

Paper for Consideration by S-101PT

New category of restricted area to indicate dangers to sub surface vessels.

Submitted by:	United Kingdom
Executive Summary:	Proposal to add: 'submarineDangerArea' as a new enumeration for the attribute, 'categoryOfRestrictedArea' and: <u>divedNavigationProhibited</u> and <u>divedNavigationRestricted</u> as new enumerations for the attribute 'restriction' in S-101 Edition 1.2.0
Related Documents:	S-101 FC & DCEG, S-4
Related Projects:	S-101

Introduction / Background

1. S-101 contains an extraction of real-world information necessary for the safe navigation of vessels.

S-4 Selection criteria for Notice to Mariners, B-620.3 b. states the requirement for charting to be maintained for sub-surface operations: *'Changes in general charted depths significant to submarines, fishing vessels and other sub-surface operations....'*

2. S-101 DCEG v1.1.0 refers specifically to the requirements of sub-surface users and is summarised in Table 1.

S-101 DCEG v1.1.0	Requirement for sub-surface users
12.1.1 Description of the seabed (S-4 – B-425 to B-427)	The nature (quality) of the seabed (bottom) must be shown in sufficient detail, where known and on the appropriate maximum display scale ENC data, for such purposes <i>as to give an indication of the nature of the seabed in deeper waters for fishermen and submariners.</i>
13.4.1 Rocks which may cover. (S-4 – B-421.2 to B-421.4)	Full details of all dangers to navigation must be encoded except in those areas for which the ENC is clearly inappropriate for navigation (see S-4 – B-401 and B-402). The fullest possible information on clearance depths must be given irrespective of their depths, where known, in preference to making any arbitrary distinction between "dangerous" and "non-dangerous" depths. This will allow navigators of all classes of vessels, including deep-draught ships and submarines, to make their own assessments of what is dangerous to them.
13.5.1 Wrecks (S-4 – B-422, B-422.1 to B-422.8)	Wrecks must be encoded to whatever depth they are considered to be of interest, also taking account of the needs of submarines and fishing vessels where appropriate, but not generally in water deeper than 2000m. (Trawling regularly takes place in depths of 400m and occasionally in depths as great as 2000m).
16.6.1 Dumping grounds (S-4 – B-442; B-446 and B-446.1)	Dumping of harmful materials is unlikely to affect depths substantially and such dumping grounds are encoded primarily as a warning against anchoring, trawling or other submarine operations.

Table 1

3. Autonomous Underwater Vehicles (AUV/UV)

In the context of growing AUV/UV activity it is envisaged that the requirements to capture areas deemed a danger to sub surface operators shall increase and therefore consistency in capture amongst nations is required.

Analysis/Discussion

4. In the current S-101 data model, there is no way to encode a *categoryOfRestrictedArea*, identified as being a danger to the navigation of a growing number of sub-surface operators. This places an over reliance on encoding the attribute *Information* to specify the actual *categoryOfRestrictedArea* specific to sub surface operations. Since the *categoryOfRestrictedArea* directly affects the navigation of sub-surface vessels there is a need to clearly specify this category. As concluded in the report of the MASS PT, the use of the *information* attribute, a free text attribute, needs to be reduced to make the information more machine-readable.

5. The following options (Table 2) for encoding Submarine Danger Area were considered in conjunction with users. Currently the encoding of Submarine Danger Areas is constrained by the S-57 UoOC and is considered sub-optimal for this purpose.

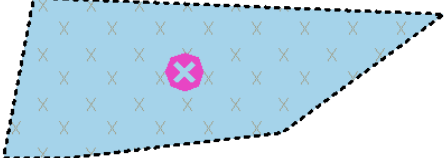
S-57/S-101 Encoding	IHO Definition	Analysis
<u>Obstruction (foul area)</u>	<i>An area of numerous unidentified dangers to navigation. The area serves as a warning to the mariner that all dangers are not identified individually and that navigation through the area may be hazardous. (IHO Dictionary – S-32).</i>	This was deemed insufficient given not all submarine danger areas are related to physical obstructions and the portrayal (in ECDIS “base display” as an obstruction to navigation) would indicate the whole of the area in question is an obstruction, effectively ‘blued out’. Dependent on the restriction attributed to the area this is not what is intended. Furthermore, some submarine danger areas cover a large geographical extent, to capture as a foul area could confuse surface users, forcing them to amend route plans, potentially pushing them closer to dangers. 
<u>Obstruction (foul ground)</u>	<i>Areas over which it is safe to navigate but which should be avoided for anchoring, taking the ground or ground fishing. (IHO Dictionary – S-32)</i>	This Feature is deemed insufficient as dependent on the category of restriction placed on the specific submarine danger area (e.g., divingRestricted) an area over which it is safe to navigate would not be applicable.
<u>Military Practice Area</u> A proposal to include a new enumeration value to the attribute <i>categoryOfMilitaryPracticeArea</i>	<i>An area within which naval, military, or aerial exercises are carried out. Also called an exercise area. (Adapted from IHO Dictionary S-32).</i>	This is deemed inadequate owing to these areas being specified for exercises rather than indicating the existence of hazards to dived submarines. Furthermore, Military Practice Areas as the name suggests are defence focused and this would not cater for the needs of non-military users. Additionally, a Military Practice Area could be interpreted as a navigationally safe area for military exercises, where it is dangerous for submarines and AUV's.

Table 2

Conclusions & Recommendations

6. A new enumeration value of the attribute **categoryOfRestrictedArea** for Restricted Area is needed.

The enumeration shall be named:

'submarineDangerArea' with the definition:

'An area in which submarine operations are prohibited or limited, owing to the existence of hazards to dived submarines'.

The suggested new category will aid consistency in the capture of Submarine Danger Areas while allowing for the wide variety of hazards and restrictions of individual Submarine Danger Areas to be captured in the attribution already bound to Restricted Areas.

7. To cover all users in this environment and to differentiate from the *restriction* values 11. "divingProhibited" and 12. "divingRestricted" which refer to recreational diving, two new enumeration values of the attribute *restriction* for RestrictedArea are required. The enumerations shall be named:

'divedNavigationProhibited' with the definition:

'A specified area within which dived navigation is prohibited in accordance with certain specified conditions'. and:

'divedNavigationRestricted' with the definition:

'A specified area designated by appropriate authority, within which dived navigation is restricted in accordance with certain specified conditions'.

Definitions are aligned with (Defence Geospatial Information Framework 2.0 2023-03)

8. As stated in MSC.530(106) – Appendix 4)) the new enumeration values on *restriction* shall trigger an alarm in ECDIS.

It is proposed to review the data model and amend the DCEG 1.2.0 as follows:

17.8 Restricted area

IHO Definition: RESTRICTED AREA. A specified area on land or water designated by an appropriate authority within which access or navigation is restricted in accordance with certain specified conditions. (Adapted from IHO Dictionary – S-32).

S-101 Geo Feature: Restricted Area (RESARE)

Primitives: Surface

Real World

Paper Chart Symbol

ECDIS Symbol

S-101 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
category of restricted area	(CATREA)	1 : offshore safety zone 4 : nature reserve 5 : bird sanctuary 6 : game reserve 7 : seal sanctuary 8 : degaussing range 9 : military area 10 : historic wreck area 12 : navigational aid safety zone 14 : minefield 18 : swimming area 19 : waiting area 20 : research area 21 : dredging area 22 : fish sanctuary 23 : ecological reserve 24 : no wake area 25 : swinging area 27 : environmentally sensitive sea area 28 : particularly sensitive sea area 29 : disengagement area 30 : port security area 31 : coral sanctuary 32 : recreation area xx : submarine danger area	EN	0,*
feature name		See clause 2.5.8	C	0,*
language		ISO 639-2/T	(S) TE	1,1
name	(OBJNAM) (NOBJNM)		(S) TE	1,1

name usage		1 : default name display 2 : alternate name display 3 : no chart display	(S) EN	0,1 †
fixed date range		See clause 2.4.8	C	0,1
date end	(DATEND)		(S) TD	0,1 †
date start	(DATSTA)		(S) TD	0,1 †
periodic date range		See clause 2.4.8	C	0,*
date end	(PEREND)		(S) TD	1,1
date start	(PERSTA)		(S) TD	1,1
restriction	(RESTRN)	1 : anchoring prohibited 2 : anchoring restricted 3 : fishing prohibited 4 : fishing restricted 5 : trawling prohibited 6 : trawling restricted 7 : entry prohibited 8 : entry restricted 9 : dredging prohibited 10 : dredging restricted 11 : diving prohibited 12 : diving restricted 13 : no wake 14 : area to be avoided 15 : construction prohibited 16 : discharging prohibited 17 : discharging restricted 18 : industrial or mineral exploration/development prohibited 19 : industrial or mineral exploration/development restricted 20 : drilling prohibited 21 : drilling restricted 22 : removal of historic artefacts prohibited 23 : cargo transshipment (lightening) prohibited 24 : dragging prohibited	EN	1,*

		25 : stopping prohibited 26 : landing prohibited 27 : speed restricted 39 : swimming prohibited 42 : power-driven vessels prohibited xx : dived navigation prohibited xx : dived navigation restricted		
status	(STATUS)	1 : permanent 2 : occasional 3 : recommended 4 : not in use 5 : periodic/intermittent 6 : reserved 7 : temporary 9 : mandatory 18 : existence doubtful 28 : buoyed	EN	0,*
vessel speed limit			C	0,*
speed limit			(S) RE	1,1
speed units		2 : kilometres per hour 3 : miles per hour 4 : knots	(S) EN	1,1
vessel class			(S) TE	0,1
scale minimum	(SCAMIN)	See clause 2.5.9	IN	0,1
information		See clause 2.4.6	C	0,*
file locator			(S) TE	0,1
file reference	(TXTDSC) (NTXTDS)		(S) TE	0,1 †
headline			(S) TE	0,1
language		ISO 639-2/T	(S) TE	1,1
text	(INFORM) (NINFOM)		(S) TE	0,1 †
Feature Associations				
S-101 Role	Association Type	Associated to	Type	Multiplicity
Auxiliary to	Fairway Auxiliary (see clause 25.8)	Fairway	Aggregation	0,1

Component of	Traffic Separation Scheme Aggregation (see clause 25.17)	Traffic Separation Scheme	Aggregation	0,1
Updates	Updated Information (see clause 25.19)	Update Information	Association	0,1
Positions	Text Association (see clause 25.16).	Text Placement	Association	0,1
Provides Information	Additional Information (see clause 25.1)	Nautical Information	Association	0,1

† The sub-attribute **name usage** may be mandatory for certain encoding combinations for instances of complex attribute **feature name**. See clause 2.5.8.

For each instance of **fixed date range**, at least one of the sub-attributes **date end** or **date start** must be populated.

For each instance of **information**, at least one of the sub-attributes **file reference** or **text** must be populated.

INT 1 Reference: L 3; M 29.1; N 2.1-2, 20-22, 25, 31, 34, 63

Restricted areas (see S-4 – B-422; B-430.2; B-431.4; B-435.7; B-435.11; B-437.1-7; B-439; B-439.2-4; B-441,1; B-445.9; B-445.11-12; B-446.4 and B-448.1)

If it is required to encode a restricted area, it must be done using the feature **Restricted Area**, or using other features having the attribute **restriction** (**Anchorage Area, Cable Area, Dumping Ground, Dredged Area, Deep Water Route Part, Fairway, Fishing Ground, Harbour Facility, Inshore Traffic Zone, Marine Farm/Culture, Military Practice Area, Offshore Production Area, Submarine Pipeline Area, Pipeline Submarine/On Land, Precautionary Area, Seaplane Landing Area, Submarine Transit Lane, Territorial Sea Area, Traffic Separation Scheme Crossing, Traffic Separation Scheme Lane Part, Traffic Separation Scheme Roundabout**).

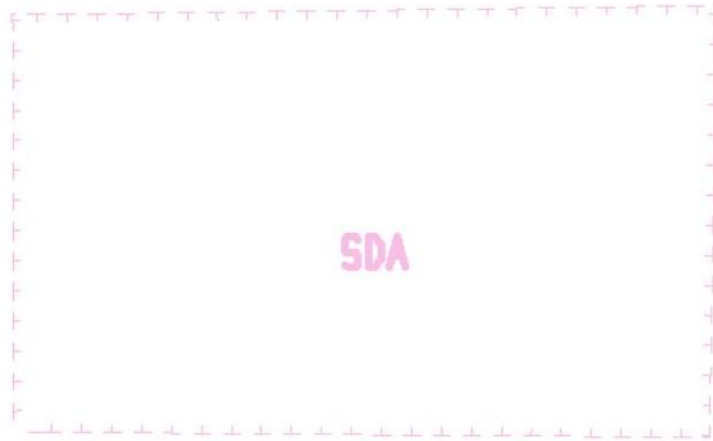
Remarks:

- For additional guidance regarding the encoding of vessel speed limits, see clause 17.4.
- The term “no anchoring area” is used to identify the IMO routing measure of that name. Such areas, where required, must be encoded as **Restricted Area** with attribute **restriction = 1** (anchoring prohibited).

Distinction: Anchorage Area; Cable Area; Caution Area; Collision Regulations Limit; Deep Water Route Part; Depth Area; Dredged Area; Dumping Ground; Fairway; Information Area; Military Practice Area; Submarine Pipeline Area; Swept Area.

To adequately differentiate from other categories of restricted area, a new point centred symbol is proposed to be used in conjunction with line style ESSARE01 (boundary of an ESSA or PSSA).

The new point centred symbol will use the PSSARE01 symbol but with SDA instead of PSSA.



Justification and Impacts

1. S-101 PT to consider adding the "submarineDangerArea" enumeration for the attribute, categoryOfRestrictedArea to adequately reflect dangers to sub surface users.
2. S-101 PT to consider including the restrictions, 'divedNavigationProhibited' and 'divedNavigationRestricted' which shall trigger an alarm in ECDIS.
3. S-101PT to consider creating the new submarineDangerArea symbol and mapping to the new "submarineDangerArea" enumeration for the attribute, categoryOfRestrictedArea for inclusion in an updated S-101 Portrayal Catalogue.
4. Update the 17.8 Restricted Area entry of the S-101 DCEG (DCEG Sub-Group)

Action Required of S-101PT

The S-101PT is invited to:

- a. endorse the paper
- b. discuss the topic and recommendations
- c. decide on the next steps