



## Process for evidence quality assurance

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## 1. Background

Marine Management Organisation (MMO) needs evidence to make decisions when acting as a competent authority for marine licensing, wildlife licensing, marine planning, managing marine protected areas and managing fisheries. Evidence can be defined as information that is used to inform decision making at MMO.

The model to deliver the evidence needs in the organisation requires that the functions of MMO relies on submissions from various sources, including bought-in services, information to support applications and submissions from a variety of stakeholders. There is a requirement for such evidence to be of sufficient high quality and robust enough to support our corporate decision making.

Assessing the quality of evidence presented to us is everyone's responsibility. MMO needs to operate in a culture that embeds such responsibility into all individuals who deal with evidence in all its forms, such as data, data products such as maps, reports, and publications.

A preliminary flow process for quality assuring evidence is presented below.

## 2. Quality assuring evidence

The objective of quality assurance (QA) is to assess whether the evidence is fit for purpose and to demonstrate that any limitations have been considered in decision

making. The QA process should enable the person using the evidence to assess its suitability and robustness, and provide an auditable document that demonstrates the assessment process. Adopting an open and transparent approach to QA is in line with the Government Chief Scientific Adviser's (CSA) '[Guidelines on the use of scientific and engineering advice in policy making](#)'<sup>1</sup>. The QA process outlines good practice for certain aspects of the GCSA guidelines.

This document sets out broadly the QA process and assessment method used. Further to this there are 2 specific operational areas that have additional documentation that provide more detail and a focused assurance processes. The first is the QA of marine geospatial data, which assess the quality of geographic information which we collect, store and analyse using geographic information systems (GIS) such as SPIRIT and ArcGIS. The second is the QA of evidence submitted in support of a marine licence application, in which the reviewer considers the quality and suitability of information supplied by an applicant.

### **3. Quality assurance of evidence process**

MMO has created a QA checklist to be used when assessing confidence in a piece of evidence. The following are the standard steps to be completed. As stated above, the steps are modified for 2 specific evidence types (namely geospatial data and information to support a licence application).

The flow chart in Figure 1 can be used as guidance on selection of the suitable checklist.

#### **1. What is the decision that this evidence will inform?**

Defining the decision that this evidence will support and framing the question will ensure that the appropriate considerations are made during the QA check. What is the question that this evidence will inform? Why does MMO require this evidence?

Every time that a piece of evidence is used to support a different decision a new QA assessment should be considered. In marine licensing, the Case Officer should conduct a QA assessment for each piece of evidence submitted to support an application. In marine planning, the planner should review the QA assessment of any geospatial mapped data and consider any limitations identified.

#### **2. Risk assessment**

An initial risk assessment (RA) will need to be conducted by the member of staff receiving the evidence to quickly assess the likely risks to the organisation or to the project from incorporating weak evidence. Such RA will also highlight potential consequences to the project and/or us from the decision taken. Risks to the organisation from accepting or dealing with unsound evidence can be financial, reputational, legal, and delivery.

#### **3. Prioritisation**

Following the risk assessment the user should assess the priority to MMO of this piece of evidence using a ranking system based on 'must have', 'should have', 'could have' and 'would like to have'. Depending upon this outcome will influence the need

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<sup>1</sup> [www.bis.gov.uk/go-science/science-in-government/strategy-and-guidance](http://www.bis.gov.uk/go-science/science-in-government/strategy-and-guidance)

to have this evidence. 'Must have' and 'should have' evidence will be viewed as business critical.

#### **4. Assess quality**

The user should assess the quality of evidence in terms of:

- appropriateness (proportionate and targeted)
- methodology
- timeliness
- completeness
- consistency
- auditability
- accuracy
- evidence of independent external review
- production quality standards

These are considered the elements of evidence relevant to the assessment of quality. A definition of each element is provided in Table 1.

Written confirmations will be sought from key suppliers of evidence to ensure that their organisational quality assurance processes are robust. MMO will seek corporate level assurances that their processes and procedures around marine evidence collection activities are thorough and robust and, where relevant, in line with the Government Chief Scientific Adviser's 'Guidance on the use of scientific and engineering advice in policy making'.

Independent external reviews are critical in evaluating the quality of evidence presented to us. When MMO conducts an independent peer review exercise the purpose of the review will be made clear from the outset and the review of comments will be open and transparent.

The assessment of quality will be measured in terms of confidence; confidence in whether a piece of evidence is robust enough and fit for purpose to be used to inform in the decision defined. MMO has developed a method for measuring confidence levels of evidence and in doing so take into consideration the quality elements explained above.

#### **4. Quality ratings**

The checklist aims to quantify and assess overall quality of a piece of evidence in a measurable and transparent way. When completing the checklist a range of confidence ratings scores should be used.

0 = Not applicable – this rating would only be used if the question is not considered relevant to the assessment of the quality of this particular evidence. By selecting not applicable you remove this question from the overall assessment and the concluding assessment will ignore any questions with not applicable as the rating. For example a Tier 1a marine licence application will not have been peer reviewed or have an associated accuracy assessment so these should be ignored when assessing the quality.

1 = Low confidence or unable to assess – the decision maker must be aware of the limitations of the evidence. Further investigation will be required before using.

2 = Moderate confidence – for example good quality evidence but may lack internal quality assurance, full documentation of methods, and/or have known inaccuracies.

3 = High confidence – high quality evidence, quality assessed, high confidence in the methodology and other elements.

The overall QA assessment, which is expressed in terms of confidence, is a measure on the sum of the individual elements scores divided by the total possible score. This percentage confidence score equates to a narrative confidence rating. Where a rating of 0 has been used and the quality element is deemed not relevant to the overall assessment, then the total denominator is reduced in the overall assessment and the narrative percentage confidence ratings still apply.

For example, when all 8 quality elements are assessed, then the overall percentage confidence assessment calculation denominator is 24, compared to when only 6 of the elements are deemed relevant then the denominator is 18.

Overall confidence assessment ratings:

- 0 to 50% – low confidence or unable to assess
- 50 to 84% – moderate confidence
- 84 to 100% – high confidence

In the circumstance that an even number of quality elements are assessed then additional overall assessment ratings can be added around low to moderate confidence and moderate to high confidence.

Currently there are no weightings given toward any of the quality elements and each is assessed equally. One overriding condition is that if the methodology is assessed as being of low confidence then the overall assessment can be no higher than low confidence.

Table 3 gives guidance on the assessment of ratings.

## 5. Recording QA assessments

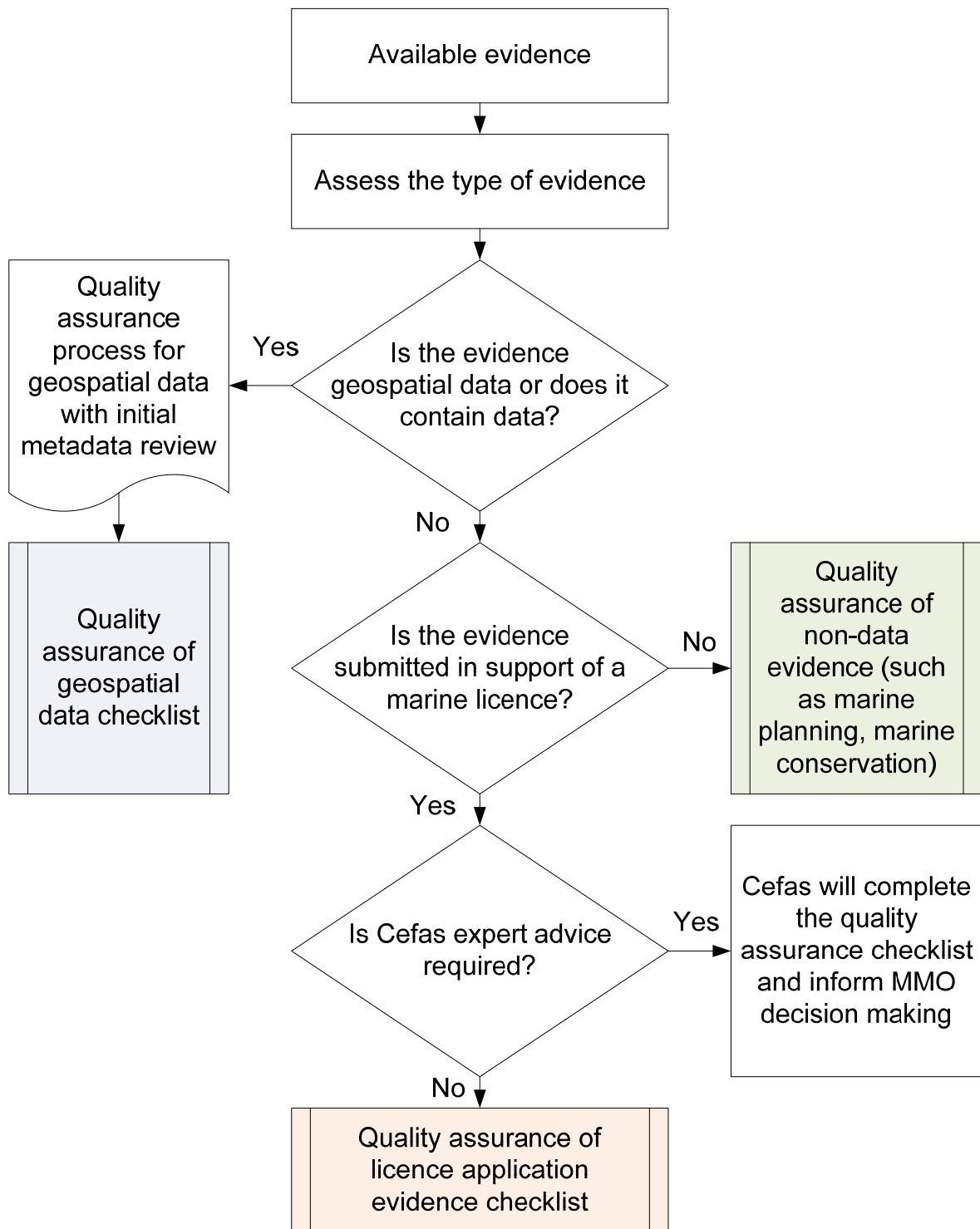
The reviewer should complete an electronic spreadsheet QA checklist. The correct checklist template's that should be used are:

- for non-data evidence received to support specific decisions – for example marine planning academic papers, or marine conservation environment evidence to support byelaw creation – the template to use is the correct evidence QA template
- for geographic information used as data in the GIS mapping tools the template to use is the data QA template

As discussed in the detailed process, it is essential to complete the Marine Environmental Data and Information Network (MEDIN) standard metadata before completing the QA.

Current IT systems updates are working to integrate the QA steps into the Marine Case Management System. In the main, MMO will rely on Centre for Fisheries, Environment and Aquaculture Science (Cefas), as our primary science advisors, to QA the information that they use to provide MMO with scientific advice. A 'how to' guide for use by MMO staff is available to assist in completing the checklist template. The confidence score is not an indication of MMO's view of a particular provider and is based solely on the information available.

Figure 1: Flow diagram for quality assurance of evidence in MMO



**Table 1: Quality elements defined**

MMO assesses the quality of evidence in terms of appropriateness (proportionate and targeted), methodology, timeliness, completeness, consistent, auditability, accuracy, evidence of independent external review and production quality standards.

Quality element	Definition
Production quality standards	MMO needs to ensure that any evidence used has been collected, processed and published with rigour and that appropriate quality assurance processes are in place, and embedded, within the organisations that collected or produced such evidence.
Appropriateness – split into proportionate and targeted	MMO needs to ensure that a piece of evidence is appropriate for its intended use and can be used to inform the question that has been posed. For example, a set of conclusions on one population of a marine species may not be appropriate for a separate population for reasons such as tides or wave action. Consideration needs to be given as to whether this is the best available evidence.
Methodology	The method used to produce or collect the evidence is recognised standard practice. MMO must have confidence in the methodology to give valid and consistent results or be aware of the limitations and assess the confidence of such evidence accordingly.
Timeliness	Age of the evidence is an important consideration. Depending on the nature of the evidence, out of date evidence has the potential to affect the user confidence. For instance old biological or ecological records may have low confidence, however seabed geomorphology will be affected significantly less by time elapsed since collection.
Completeness	MMO needs to ensure that the evidence is complete enough to satisfy the intended use.
Consistency	Evidence submitted in support of a marine licence application must be consistent across all applications of a similar nature. Demonstrates one aspect of application of the precautionary principles.
Auditable	Metadata needs to be auditable and in the recognised MEDIN standard. When data is provided without metadata the confidence will be significantly lowered.
Independent external review	An independent external review will add to the confidence placed in the evidence.
Accuracy assessment	For evidence that relies on modelled data an unbiased statistical accuracy assessment can provide assurance and confidence.

**Table 2: Checklist to assess the quality of evidence in MMO**

Item	Explanatory note	Aspects to consider	Comments	Confidence rating
1. Define the evidence	Defining MMO's requirements and framing the question to ensure that the appropriate considerations are made during the quality assurance check.	What is the decision that this evidence will inform? What is the intended use?		No score required
		For this purpose, how would good evidence be defined?		No score required
2. Risk assessment	Assess the risks to MMO of using weak evidence? What are the potential risks to MMO of making a decision without knowing the limitations of the evidence?	Could there be a delivery risk to MMO?		No score required
		Could there be a financial risk to MMO?		No score required
		Could there be a reputational risk to MMO?		No score required
		Could there be a legal risk to MMO?		No score required
3. Prioritisation	<p>Following the risk assessment, assess the priority to MMO of this piece of evidence using a ranking system based on:</p> <ul style="list-style-type: none"> <li>- <b>must have</b> evidence – project deliverables will fail without this evidence</li> <li>- <b>should have</b> evidence – still</li> </ul>	<p>Justification for the prioritisation ranking should be written in the comments box. Evidence classed as 'must have' and 'should have' evidence will be viewed as business critical.</p>		No score required



Item	Explanatory note	Aspects to consider	Comments	Confidence rating
	critical to delivery but not as time dependent - <b>could have</b> evidence – may be seen as nice to have - <b>would like</b> to have evidence			
4. Assess quality	Determine quality of evidence in terms of appropriateness, methodology, timeliness, completeness, auditability, accuracy, evidence of independent external review and production quality standards.	Has the provider given details of quality assurance methods employed, recognised quality management systems, written assurances?		0 = Not applicable 1 = Low/Unknown 2 = Medium 3 = High
		Appropriateness assessment – best <b>known</b> available, relevant; satisfies intended purpose as per definition in point 1?		0 = Not applicable 1 = Low/Unknown 2 = Medium 3 = High
		Assessment of the methodology used to prepare the evidence?		0 = Not applicable 1 = Low/Unknown 2 = Medium 3 = High
		Timeliness assessment – is this the most up-to-date version, knowledge of when		0 = Not applicable 1 = Low/Unknown

Item	Explanatory note	Aspects to consider	Comments	Confidence rating
		data was collected?		2 = Medium 3 = High
		Completeness assessment – is the evidence complete for intended purpose, uniform content?		0 = Not applicable 1 = Low/Unknown 2 = Medium 3 = High
		Auditability assessment – how auditable was the metadata provided?		0 = Not applicable 1 = Low/Unknown 2 = Medium 3 = High
		Has the evidence been independently expert reviewed? This provides expert evaluation and can demonstrate quality.		0 = Not applicable 1 = Low/Unknown 2 = Medium 3 = High
		Has a statistical, unbiased assessment been completed to evaluate the accuracy of evidence before MMO received it, and if so what was the outcome?		0 = Not applicable 1 = Low/Unknown 2 = Medium 3 = High

Overall quality assessment of the evidence	In the context set out in section 1 of this checklist is the evidence deemed to be either <b>fit for purpose</b> or <b>not fit for purpose</b>	'Fit' or 'Not Fit'
Are there any caveats required for the use of this evidence (such as conditions of use, limitations)	1. 2. 3.	

**Table 3: Overall assessment ratings**

Rating	Confidence	Definition	Potential considerations
0	Not applicable	The question is not relevant to the assessment of the quality of the evidence.	<ul style="list-style-type: none"> <li>This should only be used when certain that the question is not relevant.</li> </ul>
1	Low or unable to assess	<p>Insufficient detail is available to assess our confidence in the evidence. Low confidence in the evidence. The decision maker must be aware that there are limitations to the use.</p> <p>Further investigation will be required.</p>	<ul style="list-style-type: none"> <li>The techniques and methods used may not be the accepted, best practice method.</li> <li>Incomplete or no metadata.</li> <li>No clarity if the data is measured, modelled, predicted or estimated.</li> <li>No clarity when recorded, over what period.</li> <li>More up to date versions may be available that result in a low confidence in this set.</li> <li>No quality control procedures identified at the point of evidence collection or during processing. No published quality control or quality management system (QMS) in place at originating organisation.</li> </ul>

Rating	Confidence	Definition	Potential considerations
2	Moderate	Good quality evidence but may lack internal quality assurance, full documentation of methods, and have inaccuracies.	<ul style="list-style-type: none"> <li>• Research methodology published but we are unable to determine if this followed best practice or was considered standard by professionals in that field.</li> <li>• Data is modelled, predicted or estimated with details of such procedures provided.</li> <li>• Data is measured but precision is low or unclear.</li> <li>• Some date information is provided but is incomplete.</li> <li>• Detailed metadata and sufficiently well populated to allow assessment but not in MMO (MEDIN) standard.</li> <li>• Some quality control information published at the point of evidence collection and/or during processing. A published quality control process and/or QMS is evident at the originating organisation, however in the case of a QMS this has not been accredited to a recognised standard (such as ISO9001).</li> </ul>
3	High	High quality evidence, internally quality assessed, high confidence in methodology.	<ul style="list-style-type: none"> <li>• Detailed research methodology published and using known best practice or is considered standard by professionals in that field.</li> <li>• Data is measured and precision is high and explicitly stated.</li> <li>• Full date and update information is provided.</li> <li>• Detailed and fully populated metadata to MMO (MEDIN) standard</li> <li>• Detailed quality control procedures published at the point of evidence collection and/or during processing. A published quality control process and/or QMS are evident at the originating organisation, in the case of a QMS this is accredited to a known standard (such as ISO9001).</li> </ul>