

2nd Tidal and Water Level Working Group Meeting

27 - 29 April 2010, Offices Norwegian Hydrographic Service, Stavanger, Norway

Report to the 2nd meeting of the Hydrographic Services and Standards Committee

(Paragraph numbering is the same as the Agenda Item numbering and does not necessarily reflect the order in which matters were discussed.)

1 **Opening**

- 1.1 Mme Lucia Pineau-Guilhou (France) opened the meeting at 0900 and thanked all participants for coming, particularly Estonia and the Republic of Korea who were attending for the first time. She also thanked Norway for hosting the meeting and providing excellent support and facilities.

Mme Pineau-Guilhou reported that she was chairing the meeting as the Chairman (Mr Stephen Gill (USA)) was unable to attend due to ill health. The following message from the Chairman was read out:

Dear friends of the TWLWG,

I regret very much that I am not able to fulfil my duties as Chairperson of the TWLWG and be with you in Norway this week. My recovery from surgery is going very well and I should be able to return to work within a few weeks.

I wish you the very best for a productive and satisfying meeting and I look forward to reading the minutes and the new work plan. It has been a pleasure working with such a wonderful group of colleagues and I look forward to working with you over the coming year on the challenging tasks ahead.

Thanks to Tor and our hosts for facilitating the meeting this year. All the best for good weather and safe travels to everyone.

*Best Regards,
Steve Gill*

The meeting expressed their best wishes to the Chairman and wished him a speedy recovery.

- 1.2 Mr Herman Iversen, Section Manager Data Acquisition, at the Norwegian Hydrographic Service (NHS), welcomed all participants to Norway. He provided a briefing on the structure of the NHS and how it fits into the Norwegian Mapping Authority.

- 1.3 Stephen Shipman (IHB), on behalf of the Directing Committee thanked Norway for hosting the meeting and providing a high level of support and excellent facilities. He reported that apologies for non-attendance had been received from Canada, Germany, New Zealand, USA and Mr Dan Pillich (Expert Contributor).

2 **Administrative Arrangements**

- 2.1 The Chair invited all participants to briefly introduce themselves. The Chair then introduced the Agenda which was adopted. See Annex B.

- 2.2 The draft timetable was introduced, it was explained that this was intended for guidance only and was not intended to be a rigid structure. Where necessary time spent on individual topics would be amended to allow an appropriate discussion.
- 2.3 The Chair reported on the 1st meeting of the Hydrographic Services and Standards Committee (HSSC) which she attended as the TWLWG representative on behalf of the Chairman.
- 2.4 The minutes of the 1st meeting of the Tidal and Water Level Working Group (TWLWG1) were accepted.
- 2.5 Steve Shipman (IHB) reported on the action items from TWLWG1. Actions were either complete or were being considered further within the Agenda. A new list of Action Items would be prepared for this meeting. See Annex E.

3 National Presentations

The Chair indicated that delegates from the following 5 Member States had expressed a wish to make a national presentation: Chile; France; Korea Rep of; Norway; and the UK regarding Tide and Water Level matters / developments within their countries. Titles of the presentations made are at Annex D and pdf versions of the presentations can be downloaded from the TWLWG2 section of the IHO web site.

4 Programme matters

4.1 Standard Constituent List

.1 It was reported that there had been no additions or changes since the last meeting. Some concern was expressed that this information was freely available but the meeting was reminded that it was a list of “Constituents” not “constants”. Notwithstanding this it was agreed that **“France and the UK should prepare some text to be included with the list of Harmonic Constituents, available from the TWLWG web page, indicating their use for “official” predictions.”**

4.3 (Including Agenda Items 4.2 and 4.4)

.1 The Chair proposed to the meeting that Agenda Items 4.2 (Standard for Digital Tide Tables (DTT)), 4.3 (Dynamic Application of Tides in ECDIS), and 4.4 (Standard for the transmission of real time tidal data) were, although clearly separate items, very closely linked to one another and therefore best discussed together. The meeting supported this view.

.2 France introduced their paper TWLWG2/4/2A (Standard for Digital Tide Tables) and thanked Australia and the UK for their input. The UK introduced their paper TWLWG2/4/2B on a draft Digital Tide Tables Product Specification. The IHB reported that TWLWG2/4/2A had been passed to the Chairman of the Standardisation of Nautical Publications Working Group (SNPWG) who were currently focussed on digital publications. Following discussion it was decided to confine consideration to the Dynamic Application of Tides in ECDIS which could then lead into a Product Specification for DTT a draft of which was set out in TWLWG2/4/2B. Once this work was complete the consideration of the publication of “Guiding Principles” possibly as an IHO resolution, would be reviewed.

.3 No document had been submitted with respect to a “Standard for the transmission of real-time tidal data”. The meeting decided, as with the Standard for DTT, to return to the subject after finalising the work on Dynamic Tides in ECDIS.

.4 Finland introduced their paper TWLWG2/4/3A “Rules for dynamic water levels in ECDIS” and the IHB introduced TWLWG2/4/3B providing some comments from representatives of Transfer Standard Maintenance and Application Development Working Group (TSMAD). Australia provided a brief introduction to the development of S-57 (IHO Transfer Standard for Digital Hydrographic Data) and S-100 (IHO Universal Hydrographic Data Model) and explained the roles of Features, Objects and Attributes. In particular Australia introduced the meeting to IHO Publication S-57 Appendix A Chapter 1 - Object Catalogue and Chapter 2 - Attribute Catalogue. Following this extremely useful briefing the meeting considered Tides and Tidal Streams and prepared a list of relevant “Real-World” elements. The meeting then split into 4 sub-groups to match these against the Objects and Attributes in S-57 Appendix A and to identify missing items and those that although already available would require further elaboration to meet Tide and Water Level requirements. The outcomes of the sub-groups’ deliberations were reviewed in plenary and the final outcome is attached at Annex I.

.5 As TSMAD were meeting during the week immediately after TWLWG2 the IHB was requested to forward a draft copy of Annex I to them so that this could be discussed and any feedback provided to TWLWG.

.6 Australia proposed, and the meeting agreed, that a Task Group (TG) should be established to develop the individual pages for the Objects and Attributes identified as per S-57 Appendix A Chapters 1 & 2. The following agreed to participate in this work: Australia, Chile; France, South Africa and the UK with Australia leading. It was agreed that the members would, where possible, consult with their national representatives to TSMAD when carrying out this task. Any other TWLWG member wishing to participate should inform Australia and the IHB.

.7 Regarding a Standard for the Transmission of Real-Time Tidal Data it was agreed that the USA should continue to lead this task. The following agreed to join the TG: Australia, Chile, and the UK. The UK agreed to prepare a draft Product Specification along the lines of TWLWG2/4/2B and forward it to members of the TG.

.8 It was agreed that more detailed work on the Product Specifications for Digital Tide Tables and the Transmission of Real-Time Tidal Data should await feedback from TSMAD on the work concluded at this meeting but should be progressed as far as possible in advance of TWLWG3

4.5 Advise the translator of the French Manual of Tides into English

.1 The IHB advised the meeting that translation of the manual was now proceeding more quickly and that the IHB had provided answers to questions related to Chapters 1 to 10. Only Annexes A to E remained.

4.6 Proof read the English translation of the French Manual of tides.

.1 The IHB reported that the proof reading of Chapters 1, 3 and 4 had been completed and 2, 5, 6 and 7 was in progress. The English text of Chapters 8, 9 and 10 and Annexes A to E had not yet been received but that Proof Readers for most of these sections had already been agreed. **The IHB agreed to provide a further**

report to TWLWG3 and hoped that this task would be almost, if not fully, complete at that time.

4.7 Definitions of Mean Sea Level (MSL) and relevance of IHO TRs to non-tidal waters.

.1 Finland introduced their paper TWLWG2/4/7A and made a presentation (TWLWG2/4/7B). France introduced their definition of MSL and the IHB showed the current definition in the IHO Hydrographic Dictionary. These definitions together with some further thoughts from Finland are included in document TWLWG2/4/7C. Following a wide ranging discussion there was general agreement that the existing definitions of MSL did not fully cover all aspects of tidal and non-tidal waters of interest to the IHO. There was support for the Finnish proposal in TWLWG2/4/7A that IHO resolution 3/1919, as amended, (A2.5) “Datums and Benchmarks” should be amended to reflect datum in 3 distinct areas: tidal waters; non tidal waters connected to the oceans; and inland waters. **A TG was established to review the definition of MSL and the wording of resolution 3/1919, as amended, (A2.5) “Datums and Benchmarks” using the documents submitted to TWLWG2 as a starting point. Chile, Korea, Finland, France, Norway, Spain and the UK agreed to join the TG with Finland leading. Proposals to be submitted to the IHB no later than 1 March 2011 for posting on the TWLWG3 web page.**

4.8 Inventory of Tide gauges used by IHO Member States

.1 The IHB reported that they had collated the information received since the issue of the template by the Chairman. Since document TWLWG2/4/8A had been produced further information had been received from China and this would be included in due course. France and South Africa indicated that they would be updating their information. The inventory currently includes information from members of the TWLWG but the Work Item refers to “IHO Member States”. **The IHB would place the inventory on the TWLWG web page and arrange for a Circular Letter to be sent seeking similar information from all Member States.** It was agreed that this Work Item should be classified as “Continuous” in the Work Programme in order that the inventory be continuously updated.

4.9 Short course on Tides for Hydrography

.1 The draft course outline prepared by the Chairman was presented by the IHB. Following discussion some amendments were proposed. It was agreed that the **IHB will forward these to the Chairman and following final agreement the IHB to send the course outline to the CBSC and report back to TWLWG on any outcome.**

4.10 Review of relevant IHO Technical Resolutions

.1 The IHB introduced document TWLWG2/4/10A and showed the 2nd Edition of M-3 (Resolutions of the IHO). It was hoped that users would find the revised structure and extensive hyper-linking in the digital file easier to use. The IHB considered that the text of “tidal / water level” related resolutions was probably up to date as all had been reviewed by the TWLWG or its predecessor the Tidal Committee in recent years.

.2 Chile expressed the view that the wording of resolution 5/1932, as amended (A6.4) “Extension of World Network of Tidal Observations” and in particular paragraph 3 was slightly confusing and could be improved. There was general support

for this view. **Chile agreed to review this resolution and submit a proposal to TWLWG3.**

.3 South Africa questioned the use of “long-term” in resolution 6/1932, as amended, (A6.5) “Study of Mean Sea Level” expressing the view that there were many interpretations of how long “long-term” was. **The meeting agreed that there should be a better explanation of this term with respect to the Study of Mean Sea Level in this resolution and South Africa agreed to submit proposals to TWLWG3.**

.4 During the discussion under Agenda Item 4.7 it was agreed that **Finland would lead a TG to prepare a revised wording for resolution 3/1919, as amended, (A2.5) “Datums and Benchmarks”.**

4.11 Review of relevant IHO Charting Specifications

.1 The IHB introduced document TWLWG2/4/11A and explained the change in labelling IHO publications. In particular he pointed out that the publication to which this agenda item referred “Chart Specifications of the IHO” was now S-4 (formerly M-4). The IHB reported that previous suggestions passed to the Chart Standardization and Paper Chart Working Group (CSPCWG) had all been incorporated into the latest edition of S-4. In response to a question on S-4 section B-405.7 the IHB reminded the meeting that S-4 was specifically related to how information was displayed on charts and was the responsibility of CSPCWG. The role of the TWLWG was to ensure that such information was consistent with IHO tide and water level resolutions. Any member who considered that there was a discrepancy should submit a draft proposal for consideration to future meetings.

4.12 Global Sea Level Rise Effects

.1 France made a presentation, available as document TWLWG2/4/12A, reporting on the work undertaken by a PhD student at SHOM, formerly at La Rochelle University. Spain reported that they had initially analysed data for the period 1998-2008 and trends in HAT-LAT tidal ranges for 10 locations showed a general decrease in the HAT – LAT range. Subsequently they focused the study on 3 other ports with a longer period (more than 40 years), the results here point to a general increase of tidal range, but in these cases Spain are waiting to receive the data of the last five years in order to establish a comparison with the same period (1998-2008) as for the initial 10 locations. They hope to be able to provide further information before the time of the 2011 meeting. The UK reported that they had no further information to report at this time but they expected to make further reports at future meetings. Norway reported that they had examined historical records for the amplitude of M2. In the case of southern Norwegian ports there seemed to be a significant increase in the amplitude, although the actual value was quite low. Further North there was no such obvious increase. It was agreed that this topic should remain on the Agenda and that France, Spain and the UK would report to TWLWG3.

4.13 Exchange of Harmonic Constants / Predictions

.1 The UK provided a brief update on the exchange of Harmonic Constants. The XML exchange format remained available on the UKHO web site and this site is also linked on the TWLWG web page. Chile commented that they had noticed different references for the phase lag “g” as provided by some software analysis packages. Other members commented that they had not observed such differences and thought that this may have been caused by variation in the input parameters.

4.14 Update on IOC/GLOSS Program

.1 The IHB introduced document TWLWG2/4/14A reporting on the 11th meeting of the GLOSS Group of Experts which he attended on behalf of TWLWG. The IHB noted that several members of the TWLWG present also represented their organizations on the GLOSS Group of Experts which helped to cement the relationship between the two groups. The IHB also reported that they remained in regular contact with Dr Thorkild Aarup, the secretary to GLOSS at the IOC, and had provided assistance to GLOSS in gaining access to tidal information in support of Tsunami warning programmes.

.2 Norway, who were representing GLOSS at this meeting, made a presentation on current GLOSS activities (TWLWG2/4/14B).

.3 It was agreed that the IHB would continue to represent the TWLWG at GLOSS meetings and report to future meetings of the TWLWG.

4.15 Vertical Reference Framework Update on IAG ICP1.2

.1 The IHB introduced document TWLWG2/4/15A reporting on the work undertaken by the IAG Inter-Commission Project 1.2 on a World Height System (WHS). Not a great deal seemed to have happened since the last TWLWG meeting, however the texts of a report made by the Chairman of ICP1.2 to the IAG and a draft Pilot Project for the Realization of a World Height System were attached to TWLWG2/4/15A.

.2 It was agreed that the IHB would continue to represent the TWLWG in ICP1.2 and report back to future meetings of the TWLWG.

4.16 Tides and datums in rivers and estuaries

.1 Chile made two presentations on this topic: 1) “Tidal Hydrodynamics of the Aconcagua River Estuary”; and 2) “Characterization of the Tidal Regime in the Interior Channels of the X and XI Regions”.

.2 It was agreed that this matter was of importance to several States represented on the TWLWG and should therefore remain on the Agenda for future TWLWG meetings. **Delegates were encouraged to submit papers for consideration at TWLWG3.**

4.17 TWLWG Work Plan

.1 The IHB introduced a revised draft Work Plan (TWLWG2/4/17) The IHB had made some updates to this based on the outcome of the meeting to date. However further work would be required to complete the Work Plan to fully reflect progress made at TWLWG2. A final draft would be prepared after the meeting and attached to the report at Annex F.

.2 Once the final report of TWLWG2 is approved the IHB, in conjunction with the Chairman, will prepare the report to the 2nd meeting of the Hydrographic Services and Standards Committee (HSSC2) which will seek their endorsement of the revised draft Work Plan.

5 Any Other Business

.1 Following the catastrophic Earthquake and resulting Tsunami in Chile on 27 February 2010 Chile requested that “Tsunami Warnings” be added to the Agenda of TWLWG2. It was agreed that this would be included under Agenda Item 5 Any Other Business. Chile made two presentations on this topic: 1) Tsunami Signals in a Sea Level Register and 2) A Field Study report: Aysen Fjord, A Landslide Tsunami.

.2 Following a brief discussion on this topic it was agreed that real time tidal data had an important role to play in the prompt issuing of Tsunami Warnings. There were indications of a signal being detected in the sea level register slightly in advance of the main Tsunami and that this offered the possibility of raising the warning earlier than might otherwise be possible. **It was agreed that this was an important topic and the IHB was requested to include it under Agenda Item 4 “Programme Matters” for TWLWG3.**

.3 The IHB informed the meeting that Phil MacAulay (Canada) had informed the IHB that the Laser Tide Gauge, which had been demonstrated at IHOTC8 in Canada and reported on at TWLWG1 was now working exceptionally well. The earlier problems with stray reflections had been solved by the simple inclusion of a short vertical tube at the laser head.

6 Review of Action Items

A draft list of Action Items from the meeting were reviewed and agreed. Additional items from the final day of the meeting have been added. All Action Items are shown in **bold text** in this report and are collected together at Annex D.

7 Venue and dates of the 3rd TWLWG Meeting

The IHB reported that in recent years IHOTC/TWLWG meetings had been held as follows: Australia - 1, Europe – 2, North America – 1 and South America – 2. It therefore seemed appropriate that the next meeting should take place in either the African or Asian regions. The Republic of Korea offered to host the next meeting on Jeju Island in Korea. This kind offer was accepted by the meeting. It was agreed that April remained a good month to hold the meeting and noting that the Easter fell on 22 - 25 April it was agreed to hold TWLWG3 from 5 – 7 April 2011.

8 Draft Report to the HSSC / Draft Agenda for TWLWG3

.1 **It was agreed that the IHB would circulate a draft report to all attendees by Friday 7 May. Attendees were requested to provide any comments by Friday 21 May.** If comments were only of an editorial nature the draft report will be amended accordingly and then published. If any comments were of a substantive nature then the amendments would be circulated for further agreement.

.2 A draft Agenda was presented to the meeting. This required further amendment following decisions recently taken and the revised draft is included at Annex G to this report. The draft Agenda may require further amendment following the outcome of HSSC2.

9 Closing remarks

.1 Norway thanked everyone for coming to the meeting

.2 Steve Shipman (IHB) on behalf of the Directing Committee thanked Norway for their excellent support and facilities for the meeting which had undoubtedly contributed to a successful outcome. He also proposed a vote of thanks for Mme Lucia Pineau-Guilou (France) for deputising for the Chairman and concluding a very successful meeting. This was strongly endorsed by all present.

.3 Mme Lucia Pineau-Guilou thanked Norway for their support and all delegates for coming and contributing to the meeting. The meeting closed at 1600 on Thursday 29 April.

The following Annexes are attached:

- A. List of participants.
- B. Agenda of TWLWG1
- C. List of Documents
- D. List of national presentations made
- E. TWLWG2 – List of Actions
- F. TWLWG Draft Work Programme
- G. Draft agenda for TWLWG3
- H. Draft Basic Training Programme in Tides and Water Levels for Application to Hydrographic Surveys.
- I. Features and Attributes for Tides and Water Levels in ECDIS

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Tidal and Water Level Working Group
(27-29 April 2010 – Stavanger, Norway)
Agenda – (TWLWG2)

1 Opening

- .1 Opening address by the Chairman
- .2 Address by host nation Norway
- .3 Welcome by the IHB

2 Administrative Arrangements

- .1 Adoption of the Agenda
- .2 Conduct of the Sessions
- .3 Report on Intercessional Activities
- .4 Report of the 1st meeting of the TWLWG (TWLWG1)
- .5 Matters arising from TWLWG1 / Review of Action Items

3 National Presentations

- .1 Presentations by delegates on “National Tidal Issues”

4 Programme Matters

Note: {xx} indicates approved TWLWG Work Plan reference

- .1 Standard Constituent List {A.1} (Chris Jones)
- .2 Standard for Digital Tide Tables {B.2} (Lucia Pineau)
- .3 Dynamic Application of Tides in ECDIS {C.1} (Stephen Gill)
- .4 Standard for the transmission of real time tidal data {C.2} (Stephen Gill)
- .5 Advise the translator of the French Manual of Tides into English {D.1} (Steve Shipman)
- .6 Proof read the English translation of the French Manual of tides {D.2} (Steve Shipman)
- .7 Definitions of MSL and relevance of IHO TRs to non-tidal waters {E.1} (Jukka Varonen)
- .8 Inventory of Tide gauges used by IHO Member States {F.1} (Stephen Gill)
- .9 Short course on Tides for Hydrography {G.1} (Stephen Gill)
- .10 Review of relevant IHO Technical Resolutions (Steve Shipman)
- .11 Review of relevant IHO Charting Specifications (Steve Shipman)
- .12 Global Sea Level Rise effects (Chris Jones, Lucia Pineau & Jose Quijano)
- .13 Exchange of Harmonic Constants / Predictions (Chris Jones)
- .14 Update on IOC/GLOSS Program (Tor Tørresen / Steve Shipman)
- .15 Vertical Reference Framework Update on IAG 1.2 (Steve Shipman)
- .16 Tides and datums in rivers and estuaries (ALL)
- .17 TWLWG Work Plan (ALL)

5 Any Other Business

- .1 Tsunami warnings

6 Review of Action Items

7 Venue and dates of the 3rd TWLWG Meeting (TWLWG3)

8 Draft Report to HSSC2 / Draft Agenda for TWLWG3

9 Closing remarks

TWLWG2 - List of Documents

Document No	Document Title
Logistics	<u>TWLWG2 Logistics Information</u>
TWLWG2-Participants	<u>Provisional list of participants</u>
TWLWG2/2/1A-Rev1	<u>TWLWG2 Draft Agenda</u>
TWLWG2_Timetable	<u>TWLWG2 Draft Timetable</u>
TWLWG2/2/4A	<u>Report of TWLWG1</u>
TWLWG2/2/5A	<u>Action Items from TWLWG1</u>
TWLWG2/3/Chile	<u>National Presentation by Chile</u>
TWLWG2/3/France	<u>National Presentation by France</u>
TWLWG2/3/Korea1	<u>National Presentation by Korea-1</u>
TWLWG2/3/Korea2	<u>National Presentation by Korea 2</u>
TWLWG2/3/Norway	<u>National Presentation by Norway</u>
TWLWG2/3/UK	<u>National Presentation by UK</u>
TWLWG2/4/2A	<u>Guiding Principles for Digital Tide Tables</u>
TWLWG2/4/2B	<u>Draft DTT Product Specification</u>
TWLWG2/4/3A	<u>Rules for dynamic water level in ECDIS</u>
TWLWG2/4/3B	<u>Comments by representatives of TSMAD</u>
TWLWG2/4/5A&6A	<u>French Manual on Tides</u>
TWLWG2/4/7A	<u>Definitions of MSL and relevance of IHO TRs to non-tidal waters</u>
TWLWG2/4/7B	<u>Definitions of MSL and relevance of IHO TRs to non-tidal waters</u> Presentation by Finland
TWLWG2/4/7C	<u>Definitions of MSL</u>
TWLWG2/4/8A	<u>Inventory of tide gauges (Updated 22 April)</u>
TWLWG2/4/9A	<u>Draft 1 week CB course on Tides and Water Levels for Application to Hydrographic Surveys</u>
TWLWG2/4/10A	<u>Review of IHO Resolutions</u>
TWLWG2/4/11A	<u>Review of IHO Charting Specifications</u>
TWLWG2/4/12A	<u>Global Sea Level Rise Effects - Presentation by France</u>
TWLWG2/4/14A	<u>IOC/GLOSS Programme</u>
TWLWG2/4/14B	<u>Presentation from GLOSS</u>
TWLWG2/4/15A	<u>Vertical Reference Framework - Update on IAG 1.2</u>
TWLWG2/4/16A	<u>Tides and Datums in Rivers and Estuaries Presentation 1 by Chile</u>
TWLWG2/4/16A	<u>Tides and Datums in Rivers and Estuaries Presentation 2 by Chile</u>
TWLWG2/4/17	<u>Draft Work Programme</u>

TWLWG2/5/1A	<u>Tsunami presentation by Chile 1</u>
TWLWG2/5/1B	<u>Tsunami presentation by Chile 2</u>
TWLWG2/7/1A	<u>Venue and dates for TWLWG3</u>

Tidal and Water Level Working Group

National Presentations

- Chile:** Chilean Sea Level Network: New Challenges after Tsunami February 27th - 2010
- France:** Xynthia Storm Surge Modelling
- Norway:** Mareano Programme – Collecting Marine Knowledge
- Korea Rep of:** 1. Present Status and Future Plans for Tidal observations and Services in the Republic of Korea
2. Converting Paper Tidal Records to a Digital Database
- UK:** VORF Update

Tidal and Water Level Working Group

Actions from TWLWG2

The numbering of action items relates to the final report paragraph numbers:

- 4.1.1 France and the UK to prepare some text to be included with the list of Harmonic Constituents, available from the TWLWG web page, indicating their use for “official” predictions. (To be forwarded to IHB by 30 June 2010)
- 4.3.5 IHB to forward a draft copy of Annex I to TSMAD immediately after the meeting for consideration at their meeting 3-7 May. (**Action Complete**)
- 4.3.6 Task group, led by Australia, to develop the individual pages for the Objects and Attributes identified as per S-57 Appendix A Chapters 1 & 2. (To be forwarded to IHB by 1 March 2011 for posting on the TWLWG3 web page)
- 4.3.7 UK to prepare a draft Product Specification for the Real-Time Transmission of Tide data along the lines of TWLWG2/4/2B and forward to members of the Task Group.
- 4.6.1 The IHB to report to TWLWG3 on the status of the translation of the French Manual on Tides into English.
- 4.7.1 Chile, Finland, France, Korea, Norway, Spain, UK and IHB (Finland) to review the definition of MSL and resolution 3/1919, as amended, (A2.5) “Datums and Benchmarks” using the draft text provided in TWLWG2/4/7A as a starting point with the intention of separating tidal waters, non tidal waters connected to the oceans and inland waters, and make proposal to TWLWG3. (To be forwarded to IHB by 1 March 2011 for posting on the TWLWG3 web page)
- 4.8.1 IHB to put inventory of tide gauges on the IHO – TWLWG web page and to raise a CL seeking information from Member States.
- 4.9.1 IHB to forward proposed amendments to the Tidal Course Outline to the Chairman and following final agreement, the IHB to send the course outline to the CBSC and report back to TWLWG on any outcome.
- 4.10.2 Chile to review the wording of resolution 5/1932, as amended (A6.4) “Extension of World Network of Tidal Observations” particularly paragraph 3, to improve clarity and meaning and make proposal to TWLWG3. (To be forwarded to IHB by 1 March 2011 for posting on the TWLWG3 web page).
- 4.10.3 South Africa to review the wording of resolution 6/1932, as amended, (A6.5) “Study of Mean Sea Level” with respect to clarifying “long term” and make proposal to TWLWG3. (To be forwarded to IHB by 1 March 2011 for posting on the TWLWG3 web page)
- 4.10.4 Review resolution 3/1919, as amended, (A2.5) “Datums and Benchmarks” – See 4.7.1 above.
- 4.12.1 France, Spain and the UK to report to TWLWG3 on the outcome of ongoing studies on Global Sea Level Rise Effects.
- 4.14.3 IHB to continue to represent the TWLWG at GLOSS meetings and report to future meetings of the TWLWG.
- 4.15.2 IHB to continue to represent the TWLWG in the IAG ICP1.2 and report back to future meetings of the TWLWG.

- 4.16.2 All members to consider submitting papers on “Tides and Datums in Rivers and Estuaries” for consideration at TWLWG3.
- 4.17.2 The IHB, in conjunction with the Chairman, to prepare the report to the 2nd meeting of the Hydrographic Services and Standards Committee (HSSC2) which will seek their endorsement of the revised draft Work Plan.
- 5.1.2 IHB to include Tsunami Warnings under Agenda Item 4 “Programme Matters” for TWLWG3.
- 8.1 IHB to circulate a draft report to all attendees by Friday 7 May 2010. Attendees were requested to provide any comments by Friday 21 May 2010.

XX. TWLWG WORK PLAN

xx.1 TWLWG Tasks

- A Maintain Standard Tidal Constituent List (IHO Work Programme 3.2.4 refers)
- B Prepare a Standard for Digital Tide Tables (IHOTC Report to the XVIIth IHC as adopted)
- C Liaise with TSMAD on tidal matters relevant to the Dynamic Application of Tides in ECDIS and develop a Standard of the transmission of real-time tidal data (Action HSSC1/xx)
- D Monitor and assist in the preparation of English translation of the Tidal Manual prepared by the Institut Océanographique and SHOM (IHO funded the translation from French to English)
- E Review the various definitions of MSL and their relevance to Hydrographic Offices and review the IHO tidal resolutions to ensure that they are compatible with the requirements of non tidal areas such as the Baltic Sea.
- F Prepare and maintain an inventory of tide gauges used by Member States and to publish it on the IHO/TWLWG web site.
- G Prepare structure and contents for a short course (maximum 5 days) on “Tides for hydrography” for the Capacity Building Sub Committee

Task	Work item	Priority H-high M-medium L-low	Milestones	Start Date	End Date	Status P-planned O-ongoing C-completed	Contact Person(s) * indicates leader	Related Pubs/Standard
A.1	Maintain Standard Tidal Constituent List	H		Continuous		O	Chris Jones* Lucia Pineau	
B.2	Prepare a Standard for Digital Tide Tables	H	Prepare draft Standard	2009	2012	O	Lucia Pineau* Stephen Gill Chris Jones Zarina Jayaswal Ian Halls	

Task	Work item	Priority H-high M-medium L-low	Milestones	Start Date	End Date	Status P-planned O-ongoing C-completed	Contact Person(s) * indicates leader	Related Pubs/Standard
C.1	Liaise with TSMAD on tidal matters relevant to the Dynamic Application of Tides in ECDIS	H	Review Objects and Attributes required for water levels and streams Prepare draft pages for Objects and attributes.	2009 2010	2011 2012	O O	Ian Halls* Zarina Jayaswal Steve Gill Lucia Pineau Chris Jones Juan Fierro Ruth Farre Dan Pillich	
C.2	Develop a Standard for the transmission of real-time tidal data	H		2009	2012	O	Steve Gill* Chris Jones Zarina Jayaswal Ian Halls Juan Fierro	
D.1	Provide advice to the translator preparing the English text of the Tidal Manual prepared by the Institut Océanographique and SHOM	H	Completion of translation into English. (April 2010 Work on Chapters 1 – 10 completed Annexes A to E remain)	2003	2011	O	Steve Shipman*	
D.2	Proof read the English translation of the Tidal Manual prepared by the Institut Océanographique and SHOM	H	Approval of the English text. (Chapters 1,3 and 4 complete)	2009	2011	O	Steve Shipman* Glen Rowe Ruth Farre Dan Pillich Zarina Jayaswal Philip Woodworth Juan Fierro Steve Gill Chris Jones Bill Mitchell Chris Andreasen	

Task	Work item	Priority H-high M-medium L-low	Milestones	Start Date	End Date	Status P-planned O-ongoing C-completed	Contact Person(s) * indicates leader	Related Pubs/Standard
E.1	Review the various definitions of MSL and their relevance to Hydrographic Offices and review the IHO tidal resolutions to ensure that they are compatible with the requirements of non tidal areas such as the Baltic Sea.	H		2009	2011	O	Jukka Varonen* Tor Tørresen Lucia Pineau Steve Shipman Juan Fierro Jose Quijano Chris Jones Kwan Chang Lim	
F.1	Prepare and maintain an inventory of tide gauges used by Member States and to publish it on the IHO/TWLWG web site.	H		Continuous		O	Steve Shipman* Steve Gill	
G.1	Prepare structure and contents for a short course (maximum 5 days) on "Tides for hydrography"	H	Delivery of course structure to CBSC.	2009	2010	O	Steve Gill* Steve Shipman	

10.2 TWLWG Meetings (IHO Task 3.1.11 refers)

Date	Location	Activity
30 Mar – 1 Apr 09	Niteroi Brazil	1 st Meeting
27-29 Apr 2010	Stavanger, Norway	2 nd Meeting
April 2011	Jeju Island, Rep of Korea	3 rd Meeting

Chair: Stephen GILL, USA Email: Stephen.Gill@noaa.gov
 Vice-Chair: Lucia PINEAU-GUILLOU, France Email: lucia.pineau-quillou@shom.fr
 Secretary: Steve SHIPMAN , IHB Email: sshipman@ihb.mc

Tidal and Water Level Working Group
Jeju Island, Republic of Korea, 5 – 7 April 2011
Draft Provisional Agenda – (TWLWG3)

1 Opening

- .1 Opening address by the Chairman
- .2 Address by host nation
- .3 Welcome by the IHB

2 Administrative Arrangements

- .1 Adoption of the Agenda
- .2 Conduct of the Sessions
- .3 Report on Intercessional Activities including HSSC2
- .4 Matters arising from TWLWG2 / Review of Action Items

3 National Presentations

- .1 Presentations by delegates on “National Tidal Issues”

4 Programme Matters

Note: {xx} indicates draft TWLWG Work Plan reference

- .1 Standard Constituent List {A.1} (Chris Jones)
- .2 Standard for Digital Tide Tables {B.2} (Lucia Pineau)
- .3 Dynamic Application of Tides in ECDIS {C.1} (Ian Halls)
- .4 Standard for the transmission of real time tidal data {C.2} (Stephen Gill)
- .5 Advise the translator of the French Manual of Tides into English {D.1} (Steve Shipman)
- .6 Proof read the English translation of the French Manual of tides {D.2} (Steve Shipman)
- .7 Definitions of MSL and relevance of IHO TRs to non-tidal waters {E.1} (Jukka Varonen)
- .8 Inventory of Tide gauges used by IHO Member States {F.1} (Steve Shipman)
- .9 Short course on Tides for Hydrography {G.1} (Stephen Gill)
- .10 Review of relevant IHO Technical Resolutions (Steve Shipman)
- .11 Review of relevant IHO Charting Specifications (Steve Shipman)
- .12 Global Sea Level Rise effects (Chris Jones, Lucia Pineau & Jose Quijano)
- .13 Exchange of Harmonic Constants / Predictions (Chris Jones)
- .14 Update on IOC/GLOSS Program (GLOSS / Steve Shipman)
- .15 Vertical Reference Framework Update on IAG 1.2 (Steve Shipman)
- .16 Tides and datums in rivers and estuaries (ALL)
- .17 Tsunami Warnings (ALL)
- .18 TWLWG Work Plan (IHB)

5 Any Other Business

6 Review of Action Items from TWLWG3

7 Venue and dates of the 4th TWLWG Meeting (TWLWG4)

8 Draft Report to HSSC3 / Draft Agenda for TWLWG4

9 Closing remarks

DRAFT OUTLINE
BASIC TRAINING PROGRAM IN TIDES AND WATER LEVELS FOR APPLICATION TO
HYDROGRAPHIC SURVEYS

Purpose: To provide a short course (5-day) in the basics the application of tides and water levels to hydrographic survey operations. The training material will be targeted towards providing basic information to countries wishing to establish hydrographic survey capabilities. This course is envisioned as one of the critical modules of an overall structured course in fundamentals of hydrographic surveying. Much of the course will be at the overview level showing the flow and linkages of the material and the purpose of the material. References and referenced material will be provided through-out.

Section 1. Overview and Background.

- Overview of tides and tide producing forces with focus on tidal characteristics of coastal area of targeted country
- Basics of tide and water level correctors to soundings
- Definitions and determination of vertical reference surfaces, hydrographic survey reference and Chart Datums (LAT and other National Datums)
- Positive and negative surges
- Overview of harmonic analysis and tidal prediction

Section 2. Planning requirements for tide and water level control for hydrographic survey operations

- IHO S-44 requirements and error budget (Orders: Special, 1A, 1B and 2)
- Types of Survey: Classical, GPS, Laser and their corresponding requirement (or otherwise) for the observation of tides.
- Determination of tidal characteristics and water level variations within a given survey area
- Determination of the number and duration of operation of tide and water level gauges required for a survey area
- Construction of tidal zoning extrapolation and interpolation parameters based on the tidal characteristics
- Obtaining predicted tides for preliminary zoning during survey operations

Section 3. Survey Operations

- Types of sensors and their application.
- Establishment and operation of tide poles and gauges, bench mark networks and leveling requirements, GPS heighting
- Data collection, data quality control, data processing requirements
- Application of preliminary tidal zoning and predicted tides

- Cross-line checks for preliminary tides

Section 4. Post-survey Operations

- Tabulation of the tide from tide gauge records
- Fundamentals of harmonic analysis
- Determination of tidal datums, water level datums and Chart Datum references from tide gauge records
- Determination of final tidal zoning parameters from tide gauge observations
- Development of final tide reducer files and final quality control checks
- Estimation of final error budget.

Section 5. Case study. The last section of the training will be a group exercise in using a simulated survey area for which the class will determine tidal characteristics and plan requirements for tide gauges and tidal zoning. Logistics and scheduling for tide gauge installations will be planned. Simulated tidal datums, final tidal zoning, and tide reducer files will be developed.

« Real world » tidal data	« Modelled » tidal data (for example for ECDIS or DTT)
TIDE GAUGE	SISTAW (with attribute CATSIW=12 or 15)
Latitude	Not required (spatial object)
Longitude	Not required (spatial object)
Geodetic System	WGS84 (no other option)
Telemetry	COMCHAR is VHF only, possible need for other options
Authority	Not required for ENC
Technology	Not required for ENC
Name of the station	OBJNAM, NOBJNM
Station code	New attribute required
Type of station (primary, secondary...)	New attribute required
GLOSS/PSMSL number	Not required for ENC
Comments	INFORM, NINFOM
CD/ellipsoid	Not required for ENC
Value CD/Gauge Zero	New attribute required
OBSERVATIONS	T_TIMS (time series)
Sampling rate	T_TINT
Reference level	VERDAT (may not be the same as the cell)
Time DD/MM/YY HH:MM:SS (?)	New attribute required
Heights	T_TSVL (but only want a single value)
Quality of data	New attribute required for observations to be based on GLOSS classification) This is quality not accuracy T_ACWL).
Units	HUNITS but require centimetres (may impact the M_UNIT?)
Time zone	New attribute required
PREDICTIONS	T_HMON (harmonic prediction) T_NHMN (non harmonic prediction)
Sampling rate	T_TINT
Reference level	VERDAT (may not be the same as the cell)
Time Series DD/MM/YY HH:MM:SS (?)	New attribute required
Heights	T_TSVL (but may only want a single value)
Quality of data	T_ACWL but may need adapting
Value CD/Gauge Zero	New attribute required (See tide gauge above)
Units	HUNITS but require centimetres (may impact the M_UNIT?)
Method of prediction	T_MTOD
No. of harmonic constituents	T_VAHC
Values of harmonic constituents	T_VAHC
Time differences	T_THDF
Height Differences	T_THDF
CO-TIDAL AREA	New Object required
Range adjustment	T_THDF but recommend a new attribute (Time difference and range factor)
Time adjustment	T_THDF but recommend a new attribute as above
Quality attribute	CATQUA but needs adapting
TIDAL MODEL	New Object required
Grid points (nb, coordinates)	Does not exist, require coordinates for each grid point

Harmonic constants at each grid point	T_VAHC but needs amendment Z0, time zone, Doodson number and units
Predictions at each grid point	See above
Reference level	VERDAT
Quality attribute	CATQUA but needs adapting