

A FIELD SURVEY FORM FOR MONITORING ICE CONDITIONS ON LAKES AND RIVERS

J.C. Anderson and T.D. Prowse

Northern Hydrology Section
National Hydrology Research Institute
Environment Canada
Ottawa, Ontario

Throughout most of Canada, ice is present on rivers and lakes for a portion of the winter season. This ice affects human activities in many ways through impacts on transportation, water supply, recreation, etcetera, but perhaps the most dramatic impact is the flooding which is caused by ice jamming. As the cost of compensating flood damage victims escalates, more attention is being given to ice conditions and in particular, river ice jamming and jam-induced flooding.

In order to gain a better understanding of ice conditions, research activity is increasing. Good field data are fundamental to this research effort and although some ice data bases already exist, they fall short of current requirements. A more comprehensive data base is needed if significant advances are to be made in our understanding of ice conditions.

For that purpose, an 'Ice Survey Notes' form (Figure 1) has been designed by the Northern Hydrology Section of the National Hydrology Research Institute, Environment Canada after consultation with scientists and field personnel from across Canada working with freshwater ice problems. Primary concerns in the development of this form included the following:

- (1) that the form be as self-explanatory and logical as possible;
- (2) that it be concise but meaningful in content; and
- (3) that it be the same size as the "Hydrometric Survey Notes" form used by Water Survey of Canada for stream discharge measurements.

Though hopefully applicable to any river or lake the form is intended primarily for use at sites where ice conditions are known to contribute to high water levels and flooding. Data provided on the form will support studies such as the timing and character of freeze-up and/or break-up and the occurrence and severity of ice jams.

Page 1 of the form is for site identification and "ice quantity" information such as ice thickness and extent. "Ice quality" information and miscellaneous comments can be given on page 2, and events relating to freeze-up, break-up and/or ice jamming can be noted on page 3 and the top of page 4. On page 4 space is also provided for sketches relating to ice conditions. The form is accompanied by a statement on its rationale and instructions for its use.

Comments are invited from any potential user before the final version is completed and distributed.

P. 2

ICE QUALITY

Strength:

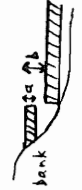
Solid	→	Degree of Decay	→	→	→	→	→	→	→	→	→
(circle one)	→	1	2	3	4	5	→	→	→	→	→

Surface Roughness:

Smooth	→	Degree of Poughness	→	→	→	→	→	→	→	→
(circle one)	→	1	2	3	4	5	→	→	→	→

Cross Section Surface Profile: smooth concave convex

Evidence of Fracturing along Bank: No Yes: a - ice thickness when fracture occurred:m
b - displacement:m



COMMENTS on any aspect of ice quantity, quality, freeze-up, break-up, jamming, weather, etc.:

.....
.....
.....
.....
.....
.....
.....
.....
.....
.....
.....
.....

PHOTOGRAPHS: No Yes: (available from)

Subject(s):

P. 1

ICE SURVEY NOTES

Station..... Sta. No.....

Date:/.../.... Yr Mo Da Time..... (....) Zone

Party..... Agency.....

Air temperature.....°C Water temperature.....°C

Water stage..... m Discharge.....m³/s

ICE QUANTITY

Initial Reference Point:

Hole No. from Ref. Pt. (m)	Snow Depth (m)			Solid Ice (m)			Black Ice (m)			Total Ice (m)			Frazil or Slush Ice (m)	Water Surface (m)				
	to top	of ice	(m)*	to top	of ice	(m)*	to top	of ice	(m)*	to top	of ice	(m)*		to top	of ice	(m)*	to top	of ice
1																		
2																		
3																		
4																		
5																		
6																		
7																		
8																		
9																		
10																		
Mean																		

Final Reference Point:

Channel Width:m

Extent of Ice Cover: 0 10 20 30 40 50 60 70 80 90 100 % (circle appropriate value)

State of Cover: Forming Stable Deteriorating

* positive if water above ice surface; negative otherwise

Figure 1. Current draft version of the "Ice Survey Notes" form, reduced from the actual 13.5 x 20 cm page size.

P.3

FREEZE-UP

Event	Timing of Event			Water Stage (m)*
	Observed	Estimated		
	Yr	Mo	Da	Time
Initial ice formation				
Complete freeze-over				
Other / Comments:				
.....				

Presence of: Border ice Moving ice: (type(s))

Icings? No Yes: covering ...% of surface cross section

On p.4, provide sketches of ice cover extent, type, etc.

BREAK-UP

Event	Timing of Event			Water Stage (m)*
	Observed	Estimated		
	Yr	Mo	Da	Time
Shore lead formation				
Transverse cracks or leads				
Main ice cover first moves				
Water clear of ice				
Other / Comments:				
.....				

ICE JAMS

Event	Timing of Event			Water Stage (m)*
	Observed	Estimated		
	Yr	Mo	Da	Time
Jam forms				
Jam exists				
Jam releases				

* measured estimated } which B.M.?

P.4

ICE JAMS (cont'd)

Jam type: partial floating grounded: at edge(s) main channel

Jam length: km

In the space below, provide sketches of the channel cross section and reach to show: ice cover extent, height, type; heights of water below, at and above jam; extent of flooding

SKETCHES: For each sketch, include approximate scale.

1. River Cross Section

downstream view

2. River Reach (Use copy of map if available; show true north.)

Figure 1. Continued