

Eliminating ENC Overlaps USCHC Case Study

January , 2015

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 comply with the International Hydrographic Organization (IHO) Worldwide Electronic Navigational Chart Database (WEND) principle that overlaps in ENCs be eliminated for safety of navigation.



A) Juan de Fuca, B) Dixon Entrance, C) Atlantic, D) Great Lakes, and E) Beaufort Sea

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 areas. 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 and Foreign Office acceptance of solutions for presentating areas where boundary disputes existed. . Before work could begin on modifying the ENC's, these matters needed to be resolved and appropriately documented.

Finally, in 2011 the two hydrographic offices agreed to proceed with a production implementation plan to eliminate the ENC overlaps for each of the five target regions. On January 31st, 2015, the USCHC completed the project with the release of the Beaufort Sea transboundary ENC's. Ultimately 94 ENC overlaps were identified and resolved.

This document summarizes the technical, policy, and managerial aspects of this project as a case study reference for other Member States and Regional Hydrographic Commissions.

Overview

The WEND Guidelines

The IHO's "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 ENC's 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 94 ENC's affected by overlaps in six scale bands.

Band	Number of US produced ENC's affected	Number of Canadian Produced ENC's affected
1	1	2
2	6	12
3	11	10
4	8	16
5	10	17
6	1	0
Total	37	57

Figure B: USCHC Affected ENC's

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 then to take those lessons learned and apply them in the other 4 Transboundary areas.

	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
Beaufort	1	1	2
Total	36	56	94

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 between the two Hydrographic Offices and it forms the framework under which the USCHC operates as a Regional Hydrographic Commission under the auspices of the International

Hydrographic Organization. The MOA was designed to accommodate project addendums (termed "Schedule A") which defined specific project agreements with defined deliverables. Each of the five regional areas was addressed through a unique project addendum with the first project (Strait of Juan de Fuca) providing the process template by which all other project areas were completed. The formality of the MOA as the long standing guiding agreement of the USCHC gave confidence to the Legal and other parties who were needed to sign-off on the accepted rules for these Transboundary ENC which defacto gave another country authority to publish official ENCs in the other country's waters. However, it should be noted that the agreement does not need to be formal.

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 include the dual language content in any ENCs produced by the U.S. covering transboundary waters. The exact language requirements and the specific text were agreed to and documented in an all-encompassing 'Encoding Guideline for Transboundary ENCs' at the outset of the overall project that defined the actual text and the corresponding S-57 objects and attributes to be used.

National Boundaries and the use of a Cartographic Boundary

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, confirmed using AIS ship track data, were considered in the scheming of ENC best coverage.

Four of the five regions also contained official boundaries 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 a region that contained a disputed boundary. The note contained within the caution area indicated: *This area is claimed by both Canada and the United States*. Additionally, a general notes was added to each ENC indicating: Any international maritime boundary shown in the disputed area is without prejudice to the legal position of the United States or Canada. Both these notes went through much discussion but they were eventually approved by both the United States State Department and the Canadian Department of Foreign Affairs Trade and Development.

Before	After
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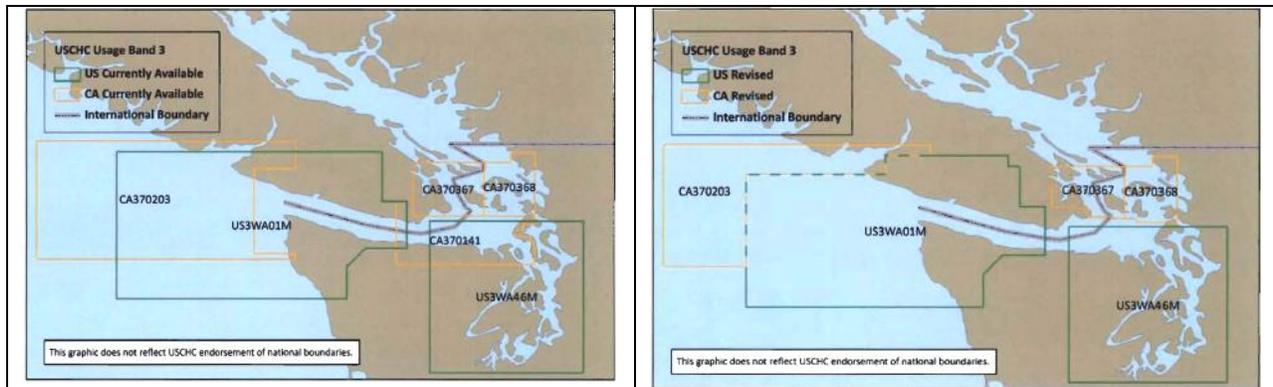


Figure : In this case, the US and Canada agreed to cut ENC not by the international boundary in order to maintain the integrity and ease of use of the navigational charts in a major shipping route in the Juan de Fuca Strait. Images are from United States – Canada Transboundary ENC Project, April 25, 2011, Annex B – Pacific Pilot, Official ENC Cuts, revised limits agreement page 9.

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 ENCs in favor of Canadian ENCs 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.

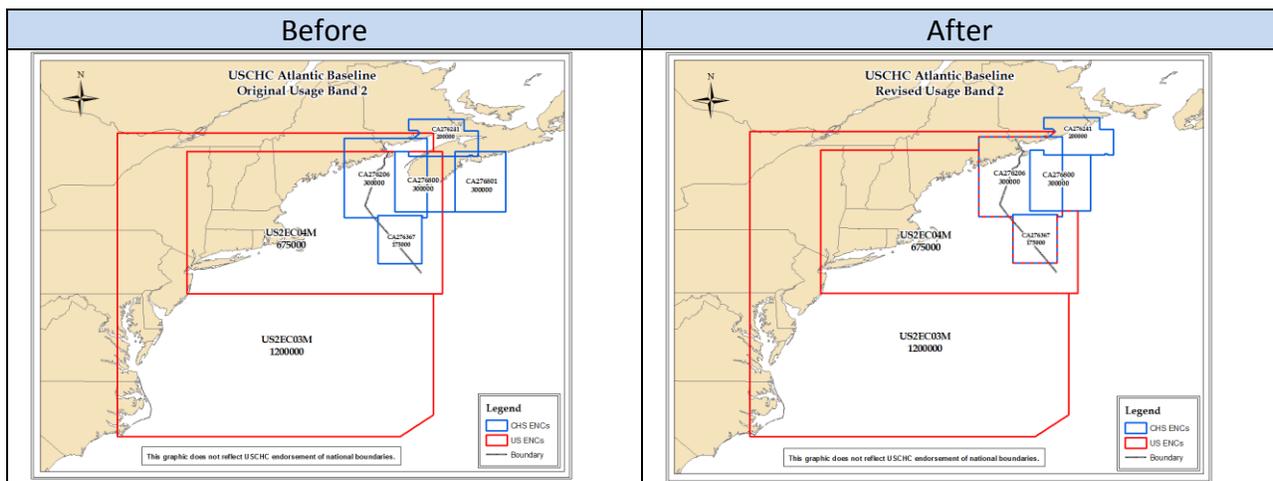
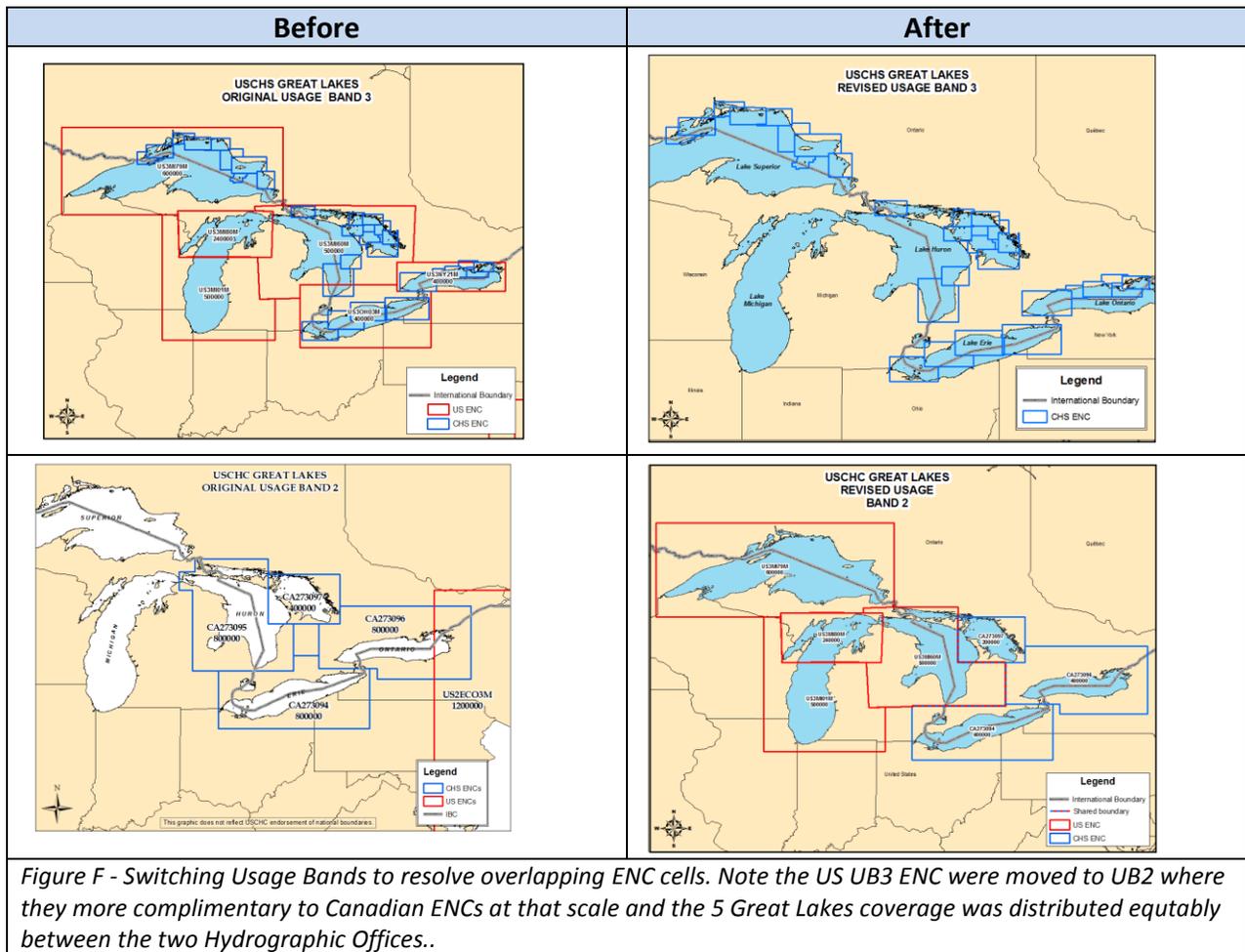


Figure E: Cutting ENC cells to eliminate overlap

Changing Usage Bands to eliminate the overlap

As mentioned previously, inconsistency between the scale ranges that define Navigational Purpose Scale Usage Bands between the United States and Canada 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. However, this option was only viable in Great Lakes region, which is a closed body of water making it easier to move the ENC's to a different scale band without having a waterfall effect on the entire suite of ENC's.



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 ENC's in this region. These notes were subsequently created, approved and included in the Encoding Guideline for Transboundary ENC's 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 U.S. ENC's 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 U.S. waters and vice versa. As part of the agreement, both the United States and Canada update their respective products for both U.S. and Canadian Notice to Mariners. On a monthly basis the United States and Canada exchange the latest new editions of ENC's. The business rules and commitments to maintain the synchronization of data and ENC coverage were codified in a Levels of Service Agreement between the two Hydrographic Offices. This Agreement is reviewed annually for consistency and relevance, at Regional

Hydrographic Commission meetings, in order to sustain the good work achieved in this transboundary ENC effort.

Paper Publication Updates (Coast Pilot and Sailing Directions)

It may be necessary to make adjustments to publications as a result of new ENC cuts. 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 HO may issue new ENCs which could create new overlaps and if this has happened, we look at each new overlap on a case by case basis and utilize the best practices to determine which is the best course of resolution.