CHAPTER 3

OBSERVED ICE CHARTS

- Preparation of Ice Charts
- Dissemination of Aerial Ice Charts
- Dissemination of Shipboard Ice Charts
- The Egg Code
- Symbols Used on Ice Charts
- Supplementary Procedures for Indicating Total Concentration
- Colour Coding Ice Charts
- Examples of the Use of the Egg Code

This chapter deals with basic procedures for preparing and transmitting ice charts. Ice charts are of importance to icebreaker captains, commercial shipping interests and fishing vessels to assist them in finding the easiest passage through the ice or to avoid the ice when feasible to do so. The data on the chart is of vital importance to ice forecasters, serving as the basis for:

- advisory messages
- preparation of daily ice analysis chart
- short- and long-range ice forecasts and seasonal outlooks
- preparation of composite ice charts

3.1 Preparation of Ice Charts

Time and care shall be exercised in plotting charts, keeping in mind that they will become part of Canadian Ice Service Archive.

3.1.1 Drawing Procedures

Maps for permanent records shall be drawn in ink. Straight lines shall be drawn using a straight edge; freehand drawing will be limited to curved lines, numerals and lettering. A solid line shall be drawn as a boundary between ice areas of different characteristics.

Symbols that are used shall be neatly drawn, parallel to the bottom of the chart, either within the ice area or in the unobserved or land areas with an arrow or arrows leading to the applicable ice area. Where letters are necessary, they should be placed in consecutive order in an unobserved area.

All ice charts originating from the field must be drawn on charts of 1:1000000 scale. These charts will be kept in their original shape and not cut any smaller. The only exception will be those ice charts originating from the Laurentian region (see section 3.3). Only one day's observations will be entered onto one chart and no extensions will be taped to these charts.

For examples of actual ice charts see Figure 3.2 (p. 3-26), Figure 3.3 (p. 3-27), Figure 3.4 (p. 3-28) and Figure 3.5 (p. 3-29).

3.1.2 Map Identification Block

Used on ice charts to detail ice-reconnaissance date/time/observer information:

ICE RECCO No: CFR 2160 8 MAR **20**02
FROM: SUMMERSIDE **TO:** ———
TIME: 1155 Z **TO:** 1830 Z **MAP:** 1 **OF** 4
OBSERVER(S): MCGREGOR KULBASKI
DAIGLE SIMARD

- **ICE RECCO No:** Aircraft and Flight Number or Ship
  Day, Month **20** Year
- **FROM:** Origin of flight or sailing
- **TO:** Termination of flight or sailing
- **TIME:** On-ice time (UTC)
- **TO:** Off-ice time (UTC)
- **MAP:** Map number
  OF: Total number of series of flight or sailing
- **OBSERVER(S):** Ice Services Specialist(s) Name(s)

Notes:

1. If destination (**TO**) and origin (**FROM**) are the same, a straight line (———) indicates the destination.
2. Maps from an aircraft mission will be numbered (**MAP_OF_**) starting with number one at the beginning of every flight.
3. Maps from a ship, including helicopter flights, will be numbered (**MAP__**) consecutively from the beginning of the season until the end of that season.

3.2 Dissemination of Aerial Ice Charts

Data on the charts is of special importance to the ice forecasters and analysts and ships operating in or near the areas observed during the reconnaissance mission. Charts are updated continuously while airborne and transmitted according to published schedules (cf. 6). Unscheduled transmissions may be made to satisfy ships requiring tactical support. Rough copies and final copies of charts may be sent in flight to the Canadian Ice Service, the appropriate Coast Guard ice offices and Coast Guard ships as necessary.

After the termination of the reconnaissance mission, the ISS will transmit the completed charts to the Canadian Ice Service. It may also be required to send copies to the Ice Operations Centre and ships in the area if a broadcast facility is available.

After the ice charts have been transmitted, the original charts must be mailed to Canadian Ice Service in Ottawa for archiving.

3.3 Dissemination of Shipboard Ice Charts

An ISS serving on icebreakers equipped with appropriate communication equipment should relay their ice charts before 1800 UTC to their Canadian Coast Guard Ice Operations Centre of responsibility. The ice charts do not have to be complete for this transmission. Upon completion of the daily ice chart, a second transmission is recommended. The ice charts should be sent by facsimile or in the form of electronic files via cellular phone, landline or satellite link depending on what is practical and available.

The Ice Operations Centres in wintertime are located in:

- Québec, Québec
- Dartmouth, Nova Scotia
- St. John's, Newfoundland
- Sarnia, Ontario

During summertime the Ice Operations Centre is located in:

- Sarnia, Ontario

All final daily ice charts will be produced/archived on the regular size 1:1000000 ice charts. The Québec ice operation is the only exception, where special charts are made specifically for the St. Lawrence River covering the area between Montréal and Sept-Îles. Ice charts will

Don Isaacs (CIS)

Photo 3.1: Escorting an oil tanker through very close pack, heavily rafted grey ice.

be archived in chronological and numerical order. The charts will be mailed to the Canadian Ice Service in Ottawa, for archival purposes, on a monthly basis. A copy of the original charts will be kept on board the icebreaker for a year.

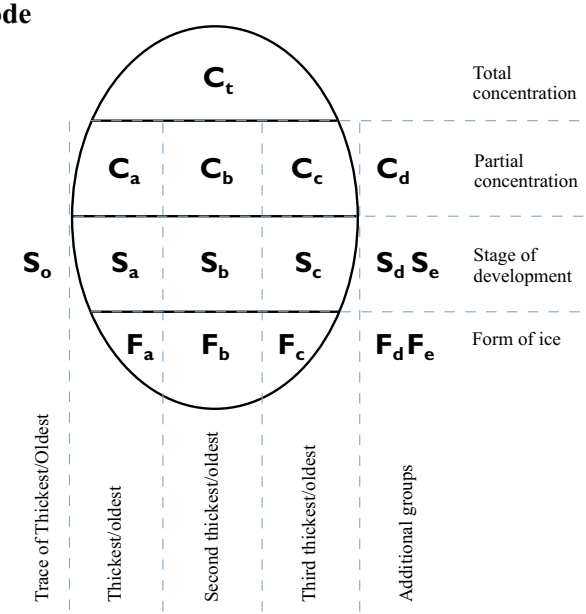
3.4 The Egg Code

The basic data concerning concentrations, stages of development (age) and form (floe size) of ice are contained in a simple oval form. A maximum of three ice types is described within the oval. This oval and the coding associated with it, are referred to as the "Egg Code". To indicate ice observations interpreted from radar imagery, the oval shall be omitted.

In the following figures and tables where ranges are shown for thickness, floe sizes or other dimensions, a report coinciding with the end point of a range shall be coded as the higher value.

The following is a summary diagram of the Egg Code. This code conforms to international convention and shall be used in coding all visual sea ice and lake ice observations without exception.

Figure 3.1: The Egg Code

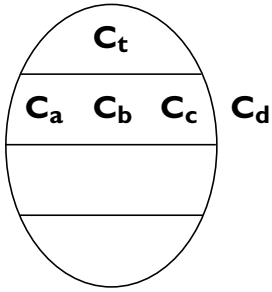


The symbols C_a C_b C_c and F_a F_b F_c correspond to S_a S_b S_c respectively.

There are some minor additions to the egg code symbology that are Canadian practice. In Canada, to enable the reporting of additional ice classes, especially during freeze-up and break-up, C_d S_e and F_e can be used. This should not be a common occurrence.

The following pages describe the specific details and rules for completing each level of information within the egg.

3.4.1 Concentration (C)

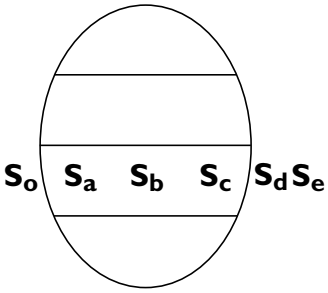


Total concentration **(C_t)** of ice in the area reported in tenths and partial concentrations of thickest **(C_a)**, second thickest **(C_b)**, third thickest **(C_c)** and fourth thickest **(C_d)** ice in tenths.

Notes:

1. Less than 1/10 (i.e. traces) shall not be reported within the oval except to describe open water (see Example 1, p. 3-20).
2. **C_d** shall only be included when **S_d** and **S_e** are reported (see Example 2, p. 3-20).
3. When **S_d** is used and **C_d** is omitted, **C_d** equals **$C_t-(C_a+C_b+C_c)$** (see Example 3, p. 3-20).
4. When only one ice type is present, the partial concentration shall not be indicated (see Example 4, p. 3-21 and Example 5, p. 3-21).
5. When one ice type is present with a trace of a thinner type, only total concentration of the major ice type shall be indicated (see Example 5, p. 3-21).

3.4.2 Stage of Development (S)



Stage of development of thickest **(S_o)**, second thickest **(S_a)**, third thickest **(S_b)** and fourth thickest **(S_c)** ice and the thinner ice types **S_d** and **S_e**, of which the concentrations are reported by **C_a C_b C_c C_d** respectively.

Notes:

1. Reference to thicker ice should be understood to mean older ice and conversely, thinner ice to mean younger ice types.
2. Ice is designated as Sea, Lake or River Ice depending on where it forms. In Canada, the practice is to use lake-ice coding to report ice in the Great Lakes and the St. Lawrence Seaway. Elsewhere, including the St. Lawrence River east of Montreal, sea-ice coding is used for stages of development.
3. **S_a**, **S_b** and **S_c** shall have concentrations of at least 1/10, except when **C_t** is zero (see Example 1, p. 3-20).
4. Reporting of **S_a**, **S_b** and **S_c** should generally be restricted to a maximum of three significant classes. In exceptional cases further classes may be reported as follows:

   S_o - Stage of ice development thicker than **S_a**, but having a concentration less than 1/10 (see Example 6, p. 3-21).

   S_d - Stage of development of the thickest remaining ice types (if more than one type remains). It is the fourth stage present after **S_a**, **S_b** and **S_c**.

   S_e - Shall only be reported when a thinner ice type remains after **S_d**. Partial concentration of **S_e** is obtained by subtracting partial concentrations (**$C_aC_bC_cC_d$**) from total concentration (**C_t**) (see Example 2, p. 3-20).
5. When **S_e** is not present, **S_d** may be a trace of ice (see Example 6, p. 3-21).
6. Concentration shall not be indicated for **S_o** and **S_e** (see Example 2, p. 3-20, and Example 6, p. 3-21).
7. Concentration shall not be indicated for **S_d** when **S_e** is not present (see Example 3, p. 3-20, and Example 5, p. 3-21).

Table 3.1: Coding for Sea-Ice Stages of Development (S_o S_a S_b S_c S_d S_e)

DESCRIPTION	THICKNESS	CODE
New ice	<10 cm	1
Nilas, Ice rind	<10 cm	2
Young Ice	10-30 cm	3
Grey Ice	10-15 cm	4
Grey-white ice	15-30 cm	5
First-year ice	≥30 cm	6
Thin first-year ice	30-70 cm	7
First stage thin first-year	30-50 cm	8
Second stage thin first-year	50-70 cm	9
Medium first-year ice	70-120 cm	1·
Thick first-year ice	>120 cm	4·
Old ice		7·
Second-year ice		8·
Multi-year ice		9·
Ice of land origin		▲·
Undetermined or unknown		X

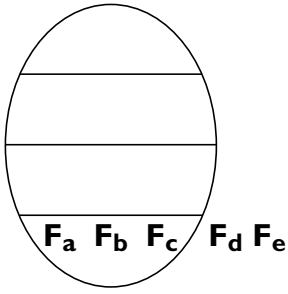
Table 3.2: Coding for Lake-Ice Stages of Development (S_o S_a S_b S_c S_d S_e)

DESCRIPTION	THICKNESS	CODE
New lake ice	<5 cm	1
Thin lake ice	5-15 cm	4
Medium lake ice	15-30 cm	5
Thick lake ice	30-70 cm	7
Very thick lake ice	>70 cm	1·

Notes for Tables 3.1 and 3.2:

1. On the horizontal line giving **$S_oS_aS_bS_cS_d$**, only one dot (•) shall be placed to indicate the distinction between classes of ice. Every coded figure to the left of the (•) is understood to have the (•) as part of its code (see Examples 2, 3 and 6, pp. 3-20, 3-21).
2. Codes 3 and 6 shall only appear on Canadian charts if the ISS cannot confidently determine the stages of the ice in the area observed.
3. Codes 8 and 9 shall only appear when measurements have been taken.
4. Codes 8• and 9• shall normally appear on Canadian charts only from 01 October to 31 December, but if the ISS is confident of the report, it may be used throughout the year, otherwise 7• is used.
5. The symbol ▲• shall only be used within the egg and when the concentration of ice of land origin is 1/10 or more.
6. The symbol **X** (meaning "undetermined") shall be used to designate stages of development or forms of ice only if it is impossible to specify otherwise.

3.4.3 Form of Ice (F)



Floe Size corresponding to **S_a S_b S_c S_d** and **S_e** (when **S_d** and **S_e** are greater than a trace).

Notes:

1. WMO International procedures also permit reporting of **F_p** and **F_s** as the primary and secondary forms of all the ice without reference to stage of development.
2. It is Canadian practice to report **$F_aF_bF_c$** as predominant floe sizes of **S_a S_b S_c** respectively. This makes it necessary, when only **S_a** and **S_b** are present, that **F_a** and **F_b** shall be followed by a dash (-) where **F_c** would normally appear (see Example 7, p. 3-22).

Table 3.3: Coding for Form of Ice (F_a F_b F_c F_d F_e)

e ice		
Small ice cake, brash ice, agglomerated brash	<2 m	1
Ice cake	2-20 m	2
Small floe	20-100 m	3
Medium floe	100-500 m	4
Big floe	500-2000 m	5
Vast floe	2 -10 km	6
Giant floe	> 10 km	7
Fast ice		8
Icebergs		9
Undetermined, unknown or no form		**X**

Notes for Table 3.3:

1. Width refers to the maximum horizontal extent.
2. At least one code 8 must be used for fast or consolidated ice. Other ice types embedded may retain their floe size (see Example 9, p. 3-22).
3. Occasionally the stage of development of fast ice cannot be determined. The area shall be blackened-in to denote fast ice (see Table 3.9, p. 3-17).
4. New sea ice does not have a definite form; therefore, when this stage of development occurs as S_a, S_b or S_c, the symbol **X** shall be used to designate floe size (see Example 4, p. 3-21).
5. Floe size is not included for S_o, S_d and S_e if the concentration of these ice types is less than 1/10. Otherwise floe sizes for S_d and S_e are optional.
6. If there is a significant variation in floe sizes in an area containing only one particular ice type, the ISS may enter the applicable floe-size categories in the lowest part of the oval reserved for floe size. The largest floe-size category shall be put on the left side within the oval, followed by the other applicable floe sizes. In this case, the partial concentrations listed (C_a C_b C_c C_d) would match the partial concentration of floe sizes, instead of different ice types.

3.4.4 Coding and Symbology for Strips and Patches

∞ C

The **∞** symbol, placed at the bottom of the oval in the section reserved for Form of Ice, indicates that the ice is in strips and patches; the concentration within the strips and patches is represented by **C**. (see Example 11, p. 3-23).

When strips and patches are observed in open-water areas, the symbol shall be placed to denote the position of the strips and patches. If the ice in the strips and patches is of the same composition as that inside an adjacent ice edge, no oval is required. If the ice in the strips and patches is of a different composition, an oval shall be used with an arrow or arrow(s) to the strips-and-patches symbol(s). To avoid confusion, the strip symbol must be included with the total concentration (see Example 10, p. 3-23).

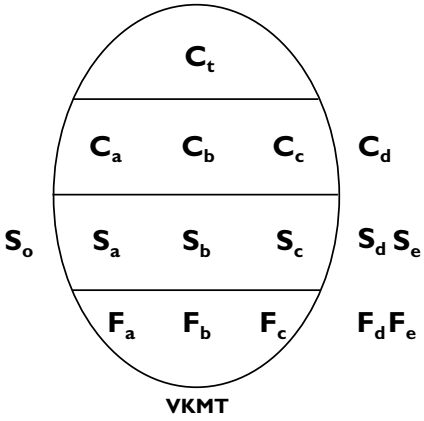
In an area where the ice is arranged in strips and patches and the ice floes are medium or greater, the floe size shall be indicated by using two ovals. The floe sizes are indicated as normal in the first oval, with the **∞** symbol placed between the first and second ovals. The **∞** symbol is repeated in the second oval beside the total concentration of the strips and patches (see Example 12a, p. 3-23).

An alternate way of reporting the same situation as above:

In an area where the ice is arranged in strips and patches and the ice floes are medium or greater, the floe sizes shall be indicated as normal. Both the total concentration and the concentration within the strips will be placed in the space reserved for $\mathbf{C_t}$, with the **∞** symbol between them. When this option is used, $\mathbf{C_a}$ $\mathbf{C_b}$ $\mathbf{C_c}$ and possibly $\mathbf{C_d}$ refer to the total concentration and not the concentration within the strips. For example, $\mathbf{C_t}$ can be reported as 2 **∞** 9 meaning the total concentration is 2 tenths with strips of 9 tenths and the partial concentration(s) shall equal 2 tenths (see Example 12b, p. 3-24).

In an area of ice where some thicker ice type(s) is (are) embedded as strips and patches, these shall be indicated by the use of two ovals. The overall partial concentrations of the ice types are indicated in the first oval and the concentrations within the strips and patches are indicated in the second oval. The **∞** symbol shall be placed between the two ovals and along with the total concentration in the second oval (see Example 13, p. 3-24).

3.4.5 Coding for Brash



If 1 tenth or more of brash is present, it will always be $\mathbf{C_a}$.

If brash is present, $\mathbf{S_a}$ will always be a dash (-), otherwise the normal table is to be used.

Brash is already indicated in the table as 1, therefore $\mathbf{F_a} = 1$ confirms the dash (-) for $\mathbf{S_a}$.

Four digits (**VKMT**) shall be added below the oval to indicate the thickness concentration breakdown of the brash that is present. Table 3.4 (below) shows the thickness categories for agglomerated brash. The breakdown shall be entered going from right (**T**) to left (**V**). In the case where there is no thickness for thin but there are entries for medium, thick and very thick a zero (**0**) shall be placed in the thin column. This also holds true for medium (**M**) and thick (**K**) regardless of the combination (see Example 14, p. 3-24 to Example 17, p. 3-25).

Table 3.4: Thickness Categories forfBrash (VKMT)f

	THICKNESS
Very Thick (**V**)	>4m
Thick (**K**)	>2-4m
Medium (**M**)	1-2m
Thin (**T**)	<1m

Notes: f

1. $\mathbf{C_a = V + K + M + T}$
2. This is a Canadian coding procedure.
3. By convention a trace of brash is not coded.

Don Isaacs (CIS)

Photo 3.2: An icebreaker escorting a freighter above the Québec City bridges clearly show thick river brash ice.

3.5 Symbols Used on Ice Charts

3.5.1 Symbols for Dynamic Processes

Compactingf

optional

1 Slight compacting

2 Considerable compacting

3 Strong compacting

Divergingf

Shearingf

Driftf

optional

15 (indicate drift speed in tenths of knots)

(e.g. 15 = 1.5 knots)

3.5.2 Symbols for Openings in the Ice

Crackf This symbol indicates the presence of cracks in the area.

Crackf This symbol represents a crack at a specific location.

Leadf or The width in nautical miles may be specified.

Frozen lead f The orientation of the crosslines may be varied to distinguish them from other hatching lines.

3.5.3 Symbols for Topographical Features

Ridges/Hummocksf

▲▲ $\bar{h}/h_x$ or f ▲▲ $\bar{h}/h_x$
C

C - Concentration or area coverage in tenths.

f - Frequency in numbers per nautical miles (**f** is an alternative for **C**).

$\bar{h}$ - Mean height expressed in decimetres and included when known.

h_x - Maximum height expressed in decimetres and included when known.

Rafting

(concentration **C** in tenths)

Jammed brash barrierf

3.5.4 Symbols for Ice Thickness

Thicknessf t_E (t_E = thickness **measuredf**in centimetres)

Thicknessf t_E (t_E = thickness **estimatedf**in centimetres)

Examples: **35** **35**

When more than one measurement has been taken, both mean and maximum thicknesses are reported, as shown below:

30/40

3.5.5 Coding for Stage of Melting

Stage of meltingf

m_s (see Table 3.5 below for m_s)

Table 3.5: Coding forfStage of Melting (m_s)f

DESCRIPTION	COVERAGE	CODE
No melt		0
Few puddles	1-3/10	1
Many puddles	>3/10	2
Flooded ice		3
Few thaw holes	1-3/10	4
Many thaw holes	>3/10	5
Dried ice		6
Rotten ice		7
Few frozen puddles		8
All puddles frozen		9
Undetermined or unknown		X

3.5.6 Coding and Symbology for Snow Cover

Snow cover

C - concentration (or area coverage) in tenths

s - snow depth, according to Table 3.6

(the orientation of the symbol with an arrow can show the direction of sastrugi)

Table 3.6: Coding forfSnow Depth (s)f

DESCRIPTION	CODE
no snow	0
1 - 5 cm	1
6 - 10 cm	2
11 - 20 cm	3
21 - 30 cm	4
31 - 50 cm	5
51 - 75 cm	6
76 - 100 cm	7
> 100 cm	8
unknown	

3.5.7 Coding and Symbology for Ice of Land Origin

Triangularfsymbol shown:f

nn = number, see following Table 3.7

yy = day of month of sighting

Table 3.7: Numberfof Bergy Bits/Growlers orfIcebergs (nn)f

NUMBER	CODE
None	00
1	01
2	02
3	03
4	04
5	05
6	06
7	07
8	08
9	09
10	10
11	11
12	12
13	13
14	14
15	15
16	16
17	17
19	19

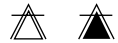
NUMBER	CODE
1 - 9	20
10 - 19	21
20 - 29	22
30 - 39	23
40 - 49	24
50 - 99	25
100 - 199	26
200 - 499	27
500 or more	28
Undetermined	99

Table 3.8: Symbology forIce of Land Originf

DESCRIPTION	SYMBOL	
	ONE	MANY
Growler		
Bergy bit		
Iceberg (size unspecified)		
Small iceberg		
Medium iceberg		
Large iceberg		
Very large iceberg		
Ice island		
Ice of sea origin (floeberg)		
Radar target (suspected berg)		

Notes:

1. Tabular iceberg indicated by adding a horizontal line through any of the symbols as shown in the following example. These symbols can be combined with a number, if exact numbers are known.

   Example: 

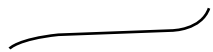
2. For further detail on reporting ice of land origin, see Chapter 4.

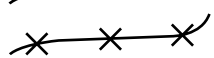
3.5.8 Symbols for Defining Limits

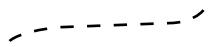
Limit of Undercast 

Limit of Radar Observations 

Limit of Visual Observations 

Observed Edge or Boundary 

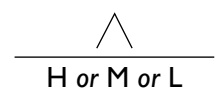
Ice Edge or Boundary from Radar 

Estimated Edge or Boundary 

3.5.9 Supplementary Coding for Radar Observations

Relative Roughnessf

Light	up to 1/10	L
Medium	2/10 - 3/10	M
Heavy	4/10 - 10/10	H

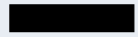
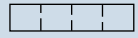
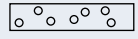
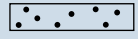


Note:f
Areas showing no radar return shall be indicated NIL ECHO.

3.6 Supplementary Procedures for Indicating Total Concentration

In order to facilitate readability of the chart, ice-covered areas may be hatched according to total ice concentration. The hatching symbology (developed by WMO) may be applied to all areas of ice concentration or only to some of them. Whenever hatching is applied, the hatching symbols as shown in Table 3.9 shall be used. No International Rules are given for the thickness of the hatching lines; the thickness may be the same throughout all hatched areas or may vary in the sense that the thickest lines are used for areas of thicker ice. It is Canadian practice not to hatch ice charts except for total concentrations less than 1/10th.

Table 3.9: WMO Symbols Forfthe Hatching of Total Concentration of Icef

DESCRIPTION	HATCHING
Fast Ice	
10/10 Consolidated ice, Compact ice and 9-9+/10 Very close pack/drift ice	
7-8/10 Close pack/drift ice	
4-6/10 Open drift ice (Line spacing is twice that of Close pack/drift ice)	
1-3/10 Very open drift ice	
Open water (less than 1/10 sea ice, no ice of land origin)	
Bergy water (less than 1/10 sea ice may be present and total ice concentration is less than 1/10)	
Water with Radar Targets (less than 1/10 sea ice may be present and total ice concentration is less than 1/10)	
Ice free (no ice present)	

Note:f

Presence of new ice can be indicated by the following symbols scattered throughout area affected: 

3.7 Colour Coding Ice Charts

3.7.1 Introduction

For several years, the Ice Service Specialists have been applying a colour code to ice information charts for the Canadian Coast Guard operations in the St. Lawrence River and the Gulf of St. Lawrence. This has proven to be quite beneficial to individuals making transportation decisions based on these information products. More recently, we have modified and expanded this colour code for application in all coastal waters of Canada, including the Arctic.

3.7.2 The Colour Code

This colour code is intended to assist navigation decisions in ice infested water. It is loosely based on the concept of a traffic light where green represents proceed, yellow represents caution and red represents danger. The objective of the colour code application is to enable a person to quickly assess general ice conditions. A ship sailing in a given area can easily assess the general ice conditions and hence qualify the difficulty or ease to either navigate through easily, or to reduce speed or to stop the ship.

However, this does not consider the other variables such as winds, currents or ship design which are important considerations in any ice navigation decision. The most detailed ice information continues to reside in the ice egg codes.

3.7.3 How to Interpret the Code

The following text is intended to assist an individual interpret the colour presentation.

Open orfBergy Waterf

- Areas of **open waterforfbergy waterf**are coloured **blue**.

  Blue – open or bergy water

Presence of Icef

- For ice concentration of one tenth or greater, the ice type must be separated into two categories: less than 15 cm and greater than 15 cm thickness:

Ice Types Thickerfthan 15 cmf

- The colour for a given ice area will be determined by the total concentration of the ice types thicker than 15 centimetres and is represented by the following list:

  Green – from 1 to 3 tenths of ice thicker than 15 cm

  Yellow – from 4 to 6 tenths of ice thicker than 15 cm

Orange – from 7 to 8 tenths of ice thicker than 15 cm

Red – from 9 to 10 tenths of ice thicker than 15 cm

Presence of Old Ice f

- The presence of old ice (multi-year ice) is indicated by the colour purple, and is represented by the following list:

Purple Dash Lines – indicates the presence of 1 to 4 tenths of old ice

Purple Background – indicates the presence of 5 tenths or more of old ice

Presence of Fast Icef

The presence of fast ice, regardless of the thickness is always black or grey.

Black – fast ice regardless of thickness

Grey – fast ice regardless of thickness

Ice Types Thinnerfthan 15 cm – No ColourfAssigned in Backgroundf

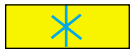
- **Ice less than 15 centimetres in thicknessf**is indicated by a **starfcodef**and the **colourf of fthe fstarsf** is determined by the predominance between **grey fice f (10 to 15 cm)f**and **new ice (0 to 10 cm),f**and is represented by the following list:

Blue Stars – predominance of ice thinner than 10 cm

Red Stars – predominance of ice thickness between 10 and 15 cm

Ice Types Thinnerfthan 15 cm – ColourfAssigned in Backgroundf

- Secondary ice types with less than 15 centimetres in thickness are indicated by a star code and the colour of the stars is determined by the predominance between secondary grey ice (10 to 15 cm) and secondary new ice (0 to 10 cm), and is represented by the following list:



Blue Stars – predominance of secondary ice thinner than 10 cm

Red Stars – predominance of secondary ice thickness between 10 and 15 cm

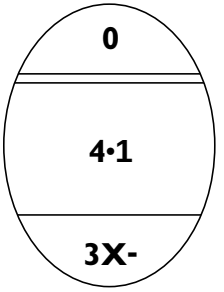
The starfcode is placed overftop of the background colour.f In the case of 9 to 10 tenths of ice (red background) and predominance of ice thickness between 10 and 15 cm (red stars), there is only one colour which can be represented: red. The result of red stars on a red background is red.

3.8 Examples of the Use of the Egg Code

3.8.1 Various Ice Type and Concentration Combinations

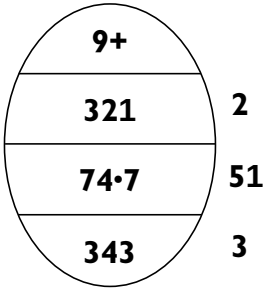
Example 1f

Less than one tenth of ice to show open water. Some thick first-year in small floes; new ice is also present and has no floe form.



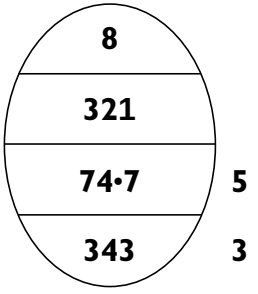
Example 2f

9+/10 total ice concentration. 3/10 old ice in small floes, 2/10 thick first-year ice in medium floes, 1/10 thin first-year ice in small floes, 2/10 grey-white ice in small floes, and the remaining 2/10 is new ice with no floe form.



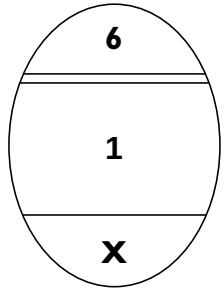
Example 3

8/10 total ice concentration. 3/10 old ice in small floes, 2/10 thick first-year ice in medium floes, 1/10 thin first-year ice in small floes and 2/10 grey-white in small floes.



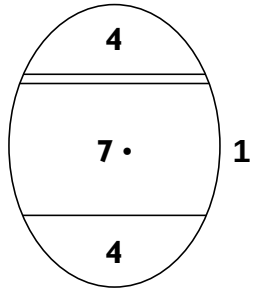
Example 4f

6/10 of new ice with no floe form.



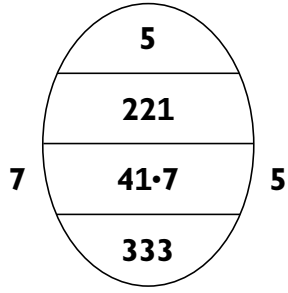
Example 5f

4/10 of old ice in medium floes. New ice is also present with a concentration of less than 1/10.



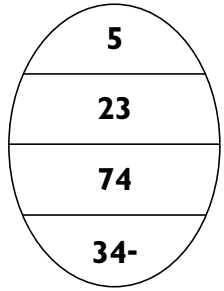
Example 6f

5/10 total ice concentration. 2/10 thick first-year ice, 2/10 medium first-year ice and 1/10 thin first-year ice. All in small floes. Old ice and grey-white ice with a concentration of less than 1/10 are also present.



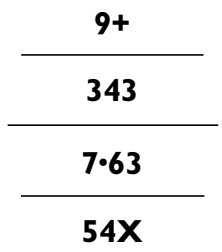
Example 7f

5/10 total ice concentration. 2/10 thin first-year ice in small floes and 3/10 grey ice in medium floes.



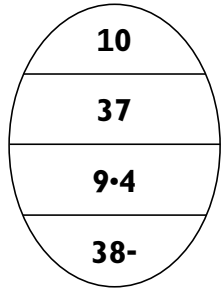
Example 8f

9+/10 total ice concentration. 3/10 old ice in big floes, 4/10 first-year ice in medium floes and 3/10 young ice with floes undetermined. Horizontal lines with no egg shell indicates that data has been interpreted from radar.



Example 9f

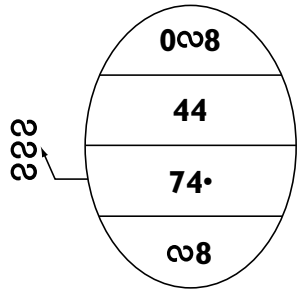
Fast grey ice with 3/10 multi-year ice in small floes embedded.



3.8.2 Strips and Patches

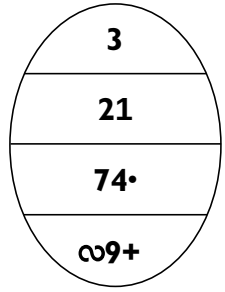
Example 10f

Open water with strips and patches of old and thick first-year ice in small floes.



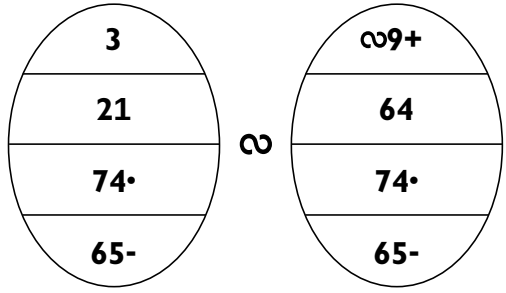
Example 11f

3/10 total ice concentration. 2/10 old ice and 1/10 thick first-year ice. All ice is concentrated in strips and patches of 9+/10.



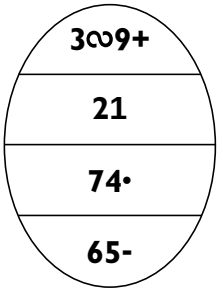
Example 12af

3/10 total ice concentration in strips and patches of 9+/10. 6/10 old ice in vast floes and 4/10 thick first-year ice in big floes. These floe sizes are significant and warrant the use of two ovals.



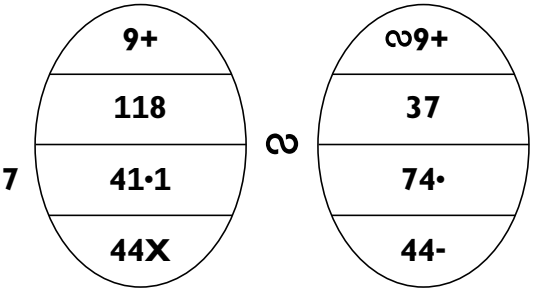
Example 12bf

An alternate way to describe the same conditions with 3/10 total ice concentration in strips and patches of 9+/10. 6/10 old ice in vast floes and 4/10 thick first-year ice in big floes. These floe sizes are indicated because they are significant.



Example 1

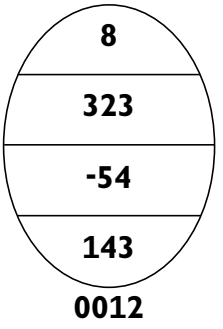
9+/10 total ice concentration comprised of 1/10 thick first-year ice, 1/10 medium first-year ice, 8/10 new ice and old ice with a concentration of less than 1/10. The old and thick first-year ice are distributed throughout the area in strips and patches made up of 3/10 old and 7/10 thick first-year ice. All ice types in the second oval must be included in the first oval.



3.8.3 Brash

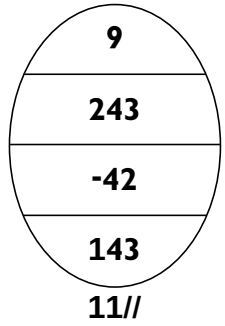
Example 14f

8/10 total ice concentration. 3/10 of brash, 2/10 grey-white ice in medium floes, 3/10 grey ice in small floes and 1/10 of the brash is medium while 2/10 is thin. There is no thick or very thick brash present.



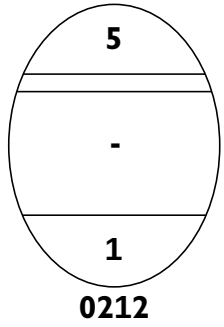
Example 15f

9/10 total ice concentration. 2/10 brash (1/10 very thick brash, 1/10 thick brash and a trace of medium and thin brash), 4/10 grey ice in medium floes and 3/10 nilas in small floes.



Example 16f

5/10 total ice concentration. All brash with 2/10 thick brash, 1/10 medium brash and 2/10 thin brash.



Example 17f

6/10 total ice concentration. 4/10 brash (1/10 medium, 1/10 thick and 2/10 very thick) and 2/10 nilas in small floes.

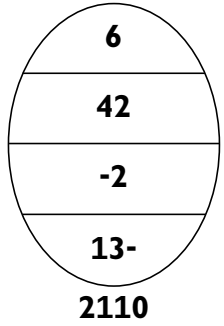


Figure 3.2: Ice Chart From a Sea-Ice Reconnaissance Flight

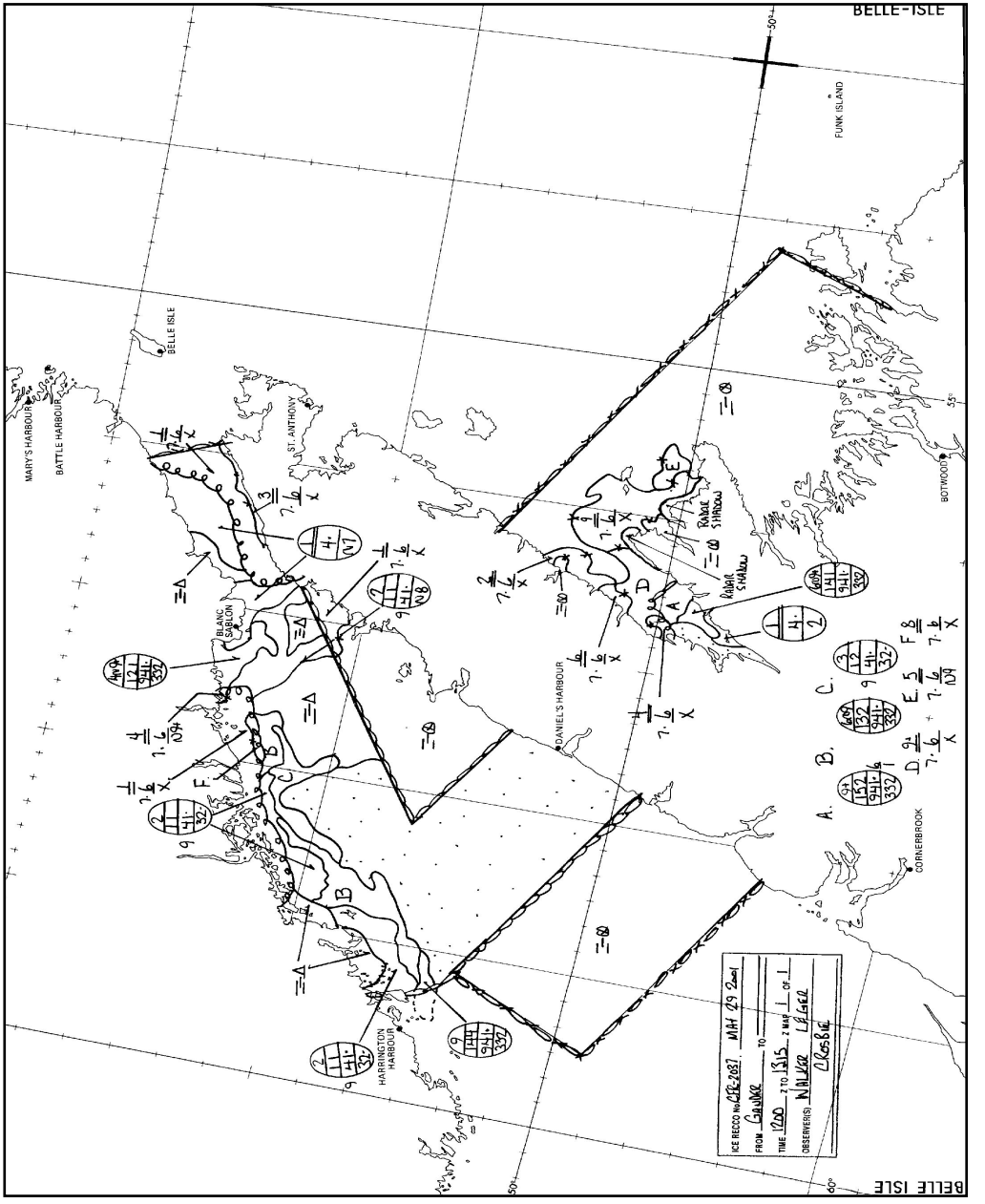


Figure 3.3: Ice Chart From a Lake-Ice Reconnaissance Flight

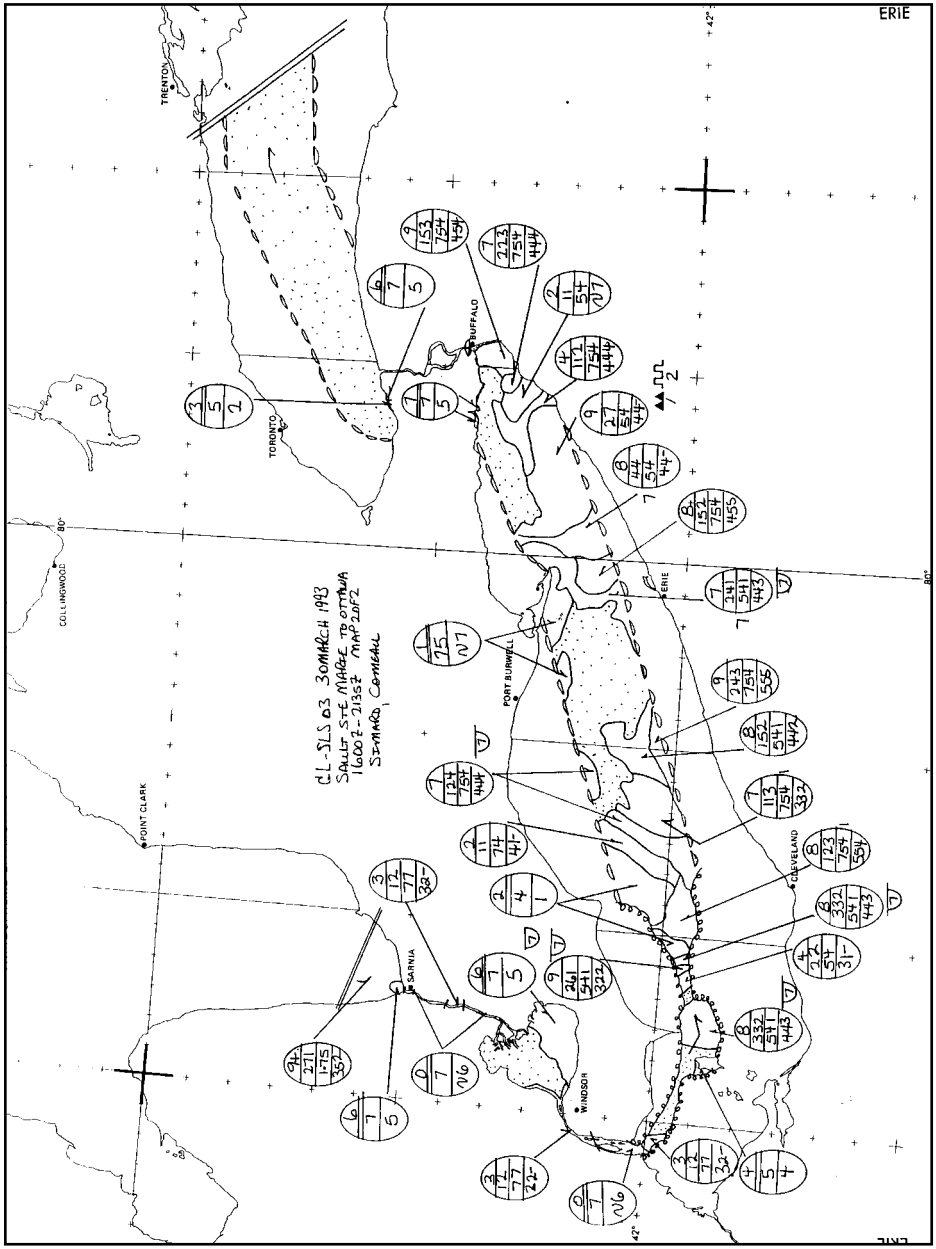


Figure 3.4: Daily Shipboard Ice Chart

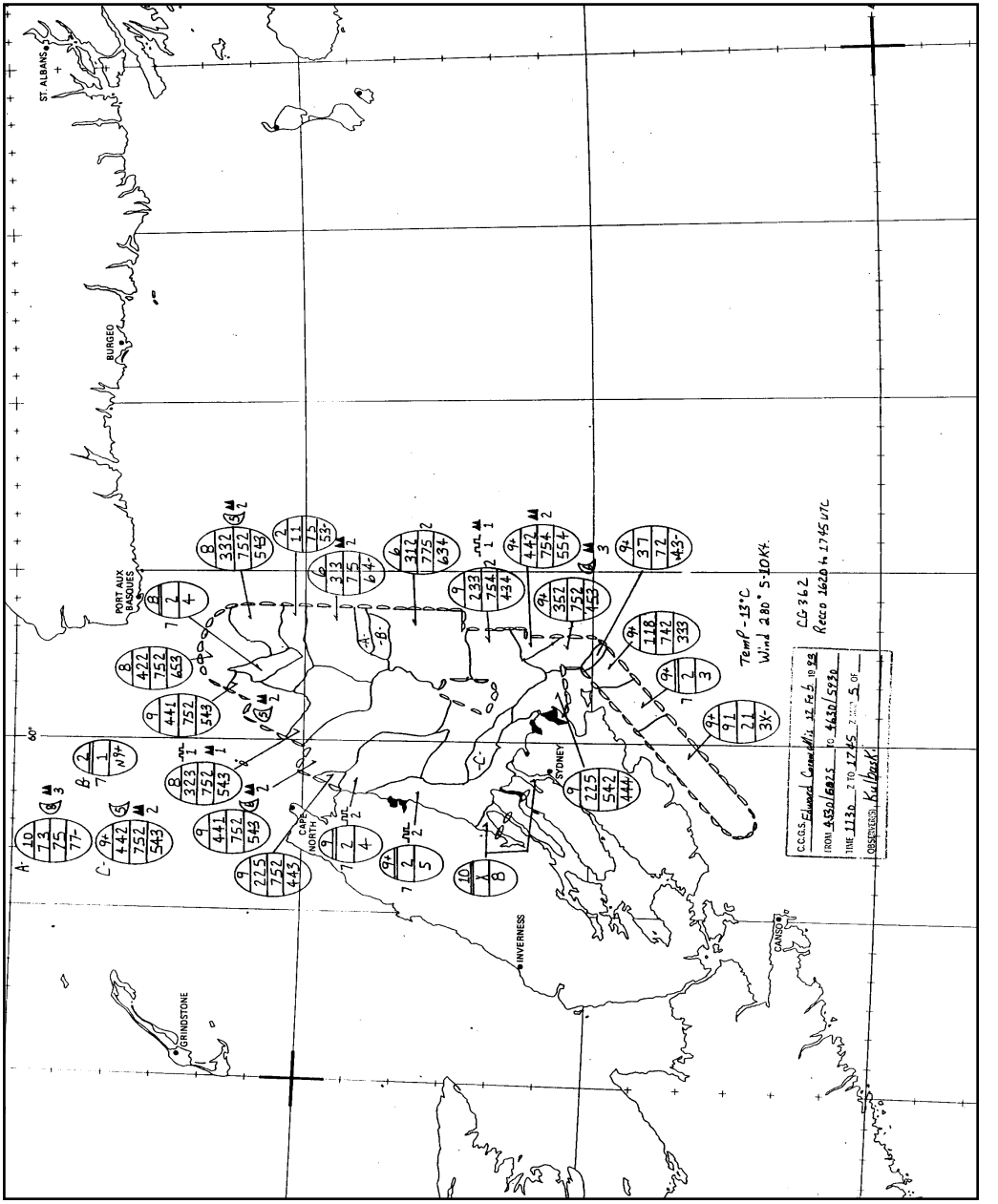


Figure 3.5: St Lawrence River Chart