172

MID-WINTER THAWS IN THE JAMES BAY REGION, 1705-1992

by

John Vincent Volek

A Thesis
presented to the University of Manitoba
in partial fulfillment of the
requirements for the degree of
Master of Arts
in
The Department of Geography
University of Manitoba

Winnipeg, Manitoba
© John V. Volek

National Library
of Canada

Acquisitions and
Bibliographic Services Branch

395 Wellington Street
Ottawa, Ontario
K1A 0N4

Bibliothèque nationale
du Canada

Direction des acquisitions et
des services bibliographiques

395, rue Wellington
Ottawa (Ontario)
K1A 0N4

Your file Votre référence

Our file Notre référence

The author has granted an irrevocable non-exclusive licence allowing the National Library of Canada to reproduce, loan, distribute or sell copies of his/her thesis by any means and in any form or format, making this thesis available to interested persons.

L'auteur a accordé une licence irrévocable et non exclusive permettant à la Bibliothèque nationale du Canada de reproduire, prêter, distribuer ou vendre des copies de sa thèse de quelque manière et sous quelque forme que ce soit pour mettre des exemplaires de cette thèse à la disposition des personnes intéressées.

The author retains ownership of the copyright in his/her thesis. Neither the thesis nor substantial extracts from it may be printed or otherwise reproduced without his/her permission.

L'auteur conserve la propriété du droit d'auteur qui protège sa thèse. Ni la thèse ni des extraits substantiels de celle-ci ne doivent être imprimés ou autrement reproduits sans son autorisation.

ISBN 0-612-13541-1

Canada

Name _____

Dissertation Abstracts International is arranged by broad, general subject categories. Please select the one subject which most nearly describes the content of your dissertation. Enter the corresponding four-digit code in the spaces provided.

Geography — SUBJECT TERM

0366 — SUBJECT CODE

U·M·I

Subject Categories

THE HUMANITIES AND SOCIAL SCIENCES

COMMUNICATIONS AND THE ARTS
Architecture 0729
Art History 0377
Cinema 0900
Dance 0378
Fine Arts 0357
Information Science 0723
Journalism 0391
Library Science 0399
Mass Communications 0708
Music 0413
Speech Communication 0459
Theater 0465

EDUCATION
General 0515
Administration 0514
Adult and Continuing 0516
Agricultural 0517
Art 0273
Bilingual and Multicultural 0282
Business 0688
Community College 0275
Curriculum and Instruction 0727
Early Childhood 0518
Elementary 0524
Finance 0277
Guidance and Counseling 0519
Health 0680
Higher 0745
History of 0520
Home Economics 0278
Industrial 0521
Language and Literature 0279
Mathematics 0280
Music 0522
Philosophy of 0998
Physical 0523
Psychology 0525
Reading 0535
Religious 0527
Sciences 0714
Secondary 0533
Social Sciences 0534
Sociology of 0340
Special 0529
Teacher Training 0530
Technology 0710
Tests and Measurements 0288
Vocational 0747

LANGUAGE, LITERATURE AND LINGUISTICS
Language
- General 0679
- Ancient 0289
- Linguistics 0290
- Modern 0291

Literature
- General 0401
- Classical 0294
- Comparative 0295
- Medieval 0297
- Modern 0298
- African 0316
- American 0591
- Asian 0305
- Canadian (English) 0352
- Canadian (French) 0355
- English 0593
- Germanic 0311
- Latin American 0312
- Middle Eastern 0315
- Romance 0313
- Slavic and East European 0314

PHILOSOPHY, RELIGION AND THEOLOGY
Philosophy 0422
Religion
- General 0318
- Biblical Studies 0321
- Clergy 0319
- History of 0320
- Philosophy of 0322

Theology 0469

SOCIAL SCIENCES
American Studies 0323
Anthropology
- Archaeology 0324
- Cultural 0326
- Physical 0327

Business Administration
- General 0310
- Accounting 0272
- Banking 0770
- Management 0454
- Marketing 0338

Canadian Studies 0385
Economics
- General 0501
- Agricultural 0503
- Commerce-Business 0505
- Finance 0508
- History 0509
- Labor 0510
- Theory 0511

Folklore 0358
Geography 0366
Gerontology 0351
History
- General 0578
- Ancient 0579
- Medieval 0581
- Modern 0582
- Black 0328
- African 0331
- Asia, Australia and Oceania 0332
- Canadian 0334
- European 0335
- Latin American 0336
- Middle Eastern 0333
- United States 0337

History of Science 0585
Law 0398
Political Science
- General 0615
- International Law and Relations 0616
- Public Administration 0617

Recreation 0814
Social Work 0452
Sociology
- General 0626
- Criminology and Penology ... 0627
- Demography 0938
- Ethnic and Racial Studies 0631
- Individual and Family Studies 0628
- Industrial and Labor Relations 0629
- Public and Social Welfare 0630
- Social Structure and Development 0700
- Theory and Methods 0344

Transportation 0709
Urban and Regional Planning 0999
Women's Studies 0453

THE SCIENCES AND ENGINEERING

BIOLOGICAL SCIENCES
Agriculture
- General 0473
- Agronomy 0285
- Animal Culture and Nutrition 0475
- Animal Pathology 0476
- Food Science and Technology 0359
- Forestry and Wildlife 0478
- Plant Culture 0479
- Plant Pathology 0480
- Plant Physiology 0817
- Range Management 0777
- Wood Technology 0746

Biology
- General 0306
- Anatomy 0287
- Biostatistics 0308
- Botany 0309
- Cell 0379
- Ecology 0329
- Entomology 0353
- Genetics 0369
- Limnology 0793
- Microbiology 0410
- Molecular 0307
- Neuroscience 0317
- Oceanography 0416
- Physiology 0433
- Radiation 0821
- Veterinary Science 0778
- Zoology 0472

Biophysics
- General 0786
- Medical 0760

EARTH SCIENCES
Biogeochemistry 0425
Geochemistry 0996
Geodesy 0370
Geology 0372
Geophysics 0373
Hydrology 0388
Mineralogy 0411
Paleobotany 0345
Paleoecology 0426
Paleontology 0418
Paleozoology 0985
Palynology 0427
Physical Geography 0368
Physical Oceanography 0415

HEALTH AND ENVIRONMENTAL SCIENCES
Environmental Sciences 0768
Health Sciences
- General 0566
- Audiology 0300
- Chemotherapy 0992
- Dentistry 0567
- Education 0350
- Hospital Management 0769
- Human Development 0758
- Immunology 0982
- Medicine and Surgery 0564
- Mental Health 0347
- Nursing 0569
- Nutrition 0570
- Obstetrics and Gynecology .. 0380
- Occupational Health and Therapy 0354
- Ophthalmology 0381
- Pathology 0571
- Pharmacology 0419
- Pharmacy 0572
- Physical Therapy 0382
- Public Health 0573
- Radiology 0574
- Recreation 0575
- Speech Pathology 0460
- Toxicology 0383

Home Economics 0386

PHYSICAL SCIENCES
Pure Sciences
Chemistry
- General 0485
- Agricultural 0749
- Analytical 0486
- Biochemistry 0487
- Inorganic 0488
- Nuclear 0738
- Organic 0490
- Pharmaceutical 0491
- Physical 0494
- Polymer 0495
- Radiation 0754

Mathematics 0405
Physics
- General 0605
- Acoustics 0986
- Astronomy and Astrophysics 0606
- Atmospheric Science 0608
- Atomic 0748
- Electronics and Electricity 0607
- Elementary Particles and High Energy 0798
- Fluid and Plasma 0759
- Molecular 0609
- Nuclear 0610
- Optics 0752
- Radiation 0756
- Solid State 0611

Statistics 0463

Applied Sciences
Applied Mechanics 0346
Computer Science 0984

Engineering
- General 0537
- Aerospace 0538
- Agricultural 0539
- Automotive 0540
- Biomedical 0541
- Chemical 0542
- Civil 0543
- Electronics and Electrical 0544
- Heat and Thermodynamics ... 0348
- Hydraulic 0545
- Industrial 0546
- Marine 0547
- Materials Science 0794
- Mechanical 0548
- Metallurgy 0743
- Mining 0551
- Nuclear 0552
- Packaging 0549
- Petroleum 0765
- Sanitary and Municipal 0554
- System Science 0790

Geotechnology 0428
Operations Research 0796
Plastics Technology 0795
Textile Technology 0994

PSYCHOLOGY
General 0621
Behavioral 0384
Clinical 0622
Developmental 0620
Experimental 0623
Industrial 0624
Personality 0625
Physiological 0989
Psychobiology 0349
Psychometrics 0632
Social 0451

MID-WINTER THAWS IN THE JAMES BAY REGION, 1705-1992

BY

JOHN VINCENT VOLEK

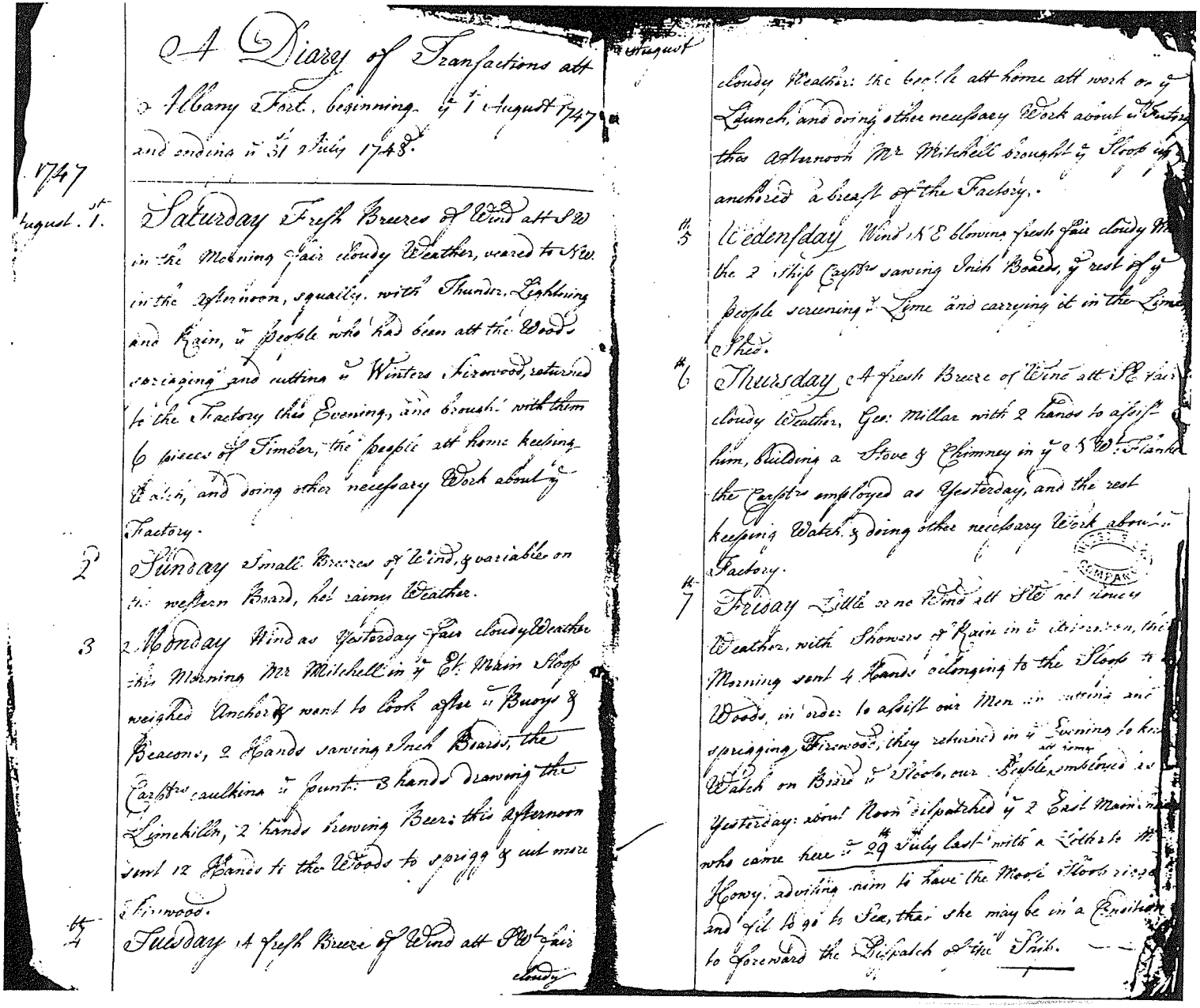
A Thesis submitted to the Faculty of Graduate Studies of the University of Manitoba in partial fulfillment of the requirements of the degree of

MASTER OF ARTS

© 1995

Permission has been granted to the LIBRARY OF THE UNIVERSITY OF MANITOBA to lend or sell copies of this thesis, to the NATIONAL LIBRARY OF CANADA to microfilm this thesis and to lend or sell copies of the film, and LIBRARY MICROFILMS to publish an abstract of this thesis.

The author reserves other publication rights, and neither the thesis nor extensive extracts from it may be printed or other-wise reproduced without the author's written permission.



A Diary of Transactions att
Albany Fort, beginning y^e 1^st August 1747
and ending y^e 31^st July 1748.

1747
August. 1. Saturday Fresh Breezes & Wind att S.W
in the Morning fair cloudy Weather, veared to N.W.
in the Afternoon, squalls, with Thunder, Lightning
and Rain, y^e People who had been att the Woods
carriaging and cutting y^e Winters Firewood, returned
to the Factory this Evening, and brought with them
6 pieces of Timber, the People att Home keeping
Watch, and doing other necessary Work about y^e
Factory.

2 Sunday Small Breezes of Wind, & variable on
the western Board, hot rainy Weather.

3 Monday Wind as Yesterday fair cloudy Weather
this Morning Mr Mitchell in y^e Ch. Main Sloop
weighed Anchor & went to look after y^e Buoys &
Beacons, 2 Hands sawing Inch Boards, the
Carpt^rs caulking y^e Joints, 3 hands drawing the
Limehills, 2 hands brewing Beer: this Afternoon
sent 12 Hands to the Woods to carrigg & cut more
Firewood.

4 Tuesday A fresh Breeze of Wind att S.W. fair
cloudy

August

cloudy Weather: the People att home att work on y^e
Launch, and doing other necessary Work about y^e Factory
this Afternoon Mr Mitchell brought y^e Sloop &
anchored a breast of the Factory.

5 Wednesday Wind N.E. blowing fresh fair cloudy W^r
the 2 Ship Carpt^rs sawing Inch Boards, y^e rest of y^e
People screening y^e Lime and carrying it in the Lime
Shed.

6 Thursday A fresh Breeze of Wind att S.E. fair
cloudy Weather, Geo: Millar with 2 hands to assist
him, Building a Stove & Chimney in y^e N.W. Islands
the Carpt^rs employed as Yesterday, and the rest
keeping Watch & doing other necessary Work about y^e
Factory.

7 Friday Little or no Wind all this 24 hours
Weather, with Showers of Rain in y^e Afternoon, this
Morning sent 4 Hands belonging to the Sloop to
Woods, in order to assist our Men in cutting and
carriaging Firewood, they returned in y^e Evening to ke
Watch on Board y^e Sloop, our People all Home
Yesterday: about Noon dispatched y^e 2 East Main
who came here y^e 29^th July last with a Letter to
Hony. advising him to have the Moose Skins
and fit to go to Sea, that she may be in a Readin
to forward the Dispatch of the Ship.

Shown here are pages 1 and 2 of the 1747 Fort Albany post journal. The weather descriptions contained within the detailed daily accounts are typical of most of the eighteenth century HBC bayside post journals. The author in this case is George Spence, who served as Chief Factor from 1747 to 1753.

(PAM, HBCA, B.3/a/39, fo. 1)

ABSTRACT

This thesis focuses on changes in the severity of the mid-winter in the James Bay region of Canada. For the historical period, this was accomplished by counting the frequencies of occurrence of mid-winter thaws at Fort Albany (1705-1941), Moose Factory (1730-1941) and Eastmain (1736-1941), using the detailed weather descriptions contained within the Hudson's Bay Company (HBC) post journals. For the modern period, this was accomplished by counting the frequencies of occurrence of daily maximum mid-winter temperatures at, or above, 0 °C (32 °F) from observations at Moosonee, Ontario (1933-1992) and Eastmain, Quebec (1961-1992). Mid-winter was defined as a period of 32 days centred on January 18 which, in the James Bay region, is the coldest day of the year in terms of normal daily temperatures. This period extends from January 3 to February 3. Overall, chronologies of thaw occurrences were developed for both the historical and modern locations.

In brief, it was concluded that Eastmain experienced the greatest change in the frequency of occurrence of mid-winter thaw over time. Secondly, it was concluded that, overall, Moose Factory and its modern counterpart, Moosonee (to 1992), experienced more mid-winter thaw events than historical and present day Eastmain.

Lastly, synoptic weather maps of select periods of the late eighteenth century were constructed in an effort to produce spatial representations of major mid-winter thaw events in central Canada. These are the earliest weather maps that can be created for central Canada using the HBC post journals.

ACKNOWLEDGEMENTS

My greatest thanks goes to my advisor, teacher and friend, Dr. Alan Catchpole. His guidance, support and patience were boundless and immeasurable. It was truly an honor and privilege working under him.

I would also like to thank my thesis examiner, Dr. Wayne Moodie, for the time and valuable advice he offered me throughout the last two years.

Special thanks also goes out to the CEOS crew: department Programmer/Analyst David Mosscrop and graduate students Paul Cooley, Sheldon Drobot, Doug Hamilton, John Iacozza, Theresa Nichols, Mike McMullan, Mark Shymanski and Andrew Thomas. Throughout 1995 they gave me invaluable advice and assistance related to computer hardware and software. Much of the tedious tasks involved in computer mapping and graphing would have taken much longer to complete if it wasn't for them.

Appreciation must also be extended to cartographers Ed Pachanuk and Marjorie Halmarson for their time and advise.

It would also like to express my gratitude to the staff at the Provincial Archives of Manitoba (PAM) for their cooperation and assistance. During the 16 months that I spent researching the Hudson's Bay Company post journals they were always very helpful and friendly.

Last but not least, special thanks goes out to my family. Their love, encouragement and support were endless and truly prepared me for an academic endeavor such as this.

TABLE OF CONTENTS

CHAPTER FOUR:

CHAPTER FIVE:

CHAPTER SIX:

CHAPTER SEVEN:

CHAPTER EIGHT:

CHAPTER NINE:

CHAPTER TEN:

LIST OF FIGURES

FIGURES

LIST OF TABLES

TABLES

1

Introduction

1.1 Role of Written Historical Evidence in Reconstructing Climatic Change

Climatologists have long been trying to determine the impacts of mankind on atmospheric processes, particularly with respect to the link between the emission of greenhouse gases and global warming. The last two to three centuries have been particularly important in this regard, as this was when human societies began to rapidly populate the earth and the industrial revolution was well under way. From an anthropocentric viewpoint, the most challenging task facing the climatologist is the need to forecast climatic changes in the coming decades and centuries. A major approach to this forecasting involves the projection of climatic changes from the recent past into the future. Therefore, there has grown a need to be able to reconstruct the climatic history of the last two to three centuries in great detail, particularly in ecologically sensitive regions of the Northern Hemisphere where climatic change has major impacts on the environment. Unfortunately, many sources of proxy evidence commonly used for reconstructing past climate, such as dendrochronology, varve clay analysis and isotope analysis, do not provide a high enough resolution to determine finer climatic fluctuations. At best, these sources may provide minimum sampling

intervals of one year and a dating accuracy of approximately one to ten years (Bradley 1985:6-7). Another source of proxy evidence, however, commonly provides a finer resolution necessary for more detailed climatic reconstruction: historical evidence. Written historical evidence is a rich source of weather information, since this evidence can date back well over 1000 years and have a daily resolution (Bradley 1985:7; Hoeller 1982:78; Ingram et al. 1981:184). Ingram, Underhill and Farmer note that European records of major trading and exploration organizations, particularly unpublished reports of explorers, sometimes provide a rich variety of different kinds of information:

> For example, ships' logs, naval officers' diaries and commercial day journals supply direct evidence, sometimes highly systematic, on wind directions and other atmospheric and oceanic conditions (including information about sea ice); (Ingram et al. 1981:189).

1.2 Hudson's Bay Company Documentary Sources

The Hudson's Bay Company (HBC) Archives, housed in the Provincial Archives building in Winnipeg, Manitoba, provide almost three centuries of weather information. Since this weather information has a daily resolution, it is invaluable in detecting finer changes in climate over time. Hoeller states that this resolution constitutes a distinct advantage over other sources of proxy data, given that the discrimination between years, months, days and sometimes even hours is possible (Hoeller 1982:78).

These records come in a variety of different forms, such as correspondence and annual reports, account books, post journals and

ships' log books. However, it is the post journals and ships' log books that provide the most climatic information. These sources comprise a substantial proportion of the HBC Archives.

The HBC ships' log books are detailed diaries that were kept by the officers on all the HBC ships. These were the supply ships that made the long and hazardous voyage from London, England, through Hudson Strait and finally into Hudson Bay. At two hourly intervals along their voyages, wind and weather information was recorded. Detailed sea ice information was also recorded in the log books (Catchpole 1992).

The second category of HBC records rich in climatic information are the post journals. It is from these journals that the climatic information used for this thesis was taken.

The HBC posts were scattered along the east and west coasts of Hudson Bay and James Bay, and eventually throughout much of eastern, central and western Canada (refer to Chapter 7 for details on the distribution of HBC posts). The Company's officers kept detailed journals at each of the posts. Within these journals, the officers recorded matters relating to the routine, daily operations of the posts and more specific matters relating to the fur trade. Generally included within each of the journal accounts was a daily description of the state of the weather. This was mainly represented by a qualitative description, for example on Jan. 6, 1741 at Fort Albany the journal stated: "Wind SW cold Sharp Weather." (PAM, HBCA, B.3/a/32, fo. 20), or, on Jan. 5, 1744 at Moose Factory we read: "Wind at S fine clear warm weather, cannot be better at London." (PAM, HBCA, B.135/a/14, fo. 21d). Furthermore, other descriptive terms

were sometimes used to enhance the description of the state of the weather. For example, on Jan. 13, 1771 at Fort Albany: "Exceeding bad Weather, blows, drifts, and snows much, Wind NBN almost a hurricane." (PAM, HBCA, B.3/a/62, fo. 17d). Another example of a vivid weather comment was on Feb. 4, 1805 at Fort Albany: "the Weather has been so exceeding sharp since Christmas, that it was scarce possible to drive a Nail into the Timbers, without splitting [them] to pieces" (PAM, HBCA, B.3/a/107, fo. 8d). In almost every case a wind direction reading was included. In some cases, thermometric readings are found within the body of the daily journal remarks. For example, on Jan. 16, 1864 at Fort Albany: "The coldest day this season 52 below-zero at sunrise" (PAM, HBCA B.3/a/175, fo. 16d). In other cases, thermometric and sometimes barometric readings are found in the left margin beside the corresponding daily remarks. By the early nineteenth century however, thermometric and barometric readings are more often found in separate meteorological registers at the end of the journals (on a few occasions, in the front Section of the journals) or in completely separate meteorological journals.

The format in which these meteorological registers (sometimes referred to as thermometric charts) were recorded is very uniform, both temporally and spatially. This format is as follows. The thermometric and barometric readings, along with the specific date and hour when the readings were taken (normally three readings per day), are commonly found on a single line. Usually the readings were made at 6 AM, noon and 6 PM. It should be noted that the times of these readings varied between 7 and 10 AM for the morning

reading, noon and 3 PM for the midday reading, and 5 and 9 PM for the evening reading. Occasionally, when a post had a self-registering thermometer (e.g. Type Six) maximum and minimum temperature readings are also found (see Appendix E for details on the Type Six). In addition, precipitation, wind direction, wind force and a general weather remark (e.g. "rain at night") were occasionally included beside the temperature readings. Usually, the thermometer (in °F) and barometer columns were averaged at the bottom of each page, giving a monthly summary (Wilson 1982:157).

1.3 Value of the HBC Post Journals in Climatic Research

The HBC post journals have the distinction of being among the oldest sources of historical weather information in North America. They were usually recorded from first-hand observations, not from rumor or second-hand information, thus reducing the possibility of error. Unfortunately, much of the climatological community is apparently not well aware of the wealth of detailed weather information contained within the HBC post journals (Hoeller 1982:77; Ingram et al. 1981:189). Many climatologists seem to believe that weather diaries are the earliest sources of daily weather information. For example, weather diaries that date back to the early 1730s, from Philadelphia and several places in Massachusetts, have been regarded as the earliest sources of weather information in North America (Landsberg 1985:42). Although the HBC post journals are not weather diaries, they nevertheless provide detailed, daily descriptions of weather and some predate the 1730s. For example,

Fort Albany had regular and detailed journal descriptions of weather starting as early as 1705.

Another distinction that the HBC post journals have over many other sources of historical climate information is that these records were kept in an ecologically sensitive region of the world. Weather information extracted from these journals would therefore be important to climatologists, biogeographers and other scientists interested in studying the effects of climate change on the position of the northern boreal forest treeline in Canada. Furthermore, the HBC post journals represent an extremely large spatial scale. Posts were set up from Labrador to the pacific coast (Figure 1).

It should also be emphasized that the weather information contained within the HBC post journals can be rigorously tested for validity or truthfulness. Firstly, historical weather information from neighbouring HBC posts can be used for comparison with one another as a test of validity. It is assumed that posts located within close geographical proximity to one another and with similar climatic conditions, like Fort Albany and Moose Factory, would commonly exhibit similar weather trends. Secondly, tree ring data can also provide a validity test (refer to Section 2.1 for details).

1.4 Outline of Previous Paleoclimatic Reconstructions Based on HBC Records

The first climatic study that made use of the HBC post journals was published in 1965 by McKay and Mackay (1965). This was a reconstruction of the dates of freeze-up and break-up of the

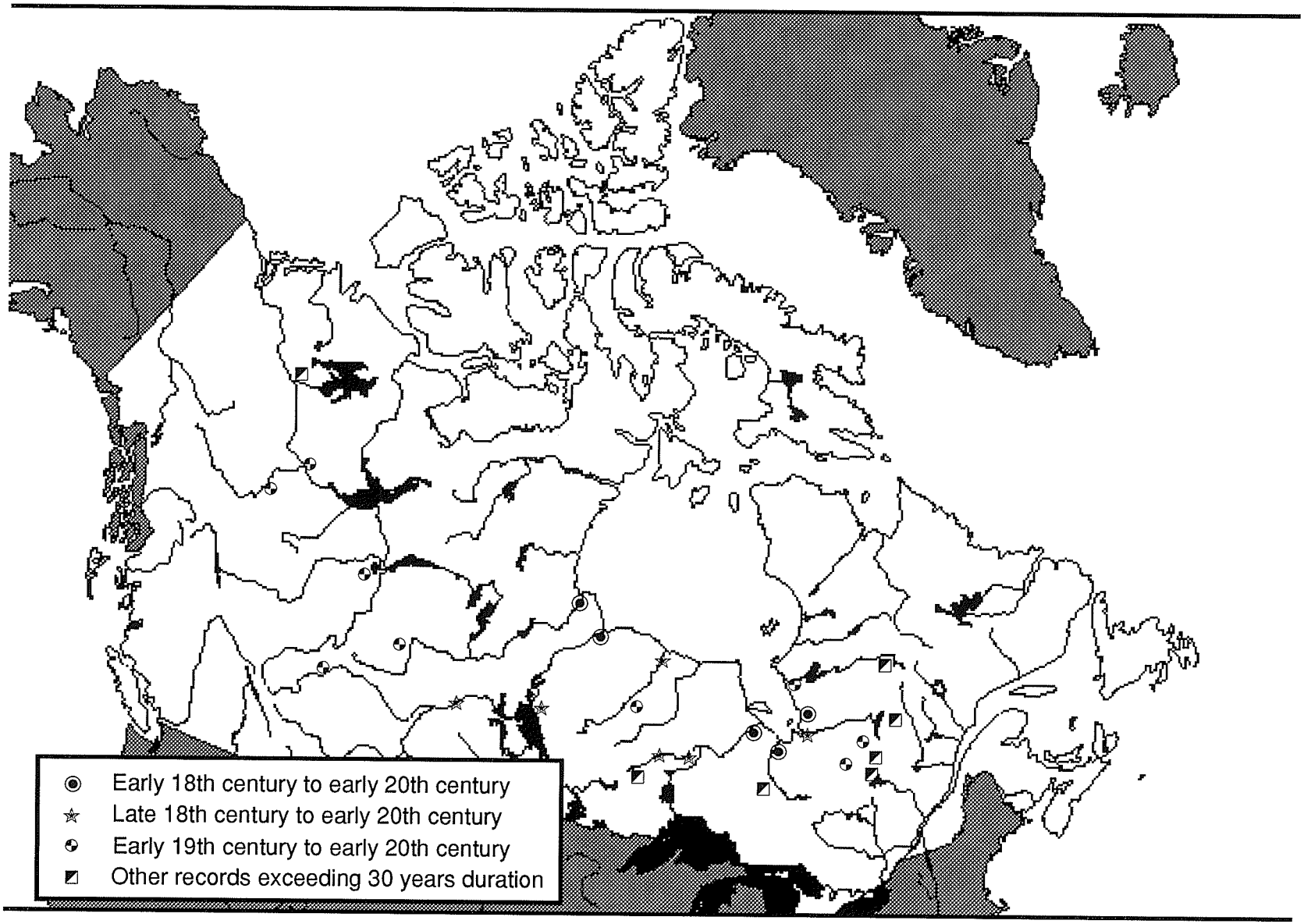


Figure 1. **Distribution of Hudson's Bay Company Post Journal Records Exceeding 30 Years Duration**

Churchill River at Fort Churchill and the Hayes River at York Factory in the eighteenth and nineteenth centuries. During the past three decades a large number of studies of past climates, based on the HBC archival records, have been published and presented in theses. These are identified in Table 1 below.

Year	Author(s)	Source(s)	Period Recon-structed	Climatic Variables	Location of Sources
1965	McKay & Mackay	Post journals	1714-1939	River freeze-up & break-up	Fort Churchill & York Factory
1970	Catchpole, Moodie & Kaye	Post journals	1775-1870	First freeze-up & break-up of rivers	Norway, Edmonton & Cumberland Houses
1970	Minns	Post journals	1824-1851	Air mass frequency	Edmonton House, Fort Simpson, Fort William & Winnipeg
1975	Moodie & Catchpole	Post journals	1714-1870	Dates of river freeze-up & break-up	Fort Churchill, Fort Albany & York & Moose Factories
1981	Faurer	Log books	1751-1870	Sea ice	Hudson Strait
1981	Madison	Post journals	1705-1870	Dates of first snow & first frost	Fort Albany & Moose Factory
1981	Magne	Post journals	1743-1940	Dates of freeze-up & break-up	Fort Severn & Eastmain
1982	Wilson	Temperature records	1814-1821	Temperature	Great Whale River, Big River & Eastmain
1983	Catchpole & Faurer	Log books	1751-1870	Sea ice & atmospheric circulation	Hudson Strait
1983	Rannie	Post journals	1815-1908	Dates of freeze-up & break-up	Red River at Winnipeg
1983	Wilson	Temperature records & post journals	1814-1821	Summer temperature, wind, precipitation	Great Whale River, Big River & Eastmain
1984	Ball & Kingsley	Temperature records	1768-1910	Temperature	Fort Churchill & York Factory
1985	Ball	Weather journals & post journals	1715-1805	# of days with rain, snow, thunder & lightning, wind, cloud & frost	Fort Churchill & York Factory
1986	Ball	Samuel Hearne map	1772	Boreal forest/ tundra transition	Canadian treeline
1987	Catchpole & Halpin	Log books	1751-1870	Summer sea ice severity	Eastern Hudson Bay

1988	Teillet	Log books	1751-1870	Summer sea ice & icebergs	Labrador Sea
1988	Wilson	Post journals, correspondence & annual reports	1800-1900	Summer thermal & wetness indices	Great & Little Whale Rivers, Big River & Eastmain
1989	Catchpole & Hanuta	Log books	1751-1870	Summer sea ice after volcanic eruptions	Hudson Strait & Hudson Bay
1990	Faurer	Log books	1751-1870	Sea ice	Hudson Strait, Hudson Bay & James Bay
1992	Ball	Post journals	1811-1820	Temperature	Central Canada
1992	Catchpole	Post journals	1810-1820	River ice & sea ice	Churchill, Hayes, Severn, Albany, Moose & Eastmain Rivers
1992	Faurer	Log books	1751-1870	Sea ice	Hudson Strait, Hudson Bay & James Bay
1992	Wilson	Post journals, meteorological registers, correspondence & annual reports	1800-1900	Summer thermal & wetness indices	Great & Little Whale Rivers, Big River & Eastmain

(Adapted from Faurer 1990)

Table 1. List of Previous Studies of Past Climates Based on HBC Archival Records

1.5 Research Objectives

The first objective of this thesis is to examine changes in the severity of the mid-winter in the James Bay region of Canada. Up to now, historical weather information on the winter months, contained in the HBC journals, has remained largely unexplored by the climatological community, as shown in Section 1.4.

One James Bay mid-winter event that is truly indicative of a dramatic deviation away from the norm is a thaw. It would therefore be expected that the more thaws that take place during a mid-winter period the less severe the mid-winter period. The

opposite also holds true: the fewer thaws that take place during a mid-winter period, the more severe the mid-winter period. I have defined mid-winter as a period of 32 days centred on January 18 which, in the James Bay region, is the coldest day of the year in terms of normal daily temperatures. This period extends from January 3 to February 3. In 1752 the Gregorian calendar reform occurred. As a result, the mid-winter period prior to 1753 extends from December 22 to January 22.[1] A thaw is an extremely noteworthy phenomena in a region of the world that may experience mid-winter temperatures well below -40 °F. When temperatures reached 32 °F or higher, the visible changes in the state of the environment were probably clearly apparent. For example, on Jan. 15, 1706 at Fort Albany the journal stated: "Close thawing Rainey Weather thawing to that degree that the Houses Runewith - water the Wind S but varyed aboute in the afternoon to the NW and then frose Hard" (PAM, HBCA, B.3/a/1, fo. 22). This case clearly demonstrates how noteworthy a mid-winter thaw might have been. Temperature changes that remain below the freezing point do not have visible effects and are, therefore, less noteworthy. Since thawing is so noteworthy, it can be expected that these events would be recorded in the daily journal accounts written by the authors at the various HBC posts. With this expectation, references to mid-winter thaw can be used to create an index of winter severity. This is done by transcribing, verbatim, all mention of "thaw" or "rain" or "sleet" (or any other term which refers to a thaw) from each mid-

[1] There is a difference of 12 days between the earlier Julian calendar and the Gregorian calendar. In 1752, September 2 was followed by September 14.

winter period throughout each journal record. From this, the frequency of occurrence of mid-winter thaws is determined for the entire historical period of the HBC journals.

The second objective of this thesis is to examine changes in the severity of the mid-winter for the modern period in the James Bay region. This can be accomplished by analyzing daily maximum temperature data for modern locations around James Bay, and extracting all temperatures at, or above 0 °C (32 °F). By counting the total number of mid-winter thaws for each year of the modern period, an index of winter severity can be produced. A modern thaw index for the James Bay region can be compared with an historical thaw index for the James Bay region. Any changes in the severity of the James Bay mid-winter, between the period of the HBC post journals and the modern period, can then be determined.

The third objective of this thesis is to construct synoptic weather maps of selected thaws in central Canada, using weather information transcribed from the HBC post journals (refer to Appendix F and Chapter 9).

1.6 Outline of Thesis

Chapter 2 examines the criteria used in the selection of the journals to be exploited, as well as the principles applied during the transcription of relevant weather information. Chapter 3 provides a classification procedure for direct and indirect weather information indicative of a thaw, and presents chronologies of mid-winter thaw occurrences at Fort Albany, Moose Factory and Eastmain. Chapter 4

deals with the derivation of mid-winter thaw data from modern observations at Moosonee (1933-92) and Eastmain (1961-92), and presents chronologies of mid-winter thaw occurrences at these two modern locations. The methods of analysis of the historical and modern thaw data are fully discussed in Chapter 5. The results of the various analyses and conclusions derived from these analyses are given in Chapter 6. Chapter 7 opens by introducing the methods used to construct synoptic weather maps from historical information. Chapter 7 then examines the criteria used in selecting the thaws for synoptic weather analysis. Also included in Chapter 7 is a Section on the transcription of historical weather information used to create the synoptic weather maps. The methods used to construct synoptic weather maps from historical information are presented in Chapter 8. Chapter 9 analyzes the synoptic weather maps produced. Lastly, Chapter 10 is a brief summary of the above chapters.

2

Selection of Journals and Transcription of Relevant Information

2.1 Selection of Journals

The complete series of post journals from the HBC posts at Fort Albany, Moose Factory and Eastmain were utilized for this project. These posts are located in close proximity to each other on the coasts of James Bay (Figure 2).

The reasons for choosing these three specific post locations involve historical and ecological considerations. Since the journals were written in close proximity to one another, this allows for the data to be cross-referenced as a method to check the validity of the historical information. Secondly, these three posts, like the others located along Hudson and James Bay, have particularly long historical records. Of the three chosen, Fort Albany was in operation the longest, with a journal record extending from 1705 to 1941. Moose Factory has a journal record extending from 1730 to 1941, while Eastmain's journal record extends from 1736 to 1941. It should be noted that missing journals exist within the Fort Albany, Moose Factory and Eastmain records. Refer to Table 1, which lists the specific years with missing journals from the Fort Albany, Moose Factory and Eastmain journal records.

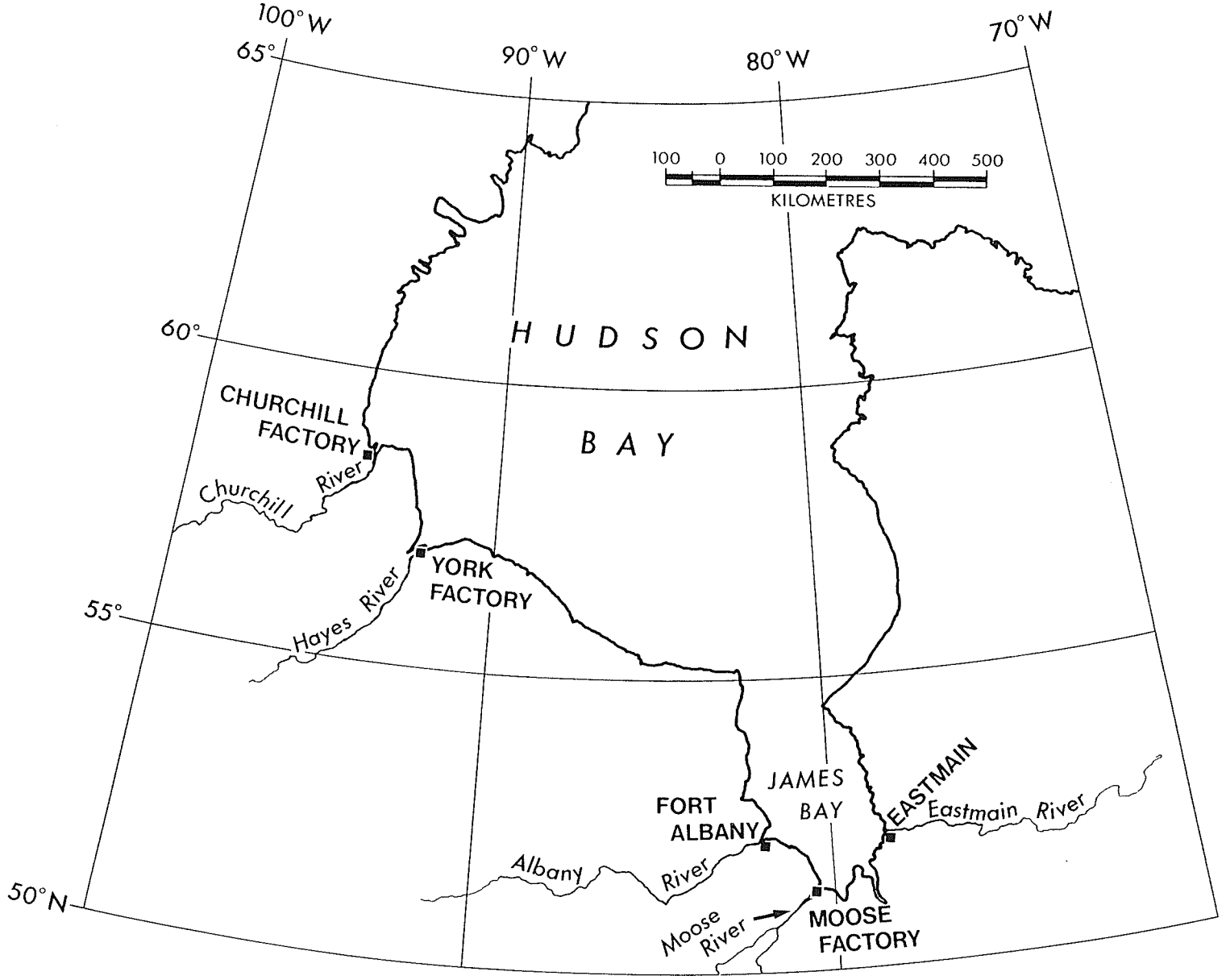


Figure 2. Major HBC Bayside Posts

Fort Albany		Moose Factory		Eastmain	
YEARS WITH MISSING JOURNALS	# OF MISSING JOURNALS	YEARS WITH MISSING JOURNALS	# OF MISSING JOURNALS	YEARS WITH MISSING JOURNALS	# OF MISSING JOURNALS
1707-11	4	1737-39	2	1821-22	1
1720-21	1	1821-22	1	1831-32	1
1801-02	1	1832-34	2	1837-93	56
1821-22	1	1864-67	3	1910-11	1
1868-71	3	1868-69	1	1921-38	17
1881-83	2	1871-77	6	1939-40	1
1885-86	1	1890-93	3		
1895-96	1	1904-12	8		
1921-29	8	1922-29	7		
1931-38	7	1930-38	8		
1939-40	1	1939-40	1		
TOTAL:	30	TOTAL:	42	TOTAL:	77

Table 2. Missing Journals within the Fort Albany, Moose Factory and Eastmain Journal Records

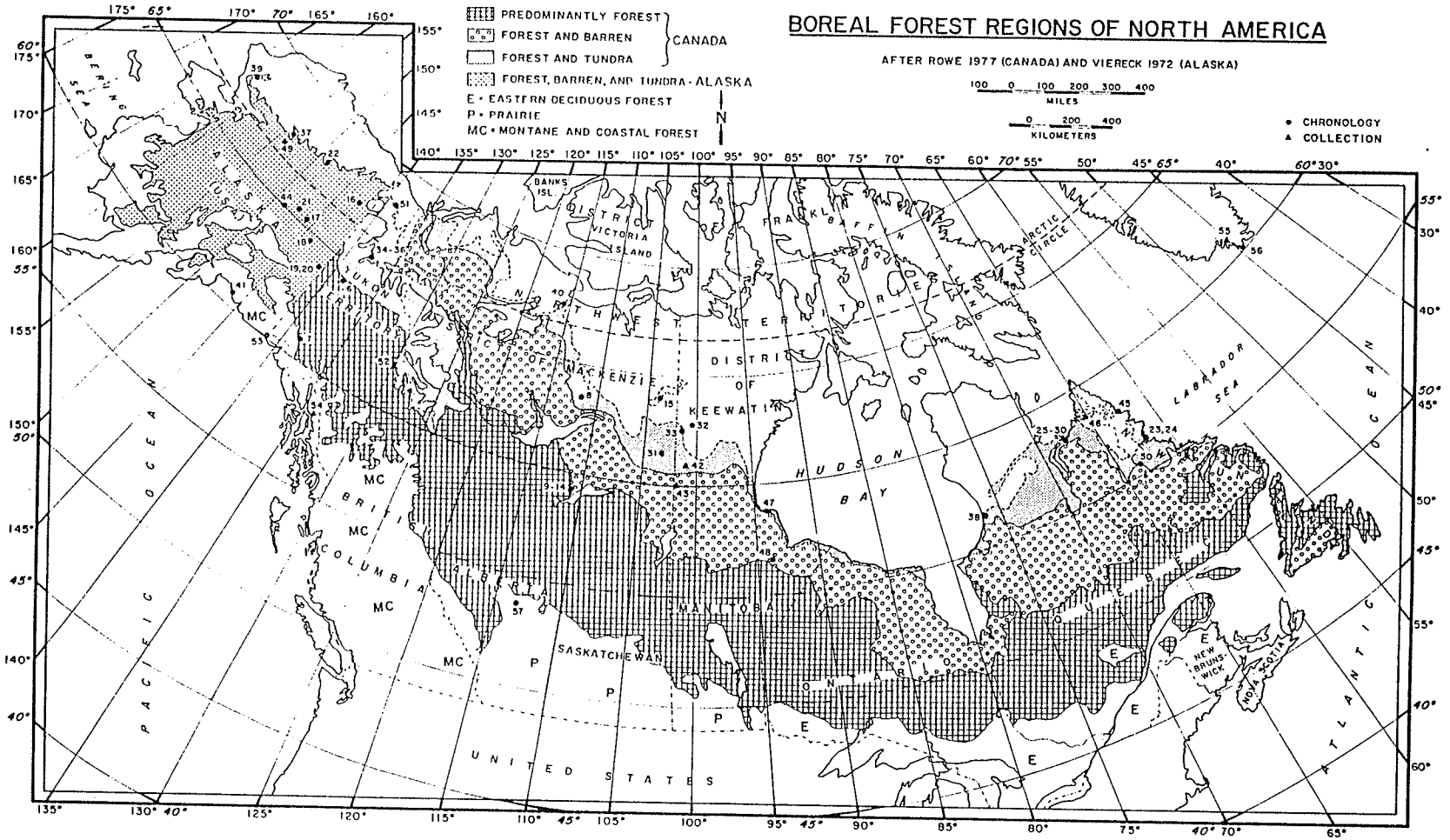
As shown in Table 1, the vast majority of the missing journals occur in the nineteenth and twentieth centuries. In the case of the Fort Albany journal record, exactly half of the missing journals occur between 1921 and 1938. Over $^{3}/_{4}$ of the missing journals in the Moose Factory journal record occur between 1871 and 1938. As with Eastmain, there were no missing journals in the eighteenth

century, however, a huge proportion of journals were missing between 1837 and 1893, as well as between 1921 and 1938.

Ecologically, these three posts are located in the most southerly latitudinal treeline region in the Northern Hemisphere. The James Bay region boreal forest treeline is particularly sensitive to changes in temperature, and even slight fluctuations in temperature may have very noticeable impacts on annual tree growth and reproduction.

The position of the northern boreal forest treeline, as shown in Figure 3, coincides closely with the mean summer position of the Arctic front. In areas north of this transitional region, average July temperatures are too low, and the length of the growing season is too short for tree growth and reproduction. Wind blown snow and ice crystals also contribute to limiting tree growth and reproduction in this region. There are some extensions or outliers beyond the regional treeline of the Northern Hemisphere. However, in these few cases, microclimatic factors influence tree growth, such as sheltered depressions, river valleys or slopes with a southern exposure (Jacoby 1981:98).

In order for reproduction to occur at any boreal forest treeline in the Northern Hemisphere, mean July temperatures must exceed 10 °C. New shoots are vulnerable to vapour loss, which in turn leads to needle desiccation and mortality when temperatures are too low. Secondly, a certain minimum time span must pass before the onset of colder temperatures. This is to ensure that shoots become hardy enough to be protected against cuticular transpiration in the winter. If reproduction is delayed too long, adequate morphological



(After Jacoby, G.C. et al. 1981:99)

Figure 3. The Position of the Boreal Forest Treeline in North America

development will likely not take place, and the treeline will not expand (Hansen-Bristow 1986 & Hadley et al. 1983).

Needle desiccation and mortality is also exacerbated by wind. Hadley and Smith (1983) state that wind blown ice crystals can lead to cuticle abrasion, which in turn can lead to reduced cuticular resistance to dry winter air. This type of process scars many of the trees that exist within the boreal forest treeline, giving them a flag-like appearance (the common krummholz shape).

With these factors limiting the extent of the boreal forest treeline in the Northern Hemisphere, a mean temperature increase may have very pronounced impacts on the position of the treeline. This level of climatic sensitivity makes the James Bay region particularly attractive to scientists interested in measuring climatic change.

Therefore, historical climatic information obtained from the Fort Albany, Moose Factory and Eastmain post journals, as well as from other bayside post journals, is extremely valuable in that it can be compared with tree ring data that have been obtained by biogeographers and other scientists in the James Bay and Hudson Bay regions. For example, M.L. Parker et al. (1981), in a landmark study, examined samples of living trees along the east coasts of James Bay and Hudson Bay, and built tree-ring width and density chronologies. These chronologies have the potential to be compared with instrumental temperature records and with historical weather data, such as weather information from the HBC post journals. G.C. Jacoby Jr. (1992) examined tree ring evidence of past climates, dating between 1601 and 1974, for a variety of regions throughout northern North America, including James Bay. Parker, Bramhall and

Johnson (1983) dated tree-rings in driftwood from raised beaches on the Hudson Bay coast near Churchill and York Factory. Since most trees in this highly stressed region do not attain a great age, the use of driftwood provides longer tree-ring chronologies that are valuable for climatic reconstruction.

2.2 Transcription of Relevant Information

When a journal entry yielded any weather information that referred to a thaw, that specific entry was carefully recorded, verbatim, for later analysis (Appendix A). For example, specific mention of "thaw" or "rain" or "sleet," would normally be expected to indicate a thaw (though freezing rain is an exception). Furthermore, instrumental temperature readings above 32 °F, which indicates a thaw, and any accompanying weather remarks were also recorded verbatim. Due to the absorption of latent heat of melting, radiation heating above 32 °F is retarded. Therefore, instrumental temperature readings of exactly 32 °F were also considered a thaw. The presence of a thermometric reading was particularly valuable in that it allowed for the verification of the weather description contained within the daily journal entry. There were only a few occasions when a thermometric reading indicated a thaw, but the accompanying journal entry did not contain weather information.

On some occasions, the journal entries contained indirect weather information that is indicative of a thaw, but thawing was not specifically mentioned and a thermometric reading was not included. For example, on Jan. 15, 1751 at Fort Albany it stated: "Little Wind

and variable round the Compass warm serene Weather" (PAM, HBCA, B.3/a/43, fo. 14d). Another example of indirect weather information indicative of a thaw occurred on Jan. 15, 1829 at Moose Factory: "Wind SW and soft Weather." (PAM. HBCA, B.135/a/134, fo. 32d). In these cases, the uncertain weather description was also recorded verbatim for future consideration. It should be noted that an occasional barometric reading was also found and recorded if it had accompanying thaw information. The barometric readings were also used, to a limited extent, in the construction of synoptic weather maps (Chapter 9).

In total, over 20,000 mid-winter journal remarks were carefully read, mostly on microfilm, and relevant information transcribed. It took over 16 months, at 25 hours per week on average, to complete this project. The full list of transcribed weather descriptions are given in Appendix A and F.

3

Derivation of Thaw Data From Transcribed Information

3.1 Determining Occurrences of Thaw from Verbatim Descriptions

Once all three journal series were completely read over and all references to mid-winter thaws extracted and recorded verbatim, the references were then analyzed into several categories.

The first objective was to count the frequencies of occurrence of mid-winter thaws. However, before this could be done, the situations where it was not perfectly clear that a thaw had occurred had to be considered. This was accomplished by classifying each thaw reference according to its content.

If a reference included the specific term "thaw," regardless if other thaw-related terms (e.g. "rain" or "sleet") were also included in the verbatim account, it was classified under the group heading "Thaw." For example, on Jan. 10, 1738 at Fort Albany it stated: "Wind S'ly all day blow'd a fresh Gale, thaw'd much & very warm weather for yee time of year; & it rain'd at Night." (PAM, HBCA, B.3/a/26, fo. 49). A second example on Jan. 28, 1755 at Moose Factory stated: "Wind variable, cloudy warm weather with some small rain and sleet, thaw'd very much all day" (PAM, HBCA, B.135/a/27, fo. 13). A third example on Jan. 29, 1786 at Fort Albany

stated: "Wind S.W. blows fresh exceeding warm weather thawing the whole day" (PAM, HBCA, B.3/a/86, fo. 14).

If a reference included the specific term "rain," but the word "thaw" was not found, it was classified under the group heading "Rain." For example, on Jan. 6, 1744 at Moose Factory it stated: "close weather with much rain, is so warm y we cannot move without sweating. feel considerable effects on our bodies by this unseasonable alteration." (PAM, HBCA, B.135/a/14, fo. 21d). A second example for the same day at Eastmain stated: "we had a great deal of rain w sum snow" (PAM, HBCA, B.59/a/8, fo. 19). A third example from Fort Albany on Jan. 22, 1829 stated: "Wind Westerly cold in the forenoon but afterwards got warm again in the afternoon when a shower of rain fell which was soon followed by sleet, and the day closed with a heavy fall of Snow." (PAM, HBCA, B.2/a/133, fo. 22d).

If a reference included the specific term "sleet," but the words "thaw," and/or "rain" were not found in the verbatim account, it was classified under the group heading "Sleet." For example, on Jan. 10, 1742 at Moose Factory it stated: "Wind at SE close weather with Sleet." (PAM, HBCA, B.135/a/11, fo. 29). A second example on Jan. 5, 1779 at Moose Factory stated: "Wind SW Cloudy heavy warm Weather, with Snow and Sleet untill 3 PM, when it came about to the NW with heavy Snow Drift, and Sharp Frost" (PAM, HBCA, B.135/a/60, fo. 12). Another example for the very next day at Eastmain (Jan. 6, 1779) stated: "warm weather w snow and sleet wind SW" (PAM, HBCA, B.59/a/53, fo. 9d).

If a reference did not include the terms "thaw," "rain" or "sleet," but gave an instrumental temperature reading of 32 °F or higher, it was included under the group heading "Therm." For example, on Feb. 3, 1800 at Moose Factory it stated: "wind SW. strong; perfectly clear, remarkably fine weather" (PAM, HBCA, B.135/a/87, fo. 12d) and in the left margin beside the daily remark it gave +24, +32 and +30, which represent the morning, midday and evening readings respectively. A second example from Jan. 15, 1829 at Fort Albany stated: "Wind easterly warm weather - Thermometer stood 35 dgs above 0." (PAM, HBCA, B.3/a/133, fo. 22). In regards to the calibration of historical thermometers, refer to Appendix E, which provides a detailed synopsis of an unpublished manuscript by Cynthia Wilson (1982) on this issue. In brief, Wilson concludes that the thermometric and barometric data contained within the HBC journals can be considered "reliable and consistent within the limitations of the instrumentation, sites, instrument exposure and observing practices of the period" (Wilson 1982:204).

The classification was further refined to account for journal entries which contain strong, but indirect thaw-related terms. An example of a very strong, but indirect thaw-related term would be "soft," as in the following quotation on Jan. 9, 1902 from Eastmain: "wind South cloudy & very Soft" (PAM, HBCA, B.59/a/125, fo. 27). Such a reference can be interpreted as simply warm for the time of year, but not necessarily a thaw, and therefore, is classified under the group heading probable ("Prob."). The term "soft," however, can be considered an exception for this classification, as it is a particularly strong indirect thaw related term. This is because the

term "soft" sometimes accompanies other definite thaw related terms, like "rain" or thermometer readings at or above 32 °F, as in the following examples. On Jan. 29, 1795 at Moose Factory it stated: "Wind S'erly Soft snowey weather" (PAM, HBCA, B.135/a/82, fo. 13), and notations of +31 and +32 occur in the left margin beside the remark. On Jan. 6, 1843 at Fort Albany it stated: "A change in the weather, Wind East and South East: Soft snow, Hail & a little Rain. The surface of the snow is glazed over with the moisture" (PAM, HBCA, B.3/a/148, fo. 14).

Other indirect thaw-related terms, such as "clear warm weather" or "warm serene weather," had to occur exactly one day before or one day after a definite thaw event, in order to be classified under the "Prob." category. For example, on Jan. 23, 1753 at Fort Albany it stated: "Little or no Wind all Day warm serene Weather" (PAM, HBCA, B.3/a/45 fo. 13). A second example on Jan. 24, 1775 at Fort Albany stated: "Wind W.S.W. Clear warm Weather" (PAM, HBCA, B.3/a/68, fo. 12). Both of these examples occurred exactly one day after direct thaw events.

Another case where weather references were classified under the "Prob." category occurred when a weather reference mentioned a specific thaw that had occurred over a period of days (between four and seven days). For example, on Jan. 21, 1832 at Fort Albany it stated: "The weather has been very mild all this last week, the little snow that was on the ground is thawed off a great deal." (PAM, HBCA, b.3/a/136, fo. 10d). For such a situation, one day was designated under either "Thaw," "Rain," "Sleet" or "Therm" (in this case, under "Thaw") and the remainder of the days that it refers to

were classified under "Prob." Since the last journal entry in this case was on Jan. 16, 1832, the remaining four days, representing Jan. 17, 18, 19 and 20, 1832, were classified under the "Prob." category.

The last group classification was possible or "Poss." This classification was used for references that contained indirect thaw-related terms and met one or more of the following criteria:

(i) were written exactly two days before or two days after a definite thaw event.

(ii) were written exactly one day before or one day after a probable thaw event.

(iii) transpire on a day where a definite thaw event had occurred at another of the three posts.

For example, on Jan. 26, 1753 at Fort Albany it stated: "Wind NW blowing fresh in the middle of the Day, warm serene Weather." (PAM, HBCA, B.3/a/45, fo. 13). In this case, the indirect thaw related reference occurred one day after a probable thaw event and two days after a definite thaw event. A second example from Fort Albany on Jan. 5 1762 stated: "Wind S clear warm weather" (PAM, HBCA, B.3/a/54, fo. 13d). For this example, a direct thaw event occurred on the same day at Eastmain.

References that contained weaker thaw-related terms, and that occur only one day before or one day after a definite thaw event were also classified under "Poss." For example, on Jan. 25, 1824 at Fort Albany it stated: "Wind SE mild and clear." (PAM, HBCA, B.3/a/128, fo. 14d). This weaker, indirect thaw-related reference immediately followed a direct thaw event.

Most of the verbatim accounts generally fall into the first two categories. The "Prob." category is also strong in the Albany data set, while the "Therm." category is strong in the Moose Factory data set.

Fort Albany, 1737-1941 (109 thaws in total)					
THAW	RAIN	SLEET	THERM.	PROB.	POSS.
25	34	3	10	26	11
22.9%	31.2%	2.8%	9.2%	23.9%	10.1%

Moose Factory, 1737-1941 (122 thaws in total)					
THAW	RAIN	SLEET	THERM.	PROB.	POSS.
43	34	9	23	11	2
35.3%	27.9%	7.4%	18.9%	9%	1.6%

Eastmain, 1737-1941 (67 thaws in total)					
THAW	RAIN	SLEET	THERM.	PROB.	POSS.
16	39	5	1	2	4
23.9%	58.2%	7.5%	1.5%	3%	6%

Table 3. Percentage Breakdown of the Thaw Classifications

3.2 Chronology of Thaw Occurrences

3.2.1 Fort Albany

Two forms of graphs were created for Fort Albany. The first graphed the annual number of days with each separate category of mid-winter thaw (Figures 4-10). The second graphed the total number of thaw days per year, and included in the single total, each type of thaw (Appendix B). A variation of the second type of graph presented the total number of thaw episodes per year (Appendix B).[2]

[2] A thaw episode is a continuous period of thaw. A thaw episode can be only one day or it can last several days. Such information allows for the ability to determine how many thaw periods occurred each year, regardless of their intensity or length.

3.2.2 Moose Factory

Like with Fort Albany, two forms of graphs were also created for Moose Factory. The first graphed the annual number of days with each separate category of mid-winter thaw (Figures 11-16). The second graphed the total number of thaw days per year, and included in the single total, each type of thaw (Appendix B). A variation of the second type of graph presented the total number of thaw episodes per year (Appendix B).

3.2.3 Eastmain

Two forms of graphs were also created for Eastmain. The first graphed the annual number of days with each separate category of mid-winter thaw (Figures 17-22). The second graphed the total number of thaw days per year, and included in the single total, each type of thaw (Appendix B). A variation of the second type of graph presented the total number of thaw episodes per year (Appendix B).

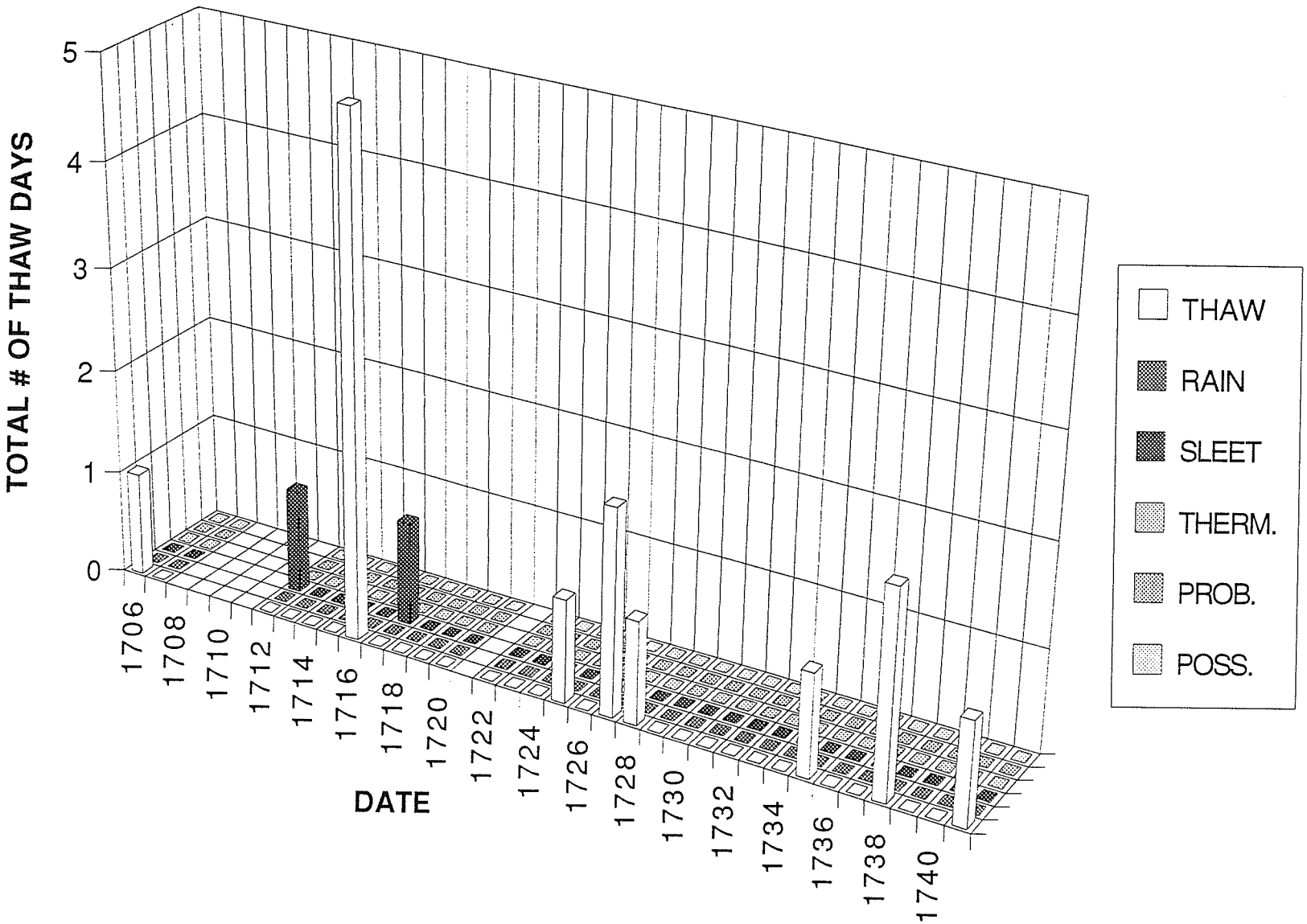


Figure 4. Frequency of Occurrence of Mid-Winter Thaw: Fort Albany, 1705-1741

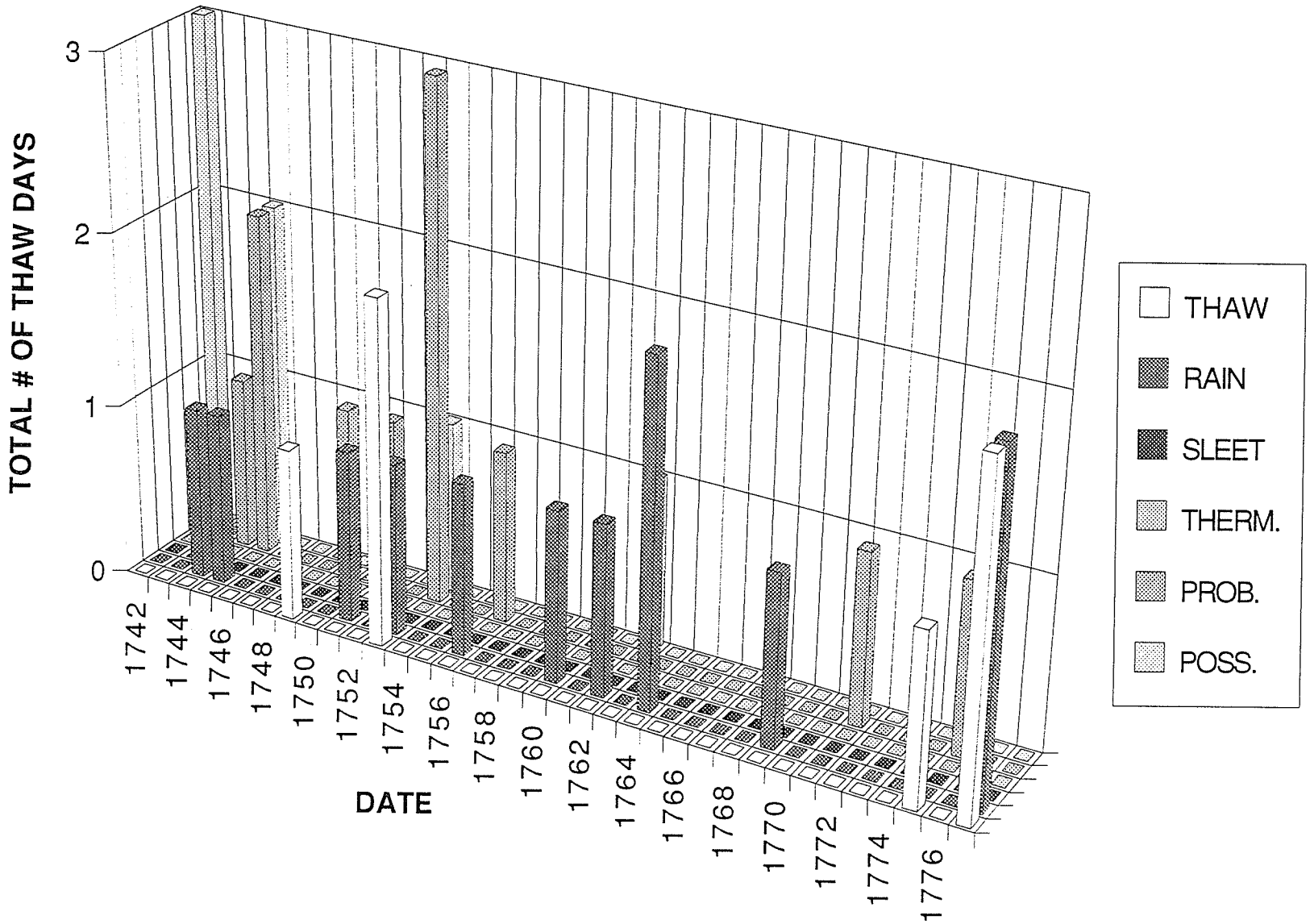


Figure 5. Frequency of Occurrence of Mid-Winter Thaw: Fort Albany, 1742-1777

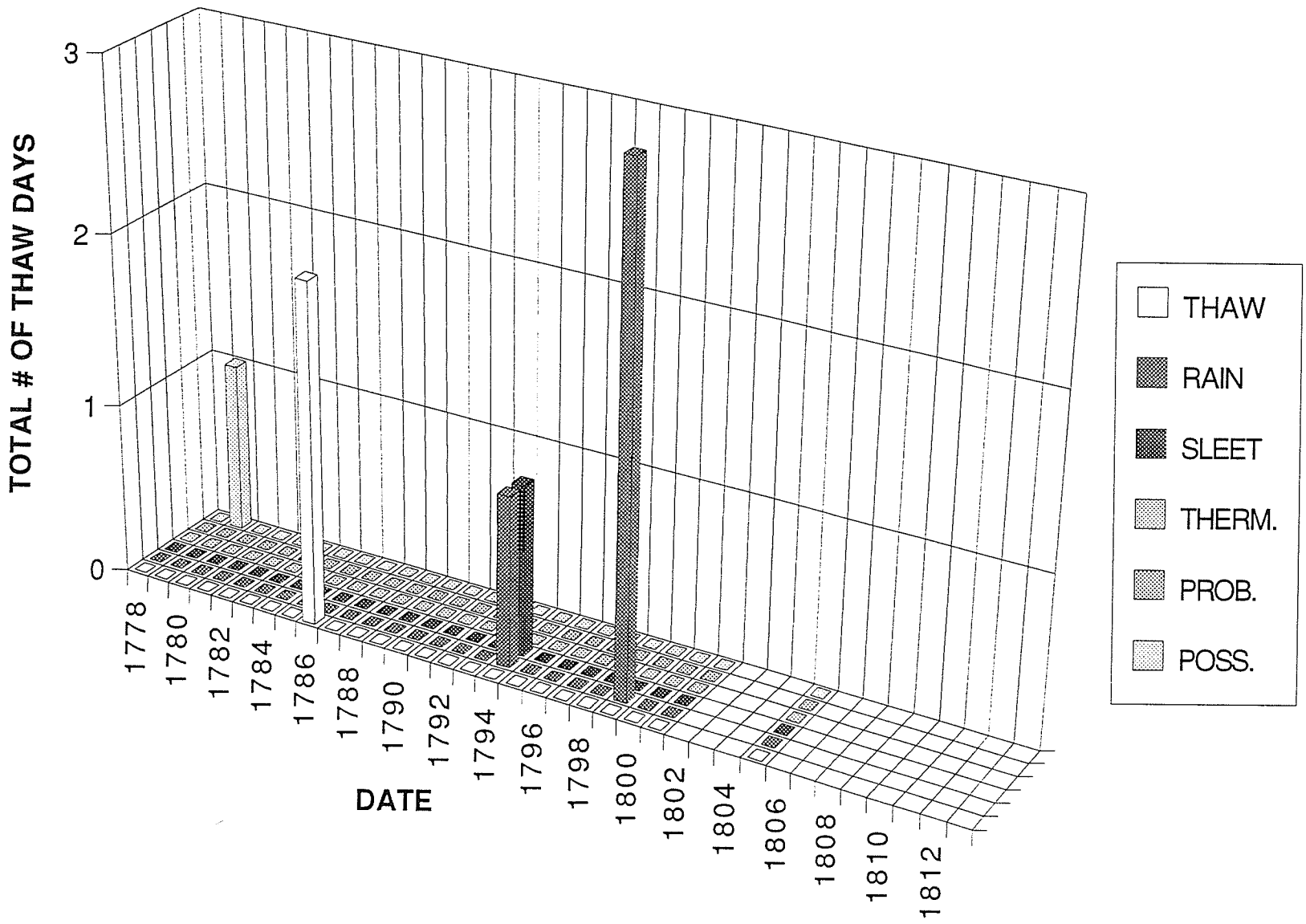


Figure 6. Frequency of Occurrence of Mid-Winter Thaw: Fort Albany, 1778-1813

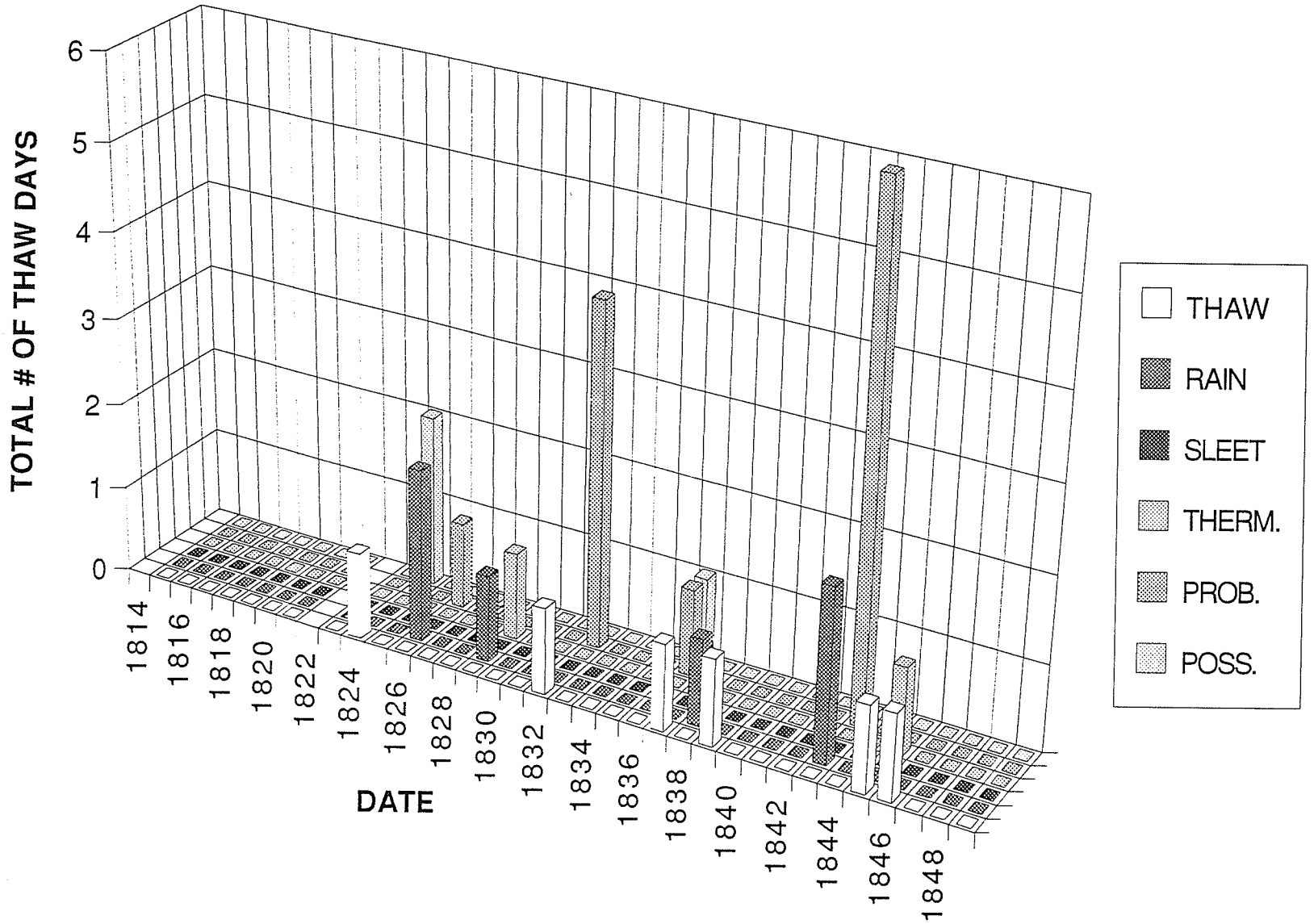


Figure 7. Frequency of Occurrence of Mid-Winter Thaw: Fort Albany, 1814-1849

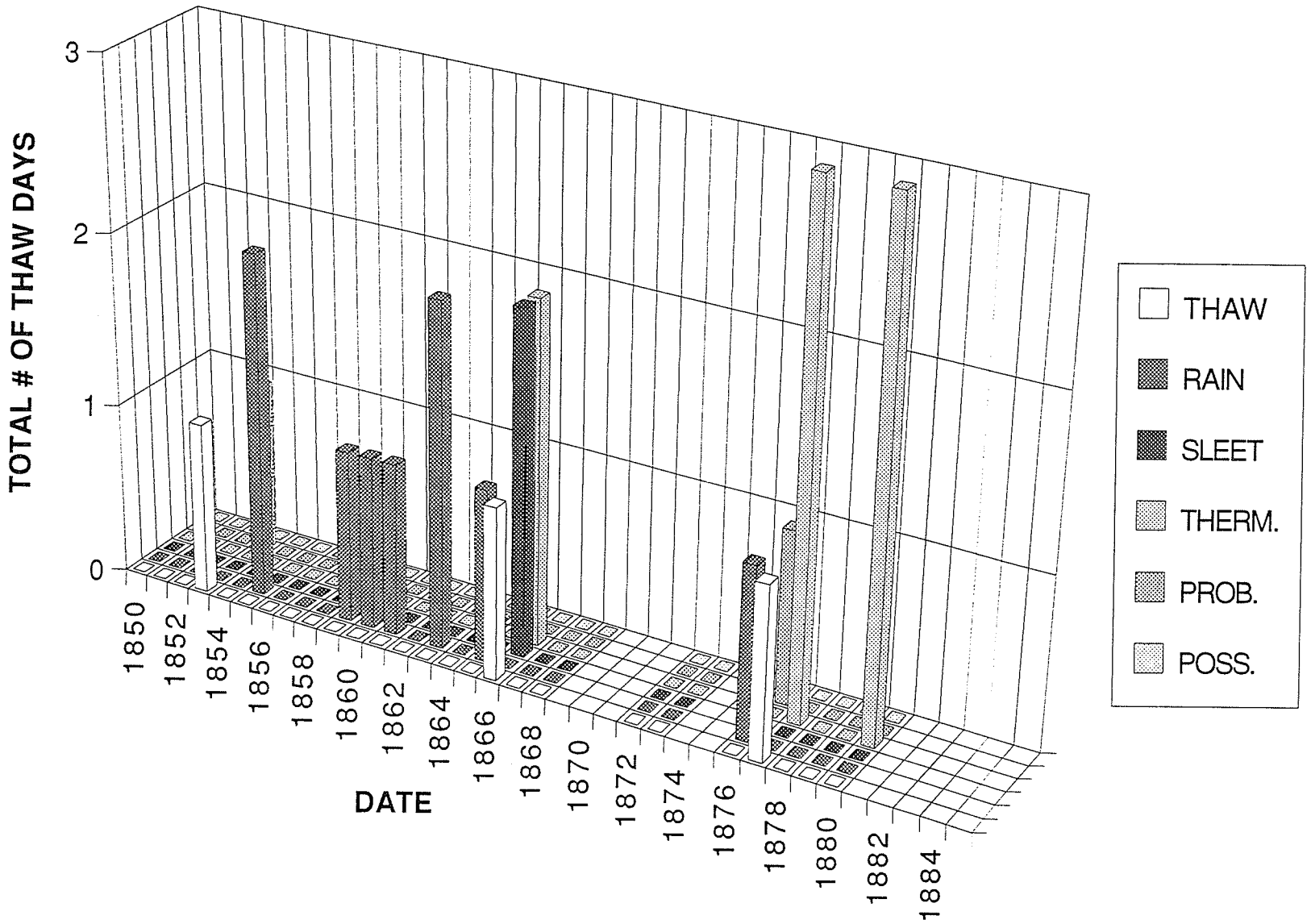


Figure 8. Frequency of Occurrence of Mid-Winter Thaw: Fort Albany, 1850-1885

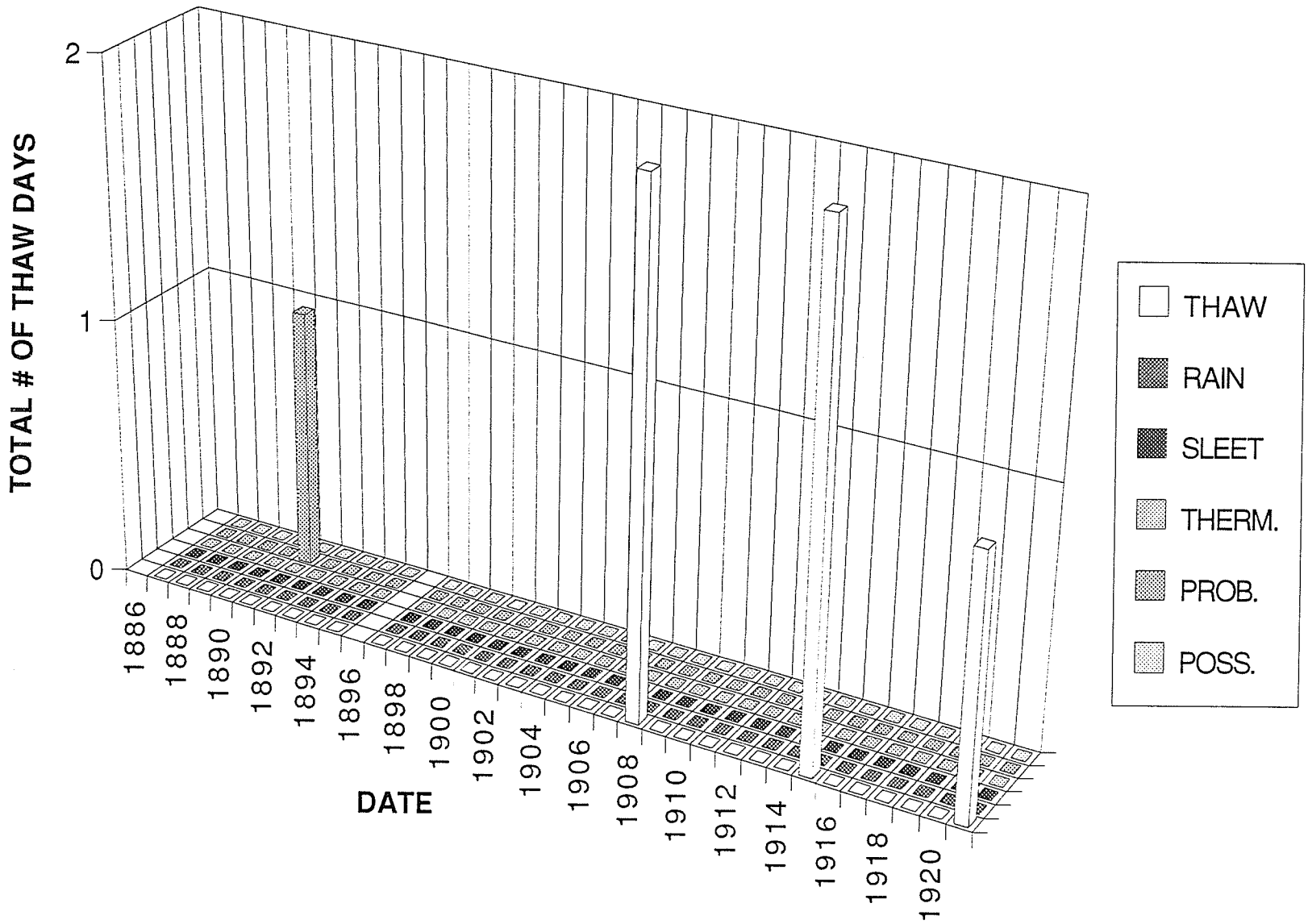


Figure 9. Frequency of Occurrence of Mid-Winter Thaw: Fort Albany, 1886-1921

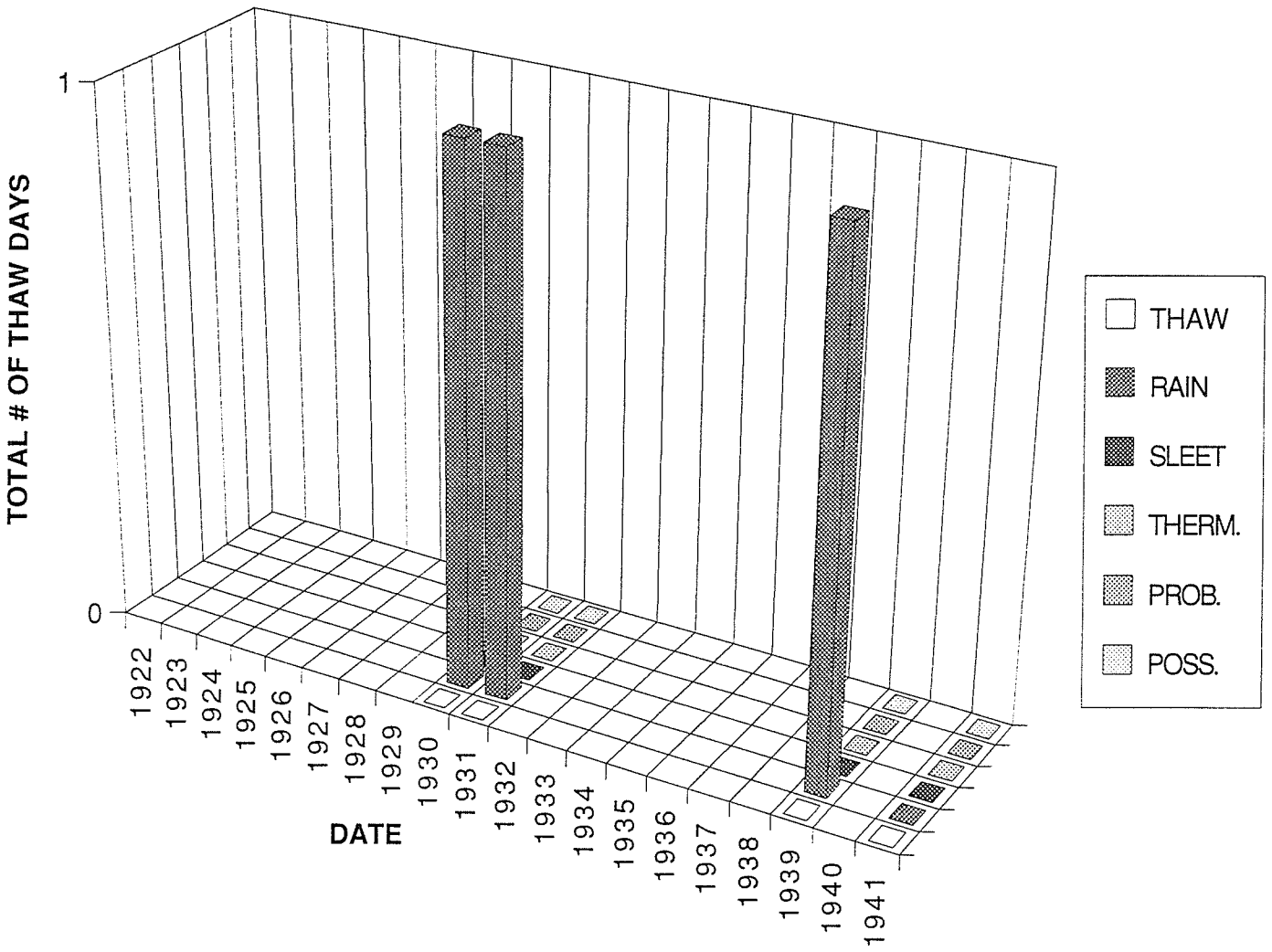


Figure 10. Frequency of Occurrence of Mid-Winter Thaw: Fort Albany, 1922-1941

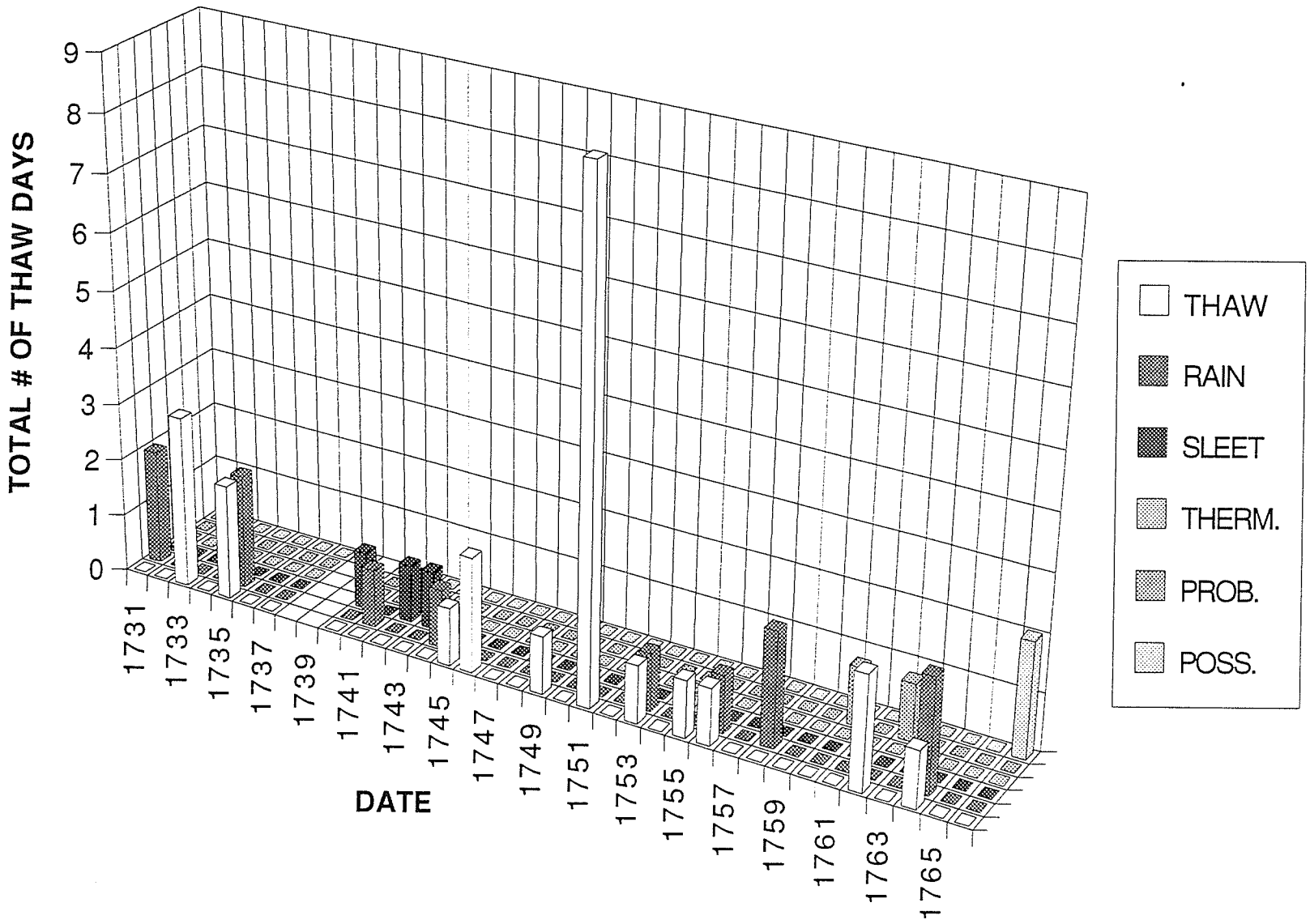


Figure 11. Frequency of Occurrence of Mid-Winter Thaw: Moose Factory, 1730-1766

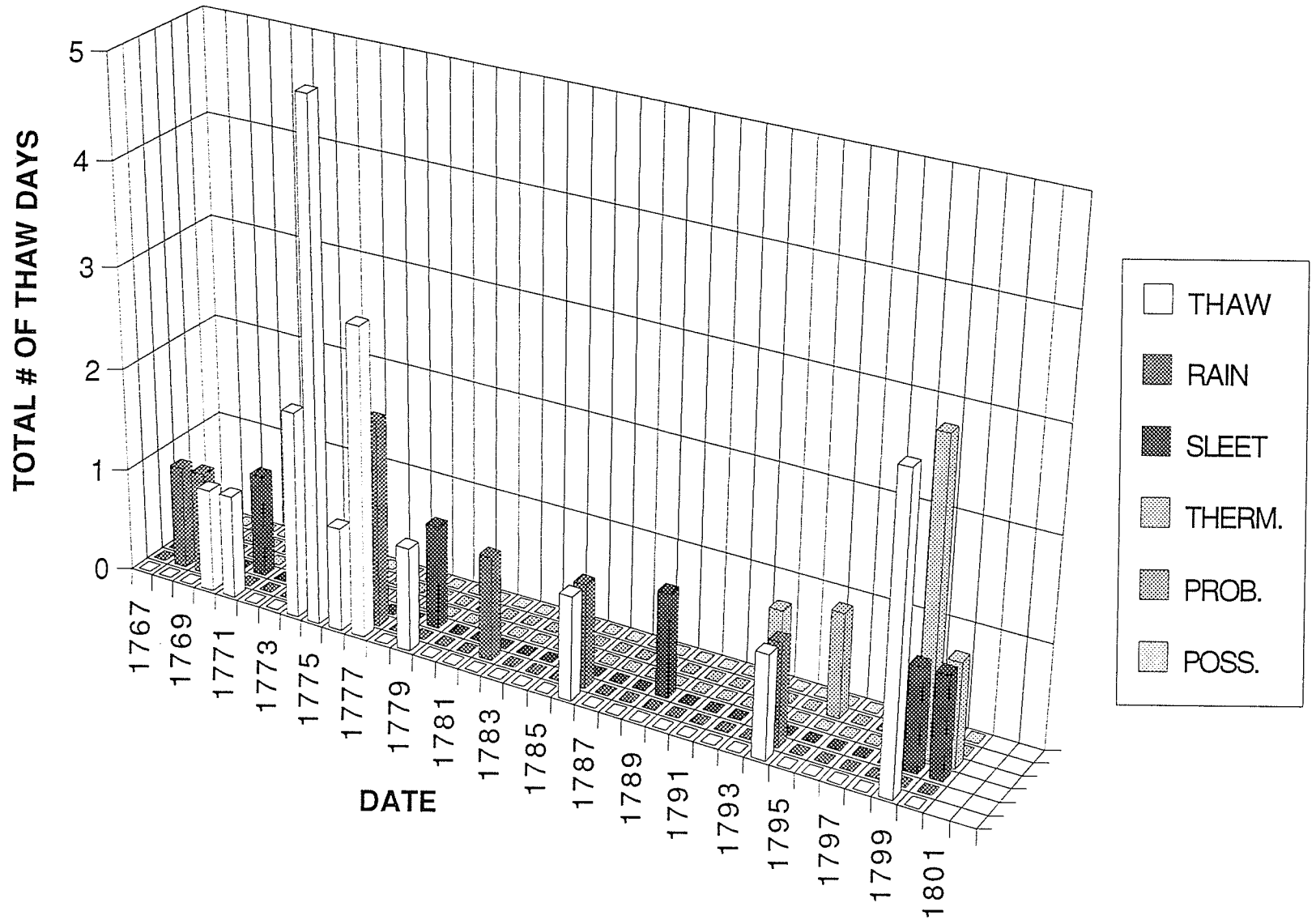


Figure 12. Frequency of Occurrence of Mid-Winter Thaw: Moose Factory, 1767-1802

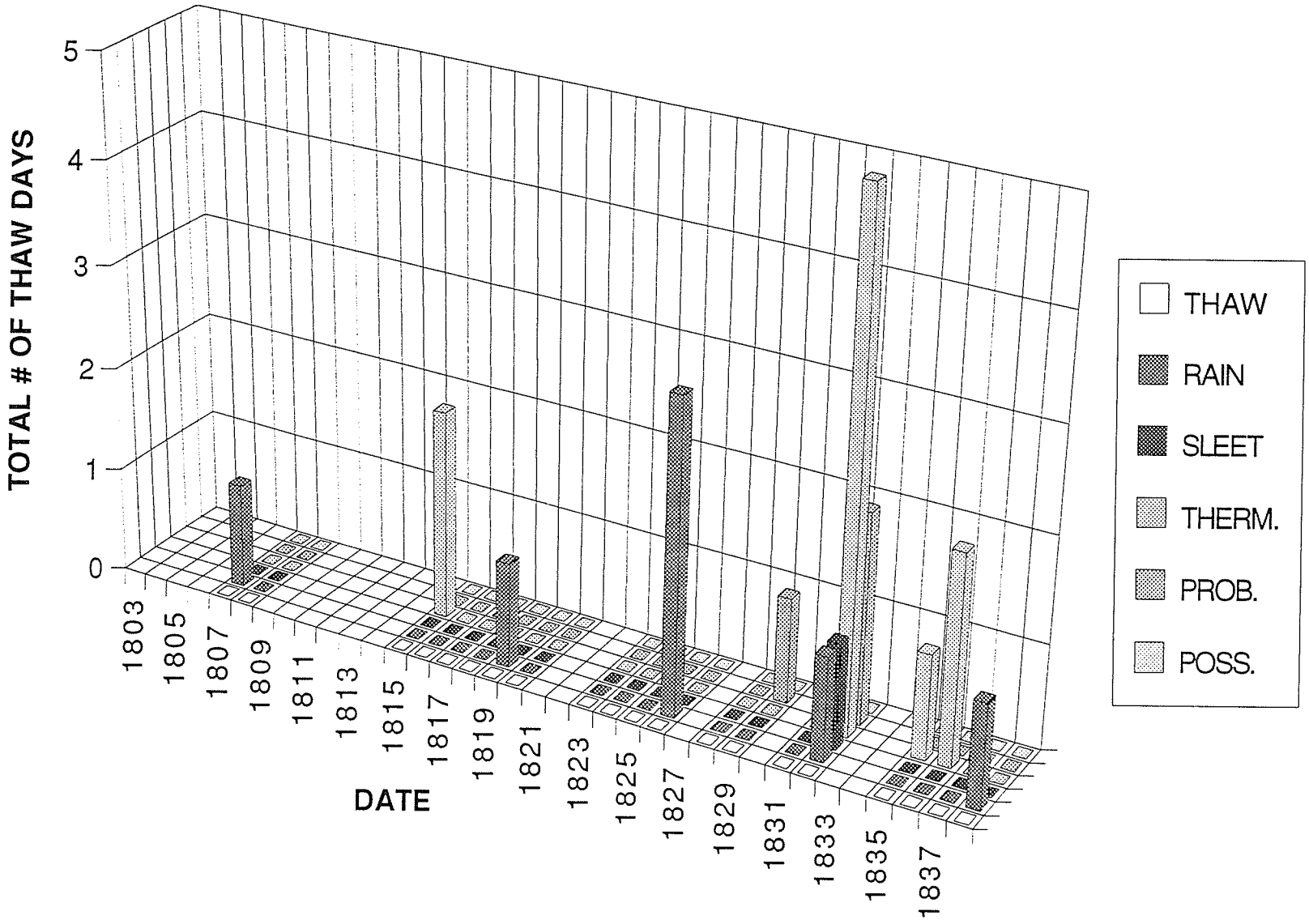


Figure 13. Frequency of Occurrence of Mid-Winter Thaw: Moose Factory, 1803-1838

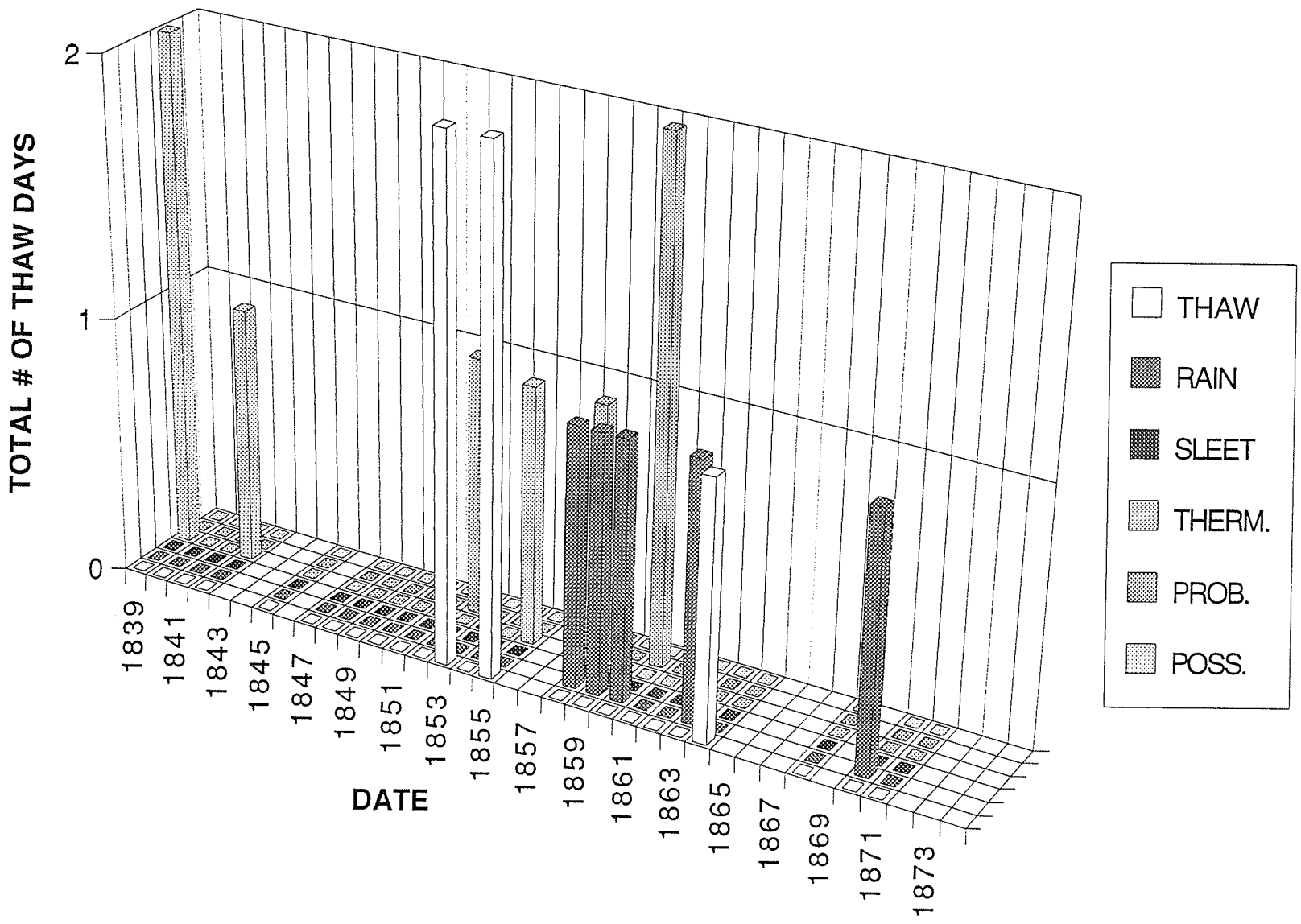


Figure 14. Frequency of Occurrence of Mid-Winter Thaw: Moose Factory, 1839-1874

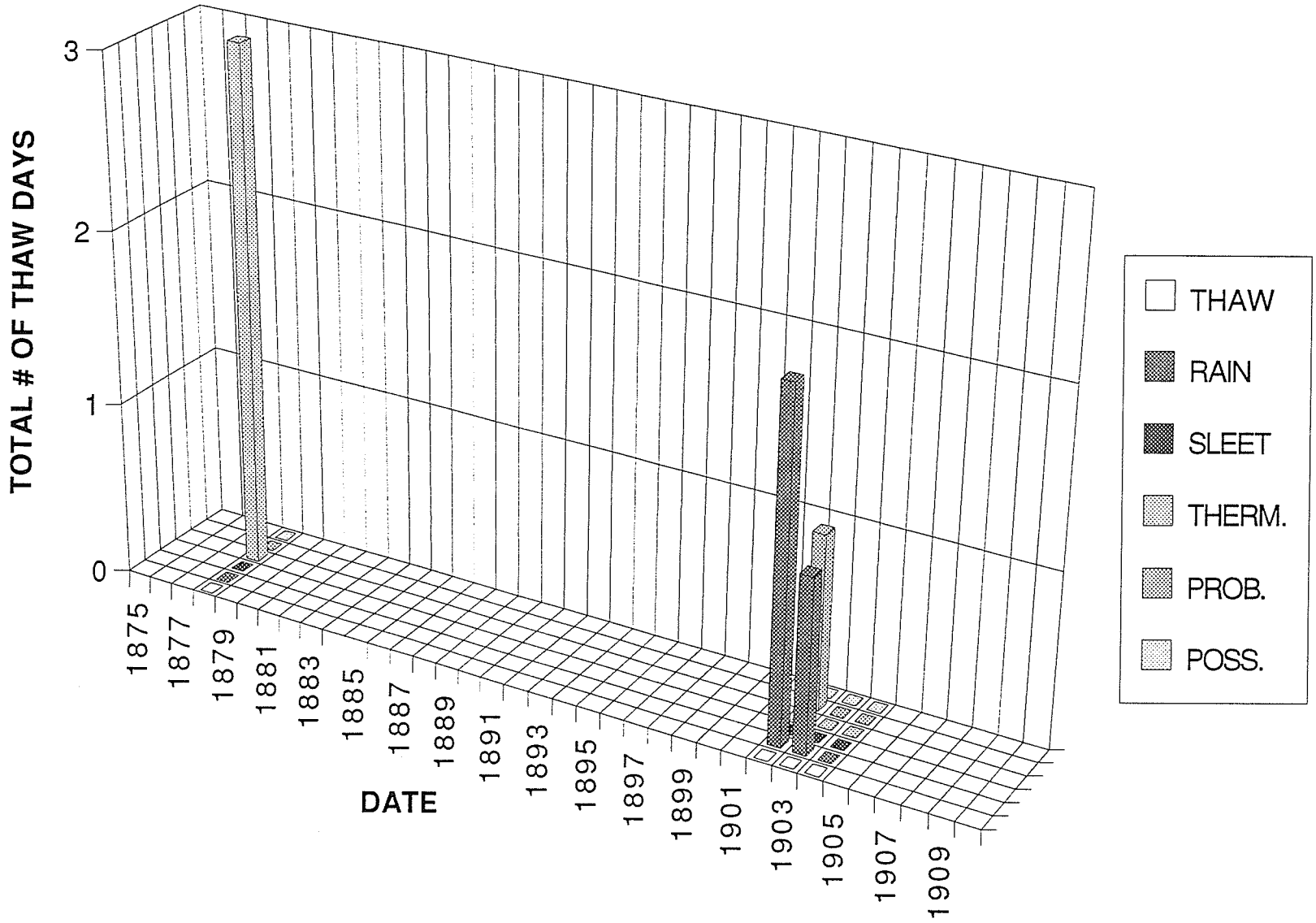


Figure 15. Frequency of Occurrence of Mid-Winter Thaw: Moose Factory, 1875-1910

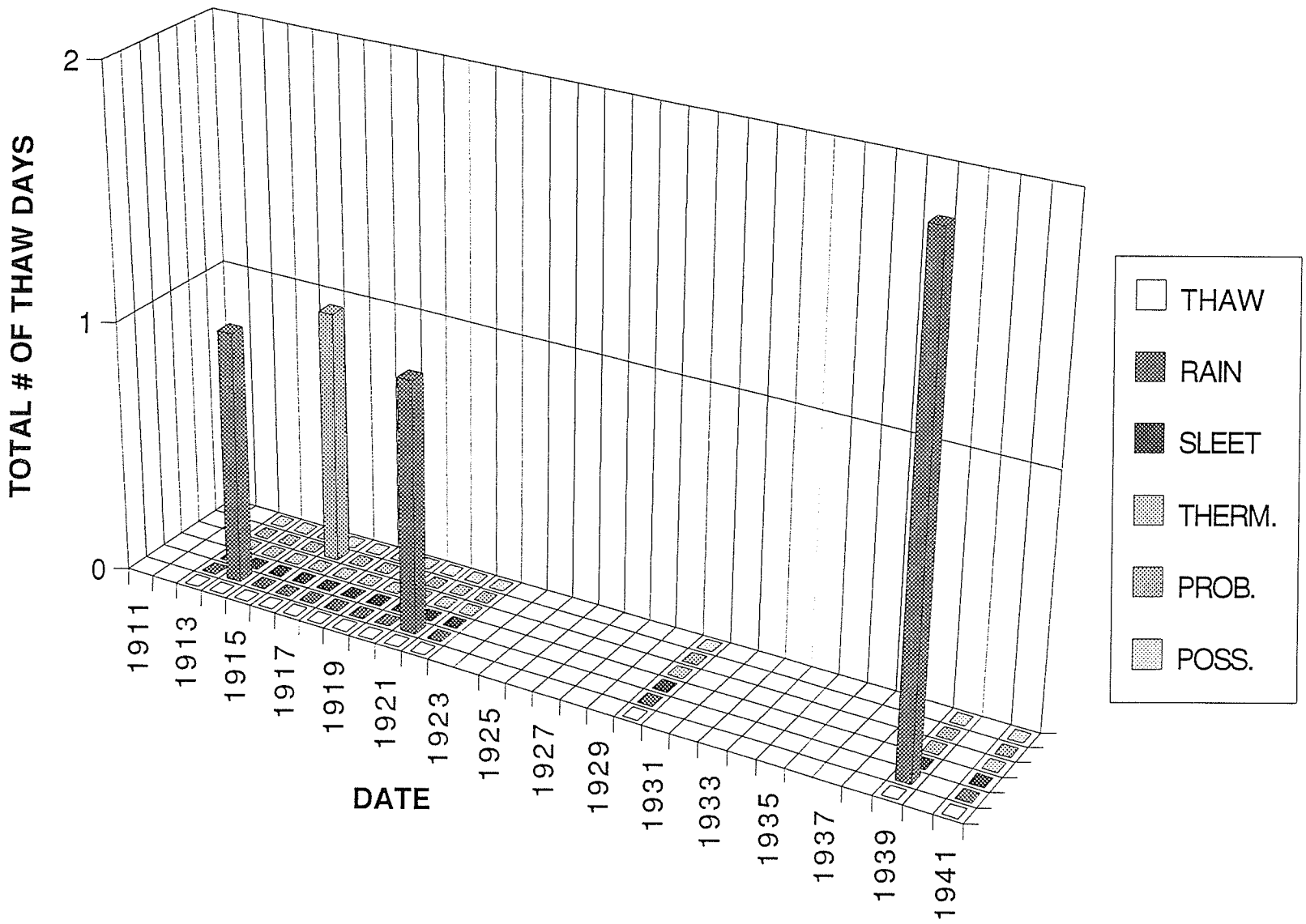


Figure 16. Frequency of Occurrence of Mid-Winter Thaw: Moose Factory, 1911-1941

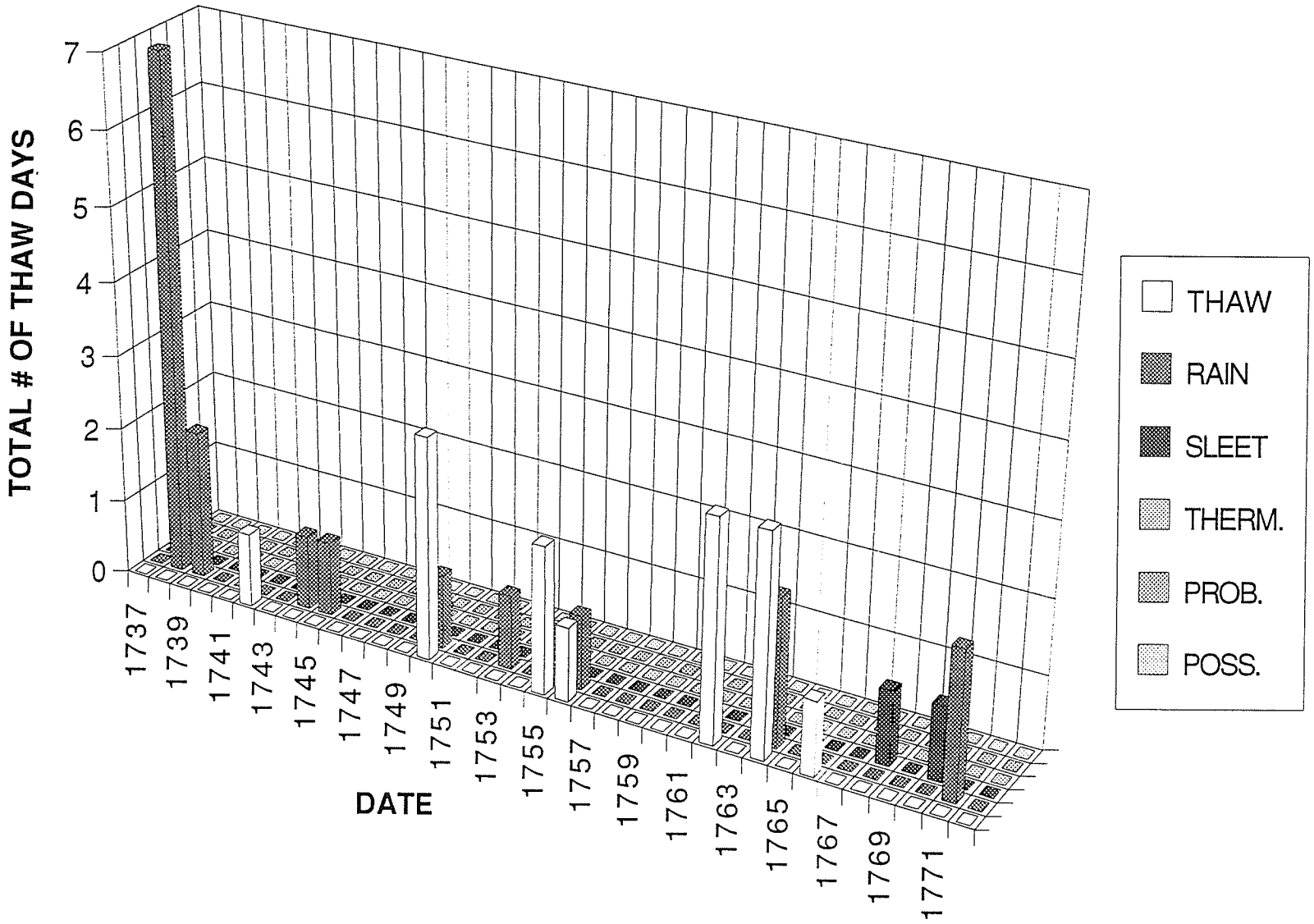


Figure 17. Frequency of Occurrence of Mid-Winter Thaw: Eastmain, 1736-1772

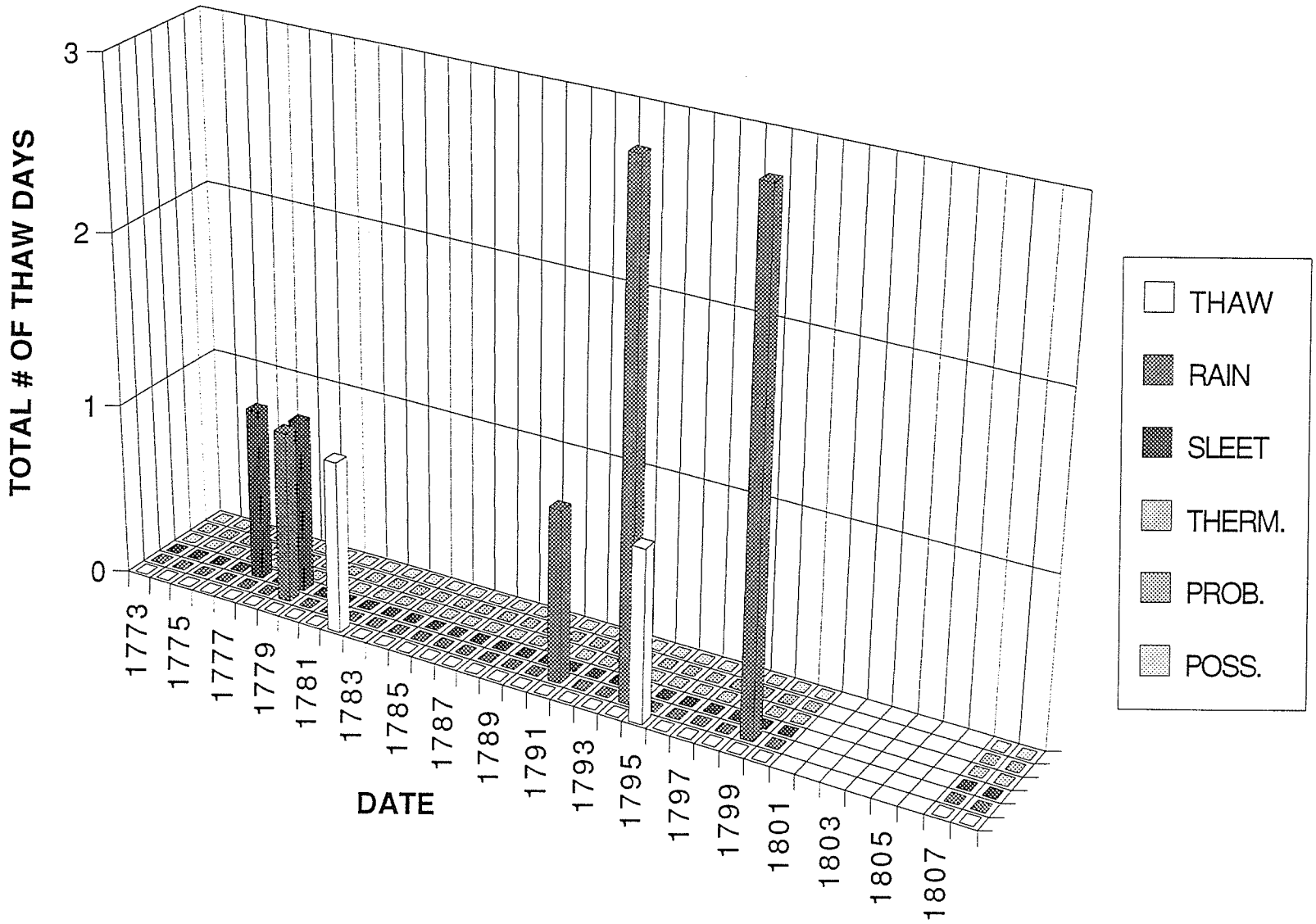


Figure 18. Frequency of Occurrence of Mid-Winter Thaw: Eastmain, 1773-1808

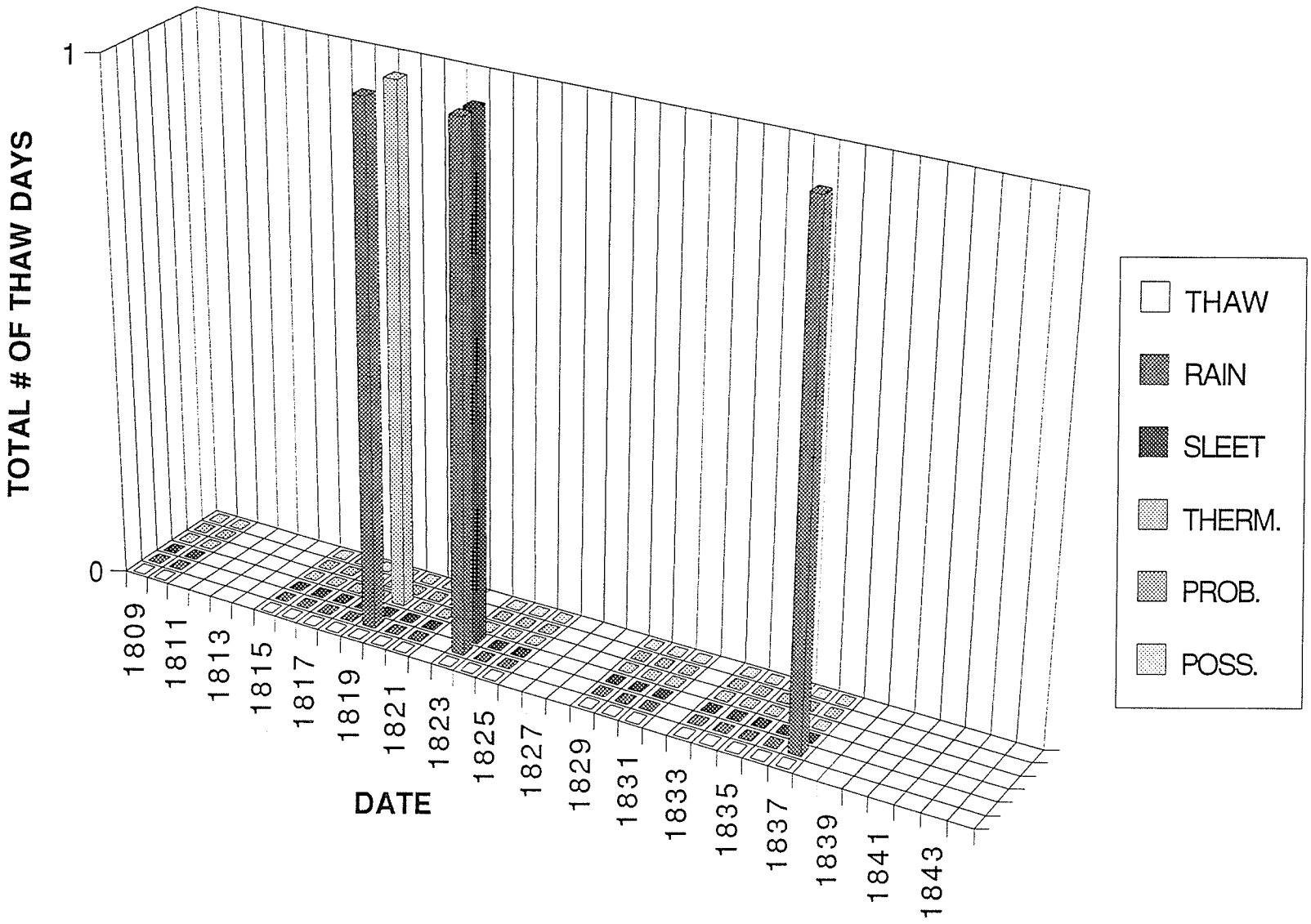


Figure 19. Frequency of Occurrence of Mid-Winter Thaw: Eastmain, 1809-1844

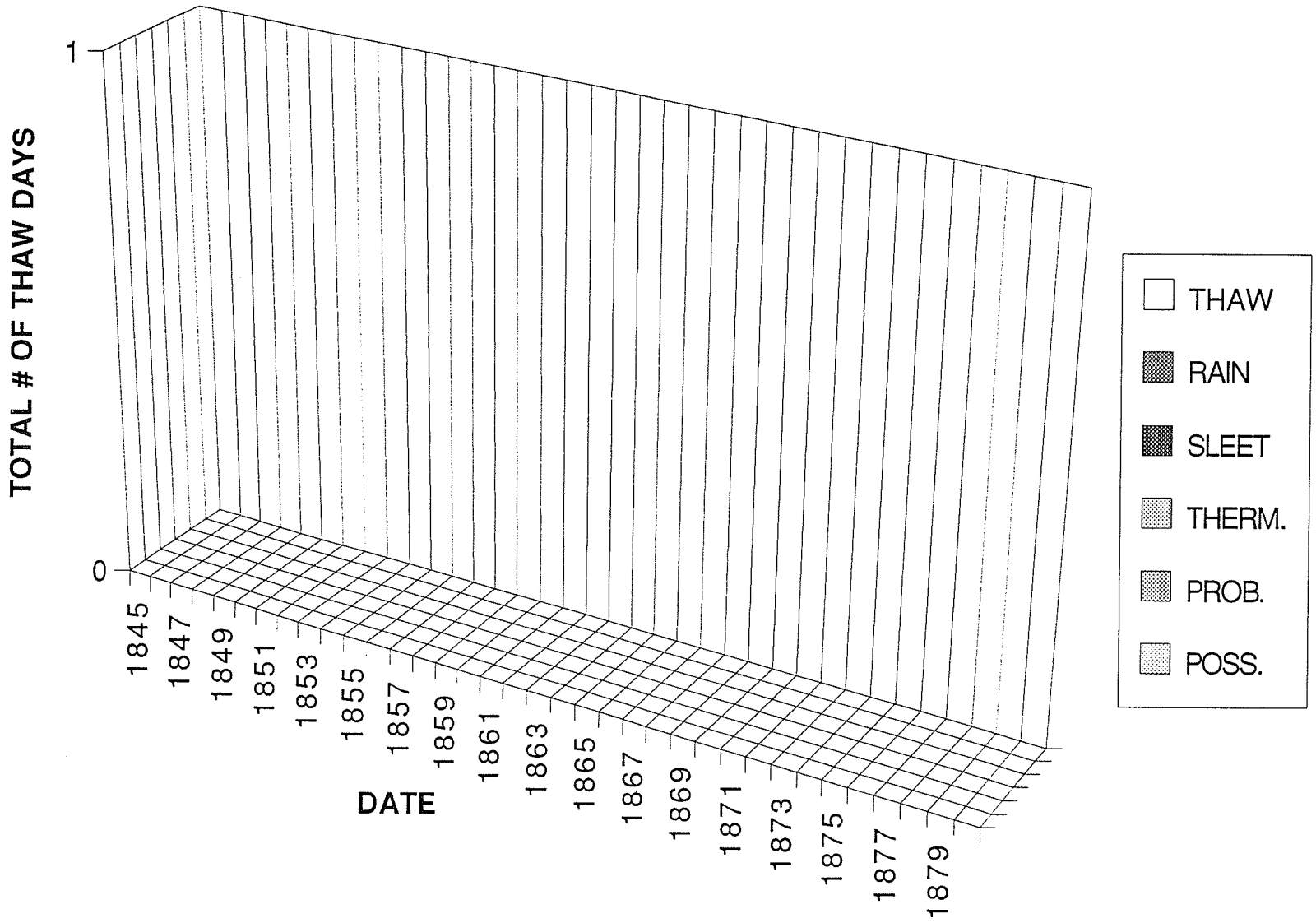


Figure 20. Frequency of Occurrence of Mid-Winter Thaw: Eastmain, 1845-1880

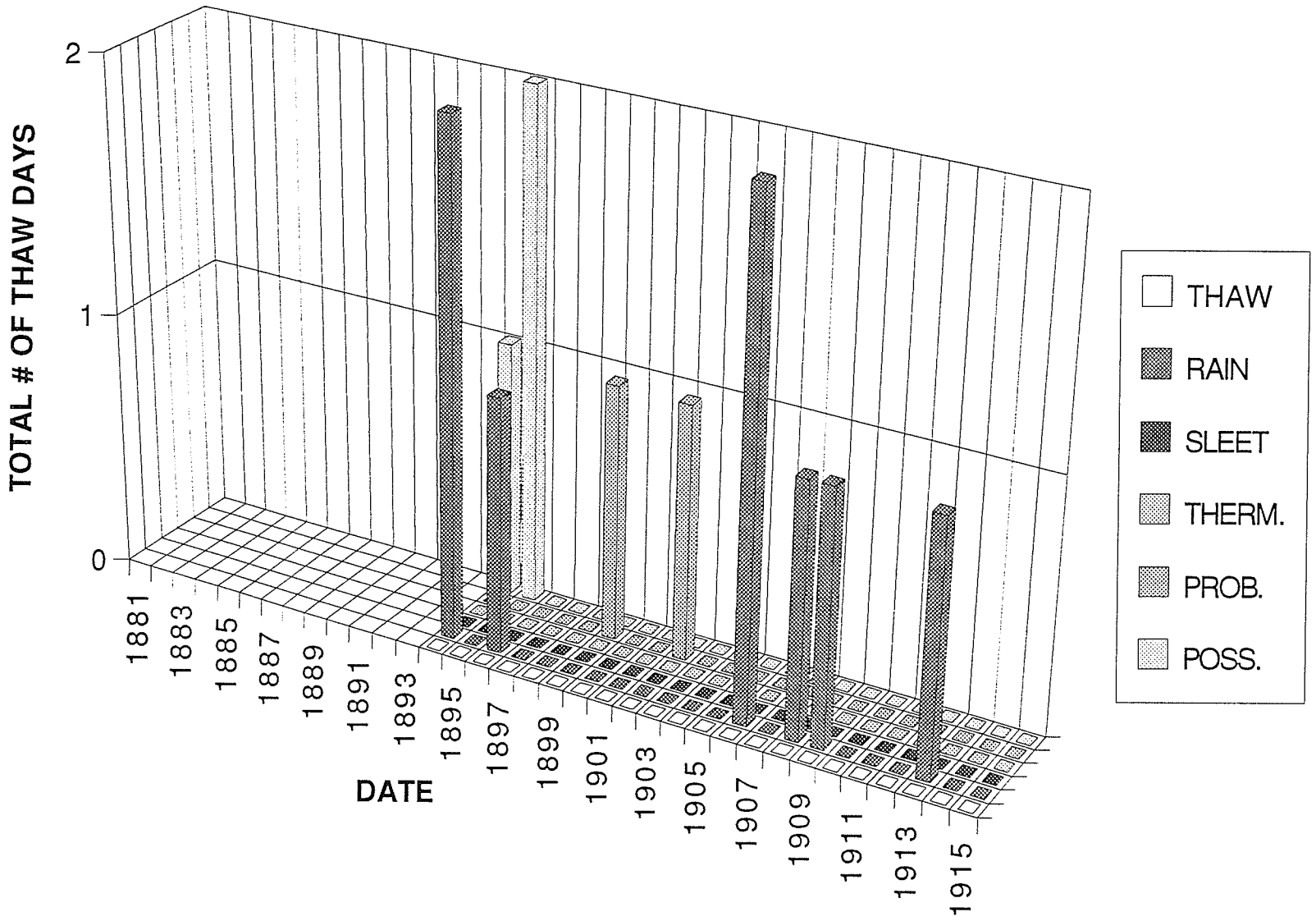


Figure 21. **Frequency of Occurrence of Mid-Winter Thaw: Eastmain, 1881-1915**

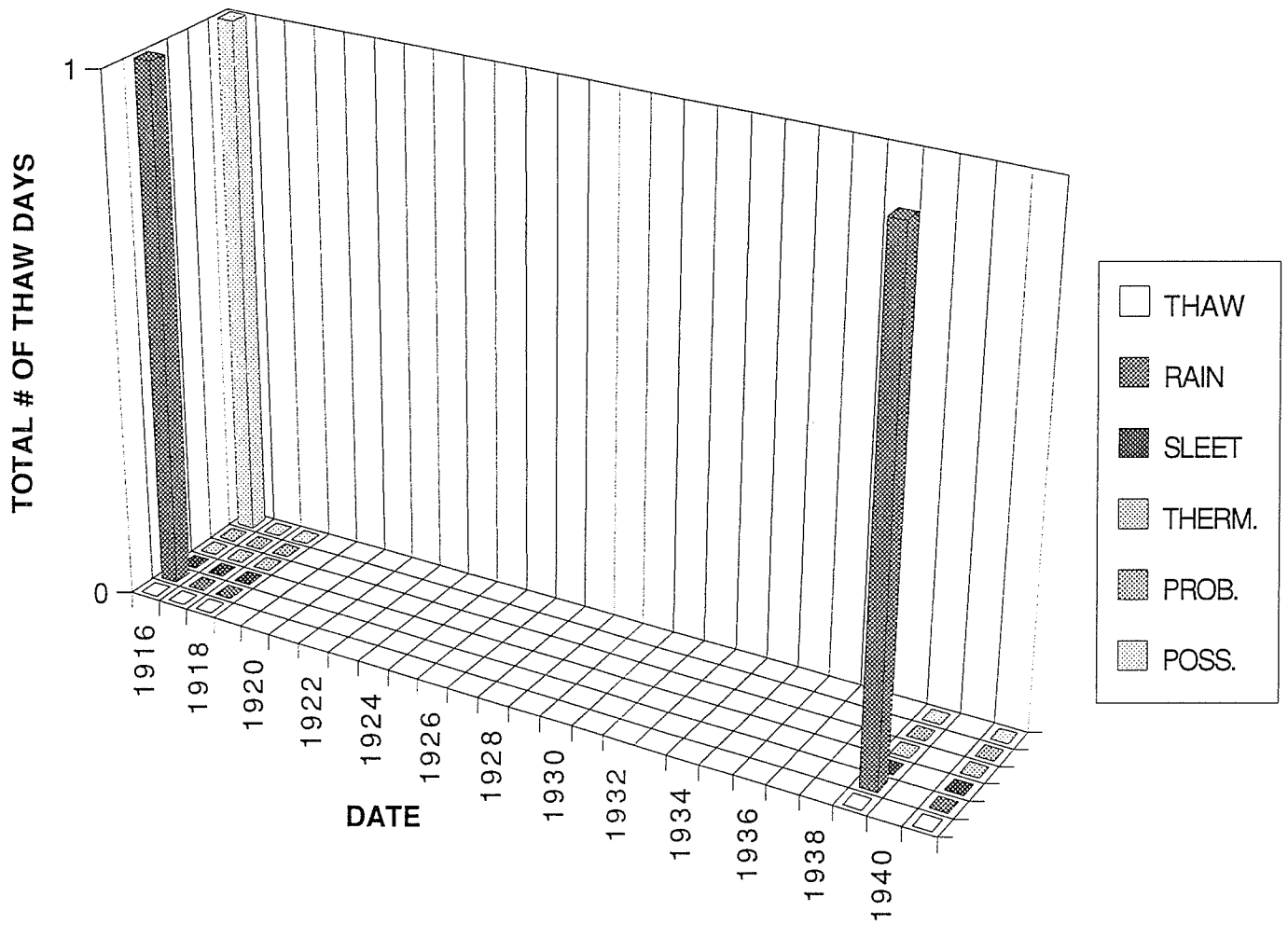


Figure 22. Frequency of Occurrence of Mid-Winter Thaw: Eastmain, 1916-1941

4

Derivation of Thaw Data from Modern Observations at Moosonee (1933-92) and Eastmain (1961-92)

4.1 Purpose of This Study

The purpose of this chapter is to provide a chronology of thaw occurrences for Moosonee (1933-1992) and modern day Eastmain (1961-1992). This chronology is necessary since it provides a useful framework for the interpretation of the historical thaw data.

4.2 Temperature Records at Moosonee and Eastmain

Data for the Moosonee and Eastmain thaw chronologies were based on daily maximum temperature records from Moosonee, Ontario (1933-92) and Eastmain, Quebec (1961-92). These data records were supplied by the Atmospheric Environment Service of Canada (AES).

4.3 Chronology of Thaw Occurrences

4.3.1 Moosonee

After extracting all temperatures at or above 0 °C (32 °F) for the January 3 to February 3 period, and adding up the total number of

thaws per year, graphs of the total number of thaw days per year were produced for Moosonee (Figures 24 and 25). As well, graphs of the total number of thaw episodes per year were also produced (Appendix C).

4.3.2 Eastmain

As with Moosonee's data set, temperatures at or above 0 °C (32 °F) for the January 3 to February 3 period were extracted from the Eastmain daily maximum temperature data set. The total number of thaws per year were then tallied and a graph of the total number of thaw days per year was produced (Figure 23). A graph of the total number of thaw episodes per year was also produced (Appendix C).

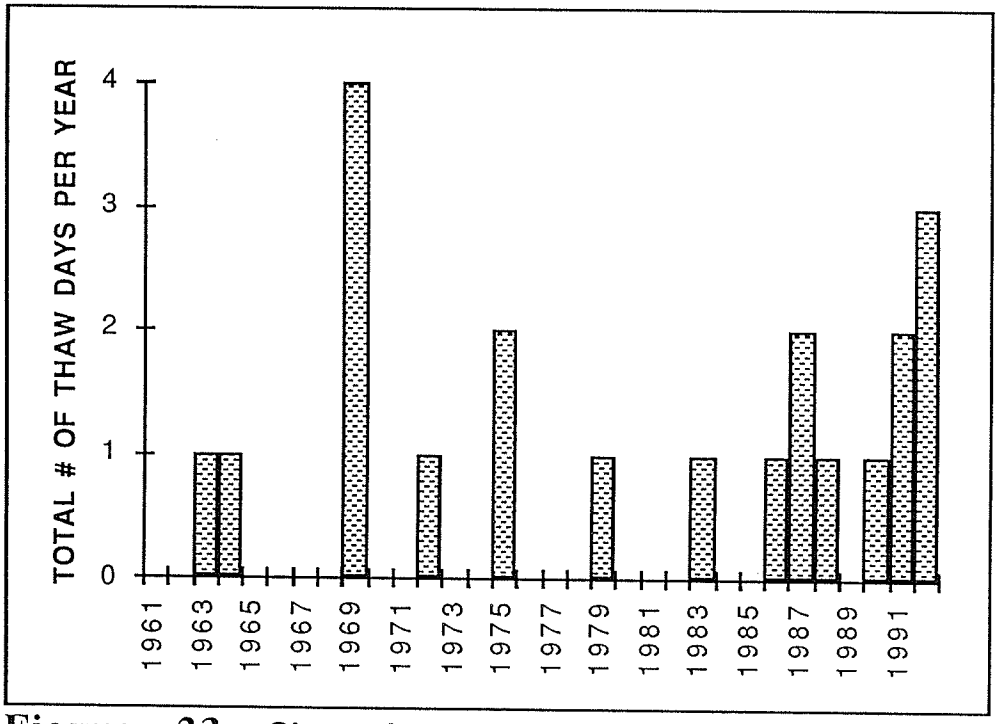


Figure 23. Chronology of Thaw Occurrences: Eastmain, 1961-1992

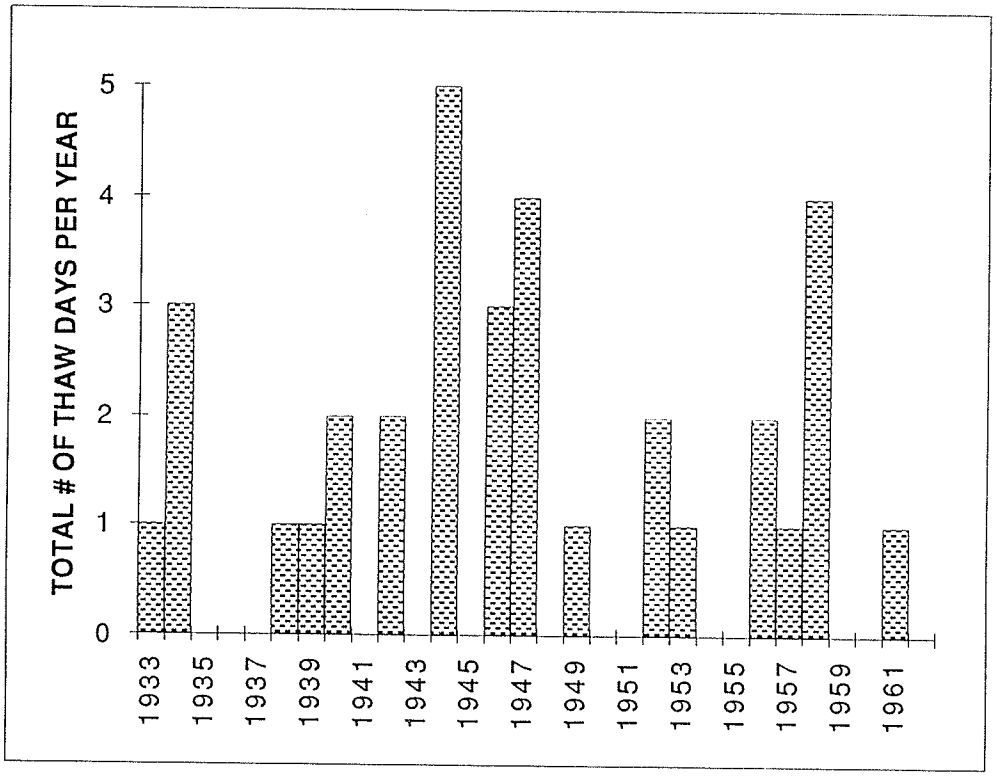


Figure 24. Chronology of Thaw Occurrences: Moosonee, 1933-1962

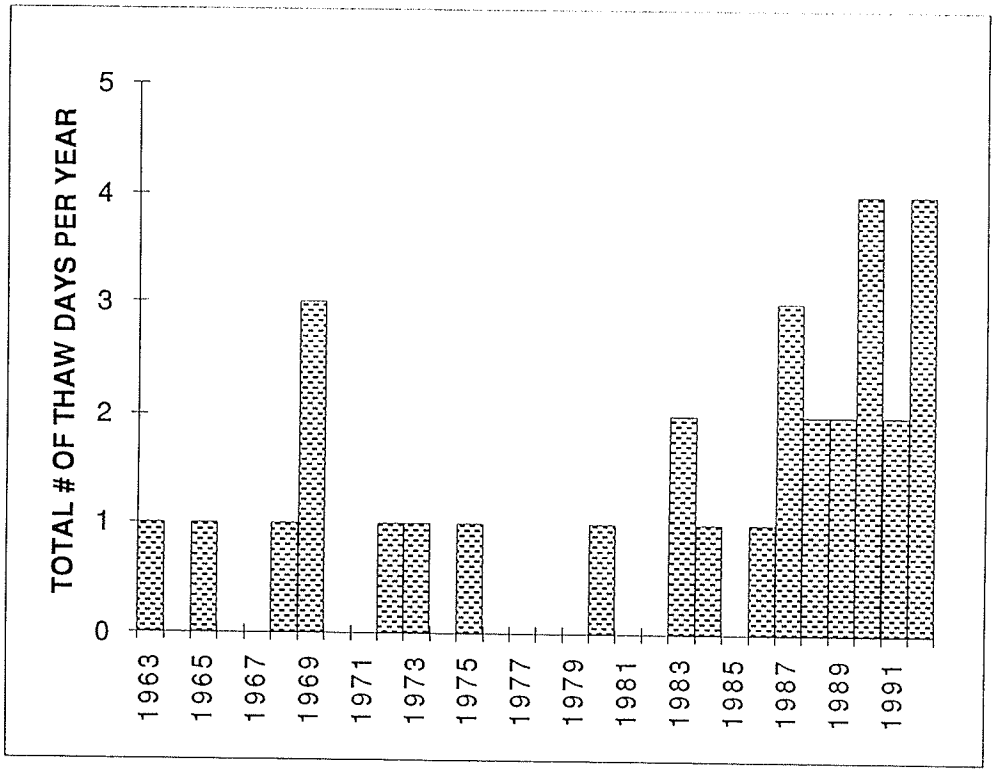


Figure 25. Chronology of Thaw Occurrences: Moosonee, 1963-1992

5

Methods of Analysis of the Historical and Modern Thaw Data

After examining all the historical and modern graphs, it became clear that the data had to be broken down into more manageable units for easier comparison. The following paragraphs highlight the types of analyses performed on both the modern and historical data sets. It should be noted that the Fort Albany data set was largely excluded from the following analyses, since there are no modern temperature observations from the Albany region. Nevertheless, weather information from the Fort Albany journals served as a useful tool for checking the validity of the other two historical data sets.

5.1 Analysis One

5.1.1 Step One

The first analysis takes into account the complete historical and modern data sets, in order to determine the average numbers of thaw days and thaw episodes per decade (Appendix D, Table A3).

The first step of this first analysis was accomplished by determining the total number of years represented in each journal and each modern data set (**Y**). The Moose Factory and Eastmain

journals have a total of 204 **Y** (1737-1941). At Moose Factory, journal entries began in 1730, but only weather information from 1737 onward was looked at, since this was when the Eastmain journal series started. This allows for consistency in making comparisons. The Moosonee data set has a total of 60 **Y** (1933-1992), while the modern day Eastmain data set has a total of 32 **Y** (1961-1992).

5.1.2 Step Two

The second step of this first analysis was to determine the total number of gaps (**G**) in the mid-winter weather record. A gap is defined as a year in which the post journal made no mid-winter reference to weather, or, a post journal that is missing. In the modern record, a gap is a year in which there was no mid-winter temperature observation. After the total numbers of gaps were determined, these figures were then subtracted from the total number of years in each data set to determine the total number of years with mid-winter weather information (**Yi**) [**Y - G = Yi**]. Moose Factory's journal series has a total of 82 **G**, therefore there is a total of 122 **Yi** (204-82=122). Eastmain's journal series has a total of 92 **G**, therefore there is a total of 112 **Yi** (204-92=112). Moosonee's data set has only one **G** (in 1935), therefore there is a total of 59 **Yi** (60-1=59). Lastly, modern day Eastmain's data set has a total of six **G**, therefore there is a total of 26 **Yi** (32-6=26).

5.1.3 Step Three

The third step of this first analysis was to read through both journal series and examine both modern data sets, counting the overall total numbers of thaw days (Td) and overall total numbers of thaw episodes (Te). After thoroughly going through the entire journal series of both Moose Factory and Eastmain (starting at 1737), it has been determined that Moose Factory's journal series has totals of 122 Td and 83 Te, while Eastmain's journal series has totals of 68 Td and 55 Te. Moosonee's data set has totals of 65 Td and 48 Te, while present day Eastmain's data set has totals of 21 Td and 15 Te (Appendix C contains the complete mid-winter weather observations for Moosonee and modern day Eastmain).

5.1.4 Step Four

The fourth step of this first analysis was to divide Td and Te by Yi for each data set, and then multiply these figures by 100, to determine the average total number of thaw days per century (Ad) and the average total number of thaw episodes per century (Ae). When dividing Moose Factory's 122 Td and 83 Te by its 122 Yi and then multiplying this figure by 100, you get approximately 100 Ad and 68 Ae. When dividing Fort Eastmain's 68 Td and 55 Te by its 112 Yi and then multiplying this figure by 100, you get approximately 61 Ad and 49 Ae. When dividing Moosonee's 65 Td and 48 Te by its 59 Yi and then multiplying this figure by 100, you get approximately 110 Ad and 81 Ae. Lastly, when dividing present

day Eastmain's 21 Td and 15 Te by its 26 Yi and then multiplying this figure by 100, you get approximately 81 Ad and 58 Ae.

5.1.5 Step Five

The last step of this first analysis was to simply divide Ad and Ae for each data set by 10, to determine the average total number of thaw days and thaw episodes per decade. Moose Factory, therefore, had approximately 10 thaw days and 7 thaw episodes per decade, while Moosonee had approximately 11 thaw days and 8 thaw episodes per decade. Eastmain had approximately 6 thaw days and 5 thaw episodes per decade, while its modern counterpart had approximately 8 thaw days and 6 thaw episodes per decade (Figure 26)

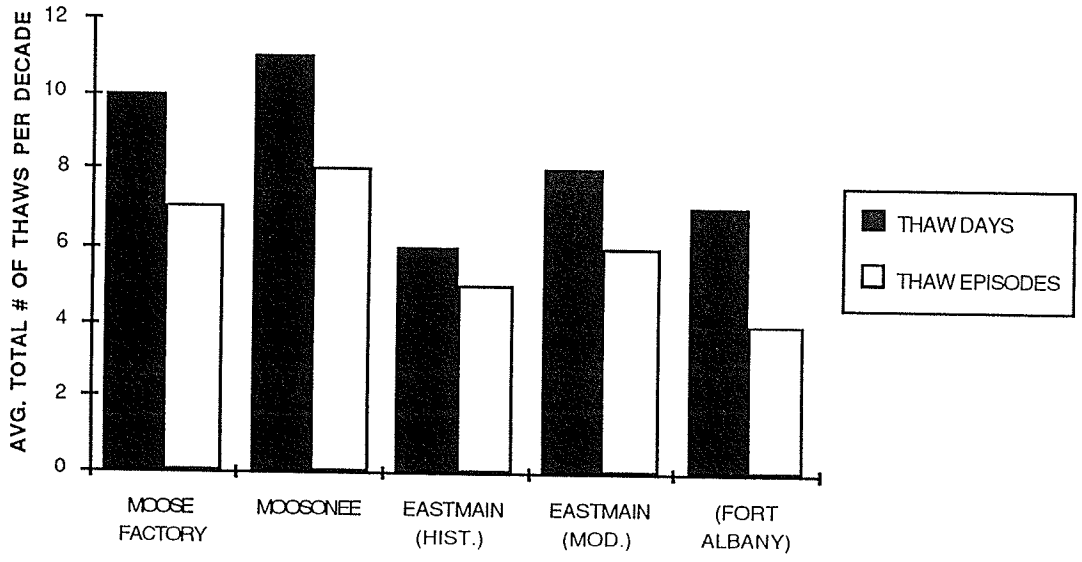


Figure 26. A Comparison of the Average Total Number of Thaw Events Per Decade

When performing all five of the above steps on the Fort Albany data set, there were approximately 7 thaw days and 4 thaw episodes per decade. This has been determined from the following figures: 204 Y, 41 G (163 Yi), 109 Td and 68 Te (Figure 26).

5.2 Analysis Two

The second analysis looks at selected decades of the modern data sets (Moosonee and Eastmain) and compares these decades with the historical situations exactly 200 years prior. The eighteenth century was chosen because it has about the same density of weather information as in the modern period. This allows weather information from the eighteenth century to be easily compared with modern temperature observations from the modern period . The decade by decade intervals of 1943-1992 (1943-52, 1953-62,... 1983-92) were compared to the decade by decade intervals of 1743-1792 (1743-52, 1753-62,... 1783-92) (Figures 27-30). The total number of mid-winter Td and Te were counted for each decade, and then the decade totals were averaged, to get the average number of Td and Te per decade (Appendix D, Table A4). A decade by decade analysis has the advantage of allowing for easier comparisons of the historical and modern weather information, as opposed to examining each individual year separately. However, a disadvantage with this form of analysis is that it does not take into account all the years with mid-winter weather information. Secondly, this analysis does not take into account any mid-winter weather record gaps and/or missing journals. Mid-winter weather record gaps are found in the

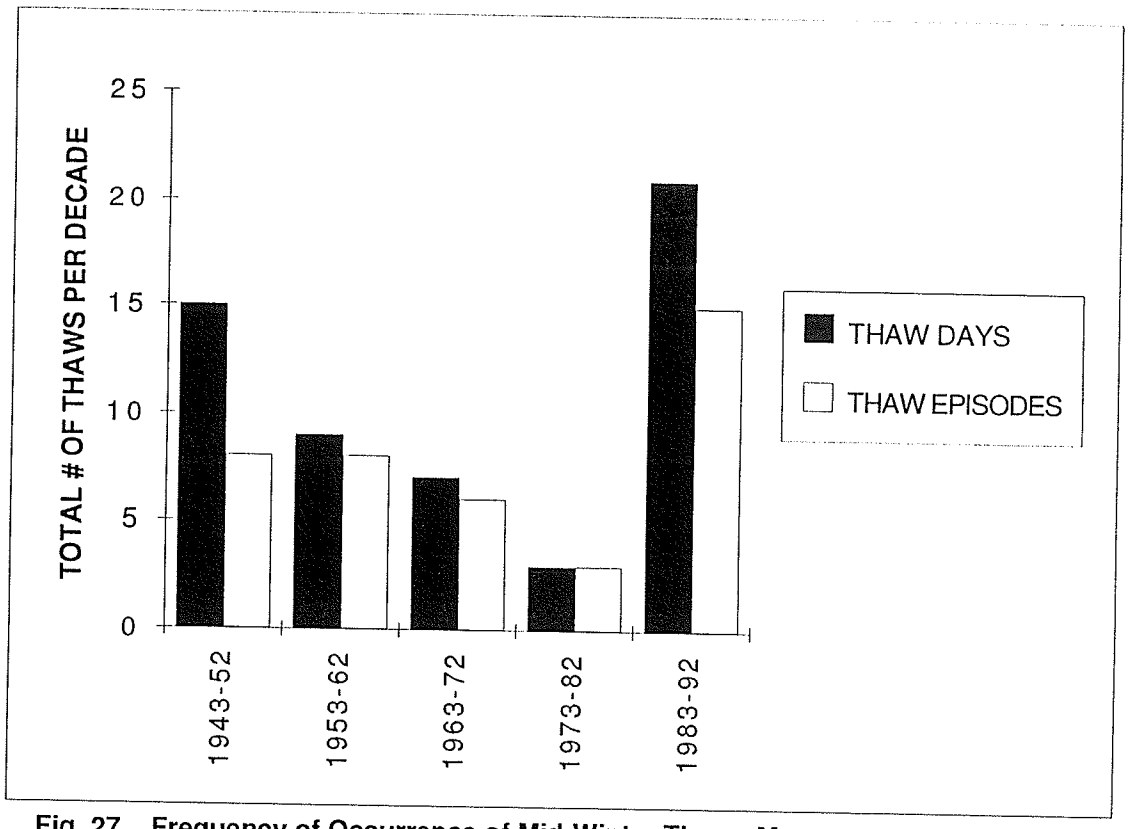


Fig. 27. Frequency of Occurrence of Mid-Winter Thaw: Moosonee, 1943-1992

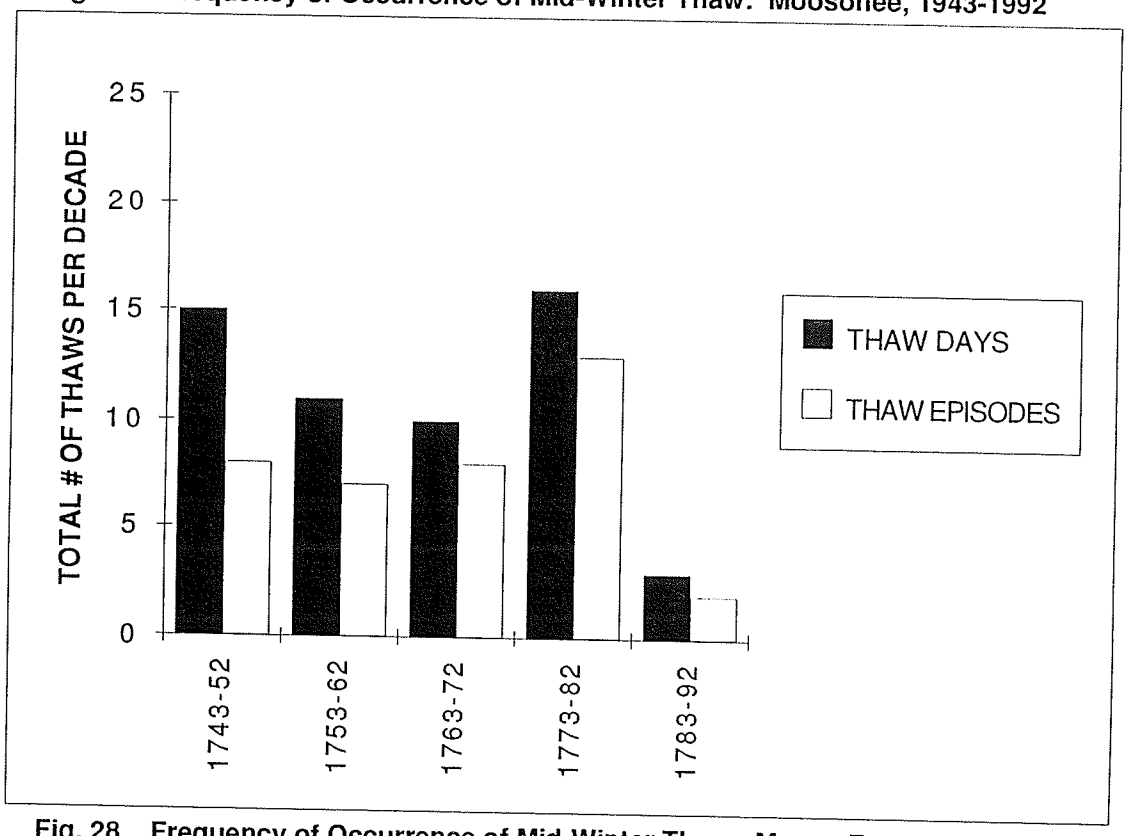


Fig. 28. Frequency of Occurrence of Mid-Winter Thaw: Moose Factory, 1743-1792

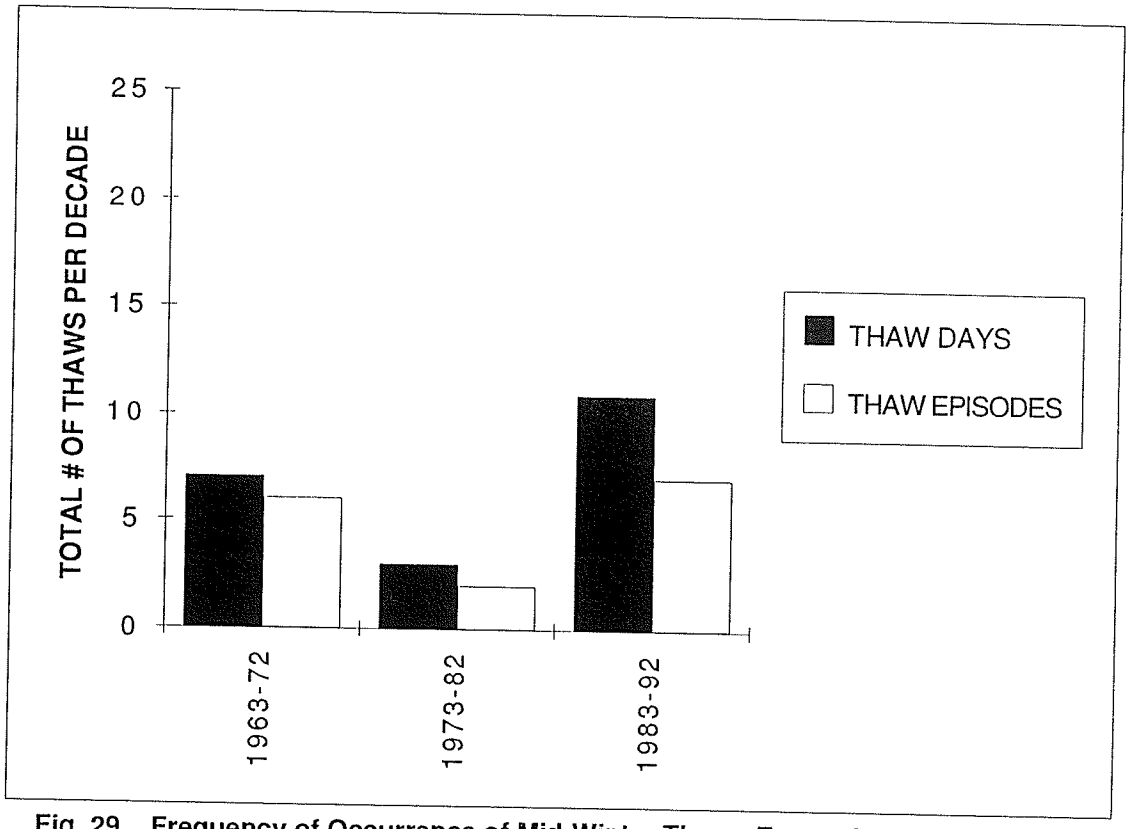


Fig. 29. Frequency of Occurrence of Mid-Winter Thaw: Eastmain, 1963-1992

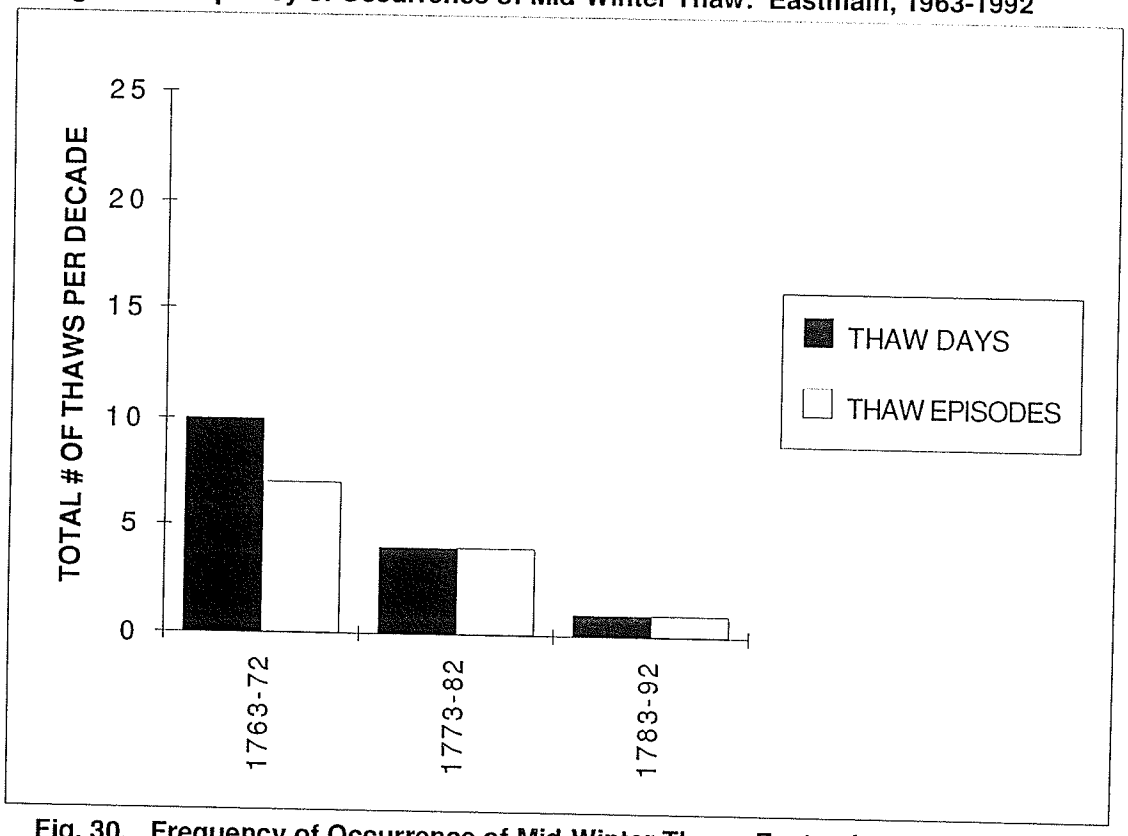


Fig. 30. Frequency of Occurrence of Mid-Winter Thaw: Eastmain, 1763-1792

modern Eastmain temperature record, and 1935 lacks weather information in Moosonee's temperature record. This is discussed in detail in Section 6.2. The results of this analysis, however, are similar to the results of the first analysis (Appendix D, Table A7).

5.3 Analysis Three

The third analysis examines selected decades of weather information for nineteenth century Moose Factory (Figure 31) and compares these decades to the entire data set of Moosonee, which is the same data set as in the second analysis with the addition of the 1933-42 decade (Appendix D, Table A5). The goal of this analysis was to get an idea of the severity of mid-winters in the nineteenth century as compared to the modern day situation.

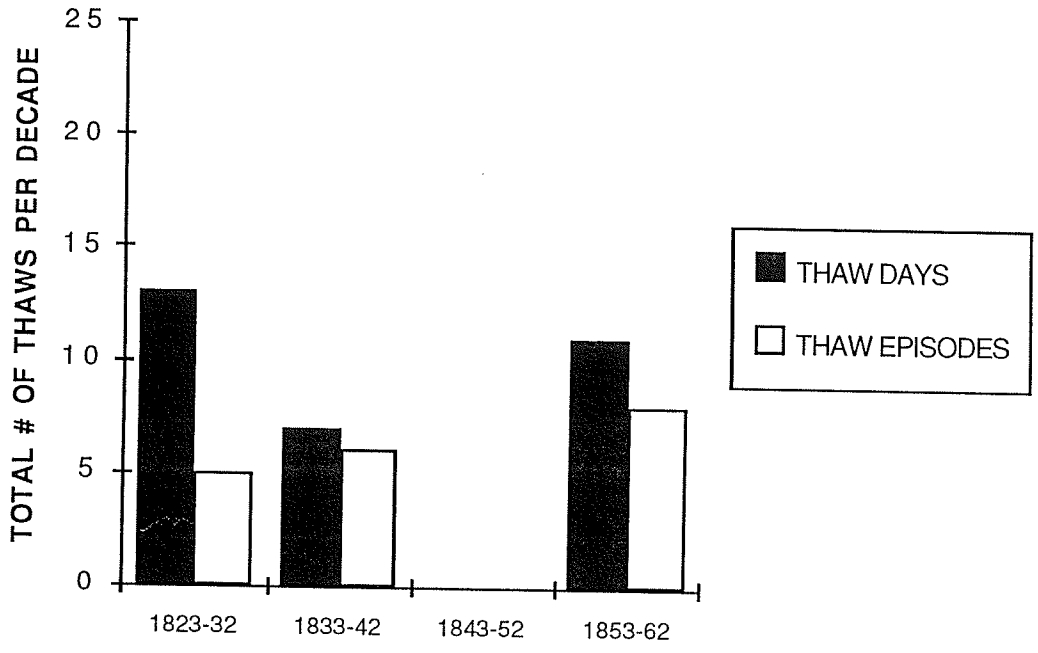


Figure 31. Frequency of Occurrence of Mid-Winter Thaw: Moose Factory, 1823-1862

Unfortunately, there were no nineteenth century Eastmain decades complete enough for analysis due to many missing journals and weather record gaps. Even the selected decades for Moose Factory do not comprise a continuous period of time. This discontinuity is caused by the 1843-52 decade being excluded, due to too many years with missing mid-winter weather data. Furthermore, there are some years lacking weather information in the three decades chosen for analysis (Appendix D, Table A8). This is discussed in detail in Section 6.3.

5.4 Analysis Four

The last analysis brings together all the historical decades complete enough to allow for comparisons (Appendix D, Table A6). For Moose Factory, this includes the decades of 1743-1792, the additional decade of 1793-1802 and the three nineteenth century decades listed above. At Eastmain, it includes the decades of 1743-1802. At Moosonee, it includes the decades of 1933-1992, while for present day Eastmain, it includes the decades of 1963-1992. The average total number of thaw days and thaw episodes per decade, for each historical and modern location, are fairly similar to the results of the first analysis (Appendix D, Table A7).

6

Findings

6.1 Results of the First Analysis

The overall findings (summarized in Appendix D, Table A3) indicate the following. When looking at the entire historical data sets (1737-1941) and modern data sets (Moosonee - 1933-92; Eastmain - 1961-92), while taking into consideration the breaks in the historical data sets, Moose Factory and Moosonee consistently have had more mid-winter thaw events than have historical and modern day Eastmain. Moose Factory had, on average, approximately four more thaw days and two more thaw episodes per decade than Eastmain, while Moosonee had, on average, approximately three more thaw days and two more thaw episodes per decade than present day Eastmain. Although the disparity between Moosonee and present day Eastmain is slightly less than that between Moose Factory and historical Eastmain, the data as a whole clearly indicate that the Eastmain River estuary has fewer mid-winter thaws than the Moose River estuary. Another finding is that the greatest difference between the historical and modern thaw frequencies was at Eastmain. While the Moose estuary had, on average, only a one thaw day and one thaw episode increase per decade, the Eastmain estuary had, on average, a two thaw day and one thaw episode increase per decade.

6.2 Results of the Second Analysis

When comparing the weather situations at Moosonee (1943-92) and Eastmain (1963-92) with the weather situations exactly 200 years prior at Moose Factory (1743-92) and Fort Eastmain (1763-92), greater differences are noted then those described in the previous Section (Appendix D, Table A4). Moose Factory had an average of approximately six more thaw days and 3.5 more thaw episodes per decade than Eastmain. In the modern period, Moosonee had an average of approximately four more thaw days and three more thaw episodes per decade than Eastmain. Again, the disparity between Moose Factory and historical Eastmain is greater than that between Moosonee and present day Eastmain, particularly with respect to total thaw days per decade. These findings also indicate that although more mid-winter thaw events occur today at Moosonee than at Eastmain, this excess was even greater exactly 200 years ago. When comparing the historical and modern frequencies in each estuary, the findings are as follows. In the Moose River estuary, the number of thaw days per decade in 1743-92 is virtually the same as the corresponding number in 1943-92. The frequency of thaw episodes increased only slightly. In the Eastmain estuary, the decadal frequency of thaw days rose by two, and that of thaw episodes rose by one over this time period. Again, this indicates that the greatest changes in the frequency of occurrence of mid-winter thaw occurred in the Eastmain estuary. It should be noted that a total of six years of mid-winter weather information were missing from the modern Eastmain daily maximum temperature record. To

be precise, three mid-winter periods lacked weather information in the 1973-82 decade (1973, 1978, and 1981) and three mid-winter periods lacked weather information in the 1983-92 decade (1985, 1989 and 1991). These years with missing mid-winter weather information may have produced additional thaw events. At Moosonee for the same years, 1973 had one thaw day, while 1989 and 1991 each had two thaw days. Therefore, it is possible that the modern Eastmain record may have yielded around five more thaw days. However, this cannot be determined with any certainty.

It is also informative to compare each individual decade. Although there is little difference between Moosonee and its historical counterpart, an analysis of individual decades yielded some interesting findings. It is clear that the decade of 1983-92 was the warmest in recent history at Moosonee, with a total of 21 mid-winter thaw days and 15 mid-winter thaw episodes. However, the decade of 1783-92 appears to be one of the coolest in the period of record for this region, yielding only three mid-winter thaw days and two mid-winter thaw episodes. As for Eastmain, a similar pattern unfolds. The decade of 1983-92 was the warmest in its modern mid-winter weather record with eleven thaw days and seven thaw episodes (more thaws may have actually occurred, as discussed in the previous paragraph), while the 1783-92 decade was one of coolest in the period of record for this region, registering only one mid-winter thaw day and one mid-winter thaw episode.

Although there is no modern counterpart for comparison with the Fort Albany data set, 1783-92 was also one of the coolest historical

decades on record for Albany, registering only two mid-winter thaw days and one mid-winter thaw episode (Appendix D, Table A1).

6.3 Results of the Third Analysis

For another comparison of historical and modern thaws in the Moose estuary,[3] three decades of yearly thaw information were selected from the nineteenth century Moose Factory records: 1823-32, 1833-42 and 1853-62. These were selected because they provide sufficient yearly mid-winter weather information (Appendix D, Table A5). The decade of 1843-52 was excluded from the analysis since three different years lacked mid-winter weather information: 1843, 1844 and 1846. For two of these three years (1843 and 1846) a total of nine mid-winter thaw events had occurred at Fort Albany. Given the close proximity of these two posts, the probability is fairly high that mid-winter thaws had occurred at Moose Factory in 1846 and in 1843. Although a total of six years lacked mid-winter weather information from the three historical decades chosen for analysis, there are no indications that these unknown periods were marked by thaws at Moose Factory as there are no recorded thaw events for those same years (1827, 1830, 1833, 1834, 1856 and 1857) in the Fort Albany journals.

Overall, when comparing the modern and historical data sets, Moosonee showed on average, an excess of half a thaw day and 1.5

[3] Nineteenth century mid-winter weather information from the Eastmain journals was excluded from this analysis as there are far too many missing journals and weather record gaps.

thaw episodes per decade. This possibly indicates a slight decrease in the severity of the mid-winter in the modern period (1933-92) as compared to the early and middle nineteenth century mid-winters.

6.4 Results of the Last Analysis

The last analysis involves comparing all the historical decades of Moose Factory and Eastmain, in which sufficient mid-winter weather information exists, with the entire modern data sets of Moosonee and Eastmain (Appendix D, Table A6). For Moose Factory, the decades which had complete, or nearly complete records of mid-winter weather include those from 1743 to 1802 (1743-52, 1753-62... 1793-1802), and also the three decades selected in Section 5.3[4] For Eastmain, the decades which had complete, or nearly complete, records of mid-winter weather are those from 1743 to 1802 only. It should be noted that the decade of 1793-1802 for Moose Factory and Eastmain had two years lacking mid-winter weather information: 1801 and 1802. It is known that 1801 did not yield mid-winter thaw information at neighbouring Fort Albany. The year 1802, on the other hand, is an unknown with respect to whether or not mid-winter thaw had occurred then, since the Fort Albany journal also has a weather record gap for that year. The results of the comparisons are as follows. Moose Factory had an average of approximately five more thaw days and 2.5 more thaw episodes per

[4] Moose Factory's weather descriptions date back to 1730, but mid-winter thaw information examined starts at 1737 when the Fort Eastmain journal record commences. Therefore, the earliest complete decade analyzed begins at 1743. This has been determined by counting up in ten year intervals, starting from 1992.

decade than Fort Eastmain. These findings indicate, once again, that more mid-winter thaw events occur at Moose Factory than at Eastmain. There is no difference between the historical and modern decadal frequencies of thaws in the Moose estuary. In each case the decadal average is eleven thaws. As for Eastmain, there was an average increase of approximately one thaw day and half a thaw episode per decade between the historical and modern periods. This again indicates that the greatest changes in the severity of the mid-winter occurred in the estuary of the Eastmain not in that of the Moose.

6.5 Conclusion

Overall, when taking into consideration all four types of comparisons, the following can be said with a reasonable level of confidence (see also "Summary of Comparisons," Appendix D, Table A7). In the historical period, Moose Factory experienced, on average, approximately four to six more thaw days and two to 3.5 more thaw episodes per decade than Fort Eastmain. In the modern period, Moosonee experienced, on average, approximately three to four more thaw days and two to three more thaw episodes per decade than Eastmain. In the Moose estuary, the differences between the historical and modern periods amounts to between zero and one thaw day per decade, and between 0.5 and 1.5 thaw episodes per decade. The differences between historical and modern day Eastmain are slightly greater. Here the increase in the number of thaw days between the historical and modern periods ranges from

one to two, and the increase in thaw episodes ranges between 0.5 and one. Therefore, it can be concluded that, overall, Eastmain experienced the greatest change in the frequency of occurrence of mid-winter thaw over time. Secondly, it can be concluded that, overall, Moose Factory and its modern counterpart, Moosonee (to 1992), experienced more mid-winter thaw events than historical and present day Eastmain.

7

Late Eighteenth Century Synoptic Weather Maps: Selection of Map Dates and Transcription of Relevant Information

7.1 Introduction to Late Eighteenth Century Synoptic Weather Maps

Synoptic situations over central Canada will be analyzed in this thesis by drawing weather maps of selected mid-winter thaws in the late eighteenth century. The production of historical synoptic weather maps of central Canada provides the reader with a unique glimpse into the nature of historical atmospheric circulation patterns over most of central Canada. Up to now, the production of synoptic weather maps of select periods of the late eighteenth century in this region has never before been accomplished. The earliest synoptic weather maps of central Canada were produced by Cynthia Wilson (1985). Utilizing the HBC post journals, she created detailed synoptic weather maps of central Canada for June 1-17, 1816. This period is particularly climatically significant as it covers one of the coldest summers in recent history, caused by the gigantic eruption of Mount Tambora in 1815. Weather maps of the late eighteenth century can also be produced utilizing wind information and the exceptionally detailed weather descriptions contained within the post journals.

These weather maps provide the earliest analyses of the weather situations over central Canada for mid-winter in the historical period.

7.2 Coverage of the Synoptic Weather Maps

The region chosen for synoptic weather analysis encompasses eastern Quebec around James Bay, most of Ontario north of the Great Lakes including northwestern Ontario, Manitoba, Saskatchewan and the extreme eastern portion of Alberta. For the purpose of this thesis, central Canada will be defined by this part of Canada.

7.3 Restrictions to the Production of Synoptic Weather Maps Using HBC Post Journals

Before data could be collected from the HBC journals, certain criteria had to be met to allow for the feasible production of synoptic weather maps of central Canada. These criteria are as follows.

The first key requirement is that there must be a sufficient number of HBC fur trading posts that kept a detailed record of weather, widely distributed throughout central Canada. It was not until about 1774, that the HBC decided to break with tradition and set-up posts inland, west of the Bays to counter the loose-knit groups of Montreal-based fur traders who were already long established in the interior.[5] Therefore, since the weather information for this thesis

[5] Unlike the HBC, who remained at the river mouths and allowed the Indians to bring furs to them, the Montreal-based traders traveled inland to gather the furs from the Indians in their hunting grounds.

comes solely from the post journals, synoptic weather maps of central Canada cannot be produced to represent a date prior to 1774.

The second key requirement for this thesis is that the synoptic weather maps had to analyze major mid-winter thaws meteorologically. A major mid-winter thaw is defined as a thaw which occurred at two or all three of the posts: Moose Factory, Fort Albany and Eastmain (Appendix F, Table A10).

The last criterion is that the weather data had to include, at least for the most part, wind direction readings and a thorough description of the weather. It was found, after carefully reading the mid-winter weather information contained within the Moose Factory, Fort Albany and Eastmain journals, that the weather remarks became abruptly poorer in quality and quantity at the beginning of the nineteenth century. For most of the eighteenth century, weather remarks are generally very detailed (often with very fine penmanship, as occasionally noted in Appendix A). They almost always included wind directions and occasionally wind speed, thermometric and barometric readings and descriptions of cloud and precipitation were given. It was by around 1800 that the quality of the weather remarks began to rapidly deteriorate. In fact, there was a complete mid-winter weather record gap between approximately 1800 and 1814, whereby the Company sent out directives to the various posts to cease recording weather information, calling a daily record of weather "useless."[6] By the year 1815, however, weather descriptions started back up again, but the quality of these

---

6 ..."Diaries of Winds and Weather are to us useless and need not be kept" (PAM, HBCA, A.6/16, fo. 167)

descriptions never recovered to the same level as in the eighteenth century. As a result of this quality problem, only mid-winter dates prior to 1800 were considered for synoptic analysis.

7.4 Final Selection of Synoptic Weather Map Dates

After thoroughly going through the complete journal series of Moose Factory, Fort Albany and Eastmain, and extracting the dates of major mid-winter thaw events between 1774 and 1799, seven years were identified as having major thaws: 1775, 1777, 1779, 1786, 1794, 1795 and 1799. However, only eight posts were established by 1775 within central Canada (Fort Albany, Fort Churchill, Cumberland House, Eastmain, Henley House, Moose Factory, Fort Severn and York Factory). There were only nine posts in 1777 (the addition of Brunswick House) and 1779 had only eleven posts (the further addition of Gloucester House and Rupert House). Even by 1786, there were only thirteen posts established within central Canada (the further addition of Frederick House and Miminiska Lake House). Unfortunately, this is not a sufficiently broad and dense distribution of posts for the feasible production of synoptic weather maps. It was not until 1794, when there were 21 posts established within central Canada, that weather information could be used to create a synoptic weather map. The year 1795 had 29 posts established, while the year 1799 had 27 posts[7] established within

[7] Mid-winter weather information for Osnaburgh House does not exist for every day. For example, between January 15th and 18th, 1799, weather information exists on the 16th and 18th only.

central Canada. Consult Appendix F for a listing of these specific posts. Major thaws for these years were on the following ten days: January 9, 21 and 22, 1794; January 29, 1795; and January 15-20, 1799.

7.5 Transcription of Relevant Information

The methods of weather information collection remained the same as in Section 2.2. However, a variety of different post journals were consulted for the ten specific days listed above. For a complete listing of these various post journals and their accompanying mid-winter weather remarks (recorded verbatim) consult Appendix F.

8

Construction of Synoptic Weather Maps Using Post Journal Information

8.1 Base Map

The base map, on which the synoptic weather information was plotted, originally came from a standard unlabeled conic projection of Canada. This base map was then scanned in raster format into a software package called Adobe Photoshop on a Macintosh Quadra 800 computer for various graphic alterations. The map image was first enlarged to include most of central Canada. All minor river systems and unnecessary landmarks were removed to make the map image as simple as practical. Using various historical reference sources, each post location was determined and then carefully placed onto the ten base maps representing 1794, 1795 and 1799. This was not without its problems as there were discrepancies in determining where some of the minor or lesser known posts were located. However, after carefully going through the Historical Atlas of Canada (Volume 1) and the National Atlas of Canada (4th edition, 1974), as well as a rather crude historical map of Canada located in the Manitoba Provincial Archives, all the post locations were finally determined and drawn on the basemaps using Photoshop.

8.2 Plotting Wind and Weather Information

The next step involved plotting the weather information for each post on the base maps. Wind direction was designated by a line protruding from the post location marker in the direction from which the wind was blowing. If there was any reference to the intensity of the wind, one to four flags were placed on the wind direction line, depending on the description of the intensity. For example, "a strong gale" was designated by four flags. Remarks such as "a fresh gale" or "heavy drift" or "blowed fresh" or "a stiff breeze" or "a strong wind" were designated by three flags." Remarks such as "a fresh breeze" or "a moderate breeze" or "a moderate wind" were designated by two flags. Lastly, remarks such as "a light breeze" or "light airs" were designated as one flag. Of course, no flags simply means no wind description for that day (Appendix F).

Weather descriptions and occasional thermometric and/or barometric readings were placed near the post location name in a smaller font. On seven of the ten synoptic weather maps (Jan. 9, 21-22, 1794; Jan. 29, 1795; and Jan. 15-16 and 20, 1799) isobars were drawn, and in two cases, fronts were also placed, thus adding to their descriptive potential (Figures 32-41). Overall, when relying solely on wind information, there is a great deal of room for error when determining where to place isobars. Unlike winds above the friction layer that blow geostrophically, surface friction combines with the Coriolis effect to balance the horizontal pressure-gradient force, and as a consequence, surface winds blow across the isobars and toward low pressure (Moran & Morgan 1991:230). The deflection angle of

surface winds crossing isobars can vary between approximately 10 degrees for smoother terrain to approximately 45 degrees for rougher terrain (Moran & Morgan 1991:230). For gently rolling topography, characteristic of most of central Canada, the deflection angle is approximately 30 degrees. Therefore, the isobars were drawn on the maps in such a fashion that the surface winds cross them at approximately 30 degrees. Secondly, the positions of the fronts were mainly determined by the available temperature, precipitation and cloud information. However, a further complication for this project was that for the remaining three weather maps, the weather systems appear particularly weak and flat, with winds seeming to be almost completely governed by local topography in some regions. Added to this the fact that much of the wind direction information lacked a description of intensity, accurately placing isobars became impossible for these last three maps. For a full explanation on the construction of synoptic weather maps using the HBC post journals refer to Wilson (1985).

9

Synoptic Weather Map Analysis

9.1 Central Canada Mid-Winter Thaw: An Unusual Phenomena

The January thaw has been widely recognized as a fairly predictable phenomena in the northeastern United States. In this case, the Bermuda high, also known as the Bermuda-Azores anticyclone, temporally shifts north of its usual mid-winter position, pumping in moist, warm Gulf of Mexico air into the New England states, thus causing a widespread thaw. The reasons for this shift are still not well understood. However, this tropical air cannot penetrate as far northwest as the study area of this thesis (defined in Section 7.2) during the mid-winter. This leaves us to wonder what triggers such an unusual phenomena during a central Canada mid-winter. Attention must therefore be focused on the nature of the mid-latitude westerlies and the Arctic front for answers.

During a typical Canadian mid-winter, the upper westerly winds become more vigorous than in the summer months. These winds significantly strengthen and exhibit fewer longwaves than in summer. Those that do develop in winter are larger in amplitude and longer in wavelength (Moran and Morgan 1991:257). This seasonal difference is a direct result of a steeper north-south pressure gradient, caused by a greater temperature difference

between north and south (Moran and Morgan 1991:257). The strong meridional flow patterns that exist when large waves develop in the upper westerlies are especially strong during the mid-winter, and this frequently pushes Arctic air deep into the interior of Canada. As a result, most of central Canada is dominated by extremely cold, dry air throughout the winter months. Average January temperatures in central Canada range between approximately -20 and -30 °C.

Occasionally, however, the mid-latitude westerlies exhibit a strong zonal flow pattern during the mid-winter when the longwaves are weak. This west to east flow pattern is sometimes almost parallel to the latitude circles (Moran and Morgan 1991:257-258). During these exceptionally rare situations, the Arctic front retreats from its normal position. Pacific air replaces the bitterly cold, dry Arctic air, causing a significant increase in temperatures throughout the Canadian interior. Pacific air, under these circumstances, dries out significantly as it flows over the Rocky Mountains and is compressed and warmed adiabatically as it descends onto the lowland regions of the Canadian interior, thus causing warmer conditions (Moran and Morgan 1991:258). Occasionally, these conditions are so warm that thaws can occur.

9.2 Thaws of January 9, 21 and 22, 1794

On January 9, 1794, the James Bay region of Canada was dominated by a low pressure system located to the southwest. Warm Pacific air made its way as far east as Eastmain (Figure 32). This area experienced an extensive thaw with rain in most parts. In

the vicinity of Fort Albany there was a combination of both snow and sleet. The remainder of this central Canada region was still under the influence of bitterly cold Arctic air.

On January 21, 1794, Pacific air again made its way into the central Canadian interior around the James Bay region, bringing very mild temperatures and heavy rain, with fog at New Brunswick House. The remainder of central Canada was still under the influence of a high pressure system that kept temperatures around seasonal norms (Figure 33).

On the following day, January 22, Pacific air was still flowing into the central Canadian interior. In fact, the Arctic front was pushed well north, so that Pacific air infiltrated even as far northwest as Cumberland House. This air brought very unseasonably warm temperatures, rain and a general thaw throughout most of the James Bay region and more westerly locations. Fog also occurred at Eastmain, while Cumberland House experienced both fog and rime (Figure 34).

9.3 Thaw of January 29, 1795

On this day, it was difficult to determine where to place isobars as spatial patterns of wind direction sometimes varied irregularly. Nevertheless, it appears that warm Pacific air made its way into the interior around the James Bay region, bringing much precipitation in the form of snow. There was a thaw at New Brunswick House, Moose Factory and Eastmain. West of Henley House, especially in northwest

Ontario and Manitoba, temperatures were typically cold, being dominated by Arctic air (Figure 35).

9.4 Thaws of January 15, 16, 17, 18, 19 and 20, 1799

On January 15, 1799, Pacific air flowed extensively throughout central Canada, causing a very widespread thaw. Thaw conditions spread as far Buckingham House to the west, York Factory to the north and Neoskweskau to the east. The Fort Severn journal remarked: "remarkable mild weather" (PAM, HBCA, B.198/a/50, fo. 24). This accurately describes most of central Canada on this day (Figure 36).

On January 16, 1799, warm Pacific air remained in the Canadian interior around James Bay, continuing the thaw conditions. Martin Fall and Nipigon House reported rain, while Moose Factory registered a temperature of 32 °F at 9:00 PM. Even as far north as Fort Severn, thaw conditions persisted. In Fort Severn's journal account for this day it was again stated: "Remarkable mild weather" (PAM, HBCA, B.198/a/50, fo. 24). West of Osnaburgh House, conditions were below the freezing point, but still well above normal (Figure 37).

On January 17, 1799, warm Pacific air was still flowing into the Canadian interior around James Bay, continuing a general thaw throughout. Michipicoten, New Brunswick House and Moose Factory all reported a thaw for this day. Henley House and Fort Albany reported "soft" conditions, while foggy conditions were reported at Nipigon House. The remainder of central Canada south of

approximately Oxford House reported conditions still rather unseasonable, although not thaw conditions (Figure 38).

On January 18, 1799, thaw conditions were the most intense of the January 15-20 thaw episode. A temperature of 38 °F was reported at Moose Factory at 9:00 PM. Thaw conditions were also reported as far east as Neoskweskau and as far west as Osnaburgh House. Michipicoten reported rain all day while Neoskweskau's journal for this day remarked: "it being so very mild has prevented my sending to the Factory" (PAM, HBCA, B.143/a/6, fo. 12). This statement probably refers to ground conditions being so unusually soft and wet, that traveling was impossible until the ground froze again. Climatic conditions for the remainder of central Canada were also well above average for this time of year. In fact, "warm" was reported in Escabitchewan, Brandon House and Setting River (Figure 39).

On January 19, 1799, intense thaw conditions persisted. The noon temperature reading at Moose Factory for this day was 36 °F. Rain and thaw were reported at Martin Fall, New Brunswick House, Michipicoten, Kenogamissi, Abitibi Fort, Fort Albany, Henley House and Eastmain. Even as far west as Sandy Lake House, conditions were reported as being "warm." Snow was reported in regions west and north of Sandy Lake. However, for most of the interior, conditions were well above average for this time of year (Figure 40).

On January 20, 1799, Pacific air was, surprisingly, still flowing well north into the James Bay region, with a western extension around Michipicoten in the south and Fort Albany in the north, and an eastern extension around Neoskweskau. In fact, it was so

unusually warm that Neoskweskau's journal remarked: "rather uncommon for it to continue so long mild at this time of the year" (PAM, HBCA, B.143/a/6, fo. 12). This warm Pacific air brought rain for most of the region, while the western margin of this low pressure cell, near Michipicoten and Fort Albany, experienced a mixture of sleet and rain. At Moose Factory, the morning and midday temperature readings were still very high, registering at 35 and 36 °F respectively (Figure 41). The remainder of central Canada, west of approximately New Brunswick House, was under the influence of cooler Arctic air. Complete freeze-up, however, of the James Bay region occurred by approximately 2:00 PM that day (e.g. +14.5 °F at Moose Factory at 2:00 PM).

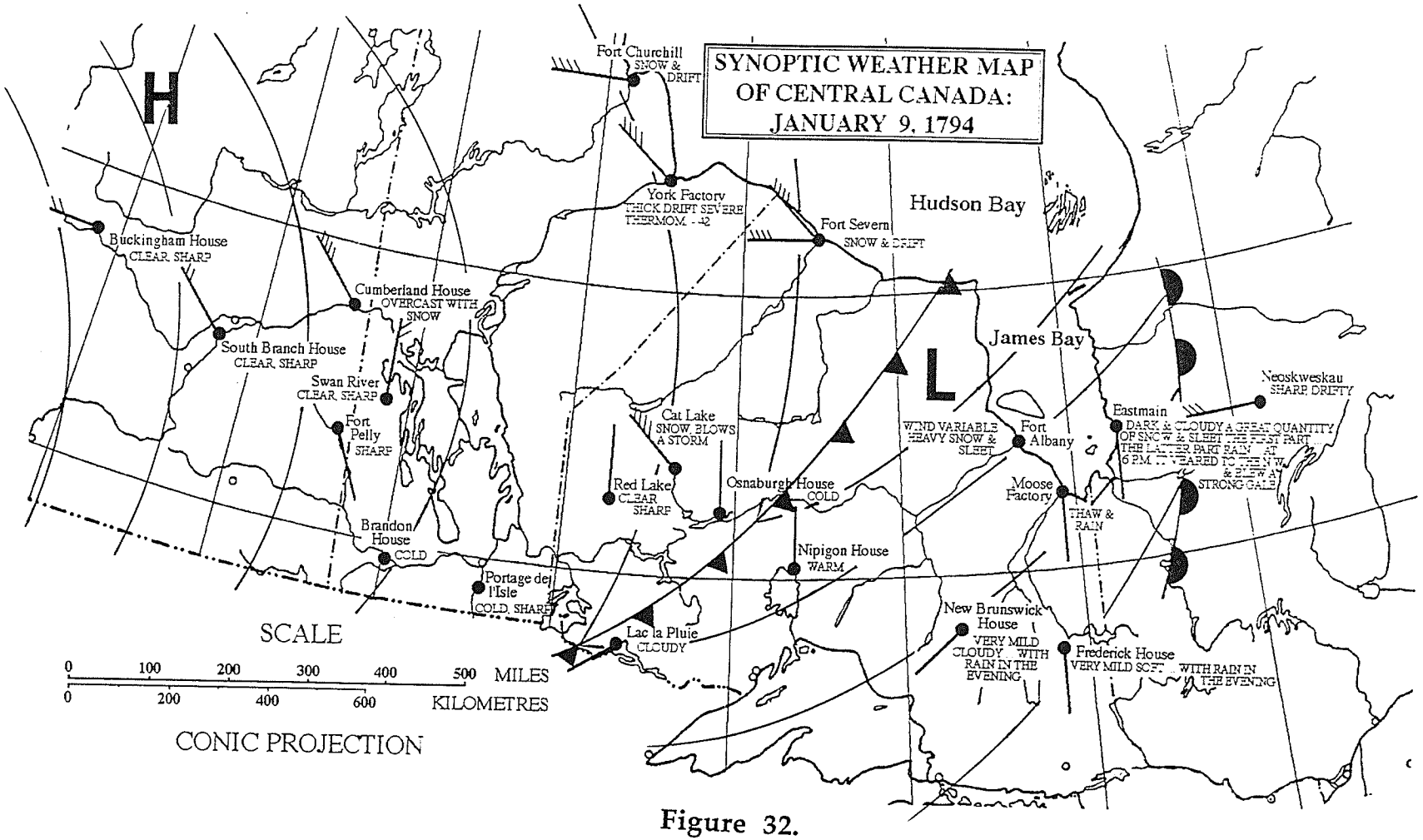

SYNOPTIC WEATHER MAP
OF CENTRAL CANADA:
JANUARY 9, 1794
H
L
Hudson Bay
James Bay
Fort Churchill
SNOW & DRIFT
York Factory
THICK DRIFT SEVERE THERMOM. -42
Fort Severn
SNOW & DRIFT
Buckingham House
CLEAR, SHARP
Cumberland House
OVERCAST WITH SNOW
South Branch House
CLEAR, SHARP
Swan River
CLEAR, SHARP
Fort Pelly
SHARP
Cat Lake
SNOW, BLOWS A STORM
Red Lake
CLEAR SHARP
Osnaburgh House
COLD
Brandon House
COLD
Portage de l'Isle
COLD, SHARP
Nipigon House
WARM
Lac la Pluie
CLOUDY
WIND VARIABLE HEAVY SNOW & SLEET
Fort Albany
Eastmain
DARK & CLOUDY A GREAT QUANTITY OF SNOW & SLEET THE FIRST PART THE LATTER PART RAIN AT 6 P.M. IT VEARED TO THE N.W. & BLEW A STRONG GALE
Neoskweskau
SHARP DRIFTY
Moose Factory
THAW & RAIN
New Brunswick House
VERY MILD CLOUDY WITH RAIN IN THE EVENING
Frederick House
VERY MILD SOFT WITH RAIN IN THE EVENING
SCALE
0 100 200 300 400 500 MILES
0 200 400 600 KILOMETRES
CONIC PROJECTION

Figure 32.

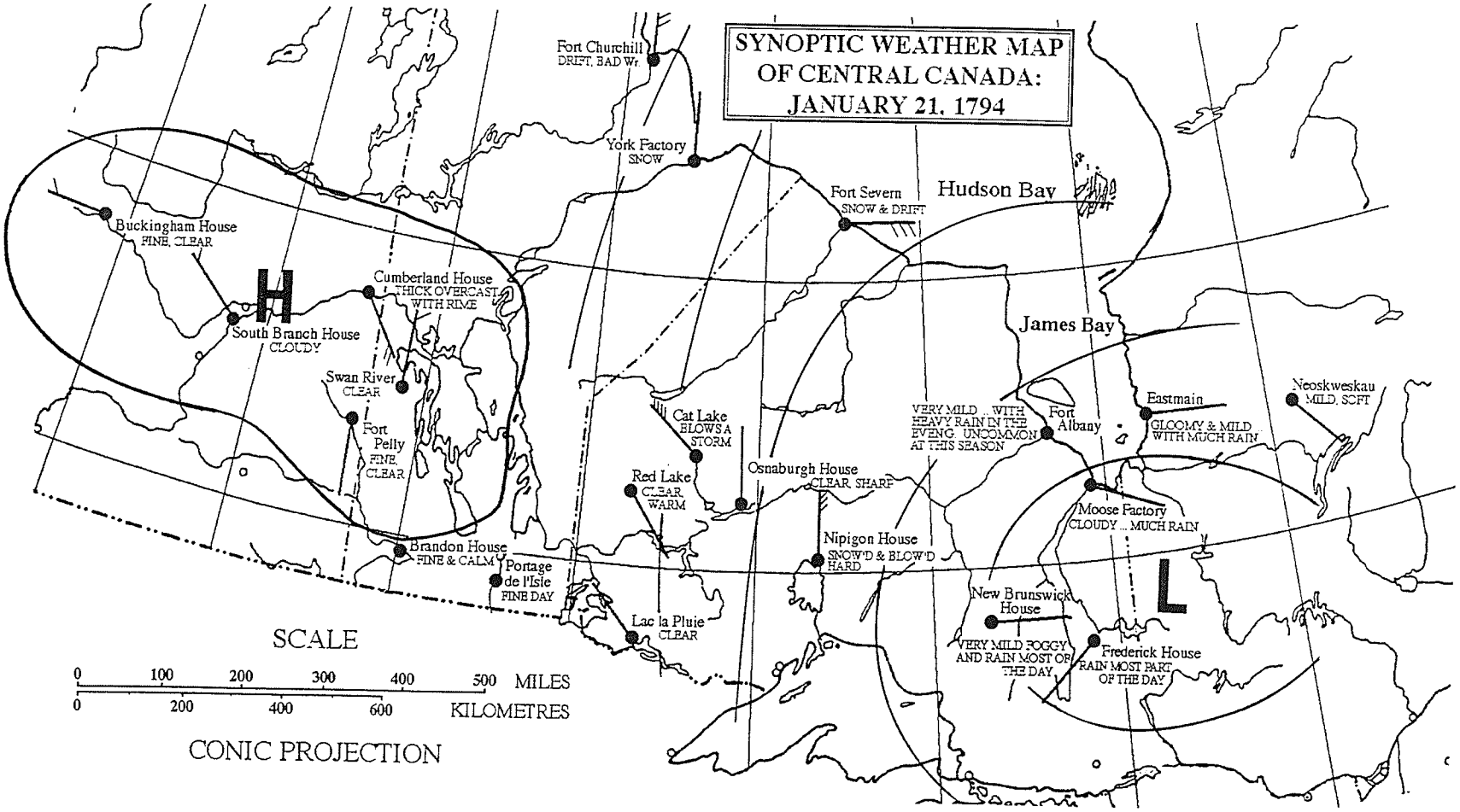

SYNOPTIC WEATHER MAP
OF CENTRAL CANADA:
JANUARY 21, 1794
Fort Churchill
DRIFT, BAD Wr
York Factory
SNOW
Fort Severn
SNOW & DRIFT
Hudson Bay
Buckingham House
FINE, CLEAR
H
Cumberland House
THICK OVERCAST
WITH RIME
South Branch House
CLOUDY
James Bay
Swan River
CLEAR
Fort
Pelly
FINE,
CLEAR
Cat Lake
BLOWS A
STORM
Red Lake
CLEAR,
WARM
Osnaburgh House
CLEAR, SHARP
VERY MILD ... WITH
HEAVY RAIN IN THE
EVENG. UNCOMMON
AT THIS SEASON
Fort
Albany
Eastmain
GLOOMY & MILD
WITH MUCH RAIN
Neoskweskau
MILD, SOFT
Moose Factory
CLOUDY ... MUCH RAIN
Nipigon House
SNOW'D & BLOW'D
HARD
Brandon House
FINE & CALM
Portage
de l'Isle
FINE DAY
Lac la Pluie
CLEAR
New Brunswick
House
VERY MILD FOGGY
AND RAIN MOST OF
THE DAY
L
Frederick House
RAIN MOST PART
OF THE DAY
SCALE
0 100 200 300 400 500 MILES
0 200 400 600 KILOMETRES
CONIC PROJECTION

Figure 33.

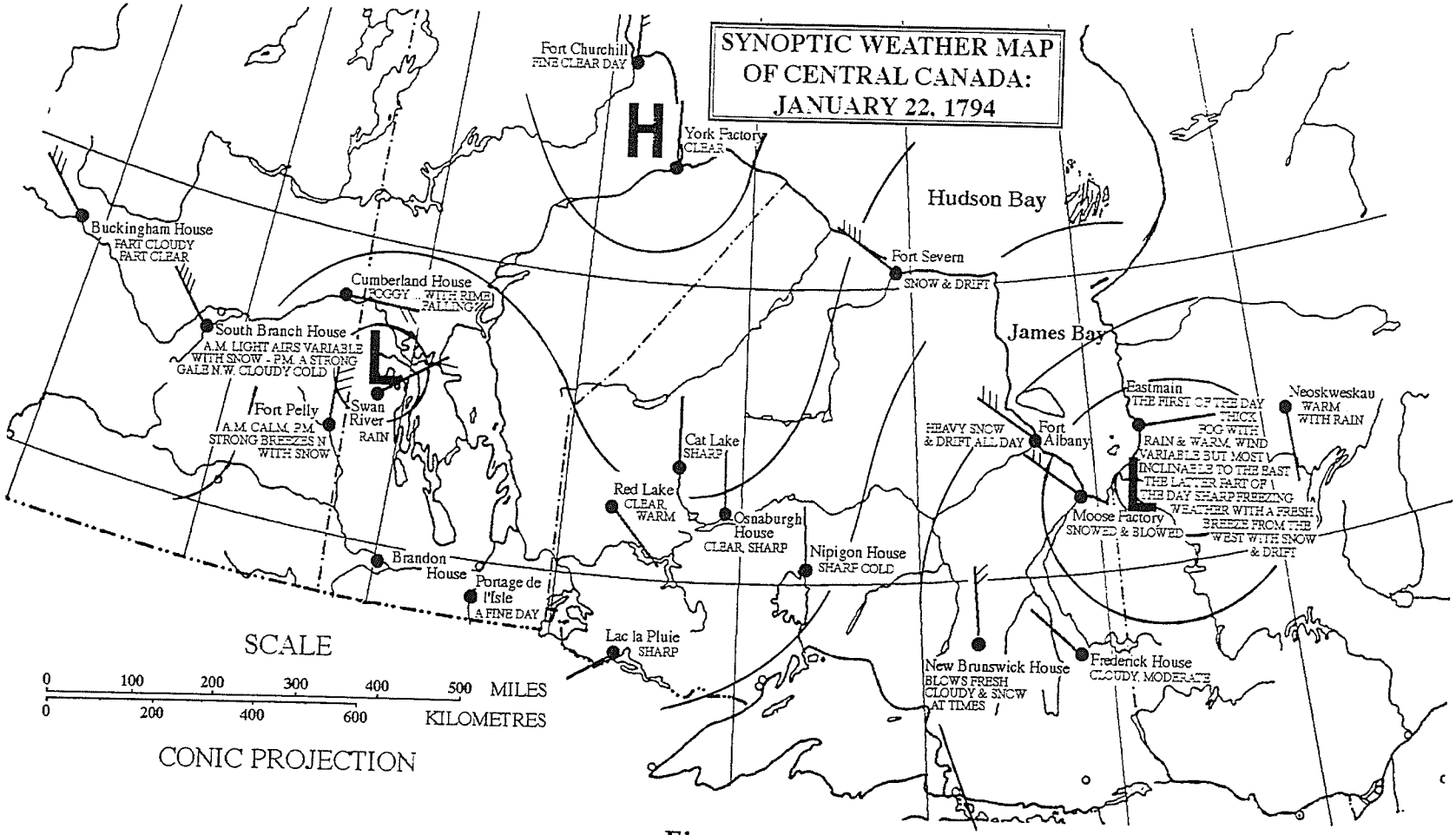

SYNOPTIC WEATHER MAP
OF CENTRAL CANADA:
JANUARY 22, 1794
Fort Churchill
FINE CLEAR DAY
H
York Factory
CLEAR
Hudson Bay
Buckingham House
PART CLOUDY
PART CLEAR
Fort Severn
SNOW & DRIFT
Cumberland House
FOGGY ... WITH RIME
FALLING
James Bay
South Branch House
A.M. LIGHT AIRS VARIABLE
WITH SNOW - P.M. A STRONG
GALE N.W. CLOUDY COLD
L
Fort Pelly
A.M. CALM. P.M.
STRONG BREEZES N.
WITH SNOW
Swan
River
RAIN
Eastmain
THE FIRST OF THE DAY
THICK
FOG WITH
RAIN & WARM. WIND
VARIABLE BUT MOST
INCLINABLE TO THE EAST
THE LATTER PART OF
THE DAY SHARP FREEZING
WEATHER WITH A FRESH
BREEZE FROM THE
WEST WITH SNOW
& DRIFT
Neoskweskau
WARM
WITH RAIN
HEAVY SNOW
& DRIFT ALL DAY
Fort
Albany
Cat Lake
SHARP
Red Lake
CLEAR
WARM
Osnaburgh
House
CLEAR, SHARP
Moose Factory
SNOWED & BLOWED
Brandon
House
Nipigon House
SHARP COLD
Portage de
l'Isle
A FINE DAY
Lac la Pluie
SHARP
New Brunswick House
BLOWS FRESH
CLOUDY & SNOW
AT TIMES
Frederick House
CLOUDY, MODERATE
SCALE
0 100 200 300 400 500 MILES
0 200 400 600 KILOMETRES
CONIC PROJECTION

Figure 34.

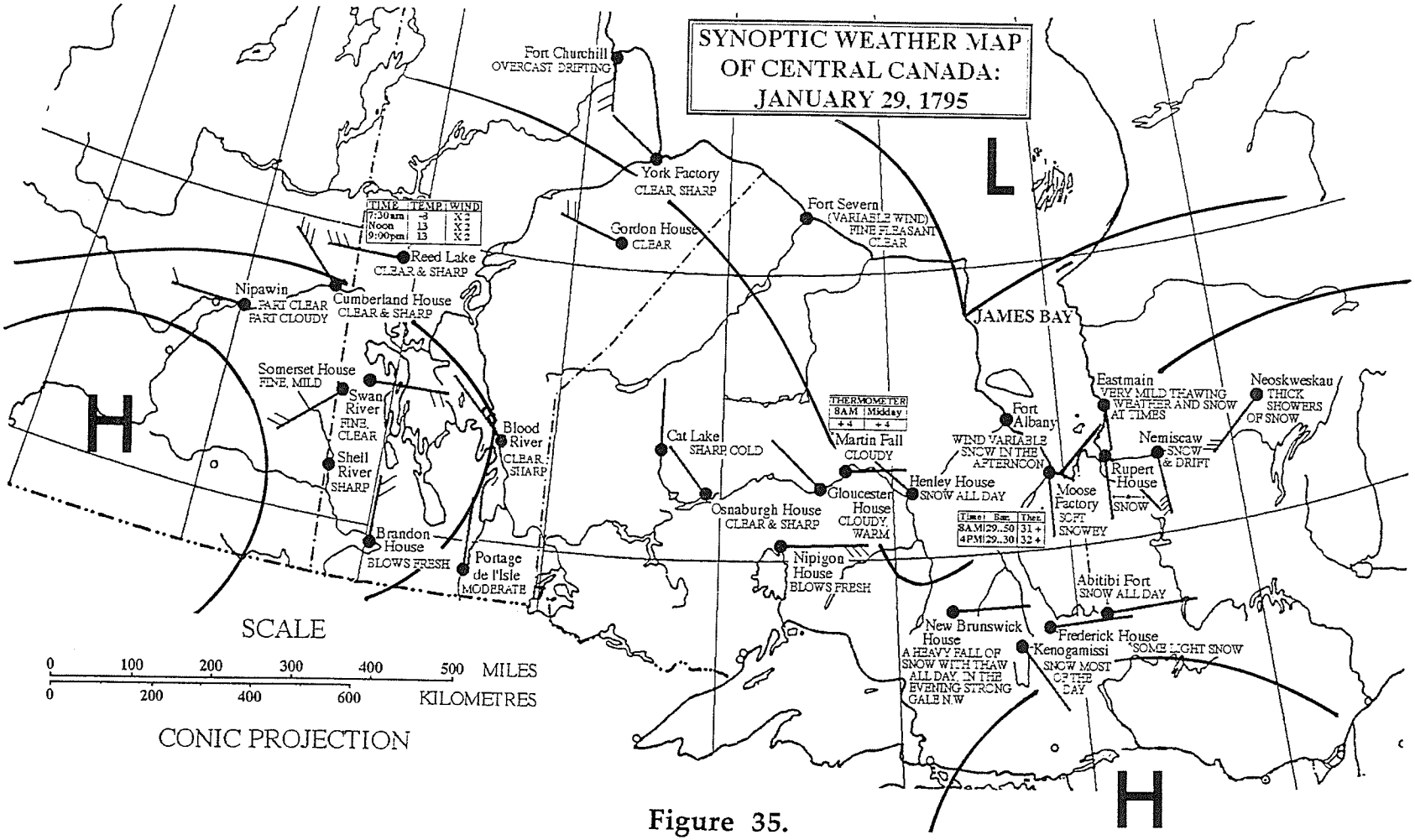

SYNOPTIC WEATHER MAP
OF CENTRAL CANADA:
JANUARY 29, 1795
Fort Churchill
OVERCAST DRIFTING
York Factory
CLEAR, SHARP
Fort Severn
(VARIABLE WIND)
FINE PLEASANT
CLEAR
Gordon House
CLEAR
L
TIME | TEMP | WIND
7:30 am | -8 | X 2
Noon | 13 | X 2
9:00pm | 13 | X 2
Reed Lake
CLEAR & SHARP
Nipawin
PART CLEAR
PART CLOUDY
Cumberland House
CLEAR & SHARP
JAMES BAY
Somerset House
FINE, MILD
Swan River
FINE, CLEAR
Shell River
SHARP
H
Blood River
CLEAR, SHARP
Brandon House
BLOWS FRESH
Portage de l'Isle
MODERATE
THERMOMETER
8 A.M | Midday
+4 | +4
Martin Fall
CLOUDY
Cat Lake
SHARP COLD
Osnaburgh House
CLEAR & SHARP
Gloucester House
CLOUDY, WARM
Henley House
SNOW ALL DAY
Nipigon House
BLOWS FRESH
Fort Albany
WIND VARIABLE
SNOW IN THE AFTERNOON
Time | Bar. | Ther.
8 A.M | 29..50 | 31 +
4 P.M | 29..30 | 32 +
Moose Factory
SOFT SNOWEY
Eastmain
VERY MILD THAWING WEATHER AND SNOW AT TIMES
Neoskweskau
THICK SHOWERS OF SNOW
Nemiscaw
SNOW & DRIFT
Rupert House
SNOW
Abitibi Fort
SNOW ALL DAY
New Brunswick House
A HEAVY FALL OF SNOW WITH THAW ALL DAY IN THE EVENING STRONG GALE N.W
Kenogamissi
SNOW MOST OF THE DAY
Frederick House
SOME LIGHT SNOW
H
SCALE
0 100 200 300 400 500 MILES
0 200 400 600 KILOMETRES
CONIC PROJECTION

Figure 35.

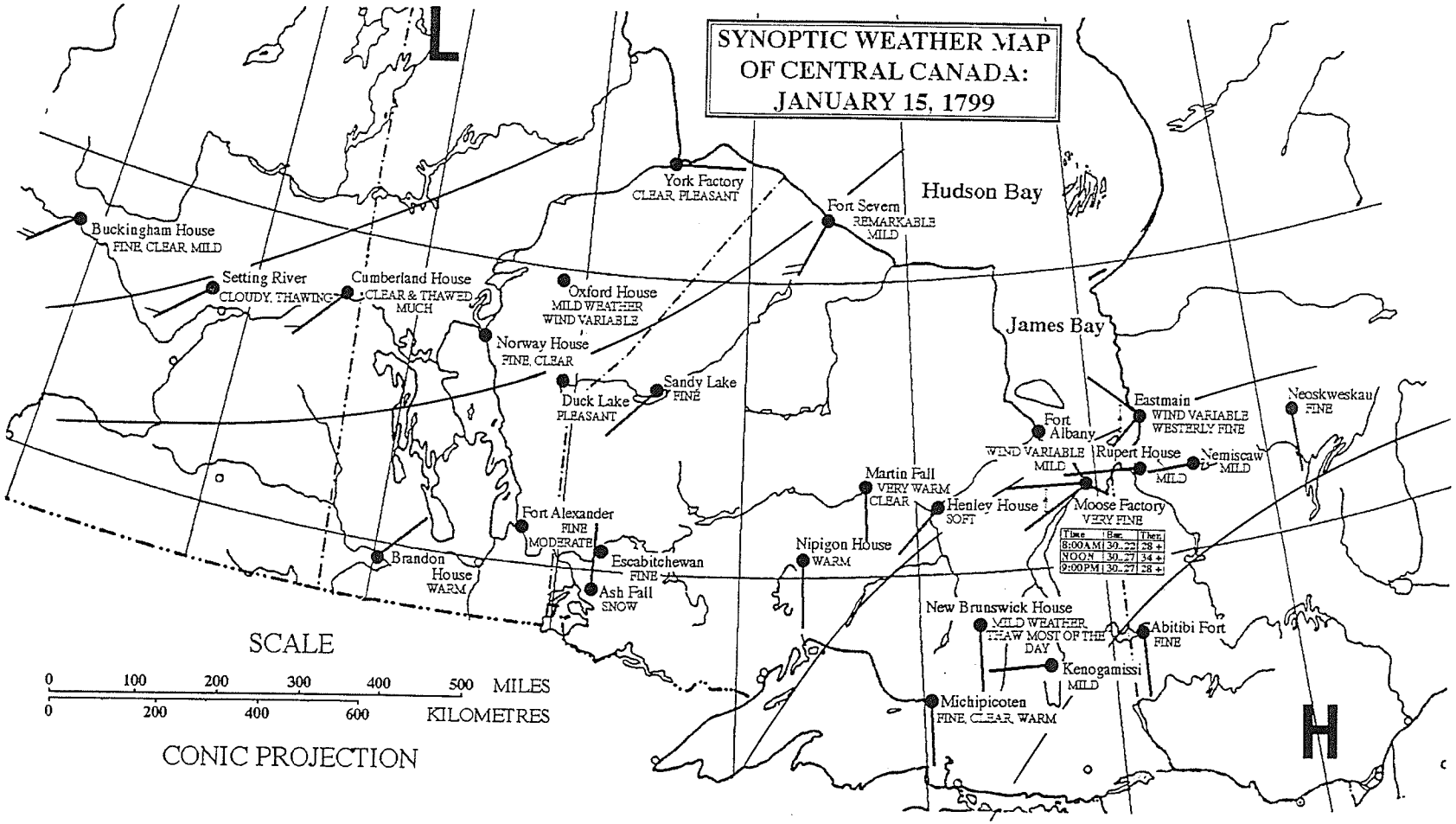

SYNOPTIC WEATHER MAP
OF CENTRAL CANADA:
JANUARY 15, 1799
L
H
Hudson Bay
James Bay
York Factory
CLEAR, PLEASANT
Fort Severn
REMARKABLE
MILD
Buckingham House
FINE, CLEAR, MILD
Setting River
CLOUDY, THAWING
Cumberland House
CLEAR & THAWED
MUCH
Oxford House
MILD WEATHER
WIND VARIABLE
Norway House
FINE, CLEAR
Duck Lake
PLEASANT
Sandy Lake
FINE
Eastmain
WIND VARIABLE
WESTERLY FINE
Neoskweskau
FINE
Fort
Albany
WIND VARIABLE
MILD
Rupert House
MILD
Nemiscaw
MILD
Martin Fall
VERY WARM
CLEAR
Henley House
SOFT
Moose Factory
VERY FINE
Time | Bar. | Ther.
8:00 AM | 30..22 | 28 +
NOON | 30..27 | 34 +
9:00 PM | 30..27 | 28 +
Fort Alexander
FINE
MODERATE
Nipigon House
WARM
Brandon
House
WARM
Escabitchewan
FINE
Ash Fall
SNOW
New Brunswick House
MILD WEATHER
THAW MOST OF THE
DAY
Abitibi Fort
FINE
Kenogamissi
MILD
Michipicoten
FINE, CLEAR, WARM
SCALE
0 100 200 300 400 500 MILES
0 200 400 600 KILOMETRES
CONIC PROJECTION

Figure 36.

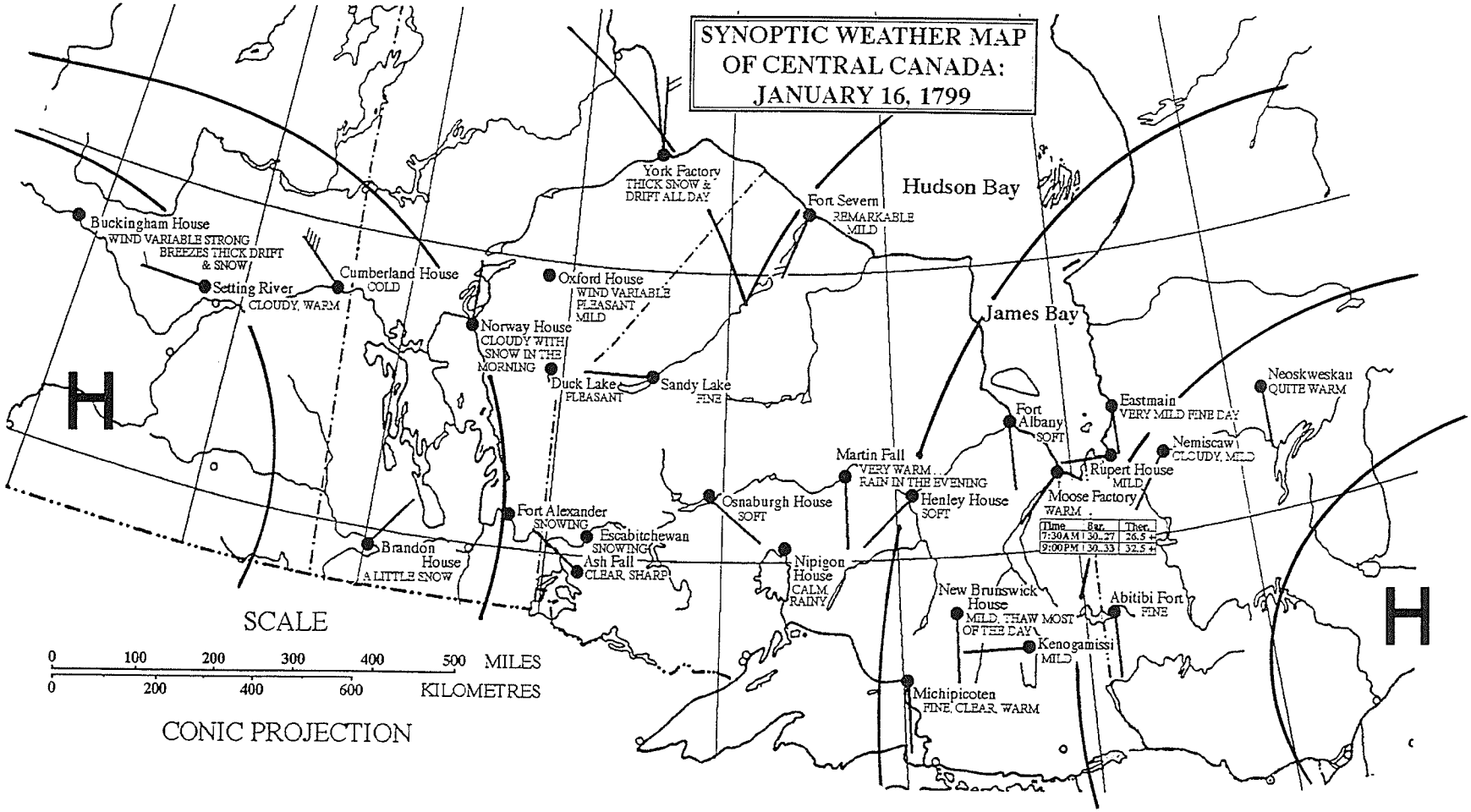

SYNOPTIC WEATHER MAP
OF CENTRAL CANADA:
JANUARY 16, 1799
Hudson Bay
James Bay
York Factory
THICK SNOW &
DRIFT ALL DAY
Fort Severn
REMARKABLE
MILD
Buckingham House
WIND VARIABLE STRONG
BREEZES THICK DRIFT
& SNOW
Setting River
CLOUDY, WARM
Cumberland House
COLD
Oxford House
WIND VARIABLE
PLEASANT
MILD
Norway House
CLOUDY WITH
SNOW IN THE
MORNING
Duck Lake
PLEASANT
Sandy Lake
FINE
H
Neoskweskau
QUITE WARM
Eastmain
VERY MILD FINE DAY
Fort
Albany
SOFT
Nemiscaw
CLOUDY, MILD
Martin Fall
VERY WARM
RAIN IN THE EVENING
Rupert House
MILD
Henley House
SOFT
Osnaburgh House
SOFT
Moose Factory
WARM
Time Bar. Ther.
7:30 A.M. 30..27 26.5 +
9:00 PM. 30..33 32.5 +
Fort Alexander
SNOWING
Escabitchewan
SNOWING
Ash Fall
CLEAR, SHARP
Brandon
House
A LITTLE SNOW
Nipigon
House
CALM
RAINY
New Brunswick
House
MILD, THAW MOST
OF THE DAY
Abitibi Fort
FINE
Kenogamissi
MILD
Michipicoten
FINE, CLEAR, WARM
H
SCALE
0 100 200 300 400 500 MILES
0 200 400 600 KILOMETRES
CONIC PROJECTION

Figure 37.

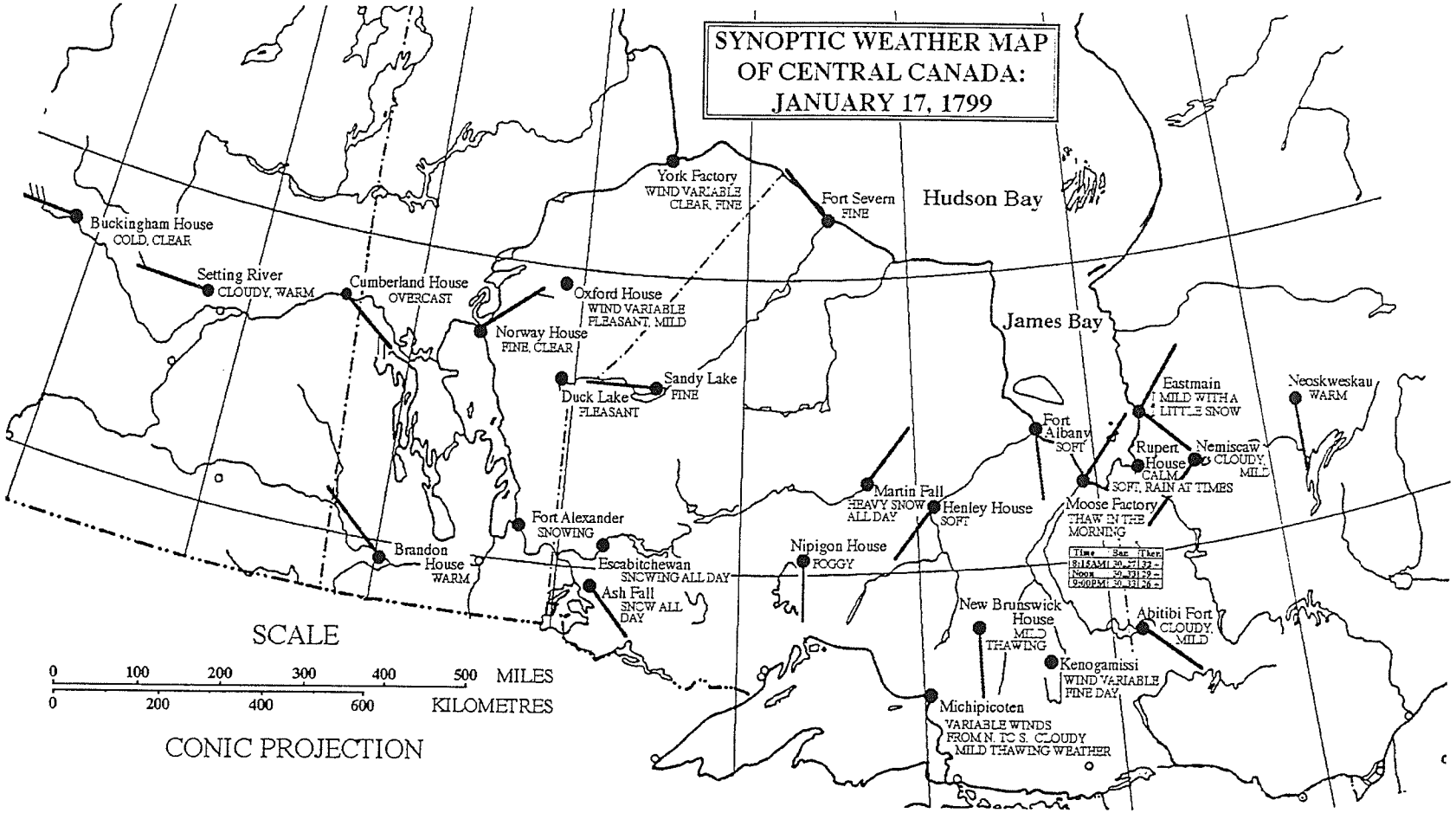

SYNOPTIC WEATHER MAP
OF CENTRAL CANADA:
JANUARY 17, 1799
Hudson Bay
James Bay
York Factory
WIND VARIABLE
CLEAR, FINE
Fort Severn
FINE
Buckingham House
COLD, CLEAR
Setting River
CLOUDY, WARM
Cumberland House
OVERCAST
Oxford House
WIND VARIABLE
PLEASANT, MILD
Norway House
FINE, CLEAR
Sandy Lake
FINE
Duck Lake
PLEASANT
Eastmain
MILD WITH A
LITTLE SNOW
Neoskweskau
WARM
Fort
Albany
SOFT
Rupert
House
CALM
SOFT, RAIN AT TIMES
Nemiscaw
CLOUDY,
MILD
Martin Fall
HEAVY SNOW
ALL DAY
Henley House
SOFT
Moose Factory
THAW IN THE
MORNING
Fort Alexander
SNOWING
Brandon
House
WARM
Escabitchewan
SNOWING ALL DAY
Nipigon House
FOGGY
Ash Fall
SNOW ALL
DAY
New Brunswick
House
MILD
THAWING
Abitibi Fort
CLOUDY,
MILD
Kenogamissi
WIND VARIABLE
FINE DAY
Michipicoten
VARIABLE WINDS
FROM N. TO S. CLOUDY
MILD THAWING WEATHER
SCALE
0 100 200 300 400 500 MILES
0 200 400 600 KILOMETRES
CONIC PROJECTION

Figure 38.

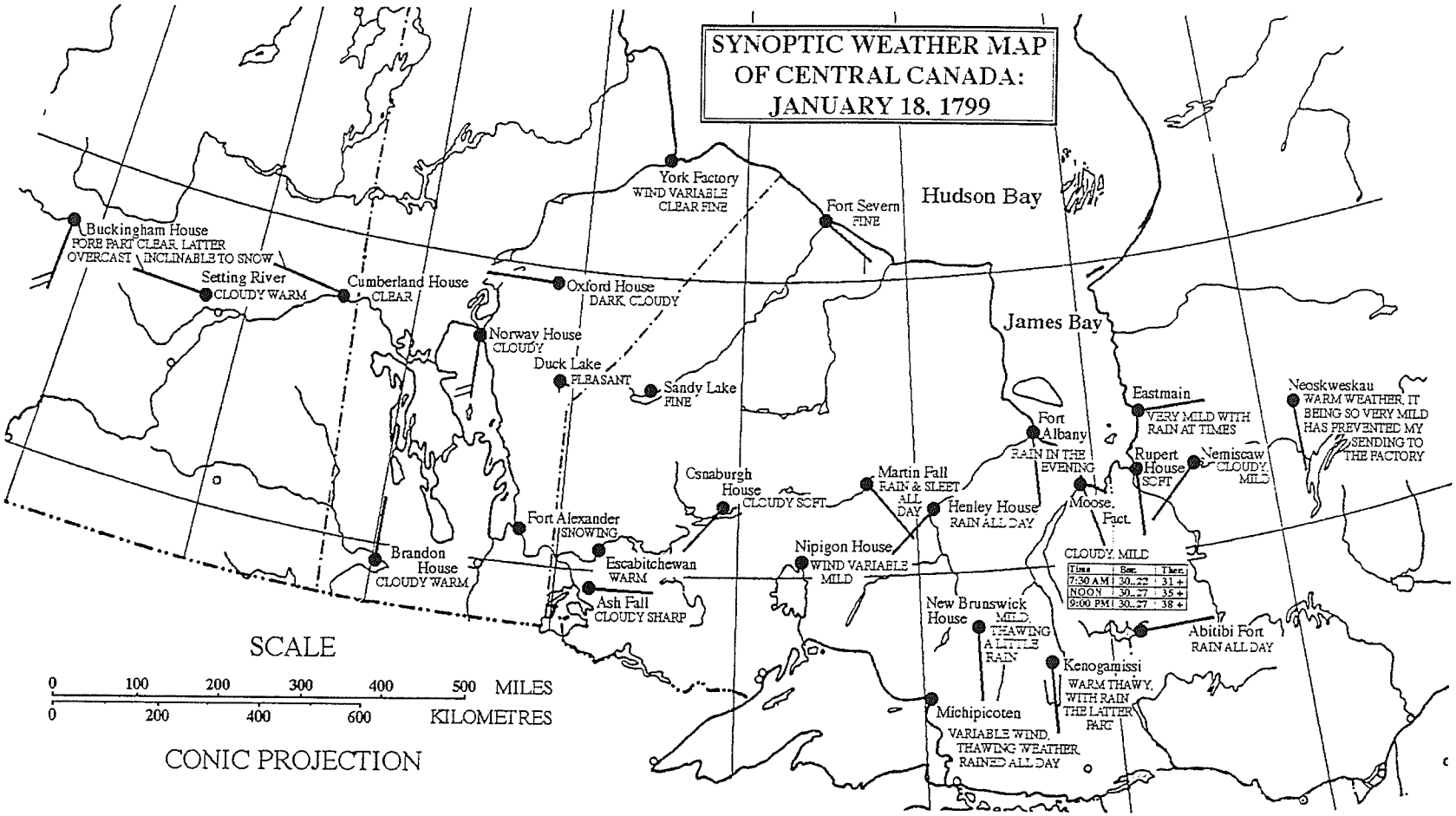

SYNOPTIC WEATHER MAP OF CENTRAL CANADA: JANUARY 18, 1799
Hudson Bay
James Bay
York Factory
WIND VARIABLE
CLEAR FINE
Fort Severn
FINE
Buckingham House
FORE PART CLEAR, LATTER OVERCAST INCLINABLE TO SNOW
Setting River
CLOUDY WARM
Cumberland House
CLEAR
Oxford House
DARK CLOUDY
Norway House
CLOUDY
Duck Lake
PLEASANT
Sandy Lake
FINE
Eastmain
VERY MILD WITH RAIN AT TIMES
Neoskweskau
WARM WEATHER, IT BEING SO VERY MILD HAS PREVENTED MY SENDING TO THE FACTORY
Fort Albany
RAIN IN THE EVENING
Rupert House
SOFT
Nemiscaw
CLOUDY, MILD
Csnaburgh House
CLOUDY SOFT
Martin Fall
RAIN & SLEET ALL DAY
Henley House
RAIN ALL DAY
Moose Fact.
CLOUDY, MILD
Fort Alexander
SNOWING
Nipigon House
WIND VARIABLE
MILD
Brandon House
CLOUDY WARM
Escabitchewan
WARM
Ash Fall
CLOUDY SHARP
New Brunswick House
MILD, THAWING A LITTLE RAIN
Abitibi Fort
RAIN ALL DAY
Kenogamissi
WARM THAWY, WITH RAIN THE LATTER PART
Michipicoten
VARIABLE WIND, THAWING WEATHER RAINED ALL DAY
SCALE
0 100 200 300 400 500 MILES
0 200 400 600 KILOMETRES
CONIC PROJECTION

Figure 39.

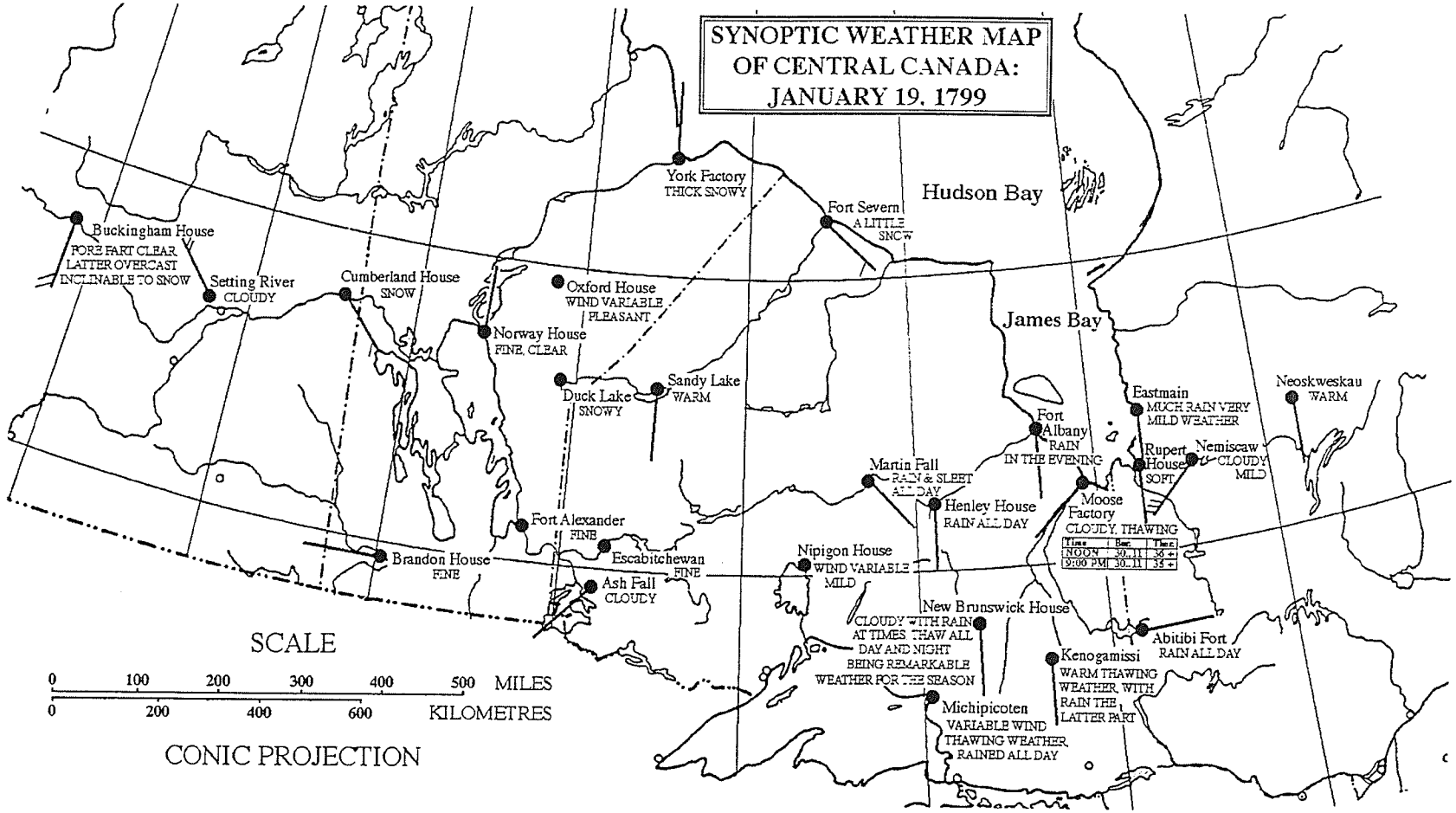

SYNOPTIC WEATHER MAP
OF CENTRAL CANADA:
JANUARY 19, 1799
Hudson Bay
James Bay
York Factory
THICK SNOWY
Fort Severn
A LITTLE
SNOW
Buckingham House
PORE PART CLEAR
LATTER OVERCAST
INCLINABLE TO SNOW
Setting River
CLOUDY
Cumberland House
SNOW
Oxford House
WIND VARIABLE
PLEASANT
Norway House
FINE, CLEAR
Sandy Lake
WARM
Duck Lake
SNOWY
Eastmain
MUCH RAIN VERY
MILD WEATHER
Neoskweskau
WARM
Fort
Albany
RAIN
IN THE EVENING
Rupert
House
SOFT
Nemiscaw
CLOUDY
MILD
Martin Fall
RAIN & SLEET
ALL DAY
Henley House
RAIN ALL DAY
Moose
Factory
CLOUDY, THAWING
Time | Bar. | Ther.
NOON 30..11 36 +
9:00 PM 30..11 35 +
Fort Alexander
FINE
Brandon House
FINE
Escabitchewan
FINE
Ash Fall
CLOUDY
Nipigon House
WIND VARIABLE
MILD
New Brunswick House
CLOUDY WITH RAIN
AT TIMES THAW ALL
DAY AND NIGHT
BEING REMARKABLE
WEATHER FOR THE SEASON
Abitibi Fort
RAIN ALL DAY
Kenogamissi
WARM THAWING
WEATHER, WITH
RAIN THE
LATTER PART
Michipicoten
VARIABLE WIND
THAWING WEATHER
RAINED ALL DAY
SCALE
0 100 200 300 400 500 MILES
0 200 400 600 KILOMETRES
CONIC PROJECTION

Figure 40.

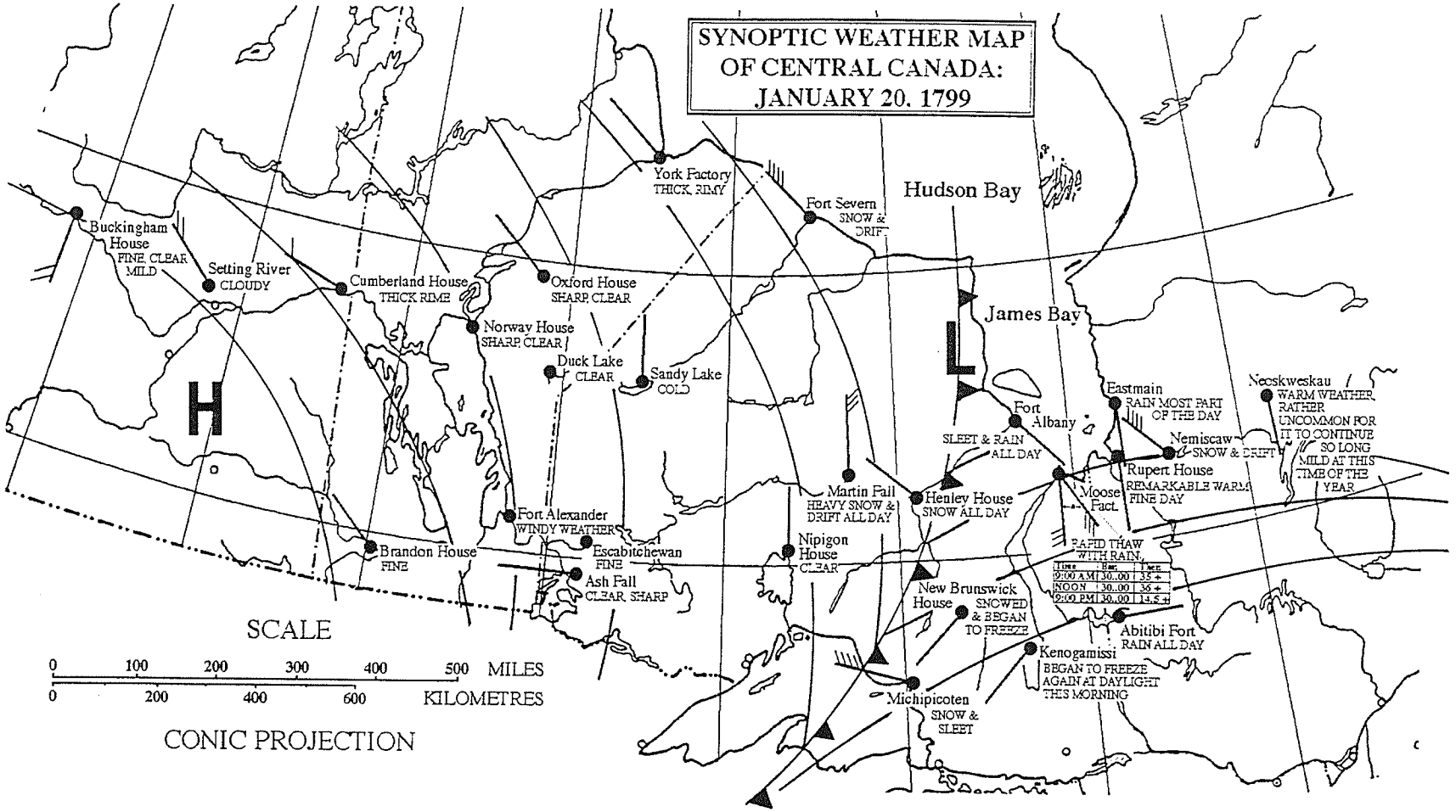

SYNOPTIC WEATHER MAP
OF CENTRAL CANADA:
JANUARY 20. 1799
Hudson Bay
James Bay
H
L
York Factory
THICK, RIMY
Fort Severn
SNOW & DRIFT
Buckingham House
FINE, CLEAR
MILD
Setting River
CLOUDY
Cumberland House
THICK RIME
Oxford House
SHARP, CLEAR
Norway House
SHARP, CLEAR
Duck Lake
CLEAR
Sandy Lake
COLD
Eastmain
RAIN MOST PART OF THE DAY
Fort Albany
SLEET & RAIN ALL DAY
Nemiscaw
SNOW & DRIFT
Neoskweskau
WARM WEATHER, RATHER UNCOMMON FOR IT TO CONTINUE SO LONG MILD AT THIS TIME OF THE YEAR
Rupert House
REMARKABLE WARM FINE DAY
Moose Fact.
Martin Fall
HEAVY SNOW & DRIFT ALL DAY
Henley House
SNOW ALL DAY
Fort Alexander
WINDY WEATHER
Brandon House
FINE
Escabitchewan
FINE
Ash Fall
CLEAR, SHARP
Nipigon House
CLEAR
RAPID THAW WITH RAIN.
Time | Bar. | Ther.
9:00 A.M. | 30..00 | 35 +
NOON | 30..00 | 36 +
9:00 P.M. | 30..00 | 34.5 +
New Brunswick House
SNOWED & BEGAN TO FREEZE
Abitibi Fort
RAIN ALL DAY
Kenogamissi
BEGAN TO FREEZE AGAIN AT DAYLIGHT THIS MORNING
Michipicoten
SNOW & SLEET
SCALE
0 100 200 300 400 500 MILES
0 200 400 600 KILOMETRES
CONIC PROJECTION

Figure 41.

10

Summary and Suggestions for Future Research

The HBC post journals provide a rich source of climatic information that spans over 200 years. This is a time when human populations began to rapidly increase and the industrial revolution was well under way. Climatologists believe that this period marked the beginning of man-induced climate change. From an anthropocentric viewpoint, such a period can be considered climatically important, and therefore, worthy of study.

One of the greatest challenges facing the climatological community is the need to forecast climatic changes in the coming decades and centuries. A major approach to this forecasting involves the projection of climatic changes from the past into the future. Therefore, there has grown a need to be able to reconstruct the climatic history of the last two to three centuries in great detail, particularly in regions of the Northern Hemisphere where climatic change has major environmental impacts.

The approach taken to reconstruct climate history in this thesis was the examination of changes in the severity of the mid-winter in the James Bay region of Canada. This was accomplished by counting the frequencies of occurrence of mid-winter thaws at Fort Albany, Moose Factory and Eastmain, using the detailed weather descriptions contained within the HBC post journals. A more severe mid-winter

was defined as having less mid-winter thaw events, and a less severe mid-winter was defined as having more mid-winter thaw events. These indices of winter severity were then compared with modern mid-winter thaw data from Moosonee, Ontario (1933-1992) and Eastmain, Quebec (1961-1992).

After analysis of the historical and modern mid-winter thaw data for this region, it has been determined that more mid-winter thaw events occurred at Moose Factory, and later Moosonee, than at Eastmain. However, the greatest change in winter severity occurred at Eastmain, whereby the modern Eastmain mid-winter period (to 1992) appears to have been less severe.

Another interesting demonstration of the weather information contained within the HBC post journals was the production of eighteenth century synoptic weather maps. In fact, the weather maps contained in this thesis are the earliest for central Canada.

Overall, an index of winter severity can be further expanded to represent regions that are north and south of James Bay. This would allow for the production of a north-south transect of mid-winter thaw information for central Canada. For this endeavor, HBC post journals representing such areas as Fort Churchill, York Factory and Fort Severn, which are located north of James Bay, and Nipigon House, Frederick House and Michipicoten, which are located south of James Bay, can be consulted and thaw information transcribed.

Lastly, mid-winter synoptic weather maps for select periods of the nineteenth century can also be constructed where quality of weather descriptions permit. This would allow for a more complete series of historical weather maps of major central Canadian thaws.

References Cited

Atmospheric Environment Service. Canada. Maximum and minimum temperature data for Moosonee, Ontario: 1933-1992 and Eastmain, Quebec: 1961-1992 (recorded on disk). T6075425.001, T6075425.002, T7092305.001, T7092305.002.

Ball, T. 1992. "Climatic Change, Drought and their Social Impact: Central Canada, 1811-20, a Classic Example," *In:* C.R. Harington (ed.), The Year Without a Summer: World Climate in 1816. Ottawa: Canadian Museum of Nature. 185-195.

1986. "Historical Evidence and Climatic Implications of a Shift in the Boreal Forest Tundra Transition in Central Canada," *Climatic Change*, Vol. 8: 121-134.

1985. "A Dramatic Change in the General Circulation on the West Coast of Hudson Bay in 1760 A.D.: Synoptic Evidence Based on Historic Records," *In:* C.R. Harington (ed.), Climatic Change in Canada 5. *Syllogeus*, Vol. 55: 219-245.

and Kingsley, R.H. 1984. "Instrumental Temperature Records at Two Cities in Central Canada: 1768 to 1910," *Climatic Change*, Vol. 6: 39-56.

Bradley, R.S. 1985. Quaternary Paleoclimatology: Methods of Paleoclimatic Reconstruction. Boston: Allen and Unwin, Inc.

Catchpole, A.J.W. 1992. "River Ice and Sea Ice in the Hudson Bay Region During the Second Decade of the Nineteenth Century," *In:* C.R. Harington (ed.), The Year Without a Summer: World Climate in 1816. Ottawa: Canadian Museum of Nature. 233-244.

1992. "Hudson's Bay Company Ships' Log-Books as Sources of Sea Ice Data, 1751-1870," *In:* R.S. Bradley and P.D. Jones (eds.), Climate Since A.D. 1500. London and Boston: Unwin Hyman.

and Hanuta, I. 1989. "Severe Summer Ice in Hudson Strait and Hudson Bay Following Major Volcanic Eruptions, 1751 to 1889 A.D.," *Climatic Change*, Vol. 14: 61-79.

and Halpin, J. 1987. "Measuring Summer Sea Ice Severity in Eastern Hudson Bay," *The Canadian Geographer*, Vol. 31, No. 3: 233-244.

and Faurer, M.A. 1983. "Summer Sea Ice Severity in Hudson Strait, 1751-1870," *Climatic Change*, Vol. 5: 115-139.

Moodie, D.W. and Kaye, B. 1970. "Content Analysis: A Method for the Identification of Dates of First Freezing and First Breaking from Descriptive Accounts," *The Professional Geographer*, Vol. XXII, No. 5: 252-257.

Faurer, M.A. 1992. "The Development and Testing of a Methodology for Extracting Sea-Ice Data from Ships' Log-Books," *In:* C.R. Harington (ed.), The Year Without a Summer: World Climate in 1816. Ottawa: Canadian Museum of Nature. 218-232.

1990. "Reliability Testing in the Derivation of Physical Environmental Information from Historical Sources," Ph. D. Thesis, University of Manitoba, Winnipeg, Manitoba.

Hadley, J.L. and Smith, W.K. 1983. "Influence of Wind Exposure on Needle Desiccation and Mortality for Timberline Conifers in Wyoming, U.S.A.," *Arctic and Alpine Research*, Vol. 15: 125-135.

Hansen-Bristow, K. 1986. "Influence of Increasing Elevation on Growth Characteristics at Timberline," *Canadian Journal of Botany*, Vol. 16: 2517-2523.

Hoeller, A.E. 1982. "The Role of Environmental and Historical Evidence in Climatic Reconstruction: A Preliminary Review and Appraisal," Unpublished Manuscript. Report #82-3. Canadian Climate Centre, Atmospheric Environment Service, Downsview, Ontario.

Hudson's Bay Company Archives
Originals and Mircofilm copies, 1705-1941, in the Provincial Archives of Manitoba, Winnipeg. Basic archival material

used in study: Post Journals for Abitibi Fort, Fort Albany, Fort Alexander, Ash Fall, Blood River House, Brandon House, Buckingham House, Cat Lake House, Fort Churchill, Cumberland House, Duck Lake House, Fort Eastmain, Escabitchewan, Frederick House, Gloucester House, Henley House, Kenogamissi, Lac la Pluie House, Martin Fall, Michipicoten, Moose Factory, Nemicaw, Neoskweskau, New Brunswick House, Nipawin, Nipigon House, Norway House, Osnaburgh House, Oxford House, Fort Pelly, Portage de l'Isle, Red Lake House, Reed Lake House, Rupert House, Sandy Lake House, Setting River House, Fort Severn, Shell River House, Somerset House, South Branch House, Swan River House and York Factory.

Ingram, M.J., Underhill, D.J. and Farmer, G. 1981. "The Use of Documentary Sources for the Study of Past Climates," *In:* T.M. Wigley, M.J. Ingram and G. Farmer (eds.), Climate and History: Studies in Past Climates and their Impact on Man. Cambridge: Cambridge Unversity Press. 180-213.

Jacoby, G.C. 1992. "Dendroclimatic Evidence from Northern North America," *In:* R.S. Bradley and P.D. Jones (eds.), Climate Since A.D. 1500. London and Boston: Unwin Hyman

and Ulan, L.D. 1981. "Review of Dendroclimatology in the Forest-Tundra Ecotone of Alaska and Canada," *In:* C.R. Harington (ed.), Climatic Change in Canada 2. *Syllogeus*, Vol. 33: 97-128.

Kington, J.A. 1988. The Weather of the 1780s Over Europe. Cambridge: Cambridge University Press.

Landsberg, H.E. 1985. "Historical Weather Data and Early Meteorological Observations," *In:* A.D. Hecht (ed.), Paleoclimatic Analysis and Modelling. New York: Wiley. 27-70.

Madison, G.N. 1981. "Reconstruction and Testing of Historical Dates of First Frost and First Snow, James Bay, Ontario 1705-1870," M.A. Thesis, University of Manitoba, Winnipeg, Manitoba.

Magne, M.A. 1981. "Two Centuries of River Ice Dates in Hudson Bay Region from Historical Sources," M.A. Thesis, University of Manitoba, Winnipeg, Manitoba.

McKay, D.K. and Mackay, J.R. 1965. "Historical Records of Freeze-up and Break-up on the Churchill and Hayes Rivers," *Geographical Bulletin*, Vol. 7: 7-16.

Middleton, W.E.K. 1966. A History of the Thermometer and its Use in Meteorology. Baltimore: The John Hopkins Press.

Minns, R. 1970. "An Air Mass Climatology of Canada During the Early Nineteenth Century: An Analysis of the Weather Records of Certain Hudson's Bay Company Forts," M.A. Thesis, University of British Columbia, Vancouver, British Columbia.

Moodie, D.W. 1976. "Science and Reality: Arthur Dobbs and the Eighteenth-Century Geography of Rupert's Land," *Journal of Historical Geography*, Vol. 2: 293-309.

and Catchpole, A.J.W. 1975. Environmental Data from Historical Documents by Content Analysis. Manitoba Geographical Studies No. 5. Winnipeg: University of Manitoba.

Moran, J.M. and Morgan, M.D. 1991. Meteorology: The Atmosphere and The Science of Weather. New York: Macmillan Publishing Company.

Parker, M.L., Bramhall, P.A. and Johnson, S.G. 1983. "Tree-ring Dating of Driftwood from Raised Beaches on the Hudson Bay Coast," *In:* C.R. Harington (ed.), Climatic Change in Canada 3. *Syllogeus*, Vol. 49: 220-272.

Jozsa, L.A., Johnson, S.G. and Bramhall, P.A. 1981. "Dendrochronological Studies on the Coasts of James Bay and Hudson Bay (Parts 1 and 2)," *In:* C.R. Harington (ed.), Climatic Change in Canada 2. *Syllogeus*, Vol. 33: 129-188.

Posts of the Canadian Fur Trade. 1974. Map, Toronto: The Macmillan Company of Canada Limited.

Rannie, W.F. 1983. "Break-up and Freeze-up of the Red River at Winnipeg, Manitoba, Canada in the 19th Century and Some Climatic Implications," *Climatic Change*, Vol. 5: 283-296.

Teillet, J.V. 1988. "A Reconstruction of Summer Sea Ice Conditions in the Labrador Sea Using Hudson's Bay Company Ships' Log-Books, 1751-1870," M.A. Thesis, University of Manitoba, Winnipeg, Manitoba.

Trading Posts, 1774-1821, 1987. Map, Toronto: University of Toronto Press.

Wilson, C.V. 1992. "Climate in Canada, 1809-20: Three Approaches to the Hudson's Bay Company Archives as an Historical Database," *In:* C.R. Harington (ed.), The Year Without a Summer: World Climate in 1816. Ottawa: Canadian Museum of Nature. 162-184.

1988. "The Summer Season Along the East Coast of Hudson Bay During the Nineteenth Century. Part III Summer Thermal and Wetness Indicies. The Indicies, 1800-1900," Unpublished Manuscript, Report No. 88-3. Canadian Climate Centre, Atmospheric Environment Service, Downsview, Ontario.

1985. "Daily Weather Maps for Canada, Summers 1816-1818 - A Pilot Study," *In:* C.R. Harington (ed.), Climatic Change in Canada 5. *Syllogeus*, Vol. 55: 191-218.

1983. "The Little Ice Age on Eastern Hudson Bay: Summers at Great Whale, Fort George, Eastmain, 1814-1821," Unpublished Manuscript, Report No. 83-9. Canadian Climate Centre, Atmospheric Environment Service, Downsview, Ontario.

1982. "The Summer Season Along the East Coast of Hudson Bay During the Nineteenth Century," Unpublished Manuscript, Report No. 82-4. Canadian Climate Centre, Atmospheric Environment Service, Downsview, Ontario.

APPENDIX A

Verbatim Transcriptions of Mid-Winter Thaws at Fort Albany, Moose Factory and Eastmain

ALBANY

B.3/a/1, 1705-06 (Anthony Beale)

(Unbelievably beautiful penmanship, excellent grammar and a very detailed weather account!)

Jan. 15, Folio (F):22
"Close thawing Rainey Weather thawing to that degree that the Houses Runewith - water the Wind S but varyed aboute in the afternoone to the NW and then frose Hard"

B.3/a/2, 1706-07 (Anthony Beale)

(difficult to read!)

no mention of thaw.

NOTE: The Journal(s) for 1707-11 is/are missing. This has been verified.

B.3/a/3, 1711-12 (Anthony Beale)

(very difficult to read!)

Jan. 10, F:13
"Wind Southerly... Som Snow and Sleet"

B.3/a/4, 1712-13 (Anthony Beale)

no mention of thaw.

B.3/a/5, 1713-14 (Anthony Beale)

no mention of thaw.

B.3/a/6, 1714-15 (Anthony Beale)

(Extremely beautiful penmanship and fine grammar)

no mention of thaw.

B.3/a/7, 1715-16 (Mich Grimington)

Dec. 26, F:7d
"This Day Warme Thawey Weather of Day time Winds Sotherly"

Dec. 27, F:7d
"This Day D: [ditto:] Winds and Weather"

Dec. 28, F:7d
"This Day D: [ditto:] Winds and Weather"

Dec. 29, F:7d
"This Day D: [ditto:] Winds and Weather" (see B.3/a/9)

Jan. 21, F:8d
"Wee have had D: [ditto:] Winds [Southerly] Small Gailes of Winds Thawey Weather" (see B.3/a/9)

B.3/a/8, 1717

only June 3 to September 9, 1717.

B.3/a/9, 1715-20 (Thomas Macklish)

frequent mention of "Rimy" or "Rimey" weather. Overall, however, it seems to be a very cold winter period.

Dec. 29, 1715, F:5d
"wind at [South] a fine gale haisey warm weath: the water running of the house."

Dec. 31, 1716, F:18
"wind as Yesterday [variable] with Snow & Sleet. warm weath"

1717-1720: *no mention of thaw.*

NOTE: The Journal for 1720-21 is missing. This has been verified.

B.3/a/10, 1721-22 (Joseph Myatt)

no mention of thaw.

B.3/a/11, 1722-23 (Joseph Myatt)

no mention of thaw.

B.3/a/12, 1723-24 (Joseph Myatt)

no mention of thaw.

B.3/a/13, 1724-25 (Joseph Myatt)

seems to be a cold winter period.

Dec. 13, F:17
"Wind last night SE blowed and snowed S west this morneinge and thaws all Daye"

B.3/a/14, 1725-26 (Joseph Myatt)

another seemingly cold period.

no mention of thaw.

B.3/a/15, 1726-27 (Joseph Myatt)

Jan. 11, F:10d
"W [wind] at South and S.S.E. fresh Gailes and a very Great thaw.

Jan. 12, F:10d
"W [wind] at South and S.S.W. frest Gailes, and a Continued Rain and a very Great thaw"

B.3/a/16, 1727-28 (Joseph Myatt)

Dec. 23, F:9d
"W [wind] at South and SW fresh Gailes with Some Showers of Rain & a Great Thaw"

B.3/a/17, 1728-29 (Joseph Myatt)

seems to be an extremely cold period. For example, read Jan. 12-28 and Mar. 10.

no mention of thaw.

B.3/a/18, 1729-30 (Richard White)

no mention of thaw.

B.3/a/19, 1730-31 (Joseph Adams)

for the most part, a cold period.

no mention of thaw.

B.3/a/20, 1731-32 (Joseph Adams)

another cold period.

no mention of thaw.

B.3/a/21, 1732-33 (Richard White)

(beautiful penmanship!)

does not seem to be a cold season.

no mention of thaw.

B.3/a/22, 1733-34 (Joseph Adams)

(beautiful penmanship!)

definitely not a cold winter period!

no mention of thaw.

B.3/a/23, 1734-35 (Joseph Adams)

Jan. 12, F:15d
"Wind S'ly till Evin'g then vear'd to W & NW very warm weather; thaw'd Much & Drizling rain at times."

B.3/a/24, 1735-36 (Joseph Adams)

(beautiful penmanship!)

no mention of thaw.

B.3/a/25, 1736-37 (Joseph Adams)

no mention of thaw.

B.3/a/26, 1736-38 (Joseph Adams)

1736-37: *no mention of thaw.*

Jan. 10, 1738, F:49
"Wind S'ly all day blow'd a fresh Gale, thaw'd much & very warm weather for yee time of year; & it rain'd at Night."

Jan. 22, 1738, F:50
"it rain'd last night"

B.3/a/27, 1737-38 (Thomas Bird)

(copy of B.3/a/26)

Jan. 10, F:17
"Wind S'ly all day blow'd a fresh Gale, thawing much & very fine weather for yee time of year; & Rain at Night"

Jan. 22, F:18
"it rain'd Last Night"

B.3/a/28, 1738-39 (Thomas Bird)

(beautiful penmanship!)

no mention of thaw.

B.3/a/29, 1739-40 (George Spence)

no mention of thaw.

B.3/a/30, 1740-41 (Joseph Isbister)

no mention of thaw.

B.3/a/31, 1740-41 (George Spence)

(copy of B.3/a/30)

no mention of thaw.

B.3/a/32, 1740-41 (Thomas Nelthorpe)

(copy of B.3/a/30,31)

however...

Jan. 11, F:8d
"part of this day it Thawed & was very warm, towards the Evening it freez'd very hard attend'd with some snow"

B.3/a/33, 1741-42 (Joseph Isbister)

I will assign the following to a "possible" category as there's a possibility that the term "warm" refers to a thaw here <u>when taken in context</u>, and also because a thaw occurred on Dec. 31, 1741 at Eastmain (B.59/a/6). At Eastmain "thawing" is specifically mentioned.

Dec. 30, 31 and Jan. 19 (*possible*)
"warm weather"

B.3/a/34, 1742-43 (Joseph Isbister)

no mention of thaw.

B.3/a/35, 1743-44 (Joseph Isbister)

Jan. 5, F:18d (*probable*)
"Wind Southerly warm weather"

Jan. 6, F:18d
"Wind SW with rain Sleet & Snow; but warm"

B.3/a/36, 1744-45 (George Spence)

(Immaculate penmanship!)

Jan. 11, F:18d
"Wind SE in yee Morning blowing a strong Gale with Hail, Snow & Rain, fair cloudy Weather & yee Wind att SW in yee Afternoon"

Jan. 10, 12 (*probable*)
"warm" weather is mentioned.

Jan. 8, 9 (*possible*)
"warm" weather is mentioned.

B.3/a/37, 1745-46 (Joseph Isbister)

no mention of thaw.

B.3/a/38, 1746-47 (Joseph Isbister)

seems to be a particularly cold period.

no mention of thaw.

B.3/a/39, 1747-48 (George Spence)

(nice penmanship)

no mention of thaw.

B.3/a/40, 1748-49 (George Spence)

Jan. 21, F:14
"Wind S warm thawing Weather"

Jan. 22, F:14 (*probable*)
"Wind SE warm cloudy Weather"

B.3/a/41, 1749-50 (George Spence)

no mention of thaw.

B.3/a/42, 1749-50 (John Yarrow)

"A journal of Wintering the Success Sloop att Albany and a voige to Goulf Hazourd, in the year 1749/50"

no mention of thaw.

B.3/a/43, 1750-51 (George Spence)

Jan. 14, F:14d
"Wind S warm cloudy Weather with drizling Rain att times"

Jan. 15, F:14d (*probable*)
"Little Wind and variable round the Compass warm serene Weather"

B.3/a/44, 1751-52 (George Spence)

no mention of thaw.

B.3/a/45, 1752-53 (George Spence)

(coldest period shifted up 12 days to Jan. 3 - Feb. 3, since Sept. 2 is followed by Sept.14.)

Jan. 22, F:12d
"A small Breeze of Wind att SW warm thawing Weather"

Jan. 23, F:13 (*probable*)
"Little or no Wind all Day warm serene Weather"

Jan. 24, F:13
"Wind SW warm thawing Weather"

Jan. 25, F:13 (*probable*)
"A strong Gale of Wind att SW: warm Cloudy Weather"

Jan. 26, F:13 (*possible*)
"Wind NW blowing fresh in the middle of the Day, warm serene Weather."

Jan. 29, F:13 (*probable*)
"A small breeze of Wind and variable on the Southern Board warm Cloudy Weathers."

Jan. 30, F:13
"Little or no wind all Day warm rainy Weather"

B.3/a/46, 1753-54 (Joseph Isbister)

no mention of thaw.

B.3/a/47, 1754-55 (Joseph Isbister)

no mention of thaw.

B.3/a/48, 1755-56 (Joseph Isbister)

Jan. 29, F:15d *(probable)*
"Winds at SE'st & South Small breezes Cloudy with warm weather"

Jan. 30, F:15d

"Winds Variable yee first-part-Fresh breezes at SE'st. Cloudy with warm weather, by yee latter part-winds at E'st-North strong gales Accompanyed with one Small Shoures of rain which was followed with sleet & Snow & hard frost"

B.3/a/49, 1756-57 (Robert Temple)

no mention of thaw.

B.3/a/50, 1757-58 (Robert Temple)

no mention of thaw.

B.3/a/51, 1758-59 (Robert Temple)

no mention of thaw.

B.3/a/52, 1759-60 (Robert Temple)

Feb. 3, F:14d
"Wind S warm weather and some rain"

B.3/a/53, 1760-61 (Robert Temple)

no mention of thaw.

B.3/a/54, 1761-62 (Robert Temple)

Jan. 5, F:13d (*possible*; thaw on same day at Eastmain)
"Wind S clear warm weather"

Jan. 15, F:14d
"Wind SW cloudy weather Rain last night"

B.3/a/55, 1762-63 (Robert Temple)

no mention of thaw.

B.3/a/56, 1763-64 (Robert Temple)

Jan. 13, F:19d
"Wind very Variable & Cloudy warm Weather, some Raine, and some Snow."

Jan. 18, F:20d
"Wind SW cloudy Weather and a great deal of Rain"

B.3/a/57, 1764-65 (Humphrey Marten)

no mention of thaw.

B.3/a/58, 1765-66 (Humphrey Marten)

no mention of thaw.

B.3/a/59, 1766-67 (Humphrey Marten)

no mention of thaw.

B.3/a/60, 1767-68 (Humphrey Marten)

no mention of thaw.

B.3/a/61, 1768-69 (Thomas Hopkins)

(poor penmanship)

Jan. 27, F:21
"Wind SE and heavy Rain at times"

B.3/a/62, 1769-70 (Humphrey Marten)

(absolutely the finest penmanship yet!)

no mention of thaw.

B.3/a/63, 1770-71 (Humphrey Marten)

frequent mention of extremely windy and/or stormy weather.

Jan. 8, F:17 (*probable*)
"Wind SBE, very warm weather, at times cloudy"

interesting:
Jan. 13, F:17d
"Exceeding bad Weather, blows, drifts, and snows much, Wind NBN almost a hurricane."

B.3/a/64, 1771-72 (Humphrey Marten)

no mention of thaw.

B.3/a/65, 1772-73 (Humphrey Marten)

no mention of thaw.

B.3/a/66, 1773-74 (Humphrey Marten)

no mention of thaw.

B.3/a/67, 1774 (John Jarvis, surgeon)

journey from Fort Albany to Henly House.

only March 7 to 17, 1774.

B.3/a/68, 1774-75 (Thomas Hutchins)

Jan. 23, F:12
"Wind S.S.W. warm clear thawing weather"

Jan. 24, F:12 (*probable*)
"Wind W.S.W. Clear warm Weather"

B.3/a/69, 1775 (John Jarvis, surgeon)

journey from Fort Albany to Henly House.

only March 29 to May 7, 1775.

B.3/a/70, 1775-76 (Thomas Hutchins)

no mention of thaw.

B.3/a/71, 1776-77 (Thomas Hutchins)

Jan. 16, F:10
"Wind NNW Sharp Rainy Weather"

Jan. 30, F:11d
"Wind North cloudy thawing Weather"

Jan. 31, F:11d
"Wind S cloudy with snow thaws much"

Feb. 2, F:11d
"Wind North Cold Rainy Weather"

B.3/a/72, 1777 (George Sutherland)

"journey to and from the River Equanl"

only March 26 to April 5, 1777.

B.3/a/73, 1777-78 (George Sutherland)

no mention of thaw.

B.3/a/74, 1777-78 (Thomas Hutchins)

(copy of B.3/a/73?)

no mention of thaw.

B.3/a/75, 1778-79 (Thomas Hutchins)

Jan. 30, F:11d (*possible*; thaw on same day at Eastmain)
"Wind WSW cloudy warm Weather with some Snow & Drift"

B.3/a/76, 1778-79 (Thomas Hutchins)

"Abstract of Mr Hutchins Journal from 18th November 1778 to 27th August 1779"

no weather remarks, few dates.

B.3/a/77a, 1779-80 (Thomas Hutchins)

no mention of thaw.

B.3/a/77b, 1779-80 (Philip Turnor)

journey from York Fort to Fort Albany and Moose Fort.

no weather remarks, few dates.

B.3/a/78, 1780-81 (Thomas Hutchins)

no mention of thaw.

B.3/a/79, 1780-81 (Thomas Hutchins)

"1781 Abstract of Mr. Hutchins Journal"

no weather remarks, few dates.

B.3/a/80, 1781-82 (Thomas Hutchins)

Henly House burned down, three people perished.

no mention of thaw.

B.3/a/81, 1782-83 (Edward Jarvis)

no mention of thaw.

B.3/a/82, 1783-84 (Edward Jarvis)

no mention of thaw.

B.3/a/83, 1783-84 (Edward Jarvis)

abstract of Albany Journal of 1783-84.

no weather remarks, few dates.

B.3/a/84, 1784-85 (Edward Jarvis)

no mention of thaw.

B.3/a/85, 1784-85 (Edward Jarvis)

abstract of Albany Journal of 1784-85.

no weather remarks, few dates.

B.3/a/86, 1785-86 (Edward Jarvis)

(lovely penmanship)

a very cold period at first, then quickly warms up to a thaw for 2 days, then reverts back to intense cold.

Jan. 28, F:14
"Wind S.W. blows exceeding hard, nevertheless thaws a little"

Jan. 29, F:14
"Wind S.W. blows fresh exceeding warm weather thawing the whole day"

B.3/a/87, 1785-86 (Edward Jarvis)

abstract of Albany Journal of 1785-86. Includes: "State of Guns at Albany Fort, extract from overhale Book 1786"

no weather remarks, few dates.

B.3/a/88, 1786-87 (Edward Jarvis)

* also includes Barometer and Thermometer readings in the left margins, giving 2 or 3 times. (e.g. 8 or 9 am, sometimes noon, and 6, 7 or 8 pm)

no mention of thaw.

B.3/a/89, 1787-88 (Edward Jarvis)

like B.3/a/88 (above), this journal also contains both Barometer and Thermometer readings.

no mention of thaw.

B.3/a/90, 1788-89 (Edward Jarvis)

no thermometer or barometer readings.

no mention of thaw.

B.3/a/91, 1789-90 (John McNab)

no mention of thaw.

B.3/a/92, 1790-91 (Edward Jarvis)

no mention of thaw.

B.3/a/93a, 1791-92 (Edward Jarvis)

no mention of thaw.

B.3/a/93b, 1792 (Donald MacKay)

Lake Dubois Journal.

only February 23 to July 9.

B.3/a/94, 1792-93 (John McNab)

no mention of thaw.

B.3/a/95, 1793-94 (John McNab)

Jan. 9, F:13
"Wind variable heavy Snow & Sleet"

Jan. 21, F:14
"Very mild weather with heavy rain in the Even'g. uncommon at this Season"

B.3/a/96, 1794-95 (John McNab)

no mention of thaw.

B.3/a/97, 1795-96 (John McNab)

no mention of thaw.

B.3/a/98, 1796-97 (John McNab)

no mention of thaw.

B.3/a/99, 1794-97

no winter period recorded.

B.3/a/100, 1796-98 (Donald McKay)

journey from Albany to York for 1796/97 and 1797/98.

B.3/a/101, 1797-98 (John McNab)

no mention of thaw.

B.3/a/102, 1798-99 (John McNab)

Jan. 18, F:9
"Wind S rain in the Evening"

Jan. 19, F:9
"Wind & Weather as yesterday"

Jan. 20, F:9
"Wind SE. Sleet & rain all day."

B.3/a/103, 1799-1800 (John Hodgson)

no mention of thaw.

B.3/a/104, 1800-01 (John Hodgson)

every 7 days there is an entry.

no mention of thaw.

NOTE: The journal for 1801-02 is missing. This has been verified.

GAP B.3/a/105, 1802-03 (John Hodgson)

every 7 days there is an entry.

no weather remarks.

GAP B.3/a/106, 1803-04 (John Hodgson)

every 7 days there is an entry.

no weather remarks.

B.3/a/107, 1804-05 (John Hodgson)

every 7 days there is an entry.

on Feb 4, F:8d it reads:
"the Weather has been so exceeding sharp since Christmas, that it was scarce possible to drive a Nail into the Timbers, without splitting to pieces"

no mention of thaw.

GAP B.3/a/108, 1805-06 (John Hodgson)

every 7 days there is an entry.

no weather remarks.

GAP B.3/a/109, 1806-07 (John Hodgson)

every 7 days there is an entry.

very few weather remarks.

GAP B.3/a/110, 1807-08 (Thomas Vincent)

every 7 days there is an entry.

no weather remarks.

GAP B.3/a/111, 1808-09 (John Hodgson)

every 7 days there is an entry.

no weather remarks.

B.3/a/112, 1808-09

only a school journal. These are mainly children of Englishmen fur traders.

GAP B.3/a/113, 1809-10 (Thomas Vincent)

every 7 days there is an entry.

no weather remarks.

GAP B.3/a/114, 1810-11 (Thomas Vincent)

every 7 days there is an entry.

no weather remarks.

GAP B.3/a/115, 1811-12 (Thomas Vincent)

every 7 days there is an entry.

no weather remarks.

GAP B.3/a/116, 1812-13 (Thomas Vincent)

daily journal entries, but...

no weather remarks.

GAP B.3/a/117a, 1813-14 (Thomas Vincent)

only 2 weather remarks about sharp weather (Jan. 28 & Feb. 2, F:10).

almost no weather remarks.

B.3/a/117b, 1814

only a "Journal from London to Quebec. Trent, Moose and Albany Factory's by George Gladman April 11 to August 13, 1814"

B.3/a/118, 1814-15 (Jacob Corrigal)
(Meteorological Register at back of Journal)

only some mention of weather in the main journal, while the meteorological journal begins on Jan. 21.

no indication/mention of thaw.

B.3/a/119a, 1815-16 (Jacob Corrigal)

no mention of thaw.

B.3/a/119b, 1815-16

only a "Journal of a Journey from Albany and Moose Factory's in Hudson Bay to London.

B.3/a/120, 1816-17 (Jacob Corrigal)

no mention of thaw.

B.3/a/121, 1816-17

Meteorological Register

no indication/mention of thaw.

B.3/a/122, 1817-18 (Jacob Corrigal)
(Meteorological Register at back of Journal)

no indication/mention of thaw.

B.3/a/123, 1818-19 (Jacob Corrigal)
(Meteorological Register at back of Journal)

no indication/mention of thaw.

B.3/a/124, 1819-20 (Jacob Corrigal)

no weather remarks.

B.3/a/125, 1819-20 (Jacob Corrigal)
Meteorological Register

no indication/mention of thaw.

B.3/a/126, 1820-21 (Jacob Corrigal)
(Meteorological Register at back of Journal)

no mention of thaw.

NOTE: The journal for 1821-22 is missing. This has been verified.

B.3/a/127, 1822-23 (Angus Bethune)

every 6 days (or so) there is an entry with a vague weather remark for the week. This format lasts up to and including Jan. 25, after which there is a daily remark. It appears to be very mild on Jan. 26, 27, 28 & 29. Nevertheless...

no <u>specific</u> mention of thaw.

B.3/a/128, 1823-24 (William McKay)

Jan. 22, F:14d
"Wind SE weather mild for the Season"

Jan. 23, F:14d (*possible*)
"Wind & Weather as yesterday"

Jan. 24, F:14d
"Wind S'erly, clear thawing weather."

Jan. 25, F:14d (*possible*)
"Wind SE mild and clear."

B.3/a/129, 1824-25 (William McKay)

no mention of thaw.

B.3/a/130, 1825-26 (William McKay)

Jan. 9, F:15d
"Wind SE cloudy till noon; afterwards rain"

Jan. 10, F:15d
"Wind variable from NE to NW, rain, snow & sleet."

Jan. 11, F:15d (*probable*)
"Wind W'erly, cloudy mild weather."

B.3/a/131, 1826-27 (William McKay)

a mild period.

no mention of thaw.

B.3/a/132, 1827-28 (William McKay)

no mention of thaw.

B.3/a/133, 1828-29 (Alexander Kennedy)

Jan. 15, F:22
"Wind easterly warm weather - Thermometer stood 35 dgs above 0."

Jan. 22, F:22d
"Wind Westerly cold in the forenoon but afterwards got warm again in the afternoon when a shower of rain fell which was soon followed by sleet, and the day closed with a heavy fall of Snow."

B.3/a/134, 1829-30 (Alexander McTavish)

(poor penmanship)

no mention of thaw.

B.3/a/135, 1830-31 (Jacob Corrigal)

some days are missing.

no mention of thaw.

B.3/a/136, 1831-32 (Jacob Corrigal)

some days are missing.

Jan. 21, F:10d (last entry was on the 16th, therefore 1 "*thaw*" & 4 "*prob.*")
"The weather has been very mild all this last week, the little snow that was on the ground is thawed off a great deal"

B.3/a/137, 1832-33 (Jacob Corrigal)

infrequent weather remarks and/or thermometer readings.

no mention of thaw.

B.3/a/138, 1833-34 (Jacob Corrigal)

infrequent weather remarks and/or thermometer readings.

no mention of thaw.

B.3/a/139, 1834-35 (Jacob Corrigal)

seems to be a mild period.

no mention of thaw.

B.3/a/140, 1835-36 (Jacob Corrigal)

seems to be a mild period.

Jan. 7, F:12 (*possible*)
"Fine mild weather. Ther 30 above zero"

Jan. 8, F:12 (*probable*)
"Very soft weather"

B.3/a/141, 1836-37 (Jacob Corrigal)

some missing days; Seems to be a milder period.

Jan. 16, F:18
"Fine mild weather, more like Spring thaw winter."

B.3/a/142, 1837-38 (Jacob Corrigal)

a few missing days.

Jan. 5, F:18
"Very mild weather, blowing a gale from the South west accompanied with Rain."

B.3/a/143, 1838-39 (Jacob Corrigal)

some missing days.

Jan. 7, F:18d (thaw refers to Jan. 6)
"The weather to day was pretty cold, but yesterday it was very mild, so much so that the snow on the ground began to thaw"

B.3/a/144, 1839

only extracts from the 1838/39 Albany Journal.

B.3/a/145, 1839-40 (Jacob Corrigal)

some missing days, sparce weather comments.

no mention of thaw.

B.3/a/146, 1840-41 (George McPherson)

a few missing days, however excellent weather coverage.

no mention of thaw.

B.3/a/147, 1841-42 (George Barnston)

some missing days, many missing weather remarks, however out-of-the-ordinary events seem to be mentioned.

no mention of thaw.

B.3/a/148, 1842-43 (George Barnston)

a few missing days and a few missing weather remarks. Nevertheless, out-of-the-ordinary weather events seem to be mentioned.

Jan. 6, F:14
"A change in the weather, Wind East and South East: Soft snow, Hail & a little Rain. The surface of the snow is glazed over with the moisture"

Jan. 9, F:14d (*probable*)
"Soft weather generally"

Jan. 21, F:14d (covers 16th to 21st, therefore 1 "*rain*" & 5 "*prob.*")
"It has been another week of very mild weather and we had Rain last night & the thermometer this day in the shade as high as 36 of Fahrenheit."

B.3/a/149, 1843-44 (Thomas Corcoran)

no mention of thaw.

B.3/a/150, 1844-45 (Thomas Corcoran)

Jan. 22, F:24
"The weather continues Mild Ther. 34 above 0."

Jan. 23, F:24
"Mild weather: thawing the greater part of the day. Some Snow fell in the evening."

B.3/a/151, 1845-46 (Thomas Corcoran)

Jan. 24, F:20d
"Mild weather, thawing in the evening"

B.3/a/152, 1846-47 (Thomas Corcoran)

no mention of thaw.

B.3/a/153, 1846-47 (Thomas Corcoran)

(copy of B.3/a/152)

B.3/a/154, 1847-48 (Thomas Corcoran)

no mention of thaw.

B.3/a/155, 1847-48 (Thomas Corcoran)

(copy of B.3/a/154)

B.3/a/156, 1848-49 (Thomas Corcoran)

no mention of thaw.

B.3/a/157, 1848-49 (Thomas Corcoran)

(copy of B.3/a/156)

B.3/a/158, 1849-50 (Thomas Corcoran)

no mention of thaw.

B.3/a/159, 1849-50 (Thomas Corcoran)

(copy of B.3/a/158)

B.3/a/160, 1850-51 (Thomas Corcoran)

no mention of thaw.

B.3/a/161, 1850-52 (Thomas Corcoran)

1851: *no mention of thaw.*

(Joseph Wilson)

1852: many missing weather remarks, but *no mention of thaw.*

B.3/a/162, 1851-52 (Joseph Wilson)

many missing weather remarks.

no mention of thaw.

B.3/a/163, 1852-53 (Joseph Wilson)

Jan. 5, F:22d
"Mild weather - thawing the greater part of the day, Wind Sly."

Jan. 6, F:23 (*probable*)
"Mild weather, Wind Sly"

B.3/a/164, 1853-54 (Thomas Corcoran)

no mention of thaw.

B.3/a/165, 1854-55 (Thomas Corcoran)

Jan. 3, F:17d
"Cloudy mild disagreeable weather, occasioned by heavy rain which commenced at about 8 pm last night and continued the greater part of the day"

Jan. 7, F:18
"We had a storm of wind last night and a more violent one I have not witnessed at Albany. It was accompanied with torrents of rain"

B.3/a/166, 1855-56 (James Watt)

no mention of thaw.

B.3/a/167, 1855-56 (James Watt)

(copy of B.3/a/166)

B.3/a/168, 1856-57 (James Watt)

mention of an "old thermometer" on Jan. 6, F:79d.

Jan. 7, F:80
"Thermometer still lower to day 53 deg. below zero."

no mention of thaw.

B.3/a/169, 1856-57 (James Watt)

(copy of B.3/a/168)

B.3/a/170, 1857-58 (Richard Hardisty)

no mention of thaw.

B.3/a/171, 1857-58 (Richard Hardisty)

(copy of B.3/a/170)

B.3/a/172, 1858-60 (Richard Hardisty)

Jan. 8, 1859, F:18d
"Thermometer stood at 55 below 0 this morning at 7 o'clock"

Jan. 9, 1859, F:18d
"52 below zero" (left margin)

Jan. 20, 1859, F:19d
"Wind SW and Cloudy - Raining at times"

Jan. 24, 1860, F:43d & 44
"Wind S. and very Mild Cloudy Weather...Raining about four o'clock in the evening."

Jan. 31, 1860, F:44
"51 Degrees below zero"

B.3/a/173, 1860-61 (George McTavish)

Jan. 13, F:30
"Wind S.S. West very mild and cloudy and in the evening sleet and a little rain"

B.3/a/174, 1861-62 (George McTavish)

no mention of thaw.

B.3/a/175, 1862-64 (George McTavish)

(poor penmanship!)

Jan. 3, 1863, F:16
"Another very mild day with light Southerly wind, we had several small showers of rain during the day"

Jan. 4, 1863, F:16
"Raining all day. a large quantity of the snow has disappeared"

Jan. 16, 1863, F:16d
"The coldest day this season 52 below-zero at sunrise"

1864: only Jan. 4, 11, 12 & 18 mentioned, *no thaw*, but see B.3/a/176 below.

B.3/a/176, 1864 (Alexander McDonald)

journal covers January 20, 1864 to February 19, 1864.

no mention of thaw.

B.3/a/177, 1864-67 (Alexander McDonald)

1865: many days missing.

Jan. 28, 1865, F:13
"Very mild thermometer up to 30 above zero in the evening at 5 o'clock when it rained a little"

1866: some missing days.

Jan. 11, 1866, F:40d
"Still milder this evening nearly thawing with sleet"

Jan. 12, 1866, F:40d
"Thermometer 35...fine day"

Jan. 13, 1866, F:40d
"Wind and weather much the same as yesterday"

Jan. 17, 1866, F:41
"Mild day with some sleet last night"

Jan. 31, 1866, F:42
"Very mild almost thawing the whole day"

1867: some missing days & many missing weather remarks, but *no mention of thaw.*

B.3/a/178, 1864

only August 22 to September 22, 1864.

B.3/a/179, 1864

voyage from Albany to Moose Factory, August 19 to October 26, 1864.

B.3/a/180, 1866

only August 27 to September 15, 1866.

B.3/a/181, 1867-68 (Alexander McDonald)

many missing days.

no mention of thaw, but may be misleading given so many missing days.

NOTE: The journal(s) for 1868-71 is/are missing. This has been verified.

B.3/a/182, 1871-73 (Alexander McDonald)

(sad penmanship and grammar)

some missing days.

1872: *no mention of thaw.*

1873: *no mention of thaw.*

B.3/a/183, 1873-82

only April 7 to September 30, 1873 & October 3 to 21, 1873 (not complete), as well as materials/cloths washing lists for most of 1882?

B.3/a/184, 1874-76 (W.K. Broughton)

1874: GAP; almost no weather remarks for January.

1875: GAP; no January 3 to Febuary 3 journal entries.

1876: a few missing days; daily thermometer readings.

Jan. 17, 1876, F:46

"Wind South Snowing and rain...glass 28 above zero before sunrise"

Jan. 18, 1876, F:45d (*probable*)
"Wind West showers of snow and soft weather the same as yesterday...glass 28 above zero"

Feb. 2, 1876, F:44d
"Thermometer nearly 50 below zero."

B.3/a/185, 1876-77 (W.K. Broughton)

very neat journal; daily thermometer readings.

Jan. 28, F:14d
"Wind E'ly, fair & clear. Therm. +33. first thaw this winter."

Jan. 29, F:14d
"Wind W'ly. therm. +35"

Jan. 30, F:15
"Wind W'ly very fine weath. ther. +36"

Feb. 3, F:15d
"Wind S. Ther +32."

B.3/a/186, 1877-78 (W.K. Broughton)

very neat journal; daily thermometer readings.

no mention of thaw.

B.3/a/187, 1878-79 (W.K. Broughton)

very neat journal; daily thermometer readings.

no mention of thaw.

B.3/a/188, 1878-80 (W.K. Broughton)
(Meteorological Register at front of Journal)

includes, amount of cloud (0- denotes clear, 10- denotes overcast).
includes, "Selt-Registering Thermometers" section and a "Temperature Of The Air" section.

1879: *no indication/mention of thaw.*

1880: does not include a February register.

DATE (1880)	TEMP. OF THE AIR	SELF REG. THERM.	WEATHER REMARKS
JAN. 6	+31.5	+34.0	Rain at night
JAN. 9	+39.0	+40.0	
JAN. 26	+16.0	+33.0	
JAN. 27	+6.0	+33.0	

(ignore the Jan. 27 temperature reading, as it seems likely that the observer did not reset the maximum thermometer)

B.3/a/189, 1879-80 (W.K. Broughton)

some missing days.

too few weather remarks, but weather information for 1880 found in B.3/a/188 above

GAP B.3/a/190, 1879-81 (W.K. Broughton)
Meteorological Register

no January and February meteorological registers.

NOTE: The journal(s) for 1881-83 is/are missing. This has been verified.

GAP B.3/a/191, 1883-84 (W.K. Broughton)

(very neat journal, fine penmanship)

no weather remarks.

GAP B.3/a/192, 1884-85 (W.K. Broughton)

(very neat journal, fine penmanship)

too few weather remarks and thermometer readings.

NOTE: The journal(s) for 1885-86 is/are missing. This has been verified.

B.3/a/193, 1886-87 (W.K. Broughton)

daily thermometer readings.

no mention of thaw.

B.3/a/194, 1887-88 (W.K. Broughton)

daily thermometer readings, sometimes for more than once a day.

no mention of thaw.

B.3/a/195, 1888-89 (W.K. Broughton)

daily thermometer readings, sometimes for more than once a day.

no mention of thaw.

B.3/a/196, 1889-90 (John Vincent)

(gorgeous penmanship after Jan. 5)

daily thermometer readings.

no mention of thaw.

B.3/a/197, 1890-91 (John Vincent)

Jan. 19, F:25 (*probable*)
"Mild Spring like day."

B.3/a/198, 1891-92 (John Vincent)

no mention of thaw.

B.3/a/199, 1892-93 (John Vincent)

no mention of thaw.

B.3/a/200, 1893-94 (John Vincent)

no mention of thaw.

B.3/a/201, 1894-95 (John Vincent)

no mention of thaw.

NOTE: The Journal for 1895-96 is missing. This has been verified.

B.3/a/202, 1896-97 (John Vincent)

a stormy period (there was a definite thaw on Jan. 2)

no mention of thaw.

B.3/a/203, 1897-99 (John Vincent)

a fine journal with daily thermometer readings.

1898: *no mention of thaw.*

1899: *no mention of thaw.*

B.3/a/204, 1898-1900

(John Vincent)

(copy of B.3/a/203)

1898: *no mention of thaw.*

1899: *no mention of thaw.*

(David Amit)

1900: *no mention of thaw.*

Jan. 25, 1900, F:56
"North West Wind 50 Below."

B.3/a/205, 1901-1906 (Bickford)

1901: *no mention of thaw.*

1902: *no mention of thaw.*

1903: *no mention of thaw.* (interesting writing style)

1904: *no mention of thaw.*

1905: *no mention of thaw.* (some missing weather remarks)

1906: *no mention of thaw.*

B.3/a/206, 1907-1908

(Bickford)

1907: *no mention of thaw.*

Jan. 16, 1907, F:1d
"Very Cold -52"

1908:

(John Mowat)

Jan. 7, F:27
"Very Mild - about thawing all day"

Jan. 21, F:28
"Thawing & looks like rain inland"

B.3/a/207, 1908-12

(John Mowat)

1909: *no mention of thaw.*

(Donald Gillies)

1910: *no mention of thaw.*

1911: *no mention of thaw.*

1912: *no mention of thaw.*

B.3/a/208, 1913-21

(Donald Gillies)

1913: *no mention of thaw.*

1914: *no mention of thaw.*

(???)

1915:

Jan. 5, F:105
"Nearly thawing but colder towards night."

Jan. 13, F:106
"nearly thawing"

1916: *no mention of thaw.*

1917: *no mention of thaw.*

1918: *no mention of thaw.* (between Jan. 21 & Jan. 31 no journal kept - party was at Moose)

1919: *no mention of thaw.*

1920: *no mention of thaw.*

(P.O.S. Griffith)

1921:

Jan. 20, F:369
"Southwest wind, thawing very hard in past night and snowing during the day."

NOTE: The journal(s) for 1921-29 is/are missing. This has been verified.

B.3/a/209, 1929-30 (A. Watt)

Jan. 6, F:37
"dull...raining"

B.3/a/210, 1930-31 (?)

Feb. 3, F:35
"Snowing in morning. Very Mild and has been raining overnight."

NOTE: The Journal(s) for 1931-38 is/are missing. This has been verified.

B.3/a/211, 1938-39 (R. Gordon)

special forms, filled in by hand.

weather comments found in left margin beside the daily entry.

Jan. 5, Sheet:38
"wet snow and rain falling"

NOTE: The journal for 1939-40 is missing. This has been verified.

B.3/a/212, 1940-41 (R. Gordon)

same format as B.3/a/211.

no mention of thaw.

END

Fort Albany Thaw Classification Totals

DATE	THAW	RAIN	SLEET	THERM.	PROB.	POSS.
1706	1	0	0	0	0	0
1707	0	0	0	0	0	0
1708						
1709						
1710						
1711						
1712	0	0	1	0	0	0
1713	0	0	0	0	0	0
1714	0	0	0	0	0	0
1715	0	0	0	0	0	0
1716	5	0	0	0	0	0
1717	0	0	1	0	0	0
1718	0	0	0	0	0	0
1719	0	0	0	0	0	0
1720	0	0	0	0	0	0
1721						
1722	0	0	0	0	0	0
1723	0	0	0	0	0	0
1724	0	0	0	0	0	0
1725	1	0	0	0	0	0
1726	0	0	0	0	0	0
1727	2	0	0	0	0	0
1728	1	0	0	0	0	0
1729	0	0	0	0	0	0
1730	0	0	0	0	0	0
1731	0	0	0	0	0	0
1732	0	0	0	0	0	0
1733	0	0	0	0	0	0
1734	0	0	0	0	0	0
1735	1	0	0	0	0	0
1736	0	0	0	0	0	0
1737	0	0	0	0	0	0
1738	2	0	0	0	0	0
1739	0	0	0	0	0	0
1740	0	0	0	0	0	0
1741	1	0	0	0	0	0
1742	0	0	0	0	0	3
1743	0	0	0	0	0	0
1744	0	1	0	0	1	0
1745	0	1	0	0	2	2
1746	0	0	0	0	0	0
1747	0	0	0	0	0	0
1748	0	0	0	0	0	0
1749	1	0	0	0	1	0

Fort Albany Thaw Classification Totals

1750	0	0	0	0	0	0
1751	0	1	0	0	1	0
1752	0	0	0	0	0	0
1753	2	1	0	0	3	1
1754	0	0	0	0	0	0
1755	0	0	0	0	0	0
1756	0	1	0	0	1	0
1757	0	0	0	0	0	0
1758	0	0	0	0	0	0
1759	0	0	0	0	0	0
1760	0	1	0	0	0	0
1761	0	0	0	0	0	0
1762	0	1	0	0	0	1
1763	0	0	0	0	0	0
1764	0	2	0	0	0	0
1765	0	0	0	0	0	0
1766	0	0	0	0	0	0
1767	0	0	0	0	0	0
1768	0	0	0	0	0	0
1769	0	1	0	0	0	0
1770	0	0	0	0	0	0
1771	0	0	0	0	1	0
1772	0	0	0	0	0	0
1773	0	0	0	0	0	0
1774	0	0	0	0	0	0
1775	1	0	0	0	1	0
1776	0	0	0	0	0	0
1777	2	2	0	0	0	0
1778	0	0	0	0	0	0
1779	0	0	0	0	0	1
1780	0	0	0	0	0	0
1781	0	0	0	0	0	0
1782	0	0	0	0	0	0
1783	0	0	0	0	0	0
1784	0	0	0	0	0	0
1785	0	0	0	0	0	0
1786	2	0	0	0	0	0
1787	0	0	0	0	0	0
1788	0	0	0	0	0	0
1789	0	0	0	0	0	0
1790	0	0	0	0	0	0
1791	0	0	0	0	0	0
1792	0	0	0	0	0	0
1793	0	0	0	0	0	0
1794	0	1	1	0	0	0
1795	0	0	0	0	0	0

Fort Albany Thaw Classification Totals

1796	0	0	0	0	0	0
1797	0	0	0	0	0	0
1798	0	0	0	0	0	0
1799	0	3	0	0	0	0
1800	0	0	0	0	0	0
1801	0	0	0	0	0	0
1802						
1803						
1804						
1805	0	0	0	0	0	0
1806						
1807						
1808						
1809						
1810						
1811						
1812						
1813						
1814						
1815	0	0	0	0	0	0
1816	0	0	0	0	0	0
1817	0	0	0	0	0	0
1818	0	0	0	0	0	0
1819	0	0	0	0	0	0
1820	0	0	0	0	0	0
1821	0	0	0	0	0	0
1822						
1823	0	0	0	0	0	0
1824	1	0	0	0	0	2
1825	0	0	0	0	0	0
1826	0	2	0	0	1	0
1827	0	0	0	0	0	0
1828	0	0	0	0	0	0
1829	0	1	0	1	0	0
1830	0	0	0	0	0	0
1831	0	0	0	0	0	0
1832	1	0	0	0	4	0
1833	0	0	0	0	0	0
1834	0	0	0	0	0	0
1835	0	0	0	0	0	0
1836	0	0	0	0	1	1
1837	1	0	0	0	0	0
1838	0	1	0	0	0	0
1839	1	0	0	0	0	0
1840	0	0	0	0	0	0
1841	0	0	0	0	0	0

Fort Albany Thaw Classification Totals

1842	0	0	0	0	0	0
1843	0	2	0	0	6	0
1844	0	0	0	0	0	0
1845	1	0	0	1	0	0
1846	1	0	0	0	0	0
1847	0	0	0	0	0	0
1848	0	0	0	0	0	0
1849	0	0	0	0	0	0
1850	0	0	0	0	0	0
1851	0	0	0	0	0	0
1852	0	0	0	0	0	0
1853	1	0	0	0	1	0
1854	0	0	0	0	0	0
1855	0	2	0	0	0	0
1856	0	0	0	0	0	0
1857	0	0	0	0	0	0
1858	0	0	0	0	0	0
1859	0	1	0	0	0	0
1860	0	1	0	0	0	0
1861	0	1	0	0	0	0
1862	0	0	0	0	0	0
1863	0	2	0	0	0	0
1864	0	0	0	0	0	0
1865	0	1	0	0	0	0
1866	1	0	2	2	0	0
1867	0	0	0	0	0	0
1868	0	0	0	0	0	0
1869						
1870						
1871						
1872	0	0	0	0	0	0
1873	0	0	0	0	0	0
1874						
1875						
1876	0	1	0	0	1	0
1877	1	0	0	3	0	0
1878	0	0	0	0	0	0
1879	0	0	0	0	0	0
1880	0	0	0	3	0	0
1881						
1882						
1883						
1884						
1885						
1886						
1887	0	0	0	0	0	0

Fort Albany Thaw Classification Totals

1888	0	0	0	0	0	0
1889	0	0	0	0	0	0
1890	0	0	0	0	0	0
1891	0	0	0	0	1	0
1892	0	0	0	0	0	0
1893	0	0	0	0	0	0
1894	0	0	0	0	0	0
1895	0	0	0	0	0	0
1896						
1897	0	0	0	0	0	0
1898	0	0	0	0	0	0
1899	0	0	0	0	0	0
1900	0	0	0	0	0	0
1901	0	0	0	0	0	0
1902	0	0	0	0	0	0
1903	0	0	0	0	0	0
1904	0	0	0	0	0	0
1905	0	0	0	0	0	0
1906	0	0	0	0	0	0
1907	0	0	0	0	0	0
1908	2	0	0	0	0	0
1909	0	0	0	0	0	0
1910	0	0	0	0	0	0
1911	0	0	0	0	0	0
1912	0	0	0	0	0	0
1913	0	0	0	0	0	0
1914	0	0	0	0	0	0
1915	2	0	0	0	0	0
1916	0	0	0	0	0	0
1917	0	0	0	0	0	0
1918	0	0	0	0	0	0
1919	0	0	0	0	0	0
1920	0	0	0	0	0	0
1921	1	0	0	0	0	0
1922						
1923						
1924						
1925						
1926						
1927						
1928						
1929						
1930	0	1	0	0	0	0
1931	0	1	0	0	0	0
1932						
1933						

Fort Albany Thaw Classification Totals

1934						
1935						
1936						
1937						
1938						
1939	0	1	0	0	0	0
1940						
1941	0	0	0	0	0	0
TOTALS:	25	34	3	10	26	11

CHECK: 109

MOOSE FACTORY

B.135/a/1, 1730-31 (Thomas Render)

Dec. 22, Folio (F):9d
"Rain all this Day from morning till night."

Dec. 23, F:9d
"The first part of the Day Calm with Rain"

B.135/a/2, 1731-32 (John Jewer)

no mention of thaw.

B.135/a/3, 1732-33 (William Bevan)

Jan. 8, F:12d
"A Fresh gale at WNW Cloudy & Thaw'd all Day."

Jan. 9, F:12d
"the Wind WSW a Strong gale & Thaw'd all Day."

Jan. 10, F:12d
"the Wind WSW a Strong gale with Snow & Thaw'd all Day."

B.135/a/4, 1733-34 (William Bevan)

no mention of thaw.

B.135/a/5, 1734-35 (William Bevan)

Dec. 24, F:8
"The wind NW a fresh gale & thaw'd all day."

Dec. 25, F:8
"The wind at W and thaw'd all day"

Jan. 11, F:8d
"The wind from the ESE to the SSW with snow & Rain."

Jan. 12, F:9
"The wind at SW a fresh gale with rain most part of the day and some snow the latter part"

B.135/a/6, 1735-36 (William Bevan)

entries for Dec. 22 - 25 are missing.

no mention of thaw.

B.135/a/7, 1736-37 (William Bevan)

no mention of thaw.

NOTE: The journal(s) for 1737-39 is/are missing. This has been verified.

B.135/a/8, 1739-40 (Alexander Light)

no mention of thaw.

B.135/a/9, 1739-40 (Richard Staunton)

(copy of B.135/a/8?)

Jan. 5, F:9
"Wind NW a Light Gale and Cloudy weather with Sum Sleet"

B.135/a/10, 1740-41 (Richard Staunton)

Jan. 18, F:15d
"Wind W.ly blowing fresh w [with] Cloudy weather Inclining to Snow or Rain, in ye Evening it began to Snow Wind W.ly"

B.135/a/11, 1741-42 (James Duffield)

Jan. 10, F:29
"Wind at SE close weather with Sleet."

B.135/a/12, 1742-43 (James Duffield)

Jan. 21, F:32
"Wind at SE Sleeting weather."

B.135/a/13, 1743 (James Duffield)

only May 8 to August 9, 1743.

B.135/a/14, 1743-44 (James Duffield)

Jan. 5, F:21d (interesting)
"Wind at S fine clear warm weather, cannot be better at London."

Jan. 6, F:21d
"close weather with much rain, is so warm y we cannot move without sweating, feel considerable effects on our bodies by this unseasonable alteration."

B.135/a/15, 1744-45 (George Howy)

Jan. 11, F:8d
"Wind Southerly it rains & thaws all day"

B.135/a/16, 1745-46 (George Howy)

Jan. 4, F:9
"Wind at South it thaws pretty much all day"

Jan. 13, F:9d
"Wind SE very Warm & thaws"

B.135/a/17, 1746-47 (George Howy)

no mention of thaw.

B.135/a/18, 1747-48 (J. Potts)

no mention of thaw.

B.135/a/19, 1748-49 (Robert Pilgrim)

Jan. 21, F:13
"the weather cloudy & fair with a generall Thaw"

B.135/a/20a, 1749-50 (Robert Pilgrim)

(there was a thaw on Jan. 1, F:13d)

no mention of thaw.

B.135/a/20b, 1750

only August 1-4 & September 2-13, 1750.

B.135/a/21, 1750-51 (Robert Temple)

Jan. 2, F:10
"Wind SW Cloudy Weather some Snow and Thaws a little"

Jan. 10, F:10d
"Wind S Cloudy Weather warm and Thaws."

Jan. 11, F:10d
"Wind S cloudy warm weather and Thaws."

Jan. 12, F:10d
"Wind S cloudy weather warm and Thaws."

Jan. 13, F:10d
"Cloudy weather warm and Thaws a little."

Jan. 14, F:10d
"Wind SW cloudy weather warm and Thaws."

Jan. 15, F:10d
"Wind S Cloudy weather warm and Thaws."

Jan. 16, F:11
"Wind S Cloudy weather and Thaws"

Jan. 17, F:11
"Wind NW Cloudy weather Warm and Thaws"

B.135/a/22, 1750-51

(copy of B.135/a/21)

B.135/a/23, 1751-52 (Thomas White)

no mention of thaw.

B.135/a/24, 1752-53 (Thomas White)

-calender changes to the Gregorian format.

Jan. 29, F:17
"Wind at S. fresh Gales and cloudy warm weather, towards Evening rain'd and thaw'd very much."

Jan. 30, F:17

"Wind S.W. fresh Gales and cloudy warm weather with a continued rain most part of the last night and all this morning, which has consumed a deal of Snow and is very surprizing weather for this time of year in Hudsons Bay, our People clearing the Drains in the Yard to carry the Water off"

B.135/a/25, 1752-53

(copy of B.135/a/24)

B.135/a/26, 1753-54 (Thomas White)

no mention of thaw.

B.135/a/27, 1754-55 (Thomas White)

Jan. 28, F:13
"Wind variable, cloudy warm weather with some small rain and sleet, thaw'd very much all day"

B.135/a/28, 1755-56 (Thomas White)

Jan. 29, F:13
"Wind from N.E. to S. light Gales and clear for the most part, warm weather for the time & thawed."

Jan. 30, F:13
"little Wind and variable, cloudy warm weather, rain most part of last night and all this morning till about noon, then a fresh Gale at N. and froze hard with snow the remaining part of the day."

B.135/a/29, 1756-57 (Henry Pollexfen Sr.)

no mention of thaw.

B.135/a/30, 1757-58 (Henry Pollexfen)

Jan. 10, F:12d
"Wind Southerly moderate Gales & fine pleasant warm weather all day, ab't 9 in the Evening blow'd hard with several showers of hail and rain."

Jan. 15, F:13
"...about 3 in the afternoon...Wind at S.W. & cloudy with some small rain toward Evening."

B.135/a/31, 1758-59 (Henry Pollexfen)

no mention of thaw.

B.135/a/32, 1759-60 (Henry Pollexfen)

Feb. 3, F:17 (*probable*)
"Wind from SW to South with moderate Gales and fine Soft Weather for the Season."

B.135/a/33, 1760-61 (Henry Pollexfen Jr.)

no mention of thaw.

B.135/a/34, 1761-62 (Henry Pollexfen)

Jan. 10, F:18
"Wind SW with warm thawy Wea."

Jan. 11, F:18d
"Wind & Wea as Yesterday."

Jan. 12, F:18d (*probable*)
"Wind little with fine warm wea."

B.135/a/35, 1762-63 (John Favell)

no mention of thaw.

B.135/a/36, 1763-64 (John Favell)

Jan. 13, F:19
"N.W. Wind Thaughy Wea."

Jan. 18, F:19d
"SW Wind with moderate Wea & Rain most part of the Day."

Jan. 19, F:19d
"W..rly Wind, Weather much the same till about Noon, when it begun to freeze & Snow."

B.135/a/37, 1763-64

(original copy of B.135/a/36)

B.135/a/38, 1764-65 (John Favell)

no mention of thaw.

B.135/a/39, 1764-65

(original copy of B.135/a/38)

B.135/a/40, 1765-66 (John Favell)

Jan. 19, F:16d (*possible*)
"A fresh breeze of Wind S'erly & very Warm"

Jan. 20, F:16d (*possible*)
"S'erly Wind & very Warm till about Noon when it began to Snow & Freeze hard with the Wind at NW."

B.135/a/41, 1765-66

(original copy of B.135/a/40)

B.135/a/42, 1766-67 (John Favell)

no mention of thaw.

B.135/a/43, 1766-67

(original copy of B.135/a/42)

B.135/a/44, 1767-68 (John Favell)

Feb. 1, F:17
"NE Wind with fine warm Wea.. Hail, Rain & Snow all Day"

B.135/a/45, 1767-68

(original copy of B.135/a/44)

B.135/a/46, 1768-69 (John Favell)

Jan. 27, F:23d
"Wind as Yesterday [Southerly] with Rain most of the Day & towards Evening hail & Sleet with Snow."

B.135/a/47, 1769

only August 10 to September 4, 1769.

B.135/a/48, 1769-70 (Christopher Gofton)

Jan. 27, F:16d
"Wind W'erly Thaughy weather with a little light Snow."

B.135/a/49, 1770-71 (John Garbul)

-journal ends on Feb. 2, but B.135/a/50 is a complete copy.

Jan. 9, F:16
"the fore part Wind NW with warm thawing weather"

Jan. 12, F:16d
"in the Evening Wind Westerly with Hail & Sleet"

B.135/a/50, 1770-71

(complete original copy of B.135/a/49)

B.135/a/51, 1771-72 (John Garbul)

no mention of thaw.

B.135/a/52, 1772-73 (Eusebius Bacchus Kitchin)

no mention of thaw.

B.135/a/53, 1773

only a journal of the transactions & observations on board Moose Sloop from Moose Fort to Noddeway River and back again, July 12 to September 9, 1773.

B.135/a/54, 1773-74 (E.B. Kitchin)

Feb. 2, F:22d
"Wind SE, mild Thawey Weather with Snow all the Day"

Feb. 3, F;22d
"Wind SE Cloudy warm Thawey Weather"

B.135/a/55, 1774

only a journal of the voyage to Abbitibby by John Thomas, July 4 to

August 16, 1774.

B.135/a/56, 1774-75 (E.B. Kitchin)

Jan. 3, F:14d
"Wind SE Warm Thawey Weather."

Jan. 9, F:15d
"Heavy Muggy Weather, Near a Rain."

Jan. 23, F:17
"Wind SW Cloudy Thawey Weather"

Jan. 25, F:17
"Wind and Weather as on the 23rd"

Feb. 1, F:18d
"Wind South warm cloudy Thawey Weather"

B.135/a/57, 1775-76 (E.B. Kitchin)

Jan. 8, F:14
"Wind South with Snow & Warm Thawey Weather near a rain"

B.135/a/58, 1776-77 (E.B. Kitchin)

Jan. 23, F:16d
"Wind SE Heavy warm Weather with Snow and Drift AM__PM Rain."

Jan. 24, F:17
"Wind S. Dark Cloudy heavy Weather with Rain and Snow at times."

Jan. 31, F:17d
"Wind SW warm thawey Weather"

Feb. 1, F:17d
"Wind N Weather as yesterday"

Feb. 2, F:17d
"Wind and Weather as before"

B.135/a/59, 1777-78 (E.B. Kitchin)

no mention of thaw.

B.135/a/60, 1778-79 (E.B. Kitchin)

Jan. 5, F:12
"Wind SW Cloudy heavy warm Weather, with Snow and Sleet untill 3 PM, when it came about to the NW with heavy Snow Drift, and Sharp Frost"

Jan. 30, F:15d
"Wind SW Cloudy Thawey Weather"

B.135/a/61, 1779-80 (Edward Jarvis)

(beautiful penmanship!)

no mention of thaw.

B.135/a/62, 1780-81 (Edward Jarvis)

(beautiful penmanship!)

no mention of thaw.

B.135/a/63, 1779-81

(original copies of B.135/a/61 & 62 respectively)

B.135/a/64, 1780-81 (Philip Turner)

only scattered entries between December 19, 1780 and August 7, 1781.

no weather remarks.

B.135/a/65, 1781-82 (John Thomas)

Jan. 5, F:14
"Wind SW warm weather with Snow and rain till noon when it veered to NW with sharp weather."

B.135/a/66, 1782-83 (John Thomas)

no mention of thaw.

B.135/a/67, 1781-83

only "Fragments of duplicate Journal"

B.135/a/68, 1783-84 (John Thomas)

(beautiful penmanship!)

no mention of thaw.

B.135/a/69, 1784-85 (John Thomas)

no mention of thaw.

B.135/a/70, 1785-86 (John Thomas)

Jan. 28, F:12d
"Wind W.S.W. mild cloudy weather mizzling rain latter part"

Jan. 29, F:13
"Wind S. blows fresh Cloudy thawing weather with mizzling rain and Snow"

B.135/a/71, 1786

only a journal of the voyage from Moose Factory to Great & Little Whale Rivers.

B.135/a/72, 1786-87 (John Thomas)

no mention of thaw.

B.135/a/73, 1787-88 (John Thomas)

no mention of thaw.

B.135/a/74, 1788-89 (John Thomas)

Jan. 23, F:21d
"Wind SE cloudy mild weather with a little snow and sleet."

B.135/a/75, 1788-89

(original copy of B.135/a/74)

B.135/a/76, 1789-90 (George Donald)

no mention of thaw.

B.135/a/77, 1790-91 (John Thomas)

no mention of thaw.

B.135/a/78, 1791-92 (John Thomas)

-2 thermometer readings are located in the left margin ("AM" & "PM")

no indication/mention of thaw.

B.135/a/79, 1792-93 (John Thomas)

-3 thermometer readings are located in the left margin ("AM", "N" & "PM")

Jan. 10, F:10
"Wind S'erly very mild Weather, with much Snow in the Evening" (+29, +33, +31)

B.135/a/80, 1793-94 (John Thomas)

Jan. 9, F:10
"Wind S'ly thaw and rain."

Jan. 13, F:10 (interesting)
"Wind S'ly forepart, latter part northerly__snowed all day, & when the Wind changed it was very thick, and blew a mere hurricane."

Jan. 21, F:10d
"Wind E.S.E. Cloudy weather much rain"

B.135/a/81, 1794

only a journal of the voyage from Moose Factory to Fredrick Hourse & Abbittibi settlement.

B.135/a/82, 1794-95 (John Thomas)

-2 barometer and 2 thermometer readings are located in the left margin ("8AM" & "4PM")

Jan. 29, F:13 (*probable*)
"Wind S'erly Soft snowey weather." (+31, +32)

B.135/a/83, 1795-96 (John Thomas)

-3 barometer and 3 thermometer readings are located in the left margin ("9AM", "N" & "9PM")

no indication/mention of thaw.

B.135/a/84, 1796-97 (John Thomas)

-3 barometer and 3 thermometer readings are located in the left margin (Variable times)

no indication/mention of thaw.

B.135/a/85, 1797-98 (John Thomas)

no mention of thaw.

B.135/a/86, 1798-99 (John Thomas)

-3 barometer and 3 thermometer readings are located in the left margin (Variable times)

Jan. 10, F:12d
"Wind SE & Sly mild with mizling Snow & Sleet" (4pm: +28.5?)

Jan. 15, F:13
"Wind SW & Wly very fine Weather" (+28, +34, +28)

Jan. 16, F:13d
"Wind SW warm weather." (+26.5, ?, +32.5)

Jan. 17, F:13d
"Wind NE thaw in the morn." (+32, +29, +26)

Jan. 18, F:13d
"Wind SSE, Cloudy mild weather, the Weather was too warm again for the People setting off for Han Bay." (+24, +35, +38)

Jan. 19, F:13d
"Wind SW Cloudy Thawing Weather" (?, +36, +35)

Jan. 20, F:13d
"Wind SE & Sly blow'd fresh rapid thaw, with rain." (+35, +36, ?)

B.135/a/87, 1799-1800 (John Thomas)

-2 or 3 barometer and thermometer readings are located in the left margin (Variable times)

Jan. 9, F:10d
"wind WSW, sleet & snow, mild weather." (+21, +25, +20)

Feb. 3, F:12d
"wind SW. strong; perfectly clear, remarkably fine weather." (+24, +32, +30)

GAP B.135/a/88a, 1800-01 (George Gladman)

no weather remarks.

B.135/a/88b, 1801

just a mere fragment of the 1800-01 journal.

GAP B.135/a/89, 1801-02 (John Thomas)

no weather remarks.

GAP B.135/a/90, 1802-03 (John Thomas)

no weather remarks.

GAP B.135/a/91, 1803-04 (John Thomas)

no weather remarks.

GAP B.135/a/92, 1804-05 (John Thomas)

no weather remarks, except Jan. 3, which read: "Therm: 36 below" in the left margin.

GAP B.135/a/93, 1805-06 (John Thomas)

no weather remarks.

B.135/a/94, 1806-07 (John Thomas)

Jan. 4, F:16d
"Wind SE cloudy with some snow and rain in the evening."

B.135/a/95, 1807-08 (John Mannall)

no weather remarks.

B.135/a/96, 1806-08 (John Mannall)

1807: (copy of B.135/a/94)

1808:

Jan. 10, F:40 (close, but still not quite a thaw)
"Wind South'ly very mild. Ther only one below the freezing point."

GAP B.135/a/97, 1808-09 (John Thomas)

no weather remarks.

GAP B.135/a/98, 1809-10 (John Thomas)

no weather remarks, except Jan. 18: -35, Jan. 19: -38, Jan. 20: -36 and Jan. 21: -35.

GAP B.135/a/99, 1810-11 (John Thomas)

no weather remarks.

GAP B.135/a/100, 1811-12 (John Thomas)

no weather remarks.

B.135/a/101, 1812 (John Thomas)

only August 25 to September 25, 1812.

B.135/a/102, 1811-12

only "Remarks from having the Prince of Wales off Cape Henrietta Maria to Albany Factory"

GAP B.135/a/103, 1812-13 (John Thomas)

no weather remarks.

GAP B.135/a/104, 1813-14 (John Mannall)

no weather remarks.

B.135/a/105, 1814-15 (Thomas Vincent)

Jan. 18, F:11d
"Cloudy warm Weather...the Weather too warm for the Packetters to begin their journey."

Jan. 19, F:12
"Cloudy and the Weather still warmer than yesterday"

B.135/a/106, 1814-15 (Thomas Vincent)

(inexact copy of B.135/a/105)

Jan. 18, F:__
"Cloudy mild Weather"
left margin: "Thermometer Noon 32+0"

Jan. 19, F:__
"Cloudy Weather and so warm as to prevent the two men from setting off for New Brunswick"
left margin: "Thermometer Noon 31+0"

B.135/a/107, 1814-15 (A. Stewart)

(another inexact copy of B.135/a/105)

B.135/a/108, 1815 (Joseph Beioley)

only March 11 to July 30, 1815.

B.135/a/109, 1815

only a journal of a journey by Thomas Vincent from Albany to Henly House and from there to New Brunswick.

B.135/a/110, 1814-15 (Joseph Greene, Surgeon)
Meteorological Register

Jan. 18 (actually reached +32 according to its corresponding daily remark in B.135/a/106)
"noon" column: +31, "sunset" column: +31

Jan. 19 (conficts with weather/temp. information from B.135/a/105 & 106)
"sunrise" column: +22, "noon" column: +20, "sunset" column: +17

B.135/a/111, 1815-16 (Thomas Vincent)

no mention of thaw.

B.135/a/112, 1815-16
Meteorological Register

no indication of thaw.

B.135/a/113a, 1816-17 (George Gladman)

no mention of thaw.

B.135/a/113b, 1816-17

only November 14 to January 1, 1817.

B.135/a/114, 1817 (George Gladman)

no mention of thaw.

B.135/a/115, 1816-17
Meteorological Register

no indication of thaw.

B.135/a/116, 1817-18 (Richard Hardisty)

no mention of thaw.

B.135/a/117, 1817-18 (Richard Hardisty)

(copy of B.135/a/116)

B.135/a/118, 1817-18
Meteorological Register

no indication of thaw.

B.135/a/119a, 1818-19 (Joseph Beioley)

Jan. 11, F:32d
"Rain during last night wind NW this day & blowing most violently."

B.135/a/119b, 1818-19
Meteorological Register

no indication of thaw. (but see above)

B.135/a/120, 1819-20 (George Gladman)

infrequent weather remarks, however extreme or unusual weather conditions seem to be mentioned.

no mention of thaw.

B.135/a/121, 1818-20

1819: (copy of B.135/a/119a)

1820: (copy of B.135/a/120)

GAP B.135/a/122, 1820-21 (George Gladman)

except for thermometric readings for 2 extremely cold days (Jan. 23@ -36 & Jan. 24@ -39.5)...

no weather remarks.

B.135/a/123, 1821 (Joseph Beioley)

only "Transactions and Occurrences in a Journey from Moose Factory towards Abbitibbi Lake"

B.135/a/124, 1822 (Joseph Beioley)

only "Transactions & Occurrences on a Journey from Moose to Timmiskaming"

NOTE: The journal for 1821-22 is missing. This has been verified.

B.135/a/125, 1822-23 (Thomas Vincent)

fairly regular thermometer readings only. No weather descriptions.

no indication of thaw.

B.135/a/126, 1823-24 (Thomas Vincent)

fairly infrequent weather remarks/thermometer readings, however...

no indication/mention of thaw.

B.135/a/127, 1824-25 (Joseph Beioley)

no mention of thaw.

B.135/a/128, 1825-26 (Jacob Corrigal)

no weather remarks.

B.135/a/129, 1825-26 (Jacob Corrigal)

Jan. 8, F:28d
"Wind Southerly, cloudy mild weather, with rain in the afternoon."

Jan. 9, F:28d
"Wind South East, with continuance of very mild weather, with showers of rain at times."

Jan. 10, F:29
"Wind South West, with rain & sleet in the morning & forenoon; afterwards changed to the North West, with snow."

GAP B.135/a/130, 1826-27 (Alexander Christie)

no weather remarks.

B.135/a/131, 1827-28 (Alexander Christie)

very infrequent weather remarks, however extreme or unusual weather conditions seem to be mentioned.

no mention of thaw.

B.135/a/132, 1828

only a journal of a voyage to South River.

B.135/a/133, 1828

only a small extract from the 1828 Moose journal.

B.135/a/134, 1828-29 (Alexander Christie)

fairly infrequent weather remarks, however extreme or unusual weather conditions seem to be mentioned.

Jan. 15, F:32d (*probable*)
"Wind SW and soft Weather."

GAP B.135/a/135, 1829-30 (Alexander Christie)

no weather remarks.

B.135/a/136, 1830-31 (John George McTavish)

fairly infrequent weather remarks, however extreme or unusual weather conditions seem to be mentioned.

no mention of thaw.

B.135/a/137, 1831-32 (John G. McTavish)

Jan. 8, F:12d
"a fall of Snow during the Night; the Weather the mildest it has been since Nov. as the Thermometer was 2 above the freezing Point."

Jan. 14, F:13
"mild weather for the Season, during the day it was above the freezing point."

Jan. 15, F:13d (*probable*)
"The Weather continuing mild for the season."

Jan. 16, F:13d
"mild Weather accompanied with Sleet"

Jan. 17, F:13d
"Remarkable mild Weather during the day_ it was 10 deg above the freezing Point."

Jan. 18, F:14
"Rain during the night and a little to day_ Thermometer 40 above Zero."

Jan. 19, F:14 (*probable*)
"The weather still mild"

Jan. 21, F:14
"The weather milder by 23 degrees than yesterday" [Jan. 20: "being 22 below the freezing point"]

Jan. 24, F:15 (refering to Jan. 23 however)
"From 33 above Zero yesterday, it was 23 below this morning"

B.135/a/138, 1832

A journal providing a very detailed and lengthy account of the events surrounding the brutal and sadistic murder of Chief Factor Thomas Corrigal and his wife, as well as a number of other innocent Indian families at Hannah Bay. The daily accounts also describe the search for the murderous culprits. Includes a detailed map of the search area.

NOTE: The journal(s) for 1832-34 is/are missing. This has been verified.

B.135/a/139, 1834-35 (John G. McTavish)
(Meteorological Register at back of Journal)

Jan. 11 "PM": +32 "Cloudy & Mild"

B.135/a/140, 1835-36 (George Keith)
(Meteorological Register at back of Journal)

infrequent weather remarks in daily entries.

Jan. 7 "PM": +32
Jan. 8 "PM": +32

B.135/a/141, 1836-37 (George Keith)

January 24-30 is missing. Seems to be a missing page?

no mention of thaw.

B.135/a/142, 1837-38 (George Keith)
(Meteorological Register at front of Journal)

Jan. 5 "AM": +33 "Rainy"

Jan. 5, F:43
"Wind Southerly & blowing fresh with a good deal of rain. The thermometer rose to 38. [degrees] towards evening it began to freeze."

B.135/a/143, 1838-39 (Joseph Beioley)
(Meteorological Register at back of Journal)

Jan. 25, F:36d (close enough? Nevertheless, an extreme temp. shift!)
"Wind SSE_ Weather Clear and Mild_ Ther. as high as 31+ where as yesterday morning at the same Hour it was 38-."

Jan. 6 "Noon": +32 "Cloudy"; "Sunset": +32 "Cloudy"
Jan. 25 "Noon": +31 "Cloudy"; "Sunset": +31 "Cloudy" (*probable*)

B.135/a/144, 1839-40 (Joseph Beioley)

(very illegible!)

no mention of thaw.

B.135/a/145, 1840-41 (Joseph Beioley)

no mention of thaw.

B.135/a/146, 1841-42 (Alexander Christie)
Meteorological Register

Feb. 2 "Sunset": +32 "N Clear & drift" (this remark must be human error)

B.135/a/147, 1842 (Alexander Christie)

(copy of B.135/a/146)

Feb. 2 "Sunset": +32 "SW__ Cloudy" (this remark seems more logical than above)

NOTE: The journal for 1842-43 is missing. This has been verified.

GAP B.135/a/148, 1843-44 (Richard Good)

no weather remarks.

B.135/a/149, 1844-45 (Robert Seaborn Miles)

few weather remarks, but extreme or unusual weather events are mentioned.

no mention of thaw.

GAP B.135/a/150, 1845-46 (Robert S. Miles)

no weather remarks.

B.135/a/151, 1846-47 (Robert S. Miles)

few weather remarks, but extreme or unusual weather events are mentioned.

no mention of thaw.

B.135/a/152, 1847-48 (Robert S. Miles)

few weather remarks, but extreme or unusual weather events are mentioned.

no mention of thaw.

B.135/a/153, 1848-49 (Robert S. Miles)

regular thermometer readings and weather descriptions.

no indication/mention of thaw.

B.135/a/154, 1849-50 (Robert S. Miles)

few weather remarks, but extreme or unusual weather events are mentioned.

no mention of thaw.

B.135/a/155, 1850-51 (Robert S. Miles)

few weather remarks, but extreme or unusual weather events are mentioned.

no mention of thaw.

B.135/a/156, 1851-52 (Robert S. Miles)

few weather remarks, but extreme or unusual weather events are mentioned.

Feb. 3, F:27d (*probable*)
"Soft weather."

B.135/a/157, 1852-53 (Robert S. Miles)

Jan. 6, F:29d
"Thawing all day & quite wet"

Feb. 1, F:32
"Very mild weather with considerable thaw__ The therm this afternoon being 42X or 10 deg. above freezing point."

B.135/a/158, 1852-53 (Robert S. Miles)

(copy of B.135/a/157)

B.135/a/159, 1853-54 (Robert S. Miles)

regular thermometer readings. No weather descriptions.

no indication of thaw.

B.135/a/160, 1853-54 (Robert S. Miles)

(copy of B.135/a/159)

B.135/a/161, 1854-55 (Robert S. Miles)

Jan. 3, F:30d
"Therm 41 above with much thaw which detains our travellers of Hannah Bay"

Jan. 6, F:31
"Therm 17 above, soft weather and in course of the day the thermometer rose to freezing point."

Jan. 7, F:31
"Therm 33 above and thawing all last night with rain"

B.135/a/162, 1854-55 (Robert S. Miles)

(copy of B.135/a/161)

GAP B.135/a/163, 1855-56 (Robert S. Miles)

no weather remarks.

B.135/a/164, 1855-56 (Robert S. Miles)

(copy of B.135/a/163)

GAP B.135/a/165, 1856-57 (Robert S. Miles)

no weather remarks.

B.135/a/166, 1856

only June 1 to August 18.

B.135/a/167, 1857-58 (John George McKenzie)

no weather remarks.

B.135/a/168, 1857-58 (John G. McKenzie)

Jan. 24, F:25
"very mild Weather, with rain in the afternoon"

B.135/a/169, 1857-58 (John G. McKenzie)
Meteorological Register

Jan. 23 "10 Pm": +35
Jan. 24 "Sunrise": +32.5; "2 Pm": +36; "10 Pm": +36

B.135/a/170, 1858-59 (John G. McKenzie)

Jan. 20, F:21
"Very soft weather & some rain during last night"

B.135/a/171, 1858-59 (John G. McKenzie)

(copy of B.135/a/170)

B.135/a/172, 1858-59 (John G. McKenzie)
Meteorological Register

Jan. 20 "2 Pm": +36 "Rain & Snow"

B.135/a/173, 1859-60 (John G. McKenzie)

Jan. 21, F:18 (*probable*)
"Very Soft with Snow at intervals."

Jan. 23, F:18d (*probable*)
"Very mild Weather"

Jan. 24, F:18d
"A very bad day with rain."

B.135/a/174, 1859-60 (John G. McKenzie)

(copy of B.135/a/173)

B.135/a/175, 1860-61 (John G. McKenzie)

no mention of thaw.

B.135/a/176, 1860-61 (John G. McKenzie)

(copy of B.135/a/175)

B.135/a/177, 1861-62 (John G. McKenzie)

no mention of thaw.

B.135/a/178, 1861-62 (John G. McKenzie)

(copy of B.135/a/177)

B.135/a/179, 1862-63 (James Anderson)

Jan. 4, F:21
"The weather still milder than it has been, raining hard this forenoon, the snow melting fast."

B.135/a/180, 1863-64 (James Anderson)

Jan. 24, F:27
"The weather very stormy, heavy Snow & drift, thawing in the forenoon."

NOTE: The journal(s) for 1864-67 is/are missing. This has been verified.

B.135/a/181, 1867-68 (James Anderson)

no mention of thaw.

NOTE: The journal for 1868-69 is missing. This has been verified.

B.135/a/182, 1869-70 (James Anderson)

Jan. 17, F:45d
"The weather raw in the morning became quite mild during the day with heavy rain in the afternoon. Wind S to SW."

B.135/a/183, 1870-71 (James Stewart Clouston)

no mention of thaw.

NOTE: The journal(s) for 1871-77 is/are missing. This has been verified.

B.135/a/184, 1877-78 (Samuel K. Parson)
Meteorological Register

Jan. 12 "Max. Temp": +32.0
Jan. 18 "Max. Temp": +32.0
Jan. 19 "9 Am": +32.0; "2 Pm": +32.5; "Max. Temp": +33.2

B.135/a/185, 1878 (Samuel K. Parson)
Meteorological Register

only up to, and including, November, 1878.

NOTE: The journal(s) for 1878-90 is/are missing. This has been verified.

GAP B.135/a/186, 1890 (Joseph Fortescue)
Meteorological Register

only up to, and including, October, 1890.

NOTE: The journal(s) for 1890-93 is/are missing. This has been verified.

GAP B.135/a/187, 1893 (William Kelk Broughton)
Meteorological Register

only up to, and including, October, 1893.

GAP B.135/a/188, 1892-1900 (William K. Broughton)

some or many missing days for each period.

no weather remarks.

B.135/a/189, 1901-04 (William K. Broughton to 1902)

after 1902 authorship is unknown.

1901: **GAP**; missing days, no weather remarks.

1902: missing days and very illegible!

Jan. 7, F:24
"Rainy"

Jan. 8, F:24 (*probable*)
"Very mild"

Jan. 9, F:24
"Very mild day...Rainy"

1903: complete, but again, very illegible!

Jan. 26, F:53
"Barometer falling & Thermometer within 6 [degrees] of thawing. a few drops of rain fell at night. snowing most of the day."

1904: missing days, *no mention of thaw.*

NOTE: The journal(s) for 1904-12 is/are missing. This has been verified.

B.135/a/190, 1912-17

1913: some missing days, *no mention of thaw.*

1914: a few missing days

Jan. 29, F:72
"Ther up to 38 at noon Snow during night and rain in afternoon."

1915: almost no weather remarks, *no mention of thaw.*

1916:

Jan. 25, F:153 (*probable*)

"Dull weather but colder, nearly raining last night."

1917: few weather remarks, *no mention of thaw.*

B.135/a/191, 1917-22

1918: quite a few missing weather remarks, *no mention of thaw.*

1919: quite a few missing weather remarks, *no mention of thaw.*

1920: *no mention of thaw.*

Jan. 24, F:88 (cold)
"52 below zero this morning"

1921:

Jan. 20, F:129
"Raining in morning & Snowing in afternoon."

1922: *no mention of thaw.*

NOTE: The journal(s) for 1922-29 is/are missing. This has been verified.

B.135/a/192, 1929-30

(very illegible)

no mention of thaw.

NOTE: The journal(s) for 1930-38 is/are missing. This has been verified.

B.135/a/193, 1938-39

forms, filled in by hand.

Jan. 5, Sheet #:77
"Blowing hard. Snow and rain at intervals all day." "Wind S.E." [in left margin]

Jan. 6, Sheet #:78
"Very mild. Heavy rain during the night." "Wind S.E." [in left margin]

NOTE: The journal for 1939-40 is missing. This has been verified.

B.135/a/194, 1940-41

forms, typewritten.

weather descriptions are in left margin & are very thorough.

no mention of thaw.

END

Moose Factory Thaw Classification Totals

DATE	THAW	RAIN	SLEET	THERM.	PROB.	POSS.
1731	0	2	0	0	0	0
1732	0	0	0	0	0	0
1733	3	0	0	0	0	0
1734	0	0	0	0	0	0
1735	2	2	0	0	0	0
1736	0	0	0	0	0	0
1737	0	0	0	0	0	0
1738						
1739						
1740	0	0	1	0	0	0
1741	0	1	0	0	0	0
1742	0	0	1	0	0	0
1743	0	0	1	0	0	0
1744	0	1	0	0	0	0
1745	1	0	0	0	0	0
1746	2	0	0	0	0	0
1747	0	0	0	0	0	0
1748	0	0	0	0	0	0
1749	1	0	0	0	0	0
1750	0	0	0	0	0	0
1751	9	0	0	0	0	0
1752	0	0	0	0	0	0
1753	1	1	0	0	0	0
1754	0	0	0	0	0	0
1755	1	0	0	0	0	0
1756	1	1	0	0	0	0
1757	0	0	0	0	0	0
1758	0	2	0	0	0	0
1759	0	0	0	0	0	0
1760	0	0	0	0	1	0
1761	0	0	0	0	0	0
1762	2	0	0	0	1	0
1763	0	0	0	0	0	0
1764	1	2	0	0	0	0
1765	0	0	0	0	0	0
1766	0	0	0	0	0	2
1767	0	0	0	0	0	0
1768	0	1	0	0	0	0
1769	0	1	0	0	0	0
1770	1	0	0	0	0	0
1771	1	0	1	0	0	0
1772	0	0	0	0	0	0
1773	0	0	0	0	0	0
1774	2	0	0	0	0	0

Moose Factory Thaw Classification Totals

1775	5	0	0	0	0	0
1776	1	0	0	0	0	0
1777	3	2	0	0	0	0
1778	0	0	0	0	0	0
1779	1	0	1	0	0	0
1780	0	0	0	0	0	0
1781	0	0	0	0	0	0
1782	0	1	0	0	0	0
1783	0	0	0	0	0	0
1784	0	0	0	0	0	0
1785	0	0	0	0	0	0
1786	1	1	0	0	0	0
1787	0	0	0	0	0	0
1788	0	0	0	0	0	0
1789	0	0	1	0	0	0
1790	0	0	0	0	0	0
1791	0	0	0	0	0	0
1792	0	0	0	0	0	0
1793	0	0	0	1	0	0
1794	1	1	0	0	0	0
1795	0	0	0	0	1	0
1796	0	0	0	0	0	0
1797	0	0	0	0	0	0
1798	0	0	0	0	0	0
1799	3	0	1	3	0	0
1800	0	0	1	1	0	0
1801						
1802						
1803						
1804						
1805						
1806						
1807	0	1	0	0	0	0
1808	0	0	0	0	0	0
1809						
1810						
1811						
1812						
1813						
1814						
1815	0	0	0	2	0	0
1816	0	0	0	0	0	0
1817	0	0	0	0	0	0
1818	0	0	0	0	0	0
1819	0	1	0	0	0	0
1820	0	0	0	0	0	0

Moose Factory Thaw Classification Totals

1821						
1822						
1823	0	0	0	0	0	0
1824	0	0	0	0	0	0
1825	0	0	0	0	0	0
1826	0	3	0	0	0	0
1827						
1828	0	0	0	0	0	0
1829	0	0	0	0	1	0
1830						
1831	0	0	0	0	0	0
1832	0	1	1	5	2	0
1833						
1834						
1835	0	0	0	1	0	0
1836	0	0	0	2	0	0
1837	0	0	0	0	0	0
1838	0	1	0	0	0	0
1839	0	0	0	2	0	0
1840	0	0	0	0	0	0
1841	0	0	0	0	0	0
1842	0	0	0	1	0	0
1843						
1844						
1845	0	0	0	0	0	0
1846						
1847	0	0	0	0	0	0
1848	0	0	0	0	0	0
1849	0	0	0	0	0	0
1850	0	0	0	0	0	0
1851	0	0	0	0	0	0
1852	0	0	0	0	1	0
1853	2	0	0	0	0	0
1854	0	0	0	0	0	0
1855	2	0	0	1	0	0
1856						
1857						
1858	0	1	0	1	0	0
1859	0	1	0	0	0	0
1860	0	1	0	0	2	0
1861	0	0	0	0	0	0
1862	0	0	0	0	0	0
1863	0	1	0	0	0	0
1864	1	0	0	0	0	0
1865						
1866						

Moose Factory Thaw Classification Totals

1867						
1868	0	0	0	0	0	0
1869						
1870	0	1	0	0	0	0
1871	0	0	0	0	0	0
1872						
1873						
1874						
1875						
1876						
1877						
1878	0	0	0	3	0	0
1879						
1880						
1881						
1882						
1883						
1884						
1885						
1886						
1887						
1888						
1889						
1890						
1891						
1892						
1893						
1894						
1895						
1896						
1897						
1898						
1899						
1900						
1901						
1902	0	2	0	0	1	0
1903	0	1	0	0	0	0
1904	0	0	0	0	0	0
1905						
1906						
1907						
1908						
1909						
1910						
1911						
1912						

Moose Factory Thaw Classification Totals

1913	0	0	0	0	0	0
1914	0	1	0	0	0	0
1915	0	0	0	0	0	0
1916	0	0	0	0	1	0
1917	0	0	0	0	0	0
1918	0	0	0	0	0	0
1919	0	0	0	0	0	0
1920	0	0	0	0	0	0
1921	0	1	0	0	0	0
1922	0	0	0	0	0	0
1923						
1924						
1925						
1926						
1927						
1928						
1929						
1930	0	0	0	0	0	0
1931						
1932						
1933						
1934						
1935						
1936						
1937						
1938						
1939	0	2	0	0	0	0
1940						
1941	0	0	0	0	0	0
TOTALS:	43	34	9	23	11	2
CHECK:	122					

EASTMAIN

B.59/a/1, 1736-37 (Joseph Isbister)

no mention of thaw.

B.59/a/2, 1737-38 (Joseph Isbister)

Dec. 30, Folio (F):12
"Weather unsetle the first part small breses att SE faire & cloudy the latter part with gails att SW sume shours of snow intermixt with raine"

Jan. 1, F:12d
"moderate w [with] the wind variable round the compass small breses cloudy w [with] warm weather, sume shours of snow intermixt w [with] sum drops of Raine and soforth"

Jan. 6, F:12d
"later part small breses at NW cloudy and warm: w [with] sume drops of Raine intermixt with snow & soforth"

Jan. 7, F:13
"fresh gales att NW sume drops of Raine"

Jan. 11, F:13d
"fresh gales att SW w [with] much raine"

Jan. 18, F:14
"latter part fresh breses at W & WS [?] w [with] shours of Raine intermixt w [with] snow"

Jan. 22, F:14d
"firt part fresh gales SE w [with] much Raine"

B.59/a/3, 1738-39 (Joseph Isbister)

Jan. 5, F:13
"winds att SW cloudy & breses w [with] some shours of snow intermixt w [with] Raine"

Dec. 22, F:14
"Squalls of Raine"

B.59/a/4, 1739-40 (Joseph Isbister)

no mention of thaw.

B.59/a/5, 1740-41 (Alexander Light)

no mention of thaw.

B.59/a/6, 1741-42 (Alexander Light)

Dec. 31, F:7
"wind SW a light gale and cloudy weather thawing a little in the middle of the day"

B.59/a/7, 1742-43 (Alexander Light)

no mention of thaw.

B.59/a/8, 1743-44 (Thomas Mitchell)

(extremely illegible!)

Jan. 6, F:19
"we had a great deal of rain w [with] sum snow"

B.59/a/9, 1744 (Thomas Mitchell)

only July 2 to August 28, 1744.

B.59/a/10, 1744 (Thomas Mitchell)

only July to August again.

B.59/a/11, 1744 (John Longland)

only June 23 to August 15, 1744.

B.59/a/12, 1744-45 (Thomas Mitchell)

weather not mentioned very often.

Jan. 11, F:13
"a great deal of rain"

B.59/a/13, 1745-46 (Thomas Mitchell)

weather not always mentioned, however it seems that extreme weather events are mentioned.

no mention of thaw.

B.59/a/14, 1746-47 (Thomas Mitchell)

no mention of thaw.

B.59/a/15, 1747-48 (Thomas Mitchell)

weather not always mentioned, however it seems that extreme weather events are mentioned.

no mention of thaw.

B.59/a/16, 1747-48 (William Lamb)

(copy of B.58/a/15)

no mention of thaw.

B.59/a/17, 1748-49 (John Yarrow)

no mention of thaw.

B.59/a/18, 1749-50 (William Lamb)

Jan. 1, F:9c (or F:9d?)
"Thick hazy weather with some raine the wind south"

Jan. 10, F:10
"Thaughing weather the wind south"

Jan. 11, F:10
"thaughing weather the wind south"

Jan. 12, F:10
"wind and weather as above mentioned"

B.59/a/19, 1750-51 (John Yarrow)

no mention of thaw.

B.59/a/20, 1751-52 (John Yarrow)

no mention of thaw.

B.59/a/21, 1752-53 (John Yarrow)

** September 2, 1752 was followed by September 14, 1752 **

Therefore, in accordance with the shift from the old Julian calender to the new Gregorian calender, the previous coldest Julian period (December 22 - January 22) has now been shifted up 12 days to the coldest Gregorian period, January 3 - February 3.

Jan 30, F:11
"Last night at 7 o'clock begun to Rain and continued all this day till 12 all night"

B.59/a/22, 1753-54 (John Yarrow)

no mention of thaw.

B.59/a/23, 1754-55 (John Longland)

(nice penmanship!)

Jan. 29, F:9
"have had this day warm wea & thawed all day the wind variable"

Feb. 2, F:9d
"have had this day dark cloudy weather a strong gale of wind at SSE - it thawed all day"

B.59/a/24, 1755-56 (John Longland)

(nice penmanship)

Jan. 29, F:8d
"have had this day warm wea: the wind at SE: it thawed all day"

Jan. 30, F:8d
"fore part of the day the wind at S and much rain, the latter part of the day had a storm of wind and snow at NW."

B.59/a/25, 1756 (John Longland)

only August to November.

B.59/a/26, 1756-57 (John Longland)

no mention of thaw.

B.59/a/27, 1757-58 (John Stephenson)

(very nice penmanship)

seems to be a severely cold winter period!

no mention of thaw.

B.59/a/28, 1758-59 (John Stephenson)

(very nice penmanship)

again, seems to be a severely cold winter period!

no mention of thaw.

B.59/a/29, 1759-60 (John Stephenson)

(very nice penmanship)

again, seems to be a severely cold winter period, and there is frequent mention of starving Indians!

no mention of thaw.

B.59/a/30, 1760-61 (John Stephenson)

(very nice penmanship)

again, seems to be a severely cold winter period!

no mention of thaw.

B.59/a/31, 1761-62 (John Stephenson)

(beautiful penmanship!)

Jan. 5, F:9
"This day have had, fine wea; in clinable to a thaw the wind att S:ly light airs"

Jan. 11, F:9d
"This day have had, Dark wea: Inclinable to a thaw the wind between the SSW and WSW"

Jan. 15, F:9d
"This day have had, the fore part a thaw with Dark Raney wea: the latter part a strong gale att W: with sharp cold freezing wea: no working out of doors."

B.59/a/32, 1762-63 (John Stephenson)

(beautiful penmanship!)

no mention of thaw.

B.59/a/33, 1763-64 (James Hester)

(nice penmanship)

Jan. 13, F:10
"wind W'erly warm thawing wea"

Jan. 14, F:10
"Wind Wea & Employment as before"

Jan. 18, F:10d
"Wind S'erly & rain"

Jan. 19, F:10d
"Wind Wea & Employment as Yesterday"

Jan. 20, F:10d
"Wind S'erly & thawing wea"

B.59/a/34, 1764-65 (James Hester)

(absolutely immaculate penmanship!!)

no mention of thaw.

B.59/a/35, 1765-66 (James Hester)

(again, absolutely beautiful penmanship!)

Jan. 20, F:11
"A Fresh Gale @ SE to WNW and dark thawing wea w [with] Snow Employment Sledding home Woods."

B.59/a/36, 1766-67 (James Hester to Jan. 31)

from Feb. 1 - 24 no journal was kept, then it was continued by George Isbister.

no mention of thaw.

B.59/a/37, 1767-68 (Thomas Moore)

Feb. 1, F:14
"at 10 Pm the wind came to NW and blow'd very hard with Snow and Sleet"

B.59/a/38, 1768-1769 (Thomas Moore)

no mention of thaw.

B.59/a/39, 1769-70 (Thomas Moore)

Jan. 27, F:28
"For the first and Middle parts of this 24 hours Wind Variable in the Southern Quarter with Sleet and Warm"

B.59/a/40, 1770-71 (Thomas Moore)

Jan. 9, F:25
"Southerly wind and Rain @ Tims and warm"

Jan. 12, F:25d
"a good dale of Rain in the Night wind SE"

B.59/a/41, 1771

only July 9 to September 15.

B.59/a/42, 1771-72 (Thomas Moore)

no mention of thaw.

B.59/a/43, 1772

only July 15 to September 26.

B.59/a/44, 1772-73 (George Atkinson)

no mention of thaw.

B.59/a/45, 1773

only July 11 to September 24.

B.59/a/46, 1773-74 (Thomas Moore)

no mention of thaw.

B.59/a/47, 1774

only July 20 to September 28.

B.59/a/48, 1774-75 (Thomas Moore)

no mention of thaw.

B.59/a/49, 1775

only July 10 to September 22.

B.59/a/50, 1775-76 (Thomas Moore)

no mention of thaw.

B.59/a/51, 1776-77 (Thomas Moore)

Jan. 23, F:16
"Mild warm weather all this day wind southerly snow and sleet in the evening"

B.59/a/52, 1777-78 (Thomas Moore)

no mention of thaw.

B.59/a/53, 1778-79 (George Atkinson)

Jan. 6, F:9d
"warm weather w [with] snow and sleet wind SW"

Jan. 30, F:11
"Warm wea'r with Snow Sleet and Rain wind SE."

B.59/a/54, 1779-80 (George Atkinson)
no mention of thaw.

B.59/a/55, 1780

only July 8 to October 9.

B.59/a/56, 1780-81 (George Atkinson)

no mention of thaw.

B.59/a/57, 1781-82 (George Atkinson)

Jan. 3, F:9
"Thawy weather with snow and sleet"

B.59/a/58, 1782-83 (George Atkinson)

no mention of thaw.

B.59/a/59, 1783-84 (George Atkinson)

no mention of thaw.

B.59/a/60, 1784-85 (George Atkinson)

no mention of thaw.

B.59/a/61, 1785-86 (William Paulson)

no mention of thaw.

B.59/a/62, 1786-87 (George Atkinson)

(beautiful penmanship!)

no mention of thaw.

B.59/a/63, 1787

only August 10 to September 18.

B.59/a/64, 1787-88 (George Atkinson)

no mention of thaw.

B.59/a/65, 1788-89 (George Atkinson)

no mention of thaw.

B.59/a/66, 1789-90 (George Atkinson)

no mention of thaw.

B.59/a/67, 1790-91 (George Atkinson)

Jan. 25, F:?
"Cloudy and mild weather w [with] some few drops of Rain, light Airs and variable"

B.59/a/68, 1791-92 (Barth W. Nelson)

no mention of thaw.

B.59/a/69, 1792-93 (George Atkinson)

no mention of thaw.

B.59/a/70, 1793-94 (Barth W. Nelson)

Jan. 9, F:16
"Dark & cloudy a great quantity of Snow & Sleet the first part of the Day, the latter part rain"

Jan. 21, F:17d
"Gloomy & mild weather - with much Rain, Wind East'ly."

Jan. 22, F:17d
"The first part of the Day thick Fog with rain & warm, Wind variable but most inclinable to the East"

B.59/a/71, 1794-95 (William Bolland)

Jan. 29, F:15d
"Wind Southerly very mild thawing weather and Snow at times"

B.59/a/72, 1795-96 (John Thomas)

no mention of thaw.

B.59/a/73, 1796-97 (William Bolland)

no mention of thaw.

B.59/a/74, 1797-98 (William Bolland)

no mention of thaw.

B.59/a/75, 1798-99 (William Boiland)

Jan. 18, F:12d
"Wind Easterly very mild with rain at times"

Jan. 19, F:12d
"wind Southerly much rain, very mild weather"

Jan. 20, F:12d
"wind Southerly rain most part of the day"

B.59/a/76, 1798-99 (William Bolland)

(copy of B.59/a/75)

Jan. 18, F:12
"Wind Easterly, very mild, with rain at times"

Jan. 19, F:12d
"wind Southerly much rain very mild weather"

Jan. 20, F:12d
"wind Southerly rain most part of the day"

B.59/a/77, 1799-1800 (William Bolland)

no mention of thaw.

GAP B.59/a/78, 1800-01 (William Bolland)

no weather remarks.

GAP B.59/a/79, 1801-02 (William Bolland)

no weather remarks.

GAP B.59/a/80, 1802-03 (William Boiland)

no weather remarks.

GAP B.59/a/81, 1803-04 (William Bolland?)

no weather remarks.

GAP B.59/a/82, 1804-05 (John Mannal)

no weather remarks.

GAP B.59/a/83, 1805-06 (George Gladman)

no weather remarks until August 5, 1806.

B.59/a/84, 1806-07 (George Gladman)

no mention of thaw.

B.59/a/85, 1807-08 (George Gladman)

no mention of thaw.

B.59/a/86, 1808-09 (George Gladman)

(very nice example of a Journal - clear, concise and detailed)

no mention of thaw.

B.59/a/87, 1809-10 (George Gladman)

a very severe winter period, for example:

Jan. 13, Pg:18
"Quicksilver frozen solid in the open air" [found in left margin]

Jan. 20, Pg:21
"Thermometer stick 50." [found in left margin]

"the greatest degree of Cold indicated by the Thermometer I ever knew in Hudsons Bay, the Teams could not work, the men who attended them were employ'd cutting wood for the fires other employ'd as before." [found in body of journal entry]

-weather information ceases to exist after approx. December 24. Fortunately, weather information does exist for most of the Jan. 3 - Feb.

3 period. After December 24, phenological indicators of non-thaw conditions, such as sledging home hay or firewood exists in almost every entry up to Jan 3. Therefore, thaw probably never occurred in the Dec. 24 - Jan. 3 period.

no mention of thaw.

GAP B.59/a/88, 1810-12 (George Gladman)

again, a severely cold winter period.

no weather remarks, just extreme events.

GAP B.59/a/89, 1812-13 (George Gladman)

again, a very cold winter period.

no weather remarks, just extreme events.

GAP B.59/a/90, 1813-14 (James Russell)

again, another extremely cold winter period.

no weather remarks, just extreme events.

GAP B.59/a/91, 1812-14 (James Russell)

(copy of B.59/a/89 and B.59/a/90)

no weather remarks, just extreme events.

B.59/a/92, 1814-15 (James Russell)

again, another bitterly cold winter period.

no weather remarks, just extreme events.

B.59/a/93, 1814-15 (James Russell)
Meteorological Register

no indication/mention of thaw.

B.59/a/94, 1815-16 (James Russell)

no weather remarks.

B.59/a/95, 1815-16 (James Russell)
Meteorological Register

no indication/mention of thaw.

B.59/a/96, 1816-17 (James Russell)

infrequent mention of weather. However, extreme weather conditions are mentioned.

no weather remarks.

B.59/a/97, 1816-17 (James Russell)
Meteorological Register

no indication/mention of thaw.

B.59/a/98, 1818 (George Gladman)

only July 10 to August 7.

B.59/a/99, 1817-18 (George Gladman)
(Meteorological Register at back of Journal)

a cold winter period.

no indication/mention of thaw.

B.59/a/100, 1818-19 (George Gladman)

Jan. 10, F:10
"Wind changed to south in the night with Rain" (see below)

B.59/a/101, 1818-19 (George Gladman)
Meteorological Register

Jan. 10, F:4
"remarks" column: "wind S'erly with Rain in the night."

Jan. 11, F:4
"am" column: "+32"

B.59/a/102, 1819-20 (George Gladman Jr.)

(George Gladman Jr. replaces George Gladman Sr. on December 17)

no mention of thaw.

B.59/a/103, 1819-20 (George Gladman)

(copy of B.59/a/102)

no mention of thaw.

B.59/a/104, 1819-20 (George Gladman)
Meteorological Register

no indication/mention of thaw.

B.59/a/105, 1820-21 (George Gladman)

no mention of thaw.

B.59/a/106, 1820-21 (George Gladman)
Meteorological Register

no indication/mention of thaw.

NOTE: The journal for 1821-22 is missing. This has been verified.

B.59/a/107, 1822-23 (author ?)

Jan. 17, F:36
"Wind SW with Snow and Sleet"

Jan. 26, F:37
"Wind south with Rain & Sleet"

B.59/a/108, 1823-24 (Erland Erlandson)

no mention of thaw.

B.59/a/109, 1824-25 (Erland Erlandson)

weather not always mentioned. Seems that extreme conditions are mentioned.

no mention of thaw.

GAP B.59/a/110, 1825-26 (Erland Erlandson)

sporadic weather remarks.

GAP B.59/a/111, 1826-27 (Erland Erlandson)

only a few weather remarks.

GAP B.59/a/112, 1827-28 (Erland Erlandson)

practically no weather remarks.

B.59/a/113, 1828-29 (Erland Erlandson)

no mention of thaw.

B.59/a/114, 1829-30 (Erland Erlandson)

no mention of thaw.

B.59/a/115, 1830-31 (Andrew Moar)

no mention of thaw.

B.59/a/116, 1830-31 (Andrew Moar)

(copy of B.59/a/115)

no mention of thaw

NOTE: The Journal for 1831-32 is missing. This has been verified.

B.59/a/117, 1832-33 (Andrew Moar)

no mention of thaw.

B.59/a/118, 1833-34 (Richard Hardisty)

(Andrew Moar to Sept. 23, 1833, then Richard Hardisty to March 16, 1834, then Andrew Moar again to March 26, 1834 and then Richard Hardisty again to the end of the Journal)

no mention of thaw.

B.59/a/119, 1833-34 (Richard Hardisty)

(copy of B.59/a/118)

no mention of thaw.

B.59/a/120, 1834-35 (Andrew Moar to July 10)

(Thomas Corcoran from July 11 to the end of the Journal)

no mention of thaw.

B.59/a/121, 1835-36 (Thomas Corcoran)

an extremely cold period.

no mention of thaw.

B.59/a/122, 1836-37 (Thomas Corcoran)

Jan. 3, F:35
"Cloudy mild weather some rain fell in Course of the day"

NOTE: There is a major gap (56 years) from 1837 to 1893. This has been verified.

B.59/a/123, 1893-96 (author ?)

seems to be a particularly stormy period.

Jan. 18, 1894, F:9
"got very mild afternoon Raining most all night"

Jan. 21, 1894, F:9d
"very mild Raining befornoon the wind went Round to the west...and got cold"

*[**Jan. 29, 1894**, F:10 (*possible*)
"very fine and warm"]

*[**Jan. 21, 1895**, F:27d (*possible*)
"wind east cloudy & very mild"]

*[**Jan. 22, 1895**, F:27d (*possible*)
"wind South cloudy & very mild"]

Jan. 11, 1896, F:48d
"wind South cloudy & mild. Small Rain most all day"

*it appears that these days are warm enough for a thaw when taken in context, although thaw (or rain, or sleet) is not specifically indicated. This has also been confirmed with A.J.W.

B.59/a/124, 1896-1900 (author ?)

does not appear to be a cold winter period.

1897: *no mention of thaw.*

1898: *no mention of thaw.*

Jan. 15, 1899, F:56 (*probable*)
"wind South cloudy & very mild & Soft Snowing most all Day"

1900: *no mention of thaw.*

B.59/a/125, 1900-1904 (author ?)

does not appear to be a cold winter period.

1901: *no mention of thaw.*

Jan. 9, 1902, F:27 (*probable*)
"wind South cloudy & very Soft"

1903: *no mention of thaw.*

1904: *no mention of thaw.*

B.59/a/126, 1904-1908 (author ?)

1905: *no mention of thaw.*

Jan. 16, 1906, F:37d
"very mild wet calm turn'd out to snow"

Jan. 22, 1906, F:38
"Fine day very mild wind East a little rain last night"

1907: no Journal entries after Jan. 17, 1907. Entries start back up again on Oct. 25, 1907. However, *no mention of thaw* up to Jan. 17, 1907. After approx. Nov. 4, 1907(?), there are many missing days and mixed-up dates!

1908: "normal" and fairly complete daily Journal accounts begin again on Jan. 14, 1908, and this weather record is complete up to at least Feb. 3, 1908.

Jan. 21, 1908, F:70
"wind South clear befornoon Cloudy afternoon very Soft a Little Rain in the Evening."

B.59/a/127, 1908-10 (author ?)

Jan. 21, 1909, F:10d
"Mild, nearly Raining"

1910: *no mention of thaw.*

NOTE: The Journal for 1910-11 is missing. This has been verified.

B.59/a/128, 1911-13 (author ?)

1911: *no mention of thaw.*

1912: *no mention of thaw.*

Jan. 18, 1913, F:34
"Mild & looks like Rain. did rain this evening"

B.59/a/129, 1913-18 (author ?)

(relatively speaking, penmanship is decent)

1914: *no mention of thaw.*

1915: *no mention of thaw.*

Jan. 9, 1916, F:87
"very mild and rained a little"

Jan. 21, 1916, F:89 (*possible*)
"very mild"

1917: *no mention of thaw.*

1918: *no mention of thaw.*

GAP B.59/a/130, 1918-21 (author ?)

what a mess!!! (missing dates, mixed-up dates)

almost no Jan. 3 - Feb. 3 Journal entries. The only exception is Jan. 1 - 8, 1919. [no thaw]

NOTE: The Journal for 1921-38 is missing. This has been verified.

B.59/a/131, 1938-39 (author ?)

(recorded by hand on yellow forms)

decent penmanship, but rather limited in terms of weather information. Usually, only the wind direction and unusual weather events are mentioned in the left margin.

Jan. 6, Sheet #:34
"variable wind rain"

NOTE: The Journal for 1939-40 is missing. This has been verified.

B.59/a/132, 1940-41 (author ?)

(beautiful, typed forms!)

instrumental temperature reading sometimes found in the left margin along with wind direction and occasionally a weather remark (e.g. "cold" or "drifting").

no mention of thaw.

END

Eastmain Thaw Classification Totals

DATE	THAW	RAIN	SLEET	THERM.	PROB.	POSS.
1737	0	0	0	0	0	0
1738	0	7	0	0	0	0
1739	0	2	0	0	0	0
1740	0	0	0	0	0	0
1741	0	0	0	0	0	0
1742	1	0	0	0	0	0
1743	0	0	0	0	0	0
1744	0	1	0	0	0	0
1745	0	1	0	0	0	0
1746	0	0	0	0	0	0
1747	0	0	0	0	0	0
1748	0	0	0	0	0	0
1749	0	0	0	0	0	0
1750	3	1	0	0	0	0
1751	0	0	0	0	0	0
1752	0	0	0	0	0	0
1753	0	1	0	0	0	0
1754	0	0	0	0	0	0
1755	2	0	0	0	0	0
1756	1	1	0	0	0	0
1757	0	0	0	0	0	0
1758	0	0	0	0	0	0
1759	0	0	0	0	0	0
1760	0	0	0	0	0	0
1761	0	0	0	0	0	0
1762	3	0	0	0	0	0
1763	0	0	0	0	0	0
1764	3	2	0	0	0	0
1765	0	0	0	0	0	0
1766	1	0	0	0	0	0
1767	0	0	0	0	0	0
1768	0	0	1	0	0	0
1769	0	0	0	0	0	0
1770	0	0	1	0	0	0
1771	0	2	0	0	0	0
1772	0	0	0	0	0	0
1773	0	0	0	0	0	0
1774	0	0	0	0	0	0
1775	0	0	0	0	0	0
1776	0	0	0	0	0	0
1777	0	0	1	0	0	0
1778	0	0	0	0	0	0
1779	0	1	1	0	0	0
1780	0	0	0	0	0	0

Eastmain Thaw Classification Totals

1781	0	0	0	0	0	0
1782	1	0	0	0	0	0
1783	0	0	0	0	0	0
1784	0	0	0	0	0	0
1785	0	0	0	0	0	0
1786	0	0	0	0	0	0
1787	0	0	0	0	0	0
1788	0	0	0	0	0	0
1789	0	0	0	0	0	0
1790	0	0	0	0	0	0
1791	0	1	0	0	0	0
1792	0	0	0	0	0	0
1793	0	0	0	0	0	0
1794	0	3	0	0	0	0
1795	1	0	0	0	0	0
1796	0	0	0	0	0	0
1797	0	0	0	0	0	0
1798	0	0	0	0	0	0
1799	0	3	0	0	0	0
1800	0	0	0	0	0	0
1801						
1802						
1803						
1804						
1805						
1806						
1807	0	0	0	0	0	0
1808	0	0	0	0	0	0
1809	0	0	0	0	0	0
1810	0	0	0	0	0	0
1811						
1812						
1813						
1814						
1815	0	0	0	0	0	0
1816	0	0	0	0	0	0
1817	0	0	0	0	0	0
1818	0	0	0	0	0	0
1819	0	1	0	1	0	0
1820	0	0	0	0	0	0
1821	0	0	0	0	0	0
1822						
1823	0	1	1	0	0	0
1824	0	0	0	0	0	0
1825	0	0	0	0	0	0
1826						

Eastmain Thaw Classification Totals

1827						
1828						
1829	0	0	0	0	0	0
1830	0	0	0	0	0	0
1831	0	0	0	0	0	0
1832						
1833	0	0	0	0	0	0
1834	0	0	0	0	0	0
1835	0	0	0	0	0	0
1836	0	0	0	0	0	0
1837	0	1	0	0	0	0
1838						
1839						
1840						
1841						
1842						
1843						
1844						
1845						
1846						
1847						
1848						
1849						
1850						
1851						
1852						
1853						
1854						
1855						
1856						
1857						
1858						
1859						
1860						
1861						
1862						
1863						
1864						
1865						
1866						
1867						
1868						
1869						
1870						
1871						
1872						

Eastmain Thaw Classification Totals

1873						
1874						
1875						
1876						
1877						
1878						
1879						
1880						
1881						
1882						
1883						
1884						
1885						
1886						
1887						
1888						
1889						
1890						
1891						
1892						
1893						
1894	0	2	0	0	0	1
1895	0	0	0	0	0	2
1896	0	1	0	0	0	0
1897	0	0	0	0	0	0
1898	0	0	0	0	0	0
1899	0	0	0	0	1	0
1900	0	0	0	0	0	0
1901	0	0	0	0	0	0
1902	0	0	0	0	1	0
1903	0	0	0	0	0	0
1904	0	0	0	0	0	0
1905	0	0	0	0	0	0
1906	0	2	0	0	0	0
1907	0	0	0	0	0	0
1908	0	1	0	0	0	0
1909	0	1	0	0	0	0
1910	0	0	0	0	0	0
1911	0	0	0	0	0	0
1912	0	0	0	0	0	0
1913	0	1	0	0	0	0
1914	0	0	0	0	0	0
1915	0	0	0	0	0	0
1916	0	1	0	0	0	1
1917	0	0	0	0	0	0
1918	0	0	0	0	0	0

Eastmain Thaw Classification Totals

1919						
1920						
1921						
1922						
1923						
1924						
1925						
1926						
1927						
1928						
1929						
1930						
1931						
1932						
1933						
1934						
1935						
1936						
1937						
1938						
1939	0	1	0	0	0	0
1940						
1941	0	0	0	0	0	0
TOTALS:	16	39	5	1	2	4
CHECK:	67					

APPENDIX B

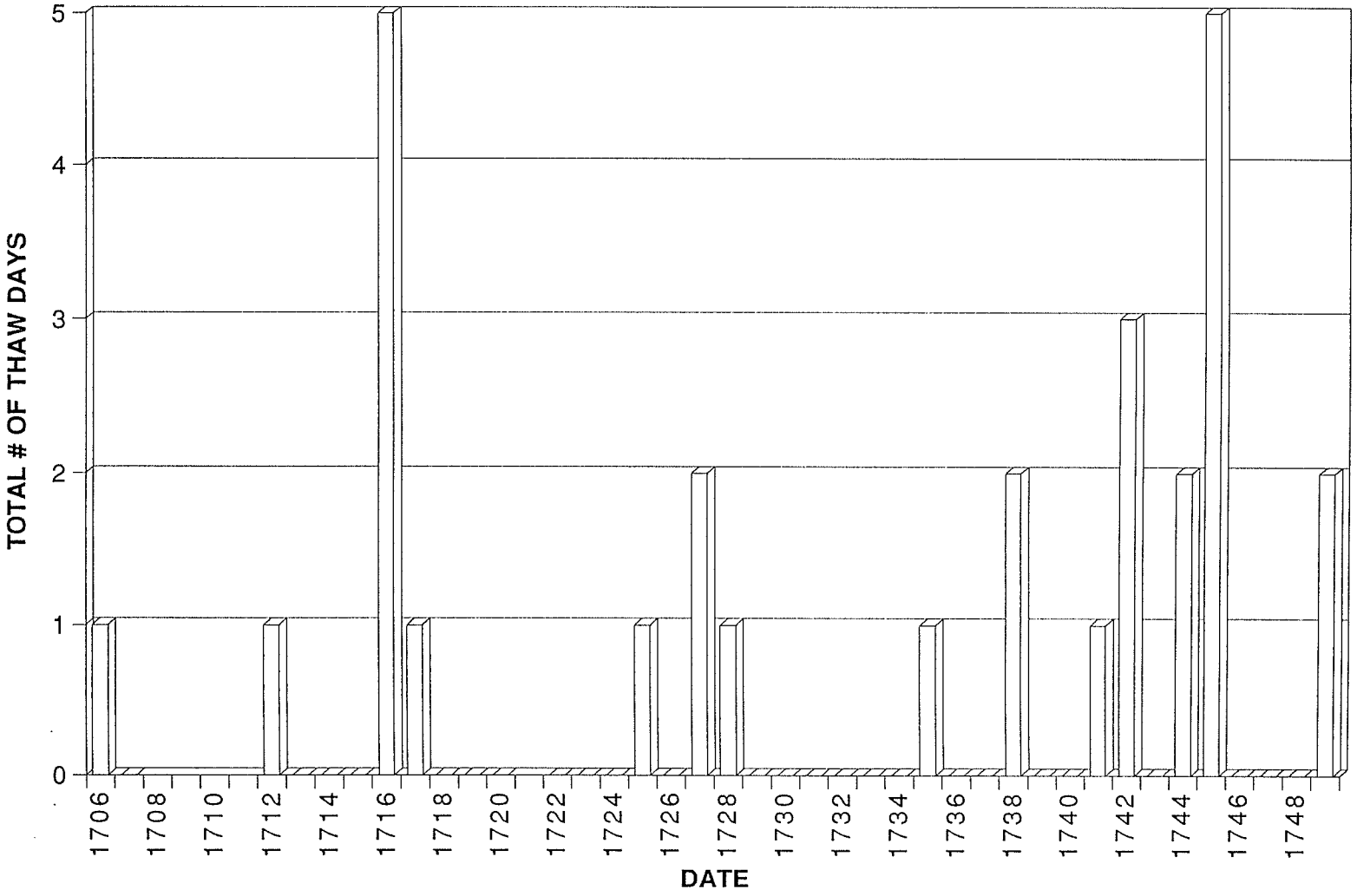
Fort Albany, Moose Factory and Eastmain Mid-Winter Thaw Chronologies: Thaw Days and Thaw Episodes

FORT ALBANY

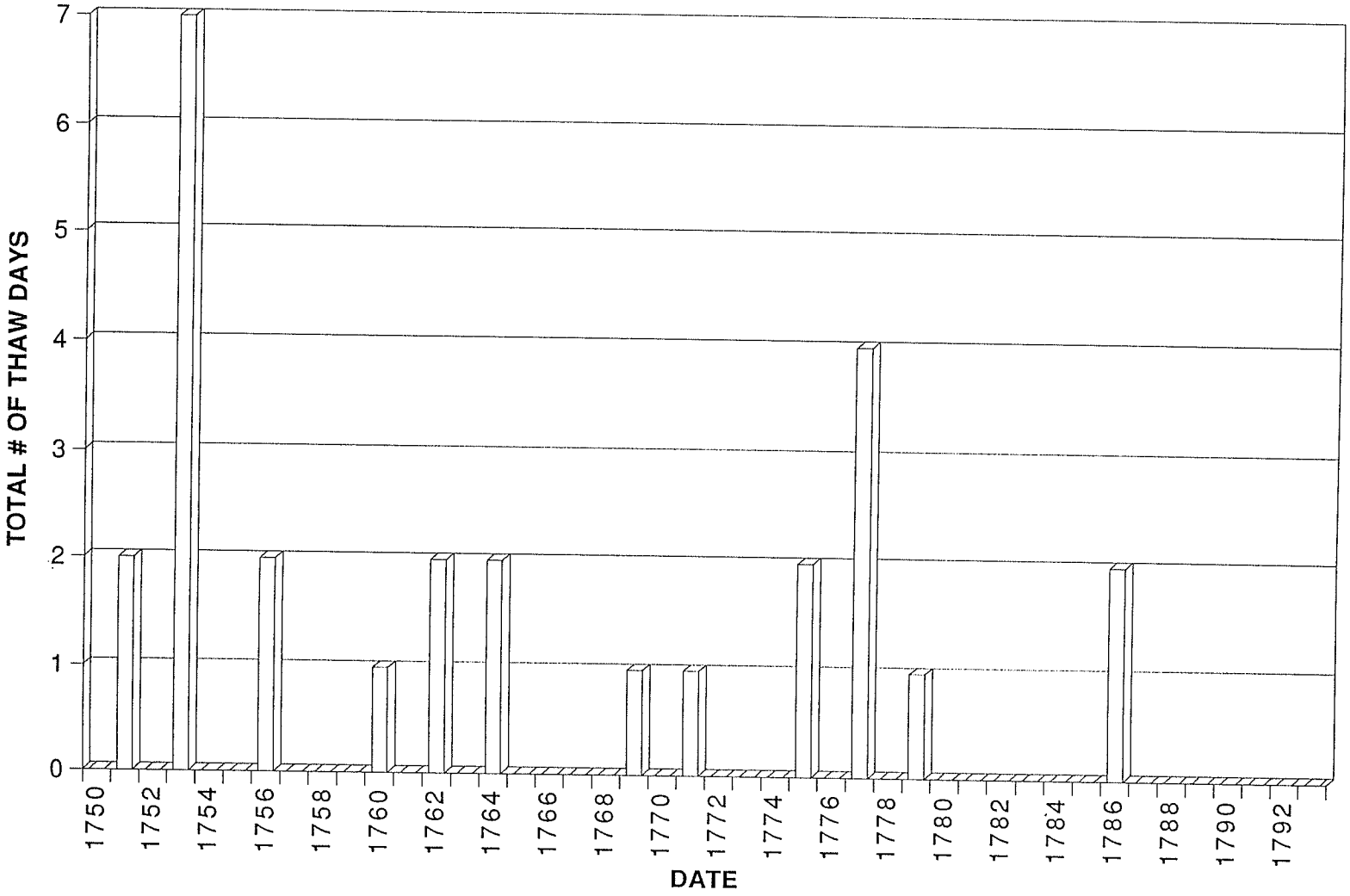
DATE	THAW TOTALS	DATE	THAW TOTALS	DATE	THAW TOTALS
1706	1	1750	0	1794	2
1707	0	1751	2	1795	0
1708		1752	0	1796	0
1709		1753	7	1797	0
1710		1754	0	1798	0
1711		1755	0	1799	3
1712	1	1756	2	1800	0
1713	0	1757	0	1801	0
1714	0	1758	0	1802	
1715	0	1759	0	1803	
1716	5	1760	1	1804	
1717	1	1761	0	1805	0
1718	0	1762	2	1806	
1719	0	1763	0	1807	
1720	0	1764	2	1808	
1721		1765	0	1809	
1722	0	1766	0	1810	
1723	0	1767	0	1811	
1724	0	1768	0	1812	
1725	1	1769	1	1813	
1726	0	1770	0	1814	
1727	2	1771	1	1815	0
1728	1	1772	0	1816	0
1729	0	1773	0	1817	0
1730	0	1774	0	1818	0
1731	0	1775	2	1819	0
1732	0	1776	0	1820	0
1733	0	1777	4	1821	0
1734	0	1778	0	1822	
1735	1	1779	1	1823	0
1736	0	1780	0	1824	3
1737	0	1781	0	1825	0
1738	2	1782	0	1826	3
1739	0	1783	0	1827	0
1740	0	1784	0	1828	0
1741	1	1785	0	1829	2
1742	3	1786	2	1830	0
1743	0	1787	0	1831	0
1744	2	1788	0	1832	5
1745	5	1789	0	1833	0
1746	0	1790	0	1834	0
1747	0	1791	0	1835	0
1748	0	1792	0	1836	2
1749	2	1793	0	1837	1

1838	1	1882		1926	
1839	1	1883		1927	
1840	0	1884		1928	
1841	0	1885		1929	
1842	0	1886		1930	1
1843	8	1887	0	1931	1
1844	0	1888	0	1932	
1845	2	1889	0	1933	
1846	1	1890	0	1934	
1847	0	1891	1	1935	
1848	0	1892	0	1936	
1849	0	1893	0	1937	
1850	0	1894	0	1938	
1851	0	1895	0	1939	1
1852	0	1896		1940	
1853	2	1897	0	1941	0
1854	0	1898	0		
1855	2	1899	0		
1856	0	1900	0		
1857	0	1901	0		
1858	0	1902	0		
1859	1	1903	0		
1860	1	1904	0		
1861	1	1905	0		
1862	0	1906	0		
1863	2	1907	0		
1864	0	1908	2		
1865	1	1909	0		
1866	5	1910	0		
1867	0	1911	0		
1868	0	1912	0		
1869		1913	0		
1870		1914	0		
1871		1915	2		
1872	0	1916	0		
1873	0	1917	0		
1874		1918	0		
1875		1919	0		
1876	2	1920	0		
1877	4	1921	1		
1878	0	1922			
1879	0	1923			
1880	3	1924			
1881		1925			

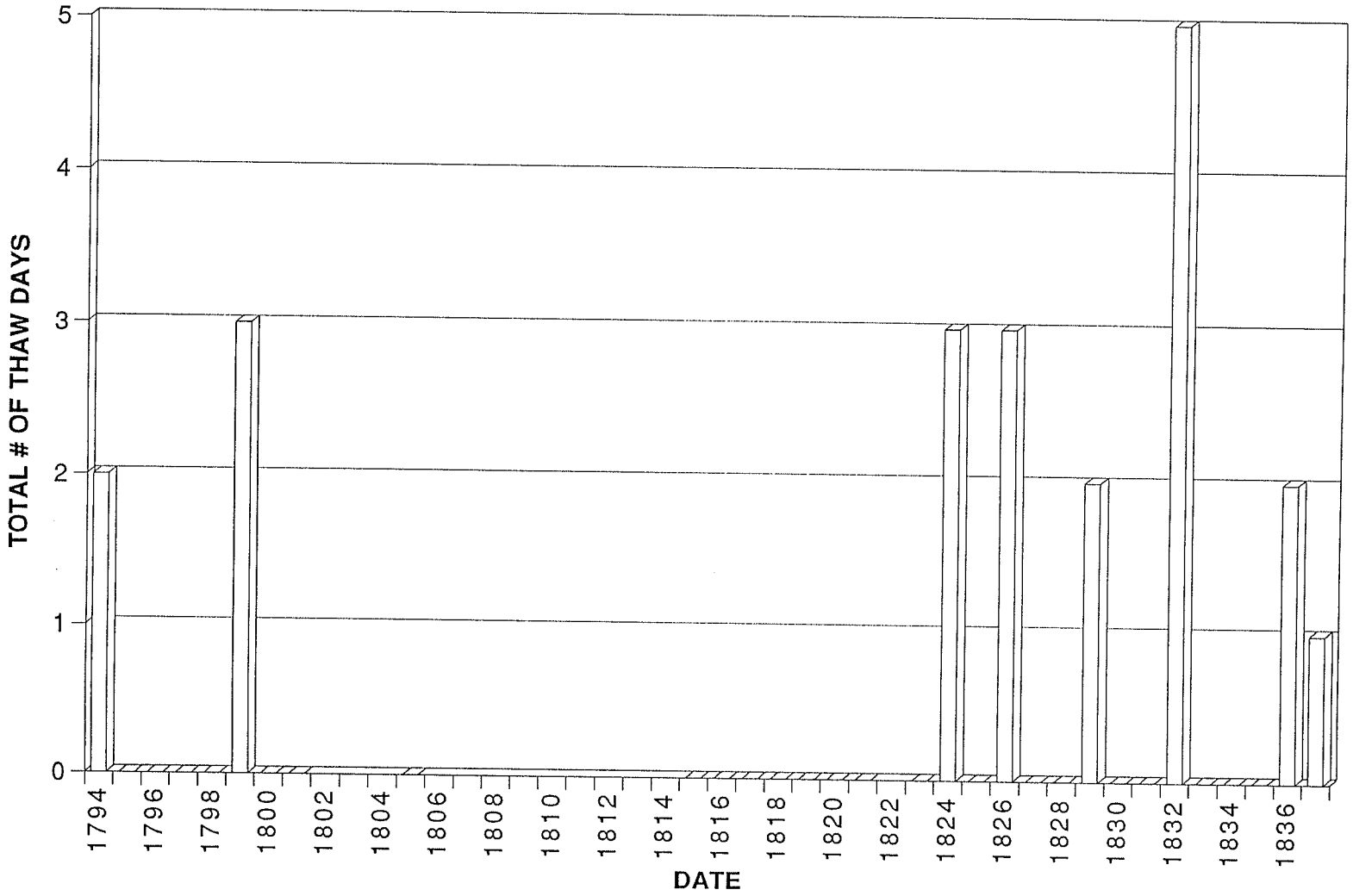
FREQUENCY OF OCCURRENCE OF MID-WINTER THAW: ALBANY 1705-49



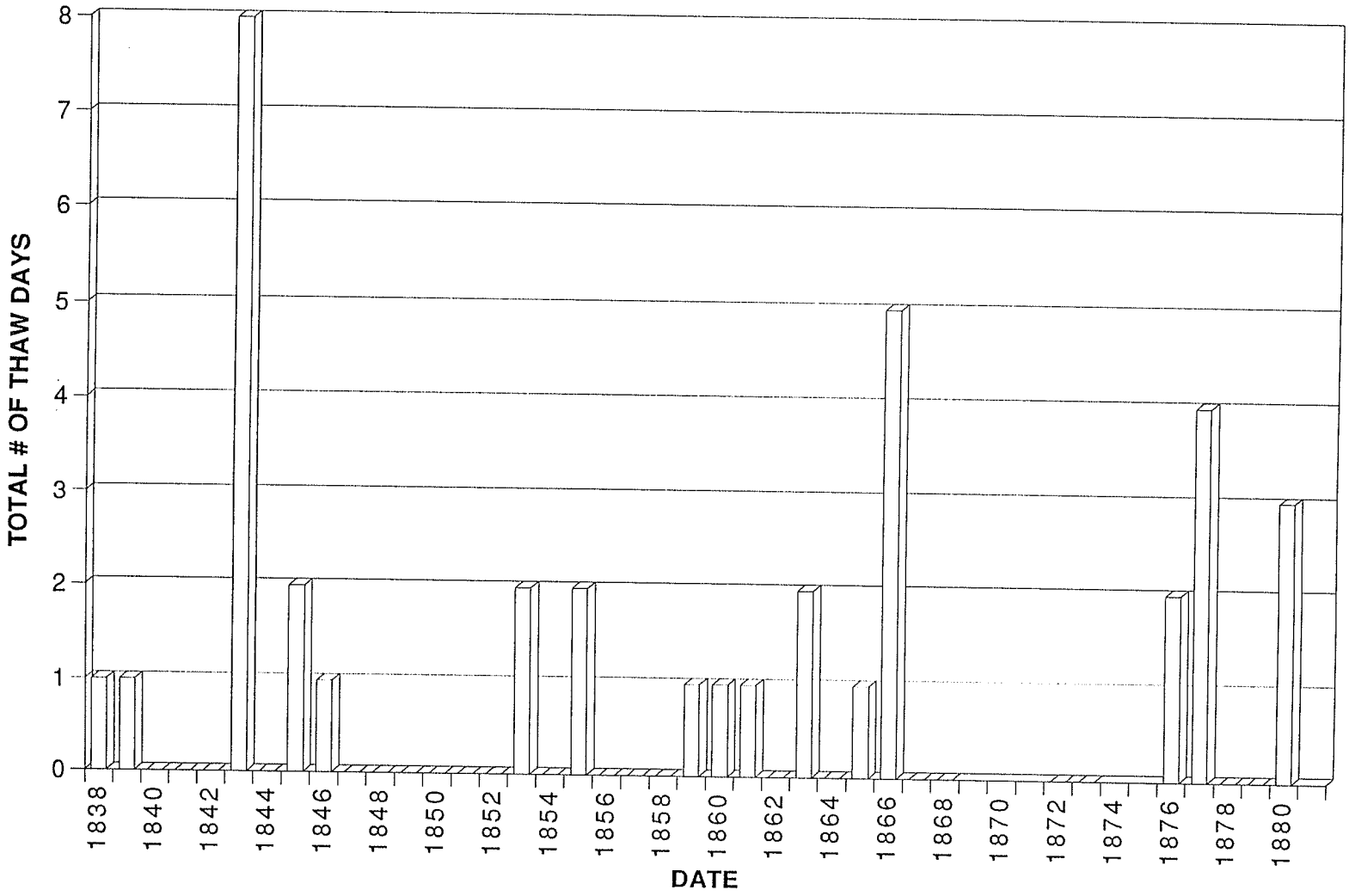
FREQUENCY OF OCCURRENCE OF MID-WINTER THAW: ALBANY, 1750-93



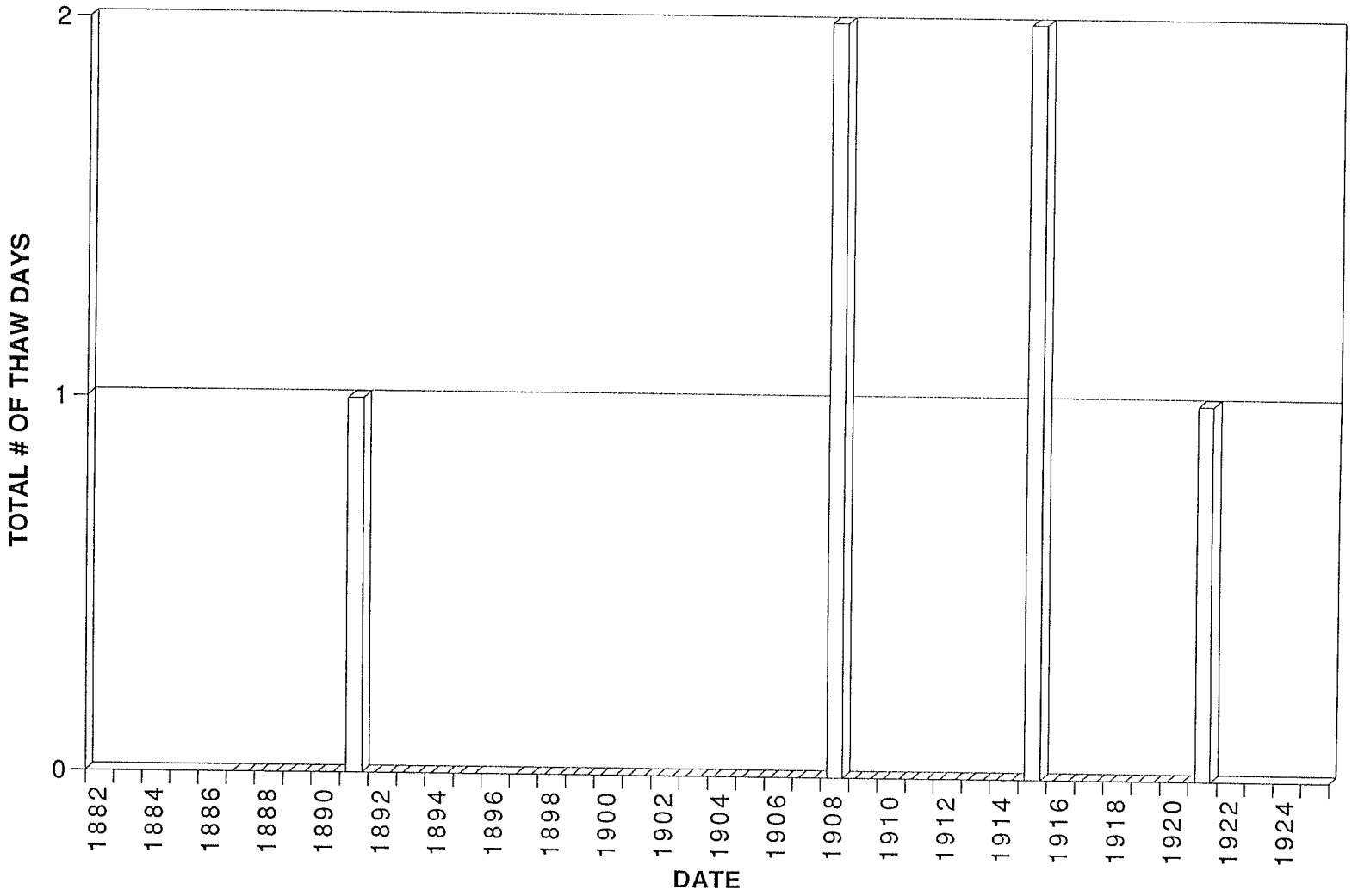
FREQUENCY OF OCCURRENCE OF MID-WINTER THAW: ALBANY, 1794-1837



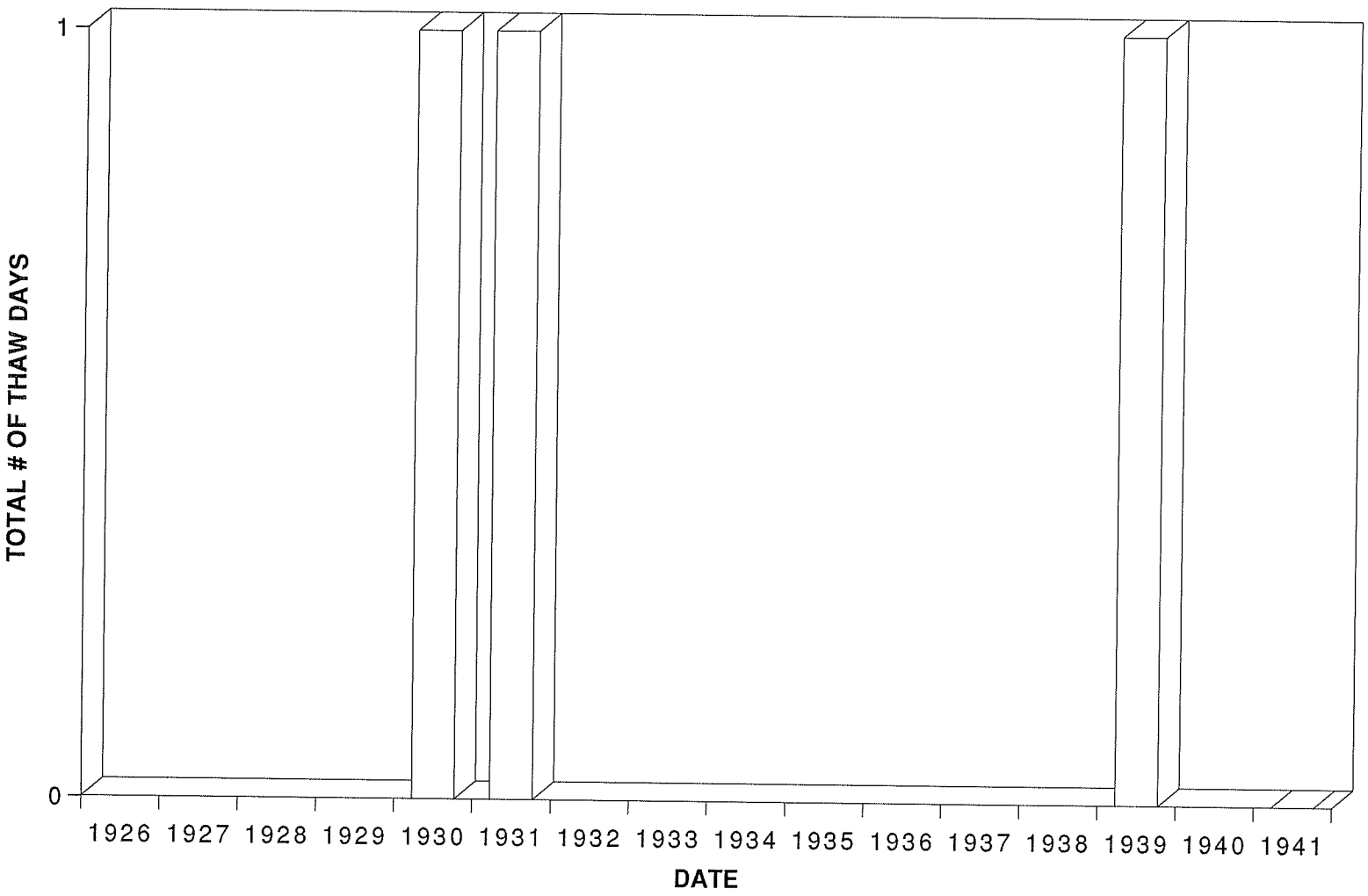
FREQUENCY OF OCCURRENCE OF MID-WINTER THAW: ALBANY, 1838-81



FREQUENCY OF OCCURRENCE OF MID-WINTER THAW: ALBANY, 1882-1925



FREQUENCY OF OCCURRENCE OF MID-WINTER THAW: ALBANY, 1926-41

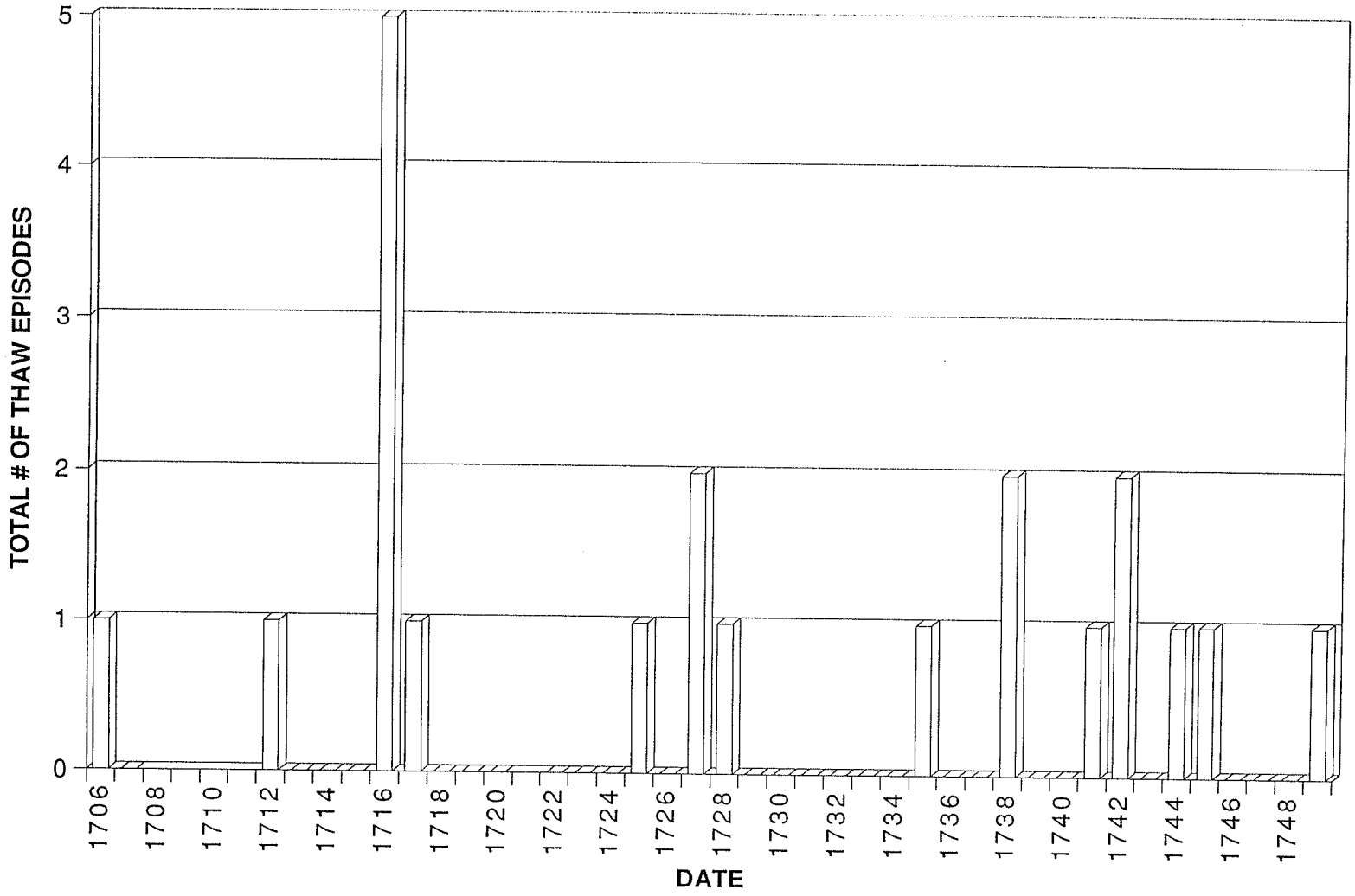


FORT ALBANY

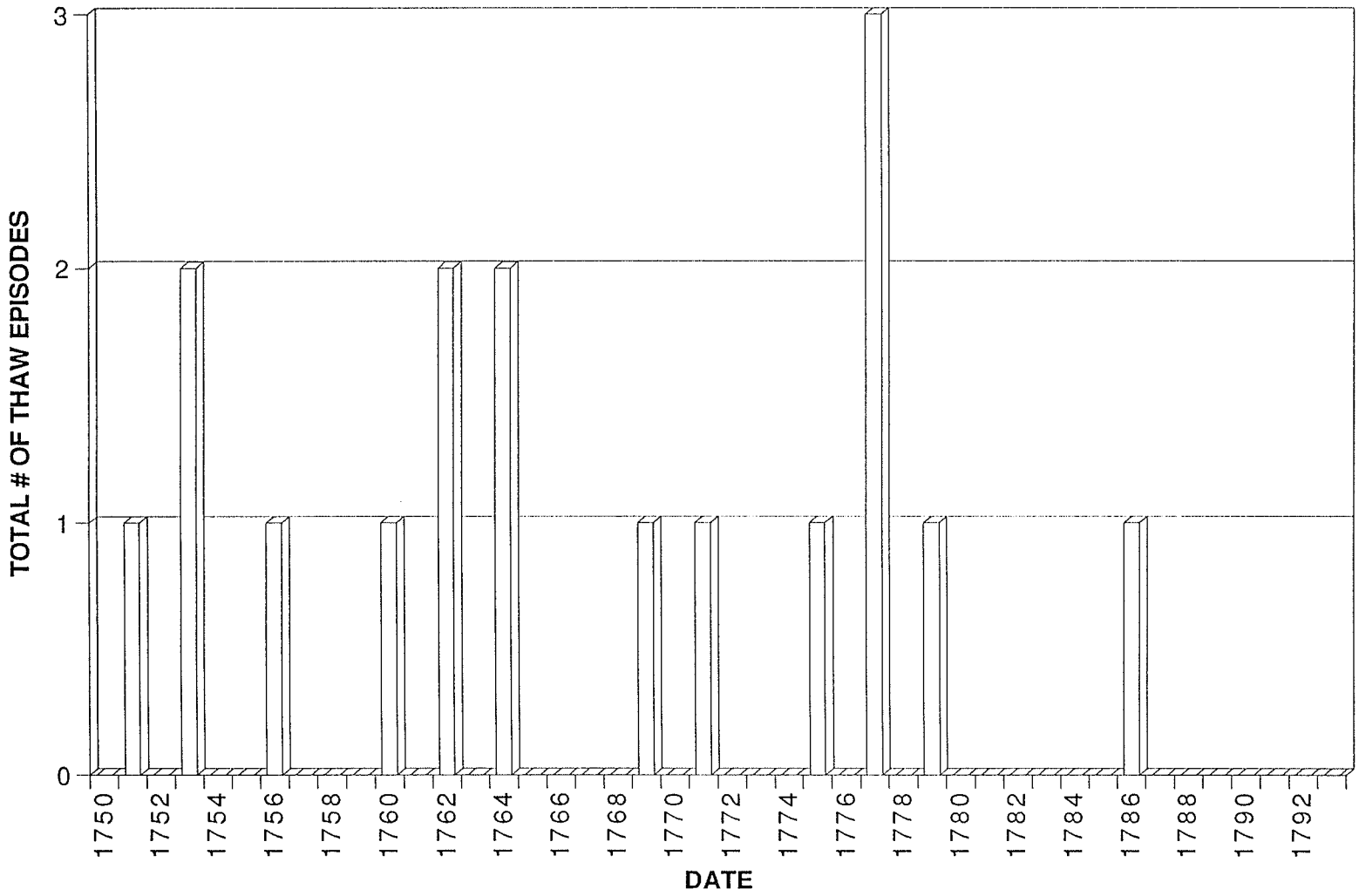
DATE	EPIS. TOTALS	DATE	EPIS. TOTALS	DATE	EPIS. TOTALS
1706	1	1750	0	1794	2
1707	0	1751	1	1795	0
1708		1752	0	1796	0
1709		1753	2	1797	0
1710		1754	0	1798	0
1711		1755	0	1799	1
1712	1	1756	1	1800	0
1713	0	1757	0	1801	0
1714	0	1758	0	1802	
1715	0	1759	0	1803	
1716	5	1760	1	1804	
1717	1	1761	0	1805	0
1718	0	1762	2	1806	
1719	0	1763	0	1807	
1720	0	1764	2	1808	
1721		1765	0	1809	
1722	0	1766	0	1810	
1723	0	1767	0	1811	
1724	0	1768	0	1812	
1725	1	1769	1	1813	
1726	0	1770	0	1814	
1727	2	1771	1	1815	0
1728	1	1772	0	1816	0
1729	0	1773	0	1817	0
1730	0	1774	0	1818	0
1731	0	1775	1	1819	0
1732	0	1776	0	1820	0
1733	0	1777	3	1821	0
1734	0	1778	0	1822	
1735	1	1779	1	1823	0
1736	0	1780	0	1824	1
1737	0	1781	0	1825	0
1738	2	1782	0	1826	1
1739	0	1783	0	1827	0
1740	0	1784	0	1828	0
1741	1	1785	0	1829	2
1742	2	1786	1	1830	0
1743	0	1787	0	1831	0
1744	1	1788	0	1832	1
1745	1	1789	0	1833	0
1746	0	1790	0	1834	0
1747	0	1791	0	1835	0
1748	0	1792	0	1836	1
1749	1	1793	0	1837	1

1838	1	1882		1926	
1839	1	1883		1927	
1840	0	1884		1928	
1841	0	1885		1929	
1842	0	1886		1930	1
1843	3	1887	0	1931	1
1844	0	1888	0	1932	
1845	1	1889	0	1933	
1846	1	1890	0	1934	
1847	0	1891	1	1935	
1848	0	1892	0	1936	
1849	0	1893	0	1937	
1850	0	1894	0	1938	
1851	0	1895	0	1939	1
1852	0	1896		1940	
1853	1	1897	0	1941	0
1854	0	1898	0		
1855	2	1899	0		
1856	0	1900	0		
1857	0	1901	0		
1858	0	1902	0		
1859	1	1903	0		
1860	1	1904	0		
1861	1	1905	0		
1862	0	1906	0		
1863	1	1907	0		
1864	0	1908	2		
1865	1	1909	0		
1866	3	1910	0		
1867	0	1911	0		
1868	0	1912	0		
1869		1913	0		
1870		1914	0		
1871		1915	2		
1872	0	1916	0		
1873	0	1917	0		
1874		1918	0		
1875		1919	0		
1876	1	1920	0		
1877	2	1921	1		
1878	0	1922			
1879	0	1923			
1880	3	1924			
1881		1925			

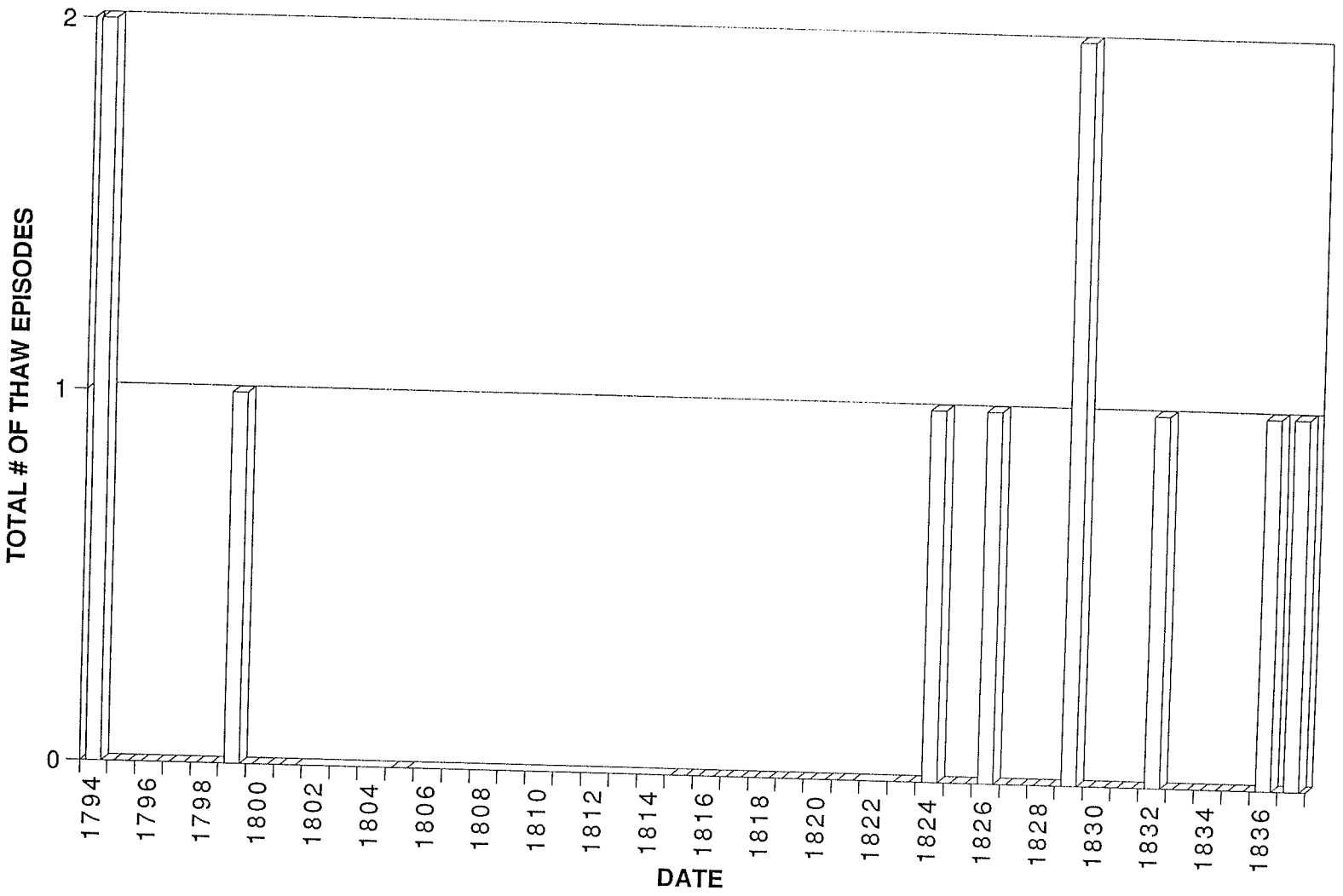
FREQUENCY OF OCCURRENCE OF MID-WINTER THAW: ALBANY, 1705-49



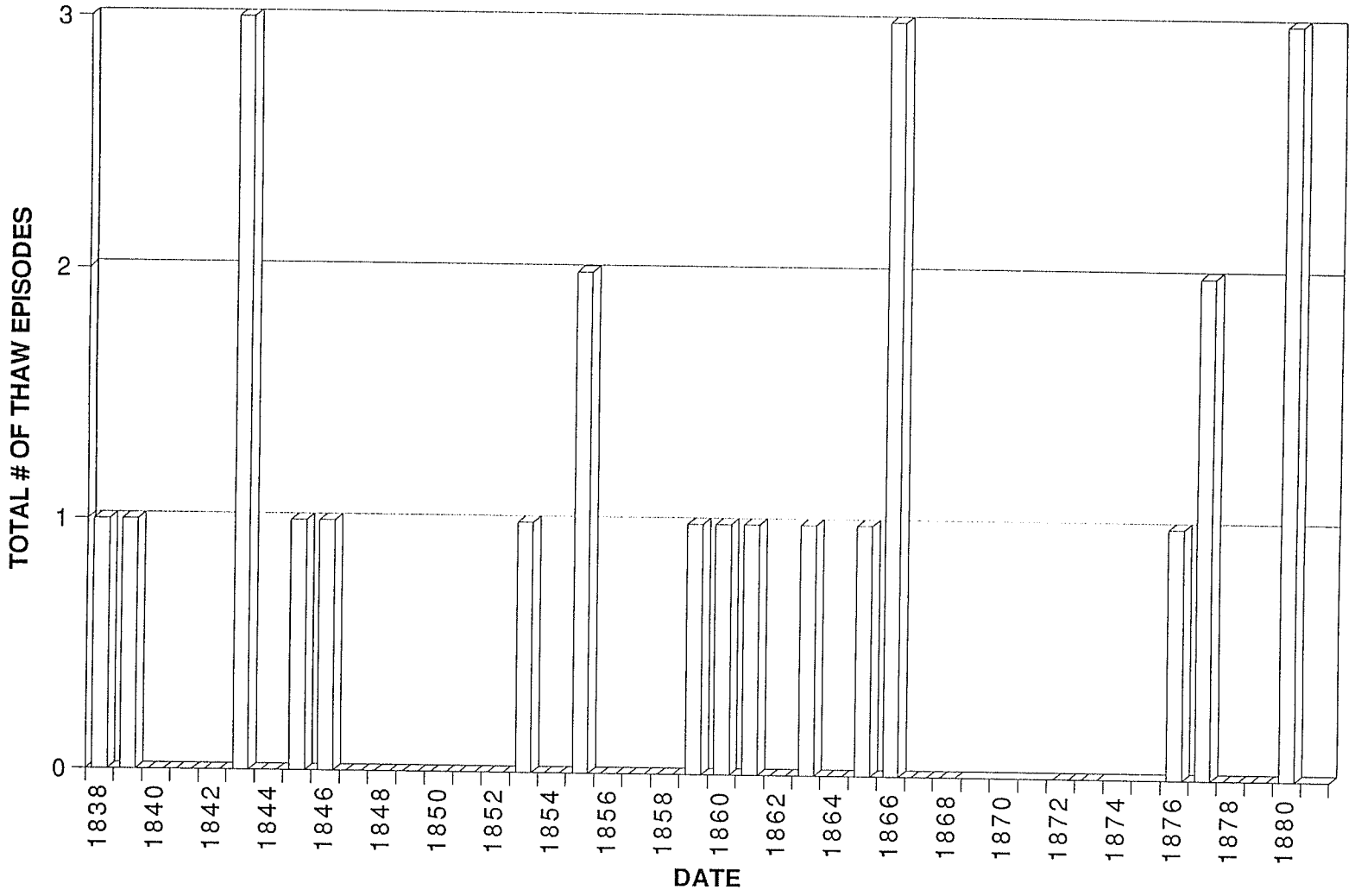
FREQUENCY OF OCCURRENCE OF MID-WINTER THAW: ALBANY, 1750-93



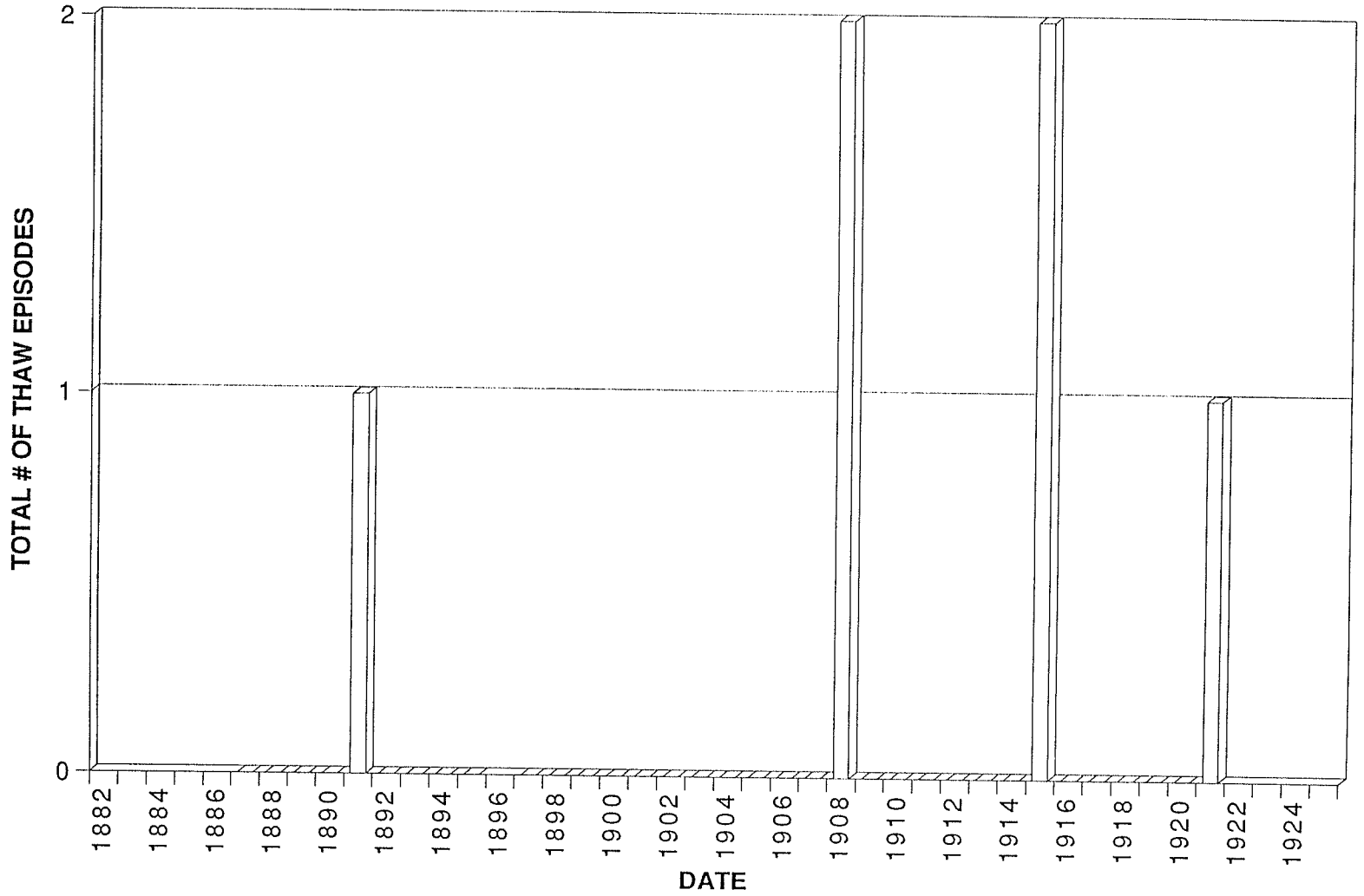
FREQUENCY OF OCCURRENCE OF MID-WINTER THAW: ALBANY, 1794-1837



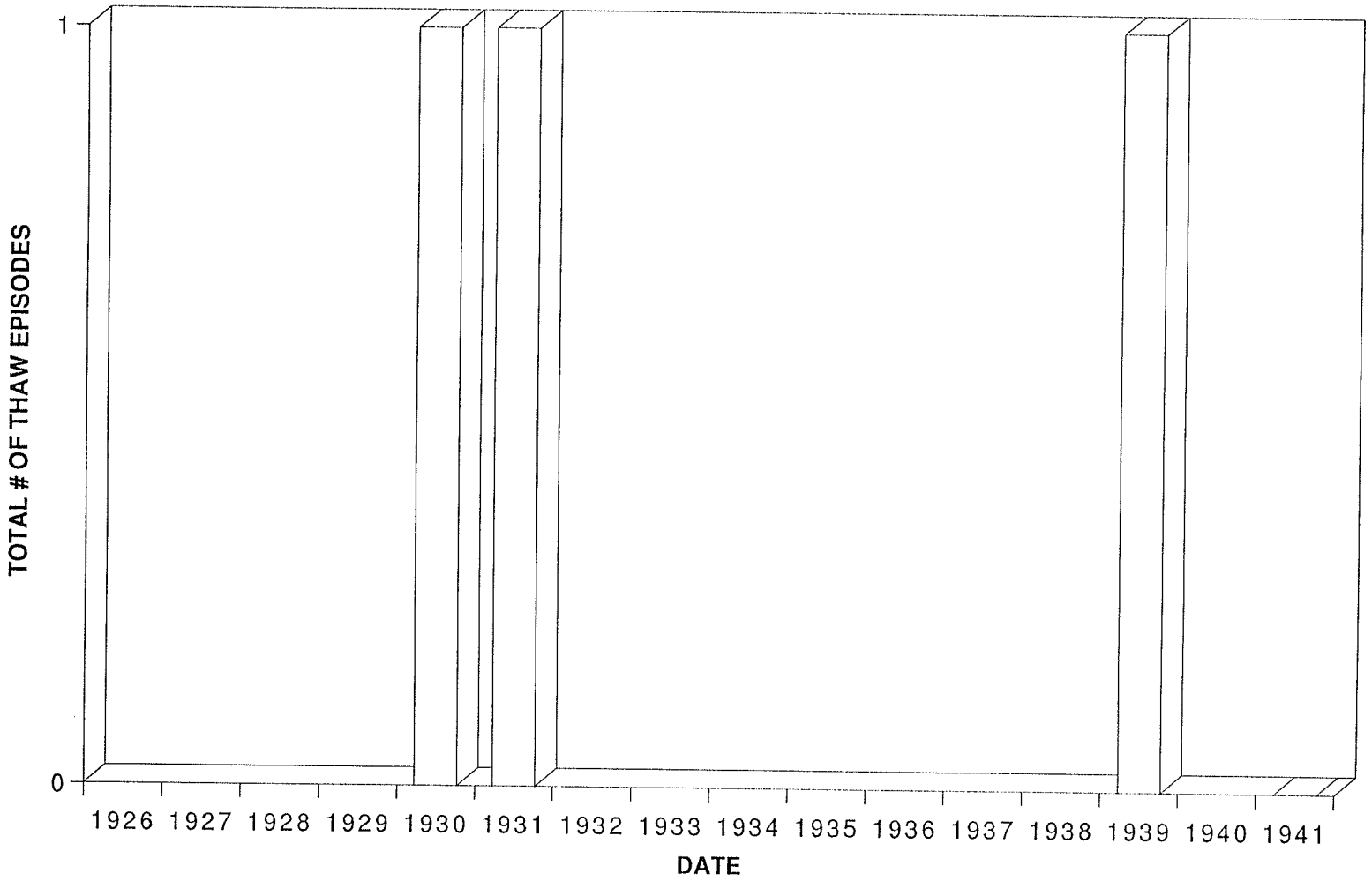
FREQUENCY OF OCCURRENCE MID-WINTER THAW: ALBANY, 1838-81



FREQUENCY OF OCCURRENCE OF MID-WINTER THAW: ALBANY, 1882-1925



FREQUENCY OF OCCURRENCE OF MID-WINTER THAW: ALBANY, 1926-41

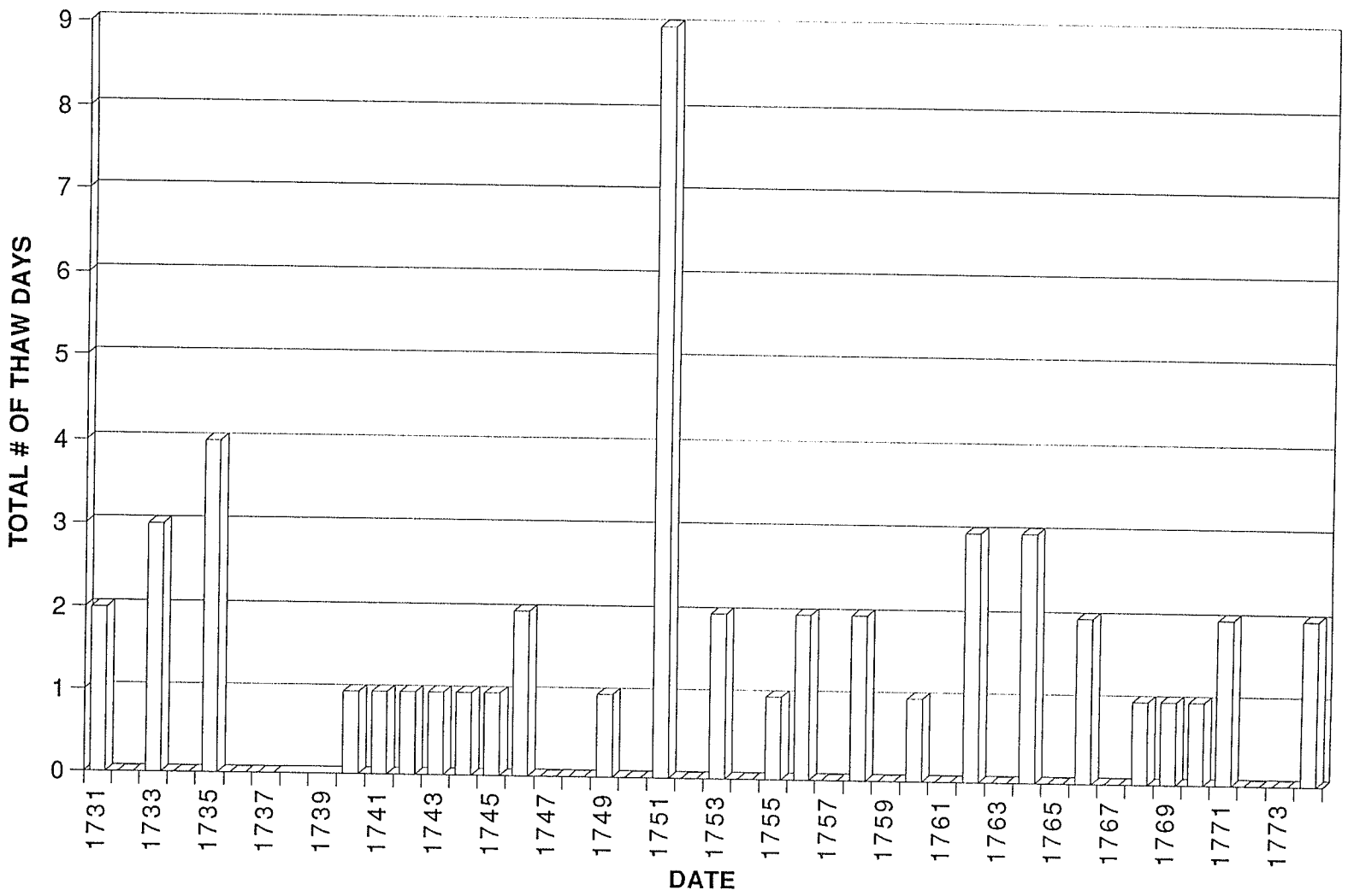


MOOSE FACTORY

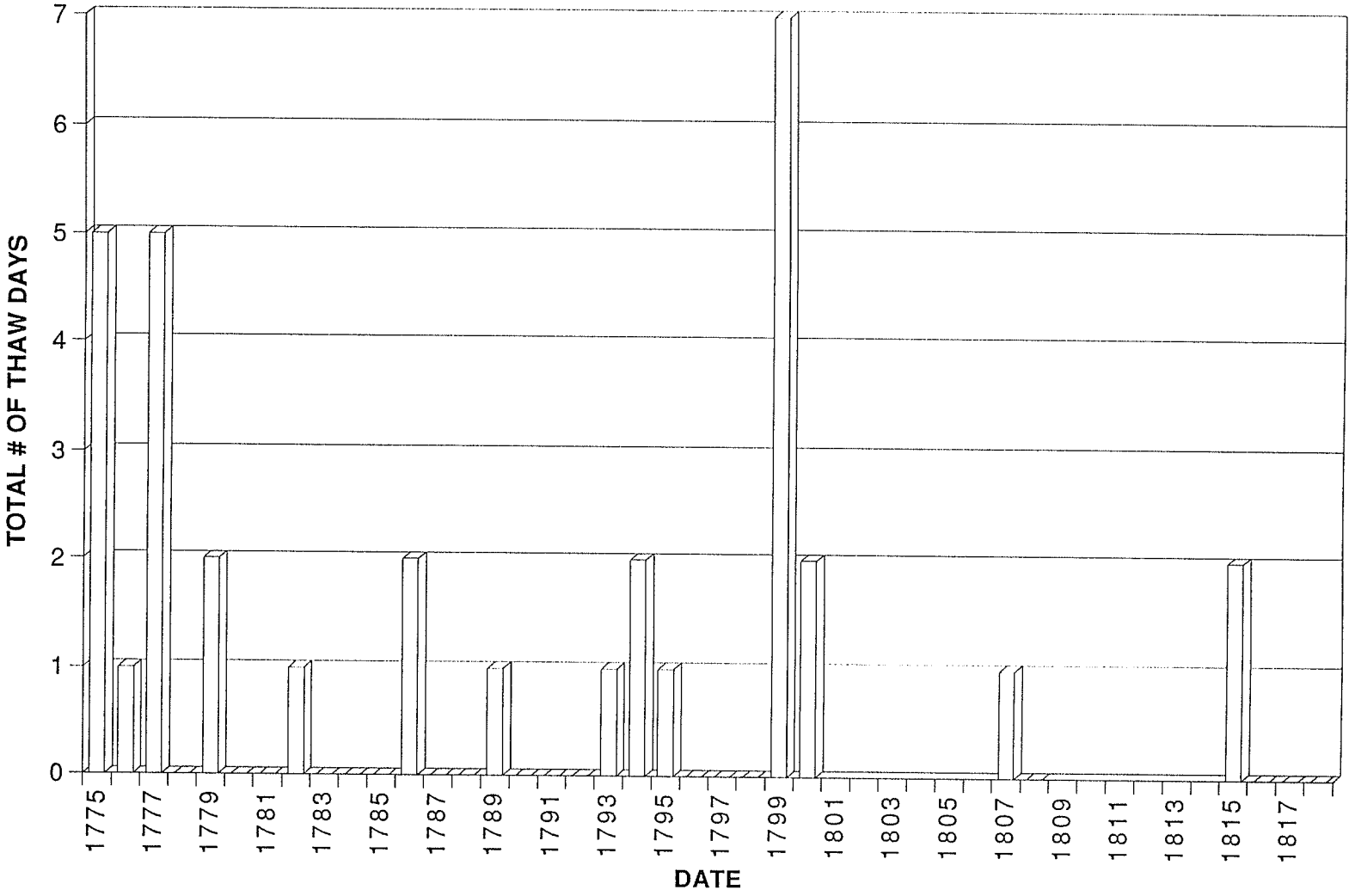
DATE	THAW TOTALS	DATE	THAW TOTALS	DATE	THAW TOTALS
1731	2	1775	5	1819	1
1732	0	1776	1	1820	0
1733	3	1777	5	1821	
1734	0	1778	0	1822	
1735	4	1779	2	1823	0
1736	0	1780	0	1824	0
1737	0	1781	0	1825	0
1738		1782	1	1826	3
1739		1783	0	1827	
1740	1	1784	0	1828	0
1741	1	1785	0	1829	1
1742	1	1786	2	1830	
1743	1	1787	0	1831	0
1744	1	1788	0	1832	9
1745	1	1789	1	1833	
1746	2	1790	0	1834	
1747	0	1791	0	1835	1
1748	0	1792	0	1836	2
1749	1	1793	1	1837	0
1750	0	1794	2	1838	1
1751	9	1795	1	1839	2
1752	0	1796	0	1840	0
1753	2	1797	0	1841	0
1754	0	1798	0	1842	1
1755	1	1799	7	1843	
1756	2	1800	2	1844	
1757	0	1801		1845	0
1758	2	1802		1846	
1759	0	1803		1847	0
1760	1	1804		1848	0
1761	0	1805		1849	0
1762	3	1806		1850	0
1763	0	1807	1	1851	0
1764	3	1808	0	1852	1
1765	0	1809		1853	2
1766	2	1810		1854	0
1767	0	1811		1855	3
1768	1	1812		1856	
1769	1	1813		1857	
1770	1	1814		1858	2
1771	2	1815	2	1859	1
1772	0	1816	0	1860	3
1773	0	1817	0	1861	0
1774	2	1818	0	1862	0

1863	1	1907	
1864	1	1908	
1865		1909	
1866		1910	
1867		1911	
1868	0	1912	
1869		1913	0
1870	1	1914	1
1871	0	1915	0
1872		1916	1
1873		1917	0
1874		1918	0
1875		1919	0
1876		1920	0
1877		1921	1
1878	3	1922	0
1879		1923	
1880		1924	
1881		1925	
1882		1926	
1883		1927	
1884		1928	
1885		1929	
1886		1930	0
1887		1931	
1888		1932	
1889		1933	
1890		1934	
1891		1935	
1892		1936	
1893		1937	
1894		1938	
1895		1939	2
1896		1940	
1897		1941	0
1898			
1899			
1900			
1901			
1902	3		
1903	1		
1904	0		
1905			
1906			

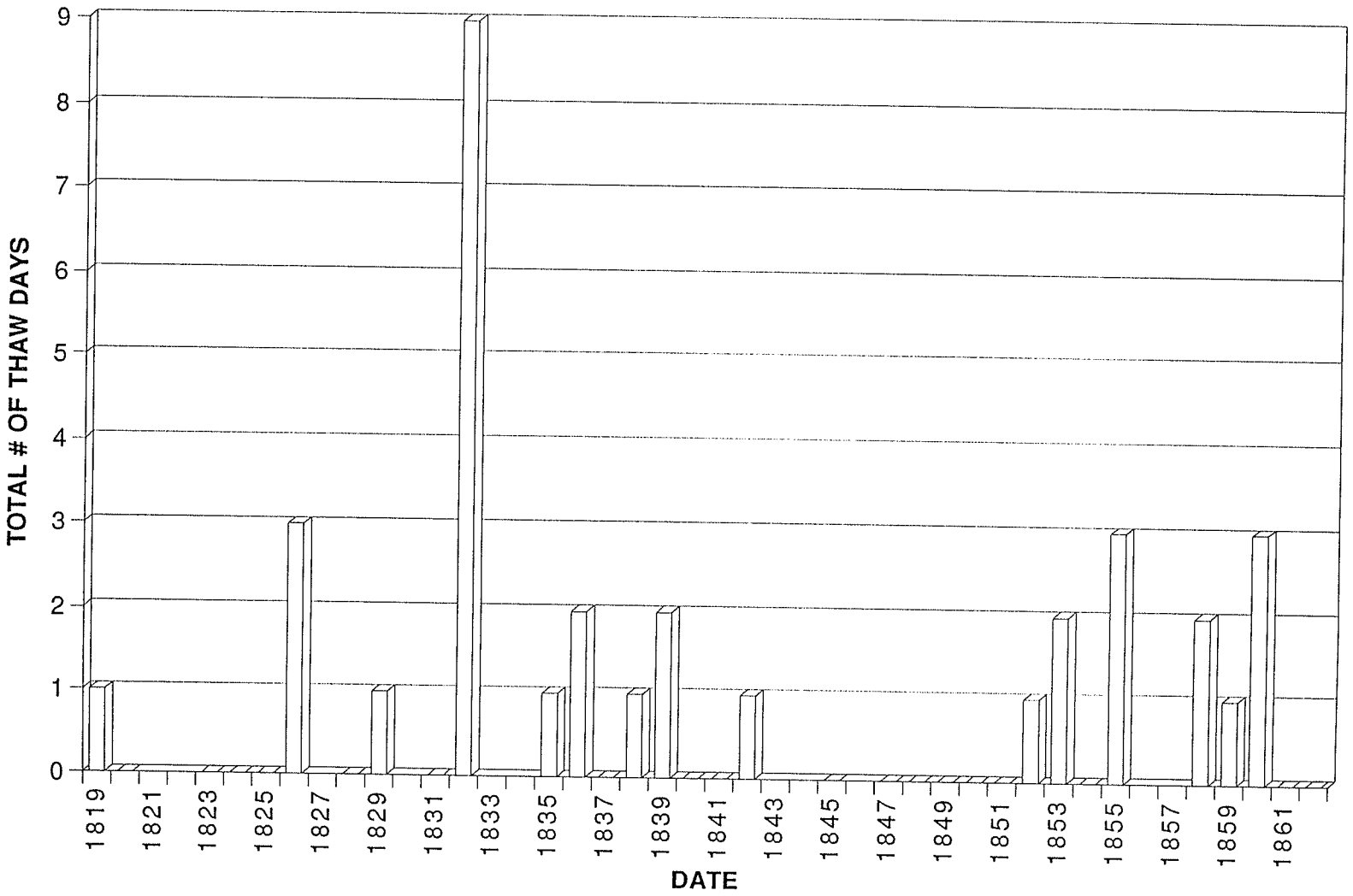
FREQUENCY OF OCCURRENCE OF MID-WINTER THAW: MOOSE FACTORY, 1730-74



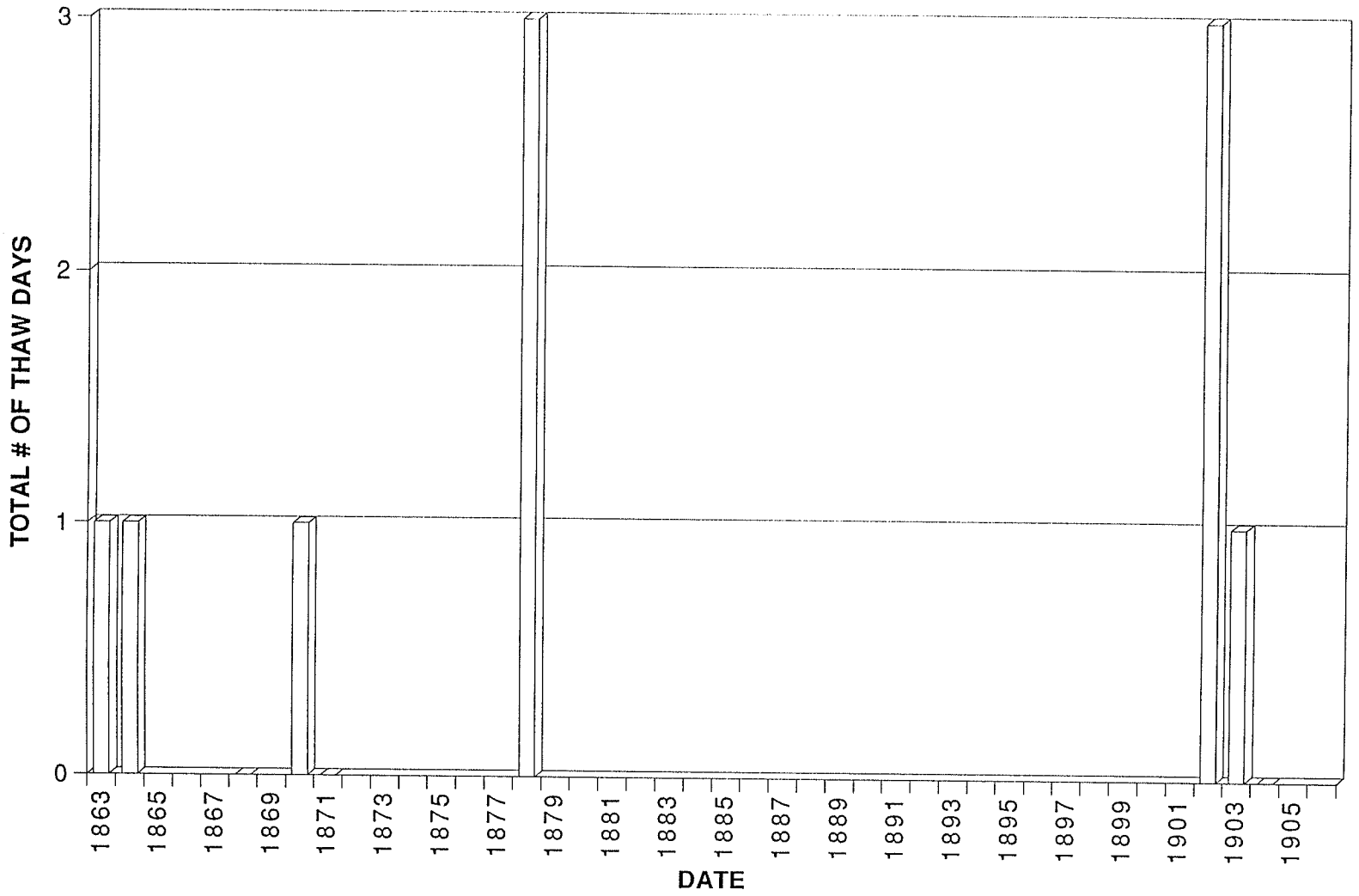
FREQUENCY OF OCCURRENCE OF MID-WINTER THAW: MOOSE FACTORY, 1775-1818



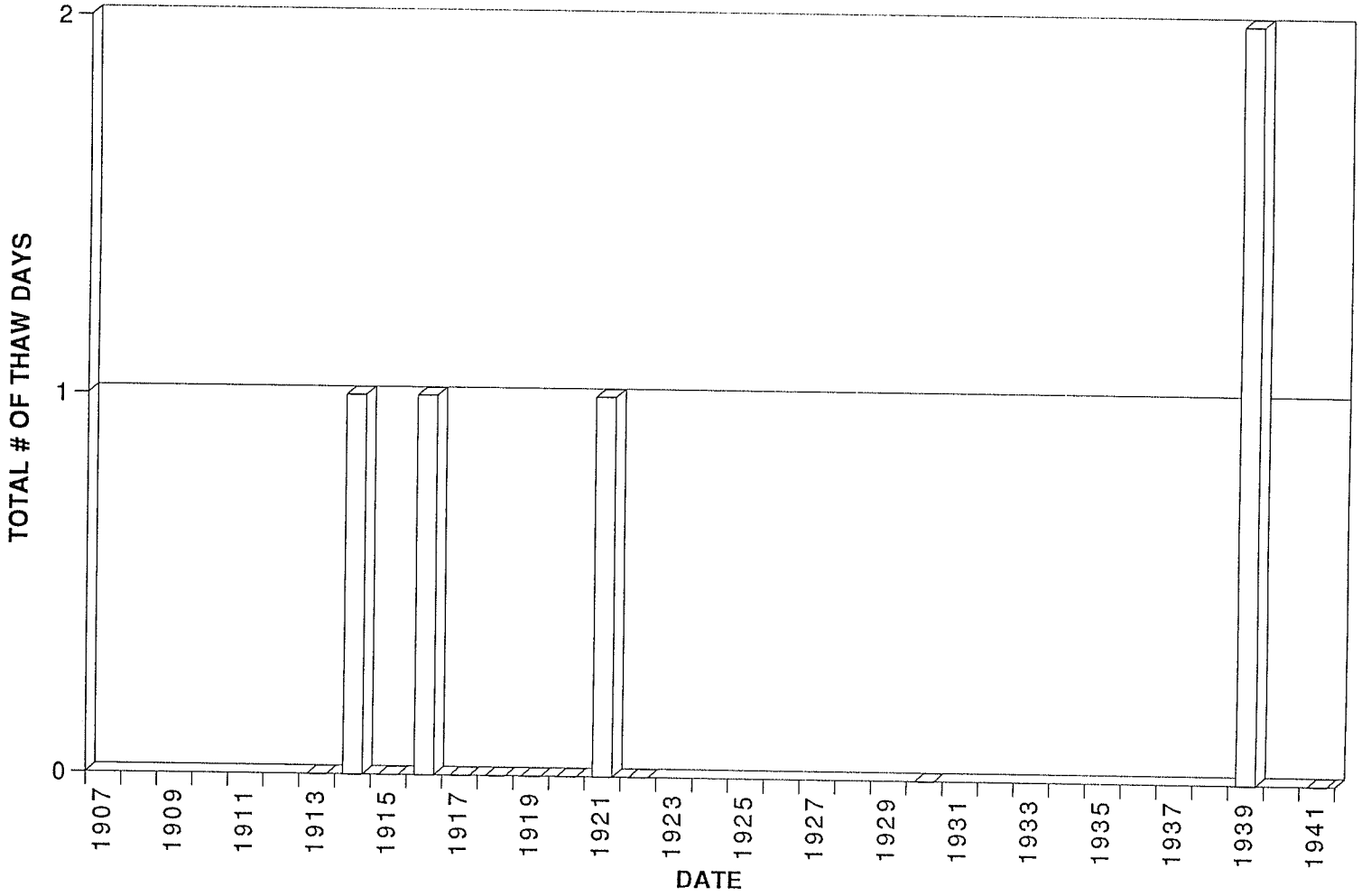
FREQUENCY OF OCCURRENCE OF MID-WINTER THAW: MOOSE FACTORY, 1819-62



FREQUENCY OF OCCURRENCE OF MID-WINTER THAW: MOOSE FACTORY, 1863-1906



FREQUENCY OF OCCURRENCE OF MID-WINTER THAW: MOOSE FACTORY, 1907-41

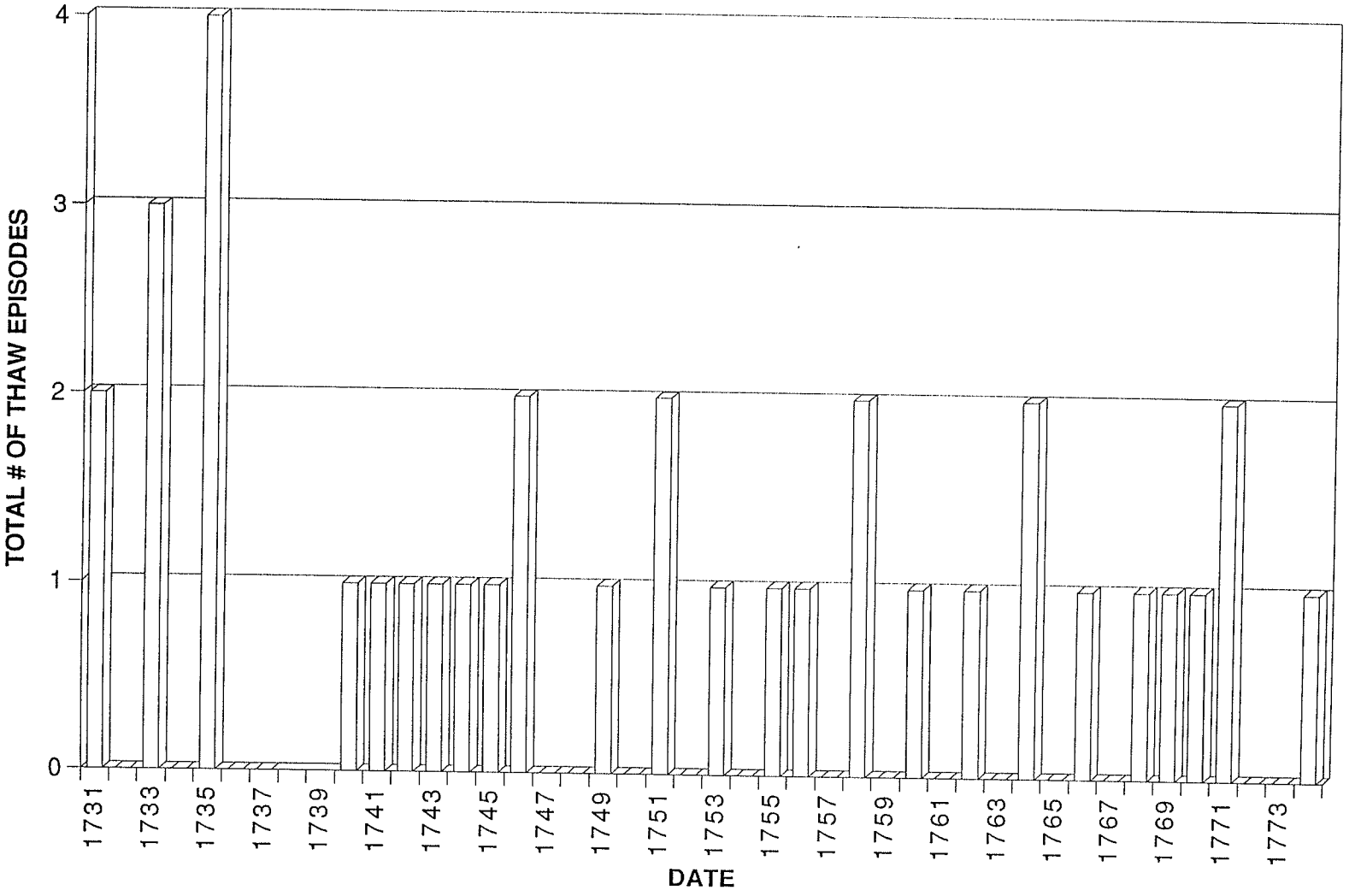


MOOSE FACTORY

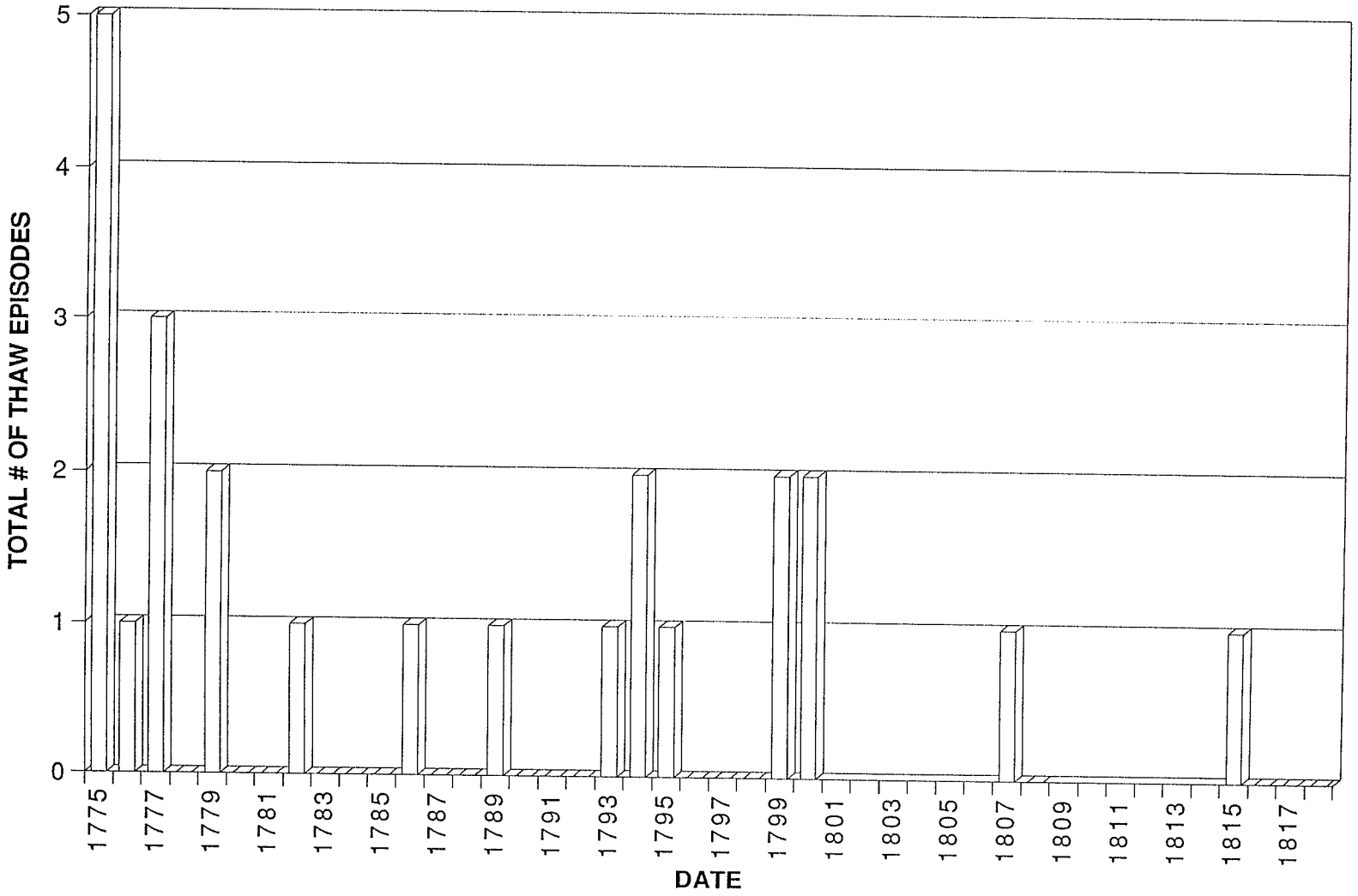
DATE	EPIS. TOTALS	DATE	EPIS. TOTALS	DATE	EPIS. TOTALS
1731	2	1775	5	1819	1
1732	0	1776	1	1820	0
1733	3	1777	3	1821	
1734	0	1778	0	1822	
1735	4	1779	2	1823	0
1736	0	1780	0	1824	0
1737	0	1781	0	1825	0
1738		1782	1	1826	1
1739		1783	0	1827	
1740	1	1784	0	1828	0
1741	1	1785	0	1829	1
1742	1	1786	1	1830	
1743	1	1787	0	1831	0
1744	1	1788	0	1832	3
1745	1	1789	1	1833	
1746	2	1790	0	1834	
1747	0	1791	0	1835	1
1748	0	1792	0	1836	1
1749	1	1793	1	1837	0
1750	0	1794	2	1838	1
1751	2	1795	1	1839	2
1752	0	1796	0	1840	0
1753	1	1797	0	1841	0
1754	0	1798	0	1842	1
1755	1	1799	2	1843	
1756	1	1800	2	1844	
1757	0	1801		1845	0
1758	2	1802		1846	
1759	0	1803		1847	0
1760	1	1804		1848	0
1761	0	1805		1849	0
1762	1	1806		1850	0
1763	0	1807	1	1851	0
1764	2	1808	0	1852	1
1765	0	1809		1853	2
1766	1	1810		1854	0
1767	0	1811		1855	2
1768	1	1812		1856	
1769	1	1813		1857	
1770	1	1814		1858	1
1771	2	1815	1	1859	1
1772	0	1816	0	1860	2
1773	0	1817	0	1861	0
1774	1	1818	0	1862	0

1863	1	1907	
1864	1	1908	
1865		1909	
1866		1910	
1867		1911	
1868	0	1912	
1869		1913	0
1870	1	1914	1
1871	0	1915	0
1872		1916	1
1873		1917	0
1874		1918	0
1875		1919	0
1876		1920	0
1877		1921	1
1878	2	1922	0
1879		1923	
1880		1924	
1881		1925	
1882		1926	
1883		1927	
1884		1928	
1885		1929	
1886		1930	0
1887		1931	
1888		1932	
1889		1933	
1890		1934	
1891		1935	
1892		1936	
1893		1937	
1894		1938	
1895		1939	1
1896		1940	
1897		1941	0
1898			
1899			
1900			
1901			
1902	1		
1903	1		
1904	0		
1905			
1906			

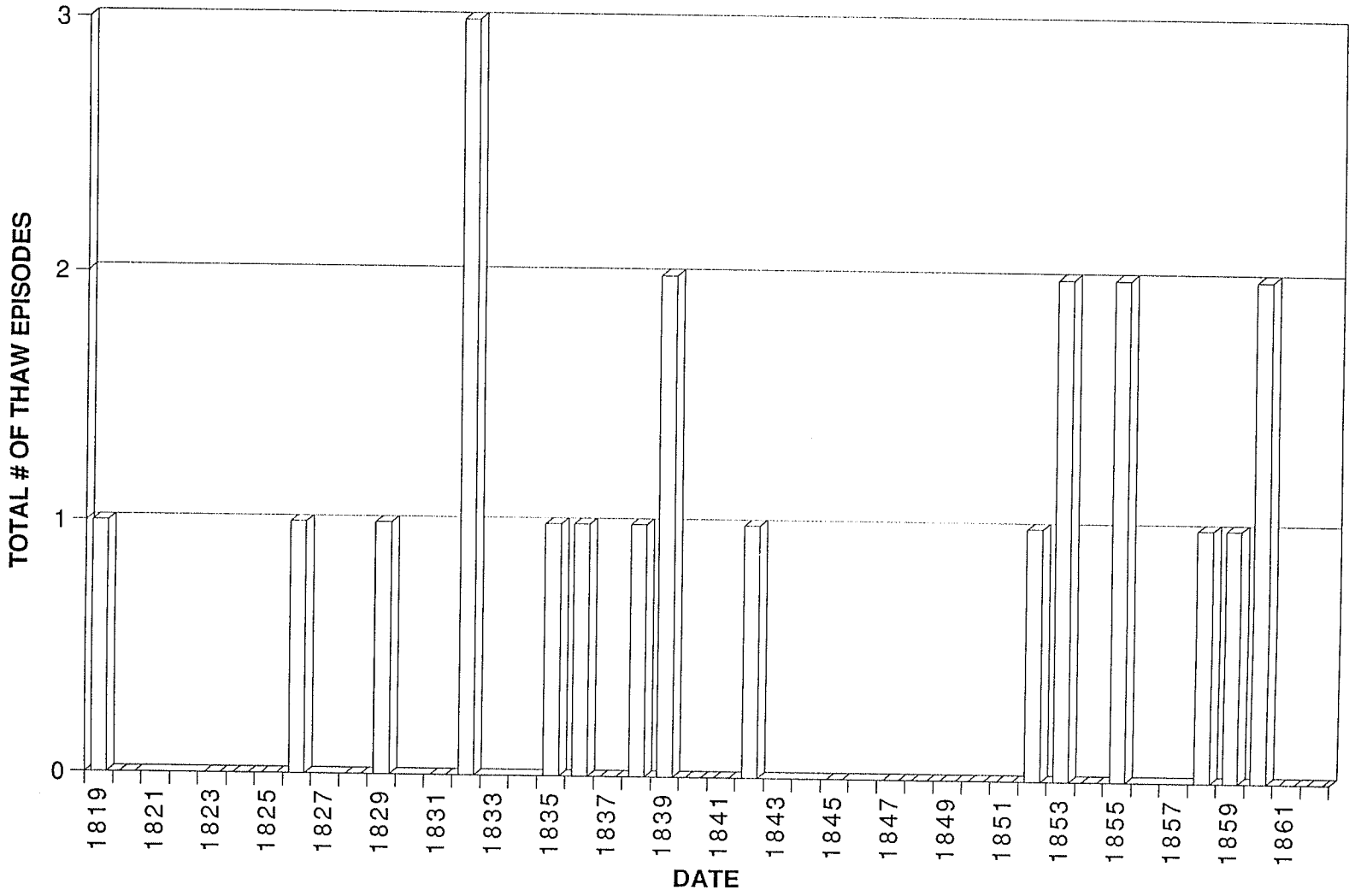
FREQUENCY OF OCCURRENCE OF MID-WINTER THAW: MOOSE FACTORY, 1730-74



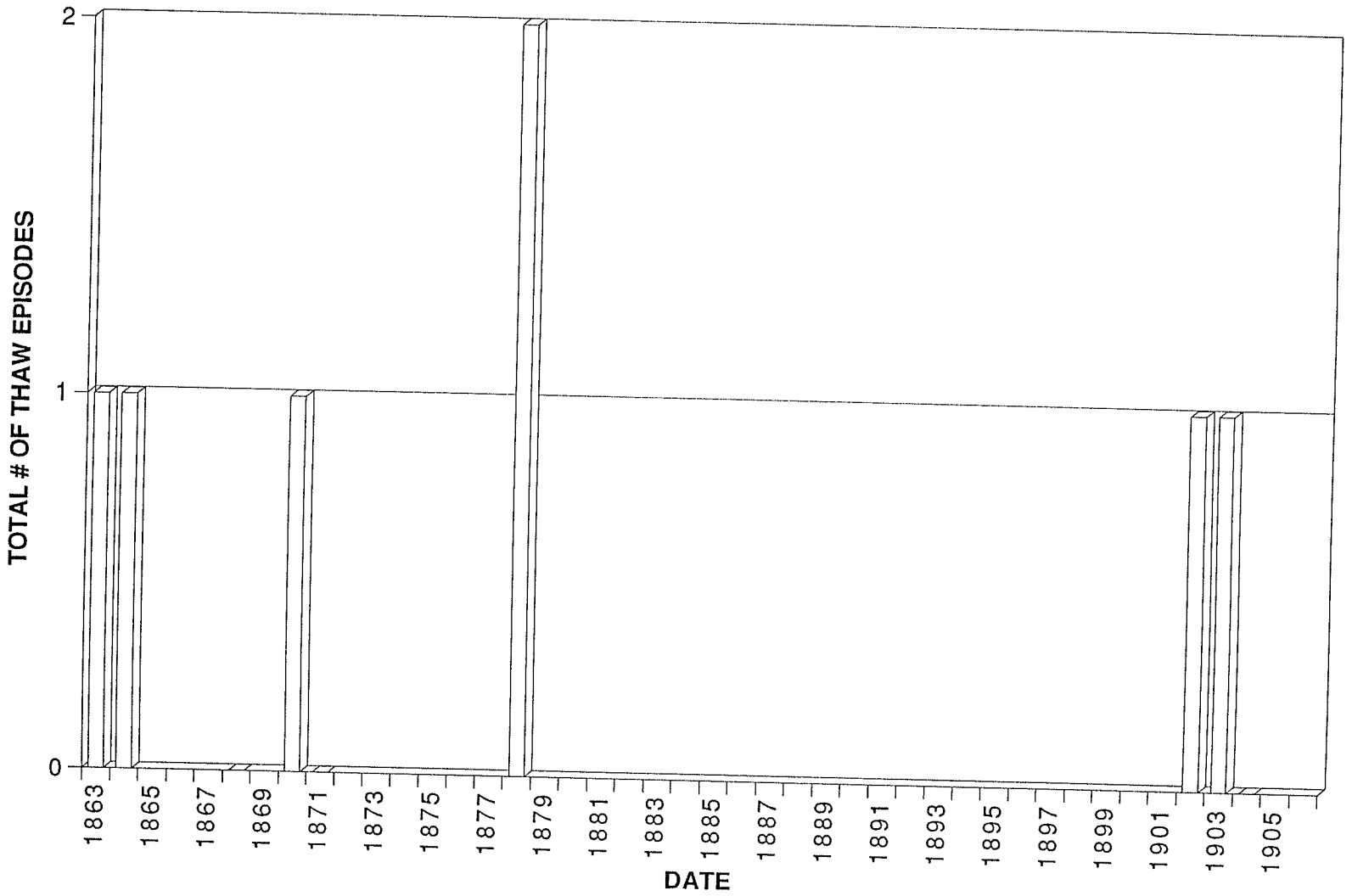
FREQUENCY OF OCCURENCE OF MID-WINTER THAW: MOOSE FACTORY, 1775-1818



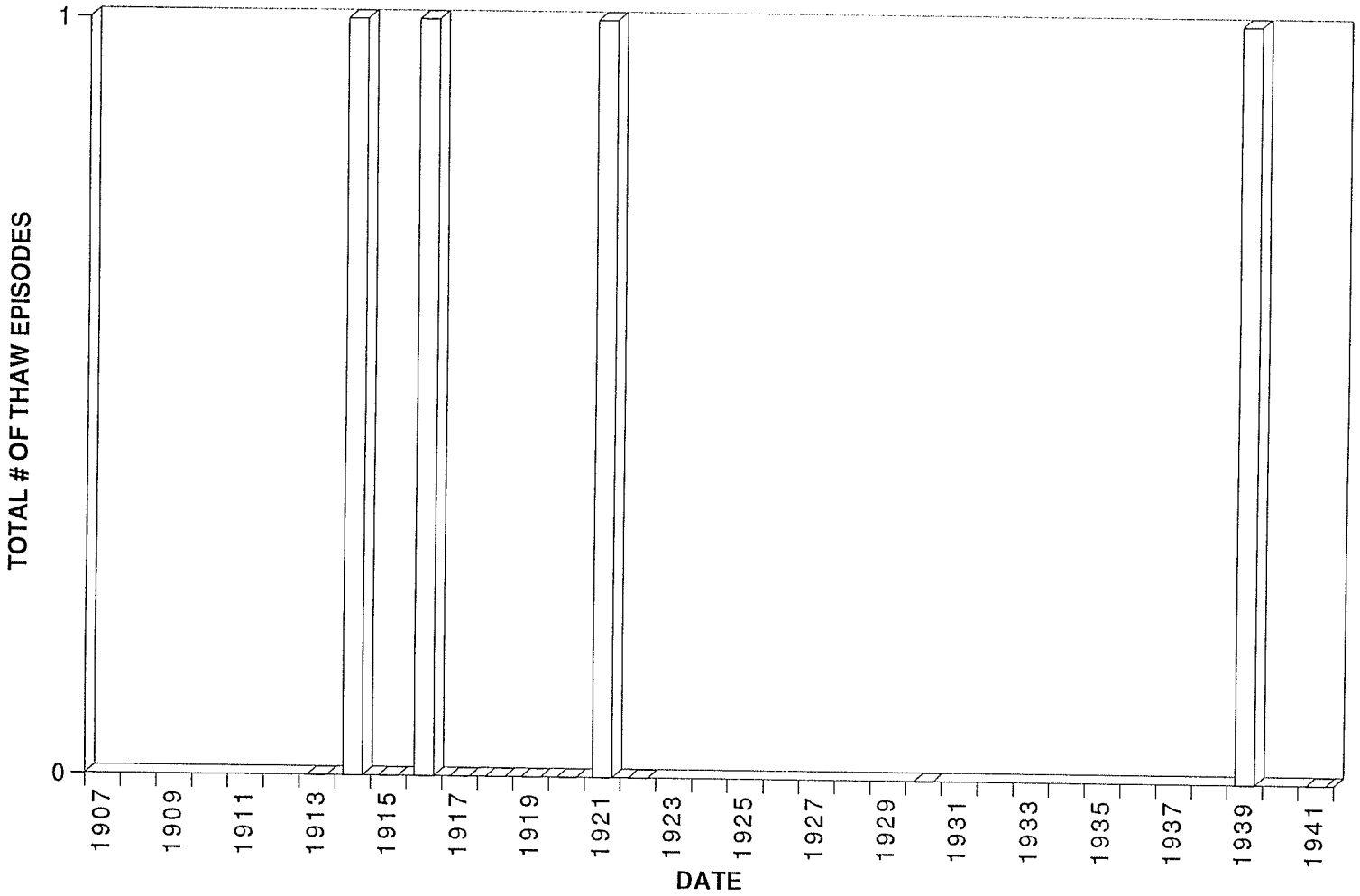
FREQUENCY OF OCCURRENCE OF MID-WINTER THAW: MOOSE FACTORY, 1819-62



FREQUENCY OF OCCURRENCE OF MID-WINTER THAW: MOOSE FACTORY, 1863-1906



FREQUENCY OF OCCURRENCE OF MID-WINTER THAW: MOOSE FACTORY, 1907-41

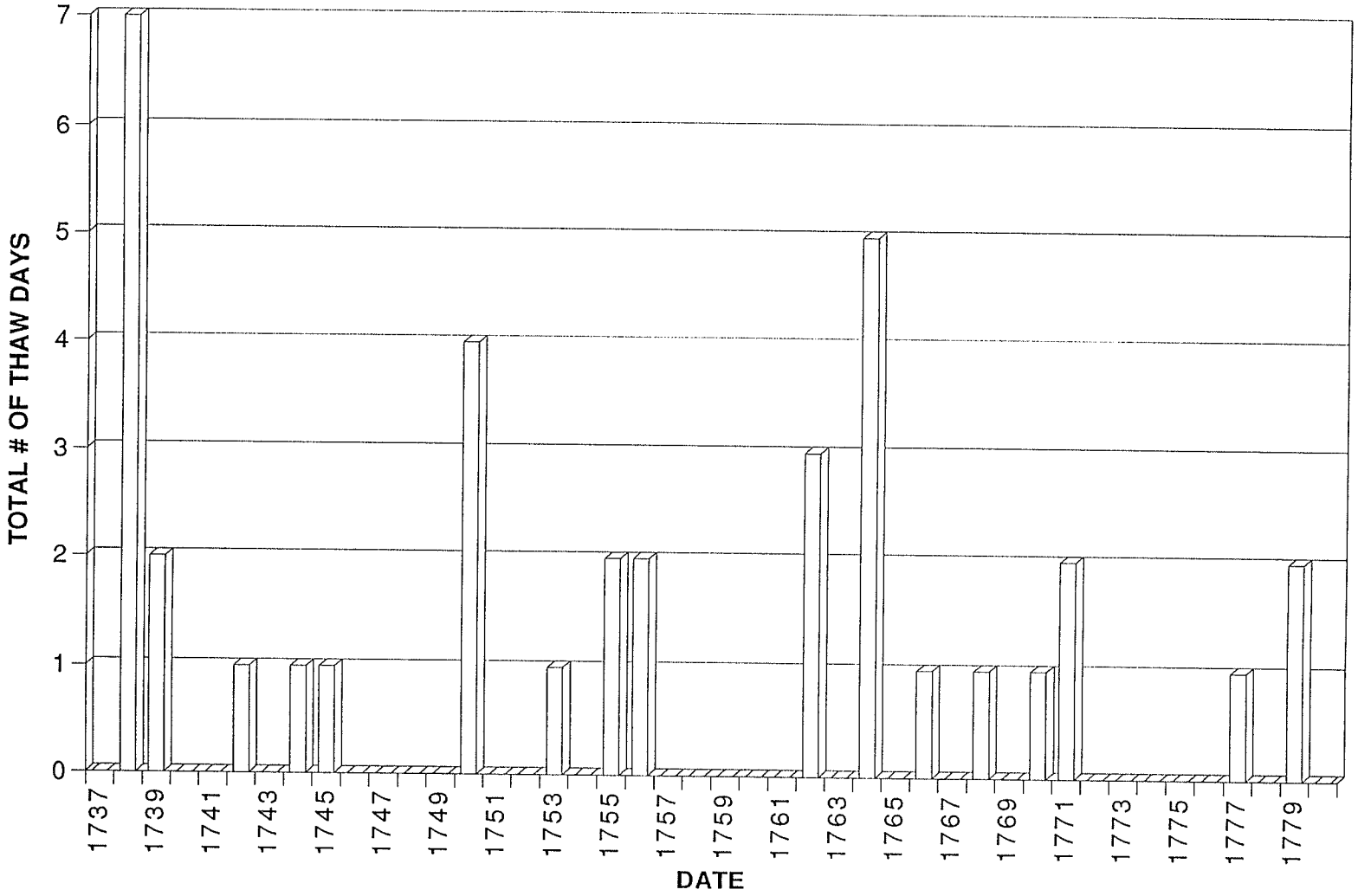


EASTMAIN

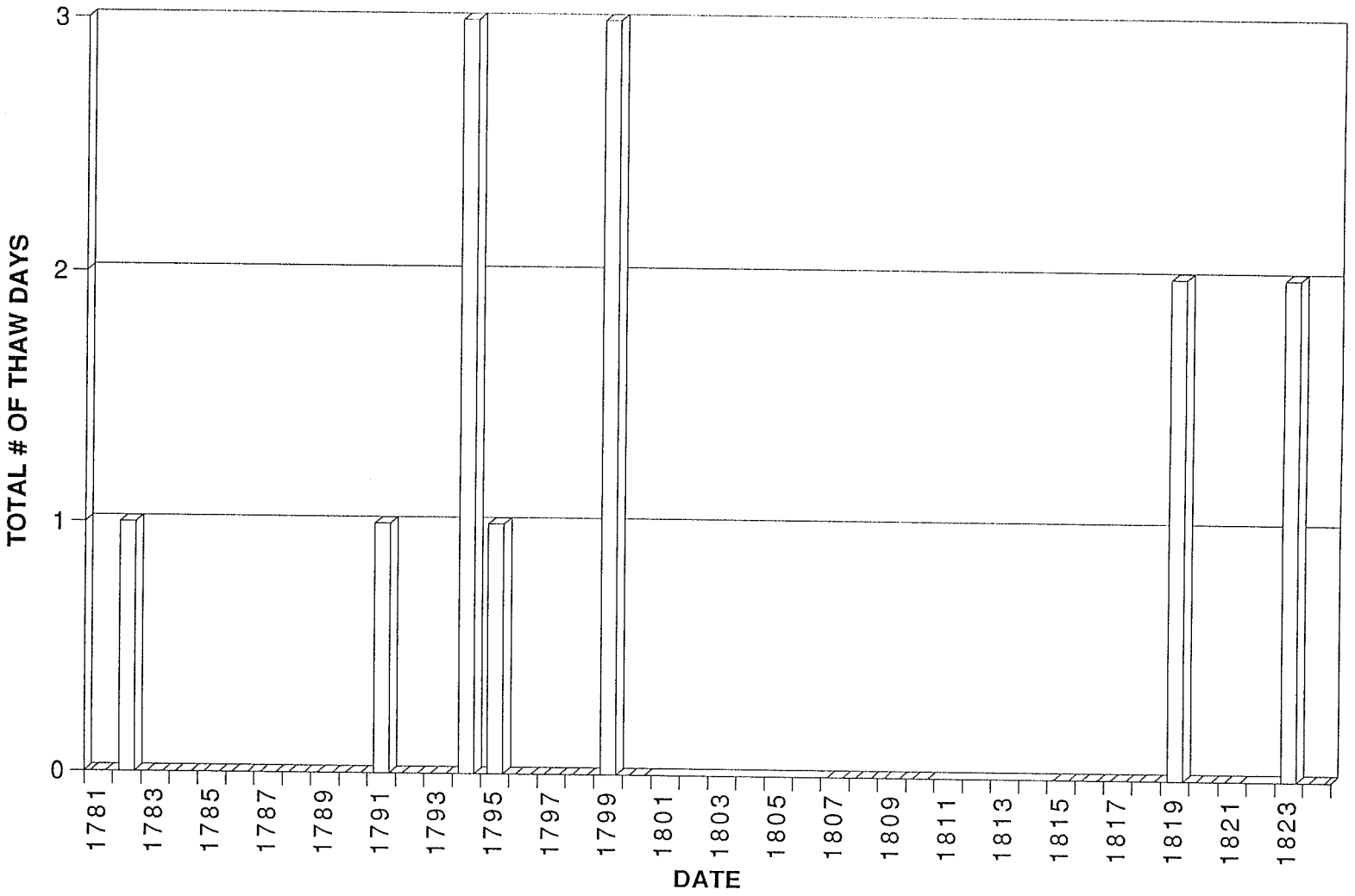
DATE	THAW TOTALS	DATE	THAW TOTALS	DATE	THAW TOTALS
1737	0	1781	0	1825	0
1738	7	1782	1	1826	
1739	2	1783	0	1827	
1740	0	1784	0	1828	
1741	0	1785	0	1829	0
1742	1	1786	0	1830	0
1743	0	1787	0	1831	0
1744	1	1788	0	1832	
1745	1	1789	0	1833	0
1746	0	1790	0	1834	0
1747	0	1791	1	1835	0
1748	0	1792	0	1836	0
1749	0	1793	0	1837	1
1750	4	1794	3	1838	
1751	0	1795	1	1839	
1752	0	1796	0	1840	
1753	1	1797	0	1841	
1754	0	1798	0	1842	
1755	2	1799	3	1843	
1756	2	1800	0	1844	
1757	0	1801		1845	
1758	0	1802		1846	
1759	0	1803		1847	
1760	0	1804		1848	
1761	0	1805		1849	
1762	3	1806		1850	
1763	0	1807	0	1851	
1764	5	1808	0	1852	
1765	0	1809	0	1853	
1766	1	1810	0	1854	
1767	0	1811		1855	
1768	1	1812		1856	
1769	0	1813		1857	
1770	1	1814		1858	
1771	2	1815	0	1859	
1772	0	1816	0	1860	
1773	0	1817	0	1861	
1774	0	1818	0	1862	
1775	0	1819	2	1863	
1776	0	1820	0	1864	
1777	1	1821	0	1865	
1778	0	1822		1866	
1779	2	1823	2	1867	
1780	0	1824	0	1868	

1869	
1870	
1871	
1872	
1873	
1874	
1875	
1876	
1877	
1878	
1879	
1880	
1881	
1882	
1883	
1884	
1885	
1886	
1887	
1888	
1889	
1890	
1891	
1892	
1893	
1894	3
1895	2
1896	1
1897	0
1898	0
1899	1
1900	0
1901	0
1902	1
1903	0
1904	0
1905	0
1906	2
1907	0
1908	1
1909	1
1910	0
1911	0
1912	0
1913	1
1914	0
1915	0
1916	2
1917	0
1918	0
1919	
1920	
1921	
1922	
1923	
1924	
1925	
1926	
1927	
1928	
1929	
1930	
1931	
1932	
1933	
1934	
1935	
1936	
1937	
1938	
1939	1
1940	
1941	0

FREQUENCY OFOCCURENCE OF MID-WINTER THAW: EASTMAIN, 1736-80

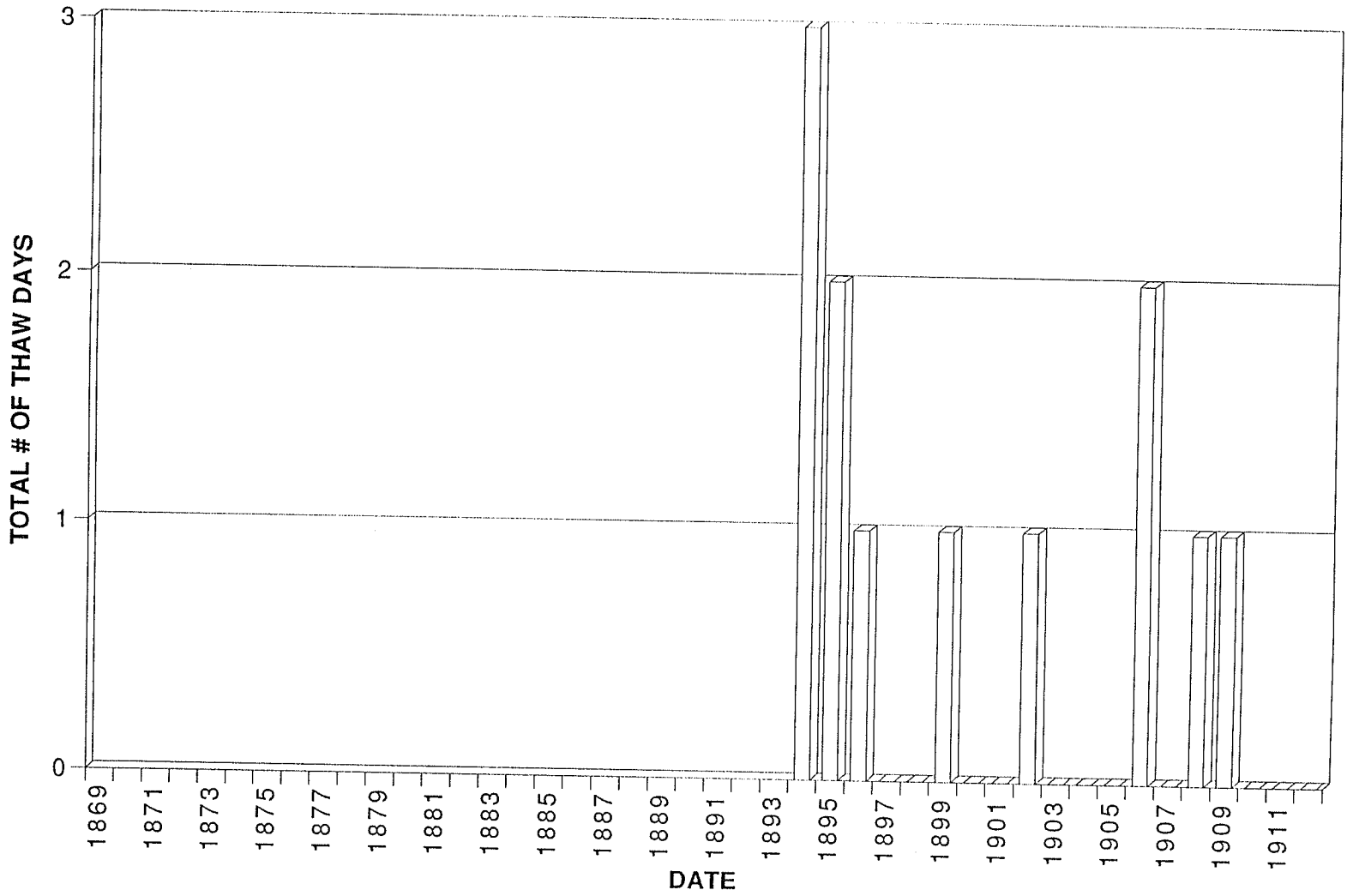


FREQUENCY OF OCCURRENCE OF MID-WINTER THAW: EASTMAIN, 1781-1824

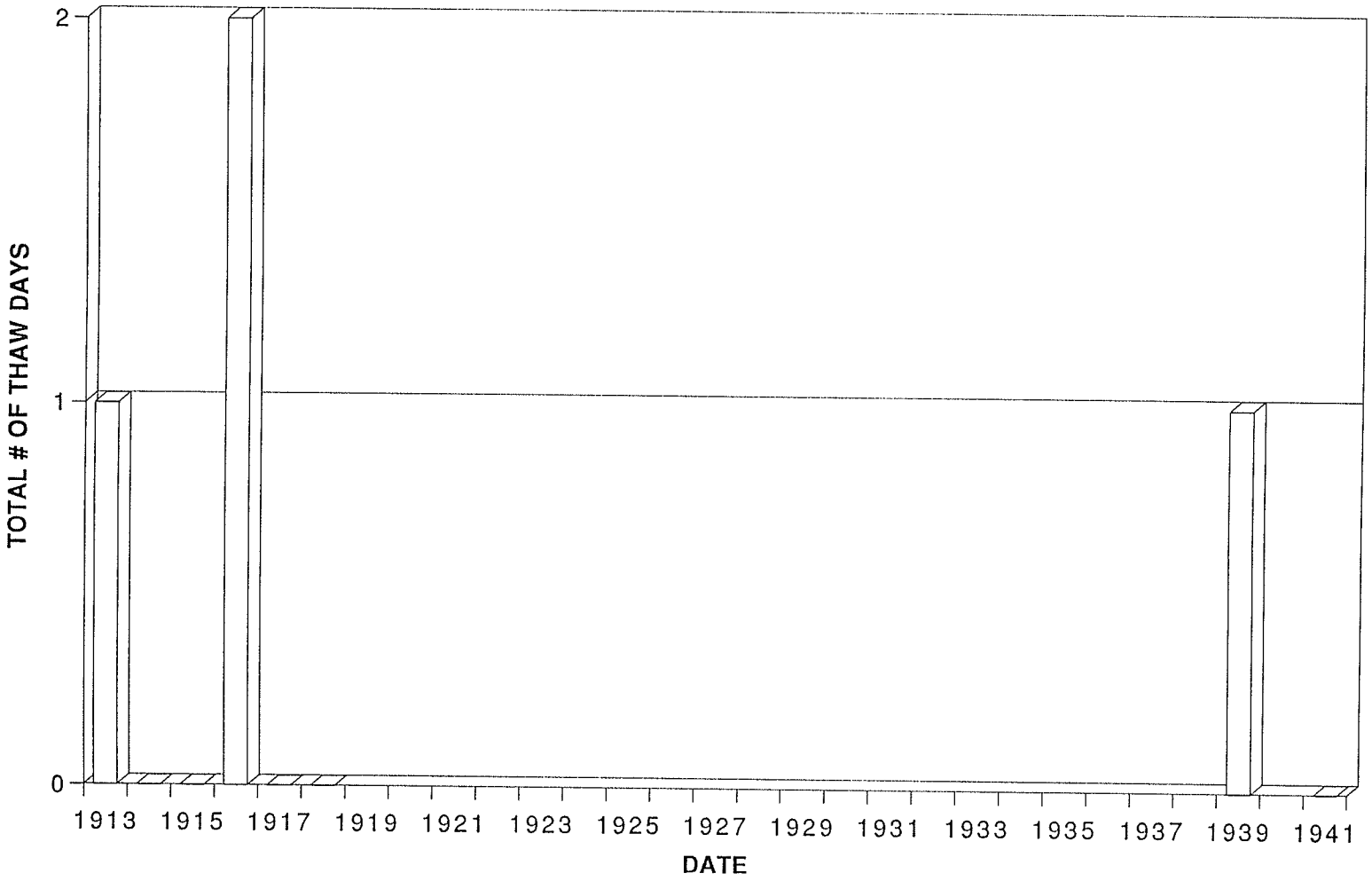


FREQUENCY OF OCCURRENCE OF MID-WINTER THAW: EASTMAIN, 1825-68

FREQUENCY OF OCCURRENCE OF MID-WINTER THAW: EASTMAIN, 1869-1912



FREQUENCY OF OCCURRENCE OF MID-WINTER THAW: EASTMAIN, 1913-41

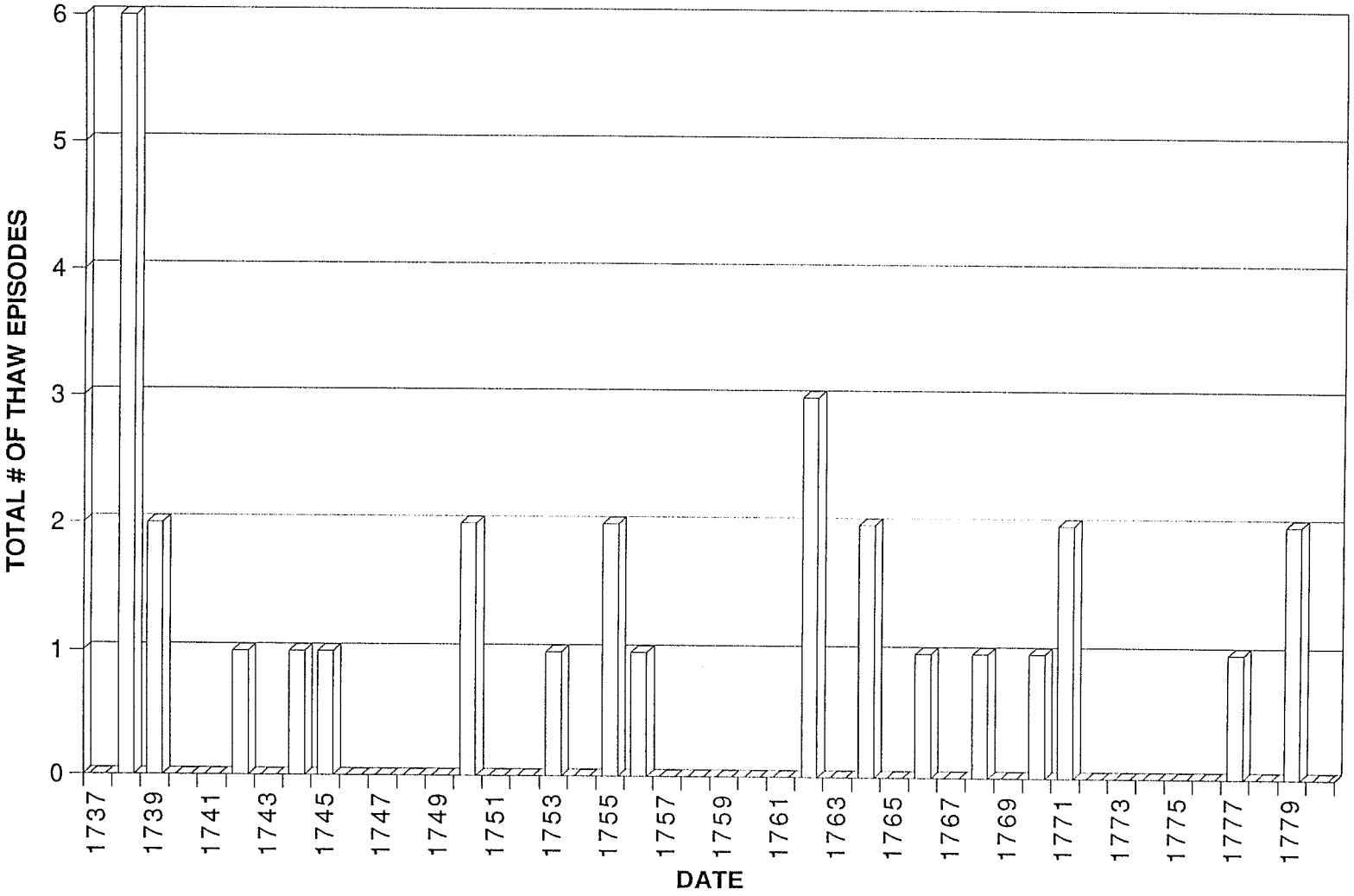


EASTMAIN

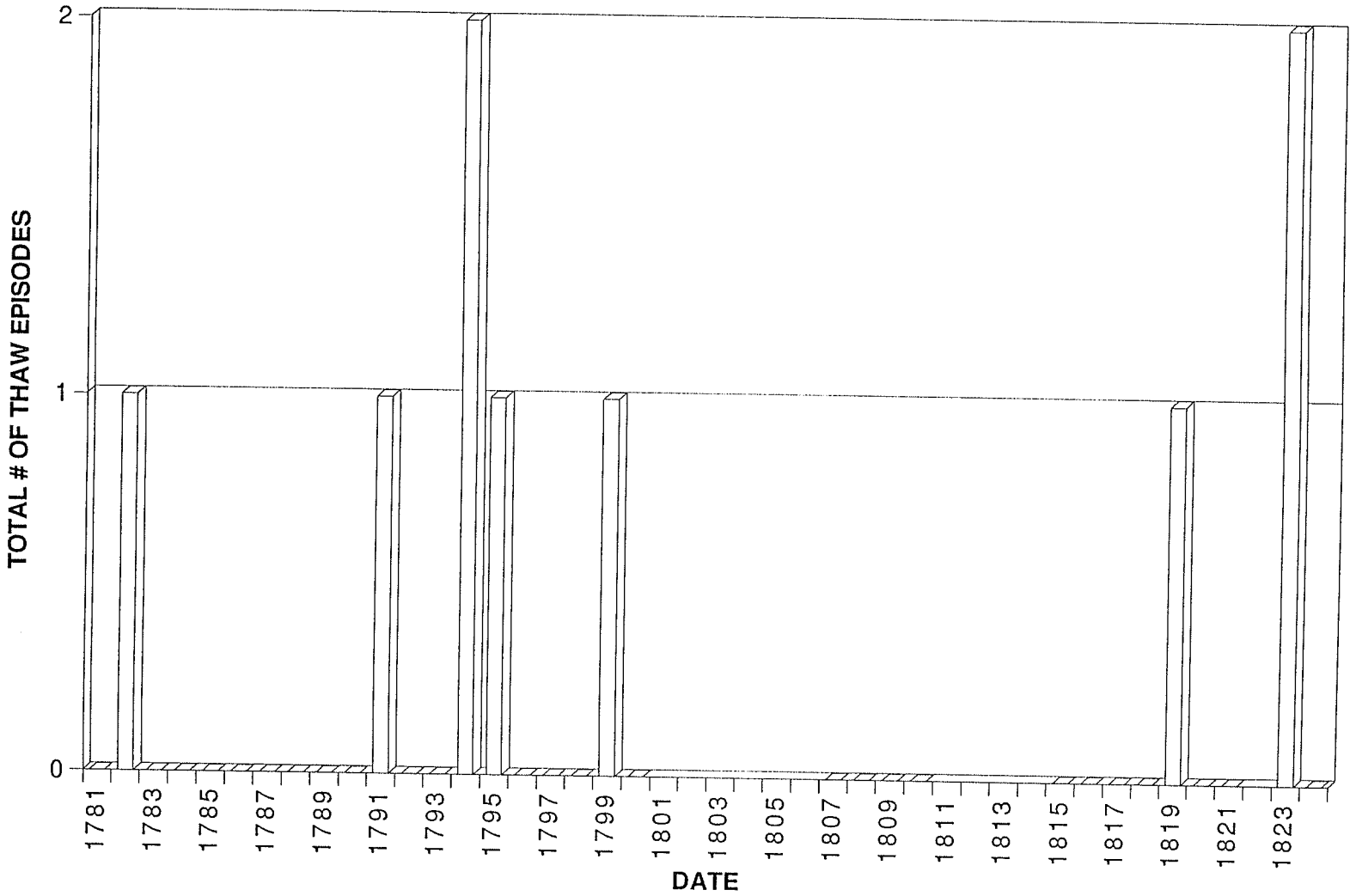
DATE	EPIS. TOTALS	DATE	EPIS. TOTALS	DATE	EPIS. TOTALS
1737	0	1781	0	1825	0
1738	6	1782	1	1826	
1739	2	1783	0	1827	
1740	0	1784	0	1828	
1741	0	1785	0	1829	0
1742	1	1786	0	1830	0
1743	0	1787	0	1831	0
1744	1	1788	0	1832	
1745	1	1789	0	1833	0
1746	0	1790	0	1834	0
1747	0	1791	1	1835	0
1748	0	1792	0	1836	0
1749	0	1793	0	1837	1
1750	2	1794	2	1838	
1751	0	1795	1	1839	
1752	0	1796	0	1840	
1753	1	1797	0	1841	
1754	0	1798	0	1842	
1755	2	1799	1	1843	
1756	1	1800	0	1844	
1757	0	1801		1845	
1758	0	1802		1846	
1759	0	1803		1847	
1760	0	1804		1848	
1761	0	1805		1849	
1762	3	1806		1850	
1763	0	1807	0	1851	
1764	2	1808	0	1852	
1765	0	1809	0	1853	
1766	1	1810	0	1854	
1767	0	1811		1855	
1768	1	1812		1856	
1769	0	1813		1857	
1770	1	1814		1858	
1771	2	1815	0	1859	
1772	0	1816	0	1860	
1773	0	1817	0	1861	
1774	0	1818	0	1862	
1775	0	1819	1	1863	
1776	0	1820	0	1864	
1777	1	1821	0	1865	
1778	0	1822		1866	
1779	2	1823	2	1867	
1780	0	1824	0	1868	

1869	
1870	
1871	
1872	
1873	
1874	
1875	
1876	
1877	
1878	
1879	
1880	
1881	
1882	
1883	
1884	
1885	
1886	
1887	
1888	
1889	
1890	
1891	
1892	
1893	
1894	3
1895	1
1896	1
1897	0
1898	0
1899	1
1900	0
1901	0
1902	1
1903	0
1904	0
1905	0
1906	2
1907	0
1908	1
1909	1
1910	0
1911	0
1912	0
1913	1
1914	0
1915	0
1916	2
1917	0
1918	0
1919	
1920	
1921	
1922	
1923	
1924	
1925	
1926	
1927	
1928	
1929	
1930	
1931	
1932	
1933	
1934	
1935	
1936	
1937	
1938	
1939	1
1940	
1941	0

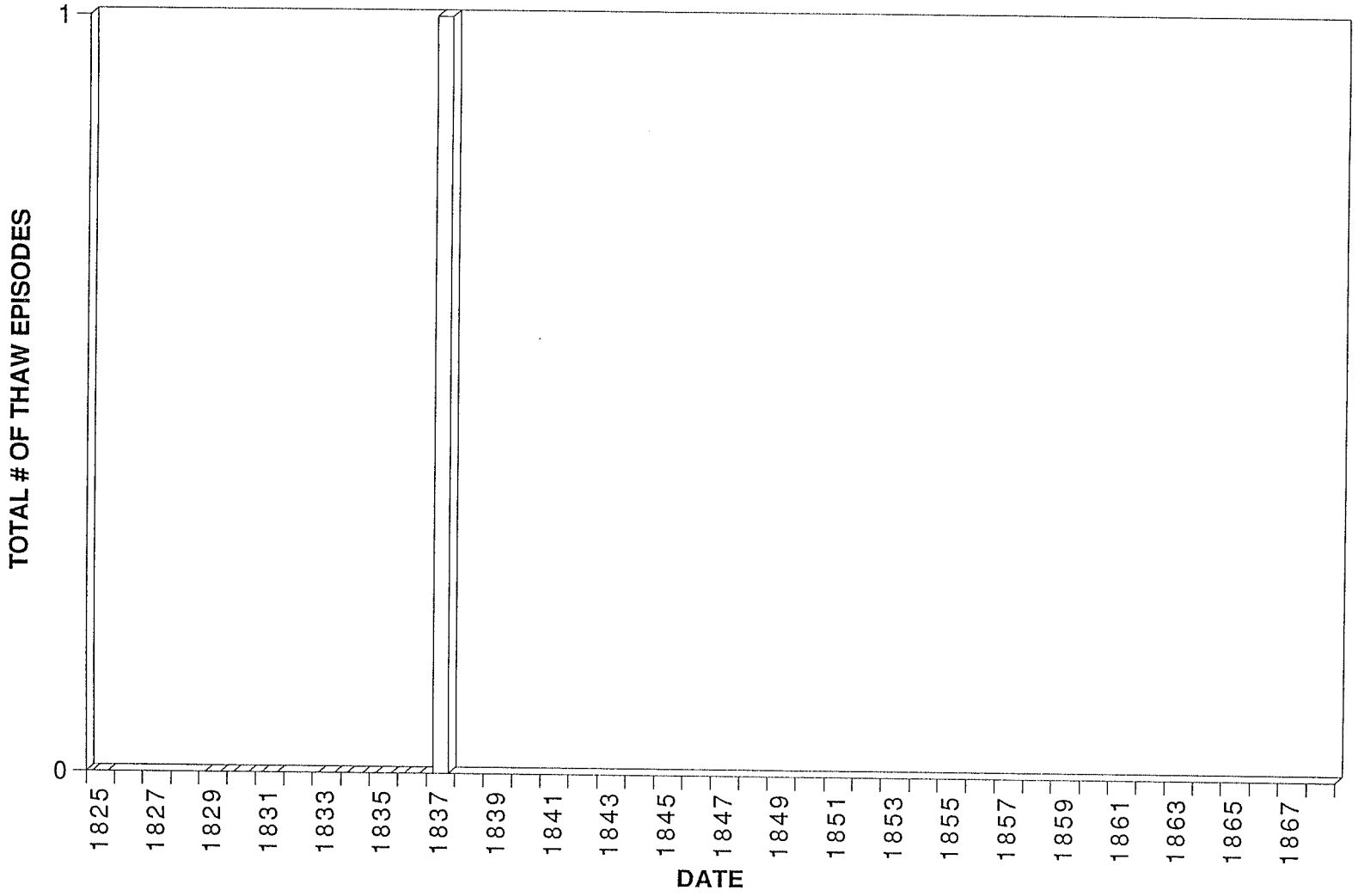
FREQUENCY OF OCCURRENCE OF MID-WINTER THAW: EASTMAIN, 1736-80



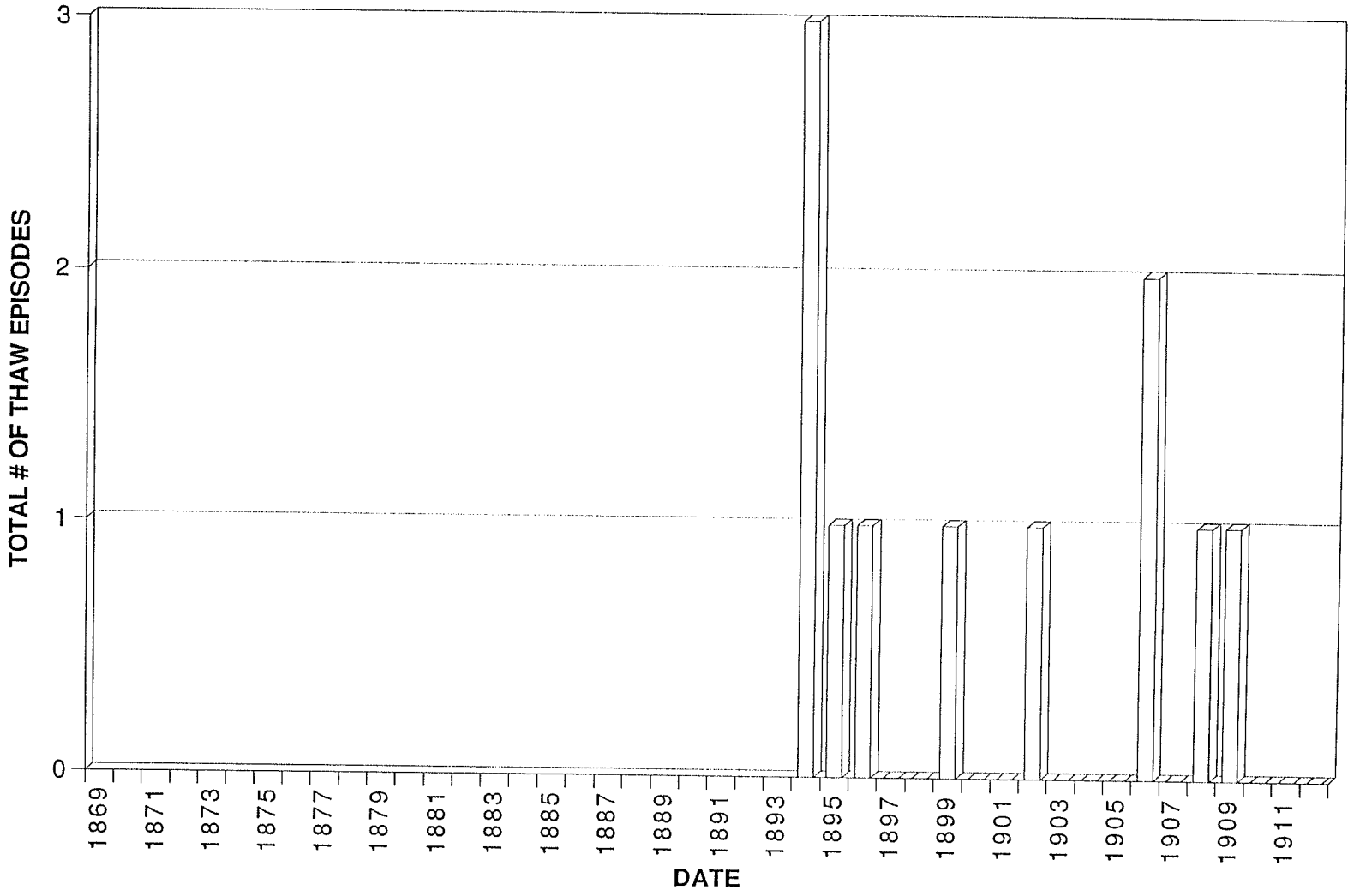
FREQUENCY OF OCCURRENCE OF MID-WINTER THAW: EASTMAIN, 1781-1824



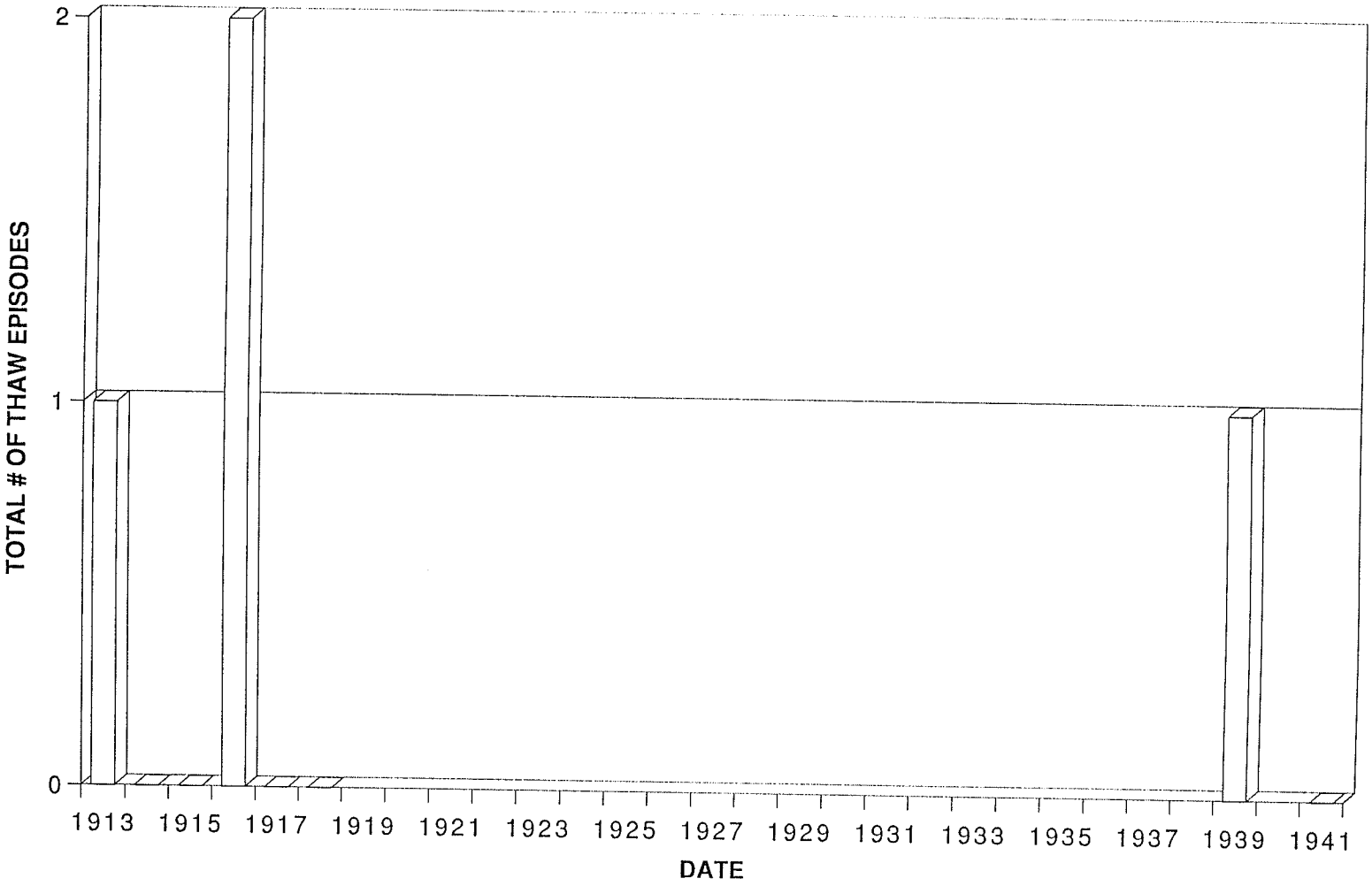
FREQUENCY OF OCCURRENCE OF MID-WINTER THAW: EASTMAIN, 1825-68



FREQUENCY OF OCCURRENCE OF MID-WINTER THAW: EASTMAIN, 1869-1912



FREQUENCY OF OCCURRENCE OF MID-WINTER THAW: EASTMAIN, 1913-41



APPENDIX C

Daily Maximum Temperature Data and Thaw Episode Chronologies for Moosonee, Ontario (1933-92) and Eastmain, Quebec (1961-92)

DAILY MAX. TEMP. DATA FOR MOOSONEE: 1933-92

DATE	JAN 03	JAN 04	JAN 05	JAN 06	JAN 07	JAN 08	JAN 09
1933	1.7	-15	-12.8	-13.9	-25	-24.4	-17.8
1934	-22.2	-4.4	-3.3	-6.1	-16.1	-14.4	-3.9
1936	-9.4	-11.7	-11.7	-12.2	-13.3	-5.6	-8.3
1937	-7.8	-15.6	-23.9	-17.8	-16.1	-18.9	-17.8
1938	-6.1	-22.2	Misg	-26.1	-20	-18.3	-17.8
1939	-21.7	-8.3	3.9	-3.3	-4.4	-8.9	-1.1
1940	-18.3	-15.6	-10.6	-18.3	-13.9	-12.8	-5.6
1941	-1.1	-8.3	-11.1	-14.4	-6.7	-3.9	-15.6
1942	-27.2	-23.9	-26.7	-23.9	-33.9	-27.8	-29.4
1943	-15.6	-15.6	-15.6	-21.1	-17.2	-13.9	-6.1
1944	-0.6	0	-3.3	-15	-16.7	-15	-12.2
1945	-14.4	-22.8	-30.6	-25.6	-12.2	-24.4	-28.9
1946	-9.4	2.2	3.3	7.2	-10.6	-1.7	-1.1
1947	-13.3	-11.1	-13.3	-3.9	-5.6	-22.2	-16.7
1948	-3.9	-3.3	-5.6	-1.7	-3.9	-3.9	-15.6
1949	-8.9	-5.6	0.6	-4.4	-4.4	-8.9	-8.9
1950	-12.8	-19.4	-18.9	-16.7	-30.6	-17.8	-18.3
1951	-16.1	-18.9	-20	-20	-17.8	-19.4	-10.6
1952	-17.8	-5	-8.3	-6.7	-1.1	-10	-9.4
1953	-13.9	-16.1	-16.1	-17.8	-17.8	-10	-6.1
1954	-11.7	-4.4	-13.3	-17.2	-17.2	-27.2	-24.4
1955	-16.1	-11.7	-6.7	-10	-17.8	-14.4	-12.2
1956	-5	-6.1	-17.2	-14.4	-15.6	-8.9	0.6
1957	-10	-12.8	-16.7	-6.1	-6.1	-13.3	-27.2
1958	-15	-6.7	0.6	-3.3	-19.4	-6.7	-0.6
1959	-17.8	-23.3	-24.4	-23.3	-19.4	-20.6	-16.7
1960	-14.4	-23.3	-27.2	-25.6	-26.1	-23.3	-20.6
1961	-20	-16.7	-13.9	-12.2	-7.8	-14.4	-7.2
1962	-13.3	-24.4	-18.9	-19.4	-12.2	-12.8	-10.6
1963	-6.7	-5.6	-2.2	-5	-5	-2.2	0.6
1964	-8.3	-11.7	-16.1	-12.2	-11.7	-5	-2.2
1965	-10.6	-5.6	-5.6	-14.4	-2.8	0.6	-22.2
1966	-11.7	-19.4	-17.8	-15.6	-18.3	-23.9	-12.8
1967	-7.2	-16.7	-20	-19.4	-18.3	-20	-16.1
1968	-21.7	-19.4	-30	-30	-30.6	-28.9	-26.1
1969	-16.7	-16.1	-10.6	-6.1	-11.1	-17.8	-12.2
1970	-15.6	-10.6	-10.6	-16.7	-16.7	-12.2	-13.9
1971	-5.6	-7.8	-8.3	-12.2	-18.3	-10.6	-8.3
1972	-12.8	-23.9	-19.4	-11.7	-7.8	-8.3	1.7
1973	-1.1	-1.1	-15.6	-23.9	-25	-22.2	-17.8
1974	-23.3	-18.9	-17.8	-21.7	-18.9	-25.6	-17.8
1975	-1.1	-7.2	-5	-1.1	-2.8	-4.4	-2.2
1976	-12.2	-19.4	-9.4	-15	-29.4	-24.4	-19.4

1977	-7	-11.6	-18.2	-8.2	-17.2	-27.4	-26.1
1978	-17.8	-17.6	-23.1	-26.4	-14.7	-13.1	-18.4
1979	-22.5	-27.3	-17.9	-11.7	-18	-14.9	-16.2
1980	-17.5	-11.5	-18.1	-17.3	-12.4	-21.2	-21.5
1981	-29	-17	-12.6	-12.1	-18.4	-22.5	-23.9
1982	-5.4	-15.7	-19.2	-14.9	-15.5	-23.6	-30.4
1983	-20.5	-2.8	-1.9	-12.8	-12.9	-18.6	-1.8
1984	0.5	-13.8	-13.2	-14	-24.7	-20.7	-22.9
1985	-5.5	-5	-13.5	-23	-20.5	-21.9	-17.7
1986	-20.7	-20.3	-17.4	-19.5	-19.5	-3	-3.1
1987	-5.7	-3.5	2.6	1.8	-8.9	-5.9	-5.5
1988	-5.4	-6.8	-20.3	-26.2	-10.7	-11.4	-21.7
1989	-25.4	-23.5	-12.7	-7.3	-13.7	-11.4	-27
1990	0.3	-2.1	-21	-18.5	-10.3	-13.2	-13
1991	-21.2	-18.2	-15.1	-20.9	-26.6	-14.2	-11
1992	2.7	2.5	0	-1.9	-13.5	-9.5	-8.6

JAN 10	JAN 11	JAN 12	JAN 13	JAN 14	JAN 15	JAN 16	JAN 17
-12.8	-19.4	-25.6	-21.7	-2.2	-1.7	-19.4	-21.1
2.8	-10	-13.9	-12.8	-11.1	-3.9	-11.7	-25
-3.3	-1.1	-26.1	-23.9	-18.9	-22.2	-24.4	-23.3
-11.1	-5	-11.7	-14.4	-14.4	-26.7	-10	-7.2
-18.3	-15.6	-12.2	-11.1	-17.2	-6.1	-23.3	-23.9
-6.7	-16.1	-15.6	-14.4	-15.6	-12.2	-24.4	-26.1
-7.8	-2.2	-3.9	-11.1	0	0	-27.2	-21.1
-20.6	-17.8	-18.9	-25.6	-26.7	-17.8	-8.3	-10
-18.9	-16.1	-16.7	-8.9	-14.4	-17.2	-1.1	1.7
-2.2	-2.8	-11.1	-17.8	-10	-13.9	-21.1	-21.7
-6.1	-4.4	-12.8	-2.8	-2.8	-15	-8.3	-9.4
-21.7	-22.8	-22.8	-23.9	-22.8	-17.8	-21.1	-22.2
-8.3	-8.9	-22.2	-29.4	-23.9	-27.8	-16.1	-17.2
-16.1	-14.4	-19.4	-10.6	2.8	-7.2	-17.2	-18.3
-15.6	-3.3	-10.6	-21.7	-28.9	-28.3	-23.3	-25.6
-22.2	-9.4	-10.6	-16.7	-13.9	-7.2	-8.9	-19.4
-7.8	-15	-2.8	-15.6	-17.8	-4.4	-19.4	-23.9
-8.3	-13.3	-11.1	-3.3	-2.8	-3.9	-3.3	-0.6
-18.3	-4.4	-18.3	-20	-10.6	-10	-12.8	-3.9
0	-15.6	-17.8	-20	-16.7	-16.1	-15.6	-6.1
-25	-17.8	-21.7	-15.6	-9.4	-17.8	-23.9	-26.1
-13.9	-15.6	-13.3	-13.3	-15	-11.1	-15	-13.3
1.1	-12.8	-11.7	-14.4	-10.6	-13.9	-14.4	-17.8
-23.3	-19.4	-25.6	-28.9	-28.3	-22.2	-25.6	-21.7
-1.1	-17.2	0.6	-20.6	-19.4	-16.1	-9.4	-16.1
-13.3	-10	-3.9	-8.3	-8.3	-10.6	-19.4	-20
-15	-6.7	-5	-4.4	-0.6	-8.9	-5.6	-8.9
-2.8	-18.3	-13.9	-2.2	-13.3	-6.7	0.6	-14.4
-14.4	-10.6	-18.9	-5	-5.6	-19.4	-20	-27.8
-17.2	-22.2	-21.1	-21.1	-22.2	-24.4	-18.3	-25
-6.1	-23.9	-16.7	-16.1	-10.6	-5.6	-11.7	-18.3
-25.6	-19.4	-20.6	-26.1	-29.4	-25	-16.7	-11.7
-10.6	-23.9	-18.9	-10.6	-15	-16.1	-11.1	-9.4
-13.3	-14.4	-3.9	-1.7	-8.3	-17.8	-20.6	-25
-25	-20	-10	-7.8	-9.4	-21.1	-15.6	-2.8
-2.2	-5	-6.1	-5	-5.6	-14.4	-1.1	1.1
-15	-18.3	-16.1	-17.8	-26.1	-20.6	-8.9	-23.3
-7.8	-25	-26.7	-23.9	-18.9	-20	-23.3	-21.1
-20.6	-17.2	-17.8	-9.4	-23.9	-28.9	-13.9	-10
-18.3	-22.8	-13.3	-4.4	-4.4	-8.3	-10.6	-10
-18.9	-23.3	-23.3	-16.7	-7.8	-26.7	-23.9	-26.7
-2.2	7.2	-5	-13.9	-26.1	-20	-25.6	-11.7
-21.1	-22.8	-13.9	-4.4	-10	-19.4	-21.1	-24.4

-21.7	-21.1	-23.8	-23.5	-24.4	-18.5	-22.3	-17.1
-15.6	-18.6	-20.9	-22.6	-17.1	-12.5	-18.9	-17.4
-20.7	-23.8	-19.5	-21.8	-21	-26.3	-26.5	-26.5
-11.5	3.9	-14.7	-1.8	-0.4	-9.5	-0.9	-1.5
-24.6	-23.3	-19	-19.8	-16.2	-16	-12.6	-6.5
-23.9	-22.5	-17.8	-21	-19.1	-9.6	-21.7	-34.2
0	-2.3	-15.5	-15.5	-21.1	-20.3	-20.4	-19.1
-28.1	-29.5	-24	-23.9	-24.5	-8	-9.1	-22.9
-15.9	-9.7	-9.4	-8.8	-11.1	-24.2	-21.4	-16.5
-18.3	-12.6	-11.7	-19.7	-22.8	-16.2	-4.9	1.2
-5.7	-3.3	-2.3	-0.2	3.5	-13.9	-18.1	-7.2
-12.7	-14.6	-19	-27.4	-17.4	-9	2.7	2.8
-24.5	-17.4	-7.7	-2.9	1.9	-0.7	-13.2	-14.6
-16.7	-8.4	-9.9	-20.3	-17.2	-7.5	-3.7	-4.3
-24.3	-13.9	-11.1	-15.6	-20.4	-16.9	-6.6	-6.9
-15	-18	-5.3	-14.7	-25.2	-31.1	-29.7	-22.2

JAN 18	JAN 19	JAN 20	JAN 21	JAN 22	JAN 23	JAN 24	JAN 25
-14.4	-11.1	-15.6	-6.1	-6.7	-8.9	-2.2	-1.1
-25	-23.3	-25	0.6	2.2	-14.4	-3.9	-21.7
-25	-22.8	-26.1	-20	-23.3	-26.7	-22.2	-17.8
-17.8	-20	-13.9	-13.9	-20.6	-15	-15.6	-20
-14.4	-5.6	-6.1	-13.9	-2.8	1.7	-11.1	-11.1
-17.8	-15	-5	-8.9	-28.3	-18.9	-27.2	-24.4
-7.2	-20	-18.9	-21.1	-18.9	-13.9	-16.7	-18.9
-17.8	-21.7	-11.1	-13.9	-18.9	-18.9	-11.7	-23.3
-12.8	-5.6	-7.2	-10	-1.7	0.6	-12.2	-10.6
-27.8	-26.1	-29.4	-28.9	-20	-15	-19.4	-23.3
2.8	1.1	-7.2	-7.2	-10	-14.4	-5.6	2.2
-11.1	-5	-9.4	-7.2	-13.9	-17.2	-27.2	-23.3
-20.6	-27.8	-19.4	-13.9	-6.7	-3.9	-11.7	-11.7
-20	-1.7	-4.4	-22.2	-22.2	-10.6	-17.8	2.2
-16.1	-13.3	-21.7	-18.9	-22.8	-18.9	-15.6	-15
-4.4	-15	-25.6	-15	-18.9	-16.7	-20	-18.3
-24.4	-26.7	-25	-23.3	-16.7	-29.4	-10.6	-13.9
-7.2	-20	-18.9	-29.4	-20.6	-12.8	-9.4	-17.2
-18.9	-12.8	-20.6	-22.2	-23.3	-29.4	-15	-5.6
-7.8	-16.1	-13.9	-5.6	-12.8	-10	-12.8	-16.7
-20	-20	-20	-28.9	-23.9	-5.6	-12.8	-18.9
-13.9	-17.8	-13.3	-12.8	-15.6	-13.9	-15.6	-16.1
-21.7	-16.7	-15	-15	-12.2	-12.2	-11.1	-10
-21.7	-3.9	0	-16.7	-18.9	-21.7	-25	-22.8
-21.7	-19.4	-14.4	-10	-8.3	-13.9	-6.1	-1.7
-10	-19.4	-14.4	-16.7	-17.2	-21.1	-19.4	-20
-8.9	-9.4	-11.1	-7.8	-1.7	-3.3	-4.4	-2.8
-24.4	-23.3	-21.7	-25.6	-27.2	-25.6	-24.4	-21.7
-22.8	-18.3	-15	-13.9	-13.9	-18.3	-4.4	-13.9
-16.1	-29.4	-23.9	-32.2	-30.6	-28.9	-20.6	-21.1
-12.2	-2.2	-0.6	-2.8	-5.6	-1.1	-21.1	-8.3
-14.4	-12.2	-16.1	-5.6	-20	-22.2	-12.8	-8.9
-8.9	-8.9	-6.7	-6.7	-10.6	-10.6	-16.1	-22.2
-21.7	-15	-22.2	-17.2	-15.6	-5.6	-11.7	-7.8
-1.1	-1.7	-3.3	-10.6	-11.7	-15	-18.3	-7.8
-7.8	-16.7	-3.3	-2.8	-11.1	-9.4	4.4	3.9
-24.4	-23.9	-23.3	-20.6	-10.6	-18.9	-9.4	-6.7
-16.1	-11.7	-7.2	-6.1	-3.3	-13.9	-20	-20
-10.6	-16.7	-23.9	-18.3	-8.3	-8.9	-16.7	-18.3
-0.6	-7.2	-15	-1.1	-3.9	-4.4	-3.9	1.7
-13.3	-17.2	-2.8	-7.2	-17.2	-13.9	-19.4	-21.7
-8.9	-26.7	-24.4	-21.1	-18.9	-15	-21.1	-20
-6.7	-3.3	-19.4	-17.8	-30.6	-25	-19.4	-5.6

-6	-11.1	-11.9	-17	-16	-11.5	-6.5	-8.3
-13.9	-17.4	-11.4	-9.1	-7.3	-3	-2.1	-12.5
-19.5	-9.2	-8	-6.9	-10.3	-14.6	-4.7	-0.9
-4.7	-8.4	-17.1	-17.5	-13.5	-20	-22.7	-9.2
-4	-6	-15.4	-1	-1.1	-6	-11.6	-5
-27.5	-17.4	-21.7	-24.9	-21.4	-17.9	-19	-20.9
-20.8	-16.7	-6.2	-2.1	0.1	-2.7	-5.8	-21
-24.4	-22	-28.9	-15.6	-16.9	-2.6	-0.1	-0.4
-21.7	-27.4	-19.1	-8.2	-8.4	-12	-13.8	-13.5
-3.8	-9.5	-11.8	-9.4	-9.5	-24.4	-18.3	-6.4
-6.5	-20.4	-15.4	-10.4	-12	-27.6	-19.8	-19.3
-12.4	-11.9	-8.4	-16.8	-10.9	-21.5	-19.1	-20.1
-24.4	-13	-21.2	-5	-4.6	-10.8	-16.8	-13.9
-11.8	-17.7	-17.7	-19.2	-11.8	-13.4	-12.8	-10.4
-15.4	-15.1	-22.2	-22.4	-10.6	-7.5	-30	-18.5
-25.5	-23.2	-21.9	-21.6	-6.4	-5.1	-21.1	-21.9

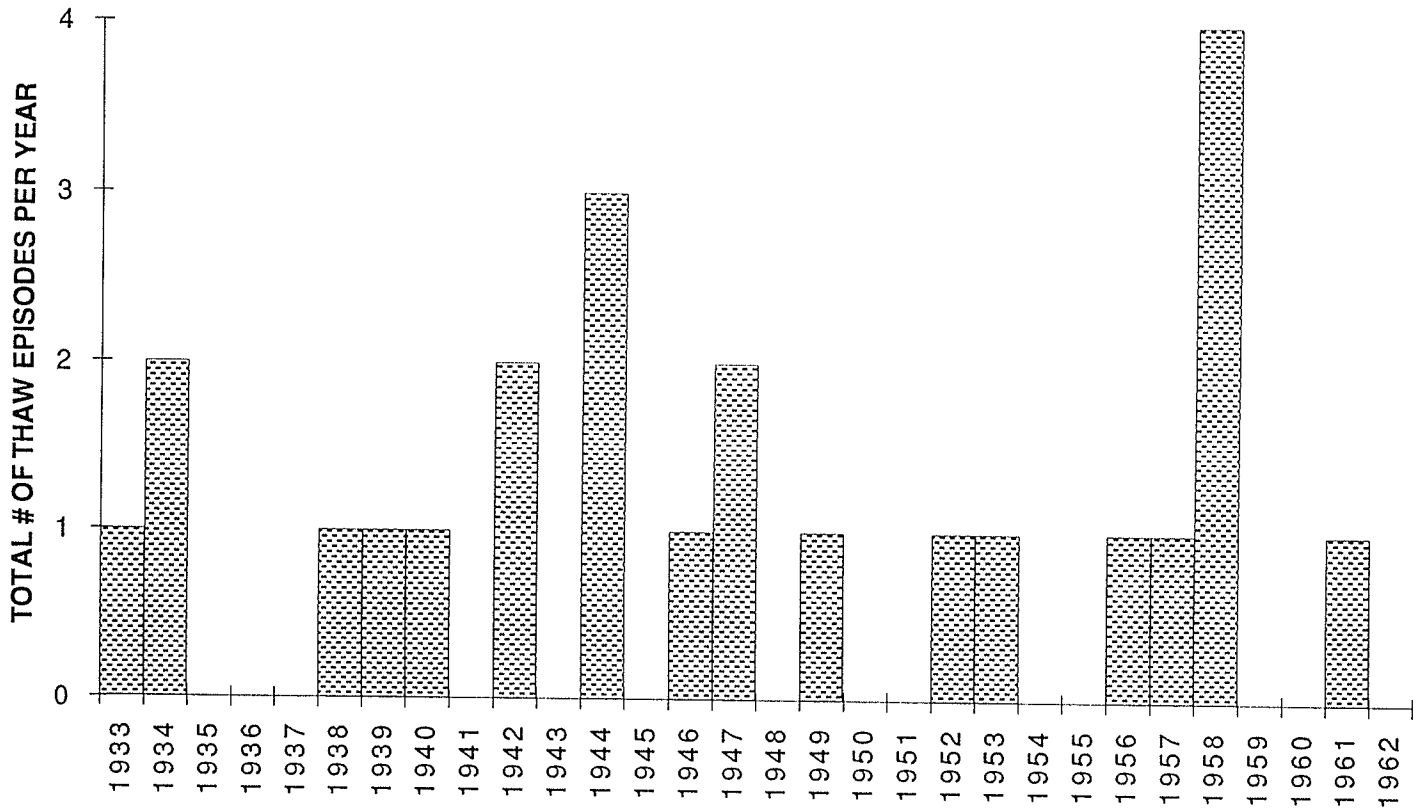
JAN 26	JAN 27	JAN 28	JAN 29	JAN 30	JAN 31	FEB 01	FEB 02
-20	-20.6	-18.3	-16.1	-13.9	-6.7	-6.7	-8.9
-12.8	-12.2	-24.4	-30.6	-12.2	-9.4	-23.3	-20
-15.6	-15.6	-21.7	-14.4	-13.3	-15.6	-22.8	-21.1
-25.6	-16.1	-6.7	-15.6	-1.7	-1.7	-16.7	-17.8
-19.4	-24.4	-15	-22.8	-24.4	-26.7	-24.4	-22.2
-13.9	-16.1	-16.1	-21.7	-16.7	-14.4	-20	-8.9
-16.1	-15	-12.8	-11.1	-9.4	-5.6	-13.9	-7.8
-22.2	-9.4	-22.2	-18.9	-15.6	-12.2	-11.1	-10
-3.9	-17.2	-19.4	-15	-8.3	-12.8	-20.6	-21.1
-22.2	-18.3	-21.7	-18.9	-7.8	-2.8	-15	-9.4
6.7	-1.7	-6.1	-9.4	-11.1	-15.6	-16.7	-16.1
-16.1	-18.3	-13.9	-13.9	-14.4	-7.2	-10	-10
-28.3	-21.1	-20.6	-24.4	-22.2	-19.4	-19.4	-20.6
3.9	0.6	-6.7	-18.3	-19.4	-15.6	-17.2	-12.2
-13.9	-22.8	-21.7	-25	-20.6	-10	-5	-22.2
-13.9	-5	-18.3	-25	-13.3	-7.2	-12.8	-20.6
-24.4	-23.3	-2.8	-14.4	-25	-12.8	-15	-7.8
-17.8	-23.9	-23.3	-32.2	-22.2	-15.6	-20	-15
-10.6	-25.6	-22.8	-18.9	-10.6	1.7	0	-11.1
-13.9	-7.2	-12.8	-19.4	-18.3	-16.1	-26.1	-18.9
-18.3	-17.8	-14.4	-9.4	-12.8	-20	-3.9	-2.2
-20	-25.6	-25.6	-28.3	-27.2	-26.1	-22.2	-17.8
-6.1	-7.2	-8.9	-8.3	-13.3	-11.1	-6.7	-10
-17.2	-22.2	-27.2	-26.1	-10.6	-20	-18.3	-12.8
1.7	-1.1	-1.1	-2.8	1.1	-4.4	-10	-12.2
-16.1	-12.8	-17.8	-16.7	-18.9	-26.1	-15.6	-2.2
-16.1	-13.3	-3.3	-22.2	-13.3	-4.4	-14.4	-11.1
-18.9	-17.8	-17.8	-21.1	-19.4	-22.2	-23.9	-20.6
-2.8	-23.3	-26.1	-25	-27.8	-29.4	-25.6	-8.3
-19.4	-19.4	-17.8	-11.1	-20.6	-11.1	-5.6	-4.4
-13.9	-10	-13.3	-6.1	-6.1	-0.6	-11.1	-12.8
-4.4	-11.7	-28.9	-18.9	-8.3	-12.8	-16.1	-20.6
-18.9	-17.8	-16.7	-13.9	-14.4	-5	-5	-7.2
-13.9	-17.2	-12.2	-14.4	-10.6	-4.4	-3.3	-17.8
-3.3	-18.3	-17.8	-3.3	-14.4	0.6	-10.6	-12.2
-20	-16.7	-7.2	-7.8	-3.9	-15	-15.6	-3.9
-17.2	-6.1	-3.9	-17.2	-9.4	-2.8	-18.9	-21.1
-24.4	-26.1	-24.4	-22.2	-29.4	-25.6	-25	-23.9
-30	-22.2	-19.4	-19.4	-19.4	-21.7	-22.2	-21.7
-1.7	-15.6	-14.4	-18.9	-31.1	-21.7	-11.7	-8.9
-11.1	-13.9	-11.7	-14.4	-5.6	-21.1	-26.1	-26.7
-17.2	-17.8	-20.6	-22.2	-20.6	-13.9	-17.2	-18.9
-10.6	-16.7	-7.8	-15.6	-18.9	-11.1	-24.4	-22.2

-19.4	-17.8	-19.8	-19.6	-9.6	-11.9	-16.5	-11.2
-9.1	-9.4	-14.4	-15	-12.9	-13.5	-19.2	-18.6
-1.6	-5	-6.8	-11	-12.6	-13.2	-15	-18
-6.7	-15.5	-19.2	-20.7	-20.1	-17.6	-17.5	-20.7
-10.9	-16.6	-11.1	-17	-7.6	-3.9	-3.9	-24.2
-17.2	-5.5	-4.5	-18.3	-11.6	-20.6	-15	-4.9
-22.6	-17.5	-3.3	-3.3	-7	-15.5	-7.1	-11.7
-16	-16.6	-15.2	-15	-20	-15.2	-6.2	-12.3
-13.7	-14.7	-18.4	-16	-14.6	-8.6	-21.1	-21.6
-9.3	-27.1	-22.4	-17.8	-17.4	-16.6	-13.2	-7.5
-8.9	-4.2	-13.8	-8.5	-10.2	-11.3	-4.3	-5.5
-20.6	-16.5	-16.1	-6.1	-12.6	-14.8	-18.4	-21.7
-8.3	-8.3	3.4	-12.9	-1.6	-7	-25	-25.5
-10.4	0.3	0.3	-5.8	0.7	-15.1	-13.1	-24.3
-12.2	-9.9	-27.7	-22.4	-16.9	-21	-8.5	5
-22.6	-18.3	1.7	-3.3	-13.4	-13.9	-14	-6.1

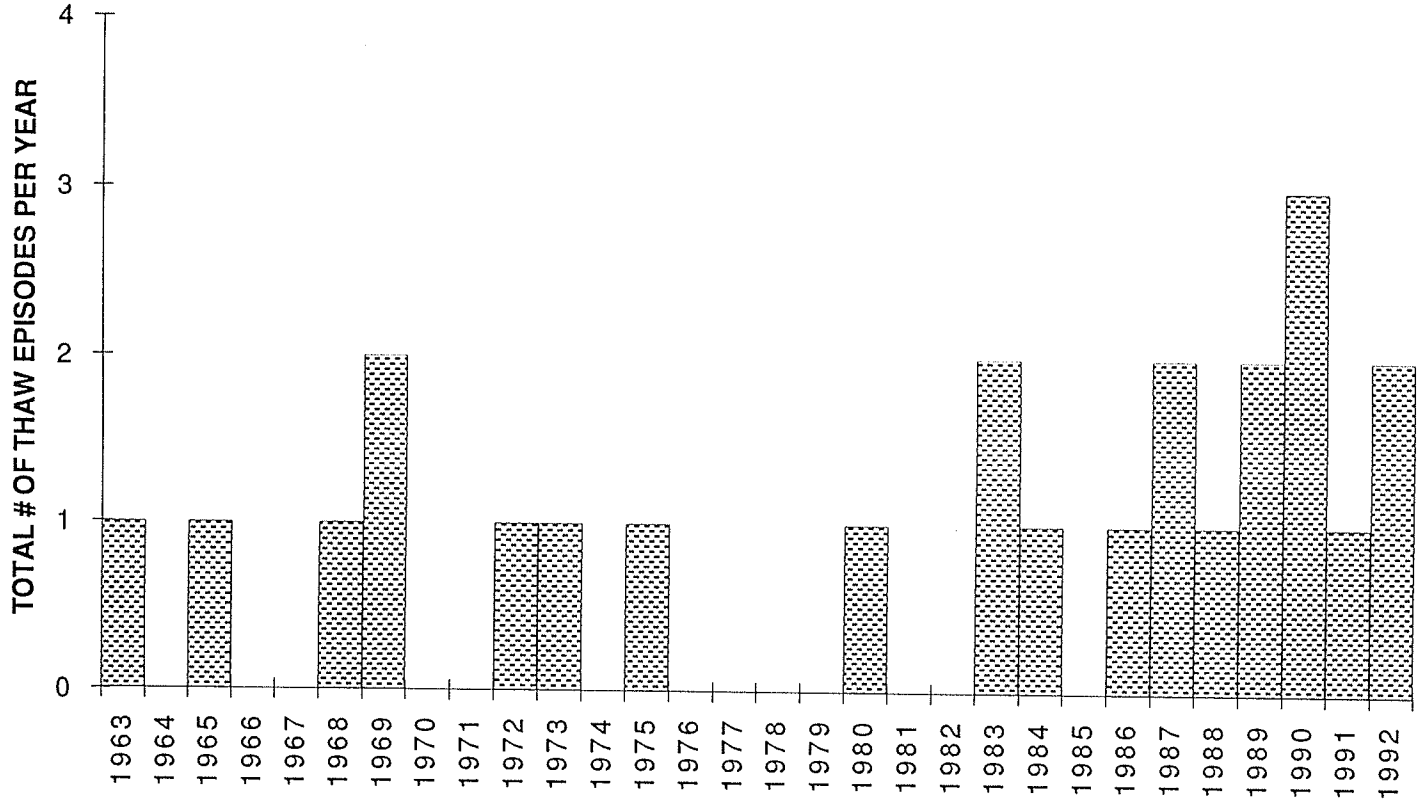
	TOTAL THAW	PER DECADE	TOTAL THAW	PER DECADE
FEB 03	DAYS	THAW DAYS	EPISODES	THAW EPISODES
-15	1		1	
-11.7	3		2	
-24.4	0		0	
-15.6	0		0	
-15	1		1	
-13.9	1		1	
-8.3	2		1	
-15.6	0		0	
-7.8	2	10	2	8
-5	0		0	
-17.8	5		3	
-8.3	0		0	
-18.3	3		1	
-7.2	4		2	
-22.8	0		0	
-14.4	1		1	
-7.8	0		0	
-10	0		0	
-2.2	2	15	1	8
-8.3	1		1	
-14.4	0		0	
-13.9	0		0	
-3.9	2		1	
-8.3	1		1	
-15	4		4	
-2.8	0		0	
-2.8	0		0	
-17.8	1		1	
-5.6	0	9	0	8
-29.4	1		1	
-0.6	0		0	
-21.1	1		1	
-8.9	0		0	
-5.6	0		0	
-11.7	1		1	
-4.4	3		2	
-27.8	0		0	
-15.6	0		0	
-13.3	1	7	1	6
-6.1	1		1	
-22.8	0		0	
-16.1	1		1	
-15	0		0	

-11.1	0		0	
-17.5	0		0	
-13.2	0		0	
-15.8	1		1	
-24.5	0		0	
-21.6	0	3	0	3
-18.6	2		2	
-6.4	1		1	
-17.7	0		0	
-12.6	1		1	
-15.6	3		2	
-13	2		1	
-25.1	2		2	
-21	4		3	
4.2	2		1	
-8	4	21	2	15
TOTAL:	65		48	

FREQUENCY OF OCCURRENCE OF MID-WINTER THAW: MOOSONEE, 1933-1962



FREQUENCY OF OCCURRENCE OF MID-WINTER THAW: MOOSONEE, 1963-1992



DAILY MAX. TEMP. DATA FOR EASTMAIN: 1961-92

DATE	JAN 03	JAN 04	JAN 05	JAN 06	JAN 07	JAN 08	JAN 09
1961	-19.4	-20	-14.4	-15	-9.4	-17.2	-10.6
1962	-16.1	-23.9	-18.9	-16.7	-12.2	-12.2	-13.3
1963	-7.8	-5	-2.2	-13.9	-12.2	-7.8	0.6
1964	-10.6	-13.9	-15.6	-15.6	-16.1	-3.3	-2.8
1965	-11.7	-8.3	-11.7	-11.7	-3.9	-0.6	-27.2
1966	-8.3	-19.4	-17.8	-16.7	-21.1	-19.4	-12.2
1967	-5.6	-12.2	-18.3	-22.2	-19.4	-20.6	-18.9
1968	-25	-24.4	-27.8	-27.8	-31.1	-30	-30
1969	-7.8	-15	-17.2	-7.2	-9.4	-10.6	-2.2
1970	-16.1	-12.2	-13.9	-13.9	-16.7	-9.4	-12.2
1971	-7.2	-7.2	-7.2	-6.7	-9.4	-12.2	-10.6
1972	-5.6	-21.7	-17.8	-9.4	-9.4	-7.2	4.4
1973							
1974	-25	-20.6	-20.6	Misg	-21.1	-27.8	-18.3
1975	-0.6	-8.3	-7.8	-3.3	-5	-3.9	-3.9
1976	-8.3	-12.8	-12.2	-13.9	-21.1	-24.4	-23.3
1977	-7.8	-8.3	-17.2	-11.1	-12.2	-25	-22.8
1978	-23.3	-19.4	-22.2	-23.9	-15	-15	-18.3
1979	-25	-26.1	-20.6	-11.7	-17.8	-16.7	-14.4
1980	-13.9	-13.3	-17.8	-21	Misg	Misg	Misg
1981	Misg	Misg	Misg	Misg	Misg	Misg	Misg
1982	-6.5	-13.5	-14	-16	-13.5	-17.5	-25
1983	Misg	Misg	Misg	-14	-11	-22	-7
1984	Misg	-17	-13	Misg	-26.5	-22	-26
1985							
1986	-24.5	-17	-16	-14	-15.5	-10	-11
1987	-6	-5	0.5	0.5	-5	-10	-8.5
1988	-4	-11	-16	-24.5	-13	-16	-18.5
1989	-23.5	-22.5	-14	-9.5	-9	-10	Misg
1990	-2.5	-7	-15	-12	-12	-14	-16.5
1991	Misg	Misg	Misg	Misg	Misg	Misg	Misg
1992	1	2	0	-3	-14.5	-10	-8.5

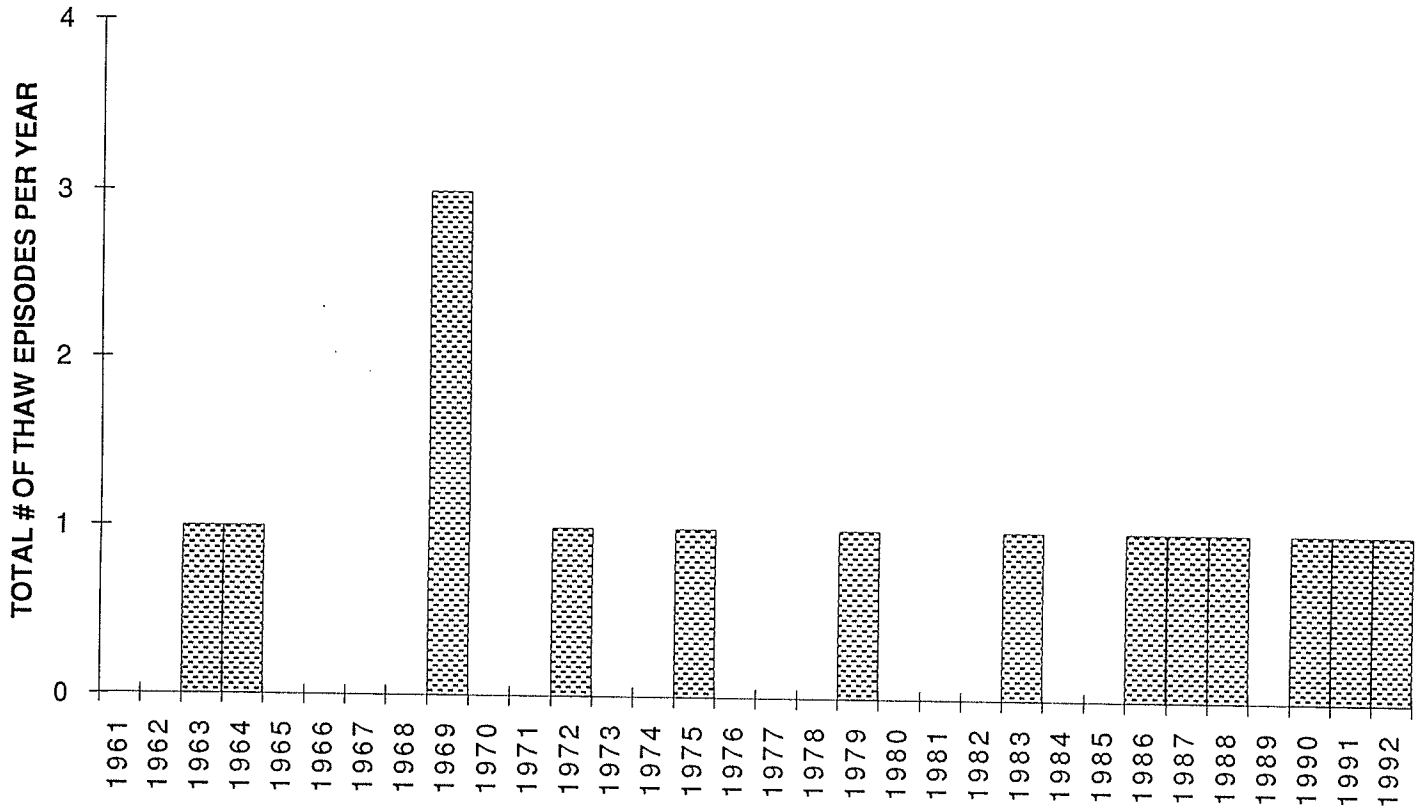
JAN 10	JAN 11	JAN 12	JAN 13	JAN 14	JAN 15	JAN 16	JAN 17
-5	-15.6	-15.6	-10	-16.7	-8.3	-1.1	-13.9
-12.2	-11.1	-19.4	-2.2	-1.1	-16.7	-21.7	-30
-20.6	-23.9	-26.1	-21.7	-22.2	-27.2	-16.1	-27.2
-10	-19.4	-18.3	-18.9	-16.1	-9.4	-18.9	-17.2
-28.3	-20	-23.9	-23.9	-31.7	-29.4	-19.4	-17.2
-9.4	-22.2	-19.4	-14.4	-17.8	-6.7	-3.9	-3.3
-16.1	-13.3	-5	-2.2	-2.2	-16.1	-22.2	-27.8
-25	-21.7	-11.1	-9.4	-10	-23.9	-22.2	-3.3
0	-2.2	-2.2	-5.6	-12.2	-12.8	0	-1.7
-13.3	-12.8	-15.6	-16.7	-25.6	-18.9	-12.2	-25
-9.4	-8.9	-27.2	-25.6	-23.3	-25.6	-24.4	-21.7
-6.1	-5	-6.7	-2.8	-16.7	-27.8	-11.7	-10
Misg	-26.1	-25.6	-12.2	-9.4	-23.3	-26.1	-23.3
2.2	5.6	-7.2	-17.2	-21.7	-17.8	-19.4	Misg
-23.3	-21.1	-12.2	-5.6	-10	-14.4	-18.9	-21.7
-21.1	-15.6	-21.7	-26.1	-22.8	-20.6	-23.3	-8.9
-15.6	Misg	Misg	Misg	Misg	Misg	Misg	Misg
-20.6	-25.6	-21.1	-18.9	-18.9	-22.2	-28.3	-25.6
Misg	Misg	Misg	Misg	Misg	Misg	-3.3	-2.8
Misg	Misg	Misg	Misg	Misg	Misg	Misg	Misg
-27.5	-16.5	-13	-23	-21	-13	-17	-26
-4	-15	-17	-17	-27	-24	-23	-20
-30.5	-30.5	-29.5	-23.5	-20.5	-10.5	-9.5	-23
-21.5	-15	-15	-24	-22	-22	-6	0
-7.5	-3.5	-3.5	-4.5	-4.5	-16	-17	-7
-14.5	-14.5	-20	-21	-16	-6	1	-2
Misg	Misg	Misg	Misg	Misg	Misg	Misg	Misg
-16	-10	-13	-15	-16	-13	-7	-5
Misg	Misg	Misg	Misg	Misg	Misg	Misg	Misg
-21	-13	-9.5	-18	-26.5	-27	-28.5	-26

JAN 18	JAN 19	JAN 20	JAN 21	JAN 22	JAN 23	JAN 24	JAN 25
-22.8	-22.8	-20	-23.3	-25.6	-24.4	-23.9	-22.8
-21.7	-13.9	-18.3	-15.6	-15	-17.2	-7.8	-18.9
-11.7	-30.6	-25	-31.7	-34.4	-30	-22.2	-23.3
-15	-12.2	0	-4.4	-3.3	-2.2	-20	-6.7
-17.2	-16.1	-13.9	-8.3	-25	-24.4	-10.6	-12.8
-10	-9.4	-9.4	-10.6	-10	-6.7	-12.2	-23.9
-17.2	-15	-22.2	-18.9	-17.2	-7.8	-11.7	-7.2
-2.2	-6.1	-11.1	-17.2	-15	-23.9	-19.4	-9.4
-10	-15	-5.6	-13.3	-11.1	0	5	-4.4
-25	-25	-26.1	-21.1	-13.3	-15	-11.7	-11.1
-14.4	-12.8	-8.9	-6.7	-3.9	-3.9	-15	-23.3
-10	-11.1	-23.3	-15	-10.6	-10.6	-17.2	-17.8
-11.7	-16.7	-6.7	-7.8	-19.4	-16.7	-18.9	Misg
Misg	-19.4	-25.6	-23.3	Misg	Misg	-22.8	-20
-5	-4.4	-12.8	-15.6	-20	-22.8	-22.2	-12.2
-5.6	-11.1	-11.7	-13.9	-17.8	-12.2	-8.3	-10.6
Misg	Misg	Misg	Misg	Misg	Misg	Misg	Misg
-20.6	-11.1	-8.9	-7.2	-10	-15	-5	-1
-2.8	-6.7	-17.2	-20.6	-15	-17.8	-17.8	-9.4
Misg	Misg	Misg	Misg	Misg	Misg	Misg	-9.5
-29	-22	-23	-27.5	-25	-17.5	-19	-20
-21.5	-21	-8.5	-6	-1.5	-5	-15	-24
-27.5	-24	-27.5	-17	-20.5	-3	-1	-1.5
-8	-10	-12	-9.5	-16.5	-26.5	-15	-7
-6.5	-21	-19	-15	-5	-16	-15	-19.5
-6	-13	-9	-14.5	-17	-20	-21	-22
Misg	Misg	Misg	Misg	Misg	Misg	Misg	Misg
-10	-15	-18.5	-18.5	-15	-17	-11	-9
Misg	Misg	Misg	Misg	Misg	Misg	Misg	Misg
-25	-26	-23	-23	-8	-6	-26.5	-25.5

JAN 26	JAN 27	JAN 28	JAN 29	JAN 30	JAN 31	FEB 01	FEB 02
-23.9	-21.1	-18.3	-21.7	-23.3	-24.4	-23.9	-22.8
-6.7	-28.3	-27.2	-27.2	-26.7	-29.4	-23.3	-10
-20	-22.2	-21.1	-13.3	-24.4	-15.6	-7.2	-5.6
-13.3	-14.4	-13.3	-7.8	-6.7	-2.8	-16.7	-22.2
-5.6	-10	-26.1	-12.8	-12.8	-16.7	-16.1	-24.4
-21.1	-16.7	-10.6	-10	-2.2	-1.7	-3.9	-10.6
-17.8	-13.3	-9.4	-15	-11.1	-5.6	-10.6	-23.3
-4.4	-18.3	-18.9	-5	-10.6	-2.2	Misg	-11.7
-17.8	-14.4	-6.7	-5.6	-3.9	-18.9	-19.4	-10.6
-16.1	-7.8	-6.1	-25.6	-6.1	-3.9	-23.3	-27.8
-22.8	-21.1	-21.1	-18.3	-18.3	-26.7	-26.1	-26.1
-28.9	-23.3	-22.8	-23.9	-23.3	-23.3	-27.8	-18.9
						-12.2	Misg
-13.9	-15	-13.3	-2.2	-20	-12.2	-27.8	-29.4
-16.1	Misg	Misg	-24.4	-25.6	-19.4	Misg	-20
-12.2	-13.9	-5	-13.9	-16.7	-12.2	-16.1	-20.6
-17.8	-16.7	-16.1	-10.6	-7.8	-12.2	-17.8	-15
Misg	Misg	Misg	Misg	Misg	Misg	-17.8	-20.6
0.6	-0.6	-1.7	-4.4	-10	-8.3	-11.7	-13.9
-9.4	-15.6	-20.6	-18.9	-22.2	-22.2	-21.1	-18.9
-12	-15	-14	-17	-15	Misg	-9	-20.5
-19	-7	-6	-15	-11.5	-18	-15.5	-6.5
-22	-16	-5	-2.5	0	Misg	Misg	Misg
-20	-18	-19	-21	-23	-14		
-20	-21	-21	-19	-19	-23	-9	-15
-8.5	-6	-19	-16	-12	-11	-10	-6
-21	-20	-19	-8	-12	-13.5	-17	-23
Misg	Misg	Misg	Misg	Misg	Misg		
-11.5	-0.5	7	-4.5	-1	-6	-13	-22
-14	Misg	-29.5	-25	-21	-22	-8	2.5
-24	-13	-4	-14	-13.5	-16	-14	-7.5

	TOTAL THAW	PER DECADE	TOTAL THAW	PER DECADE
FEB 03	DAYS	THAW DAYS	EPISODES	THAW EPISODES
-17.2	0	not incl.	0	not incl.
-7.8	0	not incl.	0	not incl.
-31.1	1		1	
-1.1	1		1	
-23.3	0		0	
-8.9	0		0	
-6.1	0		0	
-12.2	0		0	
-5	4		3	
-27.8	0		0	
-21.7	0		0	
-12.8	1	7	1	6
-8.3	0		0	
-24.4	0		0	
-20	2		1	
-21.7	0		0	
-7.8	0		0	
-22.2	0		0	
-15	1		1	
-17.8	0		0	
-30	0		0	
-14	0	3	0	2
Misg	1		1	
	0		0	
	0		0	
-14	1		1	
-14.5	2		1	
-17	1		1	
	0		0	
-21	1		1	
0	2		1	
-9.5	3	11	1	7
TOTAL:	21		15	

FREQUENCY OF OCCURRENCE OF MID-WINTER THAW: EASTMAIN, 1961-1992



APPENDIX D

Analysis Tables

DATE	*MOOSE FACT* THAW DAYS	*FORT ALBANY* THAW DAYS	*EASTMAIN* THAW DAYS
1743-52	15	11	6
1753-62	11	12	8
1763-72	10	4	10
1773-82	16	7	4
1783-92	3	2	1
1793-1802	13	5	7

	EPISODES	EPISODES	EPISODES
1743-52	8	4	4
1753-62	7	6	7
1763-72	8	4	7
1773-82	13	5	4
1783-92	2	1	1
1793-1802	8	3	4

DATE	*MOOSE FACT* THAW DAYS	*FORT ALBANY* THAW DAYS	*EASTMAIN* THAW DAYS
1803-12			
1813-22			
1823-32	13	13	
1833-42	7	5	
1843-52			
1853-62	11	7	

	EPISODES	EPISODES	EPISODES
1803-12			
1813-22			
1823-32	5	5	
1833-42	6	4	
1843-52			
1853-62	8	6	

NOTE: blanks indicate insufficient data or no data for that period.

Table A1. Total Thaw Days and Thaw Episodes Per Decade: Moose Factory, Fort Albany and Eastmain House

MOOSONEE

DATE	THAW DAYS	THAW EPISODES
1933-42	10	8
1943-52	15	8
1953-62	9	8
1963-72	7	6
1973-82	3	3
1983-92	21	15

EASTMAIN

DATE	THAW DAYS	THAW EPISODES
1963-72	7	6
1973-82	3	2
1983-92	11	7

Table A2. Total Thaw Days and Thaw Episodes Per Decade: Moosonee and Present Day Eastmain

	MOOSE FACTORY	MOOSONEE
PERIOD OF RECORD	1737-1941	1933-1992
TOTAL # OF THAW DAYS (EPISODES)	122 (83)	65 (48)
TOTAL YEARS	204	60
TOTAL # OF WEATHER GAPS IN RECORD	82	1
TOTAL YEARS WITH WEATHER INFORMATION	122	59
TOTAL # OF THAW DAYS (EPISODES)/100 Yrs.	100 (68.0)	110.2 (81.4)
~ THAWS PER DECADE	10 (7)	11 (8)

	EASTMAIN HOUSE	EASTMAIN
PERIOD OF RECORD	1737-1941	1961-1992
TOTAL # OF THAW DAYS (EPISODES)	68 (55)	21 (15)
TOTAL YEARS	204	32
TOTAL # OF WEATHER GAPS IN RECORD	92	6
TOTAL YEARS WITH WEATHER INFORMATION	112	26
TOTAL # OF THAW DAYS (EPISODES)/100 Yrs.	60.7 (49.1)	80.8 (57.7)
~ THAWS PER DECADE	6 (5)	8 (6)

Table A3. A Comparison of Mid-Winter Thaw Data: Moose Factory and Eastmain House with Moosonee and Present Day Eastmain

MOOSONEE

DATE	TOTAL THAW DAYS	TOTAL THAW EPISODES
1943-52	15	8
1953-62	9	8
1963-72	7	6
1973-82	3	3
1983-92	21	15
AVERAGE:	11	8

EASTMAIN

DATE	TOTAL THAW DAYS	TOTAL THAW EPISODES
1963-72	7	6
1973-82	3	2
1983-92	11	7
AVERAGE:	7	5

MOOSE FACT.

DATE	TOTAL THAW DAYS	TOTAL THAW EPISODES
1743-52	15	8
1753-62	11	7
1763-72	10	8
1773-82	16	13
1783-92	3	2
AVERAGE:	11	7.6

EASTMAIN

DATE	TOTAL THAW DAYS	TOTAL THAW EPISODES
1763-72	10	7
1773-82	4	4
1783-92	1	1
AVERAGE:	5	4

Table A4. **A Decade by Decade Comparison of Modern Mid-Winter Thaw Totals for Moosonee and Eastmain (1943-92) with Historical Mid-Winter Thaw Totals for Moose Factory and Eastmain (1743-92)**

MOOSONEE

DATE	TOTAL THAW DAYS	TOTAL THAW EPISODES
1933-42	10	8
1943-52	15	8
1953-62	9	8
1963-72	7	6
1973-82	3	3
1983-92	21	15
AVERAGE:	10.83	8

MOOSE FACTORY

DATE	TOTAL THAW DAYS	TOTAL THAW EPISODES
1823-32	13	5
1833-42	7	6
1853-62	11	8
AVERAGE:	10.33	6.33

Table A5. **A Decade by Decade Comparison of Modern Mid-Winter Thaw Totals for Moosonee with Eighteenth Century Mid-Winter Thaw Totals for Moose Factory**

MOOSONEE

DATE	TOTAL THAW DAYS	TOTAL THAW EPISODES
1933-42	10	8
1943-52	15	8
1953-62	9	8
1963-72	7	6
1973-82	3	3
1983-92	21	15
AVERAGE:	10.83	8

EASTMAIN

DATE	TOTAL THAW DAYS	TOTAL THAW EPISODES
1963-72	7	6
1973-82	3	2
1983-92	11	7
AVERAGE:	7	5

MOOSE FACT.

DATE	TOTAL THAW DAYS	TOTAL THAW EPISODES
1743-52	15	8
1753-62	11	7
1763-72	10	8
1773-82	16	13
1783-92	3	2
1793-1802	13	8
1823-32	13	5
1833-42	7	6
1853-62	11	8
AVERAGE:	11	7.22

EASTMAIN

DATE	TOTAL THAW DAYS	TOTAL THAW EPISODES
1743-52	6	4
1753-62	8	7
1763-72	10	7
1773-82	4	4
1783-92	1	1
1793-1802	7	4
AVERAGE:	6	4.5

Table A6. A Decade by Decade Comparison of Modern Mid-Winter Thaw Totals for Moosonee and Eastmain with Eighteenth and Nineteenth Century Mid-Winter Thaw Totals for Moose Factory and Eastmain House

	TOTAL THAW DAYS (EPISODES)	TOTAL THAW DAYS (EPISODES)	TOTAL THAW DAYS (EPISODES)	TOTAL THAW DAYS (EPISODES)
MOOSE FACTORY	1737-1941	1743-1802, 1823-42, 1853-62	1743-1792	1823-1842 1853-1862
	10 (6.8)	**11 (7.22)**	**11 (7.6)**	**10.3 (6.3)**
MOOSONEE	1933-1992	1933-1992	1943-1992	1933-1992
	11 (8.1)	**10.83 (8)**	**11 (8)**	**10.83 (8)**
EASTMAIN (HIST.)	1737-1941	1743-1802	1763-1792	
	6.1 (4.9)	**6 (4.5)**	**5 (4)**	
EASTMAIN (MOD.)	1961-1992	1963-1992	1963-1992	
	8.1 (5.8)	**7 (5)**	**7 (5)**	

Table A7. Average Thaw Days Per Decade: Summary of Comparisons

DATE	*FORT ALBANY*	*MOOSE FACTORY*	*EASTMAIN*
1743-52	0	0	0
1753-62	0	0	0
1763-72	0	0	0
1773-82	0	0	0
1783-92	0	0	0
1793-1802	1	2	2
1803-12			
1813-22			
1823-32	2	2	2
1833-42	2	2	2
1843-52			
1853-62	2	2	2

NOTE: blank cells indicate decades that could not be examined.

Table A8. Total # of Years Missing from Each Historical Decade Examined

DATE	*MOOSONEE*	*EASTMAIN*
1933-42	1	
1943-52	0	
1953-62	0	
1963-72	0	0
1973-82	0	3
1983-92	0	3

NOTE: blank cells indicate decades that could not be examined.

Table A9. Total # of Years Missing from Each Modern Decade Examined

APPENDIX E

A Synopsis of:

The Summer Season Along the East Coast of Hudson Bay During the Nineteenth Century -

C. V. Wilson

Cynthia Wilson's lengthy and complex monograph entitled: The Summer Season Along the East Coast of Hudson Bay During the Nineteenth Century focuses on the problems associated with the use of raw (uncalibrated) historical instrumental temperature data in climatic reconstruction. The main portion of this immense study is therefore devoted to the physical considerations of the calibration of historical instrumental temperature data. Wilson focuses on the archival data of the Hudson's Bay Company (HBC) and discusses four main physical considerations. Firstly, she discusses the effects of site (physical surroundings), both natural and artificial, on temperature data. Secondly, she discusses the types of thermometers used by the HBC, and how the different characteristics of each instrument may have had profound effects on the temperature data. Thirdly, Wilson discusses the manner in which the thermometers were exposed, and shows how exposure played a critical role in affecting the instrumental temperature record. Lastly, she talks about the general observing practices of the time, since different methods and quality of observation can affect temperature data in different ways.

The area under study extends along the east coast of James Bay and Hudson Bay. Wilson examines instrumental temperature data from the journals of three specific HBC bayside posts. These posts are Great Whale, Fort George (Big River) and Eastmain respectively. This coastal region forms part of the Precambrian Shield, and is characterized by low, rounded granite/gneiss hills, sandy marine terraces and beach ridges (Wilson 1982:10). The Great Whale area is a transitional zone comprising tundra and open lichen-woodland sites (Wilson 1982:10). The trees in the more exposed areas are usually stunted. White spruce is present near and at the coast, while black spruce and tamarack are found further inland (Wilson 1982:10). Other trees found include alder, dwarf birch and willow (Wilson 1982:10). To the south around the Fort George (Big River) area, there is a greater forest cover that includes jack pine and balsam fir (Wilson 1982:10). Further south still, in the Eastmain area, the forest cover is even more extensive and contains an even greater assortment of tree and shrub species.

Snow is usually gone by the last week of May on the coastal terraces, and returns by as early as mid-October (Wilson 1982:10). On the rivers near the coast, ice disappears by mid to late May

(Wilson 1982:10). The rivers are usually completely frozen by approximately late November (Wilson 1982:10).

One of the main controls of climate in this region during the summer is the open/ice conditions of the Bay. The Bay is usually frozen over between January and April, while break-up and melt take place between late May and early August (Wilson 1982:10).

Weather information contained in archival material for these posts is of particular value to climate research in that this is a marginal region comprising the boundary of the arctic and subarctic. In fact, the tree-line is further south here than anywhere else in the northern hemisphere. Such a region is ecologically sensitive to relatively small changes in total summer radiation. For example, the northward limit of the tree-line, which is affected by seasonal temperature fluctuations, can be used as an ecological climatic indicator. Furthermore, the influence of the Bay on the coastal climate, with respect to ice and open water conditions, is emphasised by local surface wind direction and storm frequency.

For this study, Wilson utilizes information contained in the HBC ships' log books, daily entries of the post journals and meteorological registers, correspondence reports and annual reports.

This study deals with the period of 1814-1821, which is an important time since better coverage of temperature data is available within the HBC documents (Wilson 1982:3). Furthermore, the earlier part of the nineteenth century was marked by periods of cooler than normal summer conditions in western and central Europe (Wilson 1982:3). Tree-ring studies in northeastern Canada for the past 300 years also indicate that relatively cold spring and summer periods occurred many times between 1810 and 1865, followed by generally warmer periods to the end of the nineteenth century (Wilson 1982:4). Other historical studies, such as on the break-up dates of ice in the estuaries of western Hudson Bay between 1714 and 1871, by Moodie and Catchpole (1975), show that some of the latest break-up dates occurred between 1812 and 1817. Therefore, this early part of the nineteenth century seems very important climatically.

Wilson states that the 1814-16 temperature records of Great Whale are similar to the 1925-57 temperature records of Great Whale with respect to site (Wilson 1982:49). This is mainly because the location of the post, and later a government weather station, was the same part of the river bank of Whale River. Not much development took place prior to 1957 to significantly alter the temperature data with respect to site (Wilson 1982:49). However, after 1957, two main factors caused significant alterations to the temperature data base.

Firstly, after 1957, the weather station was moved 0.5 km inland away from the river bank to a new location in an airport control tower (Wilson 1982:44). By March of 1961, the temperature screen and raingauge were moved again to an area 60 m west of the control tower (Wilson 1982:44). Wilson states that over a six-month period at the new airport sites, the temperature data showed a bias toward higher temperature values, whereby this was most prevalent in the minimum temperatures between January and March (Wilson 1982:49). Wilson attributes this bias to local artificial heat input (Wilson 1982:55). For example, many new heated buildings were added to the airport site after 1957, as well as an electricity generating station and two heating/hot water plants (Wilson 1982:55). Overall, Wilson states that the prevalence of higher minimum temperatures at the airport weather station suggest that local heat input was large enough to influence local temperature (Wilson 1982:55).

The second and most important factor which caused significant alterations to the temperature data base after 1957 were changes made to the surface conditions (Wilson 1982:52). The local inland terrain quickly became altered as a result of urbanization (the word "urbanization" seems much too grand for the minor building at Great Whale, but Wilson specifically coins this term). Such factors as construction, heavy vehicle traffic and new roads and buildings destroyed the vegetation mat over much of the area (Wilson 1982:44). With the removal of the vegetation cover, the soil quickly eroded away, leaving extensive stretches of loose sand, "often darkened by pollution" (Wilson 1982:44,52). Wilson states that during periods of moderate turbulence and/or sunlight, the sandy surface of the inland site would have dried out very quickly (Wilson 1982:52). The lower thermal capacity and conductivity of dry sand results in rapid daytime surface heating

under partially cloudy or sunny conditions, and therefore, a greater longwave emission of sensible heat (Wilson 1982:52). Overall, Wilson states that the daytime screen temperatures at the inland sites might register approximately 2 to 3 °C higher on days with strong solar heating compared to the historical river sites (Wilson 1982:54). However, Wilson adds that on clear, calm nights the minimum temperature differences between the historical and modern sites, resulting from changed surface conditions, are comparatively smaller (Wilson 1982:54).

There were three site changes prior to 1961 in Fort George (1817-20, 1915-33, 1933-60), but these had little effect on the homogeneity of the temperature series with respect to site (Wilson 1982:65,73). However, like Great Whale, increased settlement through the 1960s, as well as increased building density near the temperature screen, combined with the disturbance of the ground vegetation, created exaggerated warm conditions at Fort George (Wilson 1982:73).

Wilson notes that minor differences between the historical site (1817-20) and the more modern sites might have existed due to the smaller size of the forest clearing in the historical period (Wilson 1982:65). Wilson suggests that a smaller clearing may have led to higher maximum daytime temperatures during calm, sunny conditions in most parts of the historical clearing compared to the larger modern clearing (Wilson 1982:73). Interestingly, the opposite results occurred in microclimate studies of forests, which show them to be cooler during calm days than cleared areas. However, on windy days the smaller clearing could possibly provide better shelter and therefore exhibit higher maximum daytime temperatures.

The modern climatological station at Eastmain is located about 120 m southwest of the historical site, and is "similarly exposed to river and forest" (Wilson 1982:74). However, Wilson states that possible differences which can effect the homogeneity of the temperature records with respect to site, at Eastmain, are differences related to ground cover and proximity to settlement (Wilson 1982:74). The historical site (1814-21) is characterized by Wilson as being a drier, enclosed area of grass and heated wooden buildings. The modern site (1960-76), on the other

hand, is in a shallow valley or basin and is characterized as boggy and moss covered (Wilson 1982:74). Given these conditions, Wilson believes that the historical period of Eastmain was probably warmer due to the rapid heating potential of wood and ripe (dry) grass, as well as the artificial heat produced by the wooden buildings (Wilson 1982:74). Wilson further notes that the greatest differences in temperature at the two sites would occur at night, particularly quiet nights following warm, dry conditions, when the insulating properties of the moss, combined with cold air drainage, would create lower temperatures at the modern site (Wilson 1982:74).

The various types of thermometers used by the HBC during the nineteenth century undoubtedly had some distinct characteristics which affected the temperature data in various ways. Therefore, it is necessary to fully understand the characteristics of the various types of thermometers used at Eastmain, Fort George and Whale River in order to adjust the temperature data accordingly. Unfortunately, Wilson states at the outset of this paper that written confirmation on the types of instruments used was impossible to find (Wilson 1982:82). She states that a "thorough archival search" was performed, and except for a few minor exceptions, her "search proved fruitless" (Wilson 1982:82). However, she states that a variety of clues occur in the journals and registers which shed light on the possible instruments used and their exposure. Wilson combines these clues with the traditions of weather observation established on the western shores of Hudson Bay at this time. Wilson also looks at the instruments and observing practices which were common in England during the nineteenth century. Wilson feels this approach yields some "essential assumptions" (Wilson 1982:82).

Wilson states that there is evidence to suggest that the thermometer used at Eastmain was a mercury type rather than a spirit type (Wilson 1982:82). Her evidence for this decision is as follows.

Wilson states that eight Eastmain Journal entries, between 1810 and 1821 when George Gladman Sr. was in charge, mention mercury having frozen. For example, on January 13, 1810, a Journal entry by Gladman Sr. reads: "Quicksilver frozen solid in the open air" (PAM, HBCA,

B.59/a/87) (Wilson 1982:83). Wilson further states that Gladman had earlier lived on the west side of James Bay and was "undoubtedly" aware of Chief Factor Thomas Hutchins' successful study (1781-82) on the freezing point of mercury at Fort Albany, and therefore, Wilson feels that Gladman also made accurate observations (Wilson 1982:83). However, simple mention of mercury freezing and making accurate observations of this freezing process does not prove that a mercury thermometer was used at Eastmain. All Wilson seems to prove here is that some source of mercury was accurately observed to have frozen. Wilson seems to further weaken her claim by using a Journal entry by Gladman from March 3, 1818, which reads: "...the Cold was intense last night and a quantity of Quicksilver frozen solid which was exposed on the House top for experiment" (PAM, HBCA, B.59/a/99) (Wilson 1982:83). Such evidence clearly demonstrates that Gladman placed some mercury outside as an experiment on its freezing point. Gladman does not seem to be referring to a mercury thermometer. Furthermore, determining whether or not mercury is frozen solid inside a sealed thermometer tube is impossible without actually breaking open the glass to physically examine the mercury. Therefore, George Gladman must have been experimenting with bulk mercury, not a mercury thermometer, in order to physically examine the results of freezing. Wilson also notes that there was an open cistern barometer (unsealed) at Eastmain as well as a quantity of mercury available for medical purposes (Wilson 1982:83). However, this only strengthens the idea that alternative sources of mercury were readily available for experimentation by Gladman and others. The open cistern barometer, for example, has quite a large supply of mercury that could have been easily observed to have frozen.

Secondly, Wilson states that by the beginning of the nineteenth century mercury thermometers were "coming to be seen as more reliable than spirit" by the Royal Society of London (Wilson 1982:83). Although this may be true for England, it does not mean that mercury thermometers were suitable for all seasons in the Hudson/James Bay region. As will be demonstrated later, it seems that the mercury thermometer was the more accurate of the two types of instruments, but the spirit thermometer was more suitable for extremely cold days.

Lastly, Wilson states that since only fixed-hour readings were recorded at Eastmain, the instrument could not have been a self-registering maximum, minimum thermometer, like some spirit thermometers of the time (Wilson 1982:83). However, again, this does not prove that the Eastmain thermometer was a mercury type. It could very well have been that a simple spirit thermometer was used, which did not have the capability of registering maximum and minimum temperatures.

Overall, Wilson's argument can be considered weak at best, since it implies that a mercury thermometer was used year round at Eastmain. Wilson's study focuses exclusively on the summer months, when it was very possible that a mercury thermometer was used. She did not delve into the winter months. After personally going through the winter months of Eastmain for a 20 year period, a variety of clues come up which shed light on the obvious. For at least the coldest winter period, which is approximately January 3 to February 3, there is absolutely no possibility that a mercury thermometer was used at Eastmain. The most logical reason is actually given by Wilson herself in a mere footnote:

> *Although the readings below -38°F must be disregarded in the case of a mercury thermometer, it should be noted that the lowest Eastmain reading, 1814-1821, was -50°F on February 4,1817 (B/59/a/97) when James Russell was in charge; this compares with an extreme of -54°F for the modern record from 1960 to 1976. This may be an accident of contraction of the mercury, or it could indicate a spirit thermometer. On the same day, Big River, also in easterly flow, registered a minimum of -48°F (B77/a/3). The sensor at Big River appears to have been spirit. (Wilson 1982:84)*

Wilson, however, failed to mention numerous other entries which also give instrument readings well below -38°F. This proves that she did not look at the winter months. For example, on January 20, 1810, a Journal entry in the left margin by George Gladman Sr. reads: "Thermometer stick 50." (PAM, HBCA, B.59/a/87) In the corresponding daily account for January 20, 1810, Gladman states: "the greatest degree of Cold indicated by the Thermometer I ever knew in the Hudson Bay, the Teams could not work." (PAM, HBCA, B.59/a/87) Another Journal entry by Gladman on January 24, 1818 reads: "Mercury frozen solid this morning and dissolved entirely about 11 o'clock" and in the left margin it reads: "Therm 47." (PAM, HBCA, B.59/a/99) This is also verified in the meteorological register at the back of the journal, which gives the same reading of -47°F (folio 48d) for the same day. (PAM, HBCA, B.59/a/99) As well, on January 29, 1825, a

Journal entry by Chief Factor Erland Erlandson reads: "a cold morning -52." (PAM, HBCA, B.59/a/109) These are only three examples of temperatures way below the -38°F freezing point of mercury. Between 1810 and 1830 for Eastmain, there are an additional 22 Journal entries of January 3 to February 4 temperatures which range between -39°F and -48°F! Also, there are a number of other entries which mention "quicksilver" or mercury having frozen without giving a specific instrumental temperature reading. Therefore, it is clear that a spirit thermometer without a mercury indicator (explained later) was used to register temperatures lower than -38°F at Eastmain.

Another problem associated with historical mercury thermometers, but with respect to instrument error, is the slow rise in zero (also known as the "creep of the zero") caused by the contraction of the glass bulb, which is greatest in the first year and then gradually decreases (Wilson 1982:84). This was not known until 1809, so that thermometers were not aged before they were calibrated (Wilson 1982:84). This problem is more pronounced for mercury thermometers than for spirit thermometers, since mercury has an expansion coefficient of approximately 1/6 that of spirit (Wilson 1982:84). In other words, the length of the expanded liquid column over a given temperature range is six times greater for spirit than for mercury. Therefore, even a partial contraction of the glass bulb could have meant a significant error in a new mercury thermometer, since small changes in the length of the mercury column normally coincides with comparatively significant temperature changes.

The readings for both Whale River (1814-16) and Big River (1816-20) were taken from the same thermometer by Thomas Alder, who was in charge of Whale River, and later, Big River (Wilson 1982:85). Both daily maximum and minimum readings were taken, as well as fixed hour readings (Wilson 1982:85). Therefore, Wilson believes that the thermometer used was probably a self-registering maximum, minimum thermometer graduated in °F (Wilson 1982:85). Furthermore, Wilson believes that this thermometer was most likely an early Type Six combined minimum/maximum thermometer, named after its inventor, James Six, since it was the favoured of two spirit thermometers introduced to the Royal Society in London by the end of the eighteenth

century (Wilson 1982:85). The other type, Daniel Rutherford's separate mercury maximum and spirit minimum thermometer was later found to be unsatisfactory by the Royal Society, since the mercury had a tendency of getting past the index (Middleton 1966:152). As a result, the Royal Society favoured the Type Six for many years to come (Wilson 1982:85). However, as will be discussed later, the Type Six thermometer contained mercury that floated on the active spirit. This may prove to discredit Wilson's claim that a Type Six spirit thermometer was used at least during the coldest winter days in this region.

One obvious advantage of the self-registering spirit thermometer over its standard mercury counterpart was that the most extreme daily temperatures were automatically registered and later recorded by the observer (Wilson 1982:87). Furthermore, because of the much larger expansion coefficient of spirit, the lag coefficient, or the time it takes spirit to adjust to a specific proportion (e.g. 66%) of a local temperature change, is greater. Therefore, fixed-hour observations can be taken with minimal interference caused by natural small-scale temperature fluctuations and the heat emitted by the observer (discussed later).

The Type Six, which Wilson believes was used at Whale River and Big River between 1814-21, was much different in design from a standard mercury thermometer. The bulb was exceptionally large (40.64 cm long) and was connected to a U-shaped tube (see Diagram A) (Wilson 1982:85). The bulb and upper parts of the U-shaped tube were filled with spirit, while the lower part of the U-shaped tube was filled with mercury, which acted only as an indictor (Wilson 1982:87). When heated, the spirit expanded in the bulb and caused the mercury to descend on the left and rise on the right (Wilson 1982:87). When cooled, the spirit contracted in the bulb and caused the mercury to descend on the right and rise on the left (Wilson 1982:87). However, the main innovation was the development of the indexes, which were two small glass tubes each containing a piece of steel wire. Each index floated on top of the mercury inside the U-shaped tube. The indexes rode on the surface of the mercury and remained at that level (aided by a thin strand of glass that pressed against the wall of the tube) when the mercury descended again naturally, or in spite of a sudden movement of the thermometer (e.g. a bump by the observer).

The minimum and maximum readings remained at their set level, until the indexes were reset with a magnet by the observer (Wilson 1982:87). On the Six's wood (mahogany) housing, the degrees on the left side represented the minimum scale, and were therefore the inverse of the degrees on the right side maximum scale (Wilson 1982:87).

Overall, however, it is impossible that a Type Six spirit thermometer was used during the coldest winter days at Whale and Big River due to its use of mercury. A Type Six would not have been able to register a temperature lower than -38°F, since the mercury would have become frozen solid inside the U-shaped tube. Since temperatures well below -38°F were occasionally recorded in the HBC journals for this region, it is only logical to assume that a Type Six thermometer was not employed at least during the coldest winter days of each year in Great Whale and Fort George. It is likely that a Type Six was not used at all, since it is hard to believe that they had two thermometers side by side, a Type Six for when it was warmer than -38°F and another thermometer for when it was colder than -38°F!

The Rutherford separate mercury maximum, spirit minimum thermometer seems to be the only other self-registering thermometer introduced to the Royal Society by the end of the eighteenth century (Middleton 1966:152). Middleton states that the Rutherford maximum thermometer simply contained mercury with a conical index made of ivory, while the minimum thermometer simply contained spirit with a conical glass index (Middleton 1966:152). The point of the minimum index was positioned toward the bulb and immersed in spirit (Middleton 1966:152). The two instruments were simply placed in the same frame, one above the other, in a horizontal fashion (see Diagram B) (Middleton 1966:152). The bulb of the minimum thermometer was positioned just over the tip of the maximum thermometer, towards the right (Middleton 1966:152). Although the Rutherford maximum index had a problem, the possibility still exists that the Rutherford thermometer was used at least during the coldest winter days at Fort George and Great Whale, since it did not utilize mercury in its minimum thermometer.

A second major problem with the Type Six is that the spirit can eventually pass between the glass and mercury (Wilson 1982:88). This problem is only exacerbated in areas where the

mercury might freeze and shrink from the walls (Wilson 1982:88). Interestingly, Wilson recognizes that mercury can freeze inside the Type Six, but does not link this to the obvious fact that a Type Six could therefore not register a temperature below approximately -38°F.

Another disadvantage for any spirit thermometer is that a sudden and rapid drop in temperature may cause a certain amount of spirit to remain on the walls, thus creating a lower than true reading (Wilson 1982:90). This can happen in spring or summer with the icy or cold waters off the shores of James Bay and Hudson Bay adjacent to heated land surfaces (Wilson 1982:90).

Secondly, once the spirit is exposed to sunlight, it has a tendency to polymerize (change at the molecular level) with age (Wilson 1982:90). For example, polymerization can change part of the alcohol into another organic compound, like acetic acid, which has a different coefficient of expansion from alcohol, thus throwing off the calibration. This is not a problem with mercury thermometers, since mercury is an element, not a complex organic compound like spirit. Therefore, there is nothing for mercury to change into. Polymerization is most acute with spirits that are dyed, and unfortunately, many spirits are dyed for easier viewing (e.g. red dye). Dyes basically add an element of impurity to spirit, and this only accelerates the spirits' natural tendency toward polymerization (Wilson 1982:90).

Lastly, a "break" in the liquid column is more easily done with a spirit thermometer than with a mercury thermometer (Wilson 1982:90). This can occur by a sudden jolt in transport or by wind, and by drops formed by evaporation and condensation in the upper tube (Wilson 1982:90). These small breaks may go unnoticed and cause inaccurate readings.

In terms of instrument exposure, Wilson states that except for a few scattered entries in the journals which mention, for example, the instrument being in the shade, no clear indication of the exact exposure of the thermometers is given (Wilson 1982:125). However, Wilson believes that the general exposure was somewhat similar at Eastmain, Fort George and Great Whale, since their temperature records are consistent in "the pattern of their differences from the modern data" (Wilson 1982:125). Wilson further notes that these patterns are consistent with outdoor exposure

(Wilson 1982:125).

Wilson states that by the middle of the eighteenth century it was generally accepted that thermometers be located outdoors. She further states that thermometers were either attached to a post facing north and shaded by trees or buildings, or they were hung directly on the north wall of a building at a height of approximately 1.2 to 1.5 m (Wilson 1982:127). The Royal Society of London at this time specifically favoured a north-wall exposure and that the thermometer be placed between 5 and 10 cm from the wall, in order to reduce the error caused by the wall's heating effects (Wilson 1982:125). Although lacking specific evidence for Eastmain, Fort George and Whale River, Wilson states that the thermometers at these three posts had a north-wall (facing north, outdoors) exposure. This assumption is basic to the rest of Wilson's study (Wilson 1982:127).

Wilson states that the immediate physical environment at the three posts was mainly sand and wood, including the instrument mounts (Wilson 1982:132). She states that the thermal capacity and conductivity of dry wood, like sand, is very low (Wilson 1982:132). Therefore, rapid daytime heating under partially cloudy or sunny conditions was a reality in the immediate vicinity of the posts. However, since the thermometers were usually placed in the shade of a tree or building, or against a shaded wall, rapid jumps in temperature due to direct sun exposure on the instrument mount or bulb, or part of the wall or post that they were attached to, probably did not occur (Wilson 1982:134). Of more importance, in terms of exposure, was the longwave radiation (terrestrial heat) that was received from other local surfaces, especially other wooden buildings (Wilson 1982:141). For example, at Big River in 1818-20, the monthly mean 5 pm temperatures are sometimes higher than would normally be expected. However, after studying the individual temperature values, it has been concluded that the heating was probably attributed to environmental heating and not direct sun exposure on the bulb (Wilson 1982:141). Unfortunately, very little is known about the precise grouping of the wooden buildings (e.g. officer's house, men's house, stable and forge) for all three posts to give an accurate estimate on the effects of longwave radiation on the instrumental temperature record (Wilson 1982:141-142).

Wilson states that there may also be errors associated with the heated house, which provides a large source of stored energy. However, estimating the amount of error that was associated with the heated house is impossible. The amount and rate of heat loss depends entirely upon the type and quality of the building and its state of repair, as well as on the difference between the indoor and outside temperatures (Wilson 1982:135). Unfortunately, most of this kind of information is not supplied in the HBC records. Furthermore, depending on where the thermometer is placed against the wall, error can be different. For example, greater heat losses can occur through cracks, window panes and chimneys (Wilson 1982:135). The frequency and timing of when windows and doors are opened and closed may also affect error (Wilson 1982:135). Therefore, the heated house undoubtedly supplied a source of error to the temperature record, but estimating this error is impossible, especially when other factors of error, like longwave radiation from nearby objects, also played an interconnected role.

Lastly, Wilson discusses the observation practices that were undertaken at Eastmain, Fort George and Whale River during the early nineteenth century.

Weather information for Eastmain, Fort George and Whale River, between 1814 and 1821, was recorded in a very uniform format, both temporally and spatially. This format is as follows. On a single line, the observer entered the date and hour of the barometer, thermometer, precipitation, wind and weather readings (Wilson 1982:157). The temperature and barometer columns were then averaged at the bottom of the page, giving a monthly summary (Wilson 1982:157).

At Eastmain in 1814-15, the thermometer was read at 8 am, 2 pm and 8 pm. By October 1815, it was changed to 6 am, noon and 6 pm (Wilson 1982:158). When George Gladman Sr. replaced James Russell as Master in 1817, and from then until 1821, the columns were headed "am," "noon" or "M" (mid day) and "pm." Wilson states that the hours 6 am and 6 pm were probably retained (Wilson 1982:159). Her reason for this is that the regional headquarters (Moose Factory) established the times of observation in September, 1815 as 6 am, noon and 6 pm (Wilson

1982:159). Since George Gladman Jr. was clerk and observer of Moose Factory in July, 1816, and then returned to Eastmain when his father replaced Russell as Master on October, 1817, he probably retained the standards set at Moose Factory (Wilson 1982:159). Am and pm were therefore probably implied to mean 6 am and 6 pm. Although this seems only logical, it is only an assumption.

At Whale River and Big River, the times of the fixed-hour readings were 8 am, mid-day and 5 pm. The only exception is 1814/15, when only two daily observations were made. One observation was taken in the "morning" and the other in the "evening." No specific time is given.

Overall, in regards to the recording of weather observation, there is for the most part, temporal and format uniformity for most of instrumental temperature record of 1814-21 for Eastmain, Fort George and Whale River. However, trying to compare fixed-hour temperature values between Eastmain and Whale River for example, may pose some obvious problems as the usual fixed-hour times of observation are different between the two posts.

Wilson also notes that punctuality, with respect to the stated observed time, cannot always be guaranteed, especially during extremely unfavourable weather conditions (e.g. snow storms) (Wilson 1982:161). However, the problem of punctuality was probably no worse historically than today! This is mainly because the HBC post personnel lived in this region for long stretches of time, and relied heavily upon accurate weather observation for their own survival, especially during dangerous times. For example, accurate weather observation was imperative during the period leading up to spring thaw in order for the post to prepare for the risk of major flood damage. Furthermore, the HBC ran very much like a paramilitary organization and post employees received strict orders to follow their routines according to specific company guidelines. The journals do note instances where HBC post employees received punishment, sometimes corporal punishment (e.g. getting whipped) for not following the rules set by the company. Undoubtedly, inaccurate record keeping due to sheer laziness would have been punishable to some degree. Today, however, most Environment Canada employees have less of an incentive to make accurate weather observations, since their survival does not depend on it. There are various

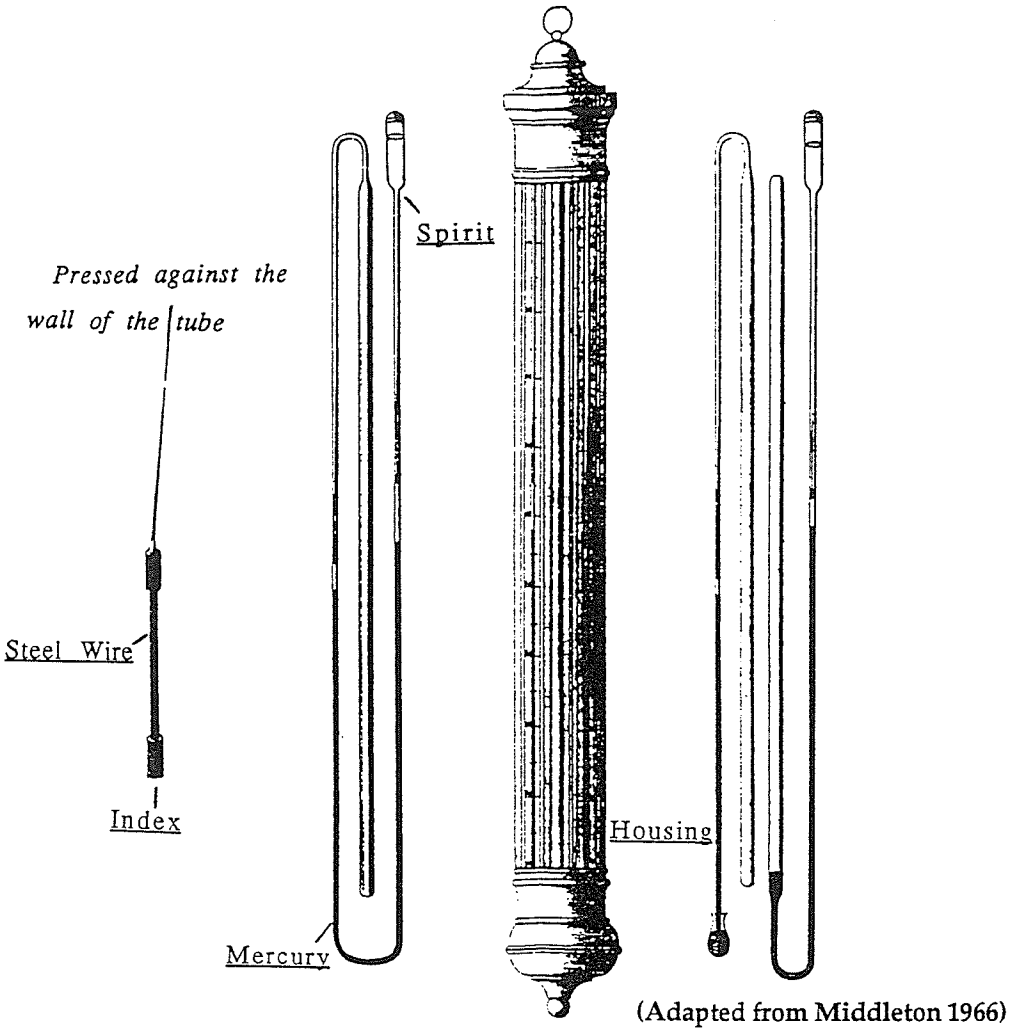
examples of poor quality weather measurements in the modern record. Furthermore, as compared to the nineteenth century (and earlier) HBC posts, there is relatively little supervision of Environment Canada personnel at many northern weather stations, and thus, human error in the modern record may be greater than we suspect.

Another problem with historical observation practice stems from the heat of the observer. The thermometer, particularly mercury, is very sensitive to heat from the observer's breath, body and touch, due to a shorter lag time (Wilson 1982:165). Therefore, fixed-hour readings, particularly with mercury thermometers, may have been affected. This problem is even more acute in cold weather and at night when a light, which is an additional heat source, is required (Wilson 1982:165). However, Wilson states that this error was minimized, since the fixed-hour readings were usually taken first, then the minimum and maximum readings (where applicable) were taken (Wilson 1982:165-166).

The historical mercury thermometer typically had a very small mercury column, and therefore had very small degrees printed next to it, as opposed to the larger spirit thermometers of the time (Wilson 1982:166). This would have made it more difficult for the observer to see the scale, especially in dim light or at night (Wilson 1982:166). Furthermore, Wilson notes that in the historical period, the mercury thermometer scale was usually marked every 5 °F, and therefore had to be "mentally divided" into whole degrees (Wilson 1982:166). This could have led to significant rounding errors. The angle at which a spirit or mercury thermometer was read may have also posed a problem (Wilson 1982:166). Unfortunately, it is nearly impossible to determine whether or not any of these types of errors even occurred, let alone to what degree. However, it is safe to assume that these errors did occur.

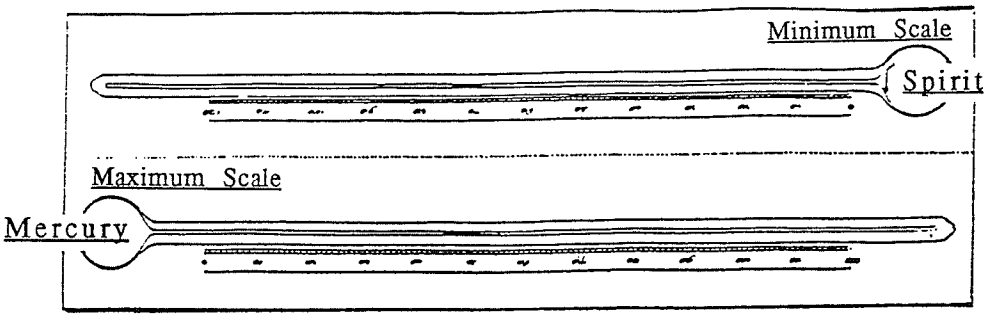
To conclude, Wilson states that the observations made at Whale River, Big River and Eastmain between 1814-21 were carefully taken and are "reliable and consistent within the limitations of the instrumentation, sites, instrument exposure and observing practices of the period" (Wilson 1982:204). Furthermore, Wilson states that when calibrated, the historical temperature

data are within "acceptable limits of error compared with the modern [temperature] series at Great Whale, Fort George and Eastmain" (Wilson 1982:204). Overall, Wilson believes that the temperatures of 1814-21 were generally cooler than those observed in the period of the modern record (Wilson 1982:204). In particular, the summers of 1816/17 were the coldest on record in this area (Wilson 1982:204). Wilson clearly indicates that much more archival research is needed in order to locate necessary information that describes the framework in which the observations were made. For example, written confirmation on the precise grouping of the buildings, the types of thermometers used and exact methods of exposure are vitally important to the process of accurately calibrating historical instrumental temperature data.



(Adapted from Middleton 1966)

Diagram A. James Six' Self-registering Maximum, Minimum Thermometer



(Adapted from Middleton 1966)

Diagram B. Rutherford's Thermometers

References

Middleton, W.E.K. 1966. A history of the thermometer and its use in meteorology. Baltimore: The John Hopkins Press.

Moodie, D.W. and A.J.W. Catchpole 1975. Environmental data from historical documents by content analysis: freeze-up and break-up of estuaries on Hudson Bay, 1714-1871. *Manitoba Geographical Studies* 5, Winnipeg: Department of Geography, University of Manitoba.

Wilson, C.V. 1982. *The summer season along the east coast of Hudson Bay during the nineteenth century. Report* 82-4. Downsview, Ontario: Canadian Climate Centre, Atmospheric Environment Service.

Manuscript Sources Cited

Hudson's Bay Company Archives (HBCA), Provincial Archives of Manitoba (PAM). Journal of Eastmain, 1810-1830, B.59/a/87-116.

APPENDIX F

Verbatim Transcriptions of Mid-Winter Thaws from Central Canadian HBC Post Journals (1794, 1795 and 1799)

SYNOPTIC WEATHER MAP DATA FOR CENTRAL CANADA: JAN. 9, 1794

Fort Albany

"Wind variable heavy Snow & Sleet" F:13

Brandon House

"Cold Weather" F:14

Buckingham House

"Wind W'ly a fresh Breeze with clear sharp weather." F:28

Cat Lake

"Wind N.W. with snow blows a storm." F:10d

Fort Churchill

"Strong Gales W'ly with snow & Drift" F:10d

Cumberland House

"Wind N West a strong Gale, overcast with Snow" F:21d

Eastmain

"Dark & cloudy a great quantity of Snow & Sleet the first part of the Day, the latter part rain, the first part of the Day Wind S.__at 6 P.M. it veared round to the NW. & blew a strong gale" F:16

Frederick House

(Jan. 8, F:9 "Wind South very mild soft Weather")

"Wind and Weather as Yesterday, with Rain the latter part" F:9d

Lac la Pluie

"Wind S.W. cloudy weather" F:12d

Moose Factory

"Wind S'ly thaw and rain." F:10

Neoskweskau

"Sharp drifty Weather, Wind W'ly" F:13

New Brunswick House

"Wind S.W. very mild cloudy weather with Rain in the Evening" F:12d

Nipigon House

"N wind warm wether" F:9

Osnaburgh House

"Wind N. cold weather" F:11d

Fort Pelly

"Wind SSE sharp weather" F:26

Portage de l'Isle

"Cold sharp weather" F:13

Red Lake

"Wind N. Clear Sharp Weather" F:6d

Fort Severn

"Wind W. and NW. strong gales with Snow and drift." F:22d

South Branch House

"a fresh Breeze N.W. clear sharp Weather" F:15

Swan River

"Wind Northerly a stiff breeze & clear sharp weather." F:10d

York Factory

"Strong gales N.W, with thick Drift Severe Thermom -42." F:13

SYNOPTIC WEATHER MAP DATA FOR CENTRAL CANADA: JAN. 21, 1794

Fort Albany

"Very mild weather with heavy rain in the Even'g. uncommon at this Season" F:14

Brandon House

"fine weather and calm" F:16

Buckingham House

(Jan. 20, F:29 "find clear weather")

"Wind W'ly a small breeze weather as before" F:29

Cat Lake

"Wind N.W. blows a storm" F:11

Fort Churchill

"Fresh breeze N'ly & drift bad Wr..." F:19d

Cumberland House

"Wind S. East a fresh Breeze thick overcast weather, with Rime." F:22d

Eastmain

"Gloomy & mild Weather - with much Rain, Wind East'ly" F:17d

Frederick House

"Wind SW rain most part of the Day" F:9d-10

Lac la Pluie

"Wind N.W. clear weather" F:13

Moose Factory

"Wind E.S.E. Cloudy weather much rain" F:10d

Neoskweskau

"Mild soft Weather, Wind S.E." F:13d

New Brunswick House

"Wind Easterly, very mild foggy weather and Rain most of the day" F:13

Nipigon House

"N wind snowd and blowd hard" F:9d

Osnaburgh House

"Wind N'ly clear sharp weather" F:12

Fort Pelly

"Wind S fine clear Weather" F:27d

Portage de l'Isle

"a fine day" F:13d

Red Lake

(Jan. 20, F:7 "Wind S.E. Clear Warm Weather")

"Wind and Weather as yesterday" F:7

Fort Severn

"wind W. and NW. strong gales with Snow and drift." F:22d

South Branch House

"a light Breeze N.W. Cloudy Weather" F:16

Swan River

"Wind North a small breeze & clear" F:11d

York Factory

"Wind N with Snow." F:13d

"Wind as before, Clear." F:13d

SYNOPTIC WEATHER MAP DATA FOR CENTRAL CANADA: JAN. 22, 1794

Fort Albany

"Wind NW, heavy Snow & Drift all day" F:14

Brandon House

no weather remark

Buckingham House

"Wind N.W. a fresh gale weather part Cloudy & part Clear." F:29d

Cat Lake

"Wind N sharp weather" F:11

Fort Churchill

"Mod breeze N'ly & fine clear day." F:10d

Cumberland House

"wind Easterly, a fresh Breeze. foggy weather with Rime falling." F:23

Eastmain

"The first of the Day: thick Fog with rain & warm, Wind variable but most inclinable to the East. __ the latter part of the Day sharp Freezing Weather with a fresh Breeze from the West with Snow & Drift." F:17d

Frederick House

"Wind NW cloudy moderate Weather." F:10

Lac la Pluie

"Wind S.W. Sharp weather" F:13

Moose Factory

"Wind N.W. snowed and blowed." F:11

Neoskweskau

"Warm Weather, with Rain - Wind Southerly" F:13d

New Brunswick House

"Wind Northerly blows fresh cloudy and Snow at times" F:13-13d

Nipigon House

"N wind Sharp Cold Wether." F:9d

Osnaburgh House

"Wind, Weather... as before." F:12

Fort Pelly

"AM calm PM strong Breezes N with snow." F:27d

Portage de l'Isle

"Wind, weather... as before" F:13d

Red Lake

"Wind, Weather... as yesterday" F:7

Fort Severn

"Wind NW a strong gale with snow and drift." F:24

South Branch House

"a.m. light airs variable with Snow, - P.M. a strong gale N.W. Cloudy cold Weather." F:16

Swan River

"Wind N.E. a small breeze with rainy weather" F:11d

York Factory

SYNOPTIC WEATHER MAP DATA FOR CENTRAL CANADA: JAN. 29, 1795

Abitibi Fort

"Wind East'ly, snow all day." F:13d

Fort Albany

"Wind variable Snow in the Afternoon"

Blood River

"Wind N.W. Clear Sharp Weather" F:?

Brandon House

"Wind N'ly blows fresh" F:13d

Cat Lake

"N wind Sharp Cold Weather" F:?

Fort Churchill

"Fresh breeze S'ly & overcast drifting Wr..." F:10

Cumberland House

"Wind N.W. a fresh gale clear & sharp." F:30

Eastmain

"Wind Southerly very mild thawing Weather and Snow at times"

Frederick House

"Wind E'erly with some light snow" F:14d

Gloucester House

(Jan. 28, F:9d "Wind SW, cloudy warm weather")

"Wind NW, as before" F:9d

Gordon House

"wind W.N.W. moderate breeze clear wea'r." F:16

Henley House

"Wind N W Snow all day" F:13

Kenogamissi

"Wind S.E. snow most of the day." F:23d

Martin Fall

"Wind Easterly, Cloudy weather" F:11

8 AM	Midday
+ 4	+ 4

Moose Factory

"Wind S'erly Soft snowey weather" F:13

Time	Bar.	Therm.
8 AM	29..50	31 +
4 PM	29..30	32 +

Nemiskaw

"wind S'ly a strong gale, with snow & Drift." F:10d

Neoskweskau

"A strong Breeze from the S.W. with thick showers of Snow." F:16d

New Brunswick House

"Wind E'ly, a heavy fall of Snow with thaw all Day, in the Evening strong Gale N.W." F:46

Nipawin

"a light Breeze W'ly part clear part Cloudy Weather." F:15d

Nipigon House

(Jan. 28, F:? "wind E'ly blows fresh")

"Wind and weather as before" F:?

Osnaburgh House

"Wind NW. clear and sharp" F:21

Portage de l'Isle

"Wind N, mod. weather" F:10

Reed Lake

"Wind Westerly a fresh gale clear and sharp" F:22

Time	Temp.	Wind Dir.	Wea. Rem.	Wind Force
7:30 AM	- 8	West	Clear	X 2
NOON	13	West	Clear	X 2
9:00 PM	13	West	Clear	X 2

Rupert House

"Wind S. & S.E. with Snow" F:11d

Fort Severn

(Jan. 27, F:21 "wind variable pleasant weather")

(Jan. 28, F:21 "a continuance of fine pleasant clear weather.")

"wind, weather... the same as yesterday" F:21

Shell River

"Sharp day, indeed"

Somerset House

"Wind S.west a moderate Breeze, with fine mild weather." F:23

Swan River

"wind Easterly a stiff Breeze with fine clear weather." F:14

York Factory

(Jan. 28, F:10d "Wind NW clear Sharp weather")

"Wind and weather as yesterday" F:10d

SYNOPTIC WEATHER MAP DATA FOR CENTRAL CANADA: JAN. 13, 1799

Abitibi Fort

"Wind E clear fine weather." F:10

Fort Albany

"Wind SW fine Weather." F:8d

Fort Alexander

"fine Clear weather" F:13d

Ash Fall

"Wind N.W. cloudy weather" F:8

Brandon House

"Wind S.W. fine weather" F:19d

Buckingham House

"Wind South'ly moderate breezes fine mild Weather. Inclinable to Snow" F:22d

Cumberland House

"Light breezes at WSW & warm." F:17d

Duck Lake

(Jan. 11, F:12 "pleasant Wr.")

"Wr as before." F:12

Eastmain

(Jan. 12, F:11d "wind Southerly, fine day")

"wind & weather the same as yesterday" F:11d

Escabitchewan

no weather remark

Henley House

"Wind North fine weather" F:10d

Kenogamissi

(Jan. 12, F:44 "Wind W clear fine weather.")

"Wind and weather as yesterday."

Martin Fall

"Wind S'ly warm weather, warm Weather & clear." F:26d

Michipicoten

"Var'ble wind from N to S. cloudy mild day." F:10

Moose Factory

"Wind Southerly fine clear mild Weather." F:13

Time	Bar.	Therm.
9:15 AM	30..66	9 -
NOON	30..60	1.5 +
9:00 PM	30..33	2 +

Nemiskaw

"Wind Variable clear sharp Weather." F:10

Neoskweskau

"Wind Southerly fine Weather" F:11d

New Brunswick House

"Wind S.W. clear weather." F:28d

Nipigon House

"Wind calm fine weather" F:12

Norway House

(Jan. 12, F:14 "Fresh gales at S fine Clear weather")

"Wind and Weather as yesterday" F:14

Oxford House

"Wind S.W. clear pleasant weather" F:12d

Rupert House

"Wind S'erly clear pleasant weather" F:9

Sandy Lake

"fine weather" F:8

Setting River

"light Airs S'ly clear thawing weather" F:16d

Fort Severn

"S.S.W. a fresh Breeze with a little Snow." F:24

York Factory

"pleasant Clear Weather Wind variable" F:21

SYNOPTIC WEATHER MAP DATA FOR CENTRAL CANADA: JAN. 14, 1799

Abitibi Fort

"Wind W cloudy mild weather" F:10

Fort Albany

"Wind & Weather as yesterday" F:8d

Fort Alexander

"fine weather" F:13d

Ash Fall

"Wind North with snow all day" F:8

Brandon House

"Wind N'ly very warm weather" F:19d

Buckingham House

"Wind & weather as yesterday" F:22d

Cumberland House

"Fine warm pleasant weather." F:17d

Duck Lake

"Wr as above." F:12

Eastmain

"wind Southerly fine day." F:11d

Escabitchewan

no weather remark

Henley House

"Wind SW fine weather" F:10d

Kenogamissi

"Wind N cloudy and sunshine at times." F:44

Martin Fall

"Wind W'ly weather overcast." F:26d

Michipicoten

"N'ly wind A.M, West'ly P.M, cloudy mild weather." F:10d

Moose Factory

"Wind S.W. & W'ly fore part clear latter part Cloudy." F:13

Time	Bar.	Therm.
7:30 AM	30..22	7 +
NOON	30..27	13.5 +
9:00 PM	30..27	16 +

Nemiskaw

"Wind variable mild Cloudy weather." F:10

Neoskweskau

"D'o wind & Weather." F:11d

New Brunswick House

"Wind S'ly, mild clear weather" F:28d

Nipigon House

"Wind and weather as yesterday" F:12

Norway House

"Fresh breezes at PM fine Clear Weather" F:14

Oxford House

"Wind Variable. Weather the same as yesterday" F:12d

Rupert House

"Wind S.W. clear pleasant weather." F:9d

Sandy Lake

"Wind SW. fine Weather." F:8

Setting River

"light Airs SW. cloudy thawing Weather" F:16d

Fort Severn

"Wind S.S.W. a fresh Breeze with remarkable mild weather." F:24

York Factory

"Mild Cloudy Weather Wind SSE a fresh Breeze." F:21

SYNOPTIC WEATHER MAP DATA FOR CENTRAL CANADA: JAN. 15, 1799

Abitibi Fort

"Wind S fine weather" F:10

Fort Albany

"Wind variable mild Weather" F:9

Fort Alexander

"fine moderate weather" F:13d

Ash Fall

"Wind and weather as yesterday" F:8

Brandon House

"Wind N.E. warm weather" F:19d

Buckingham House

"Wind S West moderate Breezes fine clear mild weather." F:23

Cumberland House

"Light airs at SW. Clear & thawed much." F:20

Duck Lake

"pleasant Weather" F:12

Eastmain

"wind variable Westerly fine day." F:12

Escabitchewan

"Fine weather" F:7

Henley House

"Wind as before soft weather" F:10d

Kenogamissi

"Wind W mild weather." F:44

Martin Fall

"Wind S'ly very warm clear Weather" F:26d

Michipicoten

"S'ly wind, fine clear warm weather." F:10d

Moose Factory

"Wind S.W. & W'ly very fine Weather." F:13

Time	Bar.	Therm.
8:00 AM	30..22	28 +
NOON	30..27	34 +
9:00 PM	30..27	28 +

Nemiskaw

"Wind Westerly mild weather." F:10

Neoskweskau

"Wind & Weather as yesterday." F:11d

New Brunswick House

"Wind S'ly, mild Weather, thaw most of the day" F:28d

Nipigon House

"Wind S. warm weather" F:12

Norway House

"Wind and weather as yesterday" F:14

Oxford House

"Wind variable pleasant mild weather" F:12d

Rupert House

"Wind Westerly mild weather" F:9d

Sandy Lake

"Wind & weather as yesterday" F:8

Setting River

"Wind and Weather as yesterday." F:16d

Fort Severn

"Wind, weather... as yesterday." F:24

York Factory

"Clear pleasant Weather. Wind E'ly" F:21d

SYNOPTIC WEATHER MAP DATA FOR CENTRAL CANADA: JAN. 16, 1799

Abitibi Fort

"Wind and Weather as yesterday" F:10

Fort Albany

"Wind S'ly Soft Weather." F:9

Fort Alexander

"Snowing weather" F:13d

Ash Fall

"Wind N.W. clear Sharp weather" F:8

Brandon House

"Wind N.E. a little Snow" F:19d

Buckingham House

"Wind variable Strong Breezes thick Drift & Snow" F:23

Cumberland House

"Cold weather with a strong gale at NW." F:20

Duck Lake

"pleasant Wr" F:12

Eastmain

"Wind Southerly very mild fine day." F:12

Escabitchewan

"Snowing most part of the day" F:7

Henley House

"Wind as before soft weather" F:10d

Kenogamissi

"Wind and weather as yesterday." F:44

Martin Fall

"Wind South very warm weather, Rain in the evening" F:26d

Michipicoten

"Wind & Wea. as yesterday." F:10d

Moose Factory

"Wind S.W. warm weather." F:13d

Time	Bar.	Therm.
7:30 AM	30..27	26.5 +
NOON	30..33	32.5 +

Nemiskaw

"Wind S.W. cloudy mild weather." F:10

Neoskweskau

"Wind Southerly quite warm Weather" F:11d

New Brunswick House

"Wind & Weather as yesterday" F:28d

Nipigon House

"Wind calm rainy weather" F:12

Norway House

"Wind Northerly fresh gales and Cloudy weather with Snow in the Morning" F:14

Osnaburgh House

"Wind S.E. Soft weather" F:12

Oxford House

"wind as yesterday" F:13

Rupert House

"Wind & weather as yesterday." F:9d

Sandy Lake

"Wind W. fine weather" F:8

Setting River

"light Airs W'ly cloudy warm Weather" F:16d

Fort Severn

"Wind and weather as yesterday." F:24

York Factory

"Thick Snow & Drift all Day _ Wind N." F:21d

SYNOPTIC WEATHER MAP DATA FOR CENTRAL CANADA: JAN. 17, 1799

Abitibi Fort

"Wind SE cloudy mild day" F:10

Fort Albany

"Wind & Weather as yesterday" F:9

Fort Alexander

"Snowing weather" F:13d

Ash Fall

"Wind South East with snow all day." F:8

Brandon House

"Wind N.W warm weather" F:20

Buckingham House

"Wind West'ly Stiff Breezes, cold clear Weather." F:23

Cumberland House

"Fresh breezes at SE & overcast" F:20

Duck Lake

"Wr. as before" F:12

Eastmain

"Wind Variable Easterly mild with a little Snow." F:12

Escabitchewan

"Snowin[g] all day" F:7

Henley House

"Wind as before soft weather" F:10d

Kenogamissi

"Wind variable fine day." F:44

Martin Fall

"Wind NE heavy Snow all day" F:26d

Michipicoten

"Varble winds from N. to S. cloudy mild thawing weather" F:10d

Moose Factory

"Wind NE thaw in the morn'g which prevented Dunnett & C [from] setting off." F:13d

Time	Bar.	Therm.
8:15 AM	30..27	32 +
NOON	30..33	29 +
9:00 PM	30..33	26 +

Nemiskaw

"D'o wind & weather." F:10

Neoskweskau

"Wind southerly warm Weather." F:12

New Brunswick House

"Wind S'ly, mild thawing Weather." F:28d

Nipigon House

"Wind S'ly foggy weather" F:12

Norway House

"Wind N.E. gentle breezes fine Clear weather" F:14

Oxford House

"wind and weather as yesterday" F:13

Rupert House

"Calm soft weather. Rain at times" F:9d

Sandy Lake

"Wind & weather as yesterday" F:8

Setting River

"Wind, Weather... as yesterday" F:16d

Fort Severn

"Wind N.W. fine weather."

York Factory

"Clear fine Weather Wind variable" F:21d

SYNOPTIC WEATHER MAP DATA FOR CENTRAL CANADA: JAN. 18, 1799

Abitibi Fort

"Wind E with rain all day" F:10

Fort Albany

"Wind S rain in the Evening" F:9

Fort Alexander

"Snowing weather" F:31d

Ash Fall

"Wind easterly cloudy sharp weather" F:8

Brandon House

"Wind N.ly cloudy warm weather" F:20

Buckingham House

"Wind South'ly moderate Breezes, Weather fore part clear, latter Overcast Inclinable to Snow." F:23

Cumberland House

"Light breezes at WNW Clear weather" F:18

Duck Lake

"Wr. as yesterday" F:12d

Eastmain

"Wind Easterly, very mild with rain at times" F:12

Escabitchewan

"warm weather" F:7

Henley House

"Wind SW rain all day" F:11

Kenogamissi

"Wind and weather as yesterday with Rain the latter part" F:10

Martin Fall

"Wind SE rain & sleet all day" F:26d

Michipicoten

"Var'ble wind, thawing weather, rained all day" F:10d

Moose Factory

"Wind S.S.E., Cloudy mild weather, the Weather was too warm again for the People setting off for Han Bay" F:13d

Time	Bar.	Therm.
7:30 AM	30..22	31 +
NOON	30..27	35 +
9:00 PM	30..27	38 +

Nemiskaw

"A strong wind S.W Cloudy mild weather." F:10

Neoskweskau

(Jan. 17, F:12 "Wind Southerly warm Weather")

"Wind & Weather as before, it being so very mild has prevented my sending to the Factory." F:12

New Brunswick House

(Jan. 17, F:29 "Wind S'ly, mild thawing weather.")

"Wind & Weather as before, a little rain."

Nipigon House

"Wind variable mild weather" F:12

Norway House

"Wind Southerly fresh breezes and Cloudy Weather." F:14

Osnaburgh House

"Wind S.W. cloudy Soft weather" F:12d

Oxford House

"wind west Dark Cloudy weather." F:13

Rupert House

"Wind S'erly soft weather." F:9d

Sandy Lake

"fine Weather" F:8

Setting River

"Wind and Weather as before" F:16d

Fort Severn

"Wind S.E. a gentle Breeze and fine Weather" F:24d

York Factory

(Jan. 17, F:21d "Clear fine Weather Wind variable")

"Wind Weather... much the same as Yesterday." F:21d-22

SYNOPTIC WEATHER MAP DATA FOR CENTRAL CANADA: JAN. 19, 1799

Abitibi Fort

"Wind and weather as yesterday" F:10

Fort Albany

"Wind & weather as yesterday" F:9

Fort Alexander

"fine weather" F:31d

Ash Fall

"Wind South W. cloudy weather" F:8

Brandon House

"Wind W.ly fine weather" F:20d

Buckingham House

"Wind & Weather the same as Yesterday." F:23

Cumberland House

"Light breezes at SE with Snow" F:18

Duck Lake

"Snowy Wr." F:12d

Eastmain

"Wind Southerly much rain very mild weather" F:12d

Escabitchewan

"fine weather" F:7

Henley House

"Wind South rain all day" F:11

Kenogamissi

"Wind and Weather as Yesterday" F:10

Martin Fall

"Wind and Weather as yesterday" F:26d

Michipicoten

"wind & Wea. as yesterday" F:10d

Moose Factory

"Wind SW Cloudy thawing Weather" F:13d

Time	Bar.	Therm.
NOON	30..11	36 +
9:00 PM	30..11	35 +

Nemiskaw

"D'o wind & Weather." F:10d

Neoskweskau

"D'o Wind, Weather" F:12

New Brunswick House

"wind S'ly, cloudy with rain at times, thaw day and night, being remarkable weather for the Season." F:29

Nipigon House

"Wind and weather as yesterday" F:12

Norway House

"wind Northerly Gentle breezes Fine Clear weather" F:14d

Oxford House

"wind variable pleasant weather" F:13

Rupert House

"Wind & Weather as before" F:9d

Sandy Lake

"Wind S. warm weather." F:8

Setting River

"a fresh Breeze N.W. cloudy Weather" F:16d

Fort Severn

"Wind S.E. a gentle Breeze with a little Snow." F:24d

York Factory

"Thick Snowy Weather, Wind N." F:22

SYNOPTIC WEATHER MAP DATA FOR CENTRAL CANADA: JAN. 20, 1799

Abitibi Fort

"wind and weather as before" F:10

Fort Albany

"Wind SE Sleet and rain all day" F:9

Fort Alexander

"Windy weather" F:31d

Ash Fall

"Wind Westerly clear Sharp weather" F:8

Brandon House

"Wind N.W. fine weather" F:20d

Buckingham House

"Wind & Weather the same as Yesterday." F:23

Cumberland House

"Light breezes at WNW with thick rime" F:18

Duck Lake

"Clear Wr." F:13

Eastmain

"wind Southerly rain most part of the day" F:12d

Escabitchewan

"fine weather" F:7

Henley House

"Wind NW snow all day" F:11

Kenogamissi

"Wind S.W. began to freeze again at daylight this morning" F:10

Martin Fall

"Wind N heavy snow & drift all day blows very strong" F:26d

Michipicoten

"heavy gales at WNW; with snow and sleet." F:10d

Moose Factory

"Wind SE and S'ly blow'd fresh rapid thaw, with rain" F:13d

Time	Bar.	Therm.
9:00 AM	30..00	35 +
NOON	30..00	36 +
9:00 PM	30..00	14.5 +

Nemiskaw

"A strong gale N.W. snow and drift." F:10d

Neoskweskau

"D'o Wind & Weather, rather uncommon for it to continue so long mild at this time of the year." F:12

New Brunswick House

"Wind S.W. Snowed and began to freeze" F:29

Nipigon House

"Wind N. Clear weather" F:12

Norway House

"Wind and Weather as yesterday" F:14d

Oxford House

"Wind N.W., sharp clear weather" F:13

Rupert House

"Wind S'erly remarkable warm fine day." F:9d

Sandy Lake

"Wind N Cold weather" F:8

Setting River

"Wind and Weather as yesterday" F:17

Fort Severn

"Wind N.W. a strong Gale with snow and drift." F:24d

York Factory

"Thick Rimy Weather, Wind N.W." F:25

PROVINCIAL ARCHIVES OF MANITOBA JOURNAL AND MICROFILM NUMBERS OF HBC POST JOURNALS USED FOR THEIR CLIMATIC INFORMATION

1794	POST JOURNAL #/ MICROFILM #	1795	POST JOURNAL #/ MICROFILM #
		Abitibi Fort	B.1/a/1, IM1
Fort Albany	B.3/a/95, IM8	Fort Albany	B.3/a/96, IM9
		Blood River House	B.254/a/1, IM16
Brandon House	B.22/a/1, IM16	Brandon House	B.22/a/2, IM16
Buckingham House	B.24/a/2, IM18		
Cat Lake House	B.30/a/5, IM20	Cat Lake House	B.30/a/6, IM20
Fort Churchill	B.42/a/119, IM33	Fort Churchill	B.42/a/121a, IM33
Cumberland House	B.49/a/25a,b, IM39	Cumberland House	B.49/a/26, IM39
Eastmain	B.59/a/70, IM46	Eastmain	B.59/a/71, IM46
Frederick House	B.75/a/9, IM54	Frederick House	B.75/a/10, IM54
		Gloucester House	B.78/a/22, IM57
		Gordon House	B.81/a/1, IM58
		Henley House	B.86/a/50, IM62
		Kenogamissi	B.99/a/1, IM66
Lac la Pluie	B.105/a/1, IM67		
		Martin Fall	B.123/a/1, IM74
Moose Factory	B.135/a/80, IM89	Moose Factory	B.135/a/82, IM89
		Nemiscaw	B.142/a/1, IM97
Neoskweskau	B.143/a/1, IM97	Neoskweskau	B.143/a/2, IM97
New Brunswick House	B.145/a/8, IM99	New Brunswick House	B.145/a/9, IM99
		Nipawin House	B.148/a/1, IM102
Nipigon House	B.149/a/2, IM102	Nipigon House	B.149/a/3, IM102
Osnaburgh House	B.155/a/9a, IM111	Osnaburgh House	B.155/a/10, IM112
Fort Pelly	B.159/a/1, IM116		
Portage de l'Isle	B.166/a/1, IM119	Portage de l'Isle	B.166/a/3, IM119
Red Lake House	B.177/a/4, IM119		

		Reed Lake House	B.178/a/1, IM120
		Rupert House	B.186/a/11, IM124
Fort Severn	B.198/a/45, IM134	Fort Severn	B.198/a/46, IM134
		Shell River House	B.199/a/1, IM139
		Somerset House	B.203/a/1, IM143
South Branch House	B.205/a/8, IM144		
Swan River House	B.213/a/5, IM144	Swan River House	B.213/a/6, IM144
York Factory	B.239/a/96, IM161	York Factory	B.239/a/97, IM161

1799	POST JOURNAL #/ MICROFILM #
Abitibi Fort	B.1/a/4, IM1
Fort Albany	B.3/a/102, IM9
Fort Alexander	B.4/a/2, IM13
Ash Fall	B.7/a/1, IM14
Brandon House	B.22/a/6, IM17
Buckingham House	B.24/a/6, IM18
Cumberland House	B.49/a/29, IM40
Duck Lake House	B.54/a/1, IM41
Eastmain	B.59/a/76, IM46
Escabitchewan	B.64/a/4, IM52
Henley House	B.86/a/54, IM63
Kenogamissi	B.99/a/5, IM66
Martin Fall	B.123/a/5, IM74
Michipicoten	B.129/a/3, IM79
Moose Factory	B.135/a/86, IM90
Nemiscaw	B.142/a/5, IM97
Neoskweskau	B.143/a/6, IM98
New Brunswick House	B.145/a/13, IM99
Nipigon House	B.149/a/7, IM103
Norway House	B.154/a/3, IM106

Osnaburgh House	B.155/a/14, IM112
Oxford House	B.156/a/1, IM115
Rupert House	B.186/a/15, IM124
Sandy Lake House	B.192/a/1, IM131
Setting River House	B.197/a/1, IM131
Fort Severn	B.198/a/50, IM135
York Factory	B.239/a/103, IM161

Date	Fort Albany	Moose Factory	Eastmain
1738	J10,J22	MISSING	D30,J1,J6,J7,J11, J18,J22
1742	D30,D31,J19	J10	D31
1744	J5,J6	J6	J6
1745	J8,J9,J10,J11,J12	J11	J11
1749	J21,J22	J21	nil
1750	nil	nil	J1,J10,J11,J12
1751	J14,15	J2,J10,J11,J12,J13,J14 J15,J16,J17	nil
1753	J22,J23,J24,J25,J26 J29,J30	J29,J30	J30
1755	nil	J28 (close enough)	J29,F2
1756	J29,J30	J29,J30	J29,J30
1760	F3	F3	nil
1762	J5,J15	J10,J11,J12	J5,J11,J15
1764	J13,J18	J13,J18,J19	J13,J14,J18,J19,J20
1766	nil	J19,J20	J20
1768	nil	F1	F1
1769	J27	J27	nil
1770	nil	J27	J27
1771	J8	J9,J12	J9,J12
1774	nil	F2,F3	nil
1775	J23,J24	J3,J9,J23,J25,F1	nil
1777	J16,J30,J31,F2	J23,J24,J31,F1,F2	J23
1779	J30	J5,J30	J6,J30
1782	nil	J5 (till noon)	J3 (close enough)
1786	J28,J29	J28,J29	nil
1794	J9,J21	J9,J21	J9,J21,J22
1795	nil	J29	J29
1799	J18,J19,J20	J10,J15,J16,J17,J18, J19,J20	J18,J19,J20
1815	nil	J18,J19	nil
1819	nil	J11	J10,J11
1824	J23,J24,J25	nil	nil
1826	J9,J10,J11	J8,J9,J10	GAP
1829	J15,J22	J15	nil
1832	J17,J18,J19,J20,J21	J8,J14,J15,J16,J17,J18 J19,J21,J23	MISSING
1836	J7,J8	J7,J8	nil

1838	J5	J5	MISSING
1839	J6	J6,J25	MISSING
1843	J6,J9,J16,J17,J18, J19,J20,J21	MISSING	MISSING
1845	J22,J23	nil	MISSING
1853	J5,J6	J6,F1	MISSING
1855	J3,J7	J3,J6,J7	MISSING
1858	nil	J23,J24	MISSING
1859	J20	J20	MISSING
1860	J24	J21,J23,J24	MISSING
1863	J3,J4	J4	MISSING
1866	J11,J12,J13,J17,J31	MISSING	MISSING
1876	J17,J18	MISSING	MISSING
1877	J28,J29,J30,F3	MISSING	MISSING
1878	nil	J12,J18,J19	MISSING
1895	nil	GAP	J21,J22
1902	nil	J7,J8,J9	J9
1908	J7,J21	MISSING	J21
1921	J20	J20	GAP
1939	J5	J5,J6	J6
TOTAL THAW DAYS:	**96**	**101**	**50**

Table A10. Major Thaw Events* at Fort Albany, Moose Factory and Eastmain, 1737-1941

* These are thaws that lasted more than one day and/or occurred at more than one of the three posts.