# Environment Canada Imaging Cover Page

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METEOROLOGICAL BRANCH - DEPARTMENT OF TRANSPORT - CANADA

# AERIAL ICE OBSERVING AND RECONNAISSANCE

# ATHABASKA RIVER, LAKE ATHABASKA,

# SLAVE RIVER AND GREAT SLAVE LAKE, 1962

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METEOROLOGICAL BRANCH - DEPARTMENT OF TRANSPORT - CANADA

# AERIAL ICE OBSERVING AND RECONNAISSANCE

# IN

# ATHABASKA RIVER, LAKE ATHABASKA,

# SLAVE RIVER, AND GREAT SLAVE LAKE - 1962

BY

D. C. Archibald, M. N. Monsinger, T. B. Kilpatrick

This is the twenty-first technical report in the series concerning ice conditions observed by aerial ice reconnaissance conducted by the Meteorological Branch, Department of Transport.

This is the second annual technical report covering observed ice conditions in the Athabaska River, Lake Athabaska and Great Slave Lake. Observed ice conditions in this area during the Spring of 1961 were described in Meteorological Branch Circular 3551, TEC-375, 25 OCT. 61.

This technical report describes observed ice conditions with regard to ice coverage, age, topography, puddling, snow cover, and water features over the area of the Athabaska River, Lake Athabaska, Slave River, Great Slave Lake and adjacent waterways during the period April 28, 1962 to June 20, 1962 inclusive.

Approved:

P. D. McTaggart-Cowan,
Director, Meteorological Branch.

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# AERIAL ICE OBSERVING AND RECONNAISSANCE PROGRAM IN THE ATHABASKA RIVER, LAKE ATHABASKA, SLAVE RIVER AND GREAT SLAVE LAKE AREA OF THE MACKENZIE RIVER SYSTEM - 1962

In late April of 1962, a field ice reconnaissance unit was established at Fort Smith, N.W.T., to carry out aerial ice reconnaissance over the river and lake shipping lanes in the Athabaska - Slave region. The Ice Observer-in-Charge of this field unit was Mr. J. Y. Lafontaine.

This ice reconnaissance program was carried out under the direction of the Meteorological Branch, Basic Weather Division. The primary purpose of the survey was to collect ice break-up data for study.

Preliminary ice data (thickness, snow cover, character of surface, etc.) was gathered from shore stations established at Yellowknife, N.W.T., on the Great Slave Lake and at Fort Chipewyan, Alberta, on Lake Athabaska. This information was supplied weekly after the first signs of ice formation in the immediate station area.

During the period of the program, thirteen sorties were completed totalling forty-three and one-half aircraft hours. The flying times and statute miles flown on each ice reconnaissance flight are shown in the table on Page 2. The program began with a comprehensive flight over the entire area on April 28th, and terminated with the final flight of June 20, 1962.

The ice conditions observed in the Athabaska - Slave region during the period from first to last flights are described on Pages 8 through 32. The accompanying charts, figures 3 through 15, summarize ice conditions on the dates indicated.

The descriptive terminology and graphic presentation of ice conditions are in accordance with the procedures outlined in the publication "MANICE", Manual of Standard Practices and Procedures for Ice Reconnaissance, Second Provisional Edition.

We are indebted to Mr. E. Stasyshyn for co-ordinating the data and assembling the charts for printing, and to Messrs. J. Y. Lafontaine, R. G. Rannard, R. I. Smith and D. Aston for their assistance in the preparation of this summary.

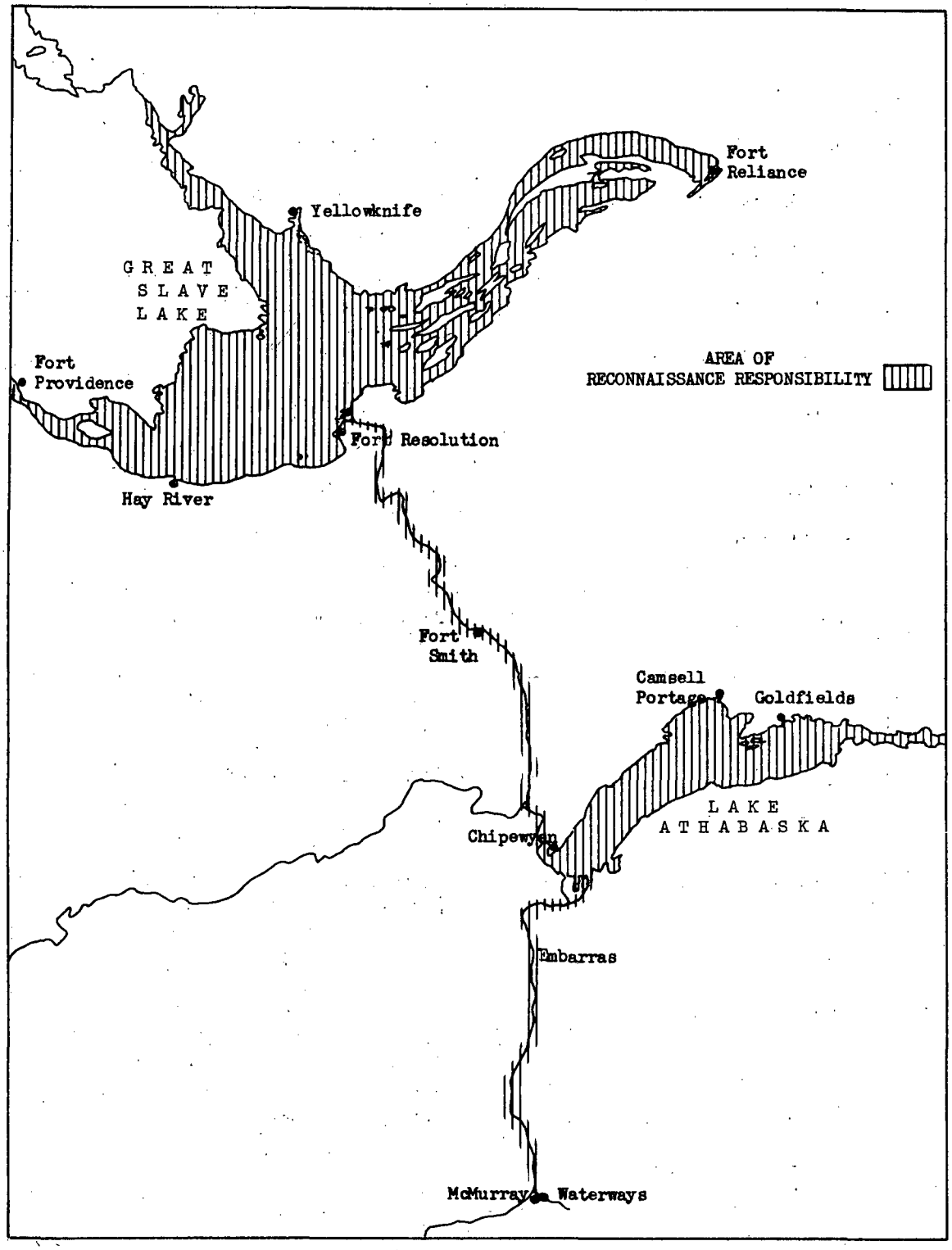
The excellent co-operation from Mr. J. R. Goodwin, District Marine Agent, Marine Services, Department of Transport, Fort Smith, N.W.T., is acknowledged.

## TABLE OF ICE RECONNAISSANCE FLIGHTS

Base of Operations: Fort Smith, N.W.T.

Type of Aircraft: Curtiss C-46

| DATE | AREA COVERED | HOURS FLOWN | MILES (STATUTE) |
|---|---|---|---|
| April 28, 1962 | All areas | 6:57 | 1300 |
| May 4, 1962 | Slave and northern Athabaska Rivers, western Lake Athabaska. | 1:45 | 350 |
| May 12, 1962 | All areas | 5:24 | 1043 |
| May 15, 1962 | Slave River and western Lake Athabaska. | 1:48 | 345 |
| May 17, 1962 | Slave River and western Lake Athabaska. | 1:42 | 310 |
| May 18, 1962 | Southern Great Slave Lake and Slave River. | 2:48 | 540 |
| May 22, 1962 | Northern Slave River. | 1:29 | 257 |
| May 25, 1962 | Lower Slave River and Lake Athabaska. | 1:47 | 328 |
| June 2, 1962 | Great Slave Lake and Lake Athabaska. | 4:14 | 749 |
| June 6, 1962 | Great Slave Lake and Lake Athabaska. | 3:37 | 668 |
| June 10, 1962 | Great Slave Lake and Lake Athabaska. | 3:52 | 668 |
| June 15, 1962 | Great Slave Lake and Lake Athabaska. | 5:20 | 1029 |
| June 20, 1962 | Northern Slave River and Great Slave Lake. | 2:45 | 489 |
| | TOTAL | 43:28 | 8076 |


Fort
Reliance
Yellowknife
GREAT
SLAVE
LAKE
Fort
Providence
AREA OF
RECONNAISSANCE RESPONSIBILITY
Fort Resolution
Hay River
Fort
Smith
Camsell
Portage
Goldfields
LAKE
ATHABASKA
Chipewyan
Embarras
McMurray
Waterways

## DESCRIPTIVE TERMS USED IN THE REPORT

| | | |
|---|---|---|
| (a) | Ice Free | No ice present. |
| (b) | Open Water | Less than 1/10 ice cover. |
| (c) | Scattered Ice | 1/10 to 5/10 ice cover. |
| (d) | Broken Ice | 5/10 to 8/10 ice cover. |
| (e) | Close Ice | 8/10 to 10/10 ice cover. |
| (f) | Consolidated Ice | 10/10 ice cover. |
| (g) | Brash | Floes less than 6 feet across. |
| (h) | Block | Floes 6 to 30 feet across. |
| (i) | Small Floe | Floes from 30 to 600 feet across. |
| (j) | Medium Floe | Floes from 600 to 3000 feet across. |
| (k) | Giant Floe | Floes from 3000 feet to 5 miles across. |
| (l) | Winter Ice | Ice of one season's growth which is over 8 inches in thickness. |
| (m) | Rotten Ice | Honeycombed ice in an advanced stage of desintegration. |
| (n) | Puddle | Melt-water on the ice surface. |
| (o) | Thawing Hole | Ice with open holes in it, usually of a circular form; these holes are a further stage of development of snow waters by ice melting. |

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# KEY TO ICE SYMBOLS

**CONCENTRATION**

< 0.1 coverage

0.1 to 0.5 coverage

0.5 to 0.8 coverage

0.8 to 1.0 coverage

1.0 coverage *(no water)*

**CONCENTRATION BY SIZE**

$\frac{C_n}{n_1, n_2, n_3}$

$n_1$ - tenths of slush, brash and block

$n_2$ - tenths of small and medium floes

$n_3$ - tenths of giant floes *and field*

**TOPOGRAPHY**

Rafted ice

Ridged ice

Hummocks

**AGE**

*A*
dominant, secondary

*Sl* - Slush
*Y* - Young Ice
*W* - Winter Ice
*Pl* - Polar Ice

Examples: *A* , *A* ,etc.
*Sl*,*W* *Pl*

**PUDDLES**

$\frac{Pd}{\text{dominant condition}}$

Tenths of ice covered if not frozen or rotten

*F* - Frozen
*R* - Rotten

Examples: $\frac{Pd}{3}, \frac{Pd}{F}, \frac{Pd}{R}$ etc.

**THICKNESS OF SEA ICE AND SNOW**

*T*,*S*, where *n* - *nearest ft.*
*n* *n*

Examples: $\frac{T}{5}, \frac{S}{2}$ etc.

**ICE OF LAND ORIGIN**

Icebergs *(many)*

Icebergs *(few)*

Bergy bits and growlers *(many)*

Bergy bits and growlers *(few)*

**WATER FEATURES**

Crack

Lead

Polynya

**UNDERCAST**

Limits

**BOUNDARY**

Known

Radar

Assumed

Limit of Estimated data

*Symbols used for Recording the Various Ice, Snow, and Water Features.*

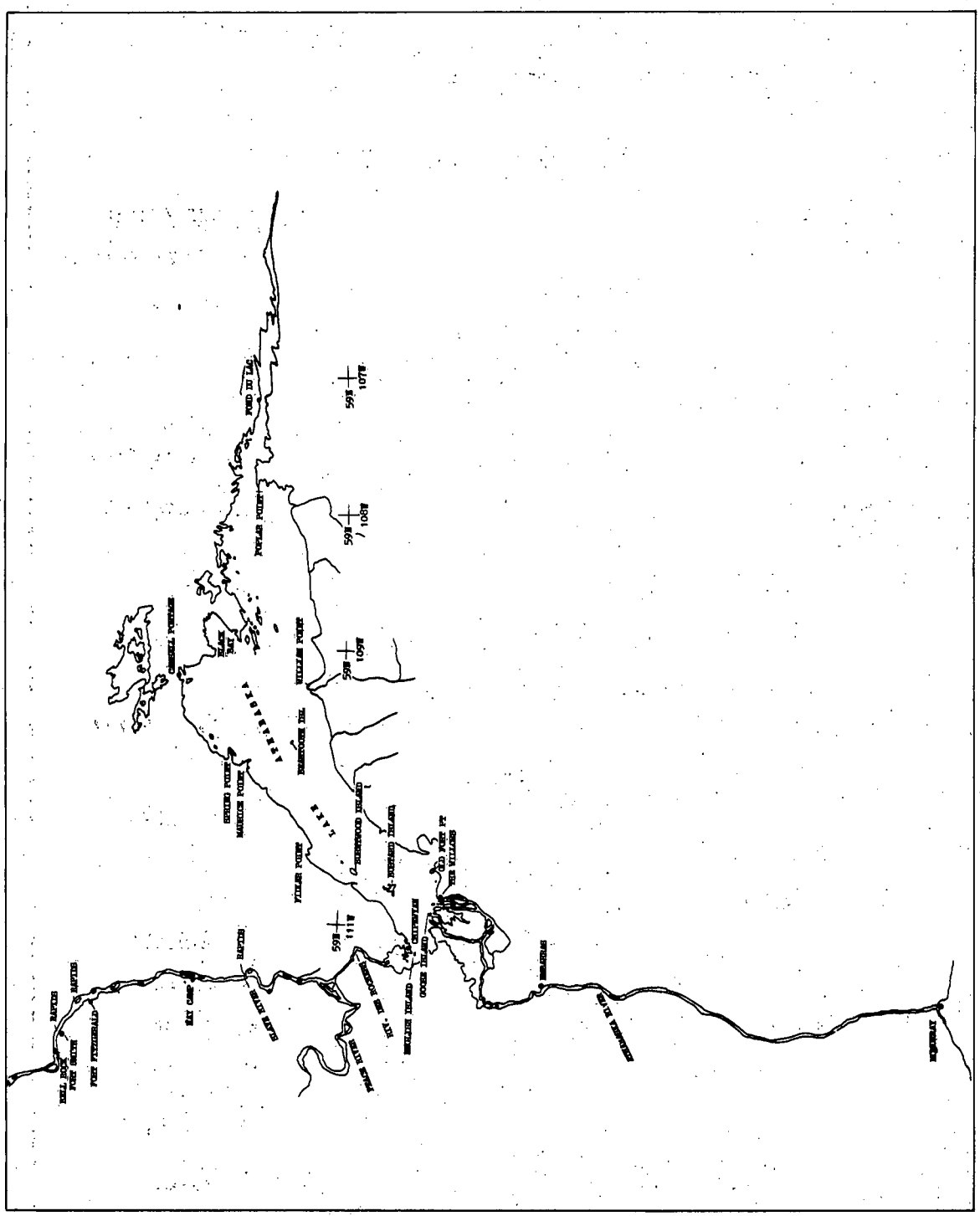


Fig. 1. - Chart of Place Names - Lake Athabaska.

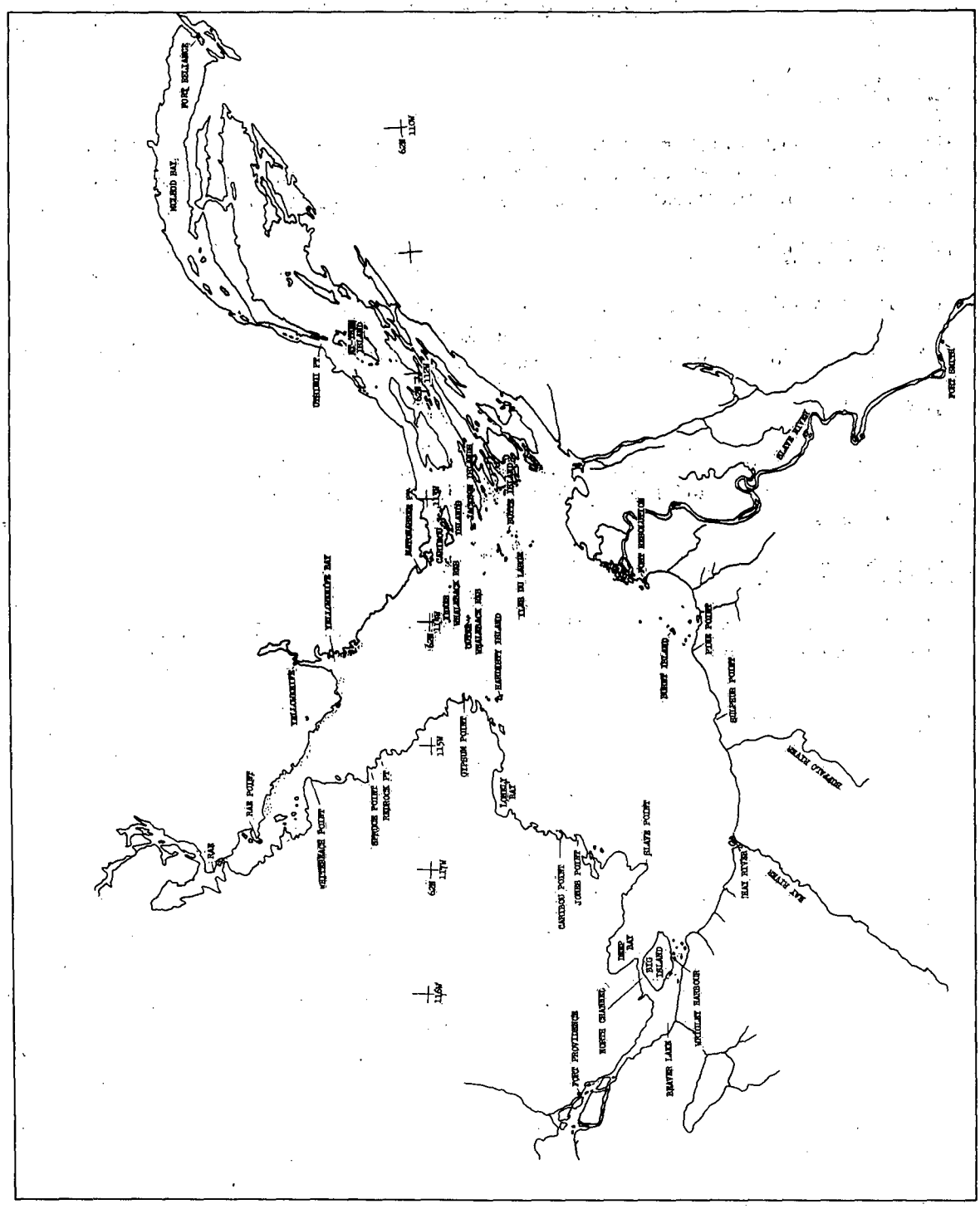

Fig. 2. - Chart of Place Names - Great Slave Lake.

## ICE CONDITIONS ON APRIL 28, 1962

Ice conditions are illustrated in Figure 3.

ATHABASKA RIVER:

Open water was observed south of Fort MacKay. Scattered to close rotten ice was noted south of the 58th parallel with consolidated winter ice in the remaining portion of the observed area.

LAKE ATHABASKA:

Scattered rotten ice was noted in the shallows, from Fort Chipewyan to Big Point. The remainder of the lake was covered with consolidated ice. Snow cover was present throughout the observed area.

SLAVE RIVER:

Except for close ice south of Mountain Rapids and Cassette Rapids, the river was covered throughout its course, with consolidated winter ice.

GREAT SLAVE LAKE:

Consolidated winter ice with heavy snow cover existed in the entire observed area.

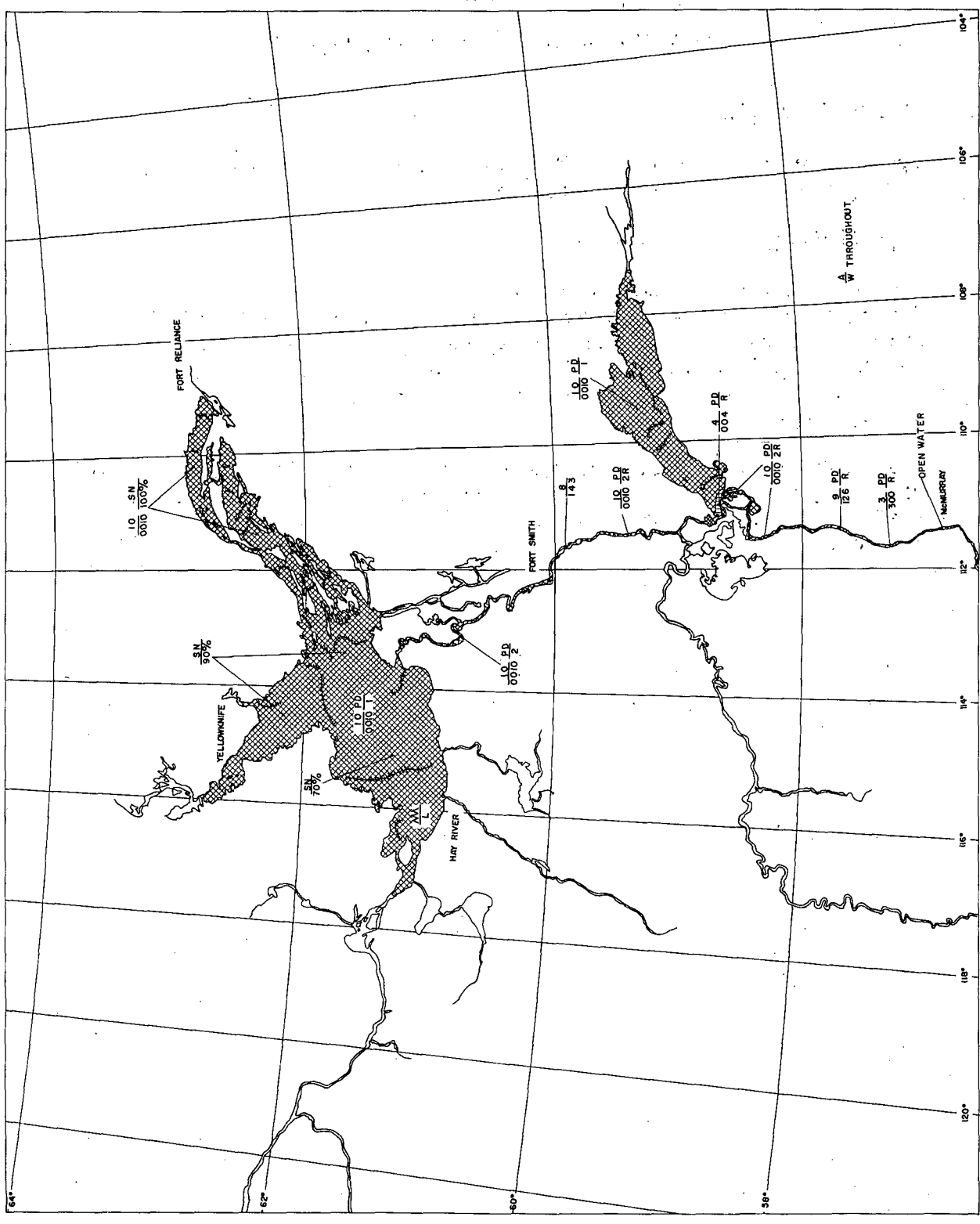


Fig. 3.1- Observed Ice Conditions, April 28, 1962.

## ICE CONDITIONS ON MAY 4, 1962.

Ice conditions are illustrated in Figure 4.

ATHABASKA RIVER:

Open water existed south of Embarras Portage with broken to close rotten ice observed in the delta channels.

LAKE ATHABASKA:

Scattered rotten ice was noted along the shipping route from Big Point to Fort Chipewyan. The remaining observed portion of the lake contained consolidated winter ice. In the area south of Bustard Island intense puddling was observed.

SLAVE RIVER:

Broken winter ice existed in the vicinity of Ryan Island. For the remaining observed area, including Riviere des Roches, close winter ice was noted. Puddling covered three to four tenths of the ice surface.

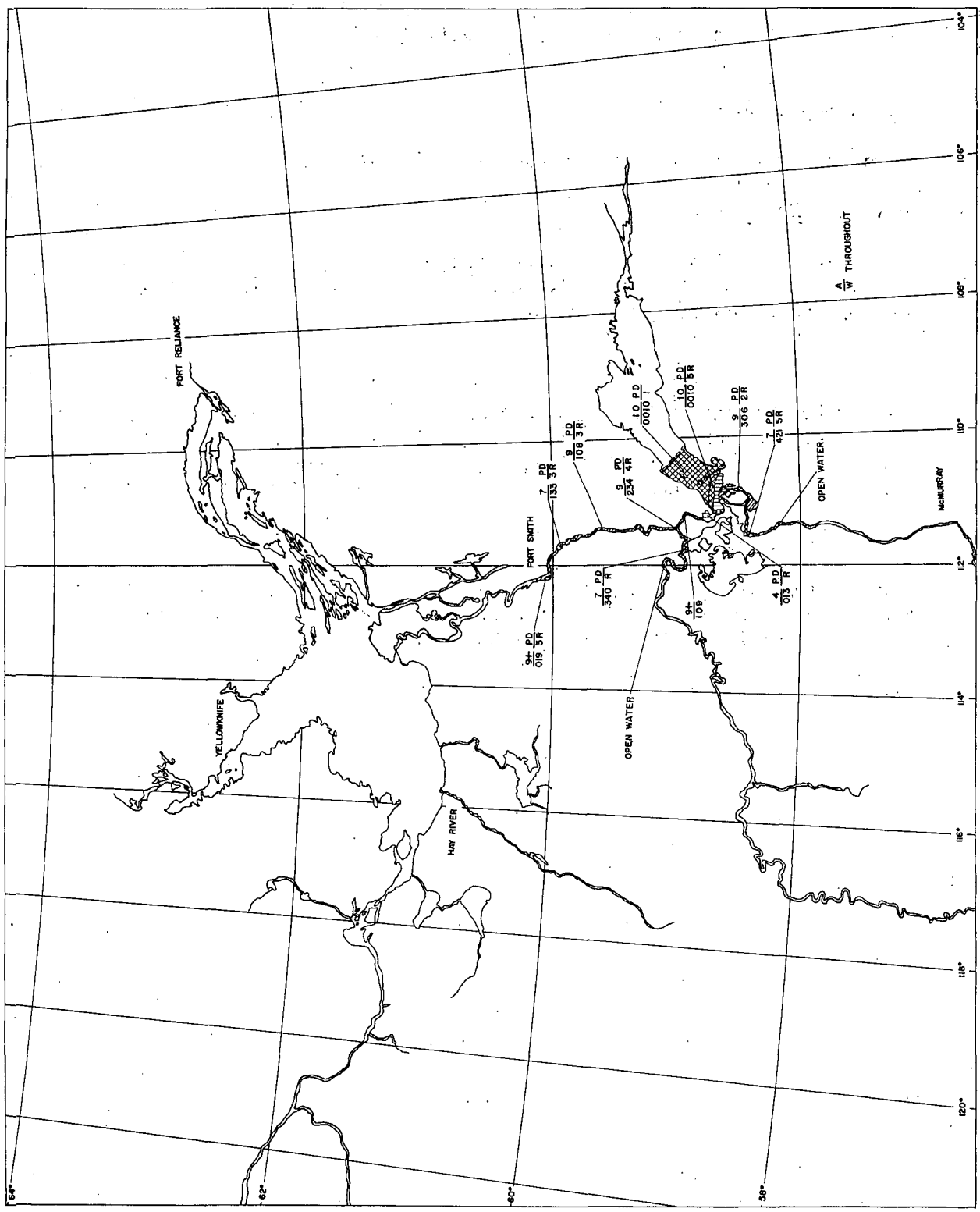


Fig. 4. - Observed Ice Conditions, May 4, 1962.

## ICE CONDITIONS ON MAY 12, 1962.

Ice conditions are illustrated in Figure 5.

ATHABASKA RIVER:

This river was free of ice throughout its length.

LAKE ATHABASKA:

Open water existed south of a line from Fort Chipewyan to Big Point. The remainder of the lake was totally covered with winter ice, partially concealed by snow drifts.

SLAVE RIVER:

Open water was noted as far north as the Demicharge Rapids. The section of the river from the Demicharge Rapids to Salt River contained close winter ice with thawing holes. The remainder of the area to the north was covered with consolidated winter ice slightly puddled.

GREAT SLAVE LAKE:

Except for a small polynya located south of Big Island, this lake was completely covered with winter ice. Snow cover increased from sixty to one hundred precent from west to east.

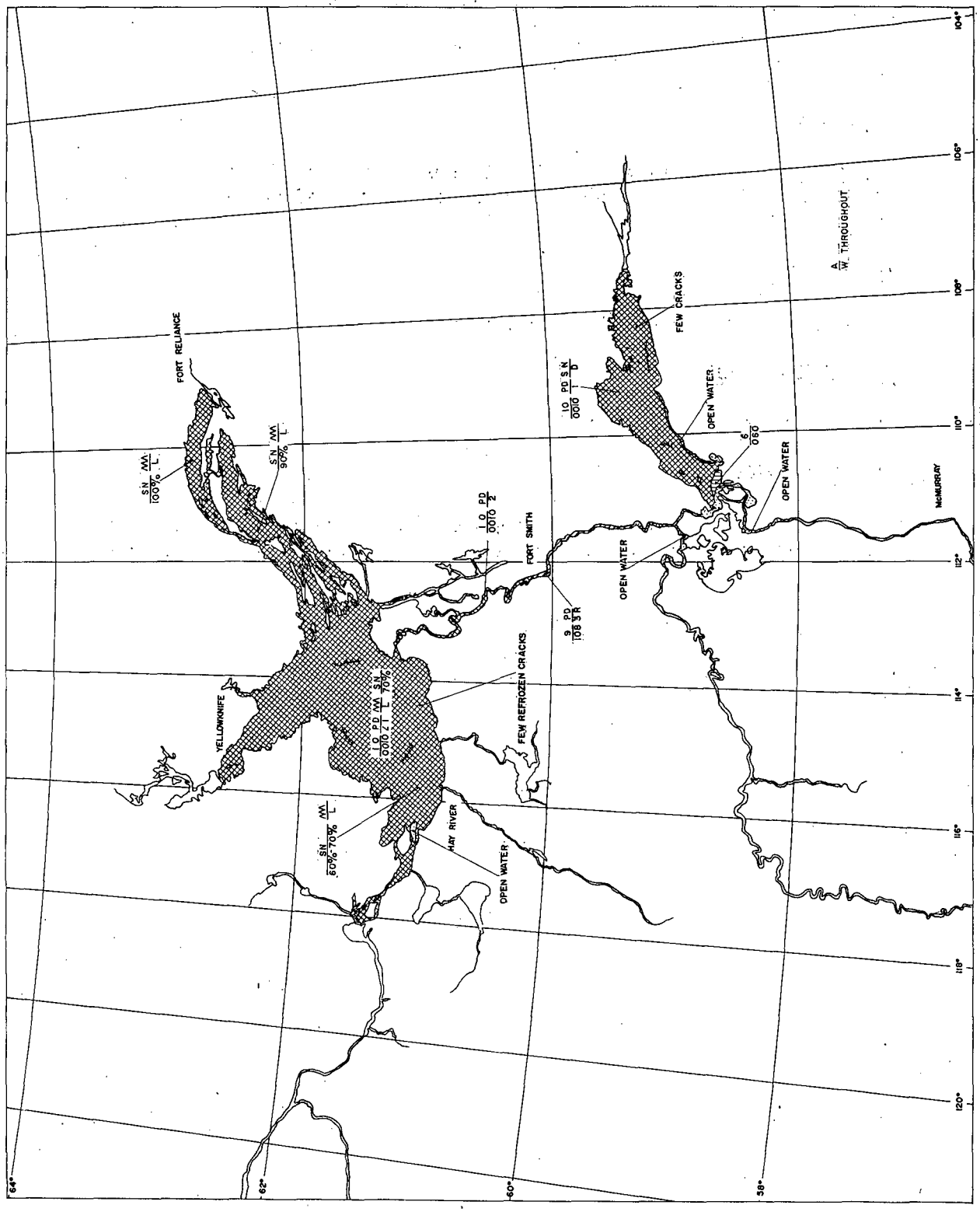


Fig. 5. - Observed Ice Conditions, May 12, 1962.

## ICE CONDITIONS ON MAY 15, 1962.

Ice conditions are illustrated in Figure 6.

SLAVE RIVER:

The portion of the river flowing through Fort Smith contained close winter ice. The remainder of the southern end of the river was ice-free.

PEACE RIVER:

The eastern end of the river contained open water.

RIVIERE DES ROCHES:

This river contained scattered ice.

LAKE ATHABASKA:

The western end of the lake contained close winter ice. The remainder of the lake which was observed contained consolidated winter ice.

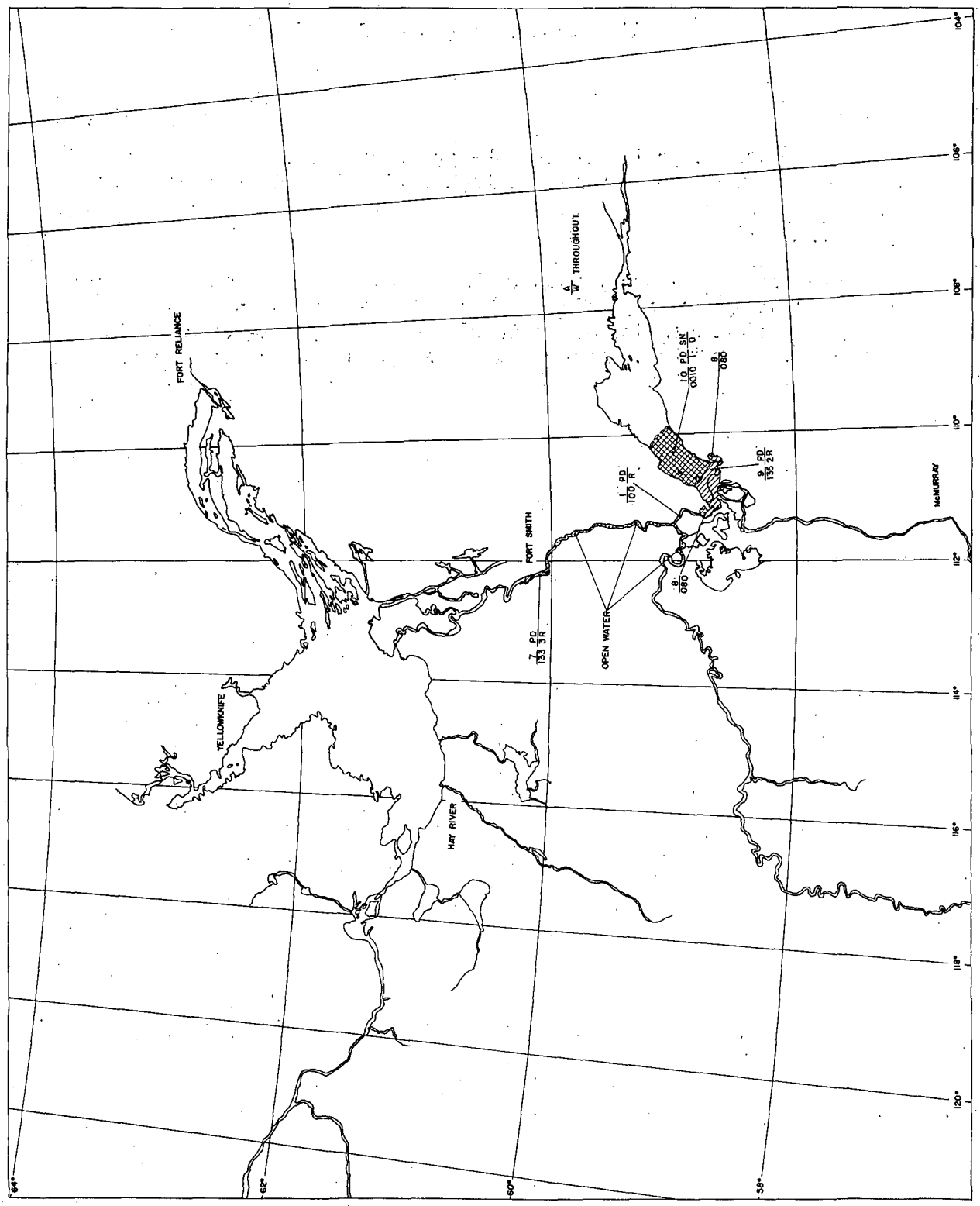


Fig. 6. - Observed Ice Conditions, May 15, 1962

## ICE CONDITIONS ON MAY 17, 1962.

Ice conditions are illustrated in Figure 7.

**SLAVE RIVER:**

Open water was noted throughout the observed area. Ice started to drift out of Fort Smith and Bell Rock during the night of May 17th.

**LAKE ATHABASKA:**

The observed area east of Bustard Island contained consolidated winter ice with moderate puddling. West of Bustard Island, a close concentration of winter ice existed. There were wide leads along the northern and southern shores in the western sector of the lake.

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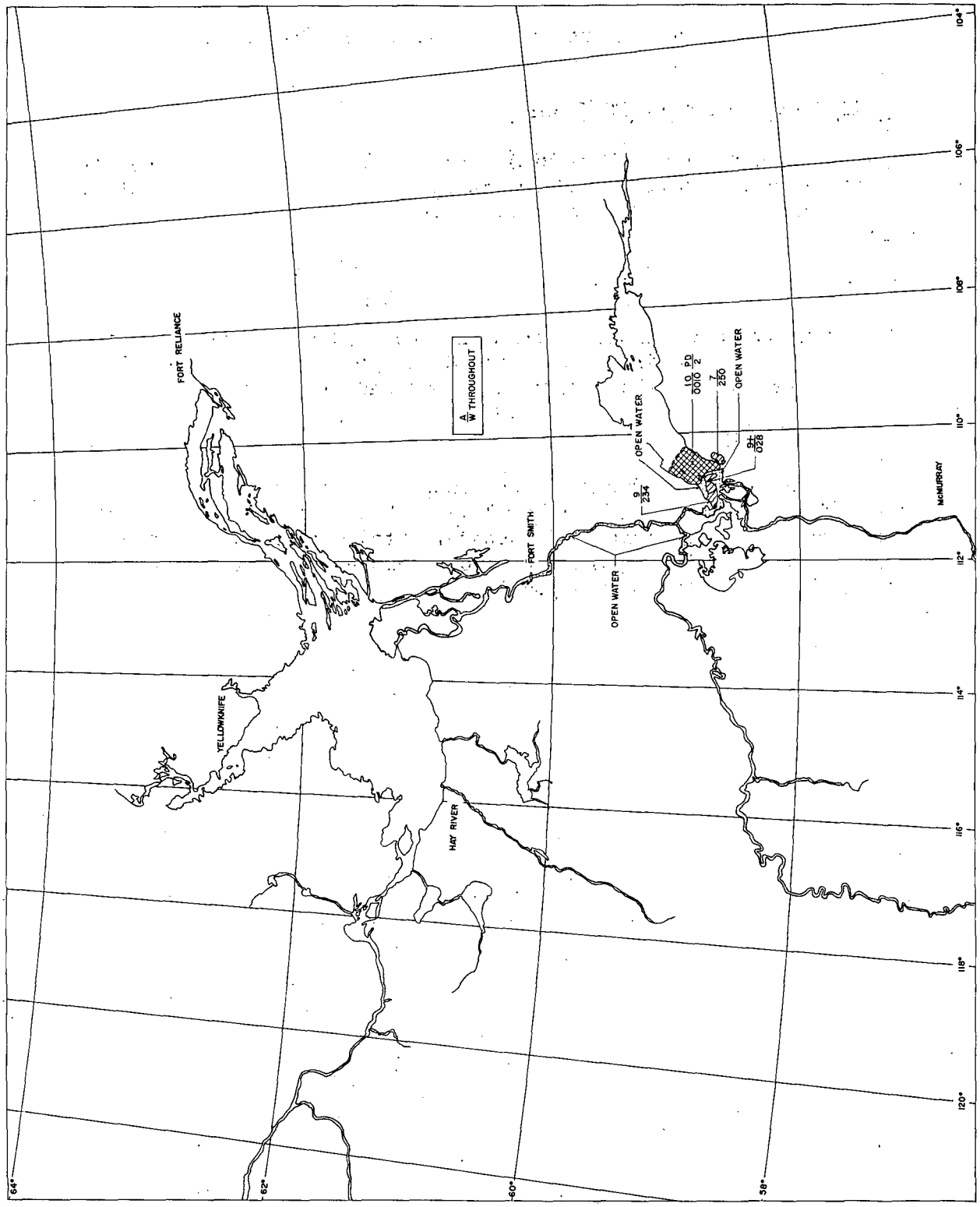


Fig. 7. - Observed Ice Conditions, May 17, 1962.

## ICE CONDITIONS ON MAY 18, 1962.

Ice conditions are illustrated in Figure 8.

### SLAVE RIVER, NORTH OF FORT SMITH:

Open water existed south of Brule Point. The remainder to the delta contained close to consolidated winter ice with few thawing holes. A flaw lead had opened into Great Slave Lake just outside the delta ice.

### MILLS LAKE:

This lake contained close to consolidated winter ice with few thawing holes. Broken winter ice existed in the vicinity of Fort Providence. Most of the floes were of medium and giant extent.

### GREAT SLAVE LAKE:

Run-off water at Hay River had cut into the heavy lake ice while the area of open water, south of Big Island, had considerably enlarged. The lake was still covered with consolidated winter ice and snow concealed half of its surface. An area enclosed between Pim Point and Pointe de Roche was heavily puddled.

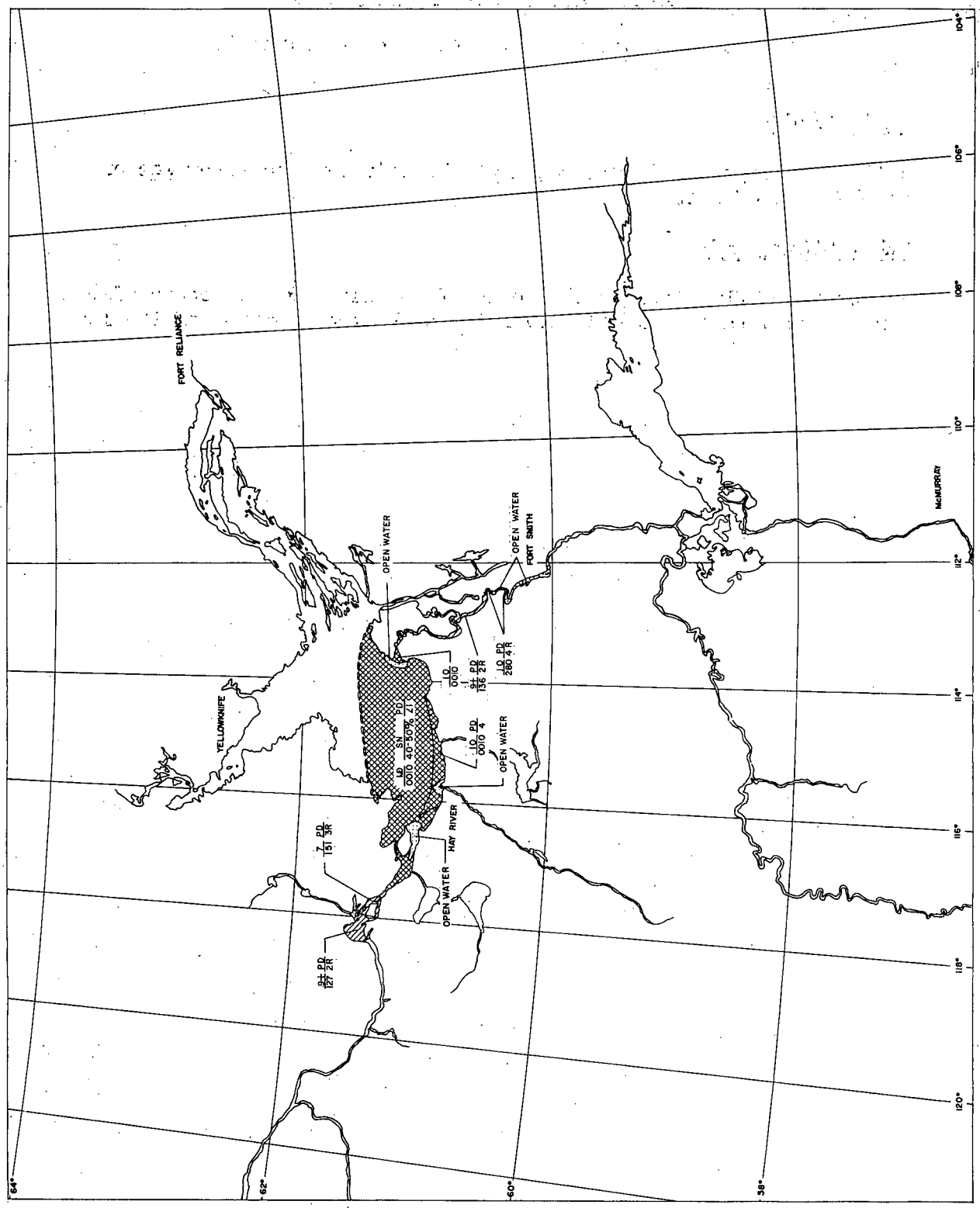


Fig. 8. - Observed Ice Conditions, May 18, 1962.

## ICE CONDITIONS ON MAY 22, 1962.

Ice conditions are illustrated in Figure 9.

SLAVE RIVER:

With the exception of an ice jam at the estuary, the river was entirely free of ice.

GREAT SLAVE LAKE:

Except for a flaw lead at the mouth of the Slave River, consolidated winter ice with few puddles covered the observed portion of the lake.

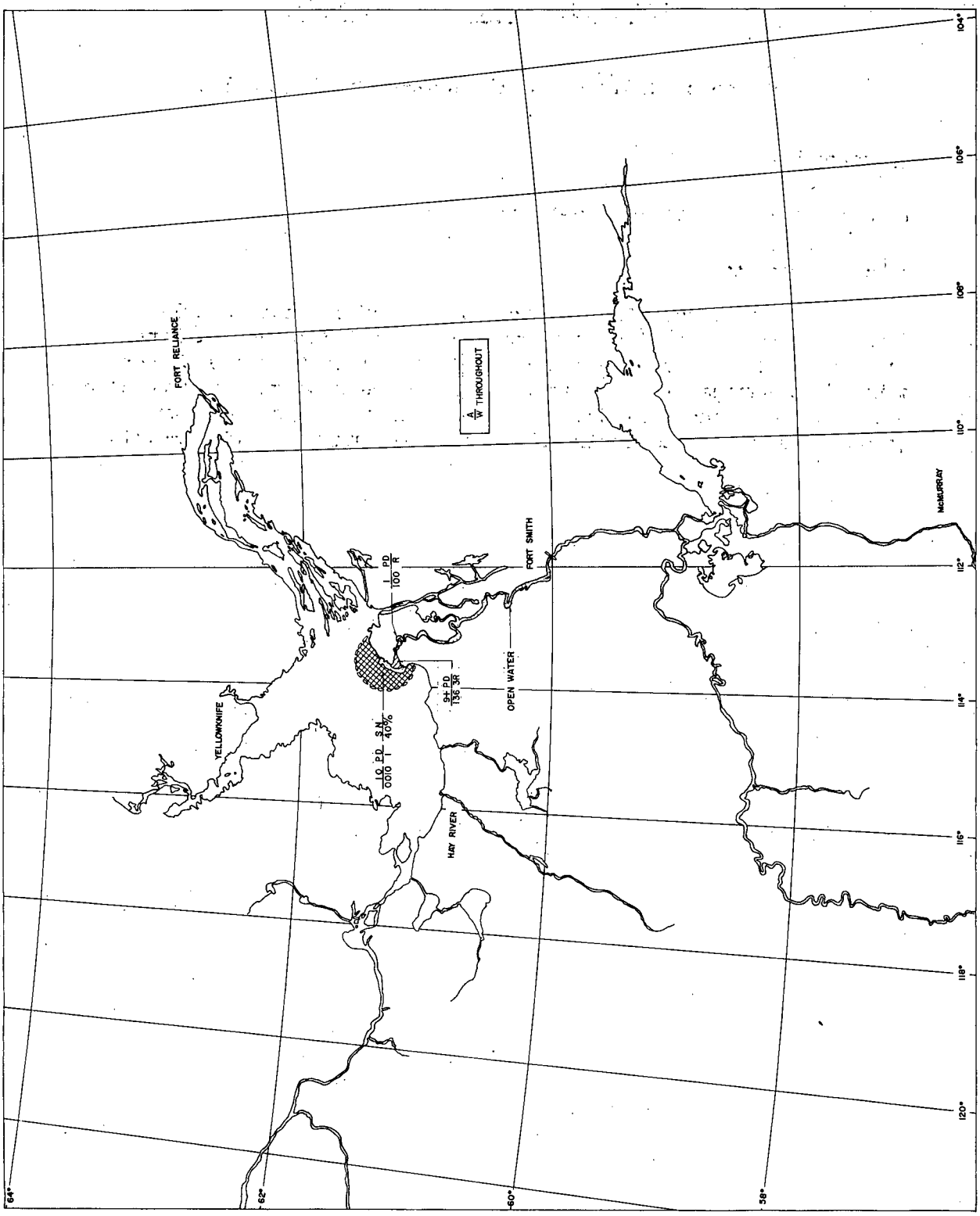


Fig. 9. - Observed Ice Conditions, May 22, 1962.

## ICE CONDITIONS ON MAY 25, 1962.

Ice conditions are illustrated in Figure 10.

### SLAVE RIVER:

This river was entirely ice-free.

### LAKE ATHABASKA:

Open water was present in the area southwest of Bustard Island. Close winter ice existed south of a line from Burntwood Island to Pointe Ennuyeuse. The remainder of the lake to the east contained ten tenths of consolidated winter ice with very few puddles and occasional snow drifts. A large crack was observed between Cypress Point and Beartooth Island terminating at William Point.

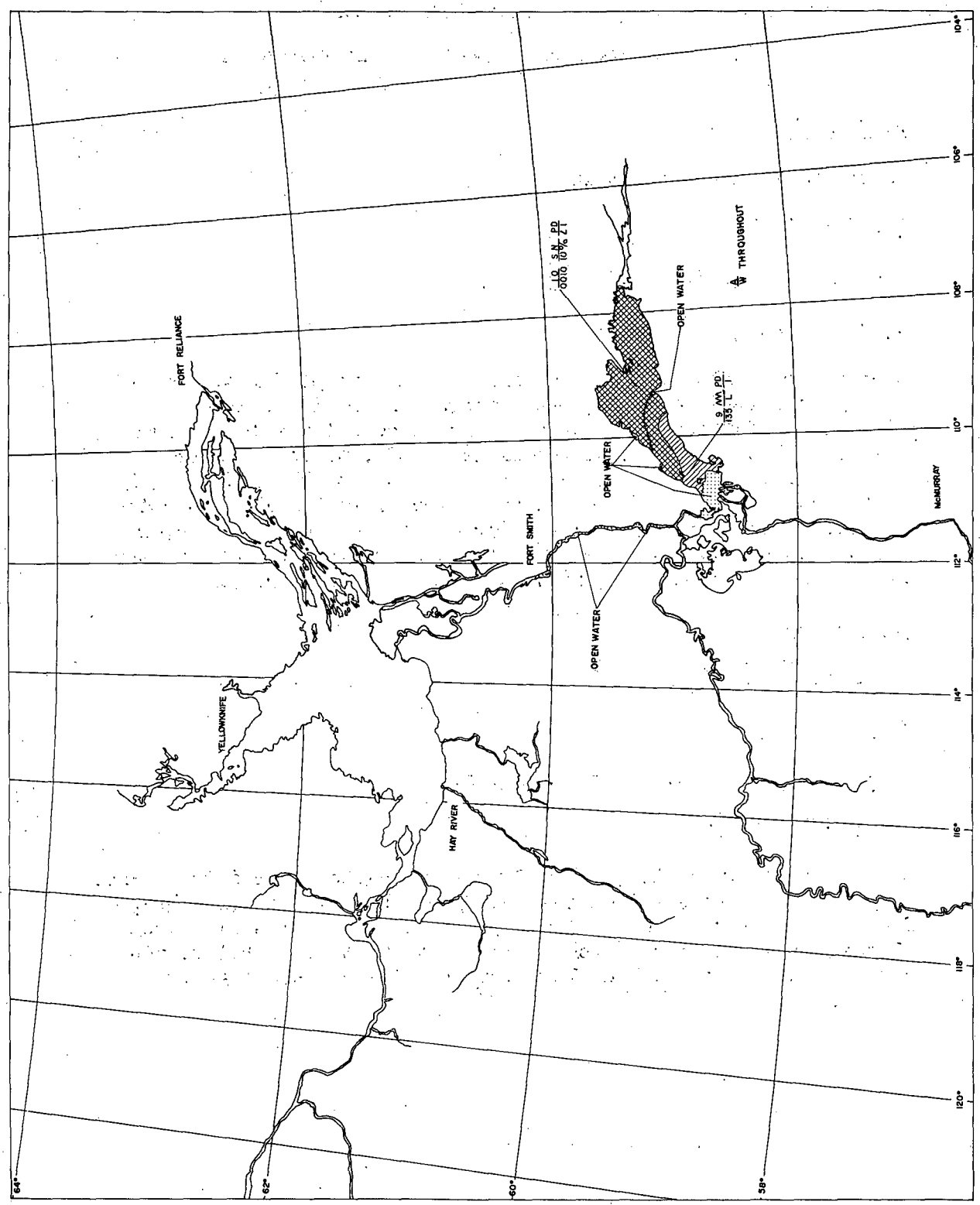


Fig. 10. - Observed Ice Conditions, May 25, 1962.

## ICE CONDITIONS ON JUNE 2, 1962.

Ice conditions are illustrated in Figure 11.

SPRING BAY:

There was no ice present in the Bay.

OLD FORT BAY:

The Bay was ice-free.

LAKE ATHABASKA:

Open water existed west of Bustard Island, except for an area of scattered rotten ice along the western corner of the Island. A five mile wide shore lead extended from Moose Point to William Point. Polynyi existed in the vicinity of Sand Point, Maurice Point and Fair Point. In the western sector of the lake, north of the shore lead, a close concentration of rotten ice was noted. The remainder of the lake was covered with consolidated winter ice slightly puddled. There was evidence of ice movement in the area located between Beartooth Island and Johnston Island.

BEAVER LAKE:

The lake was ice-free.

BIG ISLAND AREA:

There was no ice west of Beacon Point.

GREAT SLAVE LAKE:

Consolidated winter ice with a few large cracks covered this lake. Open water was observed at the mouths of the main rivers - Hay, Buffalo and Slave. Resolution Bay and in a five mile wide area aligned along the shore from Pointe de Roche to Pine Point, advanced puddling had taken place with the ice surface lightly ridged.

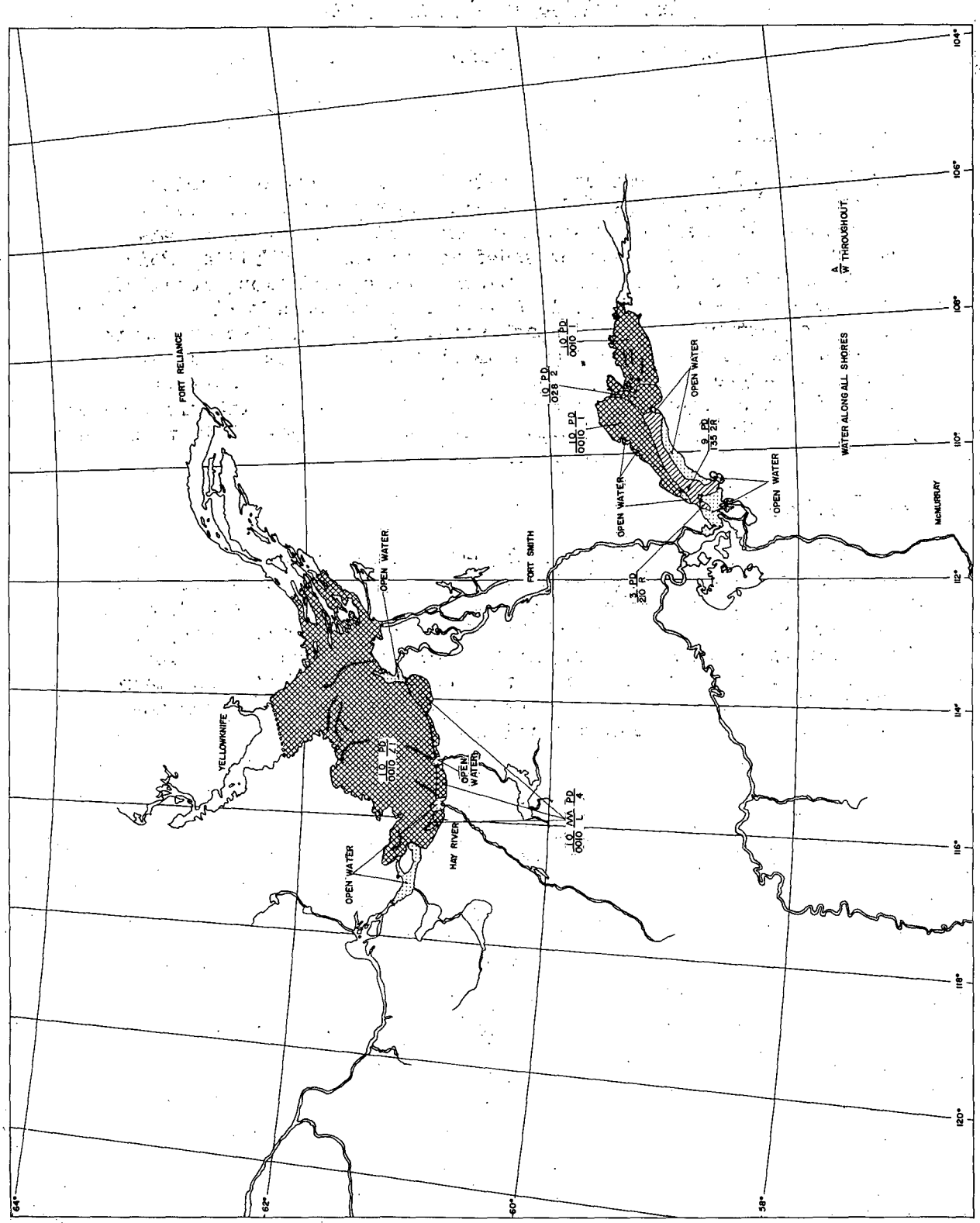


Fig. 11. - Observed Ice Conditions, June 2, 1962.

## ICE CONDITIONS ON JUNE 6, 1962.

Ice conditions are illustrated in Figure 12.

### LAKE ATHABASKA:

A wide belt of close rotten ice extended from Burntwood Island to Bustard Island and projected eastward for a distance of five to six miles. The remaining southwestern portion of the lake was open and a wide shore lead extended as far east as William Point. An ice-free lane, four miles in width, had opened along longitude 109W, with a narrower shore lead extending southeastward from Ellis Bay. The portion of the ice pack situated west of 109W and south of 5915N contained a close concentration of moderately puddled winter ice edged to the south by close rotten ice. The remainder of the ice pack consisted of consolidated winter ice lightly puddled. Most of the floes were of giant extent but there was an increase in the number of small and medium floes.

### GREAT SLAVE LAKE:

All the observed coastal areas showed definite signs of break-up, although concentrations of nine to ten tenths were present. The number of small and medium floes had considerably increased. Open water areas existed at the mouths of Hay River, Slave River, in the vicinity of Pointe Desmarais and Pointe de Roche. The ice situated along the south shore was moderately puddled. The main body of the lake was still covered with consolidated winter ice and its surface was criss-crossed with cracks.

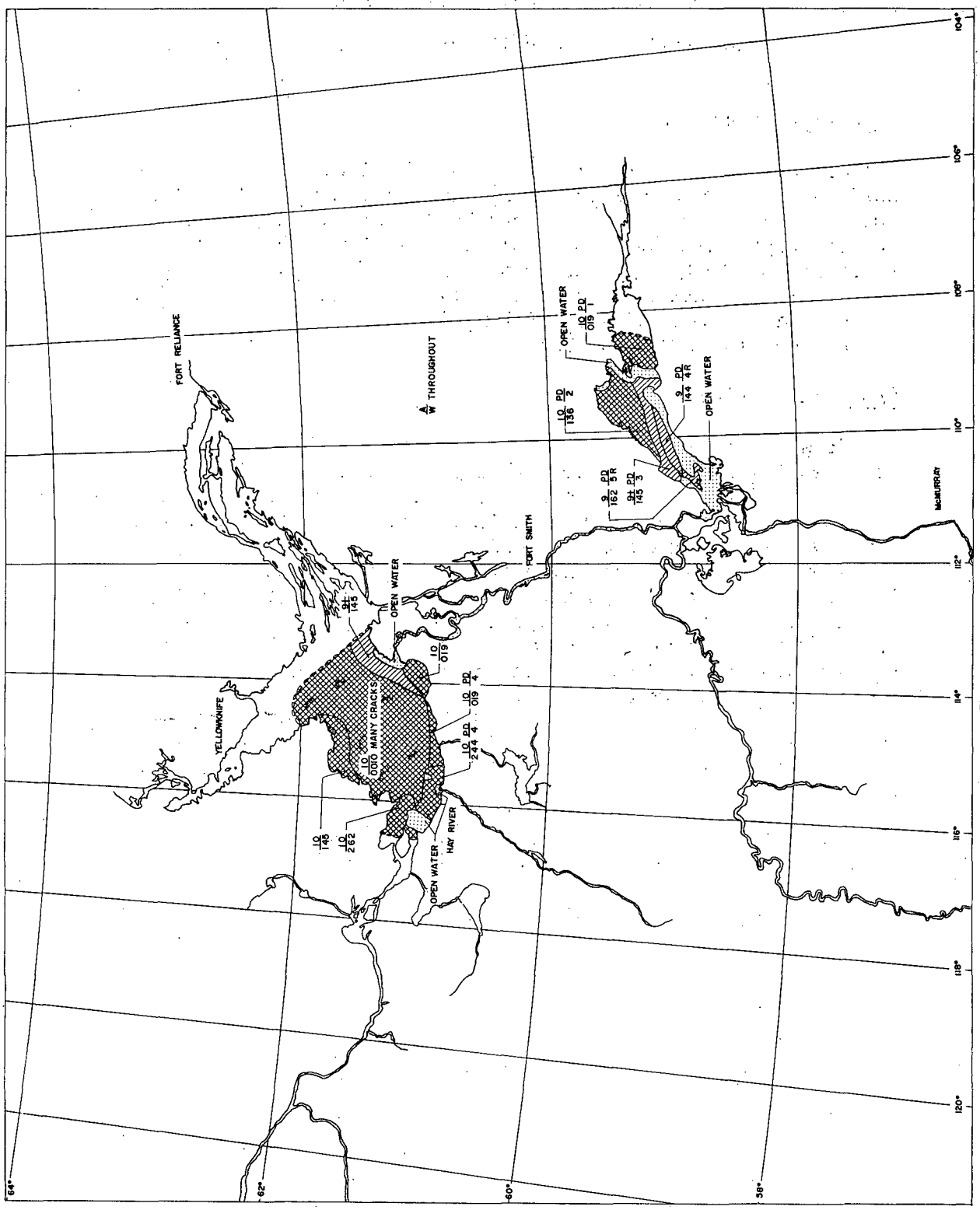


Fig. 12. - Observed Ice Conditions, June 6, 1962.

## ICE CONDITIONS ON JUNE 10, 1962.

Ice conditions are illustrated in Figure 13.

### LAKE ATHABASKA:

All areas located south of Burntwood Island were ice-free. A constricted shore lead existed along the north shore and at Halfway Point, connected with the widened lead which ran northward from Beaver Point. Except for a small scattered concentration in the proximity of Sandy Bay, the western ice pack contained close winter ice in a moderately advanced stage of disintegration. The eastern pack, situated east of Long Island, consisted of close winter ice with a few puddles.

### GREAT SLAVE LAKE:

A wide shore lead ran from the eastern limits of observation to Fort Resolution. An arm from this lead projected northward to the proximity of the Iles Basses. A second paralleled the south shore west of Sulphur Point. Another lead, existed to the east of Deep Bay. Winter Bay was ice-free and Lonely Bay was partially open. Two areas of complete coverage existed on this date, one was located northeast of Gypsum Point and the other one pressing against the western shore, occupied most of the main body of the lake. The remainder of the lake which was observed contained close winter ice. Fifty percent of the floes observed were of small and medium size.

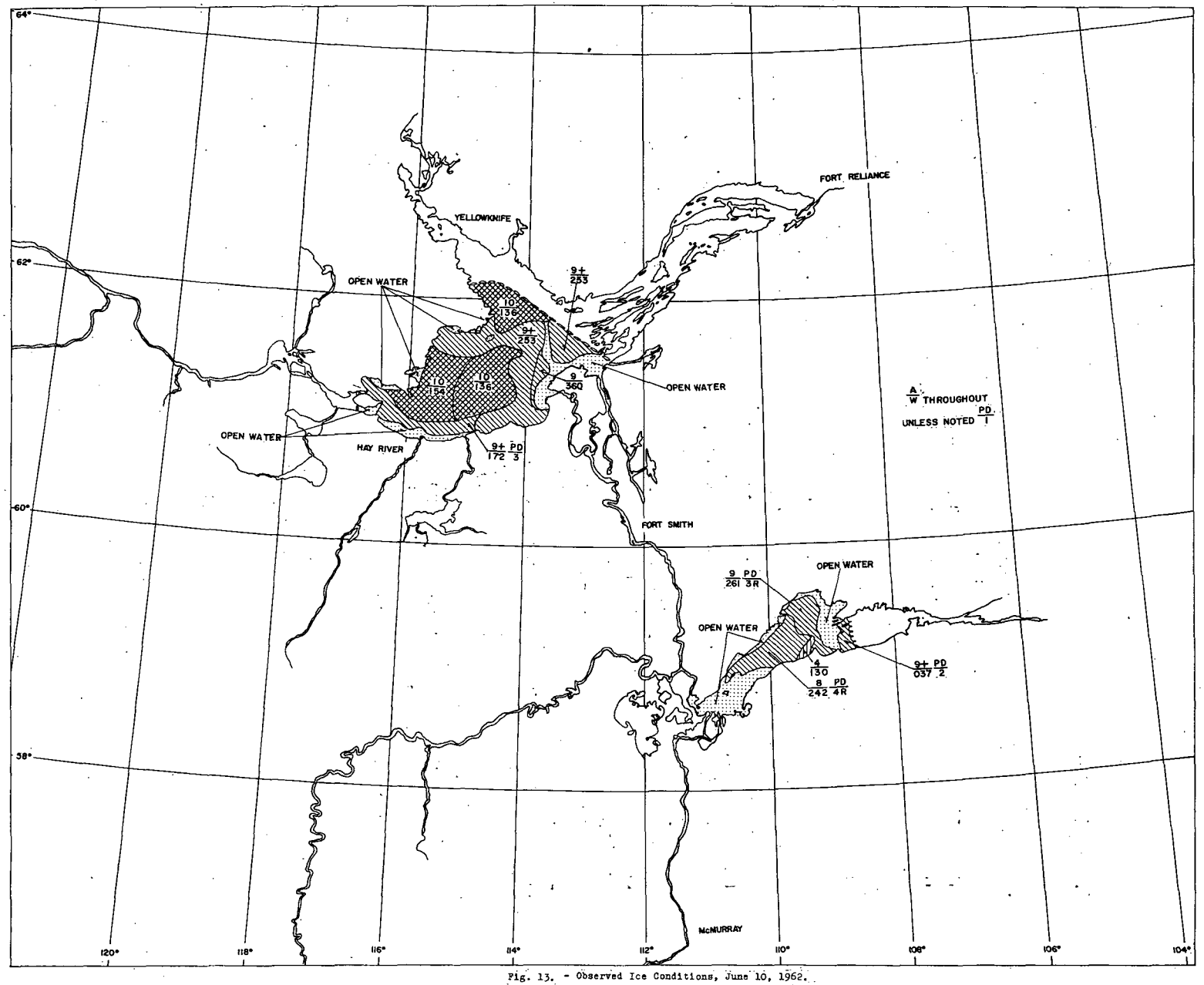


Fig. 13. - Observed Ice Conditions, June 10, 1962.



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## ICE CONDITIONS ON JUNE 15, 1962.

Ice conditions are illustrated in Figure 14.

### LAKE ATHABASKA:

A tongue of broken rotten ice extended from Halfway Point to the vicinity of Burntwood Island. The eastern pack had shrunken to the area enclosed by longitudes 108W and 109W, except for two small areas of scattered brash and block along the northern and western edges. The remainder of the observed area contained open water.

### GREAT SLAVE LAKE:

On this date, the main ice pack had been pushed against the south shore. With the exception of small polynyi at Hay River and Buffalo River, the entire coastline was ice-blocked from Pointe Desmarais to Sulphur Point. A vast area of open water extended from Mission Island and reached north almost to Yellowknife Bay. A shore lead extending from Long Island to Moraine Point, had pushed the ice ten to fifteen miles from the shore. Windy Bay was ice-free. The area located west of a line from Slave Point to Pointe Desmarais was completely open. In the North Arm there was no ice present north of Waite Island. The portion of the ice pack situated southwest of a line from Moraine Point to Pine Point contained consolidated winter ice with thawing holes. Most of the floes were of medium size. There was an area of consolidated winter ice at the entrance of Yellowknife Bay. The remainder of the main body of the lake and the North Arm contained close winter ice with few puddles and thawing holes. In the Eastern Arm of the lake, consolidated winter ice predominated except for few polynyi and areas of close ice in the vicinity of the various islands.

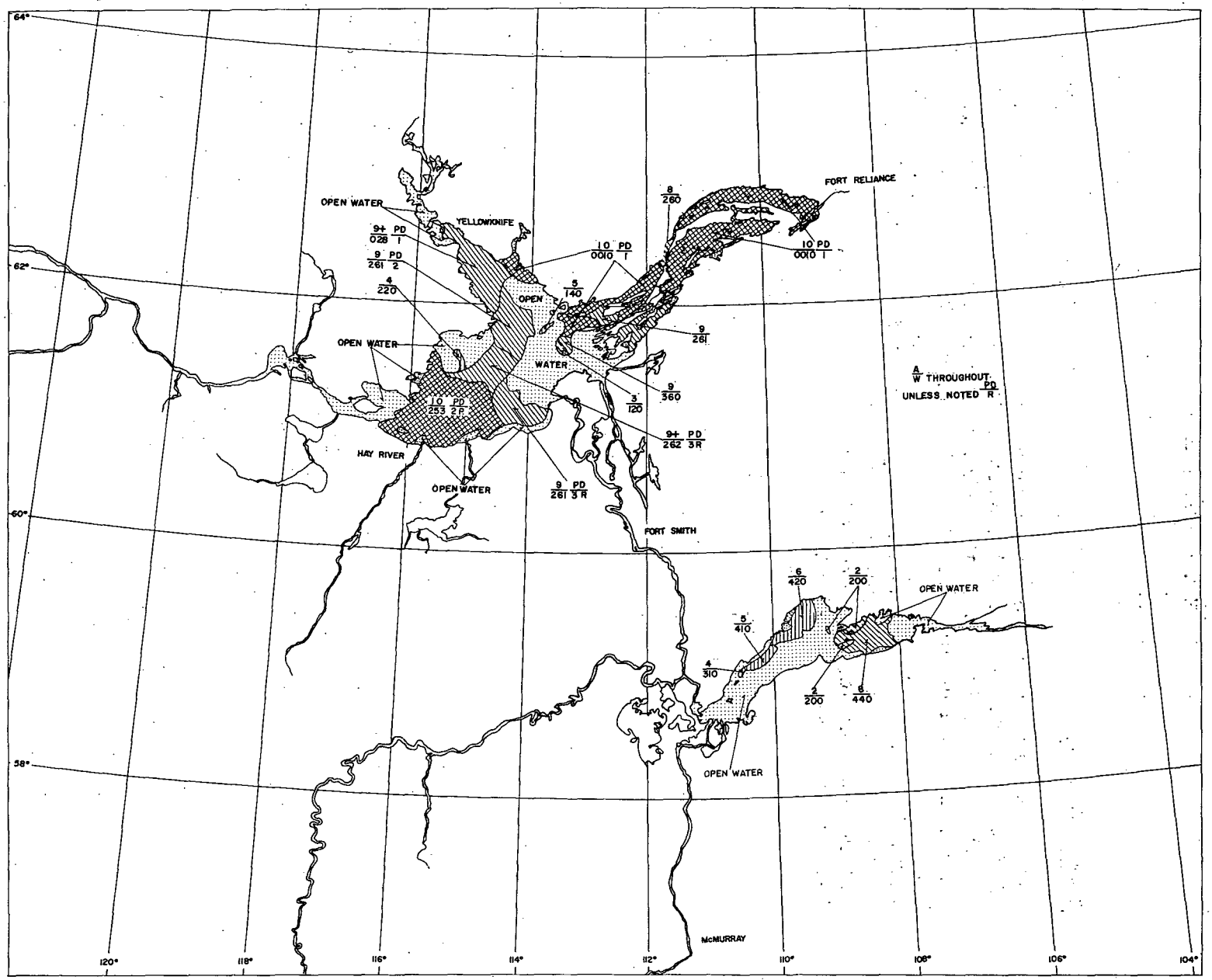


Fig. 14. - Observed Ice Conditions, June 15, 1962.



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## ICE CONDITIONS ON JUNE 20, 1962.

Ice conditions are illustrated in Figure 15.

### GREAT SLAVE LAKE:

There were areas of close ice northeast of Gypsum Point and north of Matonabbee Point. Along the south shore, in the central portion of the lake, a belt of more than nine tenths coverage still persisted. A patch of close concentration was noted at the western tip of Wilson Island and a narrow belt of close concentration occupied the bottom of Resolution Bay. Except for a wide belt of broken concentration edging the western boundary of the pack, the remainder of the ice consisted of areas of scattered concentration. There remained very few giant floes.

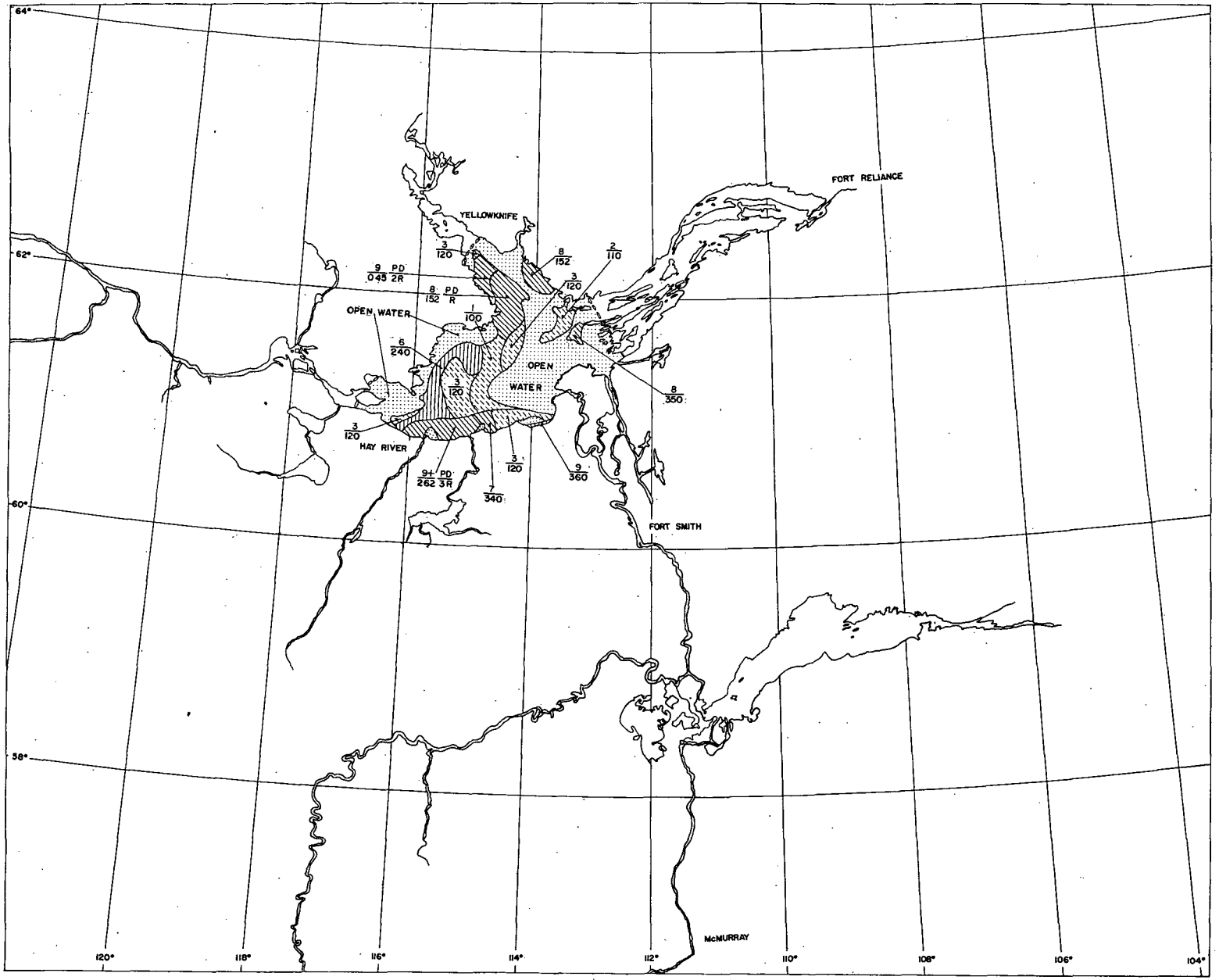


Fig. 15. - Observed Ice Conditions, June 20, 1962.