

Eliminating ENC Overlaps: USCHC Case Study 2011-2013

May 20, 2013

Executive Summary

In March 2007, the United States (U.S.) - Canada Hydrographic Commission agreed to address transboundary Electronic Navigational Chart (ENC) overlaps along their shared international borders. This effort complies with the International Hydrographic Organization (IHO) Worldwide Electronic Navigational Chart Database (WEND) Principles that overlapping ENCs be eliminated for safety of navigation.



Figure A: In 2011 the two hydrographic offices agreed to an implementation plan to address the overlaps in a phased approach in four targeted regions: A) Juan de Fuca, B) Dixon Entrance, C) Atlantic, and D) Great Lakes.

In order to comply with the WEND principles the countries had to examine their own policies and practices in order to move forward with a harmonization effort for those ENCs that fall within the Transboundary area. In addition, the countries determined that no new surveys were needed to complete this project. As a result of the initial assessment of internal processes and procedures, the largest obstacle for this project was harmonizing both policy and technical matters which included items such as Intellectual Property rights and legal acceptance of boundary portrayals amongst others. Before work could begin on modifying the ENCs, these matters needed to be resolved and appropriately documented.

Finally, in 2011 the two hydrographic offices agreed to proceed with a production implementation plan using the phased approach of four targeted regions shown in figure A. On February 22, 2013, the USCHC completed the project to eliminate ENC overlaps with the release of the final set of transboundary ENCs. Ultimately 92 ENC overlaps were identified and resolved. Gaps were not an issue since both countries had achieved adequate ENC coverage.

This document summarizes the technical, policy, and managerial aspects of this project as a case study for other Member States and Regional Hydrographic Commissions in the event the USCHC experience may be helpful.

Overview

The WEND Principles

The IHOs "Revised Wend Principles" (1/1997 as amended) state:

- *ENC duplication should be avoided. Only one country should be responsible for ENC production in any given area.*
- *Responsibility for the production of ENCs can be delegated in whole or in part by a country to another country, which then becomes the producing country in the considered area.*
- *When the production limits are the official limits for national jurisdiction waters, commercial rights shall belong to the ENC producing country.*

USCHC proved to be an appropriate vehicle for the two Member States to discuss the regional implications of the WEND principles and identify the appropriate actions to eliminate ENC overlaps.

Defining the Extent of the Problem

The USCHC identified a total of 92 ENCs affected by overlaps in six scale bands.

Band	Number of US produced ENCs affected	Number of Canadian Produced ENCs affected
1	1	2
2	5	11
3	11	10
4	8	16
5	10	17
6	1	0
Total	36	56

Figure B: USCHC Affected ENCs

Scale differences

The IHO recommended Navigational Purpose bands (Usage Bands) were released after Canada and United States had established their own Usage Bands and had incorporated these unique scale ranges into their production software. This discrepancy between Usage Bands was taken into account when decisions were made to eliminate overlaps and on most occasions the best scale within the Usage Band was selected to be retained. In exceptional cases some ENC's were moved to another Usage Band where it made the most sense for the mariner. In some cases this did result in a new overlap which was then dealt with accordingly.

Navigational Purpose	Code	NOAA Scale Ranges	CHS Scale Ranges	IHO Recommended Scale Ranges
Berthing	6	<1:5,000	1<1:2,000	<1:4,000
Harbor	5	1:5,001-1:50,000	1:2,001-1:20,000	1:4,001-1:21,999
Approach	4	1:50,001-1:150,000	1:20,001-1:50,000	1:22,000-1:89,999
Coastal	3	1:150,001-1:600,000	1:50,001-1:150,000	1:90,000-1:349,999
General	2	1:600,001-1:1,500,000	1:150,001-1:500,000	1:350,000-1:1,499,999
Overview	1	>1:1,500,001	>1:500,001	>1:1,500,000

Figure C: Comparison USCHC and IHO Usage Bands

The USCHC agreed to address the overlaps in a phased approach beginning with an initial demonstration site in the Strait of Juan de Fuca and culminating in what was perceived to be the most challenging and complex area, the Great Lakes.

	US ENCs affected	Canada ENCs affected	Cumulative Number of ENCs affected
Strait of Juan De Fuca (Pacific)	5	12	17
Dixon Entrance (Pacific)	9	11	20
Gulf of Maine/Bay of Fundy (Atlantic)	10	18	28
Great Lakes	12	15	27
Total	36	56	92

Figure D: ENC impacts by region

Challenges, Best Practices, and Lessons Learned

Operating under a Formal, nonbinding Agreement

The USCHC working arrangement was established through a nonbinding bilateral Memorandum of Arrangement (MOA) that formalized a mutual understanding and intent for collaboration. The MOA provided an excellent vehicle for the two offices to develop subsequent addendums, termed "Schedule A," to define specific project agreements with defined deliverables, including a detailed listing of all agreed ENC boundaries. Each of the four regional areas was addressed through a unique project agreement with the first project (Strait of Juan de Fuca) providing the processes template by which all other project areas were completed.

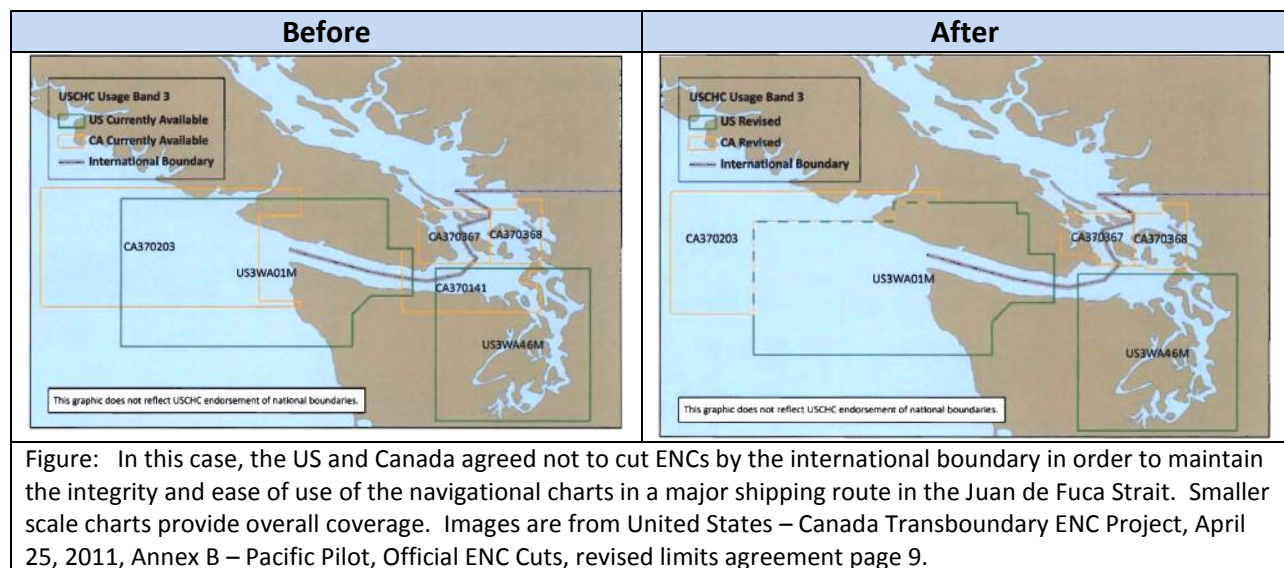
Language

The Official Language Act in Canada requires the CHS to ensure that English and French languages are both accommodated in the official nautical chart products for Canadian waters. The United States produces its charts only in English.

To address the Canadian dual language requirement, the CHS developed its French language content and NOAA agreed to post that with any ENC's produced by the US covering transboundary waters. The exact language requirements and the specific text were agreed to and documented at the outset of the overall project.

National Boundaries

The USCHC based the approach for dividing the ENC cells on the mariner's interest. As such, dividing the ENC coverage based on geo-political boundaries was never deemed the best solution. Vessel traffic management zones and known traffic patterns were considered in the scheming of ENC best coverage. In a few instances the official boundaries are in dispute and the USCHC agreed that both interpretations of the boundaries were to be included in the ENC with a caution note used to inform mariners when they were travelling in an area that contained a disputed boundaries.



One party agreeing to reduce ENC coverage

The underlying understanding was that one Hydrographic Office (HO) would withdraw its ENC or remove its overlapping coverage when it was decided that the other Office had the best coverage for the mariner. In the Atlantic, for example, US cut back overlapping coverage limits of five ENC's in favor of Canadian ENC's and cancelled two charts altogether due to the better scale coverage at the particular Usage Band. In the same Atlantic scheme Canada cancelled

two of their charts. At all times, an equitable distribution of the coverage between the two countries was considered.

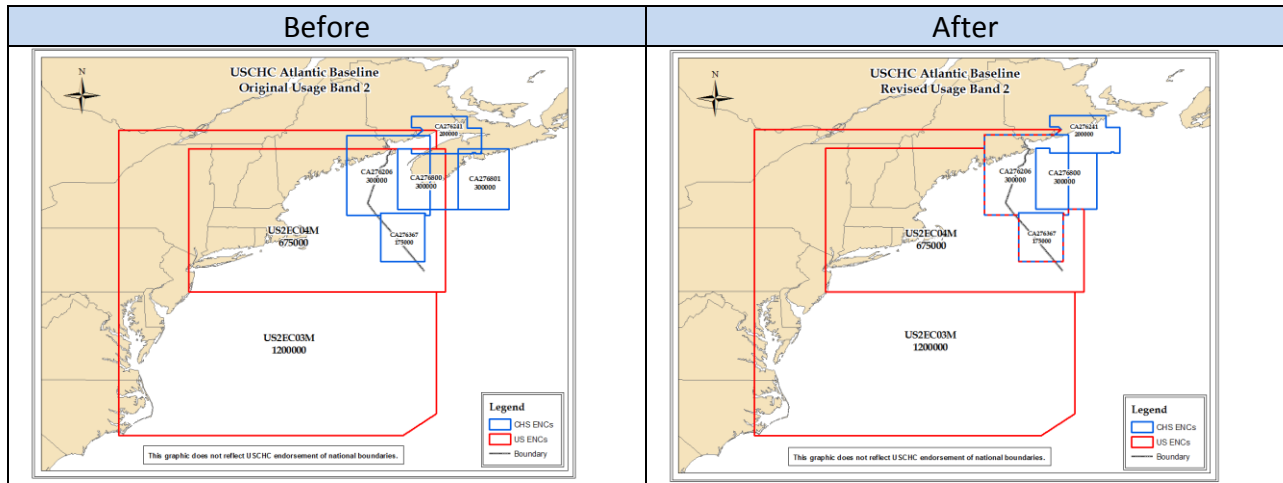


Figure E: Cutting ENC cells to eliminate overlap

Changing Usage Bands to eliminate the overlap

As mentioned previously, USCHC and IHO inconsistency between the scale ranges that define Usage Bands created unique challenges for choosing best single ENC coverage. In six cases, the USCHC was able to modify one Member States Usage Bands while creating minimal or no additional overlaps on the new Usage Band. This option was used successfully and ensured that mariners had the best range of scales with which to plan and execute their voyage.

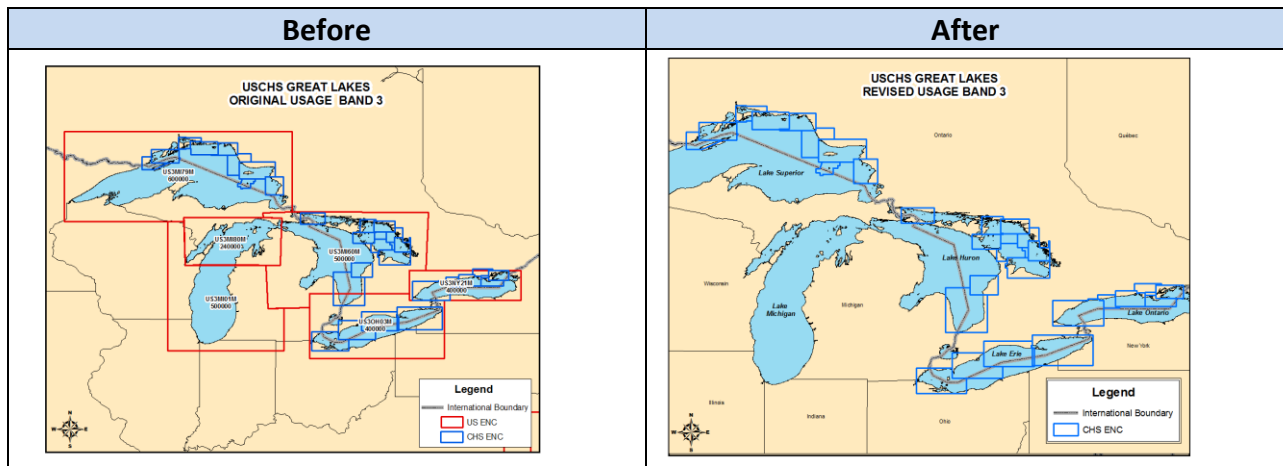


Figure F - Switching Usage Bands to resolve overlapping ENC cells

Copyright and Intellectual property

Since Canada and the United States have different rules and regulations regarding copyright and intellectual property, the USCHC determined that specific notes should be developed for ENCs in this region. An Encoding Guideline for Transboundary ENCs was developed and applied

throughout the phased projects as a means to ensure consistency in the application of technical and policy decisions.

Commercial Rights

U.S. ENC's are distributed without charge. ENC's produced by Canada are made available for purchase.

As a result of altering the production responsibilities in transboundary waters, there were cases where previously free US charts would be distributed by Canada at cost to the mariner. Similarly, in certain cases, charts previously produced by Canada would be distributed by the Office of Coast Survey and become freely available to the mariner.

It was agreed, chart distribution practices of the issuing Hydrographic Office would not be changed. No negative feedback was received from the mariners in the customer feedback and notification phases (see below).

Stakeholder Outreach and Soliciting Customer Feedback

Once the United States and Canada agreed to resolve the overlaps between ENC's the most important issue was how to communicate these changes to the maritime community. The United States and Canada established a communications framework targeting identified, specific user groups to inform them of the pending ENC coverage changes coming. This included establishing a coordinated message distributed by each HO through their website which depicted the changes, the timeline for release and an invitation for feedback. Notice to Mariners were also used to inform the mariners of the changes as were blog posts, press releases, and messages informing the distributors of the data. The public notice was given with a 90-day window before the effective ENC changes were made.

Of note in this outreach, no adverse reaction or commentary was submitted by the user community.

After the Overlaps Were Eliminated

ENC Maintenance

As a result of the ENC harmonization, there are cases where Canada is responsible for producing charts for US waters and vice versa. As part of the agreement, both the United States and Canada update their respective products for both US and Canadian Notice to Mariners.

Source material for updating charts is also exchanged under a Level of Service Agreement developed as a Schedule A under the existing MOA.

Paper Publication Updates (Coast Pilot and Sailing Directions)

It may be necessary to make adjustments to publications as a result of new ENC cuts. All HO's are reminded to consider this need.

A note of caution on issuance of new ENCs after the harmonization project

After the completion of the project, it is possible an HO may issue new ENCs which could create new overlaps. If/when this happens, USCHC looks at each new overlap on a case by case basis and utilizes the best practices to determine which is the best course of resolution.

For further information, please contact:

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