DISSEMINATION OF CHART INFORMATION USING WEB-BASED GIS

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Abstract

With the improvement of electronic technology, many navigational aid systems have been computerized. It is now heading to Web-based GIS technology for efficiency data distribution as to secure the safety of vessel navigation. Web-based GIS holds the potential to make distributed nautical charts information available to a very large worldwide audience. In practice, the Royal Malaysian Navy (RMN) took six months to more than a year to produce a new or updated chart. Therefore, any updates that are important to the users are published in Notice to Mariners by both RMN and Marine Departments monthly. Undoubtedly, this would cause some confusion to the mariners about the reliability of data, as two different departments manage the Notice to Mariners in different formats and timing. Moreover, nautical charts are widely used in offshore engineering works, fisheries industries, and others. All of these parties seek for the latest information about nautical chart in order to success their works. Since the charts are in different format, projection, symbolization and producers, they should be integrated for the needs of safety information. To overcome these problems, it is important to propose Web-based GIS system to manage and visualize nautical charts online. Thus, this paper studies on the creation of Nautical –WebGIS for sharing the charts information throughout Malaysia with the latest Notice to Mariners from both RMN and Marine Departments. The area of this study would be both MAL 5 (Peninsular Malaysia) and MAL 6 (Sabah and Sarawak).The Nautical –WebGIS will enable users to visualize, explore, and perform the queries on nautical charts for needed information.

Keywords: Nautical –WebGIS, Web-based GIS

1.0 INTRODUCTION

Basically, most people are familiar with land–based maps and its applications in Geographic Information Systems (GIS) environment whether the data sources are derived from aerial photography or remote sensing. Marine GIS is actually a similar/equivalent application, the only difference is the data. Marine GIS applications require input in the form of a map for water area. The input is a nautical chart, which is widely used by the mariners for navigating at sea.

In order to enhance the safe navigation, the recreation and commercial boating community has used the navigational charts produced by the Royal Malaysian Navy (RMN). However, charts - especially in a digital form - are better accessible. The electronic chart is widely used to support the development of Electronic Chart Display and Information system (ECDIS) on the authority of government authorized hydrographic offices such as RMN. The chart contains all the information that are necessary for safe navigation and some supplementary information in addition to that contained in the paper charts e.g. sailing directions, and others. These charts have the potential to provide a useful background layer for ocean and coastal GIS projects.

2.0 PROBLEMS IN CHARTS MANAGEMENT

In practice, the Royal Malaysian Navy (RMN) took six months to more than a year to produce a new or updated chart. Therefore, any updates that are important to the user such as maintenance of fiber

optic, light beacon that is destroyed or wreck discovered happened within Malaysia water areas are published by the Marine Department annually inside the Notice to Mariners. Undoubtedly, this would cause some confusion to the mariners about the reliability of data, as two different departments manage the charts and Notice to Mariners in different formats and timing.

Since the charts are in different format, projection, symbolization and producers, they should be integrated for the needs of safety information. To overcome these problems, it is important to propose Web-based GIS system to manage and visualize nautical charts online. Here, some sophisticated issues have to be focused in order to solve the problems:

(i) Integrate different types of information in term of data characteristic and data provider from several authorities into a web platform.
(ii) Due to the highly customize charts, the user interface of the web page has to be designed user friendly and highly interactive. The most problematic is to conceive or provide a system which organizes the corresponding between the client and server and their associated functionality.
(iii) Combination and cooperation of the various components with large variety of data will affect the overall system performance.

Using a universal platform to present nautical charts, users are able to receive all information that are necessary for them to navigate their vessel safely on a journey. Certainly, any new or updated information about charts are made available inside this universal platform once they are released. In addition, the sharing of information can be achieved as well because the user themselves are able to access whenever and wherever they are.

3.0 SURVEY OF USERS TOWARD CURRENT DIFFICULTIES IN CHARTS MANAGEMENT

By referring to the result of the respond from related parties, all of the nautical charts in the market are still in hardcopy but are some of the charts already tendered by C-MAP Malaysia Sdn. Bhd to convert into ENC format. In these related parties, most of the staffs are facing some problems like lack of staffs and specialists, late update for nautical charts and improper data management (Figure 1). From the Figure 1(a), it is obvious that most staffs are still using conventional method to manage the information. And, most of the departments have the availabilities of Internet for staff (Figure 1(b)). Therefore, it is suitable for them to have a proper Web application for publishing the Malaysia nautical charts in order to enhance the working performance. Other than that, the data dissemination of nautical charts also can be achieved.

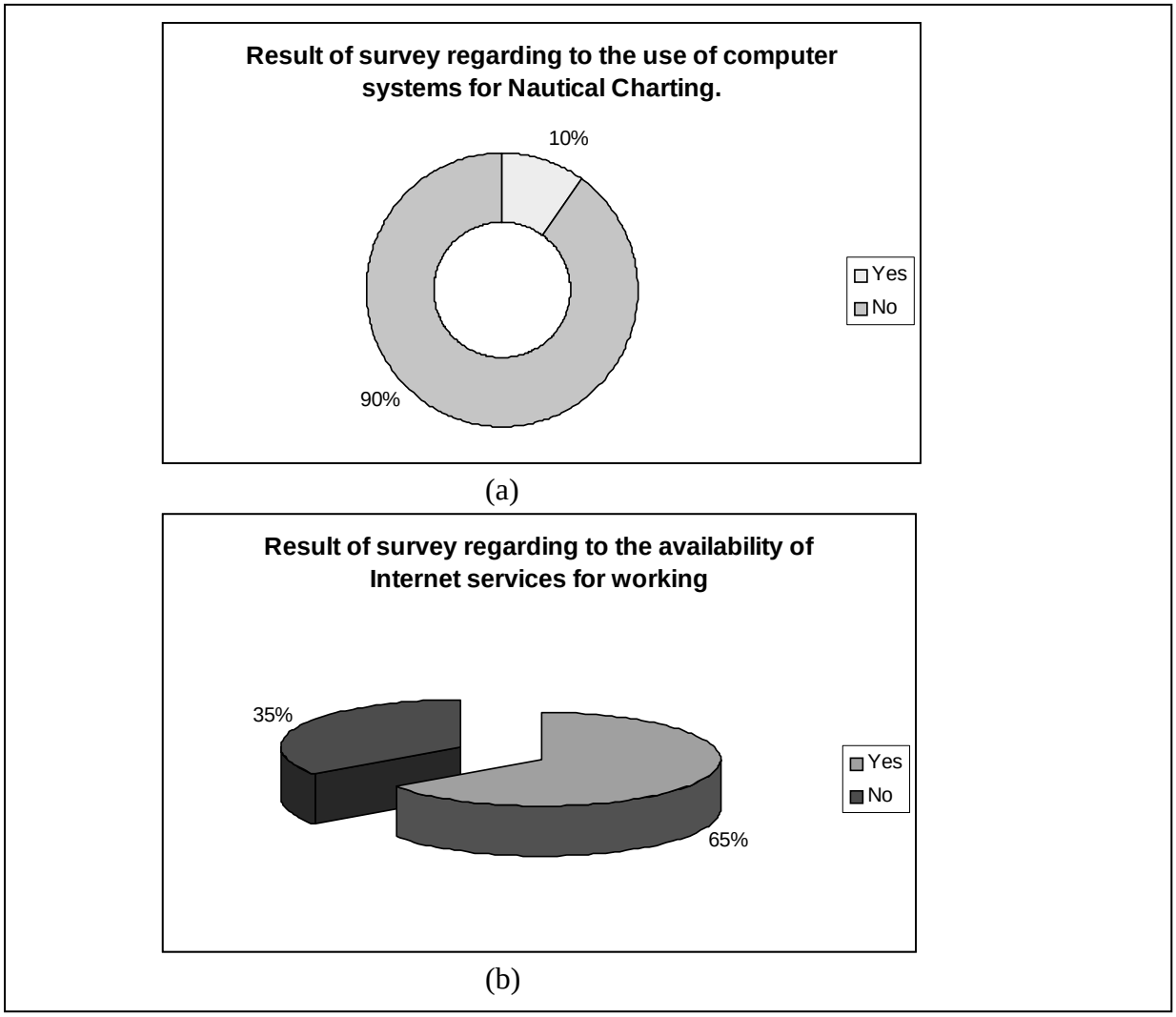

Figure 1: Result of survery for (a) the use of computer system for Nautical Charting and (b) Availability of Internet services for working

On the other hand, the results of opinion from related parties also had shown improper management of the notice to mariners. Although the latest notice to mariners would also update in marine department official website, however the notice to mariners are shown in Adobe Portable Document Format (PDF). Therefore, users need to draft the position of the happening in their paper charts and it is a time consuming problems. Moreover, the total sheets of notice to mariners would not be updated into the paper charts annually due to the late updating of the nautical charts from RMN. According to Figure 2 (a), about 70% of responsers agree with the problems in receiving updated information for charts. And, more than 80% of responsers would always look into noticen to mariners for corrections of nautical charts. (Figure 2 (b)). Thus, it is a necessary to launch the Nautical – WebGIS to solve the current difficulties.

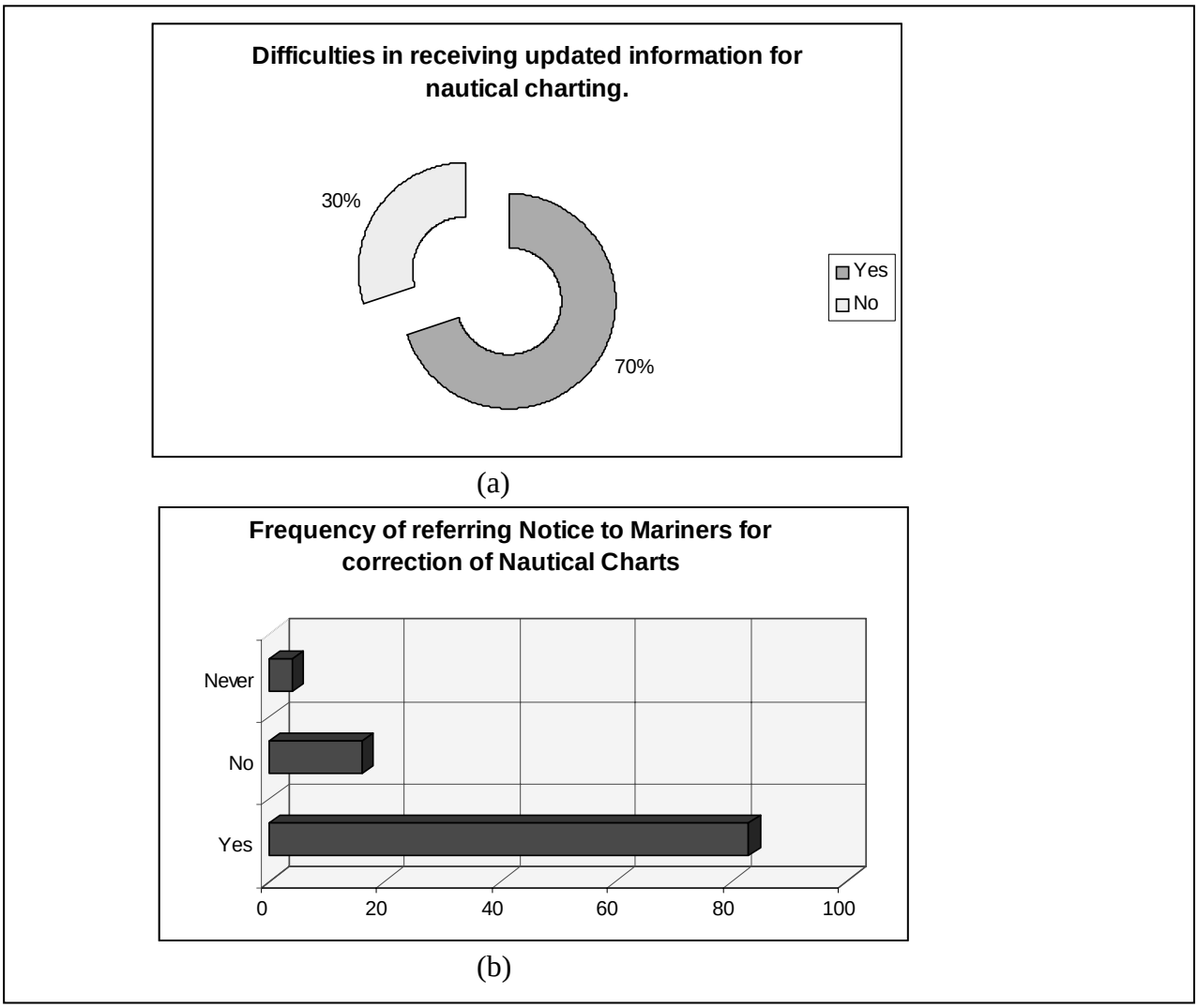

Figure 2: Result of survery for (a) Difficulties in receiving updated information for nautical charts and (b) Frequency of referring notice to mariners for correction of nautical charts.

The result of survey has been proved that there is no Web application for nautical charts available in Malaysia, therefore this research will be a pioneering in improving the working performance in both organizations and other related parties through Web.

4.0 RESULT OF NAUTICAL – WEBGIS

The Map has 8 basic tools above the map window and a list of legend beside the map window. There are pan, zoom in, zoom out, print, select, zoom selected and help. Figure 3 shows the Map Display for subscribers.

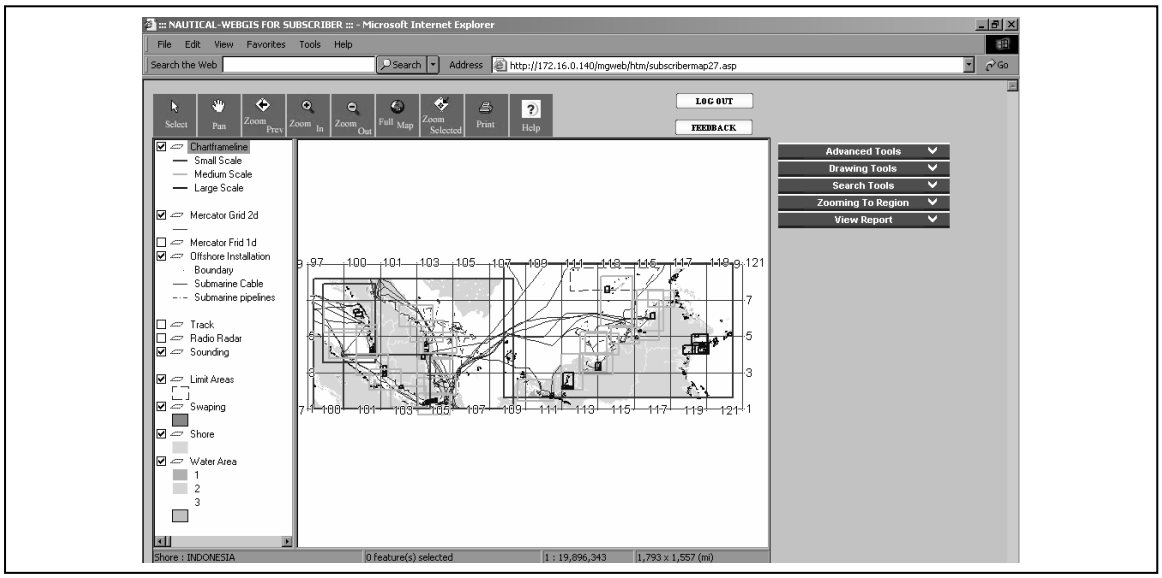

Figure 3: Map Display

The interface of query functions is in the same page with the Map Display. Basically, the query functions can be divided into five sub-sections, which are advance tools, drawing tools, searching tools, zooming to region and the view report. (Figure 4) Each of the sub-suctions is being locked in order to save space, by clicking on the small arrow at the corner will enable the list of functions to be showed.

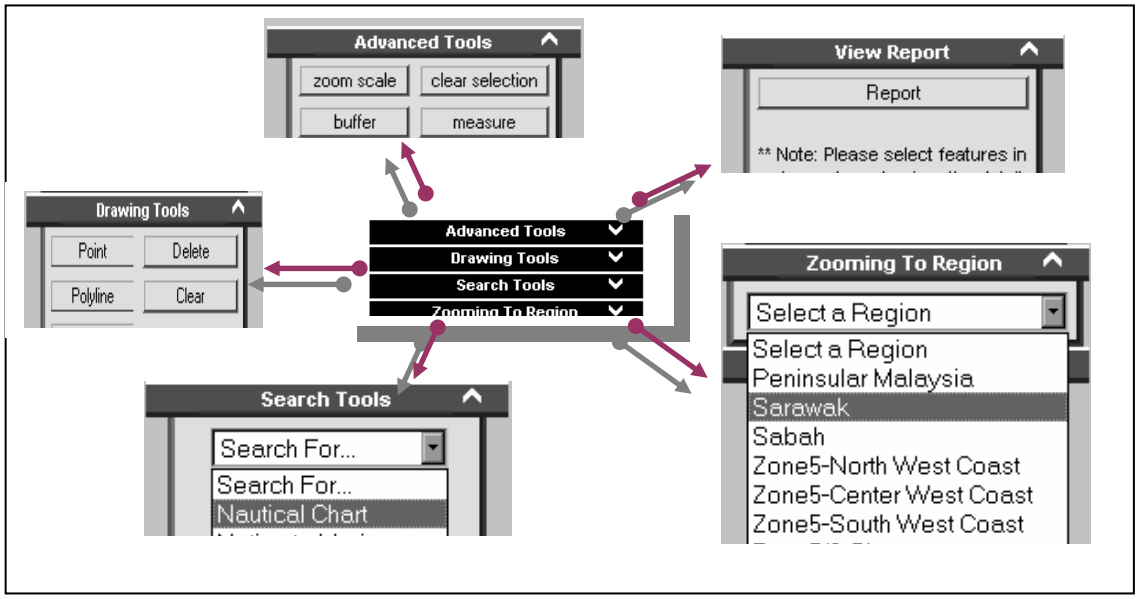

Figure 4: Sub-sections for the query functions

For the drawing tool, a pop up dialog box will show up for the style of drawing. In the dialog box, user can create a name for that polygon, define the colour, background mode and the hatch pattern. During the test, red colour,and solid style was defined. Thus, the style of drawing result will be exactly same with user defined.(Figure 5)

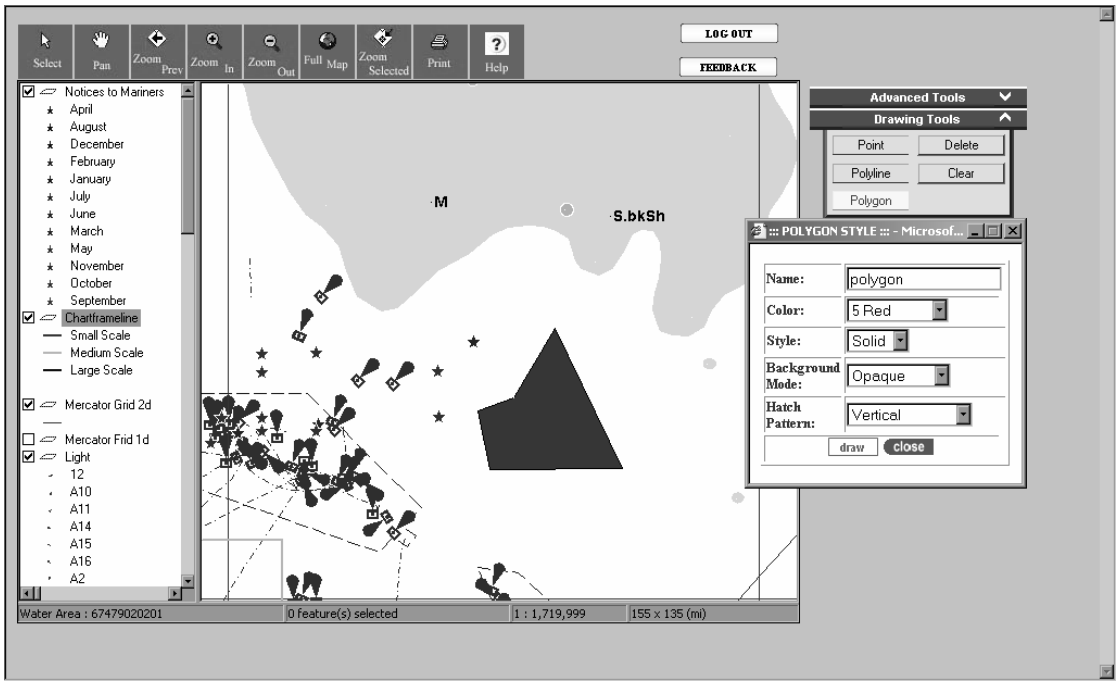

Figure 5: Result of drawing a polygon in red

As for the Searching tool, when the Nautical Charts was selected, a dialog window will occur for choosing within searching by Chart Code or State as shown in Figure 6. When the Chart Code was clicked on, the current dialog window will turn to Chart Code Search page (Figure 7). Here, MAL515 is the chart to be searched. The result will be viewed in the same dialog window. In the information of the result, there is a Zoom icon to zoom into MAL515 in the map window as shown in Figure 8.

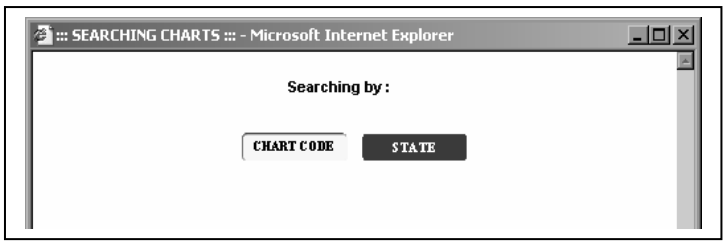

Figure 6: Dialog window to choose searching criteria

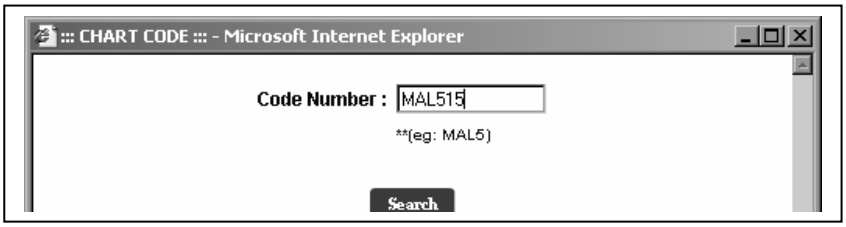

Figure 7: Dialog window to search chart by code – MAL515

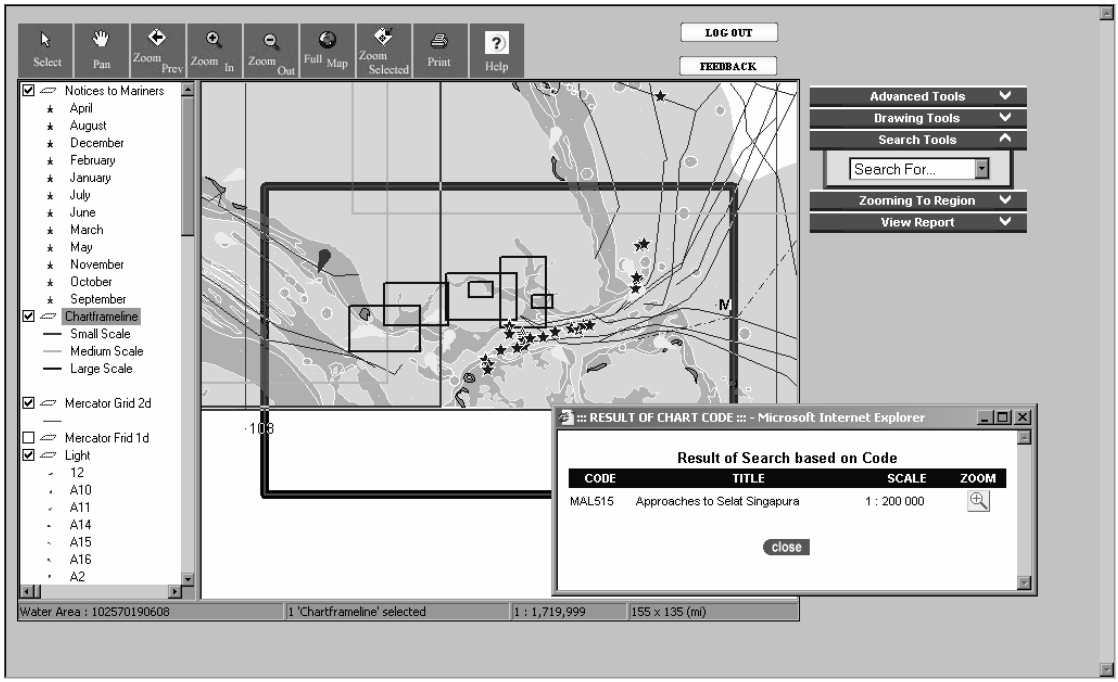

Figure 8: Result of search shows in a dialog window and zoom into MAL 515 in map window

Another query function is View Report. Here, a chart named MAL5 is selected in the map widow. Then, click on the report button to view the detail of information about MAL5. In seconds, a dialog window will appear with the information of MAL5 together with a View Picture column (Figure 9). By clicking on the View in the Picture column, a new dialog window will show the scanned image of MAL5. There is a icon in the corner for user to enlarge the image for a better view (Figure 10).

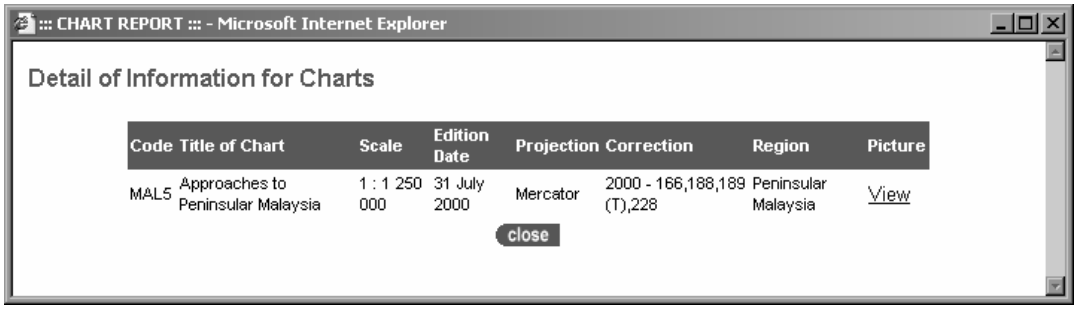

Figure 9: Report of MAL5

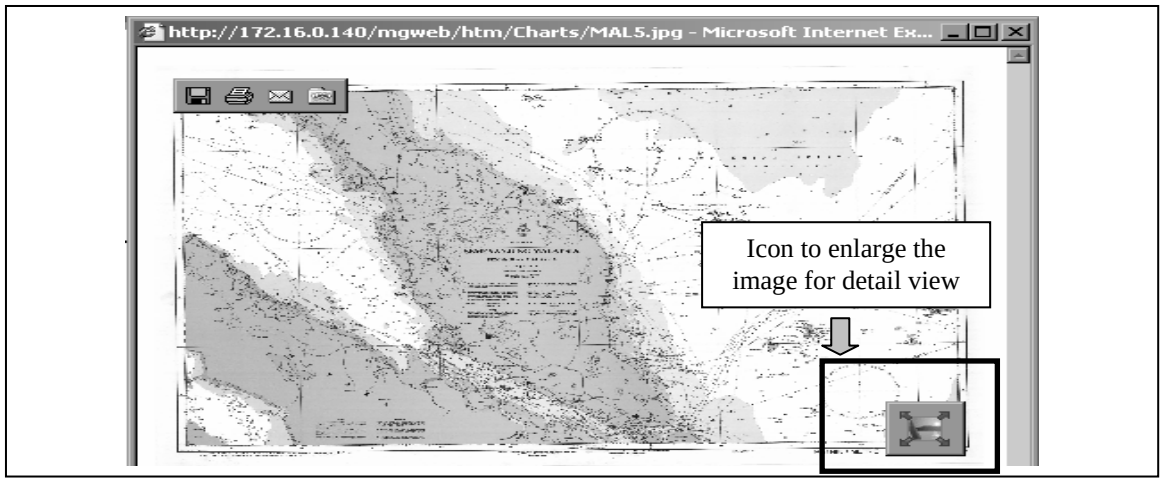

Figure 10: Image of MAL5

5.0 CONCLUSION

The integration of Web-Based GIS into nautical charting has proved the GIS functionalities can really help users to reach or access needed chart information in an interactive way without the need of GIS software. Moreover, the charts information together with the notice to mariners is able to be managed properly with a systematic Web system particularly in data sharing.

According to the result of the application, this research is obviously has the potential to expand in order to explore the new technology to the public. Therefore, this research has its contribution to government departments for the data management purposes.

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