

**Paper for Consideration by NCWG**

<b>Submitted by:</b>	UK building on work initiated by NL
<b>Executive Summary:</b>	Proposal amended use of existing swept depth symbol (K2, K27 and K42)
<b>Related Documents:</b>	S-4 Regulations of the IHO for International (INT) Charts and Chart Specifications of the IHO
<b>Related Projects:</b>	NCWG Work Plan: A. Maintain and extend Publication S-4 'Chart Specifications of the IHO & Regulations of the IHO for INT Charts' (IHO Task 2.2.1)

**Introduction / Background:**

- This paper follows and builds on proposals initiated by The Netherlands. At the 6<sup>th</sup> NCWG meeting, members have discussed revising the wording in S-4 for swept wrecks to reflect the **development and improvement** in technology used to survey wrecks and obstructions. Members unanimously agreed with the proposal regarding techniques swept wrecks, creating this action to raise the progress to DQWG.

6/3	6.7	UK to make a clean draft of Swept wrecks proposal and provide to Chair who will then submit it to the DQWG.	UK	Open
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- Members agreed proposed new wording which indicates to uncertainty of the least depth indicated, rather than the specific methodology used.
- Consolidated responses can be found [HERE](#).

**Analysis / Discussion:**

- There is a need to adjust the definition of the swept symbols K2, K27 and K42 to allow for modern best survey practice as well as past techniques and future techniques not yet developed. To this end we recommend that the definition should be system independent and focus on the fact that the depth has been found to the highest reliability, **confidence** and with least uncertainty. This aligns with the ethos of the S-44 survey standards in regard of being independent of technology.
- The mariner should not need to be concerned with the method employed to obtain a depth, they need to be able to understand the level of uncertainty. It is also considered that depths on wrecks measured using appropriate MBES water column data analysis can be at least as reliable (if not more so) than wire sweeping.
- In terms of S-57 and S-52 TECSOU values 4 (found by diver) and 6 (swept by wire drag) **will** generate the swept symbol on ENCs based on S-52 and CSP SNDFRM04 specifically.
- S-57 and S-101 also have TECSOU 8 (swept by vertical acoustic system) and 13 (swept by side scan sonar) but these **do not** generate the symbol.
- S-101 removes 6 and adds TECSOU 18 mechanically swept (to reflect that other techniques than wires are now in use).
- Currently in S-101 only values 4 and 18 of TECSOU result in the swept symbol but despite being unable to change S-52, S-101 **could** show this when 8 and 13 are present.

**Recommendation:**

- The purpose of this paper is to enable wider use of the wire swept symbol on charts and avoid the requirement for wire sweeping or diver found to be the only route for getting the symbol on the chart given that its process is antiquated, no longer / infrequently used and less accurate than the modern equivalent of using water column information.
- Following conclusion of discussion of this paper at NCWG10, a post should be raised to the S-101 Portrayal Sub-Group GITHUB referencing this paper.
- Accept the changes which affect S-4 and INT 1 and acknowledge amendments must be considered to S-52 and S-57, but these will not be a priority relative to the importance of ongoing S-101/S-1XX workstreams.
- In terms of S-57 and S-52, TECSOU 6 (swept by wire drag) will include use of 'water column data' as the confidence in the data is equivalent or better than being swept by wire drag.
- The S-101 PT consider amending TECSOU 18 from 'mechanically swept' to 'swept' i.e., to include non-mechanical sweeping, to enable use of water column information to be displayed with the same level of confidence as TECSOU values 4 (found by diver) and 6 (swept by wire drag).

#### Justification and Impacts:

- Justification: the proposed updates to allow for modern best survey practice.
- Impacts:
  - S-4 and INT1 will be amended in due course to reflect these changes.
  - The impact on S-52, S-57 to be considered by the relevant IHO WGs, noting there is no proposal for a new symbol is requested.
  - S-101 PT requested to consider amending TECSOU 18 from 'mechanically swept' to 'swept' i.e., to include non-mechanical sweeping.

#### Action required of NCWG:


The NCWG is invited to:

- a. Note this paper.
- b. Endorse the proposal.
- c. Collaborate with adjacent stakeholder WGs.


Annex A

Extracts from S-4 showing current depiction

**B-415 SWEPT DEPTHS AND AREAS; AREAS INVESTIGATED FOR DEEP DRAUGHT VESSELS**

Swept depths must be shown by the symbol  K2, for example:




The use of the symbol  must be confined to areas swept by wire drag or investigated by diver. Areas investigated by sonar, laser or multibeam echo sounder must not be described as ‘swept’ on charts.


For swept depths over wrecks and obstructions, see B-422.

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

**B-422.3** A wreck which has been wire swept, or has had its least depth determined by a diver, must be shown by sounding numerals showing the depth to which it has been swept, surrounded by a danger line, with the abbreviation ‘Wk’; the swept depths symbol  K2 must be inserted under the danger line, for example:



**B-422.4** A wreck over which the least depth that is known has been found by sounding only, must be shown as in B-422.3 but without the swept  symbol, for example:










**B-422.5** A wreck with estimated safe clearance. For a wreck (in water less than 200m deep) over which the least depth is unknown, a safe clearance depth must be estimated if possible.

To avoid the ambiguity in interpreting the symbols  and , the ‘safe clearance bar’ must be used for a wreck which is considered to have a safe clearance to the depth shown, for example:



**B-422.9**

**Submerged obstructions** too small to be shown to scale must be charted similarly to wrecks (see B-422.3, 422.4, 422.7) but with the **international abbreviation** 'Obstn' in place of 'Wk'. Further information may be provided by replacement of the legend 'Obstn' with appropriate legends to indicate the characteristics of the submerged obstruction, where known, for example: 'ODAS'; 'Diffuser'. Larger obstructions must be charted with a danger line and legend. Blue tint must be added over obstruction symbols in accordance with the charted depth, and in all cases where a depth numeral is not charted and the general depth of water is less than 100m.

		<b>K40</b> (depth unknown)
		<b>K41</b> (least depth that is known, by sounding only)
		<b>K2, K42</b> (wire swept, or least depth determined by a diver)
		<b>K3</b> (safe clearance depth)

Annex B

To avoid introducing a new symbol to S-4, NCWG proposed the following changes to the definitions of the current symbols.

For wrecks and obstructions, it would seem sensible to have 3 levels of uncertainty:

1. Lowest confidence, highest uncertainty. Depth not reliable or estimated. Currently covered by symbols K3 & K30




2. Moderate confidence, average uncertainty. Reasonably reliable. Currently covered by symbols K26 & K41




3. Highest confidence, lowest uncertainty. Most reliable. Depth measured using best currently available methods. Currently covered by symbols. K2, K27, K42



**B-415 SWEEPED DEPTHS AND AREAS; AREAS INVESTIGATED FOR DEEP DRAUGHT VESSELS**

Swept depths must be shown by the symbol  K2, for example:



The use of the symbol  must be confined to areas investigated using the most reliable currently available survey techniques, resulting in a depth with the least uncertainty. While a depth can never be guaranteed, the use of this symbol should be reserved for investigations that leave little doubt that the minimum depth has been determined. Examples include properly controlled mechanical/wire sweeping & collection and analysis of sonar water column data.

**B-422.3 A wreck which has been wire swept, by investigation using the most reliable currently available survey techniques, resulting in a depth with the least uncertainty and leaving little doubt that the minimum depth has been determined. This must be shown by sounding numerals showing the measured depth surrounded by a danger line, with the abbreviation 'Wk'; the swept symbol K2 must be inserted under the danger line, for example:**



**B-422.4 A wreck over which the least depth that is known has been found by investigation using reliable survey techniques, resulting in a depth with average uncertainty and with moderate confidence that the minimum depth has been determined. This must be shown as in B422.3 but without the swept symbol K2, for example:**



**B-422.3 A wreck estimated safe clearance.** For a wreck (in water less than 200m deep) over which the least depth is not reliable or has been estimated, a safe clearance depth must be estimated if possible. This must be shown as in B422.4 and safe clearance bar K3 must be shown, for example:



B-422.9

		<p><b>K40</b> (depth unknown)</p>
		<p><b>K41</b> (Moderate confidence, average uncertainty. Reasonably reliable)</p>
		<p><b>K27</b> (Highest confidence, lowest uncertainty. Most reliable. Depth measured using best currently available methods.)</p>
		<p><b>K30 K3</b> (Lowest confidence, highest uncertainty. Depth not reliable or estimated)</p>