Hydrographic Services and Standards Committee

# Report of the International Cable Protection Committee

*Docs: HSSC16-07.10A*

## ICPC activities affecting HSSC

Graham Evans ICPC Chairman
Managing Director EGS Survey Group
gevans@egssurvey.com

# Principal activities and achievements

- Action HSSC15/102 – ICPC Chair/Charting Working Group Chair met to discuss a third-party proposal to support development of an S-100 submarine cable product specification; main points:
  - There was little support for outsourcing the development of an S-100 cable product specification and
  - ICPC has no budget for the substantial cost
  - There was a view that the development of S-100 product specifications should be the responsibility of charting authorities; however
  - Charting Working Group members agreed to review what was needed (WIP)
- Action HSSC15/100 – ICPC paper submitted for consideration at NCWG9 requesting revision to S-4 B-443 and C-408.1 to reflect charting of cables to full ocean depth and note ICPC commitment for submarine cables to be charted end-to-end
- NCWG comments on ICPC paper:
  - It was understood that uncharted cables are at risk of being damaged, however it was agreed that it is unlikely that information on mining activities would be submitted to the hydrographic offices. ICPC response:

# Principal activities and achievements

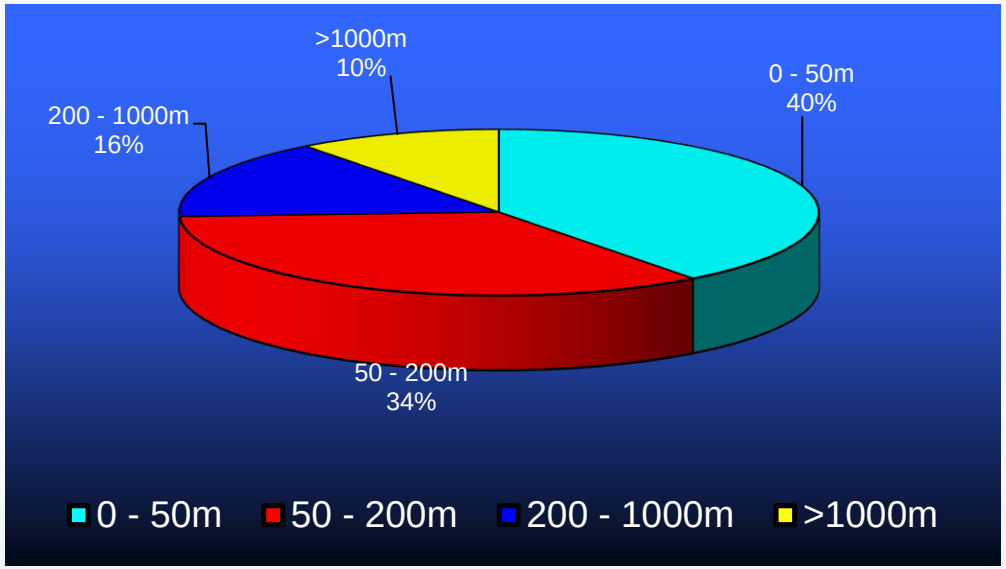
- *[ICPC] – It is because it is unlikely that mining activity will be notified to HOs, that we need cables to be charted at least where mining activity will take place; and these areas are known and defined by the ISA.*
- There was a general agreement that cables information is not always/consistently submitted to the hydrographic offices. NCWG members felt that their offices would always consider showing any cables information received and informed the ICPC that they may sometimes not receive information from the cables company.
- *[ICPC] – This issue is understood by the ICPC and has been raised with cable system owners and cable installation organizations; clearly if HOs are not provided with as laid cable information in a timely manner or at all; cables cannot be charted.*
- The hydrographic offices would require support from the cables and mining industry to ensure that information on cables in seabed mining areas is appropriately received for ingestion into production systems.
- *[ICPC] – The mining community is extremely secretive during the license application process; the location of licensed mining areas is only known after the applicant's mining area has been approved and licensed by the ISA, making coordination between the mining applicants and impacted submarine cable system operators impossible. Where conflicts occur, mining contractors argue how is coordination possible if the location of impacted submarine cables is unknown when preparing applications and plans of work. See comments under first bullet.*

# Principal activities and achievements

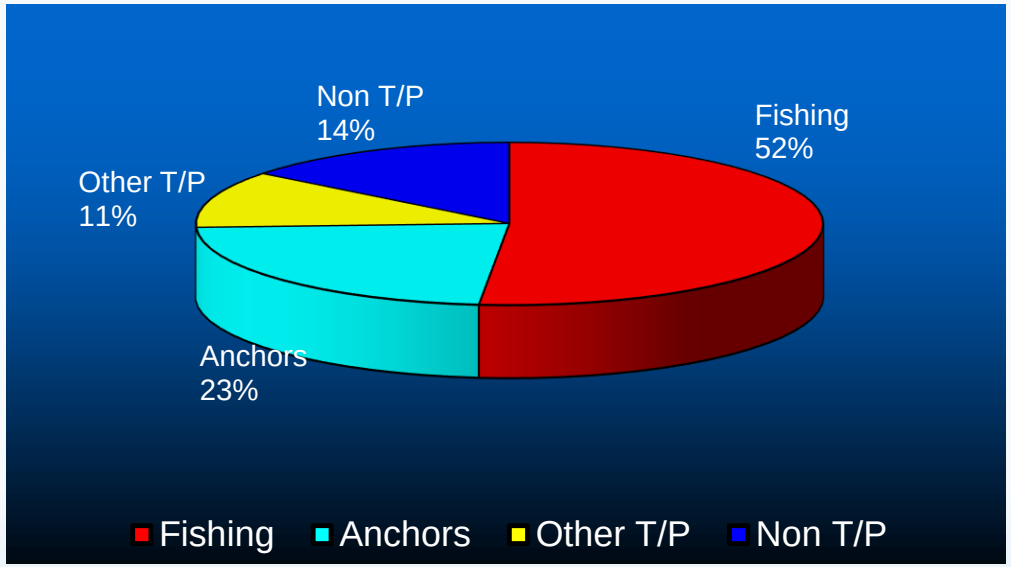
- The IHO Secretariat inquired about the ICPC progress regarding establishing a data exchange mechanism and the ICPC did not have an update on the status
- *[ICPC] – Unfortunately this deficiency is understood; currently the only data exchange mechanism is the provision of cable positional data in GIS, csv/xls file formats. Status discussed on following slides*
- S-4 defines why features should be charted, as well as their paper chart depiction, so provision in S-4 should be made to support the digital equivalents i.e., S-57 Electronic Nav Charts (ENCs) and the developing S-100 standards.
- Also noted that paper charts are not the optimal format to maintain cables information, SOLAS size vessels are mandated to use ENCs now, plus there are issues from a maintenance point of view where a change to a cable can necessitate printing a full paper new edition. It is general agreed that the developing S-100 standards would be a better place to display and maintain end-to-end cables where information is available
- NCWG also noted a complex Defense consideration, given that cables form a significant part of critical national infrastructure, and publishing the information for anyone to see opens the opportunities for nefarious activity.

# Principal activities and achievements

- *[ICPC] – The ICPC has been involved with various government agencies with respect to defense considerations of the submarine cable infrastructure; in this regard, it should be noted that this critical infrastructure is extremely resilient; and the potential activities of bad actors should be viewed within the context that more than 80% of all cable outages/breaks are due to fishing and anchoring and not through nefarious activity. So, removing cables from charts will result in greatly increased cable damage.*




Worldwide Cable Faults by Water Depth

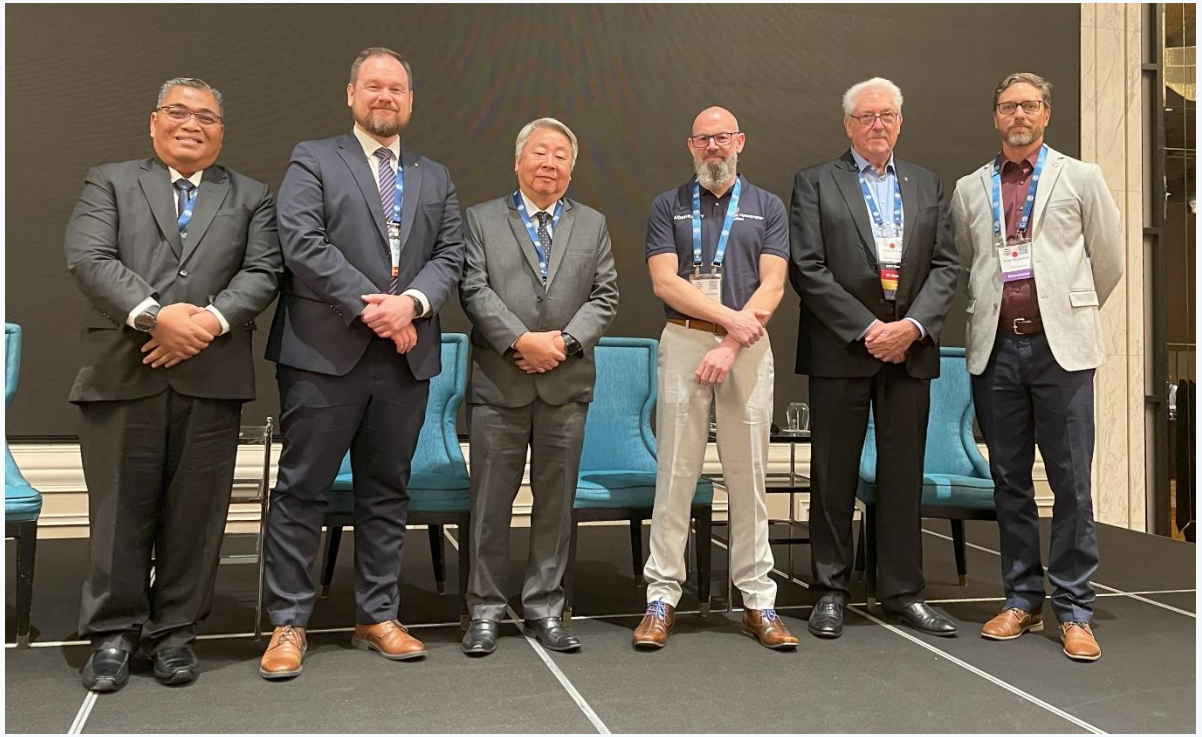



Total Faults <1,000m by Cause

# Principal activities and achievements

- Virtual follow up meeting held subsequent to NCWG9 comments on the ICPC paper. Attended by NCWG Chair and Vice Chair, representatives from UKHO and ICPC Chair. Key takeaways included:
  - UKHO to potentially assist the development of the data-model and encoding support
  - Consider amending S-4 to reduce the chance that it is interpreted that cables should not be charted beyond 2000m
  - Invite IHO representative to participate in the ICPC 2024 Plenary in Singapore
- ICPC Plenary 2024 Singapore included a panel session on Submarine Cable Charting and Geospatial Considerations
- The ICPC was pleased to welcome session panel members:
  - Mikko Hovi – NCWG Chair
  - Duncan Metcalf – Senior Geospatial Analyst UKHO
  - Commodore Dyan Primana S. – Indonesian Navy Hydro-Oceanographic Centre
  - Parry Oei – GM IHO – Singapore Innovation and Technology Laboratory

# Principal activities and achievements

- Feedback from the membership was very positive and found the Charting panel session help clarify some of the issues

# Principal activities and achievements

- ICPC Chair invited to present at the International Seminar on UN Global Geospatial Information Management, Bali 4 –8 March 2024
  - ICPC presentation focus was geospatial considerations for submarine cable networks
- An outcome from the UN-GGIM has been an invitation to the ICPC to participate the Trans-Regional Seapower Symposium to be held in Venice from October 8-10, 2024; the ICPC will be represented by our International Law Advisor
- ICPC continues participation at International Seabed Authority Council meetings working with Member States to shape the Draft Deep Seabed Mining Exploitation Regulations to safeguard submarine cable infrastructure through coordination between mining companies and submarine cable owners/operators

# Principal activities and achievements

- ICPC Charting Working Group (CWG) breakout session following the Charting Panel session at the recent Singapore Plenary resulted in a lot of interest in addressing submarine cable charting
- Specifically, a CWG Sub-group has been established to develop a standardized digital submarine cable data transfer mechanism that will assist HOs that will conform with S-100

***The Background:***

- IHO is upgrading electronic nautical charts (ENCs) from S-57 to S-100 in the coming few years
- In current IHO nautical charts, the completeness of submarine cable routes is often limited from landfalls up to 2000m water depth, which could put all submarine cables in deeper water in danger from future marine resource explorations (e.g. deep seabed mining) and other deepwater activities, including floating renewable energy anchored structures
- There are challenges in reporting and registering submarine cables with efficiency, due to:
  - Delays in submitting cable information from cable parties to IHO authorities
  - Difficulties in integrating cable data in various formats
- Cable industry is building up a CODEM (Cable Open Data Exchange Model) under ArcGIS/QGIS to include both marine survey database and cable route/installation information with great accuracy

# Principal activities and achievements

***CWG Sub-group target:***

- To bridge part of the cable information (e.g. alignment, water depth and general burial condition) from CODEM database to ENCs under S-100 specifications with efficiency and accuracy, firstly for the newly installed cables and then possibly for legacy cables

***Some suggestions for implementation:***

- Engage industry stakeholders to gather needs and requirements for submarine cable information, and define the contents to be included in this bridging efforts;
- Define Product Specifications and register under the S-100 schema, specifically this may include but not limited to:
  - Develop a feature-based data structure for feature catalogue registry
    - Define a data model for cable specific entites, attributes and relationships which can be derived/exported from the CODEM RPL model, including a selection of essential fields and an expand of attributes which might be extra required by IHO (e.g.  cable owner, contact email/number)
    - Suggest an open exchange file format for easy transfer from CODEM's .gdb or .gpkg, e.g.:
      - GML, S-100 standard format for vector data and can be manipulated by existing GIS platforms
      - SHAPE FILE, which have been used by Caris to export S-57 compatible products and can be further checked for S-100

# Principal activities and achievements

- Develop associated procedures/routines/software to extra cable data from CODEM to S100:
  - Map compatible fields of these 2 databases
  - Create new fields/attributes if necessary
  - CODEM RPL (.gdb/.gpkg) → S100-compatible products (.gml/.shp)
- Define portrayal catalog and product metadata ( if necessary)
  - Adoption of current presentation and introduce new symbols
  - Introduce new symbols for possible new entities (e.g. point symbols for BU/Spur, sections requiring special attentions)

- Define delivery/target software platform under S-100 and related distribution requirements
- Pilot the new workflow with example data packages within a working group from various cable companies and IHO organizations
- Gather feedback and refine the solution based on user needs

# Problems or outstanding issues

- S4 B443 and C408.1 still retain submarine cable charting limits of 2,000m and noting NCWG comments on limited textural revisions, ICPC requests this to be revised with no depth limit clearly indicated *(always assuming the HOs are provided with as-laid cable positional information)*
- Action HSSC15/101 – Inclusion of ISA designated mining boundaries on charts with IHO Secretariat (SG) to consider reporting on this matter to ISA at next ISA meeting
- ICPC development of S100 submarine cable product specification/digital cable positional data is work in progress by subgroup of the ICPC Charting Working Group
- ICPC updating existing Recommendations emphasizing importance of summitting as-laid cable positional data to HOs in a timely manner following installation
- ICPC is developing a standardized cable positional information (RPL) Recommendation that will be available to all cable installation companies

# Action requested of HSSC

- ICPC invites the HSSC to note this report
- ICPC invites the HSSC to note ICPC request to revise S4 B443 and C408.1 to reflect charting of cables to full ocean depth conditional on cable positional data being provided to HOs
- ICPC invites HSSC to investigate the delay in the inclusion of ISA designated mining boundaries on charts
- ICPC invites the HSSC to note ICPC intention to develop of a submarine cable digital cable positional data exchange mechanism compliant with S100 Product Specification
- ICPC invite HSSC to note ICPC commitment for submarine cables to be charted end to end recognising network resilience and noting that removal of cables from charts will result in increased damage to cables from fishing and anchoring risk that accounts for +/- 80% of cable faults.