong

- Stuck or broken tags
- Dropping or injuring the fish
- Forgetting tag codes
- Predation or attack on release

WRITE IT DOWN!
Tag recaptures

• Examine every fish for tags
  – Note pink tags may resemble bruised fin rays

• Not reporting tags does NOT mean a larger future catch limit.

• Fewer tag returns CAN mean more fish need to be tagged.
Tag recapture tasks

- **Crew and observers**: Develop a routine to thoroughly examine every fish for tags.

- **Vessel operators**: Provide incentives for tags to be recaptured. Make it important to crew. Note that statistical methods now exist to compare recapture rates among vessels.

- **Crew**: When a tag is discovered, leave the tag in the fish and notify an observer for sampling.

- **Observers**: Check logbook after each haul. Coordinate the return of physical tag and otoliths to CCAMLR Secretariat.

- And remember there is a tag return lottery!
Tag recapture sampling

- Observer samples recaptured fish.
- Record Observer ID if tag found by “Observer”, otherwise “crew”.
- Record tag codes and colour for all tags present.
- Record Trip and Haul.
- Toothfish: Record Length, Weight, Sex, Gonad weight, collect both otoliths.
- Skates: Record Total length, Pelvic length, Wingspan, Weight, Sex, Gonad stage.
Arrange your photograph

Use tag above and ensure that the tag number
Documenting a tag recapture

Name the picture file: "Colour"_"Tag_code_Cruise_Haul".jpg"
Look for other tag types

- Stomach tags
- PIT tags (just behind head in muscle)
- Archival tags
- Satellite tags
- Fish with these tags should also have a normal tag

- These tags should have a return address printed on them
When things go wrong: Recaptures

For example, what if:

• A loose tag is found
• Tag is found in fish but after processing
• Tagged fish cannot be linked to a haul
• A tag is lost after the fish is sampled

What you should do:

If tag is available: Record vessel name and the date found, report likely source haul, return tag to CCAMLR.

If tag is lost: Record vessel, likely date or haul number, report likely source, and state that no tag returned.
Summary

• Proper tagging and tag recapture are very high priorities for every toothfish fishery.
• Tag reward scheme
Photo and video credits

Judith Brown, UK
Nicolas Gasco, H. Vermande, A. Dervaux, G. Duhamel, France
Dirk Welsford, Australia
Chris Heinecken, South Africa
James Andrew, Dave Bilton and Jack Fenaughty, Steve Parker, New Zealand
Roberto Sarralde, Spain
Alan Hart drew the toothfish and skate diagrams

Also:
CCAMLR’s Fish Stock Assessment Working Group and the CCAMLR Secretariat have provided several reviews of this training module.