NORTH ATLANTIC TREATY ORGANISATION
(NATO)

# ADDITIONAL MILITARY LAYERS
## INTEGRATED WATER COLUMN
## (Phase 1)
## PRODUCT SPECIFICATION

Version 2.1, 30th June 2006

Produced and issued by the UNITED KINGDOM HYDROGRAPHIC OFFICE under the direction of the Geospatial Maritime Working Group of the NATO GEOGRAPHIC CONFERENCE.

# Document Control

**ISSUE**

| Date | Author | Issue | Summary of Changes |
|---|---|---|---|
| 09/10/03 | J Tamul, B Parish | 1.1.0 | First review draft |
| 31/07/04 | B Parish | 1.1.1 | Second review draft, environmental suitability for marine mammals is now gridded |
| 20/12/04 | Weaver, Armishaw, Maughan & Parish | 1.3 | Sediment data included & feedback from GMWG meeting 1inc revised physical properties modelling |
| 16 May 2005 | Parish | 1.4 | Sediment data removed following GMWG feedback |
| 20 June 2005 | Parish | 1.5 | Modified by annex C development |
| 4 July 2005 | Parish | 1.6 | Inclusion of additional mammal attribution |
| 9 Nov 2005 | Parish | 2.0 | Minor error fixes |
| 30 June 2006 | Parish | 2.1 | Inclusion of additional marine mammal attribution and revised definition of quality |

**APPROVALS**

| Approver and Title | Signature | Date |
|---|---|---|
| GMWG chairman | | 21/11/05 |
| MILOC chairman | | 28/10/05 |

**VERSION CONTROL**

| Version | Review Date | Reviewed By |
|---|---|---|
| 1.1.0 draft | Winter 0304 | NATO AHHWG & MILOC |
| 1.1.1 draft | 2004 | NATO GMWG |
| 1.3 | 2004/5 | For NATO GMWG approval |
| 1.4 | 2005 | For MILOC & GMWG approval |
| 1.5 | 1 July 2005 | Gardiner, Parish, Maughan |
| 1.6 | 2005 | GMWG & MILOC |

**FILE DETAILS**

| Component | Name & Location | Tool |
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| Correspondence | HA/351/002/008 | N/A |

| | | |
|---|---|---|
| and hard copy | | |

# CONTENTS

# 1 INTRODUCTION

## 1.1 SCOPE

The main body of this Product Specification describes the content and defines the data dictionary of the Additional Military Layers: Integrated Water Column phase 1(AML IWC) product, independent of any exchange standard data format. The schema and data format imposed by the chosen exchange standard implementation are defined in separate annexes (where provided).

It has been prepared in accordance with NATO STANAG 7170, Additional Military Layers and the draft NATO STANAG 4564, Performance Standards for Warship Electronic Chart Display and Information System (WECDIS) Data Products It is based on the proposed Common Product Specification Framework (CPSF) which is contained as Annex B to the draft STANAG 4564.

The AML IWC phase 1 Product Specification is designed to facilitate the encoding of the following components:

- Water Column physical properties at various depth levels, from the sea surface to the sea bottom at one or more fixed (X,Y) grid points. In phase 1 depth levels will be quoted as standard fixed levels, The capability to produce data with depth levels quoted at break-points may be introduced at phase 2.
- Ocean currents at various depth levels, from the sea surface to the sea bottom at one or more fixed (X,Y) grid points.
- Marine mammal distribution and activity at one or more fixed (X,Y) grid points.

Wave height is not included in the IWC phase 1 Product Specification.

The AML IWC phase 1 Product is intended to be used in the planning and execution stages of military or civil operations at sea.

**AML INTEGRATED WATER COLUMN MUST NOT BE USED IN ISOLATION FOR NAVIGATIONAL PURPOSES**

## 1.2 GENERAL INFORMATION ON THE PRODUCT SPECIFICATION

### 1.2.1 Version Number

The Version Number is 2.1

### 1.2.2 Date of Issue

The Date of Issue is 30th June 2006.

### 1.2.3 Custodian of the Product Specification

The Custodian of this specification is The United Kingdom Hydrographic Office.

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### 1.2.4 Relevant STANAG Number

STANAG 7170 Additional Military Layers (AML)

## 1.3 STATUS OF THE PRODUCT SPECIFICATION

This product specification will be endorsed by the Geospatial Maritime Working Group of the NATO Geographic Conference and is subject to the change control procedures implemented by that group.

## 1.4 SECURITY

### 1.4.1 Security Classification of the Specification

The Product Specification is UNCLASSIFIED

### 1.4.2 Security Classification of the Product

AML IWC phase 1 can be issued at various security classification levels according to content. AML IWC phase 1 products of differing security levels (specified at the dataset level by the 'Protective Marking' and 'National Caveat(s)' details) are physically partitioned.

The table at section 5.3 contains details of how AML IWC security classification information must be described in this product.

### 1.4.3 Copyright Statement

Producers of AML datasets must ensure that:

- the Intellectual Property Rights of those owning the information that has been used for production of the AML product is not compromised.
- sufficient mechanisms are put in place to ensure that material is not copied either in whole or part, except as specifically required within the host system, without prior agreement of the data producer and any other copyright holders.

Copyright statements should be shown at the following locations:

- on the product label
- on the product packaging
- within the product

## 1.5 CONTENTS OF THE DOCUMENT

The AML IWC phase 1 Product Specification defines the real-world features, attributes and metadata required for the production and use of the data product. It is laid out as described in the table of contents.

Also included, as annexes to the Product Specification, are details of the implementation using the relevant exchange standard(s).

Each annex (if included) is identified as follows:

- AML IWC phase 1 NetCDF Implementation (ANNEX C)

A cross-reference in the text will be included for instances when there are relevant details in one or more of the implementation annexes.

## 1.6 REFERENCES

The following standards and specifications affect the content of this Product Specification.

### 1.6.1 Standards

| | |
|---|---|
| NATO STANAG 1059 | Distinguishing Letters for Geographical Entities for use in NATO. |
| NATO STANAG 2211 | Geodetic Datums, Ellipsoids, Grids & Grid References |
| NATO STANAG 7170 | Additional Military Layers. |
| NATO STANAG 4564 | Standard for Warship Electronic Chart Display and Information System (WECDIS), Edition 1, Annex B, Data Products. |

| | |
|---|---|
| ISO 8859 | Information processing - 8-bit single-byte coded graphic character sets<br>Part 1: Latin alphabet No.1 |
| ISO 9660 | Information Processing - Volume and File Structure of CD-ROM for Information Interchange. |
| ANSI/IEEE 802.3 | IEEE Standards for Local Area Networks, Carrier Sense Multiple Access with Collision Detection (CSMA/CD)Access Method and Physical Layer Specifications |
| ISO/IEC 8211, | Information processing - Specification for a data descriptive file for information interchange |
| ISO/IEC 10646 | Information technology - Universal Multiple-Octet Coded Character Set (UCS)<br>Part 1: Architecture and Basic Multilingual Plane |

### 1.6.2 Specifications

| | |
|---|---|
| The Open GIS Abstract | Open GIS Consortium. Topic 9: Quality Version 4<br>Specification 1999 |

### 1.6.3 Other References

| | |
|---|---|
| AML | Feature and Attribute Catalogue |
| IUCN Red list | www.redlist.org |
| ITIS | www.itis.usda.gov |

## 1.7 DEFINITIONS

**AML** AML is a unified range of digital geospatial data products designed to satisfy the totality of NATO non-navigational maritime defence requirements.

## 1.8 KEY WORDS

AML

IWC phase 1

PRODUCT SPECIFICATION

## 1.9 MAINTENANCE AND SUPPORT OF THE PRODUCT SPECIFICATION

Specific processes and mechanisms that are established for the maintenance of AML Product Specifications are described in the sections 1.9.1 to 1.9.6 below.

### 1.9.1 Frequency of Review

The AML IWC phase 1 Product specification (version 2.0) will be frozen for a period of 2 years following endorsement, unless replaced by a compatible IWC phase 2 within that time scale.

### 1.9.2 Method of Maintenance

Corrections, clarifications and requests for change will be administered by the custodian. Discussion regarding proposed changes will be carried out by correspondence with national Points of Contact. Consolidated maintenance documents will be issued periodically containing published corrections and clarifications together with details of agreed extensions (these will be formally incorporated into the Product Specification and become live at its next revision).

Changes to the Product Specification beyond extensions will be reviewed by committee[1] during preparatory work for production of the next edition of the specification.

### 1.9.3 Method of Promulgation

Maintenance documents, new editions of specifications, and related documentation will be sent to nations through their appointed AML point of contact or published on the AML website.

### 1.9.4 Authority Responsible for Maintenance

AML Product Specifications will be maintained by the Custodian specified in section 1.2.3.

### 1.9.5 Error Reporting/Change Request Procedure

Comments concerning the content of the AML Product Specifications and requests for change should be addressed to the Custodian.

### 1.9.6 Available Support

Contact the Custodian for guidance and advice relating to this product specification.

[1] Will be a specific group reporting to the GMWG or its successor.

# 2 GENERAL PRODUCT DESCRIPTION

**PRODUCT TITLE**

Additional Military Layers – Integrated Water Column phase 1.

**SHORT TITLE**

AML IWC

**REFERENCE**

NATO STANAG No.7170 (Additional Military Layers).

NATO STANAG No. 4564 (Performance Standards for Warship Electronic Chart Display and Information System (WECDIS), Edition 1, Annex B, Data Products.

## 2.1 MAINTENANCE OF THE DATA PRODUCT

The frequency and method of provision of update or replacement data will be defined by each AML producing agency.

## 2.2 SUPPORT FOR MULTIPLE MODES OF OPERATION

AML IWC phase 1 data is rendered for a variety of purposes such as the depiction of monthly climatological values over an area or the distribution of marine mammals.

Data may be made available in a range of spatial and temporal resolutions as described in the following tables.

| SPATIAL SCALE BAND | SPATIAL COMPUTATION GRID SIZE |
|---|---|
| 1 | 20 degrees or coarser |
| 2 | 5 degrees |
| 3 | 1 degree |
| 4 | 30 minutes |
| 5 | 6 minutes |
| 6 | 1 minute |
| 7 | 30 seconds |
| 8 | 6 seconds |
| 9 | 1 second or finer |

| TEMPORAL SCALE BAND | TEMPORAL PERIOD |
|---|---|
| A | Year |
| B | Quarter Year |
| C | Month |
| D | Semi-month |
| E | Week |
| F | Day |

## 2.3 GEOGRAPHIC ORGANISATION

### 2.3.1 Regional Scheme

AML IWC phase 1 products may be global or partitioned, either by geographic region and or temporal period.

### 2.3.2 Tiling Scheme

See appropriate annex.

## 2.4 LAYER ORGANISATION

The content of the product is not layered. However, specific exchange standards may impose their own internal layering requirements. See appropriate annex.

## 2.5 EXCHANGE STANDARD IMPLEMENTATION

This product specification has been written to be independent of the exchange standard used. Details of exchange standard implementations are given in the relevant annex.

### 2.5.1 Spatial Data Type

AML IWC phase 1 contains gridded data, each grid point consists of the two spatial dimensions; x (eastwards) and y (northwards). Depth level and temporal period are attributes of the point data.

### 2.5.2 Level of Topology

See appropriate annex.

### 2.5.3 Relationship with Layering

See appropriate annex.

### 2.5.4 Textual Information

Attributes that contain free text must not be used when it is possible to encode the information by means of any other attribute.

### 2.5.5 Reference to External Files

Text and picture files may also be included in the AML product to provide additional information if supported by the implementation annex.

Below are examples of potential formats.

- ASCII
- TIFF
- PDF
- HTML
- JPEG
- AVI
- MPEG

## 2.6 SIZING REQUIREMENTS

Data producers should partition datasets such that data access time in the receiving system is acceptable to users. This will vary between data types and receiving systems.

## 2.7 GENERAL SOURCE DESCRIPTION

### 2.7.1 Minimum Source Requirements

- There is no minimum grid resolution requirement but it should be (as fine as possible) supported by observations and rendered at the appropriate grid size.
- Mandatory attribution levels specified in section 5 are met.

### 2.7.2 Applicable Sources

The source of individual values expressed in a climatology is of minimal relevance without detailed understanding of the processing methods and techniques used to build the climatology. For details of the method of data collection and processing techniques used refer to the producing authority. See also product data-set meta information in section 5.5.1.

# 3 GENERAL DATA DESCRIPTION

## 3.1 DATUMS

Please refer to NATO STANAG 2211 - Geodetic Datums, Ellipsoids, Grids & Grid References, which establishes the NATO guidelines to the use of horizontal and vertical datums.

### 3.1.1 Horizontal Datum

The horizontal datum for the AML IWC is the World Geodetic System 1984 (WGS 84).

### 3.1.2 Vertical Datums

3.1.2.1 *Height Datum*

N/A

3.1.2.2 *Depth Datum*

The datum for all values expressed in oceanographic data is the sea surface. Depths are recorded as increasing in a positive direction from the sea surface to the sea bed.

## 3.2 UNITS

The default units to be used in AML IWC are SI and scaled where necessary.

- Position: latitude and longitude in decimal degrees
- Profile depths: metres
- Temporal period: see section 2.2.
- Temperature profile: Degrees C
- Sound speed profile: metres per second (m/sec)
- Salinity profile: practical salinity units (psu)
- Density profile: Kilograms per cubic metre ($Kg/m^3$)
- Occurrence frequency: percentage points (%)
- Ocean current rate: metres per second (m/sec)
- Ocean current vectors: metres per second (m/sec)
- Ocean current direction: true bearing (degrees clockwise from true north)
- Marine mammal probability of occurrence: percentage points (%)
- Marine mammal predicted density: Number of animals per square Km
- Marine mammal dive depth: metres
- Marine mammal length: metres
- Marine mammal voice source level: decibels (dB re 1µpa at 1m)
- Marine mammal voice frequency: Hertz
- Marine mammal swimming speed: metres per second (m/sec)

## 3.3 CO-ORDINATE SYSTEM

The co-ordinate system used by AML IWC is Latitude and Longitude. These will be recorded as:

**Positive values:** Used for latitudes **north** of the equator and longitudes **east** of the Greenwich Meridian.

**Negative values:** are used for latitudes **south** of the equator and longitudes **west** of the Greenwich Meridian.

## 3.4 PROJECTION

AML IWC phase 1 is based upon geographical co-ordinates and is not projected.

## 3.5 LANGUAGE AND CHARACTER SETS

### 3.5.1 Language

The exchange language used by AML IWC phase 1 is English.

### 3.5.2 Character Sets

ISO 8859-1 supports English and most European languages. For those languages that it does not support ISO/IEC 10646 shall be used.

## 3.6 DATA QUALITY

AML IWC phase 1 data quality information should be encoded at an appropriate level, as defined in sections 5.5.1, 5.5.2 & 5.5.4 and as specified by the exchange standard implementation.

AML data quality information encompasses the following categories:

- Quality of observed data
- Quantity of observed data
- Source of data
- Completeness for the Product Specification
- Climatology processing techniques
- Extent of observed data in time and space

Data quality information defined below for AML IWC phase 1 can be encoded as dataset metadata (see section 5.5.1)

### 3.6.1 Quality of observed data

It is assumed that the observed data will have been subject to a degree of scrutiny appropriate to the quality standards of the originating authority. The originating authority should be consulted for details of the quality standards applied.

### 3.6.2 Source of data

The source of the data should be quoted, refer to the originating authority for further details.

### 3.6.3 Completeness for the Product Specification

AML products may be produced to fulfil operational requirements, and therefore, may not contain all available information.

All AML datasets must specify instances when:

- All available data/information has been encoded. Missing data means that the information is not available
- Only specified/required data/information is encoded.

### 3.6.4 Extent of observed data in time and space

It is assumed that the data distribution in time & space is sufficient to support the resolution of the IWC product supplied by the originating authority. The originating authority should be consulted for details of the standards and or techniques applied.

**3.6.5** The following are not explicitly encoded due to the complexity of the subject but short comment may be made in the "supporting textual information" field

**3.6.5.1** Quantity of observed data

It is assumed that the quantity of observed data is sufficient to support the resolution of the IWC product supplied by the originating authority. The originating authority should be consulted for details of the data density standards applied.

**3.6.5.2** Climatology processing techniques

The originating authority should be consulted for full details of the standards and or techniques applied.

# 4 DATA STRUCTURE

Refer to the appropriate implementation annex for details of specific implementation, format, and structure.

# 5 DATA DICTIONARY

## 5.1 GENERAL GUIDELINES

This section provides real-world descriptions for the metadata, features and attributes contained within the AML IWC phase 1 dataset. Details of how this information is to be encoded (e.g. using the chosen Exchange Standard) can be found in the implementation annexes.

## 5.2 UNKNOWN/MISSING ATTRIBUTE VALUES

The way in which an unknown or missing attribute value is handled is dependent upon the exchange standard implemented, see appropriate annex.

## 5.3 USE OF META INFORMATION

Any meta information stored as attributes of features will override meta information stored at the data-set level. AML datasets contain the following meta-information:

### 5.3.1 Dataset Metadata

The following table provides the descriptions of dataset meta information required by AML IWC phase 1 to conform to this Product Specification.

For details of how to represent the dataset metadata described, refer to the appropriate exchange standard implementation annex.

| General/Production Information | Description |
|---|---|
| Production Agency | The agency responsible for the production of the data |
| Dataset Name | The name of the dataset |
| Edition Number | The edition number of the dataset |
| Date of Release | The date the dataset was made available by the data producer (e.g. edition or revision date) |
| Product Specification Description | The name of the AML Product Specification to which the dataset conforms (see section 2) |
| Product Specification Version Number | The version number of the AML Product Specification to which the dataset conforms (section 1.2.1) |
| Spatial scale band | The grid size or scale band of the dataset (see section 2.2) |
| Temporal scale band | The grid size or scale band of the dataset (see section 2.2) |
| Completeness for the Product Specification | All available data has been encoded, or not |
| Data coverage | The content of the data-set described as geographic coverage, extent of spatial objects or inclusion of features. |

| Security Classification Information | Description |
|---|---|
| International Defence Organisation (IDO) status (see note) | The International Defence Organisation (IDO) status (if applicable) that must precede, and be applied to, the Protective Marking thus making it an IDO Marking.<br>- North Atlantic Treaty Organisation (NATO)<br>- North Atlantic Co-operation Council (NACC)<br>- Partnership for Peace (PfP)<br>- Western European Union (WEU) |
| Protective marking | A marking indicating the minimum standards of protection required of the data.<br>- COSMIC TOP SECRET<br>- FOCAL TOP SECRET<br>- TOP SECRET<br>- SECRET<br>- CONFIDENTIAL<br>- RESTRICTED<br>- UNCLASSIFIED |
| Owner Authority | The NATO country code (NATO STANAG 1059) denoting the 'owner' that is responsible for establishing and setting the protective marking level |
| Caveat (see note) | A component of a security clearance and/or security class used for computing access rights and controlling information flow by authorising a specific group of subjects to have access to the information |
| Copyright Statement | Indicates any copyright or releaseability restrictions on the data |
| Grid type | Statement of whether the grid is a lattice, domain or other type. |

NOTE:

International Defence Organisation (IDO) markings and caveats are mutually exclusive. If the data has an IDO status, then the caveat is not applicable. Additionally, caveats only apply to data that has a Protective Marking of CONFIDENTIAL or above.

## 5.4 MANDATORY META INFORMATION

All dataset meta information stated in section 5.3.1 is mandatory, see 5.5.2 for mandatory associated attributes.

## 5.5 SCHEMA

The following tables (5.5.1, 5.5.2 and 5.5.4) provide the descriptions of meta information, real-world features, and associated attributes required by AML IWC phase 1 to be attributed as complete for this Product Specification. Regular grid points or centres of

latitude/longitude cells can be considered as zero-dimensional or point features, and climatological parameters at these points as associated attributes.

For details of how to represent the real-world features and associated attributes described, refer to the appropriate exchange standard implementation annex.

### 5.5.1 Meta Information

The following tables contain non-mandatory generic or data-set meta information.

| External Reference Information | Description |
|---|---|
| Data Source | Reference volumes or external oceanographic databases for physical properties data. |
| Originating Authority | The supplier of the source data. |
| Data Type | General description of the various data types used in the compilation of the IWC product |
| Image File Link | A reference to an image file containing a pictorial representation of the object |
| Text File Reference (in national language characters) | The file name relating to an external text file |
| Reference to a publication | Reference to a specific location of any relevant information within an external publication |

| Other Supporting Information | Description |
|---|---|
| Supporting textual information (in national language characters) | Supporting (free text) information relevant to the object that cannot be explicitly encoded by any other attribute.<br>Eg. Comments referring to climatology processing techniques and the quantity of observed data |

See also 5.3.1, 5.5.2 & 5.5.4

### 5.5.2 Features.

The object primitive 'point' is allowable for any feature in AML IWC phase 1. It can be a grid point where a climatological or ocean current field is sampled (lattice climatology, in which case interpolation is valid) or the centre of a latitude/longitude cell over which the field is averaged (domain climatology, in which case interpolation is not valid). The following table contains the information described below:

- Feature – gives the name of the feature.
- Description – describes the feature.
- Associated Attributes – indicates allowable attributes relevant to each feature. (see section 5.5.4 for attribute descriptions and values.)
- M – denotes that the attribute field is mandatory (also emboldened text)
- Form – indicates the geometric form that the feature class can take (i.e. **P**oint, **L**ine, or **A**rea)
- SD is the Standard Deviation value for each parameter.

| Feature | Description | Associated Attributes | | Form | | |
|---|---|---|---|---|---|---|
| | | Description | M | P | L | A |
| Temperature and Salinity Distribution Grid Point | A geographical point to which the physical properties of the water column climatology are appended | • **Temporal period**<br>• **depth**<br>• **Temperature**<br>• **Salinity**<br>• **N-profile**<br>• Sound speed<br>• Density<br>• SD Temperature<br>• SD Salinity<br>• SD Sound speed<br>• SD Density<br>• **Occurrence frequency**<br>• Data quality<br>• Data quantity | √<br>√<br>√<br>√<br>√<br><br><br><br><br><br><br>√<br><br> | √ | | |
| Ocean Current Distribution Grid Point | A geographical point to which the ocean current information is appended | • **Temporal period**<br>• **depth**<br>• **Ocean current rate**<br>• **Ocean current direction**<br>• U vector<br>• V vector<br>• W vector<br>• SD Ocean current rate<br>• SD Ocean current direction | √<br>√<br>√<br>√<br><br><br><br><br> | √ | | |

| Feature | Description | Associated Attributes | | Form | | |
|---|---|---|---|---|---|---|
| | | Description | M | P | L | A |
| | | • Data quality<br>• Data quantity | | | | |
| Marine Mammal Distribution Grid Point | A geographical point to which marine mammal distribution information, organised by species, is appended | • **Family**<br>• **Genus**<br>• **Species**<br>• **Common name**<br>• **species code**<br>• **Temporal period**<br>• Probability of occurrence<br>• Predicted Density<br>• Relative Environmental Suitability<br>• Activity<br>• Activity start date<br>• Activity end date<br>• Quality of activity data<br>• Quality of RES data<br>• Quality of Probability of occurrence data<br>• Quality of Predicted density data | √<br>√<br>√<br>√<br>√<br>√ | √ | | |

In addition to the 'associated attributes' listed for individual real-world features 'generic attributes' are used at the data-set level. These encode meta and supporting information that may exist on any feature. Generic attributes used in AML IWC phase 1 are described in section 5.3.1 & 5.5.1.

For details of how to encode the features listed in this section, refer to the appropriate exchange standard implementation annex.

### 5.5.3 Mandatory Features

There are no mandatory features in IWC phase 1.

### 5.5.4 Attributes

The climatological parameters can be considered as attributes of the point features. The table below displays the following information:

- Attribute – gives the name of attribute.

- Definition – gives a more detailed description of the attribute if required.
- Values – specifies the range of values and units of measurement the attribute may take

For details of how to encode the attributes listed in this section, refer to the appropriate exchange standard implementation annex.

| Attribute | Definition | Values |
|---|---|---|
| Temporal period | The date of the central value of the temporal period defined in the dataset metadata (temporal resolution will not vary within a single dataset). | A date expressed as; CCYYMMDDHHMM |
| depth | Depth for which the data is given. | Metres |
| N-Profile | Defines the position of the given profile in the range 1 to n | No Units |
| Temperature i (i from 1 to n) | Temperature at each depth for a given profile | Degrees C<br>997 No Data<br>998 Not Applicable |
| Salinity i (i from 1 to n) | Salinity at each depth for a given profile | Practical salinity units<br>997 No Data<br>998 Not Applicable |
| Sound speed i (i from 1 to n) | Sound speed at each depth for a given profile | Metres per second<br>997 No Data<br>998 Not Applicable |
| Density i (i from 1 to n) | Density at each depth for a given profile | Kilograms per cubic metre<br>997 No Data<br>998 Not Applicable |
| Temperature standard deviation i (i from 1 to n) | Standard deviation value for each depth for a given profile in the range 1 to n | Degrees C<br>997 No Data<br>998 Not Applicable |
| Salinity standard deviation i (i from 1 to n) | Standard deviation value for each depth for a given profile in the range 1 to n | Practical salinity units<br>997 No Data<br>998 Not Applicable |
| Sound speed standard deviation i (i from 1 to n) | Standard deviation value for each depth for a given profile in the range 1 to n | Metres per second<br>997 No Data<br>998 Not Applicable |
| Density standard deviation i (i from 1 to n) | Standard deviation value for each depth for a given profile in the range 1 to n | Kilograms per cubic metre<br>997 No Data<br>998 Not Applicable |
| Occurrence frequency i (i from 1 to n) | The likelihood that a given profile in the range 1 to n | Percentage probability<br>997 No Data |

| Attribute | Definition | Values |
|---|---|---|
| | will occur. | 998 Not Applicable |
| Ocean current rate | Speed of water movement with respect to the sea bed at a given 3 dimensional position in the water column | Metres per second<br>997 No Data<br>998 Not Applicable |
| Ocean current direction | True bearing, indicating direction of water movement with respect to the sea bed at a given 3 dimensional position in the water column | degrees measured clockwise from true north<br>997 No Data<br>998 Not Applicable |
| Ocean current rate standard deviation | Standard deviation value for each depth | Metres per second<br>997 No Data<br>998 Not Applicable |
| Ocean current direction standard deviation | Standard deviation value for each depth | degrees measured from mean direction<br>997 No Data<br>998 Not Applicable |
| Ocean current vector u | Component of velocity in the x axis, positive = west to east | Metres per second<br>997 No Data<br>998 Not Applicable |
| Ocean current vector v | Component of velocity in the y axis, positive = south to north | Metres per second<br>997 No Data<br>998 Not Applicable |
| Ocean current vector w | Component of velocity in the vertical, positive = upwards | Metres per second<br>997 No Data<br>998 Not Applicable |
| Ocean Current data quality | Validity of the data | Red, Amber, Green where green is good and red is poor. As defined by the Production Agency |
| Ocean Current data quantity | Number of observations used in the calculation of representative vectors | Number of observations per position per temporal period. |
| Physical Properties data quality | Reliability of the data | 001 Red,<br>002 Amber,<br>003 Green<br>where green is good and red is poor. As defined by the Production Agency<br>997 No Data |

| Attribute | Definition | Values |
|---|---|---|
| | | 998 Not Applicable |
| Physical Properties data quantity | Number of observations used in the calculation of representative profiles | Number observations per grid square per temporal period.<br>997 No Data<br>998 Not Applicable |
| Family | Group of allied genera of animals. | 001 Otariidae - fur seals and sea lions<br>002 Odobenidae - walruses<br>003 Phocidae - true seals<br>004 Balaenidae - right whales<br>005 Neobalaenidae - pygmy right whales<br>006 Eschrichtiidae - gray whales<br>007 Balaenopteridae - rorquals<br>008 Physeteridae - sperm whales<br>009 Kogiidae - pygmy sperm whales<br>010 Ziphiidae - beaked whales<br>011 Platanistidae - Indian river dolphins<br>012 Iniidae - Amazon river dolphins<br>013 Lipotidae - Chinese river dolphins<br>014 Pontoporiidae - La Plata dolphins<br>015 Monodontidae - Belugas and Narwhals<br>016 Delphinidae - Dolphins<br>017 Phocoenidae - Porpoises<br>018 Dugongidae - Dugongs<br>019 Trichechidae - Manatees |
| Genus | Group of animals with | Scientific genus name |

| Attribute | Definition | Values |
|---|---|---|
| | common structural characteristics, may contain any number of individual species. | (Text string) |
| Species | Group of animals within genus, differing only in minor ways from others. | Scientific species name<br>(Text string) |
| Common name | The common usage name applied to the species. | Text string |
| Species Code | Integrated Taxonomic Information System (IT IS) Code<br><br>For full details see reference in section 1.6.3 | Numeric Code.<br><br>The full list of applicable codes is included in the table at Appendix A to this document |
| Guild ID | Alphanumeric code defining the functional forms to be used for hearing thresholds, dive behaviour, movement in response to insonification and biological response to insonification | Alphanumeric string<br><br>Defined in Appendix B |
| Probability of occurrence | The likelihood of encountering a given species in the particular area | A value, expressed as a percentage where high numbers indicate high probability of occurrence<br>997 No Data<br>998 Not Applicable |
| Predicted Density | The number of animals of a given species predicted to be present in a given area | A decimal value of animals per square kilometre |
| Relative Environmental Suitability (RES) | The suitability of the environment to support a given species. This is directly related to the probability of occurrence. | A value, expressed to two decimal places, between zero and one where high numbers indicate high RES<br>997 No Data<br>998 Not Applicable |
| Activity | The type of activity a species can be exhibiting in the location. | 001 Breeding<br>002 Breeding & Feeding<br>003 Breeding, Feeding & |

| Attribute | Definition | Values |
|---|---|---|
| | | Migrating<br>004 Migrating<br>005 Feeding & Migrating<br>006 Breeding & Migrating<br>007 Feeding<br>008 Not Present<br>009 Present but activity unknown<br>997 No Data<br>998 Not Applicable |
| Activity start date | Defines the earliest date at which the specified activity can take place. | Date expressed as coded string (CCYYMMDD) |
| Activity end date | Defines the latest date at which the specified activity can take place. | Date expressed as coded string (CCYYMMDD) |
| Quality of activity data | Numeric field whereby negative values indicate qualitative measures of uncertainty and positive values indicate quantitative measures ie. Coefficient of variation | Quantitative:<br><br>Floating point number from 0-1<br><br>Qualitative:<br><br>-1 Extremely High<br>-2 Very High<br>-3 High<br>-4 Medium<br>-5 Low<br>-6 Very Low<br>-7 Extremely Low<br><br>As defined by the Production Agency |
| Quality of RES data | Numeric field whereby negative values indicate qualitative measures of uncertainty and positive values indicate quantitative measures ie. Coefficient of variation | Quantitative:<br><br>Floating point number from 0-1<br><br>Qualitative:<br><br>-1 Extremely High |

| Attribute | Definition | Values |
|---|---|---|
| | | -2 Very High<br>-3 High<br>-4 Medium<br>-5 Low<br>-6 Very Low<br>-7 Extremely Low<br><br>As defined by the Production Agency |
| Quality of Probability of occurrence data | Numeric field whereby negative values indicate qualitative measures of uncertainty and positive values indicate quantitative measures ie. Coefficient of variation | Quantitative:<br><br>Floating point number from 0-1<br><br>Qualitative:<br><br>-1 Extremely High<br>-2 Very High<br>-3 High<br>-4 Medium<br>-5 Low<br>-6 Very Low<br>-7 Extremely Low<br><br>As defined by the Production Agency |
| Quality of Predicted Density data | Numeric field whereby negative values indicate qualitative measures of uncertainty and positive values indicate quantitative measures ie. Coefficient of variation | Quantitative:<br><br>Floating point number from 0-1<br><br>-1 Extremely High<br>-2 Very High<br>-3 High<br>-4 Medium<br>-5 Low<br>-6 Very Low<br>-7 Extremely Low<br><br>As defined by the |

| Attribute | Definition | Values |
|---|---|---|
| | | Production Agency |
| Source of density data | Source of data used to generate density predictions | Text |

If ocean current vectors are populated "u" & "v" must be used together and "w" is optional.

The variables "No Data" and "Not Applicable" hold the values which indicate that data should be present but is not available "No Data" and that data should not be present "Not Applicable"

The following encyclopaedic marine mammal information may be held as additional attribution in the dataset or in an accompanying look-up table depending upon the implementation format (see appropriate carrier annex).

| Attribute | Definition | Values |
|---|---|---|
| Conservation status | International Union for Conservation of Nature (latterly World Conservation Union) (IUCN) red list categories.<br>For full details see reference in section 1.6.3 | 000 Unknown<br>001 Critically endangered (CR)<br>002 Endangered (EN)<br>003 Vulnerable (VU)<br>004 Lower risk (LR)<br>005 Data deficient (DD)<br>006 Not evaluated (NE) |
| Habitat | Typical space occupied by an individual or group of individuals. | 000 unknown<br>001 coastal - continental slope (down to deep offshore waters)<br>002 mainly coastal - continental shelf (down to deep offshore waters)<br>003 mainly coastal - continental shelf (down to end of continental slope)<br>004 mainly coastal - continental slope (down to very deep waters)<br>005 mainly coastal - upper continental shelf (down to upper continental slope) |

| Attribute | Definition | Values |
|---|---|---|
| | | 006 mainly coastal - upper continental slope (down to deep offshore waters)<br>007 mainly continental slope - abyssal plains (down to very deep waters)<br>008 mainly continental slope (down to deep waters)<br>009 mainly continental slope (down to very deep waters)<br>010 mainly estuarine (down to beyond shelf break)<br>011 mainly lower continental slope - abyssal plains (down to very deep waters)<br>012 mainly lower continental slope (down to very deep waters)<br>013 mainly upper continental slope (down to deep waters)<br>014 restricted to abyssal plains - beyond (down to very deep waters)<br>015 restricted to estuarine & coastal waters (down to end of continental shelf) |
| Habitat Minimum depth | Minimum depth of water in which the species is known to live. | Metres |
| Habitat Maximum depth | Maximum depth of water in which the species is known to live. | Metres |
| Maximum dive depth | Deepest of the range of recorded dive depths | Metres |
| Minimum dive depth | Shallowest of the range of recorded dive depths | Metres |
| Maximum dive duration | Longest of the range of recorded dive durations | Minutes |
| Minimum dive duration | Shortest of the range of recorded dive durations | Minutes |

| Attribute | Definition | Values |
|---|---|---|
| Maximum surface duration | Longest of the range of recorded surface durations | Minutes |
| Minimum surface duration | Shortest of the range of recorded surface durations | Minutes |
| Danger | An indication of how dangerous an individual species can be to human resources engaged in operations. | 000 Unknown<br>001 High risk ( chance of death or permanent serious injury)<br>002 Medium risk (temporary incapacitation)<br>003 Low risk (unlikely to affect operational effectiveness) |
| Maximum voice frequency | Maximum frequency generated by species | Hertz. |
| Minimum voice frequency | Minimum frequency generated by species | Hertz. |
| Maximum voice source level | Maximum source level expected from a species. | dB re 1µpa at 1m. |
| Minimum voice source level | Minimum source level expected from a species. | dB re 1µpa at 1m. |
| Maximum adult length | Maximum length an adult of a particular species may achieve. | Metres |
| Minimum adult length | Minimum length at sexual maturity | Metres |
| Sensitivity to noise group | Group of animal species associated by a common relative sensitivity to noise in the water column. | Integer values from 1-n (where n is the number of groups defined by the producing authority and supplied as an external reference file)<br>997 No Data |
| Maximum Group size | The largest number of animals likely to be encountered in a single group. | Integer |
| Minimum Group Size | Lower point of the range of recorded group sizes | Integer |
| Maximum swimming speed | The fastest recorded swimming speed for this species. | Metres per second |
| Minimum swimming speed | Lower point of the range of | Metres per second |

| Attribute | Definition | Values |
|---|---|---|
| | recorded swimming speeds for this species. | |
| Quality of habitat data | Reliability of the data | Red, Amber, Green where green is good and red is poor. As defined by the Production Agency |
| Quality of habitat depth data | Reliability of the data | Red, Amber, Green where green is good and red is poor. As defined by the Production Agency |
| Quality of maximum group size data | Reliability of the data | Red, Amber, Green where green is good and red is poor. As defined by the Production Agency |
| Quality of minimum group size data | Reliability of the data | Red, Amber, Green where green is good and red is poor. As defined by the Production Agency |
| Quality of maximum swimming speed data | Reliability of the data | Red, Amber, Green where green is good and red is poor. As defined by the Production Agency |
| Quality of minimum swimming speed data | Reliability of the data | Red, Amber, Green where green is good and red is poor. As defined by the Production Agency |
| Quality of sensitivity group data | Reliability of the data | Red, Amber, Green where green is good and red is poor. As defined by the Production Agency |
| Quality of maximum dive depth value | Reliability of the data | Red, Amber, Green where green is good and red is poor. As defined by the Production Agency |
| Quality of minimum dive depth value | Reliability of the data | Red, Amber, Green where green is good and red is poor. As defined by the Production Agency |
| Quality of maximum dive duration value | Reliability of the data | Red, Amber, Green where green is good and red is poor. As defined by the Production Agency |
| Quality of minimum dive duration value | Reliability of the data | Red, Amber, Green where green is good and red is poor. As defined by the |

| Attribute | Definition | Values |
|---|---|---|
| | | Production Agency |
| Quality of maximum surface duration value | Reliability of the data | Red, Amber, Green where green is good and red is poor. As defined by the Production Agency |
| Quality of minimum surface duration value | Reliability of the data | Red, Amber, Green where green is good and red is poor. As defined by the Production Agency |
| Quality of voice frequency values | Reliability of the data | Red, Amber, Green where green is good and red is poor. As defined by the Production Agency |
| Quality of maximum adult length values | Reliability of the data | Red, Amber, Green where green is good and red is poor. As defined by the Production Agency |
| Quality of minimum adult length values | Reliability of the data | Red, Amber, Green where green is good and red is poor. As defined by the Production Agency |
| Quality of danger value | Reliability of the data | Red, Amber, Green where green is good and red is poor. As defined by the Production Agency |
| Quality of voice source level value | Reliability of the data | Red, Amber, Green where green is good and red is poor. As defined by the Production Agency |

# 6 DATA CAPTURE GUIDELINES

The ‘AML IWC phase 1 carrier format annex provides guidance on the conventions that are to be used to encode grid points, and associated attribution (parameters), using a relevant implementation standard. The content of the AML IWC phase 1 is at the discretion of the producing authority.

## 6.1 CONTINUITY

Gridded datasets consisting of multiple digital source files should aim to be contiguous for consistency of display. To avoid duplication, grid points on the eastern and northern boundaries of a selected area should not be included, in case an adjacent area is added later.

# 7 DATA PRESENTATION

## 7.1 SCOPE

The way in which AML IWC phase 1 is displayed is dependent upon an individual customer's requirement. How their systems are developed to display AML IWC phase 1 data will largely be governed by the:

- Environment in which the data is to be viewed
- Types of products that are to be displayed with the AML product

This Product Specification is designed to support the production and supply of Integrated Water Column phase 1. It does not address data presentation.

# 8 PROVISION OF DATA

## 8.1 GENERAL

### 8.1.1 File Format (Encapsulation)

The file format or encapsulation is exchange standard specific.

### 8.1.2 Auxiliary Information

All media containing AML products will contain cataloguing information regarding the coverage of the products contained within it. A complete AML catalogue is planned for future development.

## 8.2 DISTRIBUTION MEDIA

AML is available in the following format(s):

- **CD-ROM**
- **DVD**

Other approved means of distribution will be promulgated in due course. While data must be available to users on standard media, other media/transmission means may be agreed directly between producers and recipients.

## 8.3 VOLUME NAMING

AML volumes (defined as packages) may contain several datasets, each from a different product specification. The volume naming convention for AML 'Packages' is not defined by AML Product Specifications.

## 8.4 FILE NAMING

**CD-ROM** AML file naming conforms to ISO 9660, International Standards Organisation, Information Processing - Volume and File Structure of CD-ROM for Information Interchange.

## 8.5 DIRECTORY STRUCTURE

**CD-ROM** The directory structure conforms to ISO 9660, International Standards Organisation, Information Processing - Volume and File Structure of CD-ROM for Information Interchange.

## 8.6 ERROR DETECTION

Datasets will undergo file integrity checks that are dependent upon the exchange standard implemented.

## 8.7 COMPRESSION

See appropriate implementation annex.

## 8.8 ENCRYPTION

All AML products are unencrypted, irrespective of security classification.

## 8.9 HARDWARE AND SOFTWARE REQUIREMENTS

N/A.

# 9 TESTING METHOD

This product specification has been designed to achieve interoperability of AML data products and other digital data products. This is achieved by the separation of the data dictionary from the standard used to encode the data and by the use of internationally recognised standards for the transfer of the data.

It is the responsibility of the data producer to ensure that AML data products fully conform to this Product Specification and to the chosen transfer standard.

# APPENDIX A MARINE MAMMALS

| Common name | Scientific name | SpecID | ITIS | | Sensitivity Group | Sensitivity Group Name |
|---|---|---|---|---|---|---|
| Bowhead whale | Balaena mysticetus | Bamys | | 180533 | 1a | Large Baleen Whales |
| Blue whale | Balaenoptera musculus | Bamus | | 180528 | 1a | Large Baleen Whales |
| Gray whale | Eschrichtius robustus | Esrob | | 180521 | 1a | Large Baleen Whales |
| Southern right whale | Eubalaena australis | Baaus | | 552771 | 1a | Large Baleen Whales |
| North Atlantic right whale | Eubalaena glacialis | Bagla | | 180537 | 1a | Large Baleen Whales |
| North Pacific right whale | Eubalaena japonica | Bajap | | 612591 | 1a | Large Baleen Whales |
| Humpback whale | Megaptera novaeangliae | Menov | | 180530 | 1a | Large Baleen Whales |
| Dwarf minke whale | Balaenoptera acutorostrata | Baacu | | 180524 | 1b | Small Baleen Whales |
| Antarctic minke whale | Balaenoptera bonaerensis | Babon | | 612592 | 1b | Small Baleen Whales |
| Sei whale | Balaenoptera borealis | Babor | | 180526 | 1b | Small Baleen Whales |
| Bryde's whale | Balaenoptera brydei | Babry | | 612597 | 1b | Small Baleen Whales |
| Eden's whale | Balaenoptera edeni | Baede | | 180525 | 1b | Small Baleen Whales |
| Fin whale | Balaenoptera physalus | Baphy | | 180527 | 1b | Small Baleen Whales |
| Pygmy right whale | Caperea marginata | Camar | | 180535 | 1b | Small Baleen Whales |
| Northern bottlenose whale | Hyperoodon ampullatus | Hyamp | | 180504 | 2a | Large Toothed whales |
| Southern bottlenose whale | Hyperoodon planifrons | Hypla | | 180505 | 2a | Large Toothed whales |
| Killer whale | Orcinus orca | Ororc | | 180469 | 2a | Large Toothed whales |
| Sperm whale | Physeter catodon | Phmac | | 180488 | 2a | Large Toothed whales |
| Beluga or white whale | Delphinapterus leucas | Deleu | | 180483 | 2b | Offshore Toothed Whales |
| Long-beaked common dolphin | Delphinus capensis | Decap | | 555654 | 2b | Offshore Toothed Whales |
| Short-beaked common dolphin | Delphinus delphis | Dedel | | 180438 | 2b | Offshore Toothed Whales |
| Arabian common dolphin | Delphinus tropicalis | Detro | | 612595 | 2b | Offshore Toothed Whales |
| Pygmy killer whale | Feresa attenuata | Featt | | 180461 | 2b | Offshore Toothed Whales |
| Short-finned pilot whale | Globicephala macrorhynchus | Glmac | | 180466 | 2b | Offshore Toothed Whales |
| Long-finned pilot whale | Globicephala melas | Glmel | | 552461 | 2b | Offshore Toothed Whales |
| Risso's dolphin | Grampus griseus | Grgri | | 180457 | 2b | Offshore Toothed Whales |
| Pygmy sperm whale | Kogia breviceps | Kobre | | 180491 | 2b | Offshore Toothed Whales |
| Dwarf sperm whale | Kogia simus | Kosim | | 612590 | 2b | Offshore Toothed Whales |
| Fraser's dolphin | Lagenodelphis hosei | Lahos | | 180440 | 2b | Offshore Toothed Whales |
| Atlantic white-sided dolphin | Lagenorhynchus acutus | Laacu | | 180443 | 2b | Offshore Toothed Whales |

| | | | | | |
|---|---|---|---|---|---|
| White-beaked dolphin | Lagenorhynchus albirostris | Laalb | 180442 | 2b | Offshore Toothed Whales |
| Peale's dolphin | Lagenorhynchus australis | Laaus | 180446 | 2b | Offshore Toothed Whales |
| Hourglass dolphin | Lagenorhynchus cruciger | Lacru | 180447 | 2b | Offshore Toothed Whales |
| Pacific white-sided dolphin | Lagenorhynchus obliquidens | Laobl | 180444 | 2b | Offshore Toothed Whales |
| Dusky dolphin | Lagenorhynchus obscurus | Laobs | 180445 | 2b | Offshore Toothed Whales |
| Northern right whale dolphin | Lissodelphis borealis | Libor | 180454 | 2b | Offshore Toothed Whales |
| Southern right whale dolphin | Lissodelphis peronii | Liper | 180455 | 2b | Offshore Toothed Whales |
| Narwhal | Monodon monoceros | Momon | 180485 | 2b | Offshore Toothed Whales |
| Melon-headed whale | Peponocephala electra | Peele | 180459 | 2b | Offshore Toothed Whales |
| False killer whale | Pseudorca crassidens | Pscra | 180463 | 2b | Offshore Toothed Whales |
| Pacific hump-backed dolphin | Sousa chinensis | Sochi | 180419 | 2b | Offshore Toothed Whales |
| Indian hump-backed dolphin | Sousa plumbea | Soplu | 612594 | 2b | Offshore Toothed Whales |
| Atlantic hump-backed dolphin | Sousa teuszii | Soteu | 180420 | 2b | Offshore Toothed Whales |
| Pantropical spotted dolphin | Stenella attenuata | Statt | 180430 | 2b | Offshore Toothed Whales |
| Clymene dolphin | Stenella clymene | Stcly | 180435 | 2b | Offshore Toothed Whales |
| Striped dolphin | Stenella coeruleoalba | Stcoe | 180434 | 2b | Offshore Toothed Whales |
| Atlantic spotted dolphin | Stenella frontalis | Stfro | 552460 | 2b | Offshore Toothed Whales |
| Spinner dolphin | Stenella longirostris | Stlon | 180429 | 2b | Offshore Toothed Whales |
| Rough-toothed dolphin | Steno bredanensis | Stbre | 180417 | 2b | Offshore Toothed Whales |
| Indian Ocean bottlenose dolphin | Tursiops aduncus | Tuadu | 612596 | 2b | Offshore Toothed Whales |
| Bottlenose dolphin | Tursiops truncatus | Tutru | 180426 | 2b | Offshore Toothed Whales |
| Arnoux's beaked whale | Berardius arnuxii | Bearn | 180495 | 2c | Beaked whales |
| Baird's beaked whale | Berardius bairdii | Bebai | 180496 | 2c | Beaked whales |
| Longman's beaked whale | Indopacetus pacificus | Inpac | 180502 | 2c | Beaked whales |
| Sowerby's beaked whale | Mesoplodon bidens | Mebid | 180515 | 2c | Beaked whales |
| Andrews' beaked whale | Mesoplodon bowdoini | Mebow | 180513 | 2c | Beaked whales |
| Hubb's beaked whale | Mesoplodon carlhubbsi | Mecar | 180512 | 2c | Beaked whales |
| Blainville's beaked whale | Mesoplodon densirostris | Meden | 180517 | 2c | Beaked whales |
| Gervais' beaked whale | Mesoplodon europaeus | Meeur | 180509 | 2c | Beaked whales |
| Ginkgo-toothed beaked whale | Mesoplodon ginkgodens | Megin | 180510 | 2c | Beaked whales |
| Gray's beaked whale | Mesoplodon grayi | Megra | 180511 | 2c | Beaked whales |
| Hector's beaked whale | Mesoplodon hectori | Mehec | 180507 | 2c | Beaked whales |
| Strap-toothed whale | Mesoplodon layardii | Melay | 180516 | 2c | Beaked whales |

| | | | | | |
|---|---|---|---|---|---|
| True's beaked whale | Mesoplodon mirus | Memir | 180508 | 2c | Beaked whales |
| Perrin's beaked whale | Mesoplodon perrini | Meprr | 612599 | 2c | Beaked whales |
| Pygmy beaked whale | Mesoplodon peruvianus | Meper | 552772 | 2c | Beaked whales |
| Stejneger's beaked whale | Mesoplodon stejnegeri | Meste | 180514 | 2c | Beaked whales |
| Spade-toothed beaked whale | Mesoplodon traversii | Mebah | 612598 | 2c | Beaked whales |
| Tasman or Shepherd's beaked whale | Tasmacetus shepherdi | Tashe | 180500 | 2c | Beaked whales |
| Cuvier's beaked whale | Ziphius cavirostris | Zicav | 180498 | 2c | Beaked whales |
| Commerson's dolphin | Cephalorhynchus commersonii | Cecom | 180449 | 2d | Inshore and Small Toothed Whales |
| Black dolphin | Cephalorhynchus eutropia | Ceeut | 180450 | 2d | Inshore and Small Toothed Whales |
| Heaviside's dolphin | Cephalorhynchus heavisidii | Cehea | 180451 | 2d | Inshore and Small Toothed Whales |
| Hector's dolphin | Cephalorhynchus hectori | Cehec | 180452 | 2d | Inshore and Small Toothed Whales |
| Finless porpoise | Neophocaena phocaenoides | Nepho | 180478 | 2d | Inshore and Small Toothed Whales |
| Irrawaddy dolphin | Orcaella brevirostris | Orbre | 180471 | 2d | Inshore and Small Toothed Whales |
| Spectacled porpoise | Phocoena dioptrica | Phdio | 180475 | 2d | Inshore and Small Toothed Whales |
| Harbour porpoise | Phocoena phocoena | Phpho | 180473 | 2d | Inshore and Small Toothed Whales |
| Vaquita | Phocoena sinus | Phsin | 180474 | 2d | Inshore and Small Toothed Whales |
| Burmeister's porpoise | Phocoena spinipinnis | Phspi | 180476 | 2d | Inshore and Small Toothed Whales |
| Dall's porpoise | Phocoenoides dalli | Phdal | 180480 | 2d | Inshore and Small Toothed Whales |
| Franciscana | Pontoporia blainvillei | Pobla | 180411 | 2d | Inshore and Small Toothed Whales |
| Tucuxi | Sotalia fluviatilis | Soflu | 180422 | 2d | Inshore and Small Toothed Whales |
| Hooded seal | Cystophora cristata | Cycri | 180657 | 4a | Hair Seals |
| Bearded seal | Erignathus barbatus | Erbar | 180655 | 4a | Hair Seals |
| Gray seal | Halichoerus grypus | Hagry | 180653 | 4a | Hair Seals |

| | | | | | |
|---|---|---|---|---|---|
| Ribbon seal | Histriophoca fasciata | Hifas | 622021 | 4a | Hair Seals |
| Leopard seal | Hydrurga leptonyx | Hylep | 180667 | 4a | Hair Seals |
| Weddell seal | Leptonychotes weddellii | Lewed | 180669 | 4a | Hair Seals |
| Crabeater seal | Lobodon carcinophagus | Locar | 180663 | 4a | Hair Seals |
| Northern elephant seal | Mirounga angustirostris | Miang | 180672 | 4a | Hair Seals |
| Southern elephant seal | Mirounga leonina | Mileo | 180671 | 4a | Hair Seals |
| Mediterranean monk seal | Monachus monachus | Momoa | 180659 | 4a | Hair Seals |
| Hawaiian monk seal | Monachus schauinslandi | Mosch | 180661 | 4a | Hair Seals |
| Ross seal | Ommatophoca rossii | Omros | 180665 | 4a | Hair Seals |
| Harp seal | Pagophilus groenlandicus | Pagro | 180647 | 4a | Hair Seals |
| Largha or spotted seal | Phoca largha | Phlar | 180642 | 4a | Hair Seals |
| Harbour seal | Phoca vitulina | Phvit | 180649 | 4a | Hair Seals |
| Ringed seal | Pusa hispida | Puhis | 622018 | 4a | Hair Seals |
| South American fur seal | Arctocephalus australis | Araus | 180633 | 4b | Eared Seals |
| New Zealand fur seal | Arctocephalus forsteri | Arfor | 180631 | 4b | Eared Seals |
| Galapagos fur seal | Arctocephalus galapagoensis | Argal | 180634 | 4b | Eared Seals |
| Antarctic fur seal | Arctocephalus gazella | Argaz | 180630 | 4b | Eared Seals |
| Juan Fernandez fur seal | Arctocephalus philippii | Arphi | 180635 | 4b | Eared Seals |
| South African & Australian fur seal | Arctocephalus pusillus | Arpus | 180629 | 4b | Eared Seals |
| Guadalupe fur seal | Arctocephalus townsendi | Artow | 180636 | 4b | Eared Seals |
| Subantarctic fur seal | Arctocephalus tropicalis | Artro | 180632 | 4b | Eared Seals |
| Northern fur seal | Callorhinus ursinus | Caurs | 180627 | 4b | Eared Seals |
| Steller's sea lion | Eumetopias jubatus | Eujub | 180625 | 4b | Eared Seals |
| Australian sea lion | Neophoca cinerea | Necin | 180623 | 4b | Eared Seals |
| South (American) sea lion | Otaria flavescens | Otfla | 180619 | 4b | Eared Seals |
| Hooker's or New Zealand sea lion | Phocarctos hookeri | Phhoo | 180617 | 4b | Eared Seals |
| California sea lion | Zalophus californianus | Zacal | 180621 | 4b | Eared Seals |
| Galapagos sea lion | Zalophus wollebaeki | Zawol | 622014 | 4b | Eared Seals |
| Walrus | Odobenus rosmarus | Odros | 180639 | 4c | Walrus |

# APPENDIX B: GUILD ID DEFINITION

Guild ID will take the following form with 13 digits:

Audiogram Dive function Dose-response Movement

**Audiogram**: This 2-digit number between 01 and 99 will identify the audiogram which should be applied to a given species. The Global EIA generic audiogram will be given the code 01 and will be applied to species for which there is no further information. All species will be allocated either 01, a guild specific-code or a species-specific code. A look-up table will be provided relating these codes to sources of information, and references where available.

**Dive function**: This 3-digit number between 010 and 160 will identify the mathematical function used to describe the diving behaviour of a given species. The ERMC(S) Stage 2 generic dive function will be given the code 010. There will be 5 basic dive types assigned – U-shaped (Type1) V-shaped (Type 2), left-skewed (Type 3) and right-skewed (Type 4). The 3rd digit can take a value of 0 or 1 depending on whether a species carries out "bounce" dives of a particular type which are shallow dives following deep dives. Each species will be allocated a code determined by the combination of dive types it undertakes (Table 1). All species will be allocated 01, a guild specific code or a species-specific code. A look-up table will be provided with references where available.

Table 1: Possible combinations of dive type that will be coded for within Guild ID, where the 3 digit (Y) is binary.

| **Guild ID code** | **Dive types** |
|---|---|
| XX01YXXXXXXXX | Stage 2 generic |
| XX02YXXXXXXXX | U-shaped dive only (Type 1) |
| XX03YXXXXXXXX | V-shaped dive only (Type2) |
| XX04YXXXXXXXX | left-skewed (Type 3) |
| XX05YXXXXXXXX | right-skewed (Type 4) |
| XX06YXXXXXXXX | Type 1 & 2 |
| XX07YXXXXXXXX | Type 1 & 3 |
| XX08YXXXXXXXX | Type 1 & 4 |
| XX09YXXXXXXXX | Type 2 & 3 |
| XX10YXXXXXXXX | Type 2 & 4 |
| XX11YXXXXXXXX | Type 3 & 4 |
| XX12YXXXXXXXX | Type 1, 2 & 3 |
| XX13YXXXXXXXX | Type 1, 2 & 4 |
| XX14YXXXXXXXX | Type 1, 3 & 4 |
| XX15YXXXXXXXX | Type 2, 3 & 4 |
| XX16YXXXXXXXX | Type 1, 2, 3 & 4 |

**Dose-Response**: This 6-digit number will identify the forms of three relationships (i.e. 3 pairs of digits – digit 1 & 2 will code for PTS, digit 3 & 4 will code for TTS and digit 5 & 6 for Behaviour) relating the level of sound that an animal is exposed to and the probability of the three physiological/behavioural responses. Currently the code will be 010101 for all species as no species-specific information is available but this code structure allows for future updates. References for these functions will be provided in a look-up table.

**Movement in response to sound**: This 2-digit number (range 01-99) will identify the way in which a species is expected to respond to sound exposure. E.g. 01 may define directed movement away from a sound source. A look-up table will be provided with references where available.