

Institute for Ocean Technology

Report Management Form

Report Title Ship Iceberg Collision Database Operations Manual																					
Report Number LM-2004-33	Date of Submission 24 November 2004																				
Security Classification Unclassified	Distribution Unrestricted																				
External Publication? Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> If yes, refereed <input type="checkbox"/> non-refereed <input type="checkbox"/> invited <input type="checkbox"/>																					
If conference, proceedings published? Yes <input type="checkbox"/> No <input type="checkbox"/>																					
Workspace/File Name	No. of copies to be printed: 3																				
Approvals: <table><tr><td>_____</td><td>_____</td></tr><tr><td>Lead Author</td><td>Date</td></tr><tr><td>_____</td><td>_____</td></tr><tr><td>Author</td><td>Date</td></tr><tr><td>_____</td><td>_____</td></tr><tr><td>Group Leader</td><td>Date</td></tr><tr><td>_____</td><td>_____</td></tr><tr><td>Director, R&D</td><td>Date</td></tr><tr><td>_____</td><td>_____</td></tr><tr><td>Director General</td><td>Date</td></tr></table>		_____	_____	Lead Author	Date	_____	_____	Author	Date	_____	_____	Group Leader	Date	_____	_____	Director, R&D	Date	_____	_____	Director General	Date
_____	_____																				
Lead Author	Date																				
_____	_____																				
Author	Date																				
_____	_____																				
Group Leader	Date																				
_____	_____																				
Director, R&D	Date																				
_____	_____																				
Director General	Date																				



National Research Council Canada
Conseil national de recherches
Canada

Institute for Ocean
Technology

Institut des technologies
océaniques

SHIP ICEBERG COLLISION DATABASE OPERATIONS MANUAL

LM-2004-33

Brian T. Hill

November 2004

DOCUMENTATION PAGE

REPORT NUMBER	NRC REPORT NUMBER	DATE	
LM-2004-33		November 2004	
REPORT SECURITY CLASSIFICATION		DISTRIBUTION	
Unclassified		Unlimited	
TITLE			
Ship Iceberg Collision Database Operations Manual			
AUTHOR(S)			
Brian T. Hill			
CORPORATE AUTHOR(S)/PERFORMING AGENCY(S)			
Institute for Ocean Technology, National Research Council			
PUBLICATION			
SPONSORING AGENCY(S)			
Program for Energy Research and Development			
IOT PROJECT NUMBER		NRC FILE NUMBER	
42_2061			
KEY WORDS		PAGES	FIGS.
Iceberg collisions, North Atlantic, Alaska, Arctic		iv, 23	14
SUMMARY			
<p>The manual describes how to use the Ship Iceberg Collision Database developed by the Institute and available as a CD or on-line from the web site.</p>			
ADDRESS			
National Research Council Institute for Ocean Technology Arctic Avenue, P. O. Box 12093 St. John's, NL A1B 3T5 Tel.: (709) 772-5185, Fax: (709) 772-2462			

TABLE OF CONTENTS

List of Figures	iii
1.0 INTRODUCTION.....	1
2.0 OPERATING NOTES	2
2.1 Opening Screen.....	2
2.2 Search Screen.....	3
2.3 Search Result Screen.....	5
2.4 General Event Screen.....	5
2.5 Vessel Characteristics Screen	7
2.6 Information Source Screen.....	8
2.7 Climate Screen (Figure 7).....	8
2.8 Damage Screen (Figure 8)	9
2.9 Damage (cont'd) Screen (Figure 9).....	13
2.10 Ice Screen (Figure 10).....	14
2.11 Route Screen (Figure 11).....	16
2.12 Voyage Screen (Figure 13)	19
2.13 Preview Report.....	20
3.0 SEARCH EXAMPLES.....	21
4.0 ACKNOWLEDGEMENTS	22
5.0 REFERENCES	23
6.0 WEB SITE	23

LIST OF FIGURES

Figure 1. Opening Screen.....	2
Figure 2. Search Screen	3
Figure 3. Example of Search Results.....	5
Figure 4. General Event Screen	6
Figure 5. Vessel Characteristics Screen.....	7
Figure 6. Information Source Screen	9
Figure 7. Climate Screen.....	10
Figure 8. Damage Screen.....	11
Figure 9. Damage (cont'd) Screen.....	13
Figure 10. Ice Screen.....	14
Figure 11. Route Screen.....	17
Figure 12. Geographical Areas	18
Figure 13. Voyage Screen	19
Figure 14. Preview Report Screen	20

SHIP ICEBERG COLLISION DATABASE OPERATIONS MANUAL

1.0 INTRODUCTION

The Ship Iceberg Collision Database is a Microsoft Access 2000 database that catalogues 200 years of ship iceberg collisions in the North Atlantic. Many of these collisions occurred on or near the Grand Banks of Newfoundland but others occurred further afield; in the Arctic, off Greenland, and in the fjords of Alaska. Collision details have been culled from a huge variety of sources; two of the more notable being Lloyd's List and The New York Maritime Register. If references to information sources are missing for some events then it is likely that these two cited newspapers are the original sources. The collision database was initially conceived during a study of sea ice extents off Newfoundland and has continued to evolve. Much of the original information has been augmented by further research, and where possible, the database includes information about the nature of the damage, the weather and sea state, the ice conditions, the vessel route and location at the time, and vessel characteristics. In addition, photographs of the vessel, vessel damage, and images of charts showing ice conditions are included.

The Access database is derived from an earlier list of collisions which has been available for some time on the Institute's web site and which was published in the annual bulletin of the International Ice Patrol for the year 2000 (Hill, 2000). The development of the database and some of the trends that it illustrated were described in Hill (2001); this information is also available from the web site. The database continues to evolve; existing information is augmented and new data are added as further research unearths more details.

2.0 OPERATING NOTES

2.1 Opening Screen

On start up a message label appears warning that this is a read only version and that the user will be unable to change the contents. After acknowledging this message a disclaimer is shown for a brief period. Note that the user can dismiss the disclaimer by clicking its Close button. Once this preamble is complete an opening dialog as shown in Figure 1 appears.

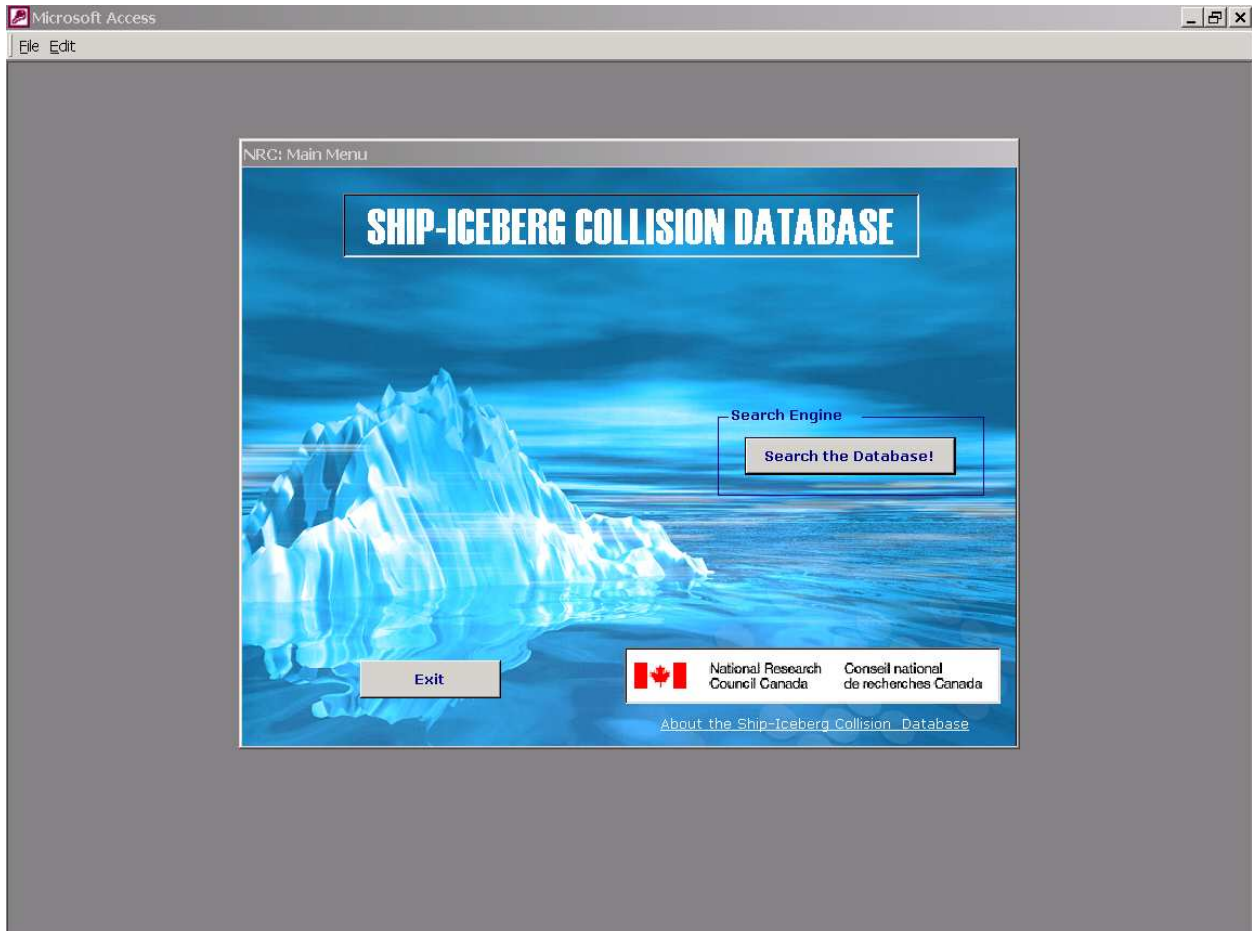


Figure 1. Opening Screen

The opening dialog presents three clickable options:

“Search the Database” starts the database,

“Exit” exits the database,

“About the Ship – Iceberg Collision Database” provides a brief description of the development of the database.

2.2 Search Screen

Selecting the “Search the Database” button opens the search screen as In Figure 2. Basically, the search criteria are defined in the top section and the results are displayed in the table below. The results can be bookmarked, and viewed and printed in formatted text by using the appropriate buttons at the bottom of the screen.

The screenshot shows a Microsoft Access window titled "NRC: Search the Database". The main area is a search form with a dark blue background and white text. The form is titled "Search the Ship-Iceberg Collision Database". It has five columns: "Search Category", "Search Operator", "Argument A", "Argument B", and "Next". Each column has a dropdown menu. Below the form is a "Bookmarks" section with "Add", "<", "0", ">", and "Clear" buttons. A large "Search!" button is in the center. To the right, it says "Results: 641". Below the search form is a table with the following data:

InteractionEv	VesselName	VesselType	Date	GeographicArea	LatitudeR	LatitudeDir	Longitude	Long
7	BCM Atlantic	Fishing trawler	18-Mar-2000	Strait of Belle Isl	53.15 N		052.18 W	
9	Harp	Cutter	20-Jun-1997	Strait of Belle Isl	49.79 N		054.61 W	
10	Acadienne Gale	Fishing trawler	01-Apr-1997	Strait of Belle Isl	53.18 N		054.43 W	
12	Spirit of Adventure	Catamaran	26-Aug-1996	Alaskan Waters	58.37 N		136.00 W	
13	Reduta Ordon	Bulk Carrier	21-Jul-1996	Hudson Strait	61.48 N		066.63 W	
15	UB Prince	Cargo - Refrigerated	08-Jun-1995	Grand Banks	50.00 N		053.88 W	
16	Alla Tarasova	Ferry	19-Jul-1995	Hudson Strait	63.08 N		067.70 W	

At the bottom of the screen, there are buttons for "View Details", "View Images", "View Reports", "Export Details", "Reset Form", and "Close". The National Research Council Canada logo is also present.

Figure 2. Search Screen

The search criteria is defined by filling out one or more of the top 4 rows of the form as follows:

- Search a Category Choose from list after clicking on downward arrow of label (see below for description of categories).
- Search Operator Select appropriate operator after clicking on downward arrow (see below for list of operators),
- Argument A Value of the selected category. This is either entered as a numeric value or selected from the available list.
- Argument B Value of the second argument when a “Between” operator has been selected.

Next Defaults to “end” the search but can be selected to “and” or “or” to extend the search criteria.

Description of Search Categories

Vessel Name	is the name of the ship and can be selected from the alphabetical list in Argument A. Typing the initial letters of the name will shortcut to that point in the list. See Appendix A for list of vessels.
Vessel Type	is the type of vessel such as Bulk Carrier, Oil tanker or Passenger and can be chosen from the list in Argument A. See Appendix A for list of vessel types.
Date	is in the format 1 April 1963 or 1 Apr 1963
Geographical Area	Choose from the list in Argument A, such as Grand Banks, Strait of Belle Isle, or Alaskan Waters. See Appendix A for list of areas and geographical boundaries.
Latitude Route	is the latitude co-ordinates of the collision in <u>degrees decimal</u> .
Latitude Direction Route	is the north or south (N or S) hemisphere. (So far, the database is only concerned with collisions in the northern hemisphere.)
Longitude Route	is the longitude co-ordinates of the collision in <u>degrees decimal</u> .
Longitude Direction Route	is the west or east (W or E) hemisphere.
Fatalities	is either Yes or No or Unknown
Damage Location	Choose from the list in Argument A, such as Bow, or Stern, or Bottom. See Appendix A for the full list.
Damage Severity	Choose from the list in Argument A, such as Dent, or Hole, or Sinking. See Appendix A for the full list.
Damage Name	Choose from the list in Argument A, such as Appendage, or Plate, or Rudder. See Appendix A for the full list.
Iceberg Shape	Choose from the list in Argument A, such as Blocky, or Pinnacle, or Tabular. See Appendix A for the full list.
Iceberg Size	Choose from the list in Argument A, such as Bergy Bit, or Medium, or Ice Island. See Appendix A for the full list.
Iceberg Tonnage	Enter numeric value(s).

List of Operators

Equal to
Not equal to
Lesser than
Greater than
Less than or equal to
Greater than or equal to
Between

To initiate the search, click on the Search button.

2.3 Search Result Screen

NRC: Search the Database

Search the Ship-Iceberg Collision Database

Search Category	Search Operator	Argument A	Argument B	Next
GeographicArea	EQUAL TO	Baffin Bay Area		End
Choose a Category				End
Choose a Category				End
Choose a Category				End

Bookmarks: Add < 0 > Clear

Search!

Results: **11**

InteractionEv	VesselName	VesselType	Date	GeographicArea	LatitudeR	LatitudeDir	LongitudeF	Long
24	Finnpolaris	Cargo - General	11-Aug-1991	Baffin Bay Area	71.98 N		059.87 W	
27	Terra Nova	Cargo - General	03-Oct-1990	Baffin Bay Area	73.80 N		078.07 W	
49	USCGC Westwind	Icebreaker	01-Jul-1970	Baffin Bay Area	72.00 N		065.00 W	
60	Hubert Gaucher	Tanker - Product	31-Aug-1991	Baffin Bay Area	76.70 N		089.73 W	
62	Arctic	Bulk Carrier	17-Oct-1978	Baffin Bay Area	72.13 N		064.42 W	
639	Alert	Sailing Vessel - Pow	01-Aug-1884	Baffin Bay Area	73.00 N		065.00 W	
654	Terra Nova	Cargo - General	31-Jul-1989	Baffin Bay Area	75.20 N		060.77 W	

View Details View Images View Reports Export Details Reset Form

National Research Council Canada Conseil national de recherches Canada

Close

Figure 3. Example of Search Results

Figure 3 is an example of a search result for a Geographical Area set equal to Baffin Bay area. The number of search results is indicated in the yellow bar to the right of the screen. Scrolling down with the side bar displays the list of events found while scrolling to the right displays the records from the search categories. The data can be sorted by clicking on an appropriate column heading with the left button and selecting ascending or descending order from the menu by clicking on the right mouse button. This sorts the displayed data only and does not affect the order when using the View and Export buttons at the bottom of the screen. The “Add” button of the Bookmarks panel is highlighted after the search. The search results can then be bookmarked by clicking on this button. Any number of selections can be bookmarked (the only limit being the memory capacity of one’s PC) and can be returned to by clicking the < or > buttons, and cleared by clicking the “Clear” button.

2.4 General Event Screen

Details of the current search results can be viewed by clicking on the “View Details” button on the lower left hand bottom of the Search Result Screen. This produces a screen as illustrated in

Figure 4 with the main topics menu (General, Climate, Damage, etc) near the top of the screen. Description of the various buttons and windows is as follows:

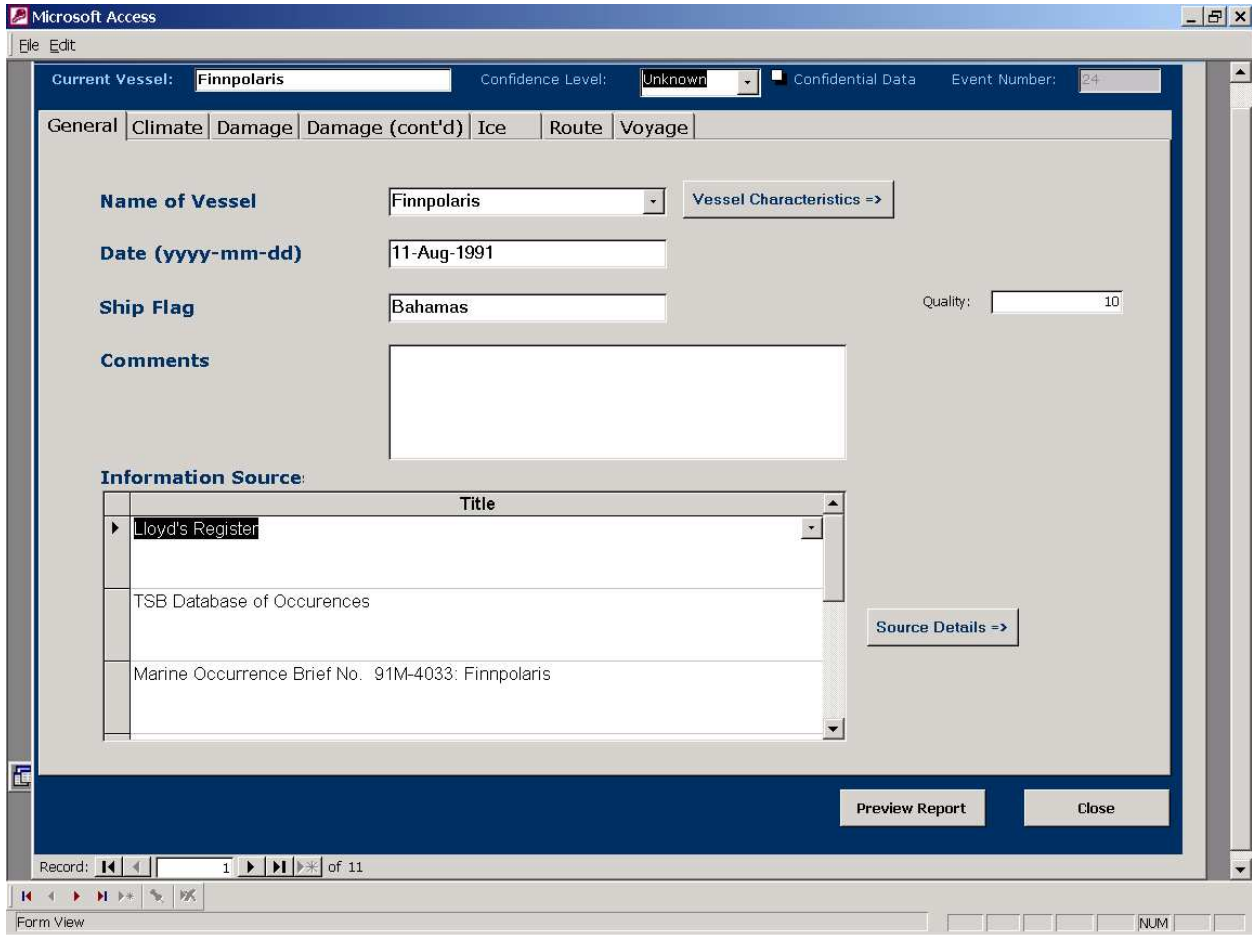


Figure 4. General Event Screen

The **Current Vessel** is given in the top left corner of the screen.

The **Confidence Level** is next to it and is rated as High, Low or Unknown depending on the reliability of the sources and the confidence that an iceberg, or ice described, was involved.

The Interaction ID **Event No.** is given in the top right corner.

Quality: The number, from 1 to 10, shown in the window near the top right hand corner of the screen is a subjective rating of the quality of the data based on the number of parameters known. 10 is the highest rating, normally given when the description of the collision has been well documented though formal investigations. 1 is the poorest reflecting a scantiness of details and sources where even the date and locality are unknown.

Record: The number of records found is displayed at the bottom left hand corner of the screen with sideways arrows to step through the records by clicking with the mouse.

2.5 Vessel Characteristics Screen

Clicking on the vessel characteristics button on the General Event Screen produces the screen as in Figure 5 with the Name of Vessel in bold near the top of the screen. The vessel particulars are in order:

The screenshot shows a software interface titled "NRC: Vessel Characteristics" with a main heading "Vessel Characteristics". The "Name of Vessel" field is "Finnpolaris". The form contains several input fields and dropdown menus for vessel details. On the right, there are three tonnage fields: "Tonnage, GRT (tons)" with value 12385, "Tonnage, DWT (tons)" with value 14906, and "Tonnage, Net (tons)" with value 6430. A "Propulsion Plant" section includes fields for "Prime Mover" (Diesel), "Transmission" (Geared), "Power (kW)" (7380), "NPropeller" (1), and "Propeller Type" (Fixed Pitch (FP)). A "Steel Grade" field is set to "Unknown". A "Comments" field contains text about the ship's characteristics and tonnage. At the bottom, there is a "Close" button and a record navigation bar showing "Record: 1 of 1 (Filtered)".

Field	Value
Name of Vessel	Finnpolaris
ASPPR Ice Class	Type A
Lloyd's Class	100A1
Baltic Class	1ASuper
Vessel Type	Cargo - General
Owner	FCRS Shipping
Country where Built	Spain
Year Built	1981
Bow Shape	Unknown
Stem angle (degrees)	
Length (m)	159.1
Beam (m)	21.4
Depth of Hold (m)	12.6
Comments	-Ship Characteristics are included in Norland Database -Strengthened for Ore Cargoes -Due to Tonnage Mark, another set of Masses exist (tons): * - GRT: 6300
Tonnage, GRT (tons)	12385
Tonnage, DWT (tons)	14906
Tonnage, Net (tons)	6430
Prime Mover	Diesel
Transmission	Geared
Power (kW)	7380
NPropeller	1
Propeller Type	Fixed Pitch (FP)
Steel Grade	Unknown

Figure 5. Vessel Characteristics Screen

ASPPR Ice Class Arctic Shipping Pollution Prevention Regulations ice class such as Arctic Class or Type.

Lloyd's Class, if known, is the vessel classification according to Lloyd's, American Bureau of Shipping, or Det Norske Veritas

Baltic Class, the vessel Baltic Ice Class rules classification, if known.

Vessel Type such as fishing trawler, bulk carrier, tanker, etc.

Owner, the registered owner of the vessel.

Country where built

Year built, the year the vessel was completed, or the year of its maiden voyage if known.

Bow shape, type of icebreaking bow or traditional shape if known.
Stem angle (degrees) if known.
Length (m) in meters
Beam (m) in meters
Depth of hold (m) in meters
Tonnage, GRT (tons) the gross registered tonnage
Tonnage, DWT (tons) the deadweight tonnage
Tonnage, Net (tons)
Prime mover of the propulsion plant whether diesel, diesel electric, sail, etc.
Transmission whether direct or geared, etc.
Power (kw) of the propulsion plant
Npropeller, the number of propellers
Propeller Type such as fixed or controllable pitch, open or ducted, etc.
Steel Grade such as DH and EH, but in fact, rarely known.
Comments may include further vessel particulars, or brief history and name changes.

Clicking on the Close button closes the Vessel Characteristics screen and returns to the General Event Screen as in Figure 4.

2.6 Information Source Screen

The information source screen contains the references from which information about the collision was collected. The full reference for each title appearing in the Information Source window can be seen by first clicking on the appropriate title then clicking on the Source Details button to the right. This displays the Information Source screen as in Figure 6 which displays all known relevant information about that source.

The screen is closed by clicking on the Close button on the bottom right of the screen. This completes the description of the General Event screen. Clicking on one of the topics on the top menu bar of the screen produces individual screens which are described in turn.

2.7 Climate Screen (Figure 7)

Visibility (Nautical miles) is the numerical value at the time of the collision if known.

Visibility is the brief description: Good, Limited, Overcast, Poor, Reasonable or Unknown.

Visibility – fog is the description of the obstruction as to Clear, Fog, Mist, Thick fog or Unknown.

Visibility – light is the description of the obstruction as to Daylight, Low light, Night or Unknown.

Precipitation is the description of the reduction of visibility as to Clear, Drifting snow, Light Snow, Rain or Unknown.

NRC: Information Source(s)

Information Source

Source Number

TITLE

Confidential ?

TYPE

Author(s)

Date of publication

Prepared for

Original source(s)

Comments

Record: of 1 (Filtered)

Figure 6. Information Source Screen

Air Temperature (deg. C) is the numerical value at the time of the collision if known.

Wind speed (knots) is the numerical value at the time of the collision if known.

Wave Height (m) is the numerical value at the time of the collision if known.

Water Temperature (deg. C) is the numerical value at the time of the collision if known.

Sea State – Waves is the description as to Calm, Ice [covered], Ice covered - Moderate [swell], Moderate, Rough, Slight, or Unknown.

2.8 Damage Screen (Figure 8)

Damage? Brief description whether No, Yes, or Unknown.

Scenario Description is a brief description of the kind of impact at collision:

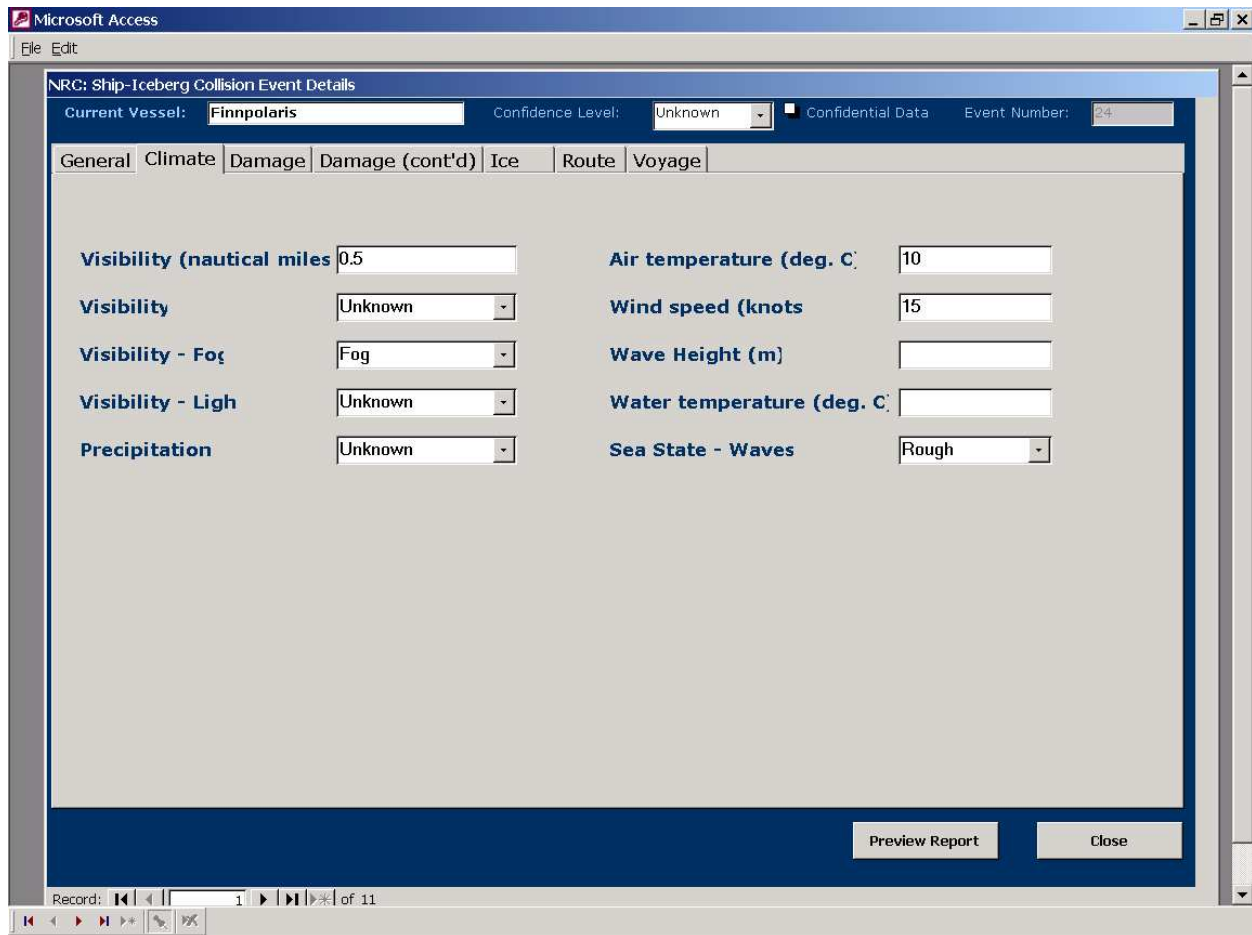


Figure 7. Climate Screen

Collision with other object avoiding an iceberg: While not a true collision with an iceberg there are a few instances when an accident occurred while manoeuvring around an iceberg either going aground or striking another ship. The most notable example is that of the *Exxon Valdez*.

Direct impact: Vessel collides with the iceberg head on.

Glancing blow: Vessel strikes an iceberg in passing often doing damage to the hull other than the bow, as in the case of the *Titanic*.

Grounding on: The vessel rides up, and often remains for some moments, on an underlying ledge or projection, sometimes in the valley of a drydock iceberg as in the case of the *Saugus* in 1925.

Iceberg drifts upon vessel: In this scenario, the vessel may be at anchor, becalmed, held captive in pack ice, or otherwise unable to get out of the way of an iceberg drifting down on it as in the case of the drillship *Pacnorse* in 1982.

Striking concealed bergy bit/growler in field ice: In heavy field ice, bergy bits, growlers and pieces of multi-year are easily hidden and can do appreciable damage when struck as in the case of the *William Carson* in 1977.

Striking concealed bergy bit/growler in waves: In heavy seas, bergy bits, growlers and pieces of multi-year are easily hidden and can do appreciable damage when struck as in the case of the *BCM Atlantic* in March 2000.

Striking projection: Vessel apparently clearing the above water portion of the iceberg but striking below as in the case of the *Brooklyn City* in 1897.

Vessel drifts upon iceberg: An unusual situation as in the case of the *Intrepid* in 1851 when the vessel is immobilized for one reason or another and is cast against an iceberg.

Unknown

Microsoft Access
File Edit

NRC: Ship-Iceberg Collision Event Details

Current Vessel: Confidence Level: Confidential Data Event Number:

General | Climate | Damage | Damage (cont'd) | Ice | Route | Voyage

Damage?

Scenario Description

Damage Location

Damage Severity

Damage Code

Length of Downtime

Cost to Repair (\$)

Cost of Downtime (\$)

Cause of Damage

Description of Damage

Damage Distance above WL (m)

Above WL damage length (m)

Above WL damage height (m)

Damage Distance below WL (m)

Damage Distance below WL (n)

Below WL damage length (m)

Below WL damage Height (m)

Steel Failure Type

Vessel Damage Photographs

Record:

Preview Report Close

Form View

Figure 8. Damage Screen

Damage Location is a brief indication as to where on the vessel the damage occurred and includes Bottom, Bow, Bow and tanks, Hull and tanks, Hulls, Machinery, Midship, Propeller, Shoulder, Steering gear, Stern, Unknown–dent, Unknown.

Damage Severity is a brief description as to the kind of damage suffered by the vessel and includes Abandoned, Cracks, Crushed, Denting, Hole, Large hole, Minor deck damage, No damage, Puncture, Sinking, Small puncture, Unknown.

Damage Code is a brief description as to what was damaged on the vessel as to Appendage, Frame, Hole, Plate, Propulsor, Rudder, Unknown.

Length of Downtime if known.

Cost to Repair if known.

Cost of Downtime being an estimate of revenue lost due to being laid up.

Cause of Damage box contains textual description of the events leading to the collision.

Description of Damage box contains textual description of the damage and significant events after the collision.

Damage Distance above WL (m)

Above WL damage length (m)

Above WL damage width (m) are the dimensions of any damage area above the waterline.

Damage Distance below WL (m)

Below WL damage length (m)

Below WL damage width (m) are the dimensions of any damage area below the waterline.

Steel Failure Type is Brittle, Ductile, or Unknown.

Vessel Damage Photographs is a window containing any images of the vessel and/or damage. Also included may be other ship drawings and Ice Charts showing the geographical location of the collision to the known ice conditions at the time. The charts are from the International Ice Patrol (IIP) or the Canadian Ice Service (CIS) and have been edited for the purpose, or have been recreated from our extensive database of ice reports. All the images are Bitmaps as it was anticipated that all potential users would have at least Microsoft Paint for viewing images on their PCs.

Clicking on the side arrows at the bottom of the image steps through the available images for the Current Vessel. Clicking on the side arrow with the vertical bar calls up the respective last or first image. Double clicking on the image with the left mouse button calls up a larger Vessel Photo window complete with vessel name and a brief description of the image. The large Vessel Photo window can be dismissed by clicking its Close button. Right clicking on the small or large image produces a menu table with a few basic options.

Copy The image can be copied to an image viewer which is compatible with Bitmaps (such as Paint or Photo Editor) by clicking on Copy from the menu then selecting Paste from the viewer.

Bitmap Image Object The image can be opened automatically in Paint by highlighting the words Bitmap Image Object with the cursor then clicking on **Open** in the sub-menu. This

feature can be useful should one want to zoom in on detail or create a larger image. Paint closes automatically as one continues to browse in the database but a window message “Microsoft Access cannot save your changes to this bound OLE object.” may pop up. To continue it is necessary to close this window then press the Esc button on the keyboard, otherwise the window message continues to appear.

2.9 Damage (cont'd) Screen (Figure 9)

The screenshot shows a Microsoft Access window titled "NRC: Ship-Iceberg Collision Event Details". The window has a menu bar with "File" and "Edit". Below the menu bar, there are several fields: "Current Vessel:" with the value "Finnpolaris", "Confidence Level:" with a dropdown menu set to "Unknown", a "Confidential Data" checkbox, and "Event Number:" with the value "24". Below these fields is a tabbed interface with tabs for "General", "Climate", "Damage", "Damage (cont'd)", "Ice", "Route", and "Voyage". The "Damage (cont'd)" tab is active. The main area of the screen contains several data entry fields:

Fatalities (Y/N/U)	No	Number of Fatalities	0
Injuries (Y/N/U)	No	Number of Injured	0
Loss of Cargo (Y/N/U)	Yes	Main Cause of Casualties	Unknown
Pollution (Y/N/U)	No		
Pollution Potential (Y/N/U)	Yes		

At the bottom of the screen, there are two buttons: "Preview Report" and "Close". Below the buttons is a record navigation bar showing "Record: 1 of 11" and various navigation icons.

Figure 9. Damage (cont'd) Screen

Fatalities (Y/N/U) are indicated by Yes, No, or Unknown.

Injuries (Y/N/U) are indicated by Yes, No, or Unknown.

Loss of Cargo (Y/N/U) is indicated by Yes, No, or Unknown.

Pollution (Y/N/U) is indicated by Yes, No, or Unknown.

Pollution Potential (Y/N/U) is indicated by Yes, No, or Unknown. Any ship carrying fuel oil has the potential for pollution but the emphasis here is on oil and chemical tankers or other vessels carrying cargo capable of polluting waters.

Number of Fatalities is given when known.

Number of Injuries is given when known.

Main cause of casualties is identifying whether the these were inflicted at the moment of collision or at some time later and include, Crushed at Impact, Crushed by falling ice/debris, Drowned, Fall to deck [from masts], Hypothermia/frostbite, Illness, Other, Unknown.

2.10 Ice Screen (Figure 10)

The screenshot shows a Microsoft Access window titled "NRC: Ship-Iceberg Collision Event Details". The "Ice" tab is active, displaying various data entry fields. At the top, it shows "Current Vessel: Finnpolaris", "Confidence Level: Unknown", and "Event Number: 24". The form includes sections for "Ice Briefing" (with a dropdown for "Ice Reports R"), "Iceberg Population (per degree square)", "Sea Ice Concentration (10ths)", and "Radar?" (with a dropdown for "Unknown"). There is a "Ship Radars" table with a "Radar Type" column. The "Iceberg" section includes fields for "IIP Iceberg Number", "Iceberg Shape" (dropdown: "Unknown"), "Iceberg Size/Multi-Year" (dropdown: "Bergy bit"), "Iceberg Tonnage (tonnes)", "Iceberg Length (m)", "Iceberg Width (m)", and "Iceberg Height (m)". The "Location" section includes "Latitude Nearest Known Iceber" and "Longitude Nearest Known Iceber" (both with degree, minute, and second fields), "Direction" (dropdown: "N" and "W"), "Distance within IIP Limits (nm)", and "Date of Observation (yyyy-mm-dd)". At the bottom right, there are "Preview Report" and "Close" buttons. The status bar at the bottom indicates "Record: 1 of 11".

Figure 10. Ice Screen

Ice Briefing is an attempt to capture what knowledge the captain of the vessel had regarding ice conditions before collision and include, Good Forewarning, Ice Reports Received, Little, None, Unknown.

Iceberg Population (per degree square) The iceberg count per degree square is based largely on the IIP records from 1922 and on the PERD Grand Banks Iceberg Database (which is also largely based on IIP records) from 1960, and from IOT's ice database prior to 1922. The number gives an idea of the risk involved, whether it be an unfortunate chance encounter, or a significant threat.

Sea Ice Concentration (10ths) An estimation of the sea ice concentration in the area whose presence may hinder recognition of the smaller iceberg masses such as growler and bergy bits. The concentration is based on accounts or the CIS ice charts of the time.

Radar A ship fitted with Radar is indicated with a Yes, No, or Unknown. Since Radar is a fairly modern invention it was not generally available before World War Two.

Ship Radars This window lists the known onboard Radar systems. This field is rarely known.

Latitude Nearest Known Iceberg and **Longitude Nearest Known Iceberg** in degrees, minutes and seconds, is the position of the closest iceberg based on IIP records or other ice reports to the site of the collision. Together with the date of the sighting this gives an indication of the ice information that was available to the vessel whether it was received or not.

Direction indicates whether the latitude is **North** or **South**, and the longitude **East** or **West**.

Distance within IIP Limits (nm) This is the approximate distance from the collision site to the boundary limit of all known ice in the Grand Banks area and south of 52°N as estimated by the IIP. This distance gives an indication of whether the collision took place close to the fringe or well inside the ice hazard area.

Date of Observation (yyyy-mm-dd) is the date of the observation of the closest reported iceberg.

IIP Iceberg Number This is the IIP ID number of the nearest known iceberg. Starting in 1947 each ice report for the year was given a chronological number. The PERD Grand Banks Iceberg Sightings Database contains all the IIP data from 1960 (earlier data is in progress) and may contain more information about the iceberg and whether it is a resight from a previous sighting which may then give some indication of its drift.

Iceberg Shape conforms to the standard shape descriptions as to:

Blocky	A flat topped iceberg with steep vertical sides.
Dome	An iceberg that is smooth and rounded on top.
Dry-dock	An iceberg that is eroded such that a U-shaped slot is formed near or at water level, with twin columns or pinnacles.
Tabular	A flat-topped iceberg. Most show horizontal banding.
Non-Tabular	A flat-topped iceberg that has been eroded so that it no longer has a flat top.

Pinnacle	An iceberg with a central spire or pyramid, with one or more spires.
Wedge	An iceberg which is rather flat on top and with steep vertical sides on one end, sloping to lesser sides on the other end.
Other	Any shape not described above.
Unknown.	Not described.

Iceberg Size/Multiyear conforms to the standard size descriptions as to

Bergy bit	Less than 1 m. freeboard , less than 5 m. long and weighing about one thousand tons.
Growler	Between 1 m. and 5 m. freeboard, 5 m to 15 m long, and weighing up to ten thousand tons.
Small	Between 5 m. and 15 m. freeboard, 15 m to 60 m long, and weighing up to one hundred-thousand tons.
Medium	Between 16 m. and 45 m. freeboard, 61 m to 120 m long, and weighing up to two million tons.
Large	Between 46 m. and 75 m. freeboard, 121 m to 200 m long, and weighing up ten million tons.
Very large	Greater than 75 m. freeboard and 200 m. in length and weighing greater than 10 million tons.
Ice Islands	Typically quite low with about a 5 m, freeboard, and several square thousand meters in area
Multiyear ice	Sea ice that has survived at least 2 summers melt. This ice has become very hard and small pieces may be hard to distinguish from bergy bits.
Unknown.	Size not described.

Iceberg Tonnage (tonnes) Weight of iceberg in metric tons when estimated.

Iceberg Length (m) Iceberg Width (m), Iceberg Height (m) The iceberg dimensions, normally estimated.

2.11 Route Screen (Figure 11)

Geographical Area. Searches within a certain area can be conducted by defining the area in geographical co-ordinates. To make searching a little easier, the waters of the northern hemisphere where icebergs collisions are likely to occur have been divided into several pre-defined areas. The names of these areas are descriptive rather than specific and are shown in Figure 12 as described below:

- [1] All waters.
- [2] North Atlantic: between lats. 30°N and 60°N and lons. 0°W and 63°W.
- 3 Grand Banks: between lats. 35°N and 50°N and lons. 35°W and 55°W.
- 4 Gulf of St. Lawrence and South Newfoundland Waters: between lats. 40°N and 48°N and lons. 55°W and 63°W.
- 5 Strait of Belle Isle and Approaches: between lats. 48°N and 55°N and lons. 50°W and 62°W.

- 6 Labrador Sea and Davis Strait: between lats. 55°N and 70°N and lons. 48°W and 65°W.
- 7 Hudson Strait: between lats. 55°N and 65°N and lons. 60°W and 80°W.
- 8 South Greenland Waters: between lats. 55°N and 70°N and lons. 25°W and 48°W.
- 9 Baffin Bay Area: between lats. 70°N and 90°N and lons. 50°W and 115°W.
- 10 Greenland Sea: between lats. 67°N and 90°N and lons. 30°E and 25°W.
- 11 Alaskan Waters: between lats. 55°N and 62°N and lons. 130°W and 150°W.
- [12] Unknown: area not described.

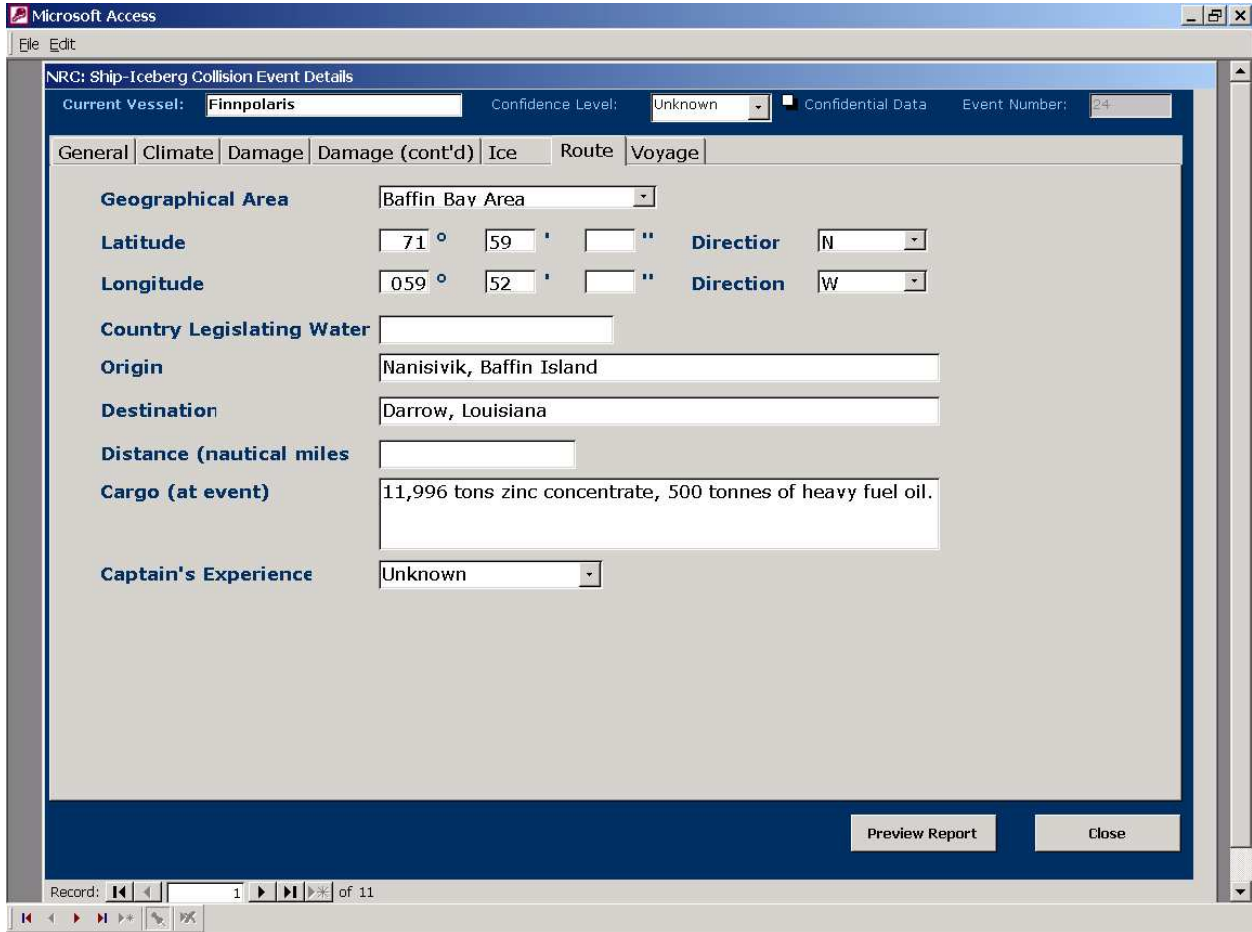


Figure 11. Route Screen

Latitude, Longitude, Direction Geographical coordinates in Degree, Minutes and Seconds with North or South, East or West as appropriate.

Locale Accuracy Geographical coordinates have been ascribed to all collision locations. Where the location is known to a reasonable limit of accuracy the position is described as “known”. Where the location is known to have occurred within a specified area such as the Gulf of St. Lawrence, Strait of Belle Isle or the Grand Banks, the position is described as “estimated”. “Unknown” is used to describe all other incidents and a best guess is used in giving a position.

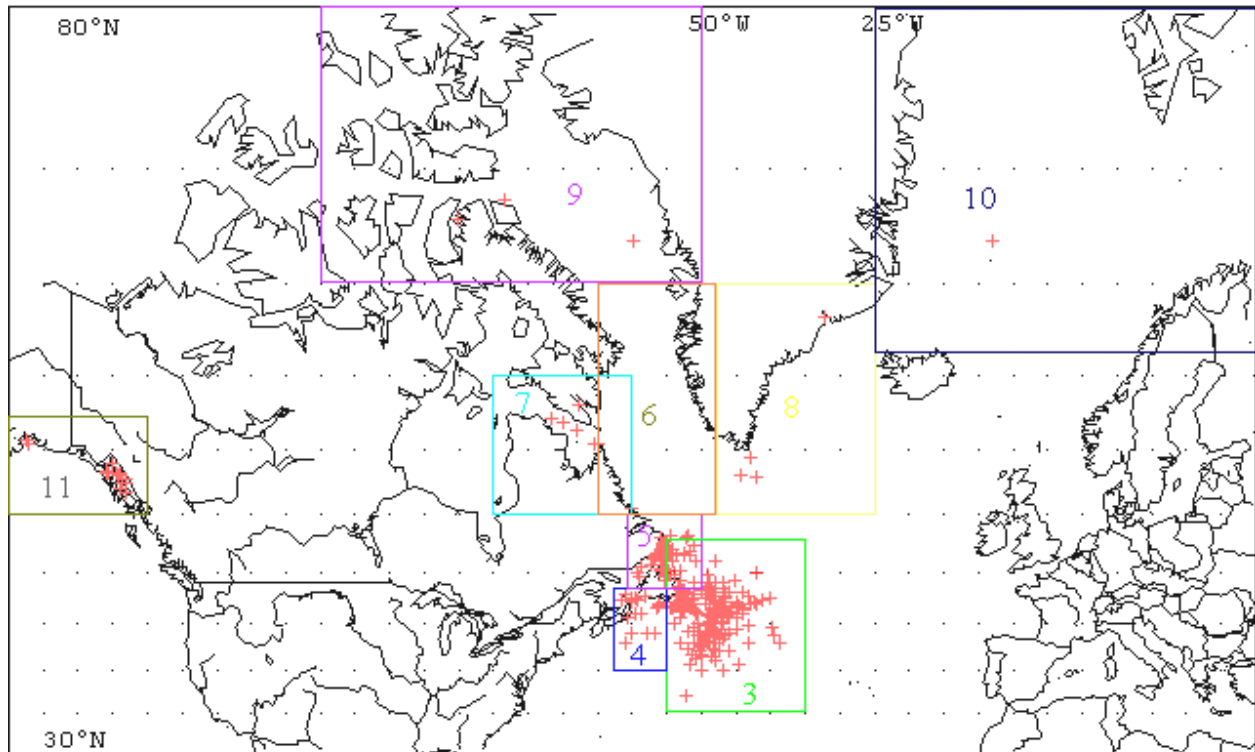


Figure 12. Geographical Areas

Country Legislating Water The territorial waters assumed by proximity rather than by legislative definition. The islands of the Canadian High Arctic came under Canadian Sovereignty in 1895. Accidents occurring in Newfoundland waters prior to 1948 when it became a province of Canada are described as such. Similarly, Greenland was granted self government by the Danish parliament in 1979. Norway’s sovereignty of Svalbard (Spitzbergen) was not recognized until 1920.

Origin The port or country from which the vessel left for its voyage. Occasionally more than one port is mentioned.

Destination The port or country which the vessel was originally heading for. Occasionally more than one is mentioned. If the vessel survived the collision the vessel normally headed for the next nearest port for repair on inspection.

Distance (nautical miles) The distance between the last port of call and the next destination.

Cargo (at event) Description of known cargo.

Captain’s Experience Not generally known, however, from the few instances where there has been an investigation and his experience has been assessed then it is described as High, Low or Medium. The description is somewhat subjective and is meant to give an overall idea as to the skipper’s overall experience not necessarily in relation to the ice conditions at the time. Captain

Smith of the *Titanic* had decades of experience in the Atlantic but had no previous encounter with ice. The skipper of the *William Carson* had good experience in the ice conditions of the Gulf of St. Lawrence but was held at fault by the inquiry for taking the ship into the more severe Labrador ice conditions of which he had no experience.

2.12 Voyage Screen (Figure 13)

The screenshot shows a Microsoft Access window titled "NRC: Ship-Iceberg Collision Event Details". The window has a menu bar with "File" and "Edit". Below the menu bar, there are several fields: "Current Vessel:" with the value "Finnpolaris", "Confidence Level:" with a dropdown menu showing "Unknown", a "Confidential Data" checkbox, and "Event Number:" with the value "24". Below these fields is a tabbed interface with tabs for "General", "Climate", "Damage", "Damage (cont'd)", "Ice", "Route", and "Voyage". The "Voyage" tab is selected. The main area of the screen contains several data entry fields: "Displacement (tons)" with an empty text box, "Vessel Speed at Collision (knots)" with the value "12", "Vessel Service Speed (knots)" with the value "15", "Draft FWD (m)" with the value "8.88", and "Voyage Constraints" with a large empty text box. At the bottom right of the main area are two buttons: "Preview Report" and "Close". At the bottom of the window, there is a record navigation bar showing "Record: 1 of 11" and various navigation icons.

Figure 13. Voyage Screen

Displacement (tons) The loaded displacement of the vessel at the time of the voyage if known, or if not, the stated value.

Vessel Speed at Collision (knots) The numerical speed value. Occasionally, nautical terms such as dead slow, or half speed were used in the accident descriptions in which case an estimated value was given based on the service speed if known.

Vessel Service Speed (knots) The stated speed of non wind powered vessels. This speed could be used as the collision speed if there was sufficient reason to believe it had not been reduced.

Draft FWD (m) The draft of the vessel at the bow at the time of the voyage if know, otherwise, the stated value.

Voyage Constraints Any comments regarding any unusual circumstances restricting the vessel's operations to, or manoeuvrability in ice covered waters thereby increasing the risk of iceberg collision.

2.13 Preview Report

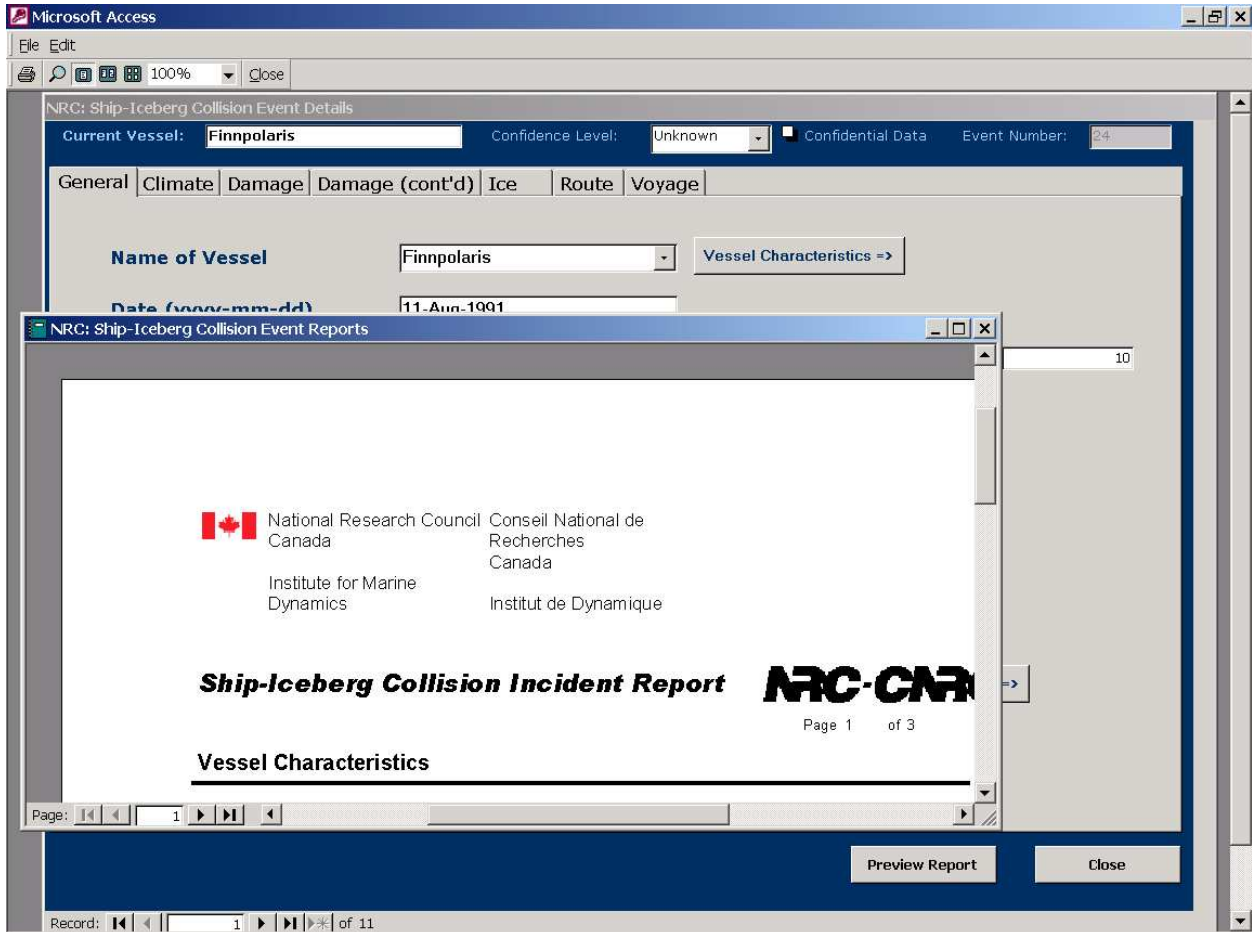


Figure 14. Preview Report Screen

A three page report can be generated for the Current Vessel from any of the menu screens by clicking on the Preview Report button on the bottom right hand corner. This opens a window as in Figure 14 showing the format of the report which is a précis of all the information about the particular event but does not include the images. Right clicking with the mouse produces a small menu from which it is possible to zoom the image, view multiple pages, print, and save (export) in a variety of formats including text and html. Clicking on the side arrows on the bottom left of the window steps through the three pages. The window can be enlarged by placing the cursor on one of the window corners to produce the diagonal arrow cursor and then dragging with the left mouse button. The window can be closed from either of the two control buttons on the top corners of the window.

Close The main menu items screen can be closed at any time by left clicking on the Close button.

Continuing with the main search screen (Figure 2), description:

View Images Clicking on this button produces the Vessel Photo window as described above in the Damage Screen section but it contains the images of all vessels pertaining to the current search. The number of images available is shown at the bottom of the window and the side arrows can be used to view them.

View Reports Clicking on this button will produce report pages as described above in the Preview Report section but will contain all the 3 page reports for each of the events, the total number of pages being shown near the top right corner of the window.

Export Details Clicking on this button will open an Excel file (provided it has already been installed on your computer) with all the information from the search in 4 worksheets. The Event sheet has 69 column titles with a row for each event. The Vessel Characteristics sheets has 27 column titles with a row for each vessel. The Information Source sheet has 9 column titles for each source. The Radar sheet is still under development with two columns. The Interaction Event ID is the unique ID number for each individual event and is the common identifier within each worksheet. Some experience in Excel would be useful if attempting any kind of data analysis.

Reset Form Clicking on this button will reset the current search criteria and results to the initial Search Screen with the complete records. It does not clear any bookmarks which should be cleared using the clear button on the Bookmark panel as required.

Close Clicking on the close button closes the search screen and returns to the Opening Screen.

3.0 SEARCH EXAMPLES

How to find vessels which struck growlers on the Grand Banks?

Search Category	Search Operator	Argument A	Argument B	Next
IcebergSize	EQUAL TO	Growler		And
GeographicArea	EQUAL TO	Grand Banks		End
Choose a Category				End
Choose a Category				End

Bookmarks: Add < 0 > Clear

Search!

Results: 32

How to find vessels which struck growlers on the Grand Banks and sank?

The screenshot shows the search interface for the Ship-Iceberg Collision Database. The search criteria are as follows:

Search Category	Search Operator	Argument A	Argument B	Next
IcebergSize	EQUAL TO	Growler		And
GeographicArea	EQUAL TO	Grand Banks		And
DamageSeverity	EQUAL TO	Sinking		End
Choose a Category				End

Below the search criteria, there is a "Bookmarks" section with "Add", "<", "o", ">", and "Clear" buttons. A central "Search!" button is highlighted with a yellow border. On the right, the "Results:" section shows a yellow box with the number "5".

How to find how many people lost their lives when the vessel sank after colliding with an iceberg?

The screenshot shows the search interface for the Ship-Iceberg Collision Database. The search criteria are as follows:

Search Category	Search Operator	Argument A	Argument B	Next
DamageSeverity	EQUAL TO	Sinking		And
Fatalities	EQUAL TO	Yes		End
Choose a Category				End
Choose a Category				End

Below the search criteria, there is a "Bookmarks" section with "Add", "<", "o", ">", and "Clear" buttons. A central "Search!" button is highlighted with a yellow border. On the right, the "Results:" section shows a yellow box with the number "45".

The database cannot be interrogated directly for the number of persons killed though the numbers are there but only whether there were fatalities or not. Once the search for fatalities has been done then the results can be exported to Excel and the number of fatalities summed.

4.0 ACKNOWLEDGEMENTS

The Ship-Iceberg Collision database was created at the Institute for Ocean Technology. The design template was originally created by Ivana Kubat and Isabelle Morin of NRC Canadian Hydraulics Centre and modified by IOT.

The project was largely funded by PERD and is managed by Brian Hill of IOT. Many thanks to work term Engineering students Zahra Addetia, Justin Wheeler, Craig Mercer and Jonathan Caines in developing this database, and also to Alan Ruffman of Geomarine Associates Ltd., Halifax for many helpful contributions.

Special thanks to Wayne Pearson and Greg Janes of IOT for their expertise and helping hands in code development.

Background image on main menu (c) Omnera Interactive. Used with permission.

5.0 REFERENCES

Hill, Brian T. 2000. Database of Ship Collisions with Icebergs. Report of the International Ice Patrol Bulletin in the North Atlantic. 2000 Season, Bulletin No.86, CG-188-55

Hill, Brian T. 2001. Ship Collisions with Icebergs: an Historical Record of Collisions in the Seas around North America and Greenland. Proceedings of the 16th International Conference on Port and Ocean Engineering under Arctic Conditions '01, Ottawa, Canada Vol.2 pp 997-1002

6.0 WEB SITE

www.icedata.ca