



Fisheries & Aquatic Ecosystems Branch  
AFBI Head Quarters  
Newforge Lane  
Belfast  
BT9 5PX

## **Development of the NMBAQC Video Ring Test: Executive Summary by AFBI**

On behalf of the National Marine Biological Analytical Quality Control Scheme (NMBAQC), the Agri-Food and Biosciences Institute (Northern Ireland) project commissioned a three-part seabed video analysis ring test. Envision Mapping Ltd was contracted to 1) develop and distribute the three tests, 2) collect, score and report the tests and 3) host a workshop for ring test participants to discuss future developments in quality assurance.

All three tests are now complete and a final report produced by Envision Mapping Ltd. Individual tests had between 18-22 participants at 11-13 organisations and revealed interesting insights into the current consistency of seabed video analysis. The workshop generated valuable information on 1) the differing purposes for videography, 2) the perceived resource limitations for comparable analysis between organisations/purposes and 3) recommendations for further development of both SOPs and ring tests.

Envision were asked to distil the main sources of perceived participant variance and subsequent recommendations within their final report. The main recommendation from Envision Mapping Ltd are:

### Preparation

- There should be a review of existing video analysis procedures;
- A 'Guide to Video Analysis' Best Practice Manual should be produced if no existing document or SOP is found to be suitable;
- There should be regular workshops to review the manual and training and testing procedures;
- The Video Ring Test process should be supported by centralised management structure for dealing with materials and information relating to video analysis techniques;

### Training

- Training materials should be made available to potential Video analysis contractors to enable them to work to the Best Practice guidelines. The guidelines would address a number of problem areas identified from the ring tests including;
  - A complete list of available resources should be produced and made available via the NMBAQC website.
  - 'In situ' species identification;
  - Substrate/Habitat recognition;

- Enumeration techniques (i.e. counting, assessing SACFOR and % cover) - may need to reinvent abundance assessment techniques specifically for video analysis;
- New technologies (to keep abreast of developments that improve quality of benthic video and its analysis).
- If 'Biotope', 'Life Form' or similar habitat recognition from video is to form part of a ring test then, specific documentation and training materials should be developed and made available.

Where persistent problem areas are identified through further ring tests or other means, targeted workshops should be held to assist video analysis contractors and future ring tests.

### Ring Test

There should be two types of Video Ring Test:

- A general (standard) test
- A specialist (purpose-driven test);
- The test should be carried out on-line;
- 'Life Form' and 'Biotope' allocation should not form part the test. We recommend that these should be part of a separate QA exercise that would need to involve a considerable training element.
- For taxonomic identification, annotated video footage should be incorporated to highlight the target species to ensure consistent identification.



Fisheries & Aquatic Ecosystems Branch  
AFBI Head Quarters  
Newforge Lane  
Belfast  
BT9 5PX

- Video clips for analysis should be no less than 3 minutes long;
- Video clips for analysis should be accompanied by appropriate metadata; the appropriateness should be judge against the purpose of the test, if the metadata provided would give an advantage or elucidate to the correct answer then this would be inappropriate.
- Video footage should be of suitable or typical quality and bias should not be towards 'high' quality footage as this would skew the test towards high quality footage and not footage of a quality likely to be encountered on a contract work basis.
- Where feasible a scale bar or indication of scale should be provide on the video footage to assist the candidates.

### Testing and Assessment

- Testing should be carried out twice yearly: early spring and late autumn on fixed dates to accommodate workloads around survey periods and to ensure personnel changes with an organisation are accounted for and are current. Tests that are more frequent were considered an over-burden on workloads and less frequent tests would not accommodate personnel changes.
- Feedback should be given as soon as possible after the test, on fixed dates;
- Feedback should include details of candidates' strengths and weaknesses so that remedial action can be taken where necessary;
- The test should be marked by NMBAQC appointed assessors;

- The 'yardsticks' (for each component of the test) against which to assess the performance of candidates need to be set for each video clip used for the test BEFORE the test is carried out;
- Advice from local (i.e. local to the site from which the video was taken) experts should be sought in setting yardsticks;
- Consideration is required to determine the level at which Pass/Fail marks are given. From the development of the test substrate marks over 70% was achieved by more than 90% of participants in test 2 and 80% in test 3, for biota in test 2 85% of candidates scored over 60% and in test 3 70% of candidates scored over 60%. These levels could be used as a starting point for future tests and reviewed at regular intervals.

#### Standard Operating Procedures for Video Analysis

- In order for there to be consistency between results from various organisations the type of hardware to be used for video analysis should follow standard recommendations and should be consistent as possible amongst participating organisations;
- Only those people who have been on appropriate suitable training sessions or have other appropriate training should be eligible as test candidates;
- Video clips to be analysed should be graded for quality;
- Video clips should have a minimum set of metadata (MESH metadata standards);
- Videos should include an indication of scale;



Fisheries & Aquatic Ecosystems Branch  
AFBI Head Quarters  
Newforge Lane  
Belfast  
BT9 5PX

- The specific purpose of the analysis should be clearly defined;
- Associated still images should be used where practicable;
- Analysis procedures (e.g. reviewing of video clips, data entry, enumeration) should follow the proposed 'Guidance to Video Analysis' best practice manual (see 'Preparation' section above);
- Standard data entry forms (as on on-line test) should be used;
- There should be 'in-house' quality checks as a minimum, such as review by second analyst, but preferably with independent reviews.

In addition to these, AFBI would like add or emphasis the following recommendations:

- To date, the ring test has concentrated on species identification, biotope/seabed classification and feature indices. For some forms of seabed videography, it is appropriate to apply quantitative methodologies that yield data useful for statistical analysis and measuring change. It is important that future manuals and ring tests recognise and supporting these methods.
- Although two tests a year would preferable, it is likely that current financial restrictions may only make an annual test realistic for funders and participants. This is the minimum required to maintain some continuity and development of the ring test. Furthermore, it may be necessary to produce a simplified test to meet financial restraints, with greater voluntary contributions from current collectors of seabed video footage.



Fisheries & Aquatic Ecosystems Branch  
AFBI Head Quarters  
Newforge Lane  
Belfast  
BT9 5PX

- It is recommended that, in negotiation with Envision Mapping Ltd. (the holder of the code and retainer of intellectual property), the proven web front end used in test 2 and 3 is moved to the NMBAQC website for future test.
- Running the scheme is costly; external funding and participant contributions were not enough to meet the full economic cost of running the pilot scheme
- Use of Inter-rater reliability statistics such as Cohen's kappa (two raters, Normally distributed data), Fleiss' kappa (numerous raters, Normally distributed data), Pearson's  $r$  or Spearman's  $\rho$  (two raters, continuous and ordinal data respectively) and Lin's Concordance Correlation Coefficient (two raters, Poisson distributed data) should be investigated for in-house and community ring test application.
- Sourcing video footage from other sources, e.g. divers where species collection and definitive identification may be possible. This may facilitate identification sections where knowing exactly what species are present is important.
- That future tests, issued after a videography manual or SOPs, should allow be comparable to the first test, hence allowing some measureable assessment of analytical quality to be assessed after the provision of new protocols.
- Other NMBAQC ring tests all have a failure threshold. Ultimately, the seabed videography ring test will also require failure thresholds. How these are established



Fisheries & Aquatic Ecosystems Branch  
AFBI Head Quarters  
Newforge Lane  
Belfast  
BT9 5PX

are not clear and depend on the quality and structure of the ring test source material.

### Acknowledgement

AFBI wish to thank Envision Mapping Ltd for the successful delivery of the first NMBAQC video ring test. AFBI also acknowledge the significant contributions of the ring test participants both during the tests and workshop. Finally, AFBI are particularly thankful to JNCC, NEIA-NH and the Aggregate Levy Fund for providing financial assistance and making the video ring test a reality.