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GREAT LAKES DEGREE-DAY AND WINTER SEVERITY INDEX UPDATE: 1897-1983

Raymond A. Assel

Great Lakes Environmental Research Laboratory
Ann Arbor, Michigan
May 1986

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Available from: National Snow and Ice Data Center/CIRES
Box 449, University of Colorado
Boulder, CO 80309.

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GREAT LAKES DEGREE-DAY AND WINTER SEVERITY INDEX UPDATE: 1897-1983*

Raymond A. Assel

ABSTRACT. Daily maximum and minimum temperatures at 25 stations on the perimeter of the Great Lakes for the winters of 1977-1983 are used to calculate freezing degree-days and thawing degree-days. Daily, weekly, and monthly FDD's and daily TDD's for those years are presented in microfilm appendixes, which are available from the National Snow and Ice Data Center located in Boulder, Colorado. This report also updates an 80-winter FDD climatology and presents tabulations of the seasonal maximum FDD's and TDD's for each of the 86 winters and 87 summers between 1897 and 1983. The maximum FDD's are used to revise winter severity class limits developed in an earlier study and to identify those winters with above and below normal severity over the 86-winter base period. The period of the update is remarkable in that it contained some of the most severe and most mild winters of the 86-year base period.

1. INTRODUCTION

Freezing degree-days (FDD) and thawing degree-days (TDD) are used in the simulation of ice growth and ice decay (for example see Hinkel, 1983; Shen and Yapa, 1983; and Richards, 1963). FDD's are defined as the departure of the mean daily air temperature from 0°C. Temperatures below 0°C are given a positive algebraic sign and temperatures above 0°C are given a negative sign. The cumulative value of FDD's on a given date in the winter is dependent on the start date of the accumulation and mean daily air temperatures from that date. The convention used here is to start the accumulation on the first day after 1 October that the mean daily air temperature falls below 0°C and to continue the accumulation to 30 April of the following year, for a given winter season. If the cumulative FDD value becomes negative on a given date owing to a period of above 0°C temperature, the cumulative value is set to zero and a new FDD summation is started the next day. In a similar manner TDD's are defined as the departure of the mean daily air temperature from 0°C only now temperatures below 0°C are given a negative algebraic sign and temperatures above 0°C are given a positive algebraic sign. In this report TDD accumulations are started on 1 March and continued to 31 December. If the cumulative TDD value becomes negative on a given date owing to a period of below 0°C temperature, the cumulative value is set to zero and a new TDD summation is started the next day.

FDD's are also used as in index of winter severity (Assel, 1980b), and are currently used by the National Weather Service (NWS) and the U.S. Army Corps of Engineers (COE) as input data in making forecasts of ice conditions on the St. Marys River and by the NWS as an aid in making 30-day ice cover outlooks for the Great Lakes (personal communications, COE-Detroit and NWS-Ann Arbor). The purpose of this report is to update the 80-winter degree-day

*GLERL Contribution No. 490.

climatology described in Assel (1980a) and the winter severity index based on that climatology (Assel 1980b). Tabulations of seasonal maximum FDD's and TDD's are presented for the 86 winters and 87 summers between 1897 and 1983, and new class limits for Assel's winter severity index are presented. However, it was not possible to maintain station continuity for Escanaba and Bay City, Michigan, and Parry Sound, Ontario. The Bay City station was closed. Temperature data were not available for portions of 1977, 1978, and 1979 for Parry Sound and portions of 1978, 1979, and 1980 for Escanaba. (Proxy data from nearby stations were used for these three stations, and monthly mean temperatures were compared to evaluate temperature differences.) Daily, weekly, and monthly FDD's and daily TDD's were calculated for the years of 1977 through 1983, and these data are given in microfilm appendices, which are available from the National Snow and Ice Data Center/Cooperative Institute for Research in Environmental Sciences (NSIDC/CIRES--address given on p. iii of this report).

2. DATA AND COMPUTATIONAL PROCEDURES

Daily mean air temperatures were calculated from daily maximum and minimum values, for stations shown in Figure 1 and listed with abbreviations in Table 1. Data were abstracted from climatic publications (a summary of meteorological data by state for Minnesota, Michigan, Wisconsin, Illinois, Ohio, Pennsylvania, and New York published by the U.S. Department of Commerce

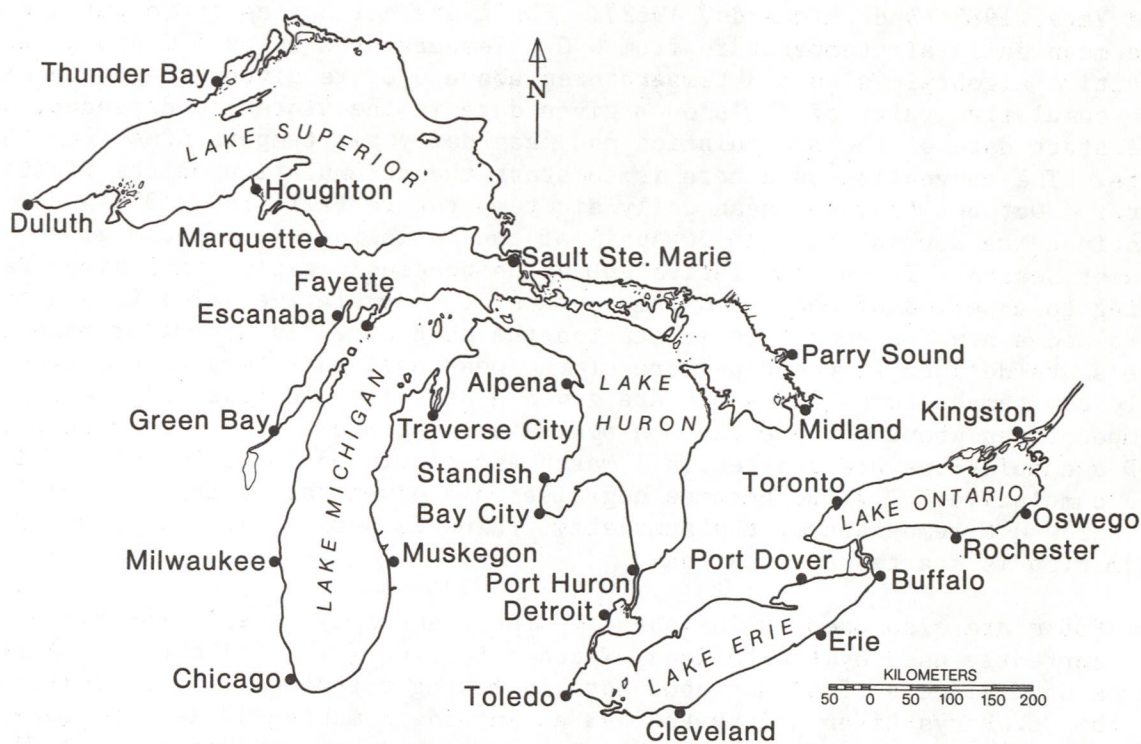


Figure 1.--Location map of temperature stations.

Table 1.-- Temperature stations used for 1977-1983
degree-day calculations

Abbreviation	Location
<u>Lake Superior (SUP)</u>	
FTW	Thunder Bay-Fort William, Ont.
HOU	Houghton, Mich.
DUL	Duluth, Minn.
MQT	Marquette, Mich.
SSM	Sault Ste. Marie, Mich.
<u>Lake Michigan (MIC)</u>	
ESC	Escanaba, Mich. *
TVC	Traverse City, Mich.
GB	Green Bay, Wis.
MSK	Muskegon, Mich.
MIL	Milwaukee, Wis.
CHI	Chicago, Ill.
<u>Lake Huron (HUR)</u>	
PAS	Parry Sound, Ont. **
ALP	Alpena, Mich.
STN	Standish, Mich. ***
PTH	Port Huron, Mich.
<u>Lakes St. Clair-Erie (ERI)</u>	
BUF	Buffalo, N.Y.
PTD	Port Dover, Ont.
DET	Detroit, Mich.
ERI	Erie, Pa.
TOL	Toledo, Ohio
CLV	Cleveland, Ohio
<u>Lake Ontario (ONT)</u>	
KIN	Kingston, Ont.
TOR	Toronto, Ont.
OSW	Oswego, N.Y.
ROC	Rochester, N.Y.

* Supplemented with data from Fayette, Mich., for years 1978-1980.

** Replaced by data from Midland, Ont., for years 1977-1979.

*** STN (Standish, Mich.), replaced BCI (Bay City, Mich.) for update period of 1978-1983.

and from Monthly Record Meteorological Observations in Canada published by Fisheries and Environment, Canada). In cases of missing temperature data, direct substitution was made from a proxy station. Proxy stations and their respective periods of record are indicated in the footnotes of Table 1. Comparison was made of mean monthly temperatures for original and proxy stations for a 10-year base period (1960-1969) over the months of October-April. FDD's were compiled over these months. A different and smaller base period (1975-1983, excluding 1978 and 1979) was used for Parry Sound because of the lack of temperature data at the proxy station (Midland, Ontario) during the base period used at the other two stations. Analysis of these data shows that the average difference between proxy and original station monthly temperature is about 1°C for Parry Sound and Bay City and near 0.5°C for Escanaba (Figure 2 and Table 2). No adjustments were made to the daily temperatures at proxy stations on the basis of this analysis, as the main purpose was to identify in qualitative terms the differences between proxy and original station temperature data.

A daily running sum of FDD's was calculated between October 1 and April 30 for winters. This running sum is a measure of the cumulative departure of the mean daily air temperature below 0°C. The calculation is based on equation (1); if the sum became negative, a new sum was started on the next day:

$$FDD_j = \sum_{i=Oct. 1}^{Apr. 30} -T_i, \quad (1)$$

where

FDD_j = daily running sum on day j , where October 1 $\leq j \leq$ April 30 and

$$T_i = \frac{(\max + \min) \text{ temperature } (^{\circ}C)}{2}.$$

Tabulations of the daily running sums were generated for daily, weekly, and monthly time increments. In addition, the FDD accumulation during each weekly and monthly time increment was also calculated. Finally, the maximum FDD value for each winter season and the date on which it occurred (FDD-date) were tabulated.

A daily running sum of thawing degree-days was calculated between March 1 and December 31 each year. In this case the running sum is a measure of the cumulative departure of the mean daily air temperature above 0°C. The calculation is based on equation (2); if the sum became negative, a new sum was started the next day:

$$TDD_j = \sum_{i=Mar. 1}^{Dec. 31} (T_i), \quad (2)$$

where

TDD_j = daily running sum of day j , March 1 $\leq j \leq$ December 31,
and T_i is the same as in equation (1).

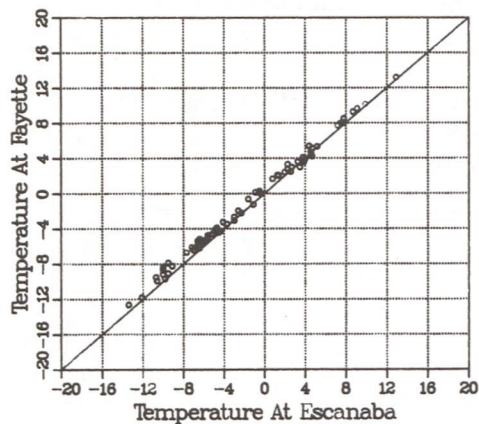


Figure 2a.--Monthly average temperature ($^{\circ}\text{C}$) comparisons between Escanaba and Fayette, Michigan, for the months of October through April 1960-1969.

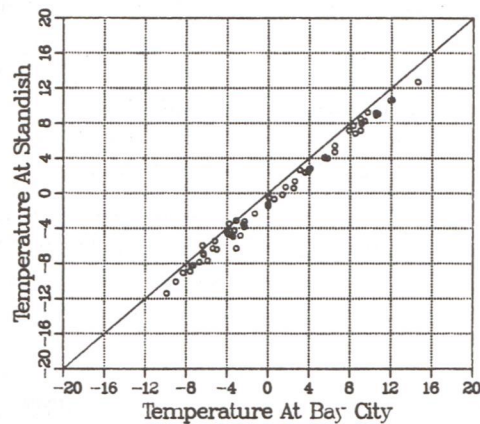


Figure 2b.--Monthly average temperature ($^{\circ}\text{C}$) comparisons between Bay City and Standish, Michigan, for the months of October through April 1960-1969.

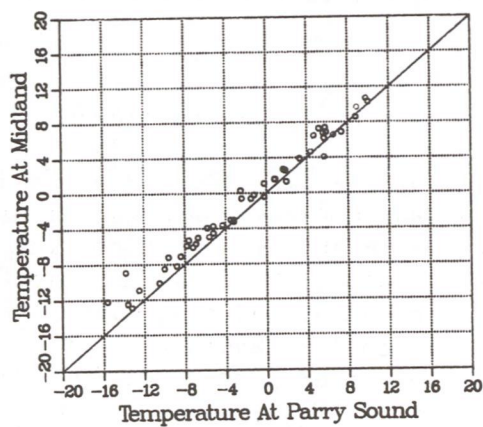


Figure 2c.--Monthly average temperature ($^{\circ}\text{C}$) comparisons between Parry Sound and Midland, Ontario, for the months of October through April 1975-1983.

Table 2.--Average difference in monthly temperatures
between original and proxy stations

Original	Proxy	Base period	Difference(°C)
Escanaba	Fayette	1960-1969	-0.54
Bay City	Standish	1960-1969	1.16
Parry Sound	Midland	1975-1983*	-1.02

* Excluding 1978 and 1979, because no data were available at Parry Sound for portions of those years.

3. SUMMARY OF RESULTS

3.1 Seasonal FDD and TDD Distribution

The analysis described in section 2 produced 46 pages of tabulations per station, or more than 1,000 pages for the stations given in Table 1. These products are given in the microfilm appendixes of this report and include daily, weekly, monthly, and seasonal maximum values for FDD's, and daily and seasonal maximum values of TDD's. These data are given in both degrees Fahrenheit and Celsius. The microfilm appendixes are not included here, but they are available from NSIDC (see p. iii of this report). The tabular products (in the same sequence as in the microfilm appendixes) are summarized in Table 3. Seasonal maximum FDD's and julian date of maximum FDD's for the 86-year period 1898-1983 are given in chronological order in Appendix A and Appendix B, respectively. Similarly seasonal maximum TDD's and julian dates of maximum TDD's for the 87-year period 1897-1983 are given in Appendix C and Appendix D, respectively.

3.2 Winter Severity Index

Assel (1980b) defined a winter severity index based on the cumulative frequency distribution function (CDF) of the seasonal maximum FDD's over the base period 1897-1977 as shown in the first two columns of Table 4. Winter severity class ranks (third column of Table 4) and limits were calculated for the base period 1898-1983. These revised class limits are summarized for all stations on the perimeter of each lake and are given at the bottom of Appendix E and Appendix F. The upper portion of Appendix E summarizes the rank and value of seasonal maximum FDD's and associated year of occurrence for the 86 winters, and the upper portion of Appendix F summarizes the rank and value of julian dates for the occurrence of the maximum FDD and associated year of that rank. Winters between rank 18 and 69 are classified as normal, whereas winters ranked below rank 69 are classified as below normal and winters with rank above 18 are classified as above normal.

Table 3.--Sequence and description of data in microfilm appendixes

Step	Description										
1.	Seasonal tabulations of daily running TDD accumulations alternating with seasonal running FDD accumulations. There are 7 or 8 TDD seasons starting in 1976 or 1977 and 6 or 7 FDD seasons starting in the winter of 1977 or 1978 depending upon the station.										
2.	Seasonal accumulation of FDD's at weekly intervals. The weekly intervals are as shown below:										
	<table> <tr> <th>Week Number</th><th>Ending Date</th></tr> <tr> <td>1</td><td>8</td></tr> <tr> <td>2</td><td>15</td></tr> <tr> <td>3</td><td>23</td></tr> <tr> <td>4</td><td>30 or 31*</td></tr> </table>	Week Number	Ending Date	1	8	2	15	3	23	4	30 or 31*
Week Number	Ending Date										
1	8										
2	15										
3	23										
4	30 or 31*										
	* 28 or 29 for February										
3.	Same as step 2, but for FDD accumulations for each week from October to April.										
4.	End-of-month accumulations of running sum of FDD's.										
5.	Same as step 4, but for accumulations each month from October to April.										
6.	Seasonal maximum FDD accumulation and date of occurrence listed by winter season.										
7.	Seasonal maximum TDD accumulation and date of occurrence listed by year.										
8.	Same as steps 1 through 7, but in degrees Celsius for U.S. stations and in degrees Fahrenheit for Canadian stations.										

Table 4.--The winter severity index.

CDF	Winter Severity Class	Rank*
Upper 5%	Severe	1-4
Next 15%	Above normal severity	5-17
Mid 60%	Normal severity	18-69
Next 15%	Below normal severity	70-82
Lower 5%	Mild	83-86

* Based on 86-year time period

3.3 Lake-Averaged FDD's

The method developed by Croley and Hartmann (1985) was used to calculate Thiessen weighting factors for the stations on each Great Lake. Stations in Table 1 were used as shown for each lake, Sault Ste. Marie was used for Lake Superior and for Lake Huron calculations because of its proximity to both of these lakes. Lake-averaged seasonal maximum FDD's and winter severity class limits were then calculated for each Great Lake. These data are summarized in Appendix G and Appendix H. Maximum FDD's for Parry Sound and Bay City for years when temperature data at proxy stations were used were adjusted to compensate for differences in temperature shown in Table 2. The adjustment procedure consisted of adding or subtracting from the proxy station's maximum FDD's the number of FDD's equal to the product of (1) the average monthly temperature difference between original and proxy station given in Table 2 and (2) the number of months, starting from the first month when average monthly temperature is less than 0°C to the month when seasonal maximum FDD's occurred at the proxy station during a given winter season. If the maximum FDD's occurred before the middle of the that month, that month was not included in the calculation. This product was added to proxy station seasonal maximum FDD's if the proxy station had higher temperatures, and subtracted if it had lower temperatures relative to the original station.

4. CONCLUDING REMARKS

An 81-year temperature and degree-day data base was updated to include the years of 1977-1983. These data for 1977 supersede data given in Assel (1980a) for that year, which were based in part on monthly average temperatures at some stations in that earlier study. It was not possible to maintain station continuity at three of the 25 stations given in Assel's recent study because one station was discontinued and two others were temporarily closed. Comparisons of average monthly temperatures at original and proxy stations show that the average difference in monthly temperature over the period of months when FDD's are accumulated was on the order of 1°C for two of the proxy stations and near 0.5°C for the third. This may cause significant differences in the daily FDD accumulations from what would have been accumulated had temperature data been available for the original stations. However, developing corrective procedures to estimate the daily temperature time series at the original station for periods without data is beyond the scope of this work. Gaskill (1982) made a homogeneity analysis of the seasonal mean temperatures of the original 81-year 25-station network. He calculated seasonal estimates of the magnitude of inhomogeneities when statistically significant in at least one season for a given base period and comparison station. His study shows that for selected base periods the magnitude of inhomogeneities for winter seasons at Escanaba, Bay City, and Parry Sound are -0.2°C , 0.6°C , and 0.4°C , respectively. Thus inhomogeneities of about half the magnitude of the monthly temperature differences between original and proxy stations given in this study already exist over portions of the original temperature time series (1898-1977) and are due to local changes in station location or elevation or both.

The period of the degree-day update (1977-1983) is remarkable in that winter severity indexes over this time period contained both severe and mild

winters at some stations. The 1977, 1978, and 1979 winters are ranked in the upper 20% of the CDF (of seasonal maximum FDD's 1898-1983) at most stations whereas the winter of 1983 is ranked in the lowest 20% of the CDF at most stations. Ice conditions these winter seasons were also extreme: 1979 was the first time during the past 20-odd years that all five Great Lakes were documented to be nearly 100% ice covered simultaneously (Dewitt et al., 1980), and winter 1983 ice conditions were the mildest during the same 20-odd-year period (Assel et al., 1985).

5. ACKNOWLEDGMENTS

This work was initiated at the suggestion of Frank Quinn, head of Lake Hydrology Group, GLERL. I appreciate the work of the National Snow and Ice Data Center, for archiving and making available to the public the microfilm appendixes of this report. The software algorithm for calculating the Thiessen weighting factors was supplied by Holly Hartmann, also of Lake Hydrology Group, and Lynn Herche of GLERL's Computer Systems Group developed the software to place the computer output on microfilm.

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Appendix A: Seasonal Maximum FDD's (°C) 1898-1983 by Lake and Station

Lake Superior Seasonal Maximum FDD's (°C) 1898-1983

Year	FTW	HOU	DUL	MQT	SSM	Year	FTW	HOU	DUL	MQT	SSM
1898	1396	817	1010	653	881	1941	1461	783	1081	625	884
1899	1807	1279	1523	1198	1292	1942	1018	620	720	501	807
1900	1355	1011	1054	875	986	1943	1772	1129	1381	922	1200
1901	1469	1004	1116	849	1004	1944	1356	770	1013	596	902
1902	1196	712	868	603	789	1945	1287	820	1051	714	980
1903	1353	710	954	628	778	1946	1411	840	1164	668	927
1904	1805	1362	1738	1241	1467	1947	1423	945	1166	711	926
1905	1472	1094	1310	966	1261	1948	1708	1292	1378	906	1139
1906	1186	807	1078	662	872	1949	1363	937	1337	614	778
1907	1499	1036	1367	857	1159	1950	1739	1197	1584	859	1088
1908	1175	794	985	661	985	1951	1658	1257	1588	806	933
1909	1299	854	1082	713	868	1952	1524	1099	1374	707	928
1910	1119	796	1090	687	918	1953	1074	775	1038	481	634
1911	1281	784	1265	693	1048	1954	1350	874	1186	539	839
1912	1726	1337	1672	1204	1363	1955	1455	958	1253	634	900
1913	1561	1072	1401	902	1012	1956	1488	1010	1487	694	1023
1914	1194	858	1033	692	974	1957	1667	1140	1479	814	1081
1915	1121	876	1152	726	884	1958	1139	847	1052	578	775
1916	1364	1060	1416	905	1063	1959	1766	1295	1547	992	1279
1917	1684	1300	1623	1153	1312	1960	1412	1034	1305	695	946
1918	1536	1224	1468	1070	1395	1961	1293	924	1027	650	941
1919	897	513	851	403	608	1962	1521	1047	1434	874	1034
1920	1641	1328	1628	1154	1371	1963	1629	1268	1368	1043	1256
1921	945	621	886	457	626	1964	1384	962	1148	610	909
1922	1337	920	1336	745	1013	1965	1851	1275	1685	929	1134
1923	1678	1227	1484	1058	1393	1966	1352	906	1259	543	749
1924	1203	790	1034	664	889	1967	1733	1096	1394	1030	1074
1925	1520	1036	1370	906	1100	1968	1355	1001	1177	1081	1038
1926	1416	1045	1266	886	1118	1969	1394	891	1298	1010	939
1927	1333	932	1248	751	1006	1970	1621	1175	1435	1236	1209
1928	1379	1018	1383	795	1069	1971	1554	1091	1481	1260	1192
1929	1285	1014	1295	846	910	1972	1784	1268	1634	1373	1149
1930	1395	1032	1325	857	1103	1973	1290	823	1203	913	749
1931	879	589	690	435	724	1974	1600	1061	1418	1187	1075
1932	914	609	937	424	575	1975	1262	844	1296	989	931
1933	1324	959	1271	774	792	1976	1471	938	1289	1066	1014
1934	1600	1071	1392	969	1372	1977	1593	1215	1467	1391	1291
1935	1238	832	1164	668	991	1978	1565	1026	1413	1237	1176
1936	1739	1101	1671	963	1182	1979	2003	1354	1703	1450	1250
1937	1667	931	1390	764	904	1980	1364	916	1175	1031	935
1938	1448	793	1101	723	966	1981	1267	863	1090	975	1117
1939	1655	868	1292	823	1059	1982	1640	1085	1526	1259	1254
1940	1151	688	930	623	921	1983	1075	686	970	741	686

Summary Statistics	FTW	HOU	DUL	MQT	SSM
maximum value	2003	1362	1738	1450	1467
year	1979	1904	1904	1979	1904
minimum value	879	513	690	403	575
year	1931	1919	1931	1919	1932
average value	1429	977	1270	844	1013

Appendix A (Continued)

Lake Michigan Seasonal Maximum FDD's (°C) 1898-1983

Year	ESC	TVC	GB	MSK	MIL	CHI	Year	ESC	TVC	GB	MSK	MIL	CHI
1898	731	468	681	334	448	280	1941	680	383	677	254	382	206
1899	1218	1008	1149	699	801	601	1942	528	401	481	237	395	206
1900	852	576	753	485	501	421	1943	963	750	949	382	704	484
1901	908	525	808	447	481	408	1944	606	433	513	202	368	199
1902	693	461	668	448	499	458	1945	808	619	780	333	585	462
1903	672	369	664	350	423	358	1946	669	450	677	285	489	329
1904	1326	1109	1288	800	915	737	1947	709	523	659	293	491	326
1905	1060	805	1019	609	705	587	1948	959	726	976	448	667	483
1906	716	356	639	288	326	127	1949	610	383	631	256	374	199
1907	818	493	673	437	377	192	1950	871	524	853	287	395	197
1908	683	367	594	306	336	147	1951	859	605	1079	409	701	535
1909	708	455	618	259	317	99	1952	739	514	873	331	437	266
1910	779	580	817	476	639	439	1953	479	353	622	198	279	99
1911	728	514	656	299	351	181	1954	573	404	548	198	271	134
1912	1256	873	1190	783	837	612	1955	649	510	774	291	385	221
1913	934	455	759	285	442	217	1956	816	598	937	399	454	242
1914	734	399	619	399	365	206	1957	801	506	854	300	499	265
1915	799	493	700	314	473	339	1958	582	475	655	324	477	317
1916	939	571	843	404	504	249	1959	1108	896	1179	642	838	608
1917	1194	785	1134	573	786	520	1960	713	566	786	368	544	383
1918	1135	796	1049	659	774	598	1961	706	655	639	380	446	421
1919	448	226	376	168	221	110	1962	881	769	1008	503	709	567
1920	1200	849	1141	669	787	549	1963	1086	950	1095	664	896	779
1921	470	216	369	149	170	86	1964	629	647	804	274	544	488
1922	836	386	823	314	418	222	1965	989	902	963	355	691	558
1923	1144	740	936	391	522	244	1966	549	514	658	347	489	375
1924	769	594	708	371	436	273	1967	776	631	811	340	543	377
1925	933	603	827	388	526	299	1968	796	622	740	386	452	365
1926	971	574	860	380	517	315	1969	617	638	799	400	469	323
1927	797	478	736	286	388	227	1970	865	732	1003	524	639	436
1928	908	499	768	191	408	246	1971	849	645	1050	479	724	389
1929	953	591	943	375	607	444	1972	1025	622	993	411	615	394
1930	970	595	774	342	486	337	1973	636	464	601	273	443	267
1931	507	317	414	103	183	114	1974	834	614	737	419	460	314
1932	503	201	417	116	160	95	1975	701	364	714	239	403	245
1933	813	360	594	171	292	158	1976	757	491	726	247	393	327
1934	978	663	726	369	368	202	1977	1040	830	1199	705	875	723
1935	732	471	698	294	416	245	1978	925	893	1143	681	818	757
1936	1030	703	1028	492	769	633	1979	968	937	1181	675	816	715
1937	814	412	711	165	343	178	1980	594	626	685	398	475	375
1938	775	508	696	263	360	232	1981	732	552	685	421	515	399
1939	842	459	677	210	324	163	1982	920	685	947	565	798	692
1940	686	437	644	365	479	391	1983	440	272	391	148	189	173

Summary Statistics	ESC	TVC	GB	MSK	MIL	CHI
maximum value	1326	1109	1288	800	915	779
year	1904	1904	1904	1904	1904	1963
minimum value	440	201	369	103	160	86
year	1983	1932	1921	1931	1932	1921
average value	814	570	794	378	507	351

Appendix A (Continued)

Lake Huron Seasonal Maximum FDD's (°C) 1898-1983

Year	PAS	ALP	BCI	STN	PTH	Year	PAS	ALP	BCI	STN	PTH
1898	731	507	350	-999	301	1941	905	618	388	-999	364
1899	1073	901	857	-999	546	1942	731	477	292	-999	312
1900	899	679	601	-999	548	1943	1069	752	526	-999	540
1901	931	687	532	-999	452	1944	808	474	270	-999	323
1902	791	575	333	-999	484	1945	887	661	469	-999	532
1903	751	520	466	-999	400	1946	815	564	400	-999	346
1904	1403	1117	941	-999	882	1947	862	581	427	-999	272
1905	1280	914	801	-999	719	1948	988	709	603	-999	522
1906	779	531	422	-999	303	1949	605	387	201	-999	142
1907	1053	670	552	-999	484	1950	744	570	270	-999	184
1908	912	649	504	-999	400	1951	702	609	401	-999	337
1909	758	527	358	-999	268	1952	692	521	333	-999	289
1910	756	584	473	-999	491	1953	556	329	134	-999	114
1911	946	587	356	-999	391	1954	824	451	222	-999	205
1912	1190	974	810	-999	784	1955	918	552	328	-999	241
1913	756	611	408	-999	366	1956	1102	634	388	-999	283
1914	873	678	454	-999	446	1957	915	565	324	-999	281
1915	805	631	320	-999	500	1958	794	475	338	-999	274
1916	943	741	576	-999	529	1959	1279	910	676	-999	525
1917	1053	917	690	-999	653	1960	1015	816	399	-999	341
1918	1294	1070	853	-999	795	1961	981	779	466	-999	380
1919	556	366	149	-999	161	1962	961	845	611	-999	451
1920	1237	1035	848	-999	760	1963	1157	1078	757	-999	592
1921	527	322	167	-999	156	1964	888	694	363	-999	269
1922	882	591	374	-999	335	1965	1039	865	573	-999	352
1923	1251	892	589	-999	501	1966	704	514	394	-999	292
1924	821	659	478	-999	411	1967	973	804	547	-999	316
1925	943	706	586	-999	500	1968	983	736	467	-999	406
1926	1071	813	559	-999	520	1969	884	695	438	-999	338
1927	889	626	430	-999	351	1970	1157	895	572	-999	464
1928	751	621	372	-999	336	1971	1111	816	542	-999	413
1929	833	658	496	-999	425	1972	997	797	471	-999	370
1930	969	720	264	-999	439	1973	740	563	327	-999	218
1931	721	471	215	-999	284	1974	898	718	418	-999	345
1932	520	284	158	-999	138	1975	753	571	273	-999	231
1933	629	475	246	-999	217	1976	963	715	394	-999	347
1934	1335	887	591	-999	486	1977	1299	924	765	-999	680
1935	991	619	423	-999	371	1978	931	917	-999	916	603
1936	1095	829	633	-999	604	1979	800	903	-999	930	531
1937	677	484	244	-999	369	1980	669	655	-999	587	347
1938	844	619	444	-999	351	1981	901	717	-999	699	461
1939	883	598	363	-999	341	1982	964	843	-999	743	580
1940	985	604	468	-999	461	1983	458	356	-999	237	146

-999 = NO DATA

Summary Statistics	PAS	ALP	BCI	STN	PTH
maximum value	1403	1117	941	930	882
year	1904	1904	1904	1979	1904
minimum value	458	284	134	237	114
year	1983	1932	1953	1983	1953
average value	905	675	457	685	405

STN replaces station BCI, which was discontinued.

Appendix A (Continued)

Lakes St. Clair & Erie Seasonal Maximum FDD's (°C) 1898-1983

Year	BUF	PTD	DET	ERI	TOL	CLV	Year	BUF	PTD	DET	ERI	TOL	CLV
1898	233	370	274	138	171	149	1941	363	407	258	233	213	178
1899	353	650	511	345	406	368	1942	323	343	260	218	236	212
1900	419	588	431	323	349	303	1943	480	492	435	293	386	155
1901	387	281	458	309	383	309	1944	319	341	229	192	243	176
1902	369	544	426	385	424	395	1945	481	508	443	346	503	394
1903	286	407	339	242	296	239	1946	343	355	291	174	286	203
1904	655	863	746	620	677	616	1947	298	321	273	159	263	183
1905	668	816	585	525	532	493	1948	494	536	477	301	494	341
1906	208	340	187	173	168	156	1949	120	208	104	45	67	54
1907	442	604	346	300	252	261	1950	222	291	184	136	143	105
1908	280	507	315	222	203	185	1951	257	377	333	251	383	282
1909	181	369	149	54	73	62	1952	235	351	245	154	204	119
1910	374	543	448	349	371	379	1953	99	164	60	30	53	30
1911	333	541	301	187	188	157	1954	228	278	177	159	155	128
1912	591	841	670	536	576	526	1955	268	323	215	200	216	179
1913	213	347	285	169	194	161	1956	352	417	271	249	313	169
1914	389	532	332	290	248	236	1957	261	338	246	216	254	184
1915	359	497	372	274	343	267	1958	315	337	260	283	283	237
1916	431	679	376	308	257	237	1959	519	652	482	440	498	373
1917	503	747	504	399	434	391	1960	391	442	280	277	276	252
1918	683	997	648	565	589	544	1961	546	494	358	386	411	423
1919	92	258	82	69	73	66	1962	459	495	428	369	443	348
1920	664	810	608	527	530	476	1963	608	673	621	564	720	624
1921	137	217	104	61	59	53	1964	336	408	219	266	374	317
1922	299	346	258	186	203	168	1965	331	429	270	262	349	185
1923	410	498	328	261	236	206	1966	328	341	258	273	293	280
1924	338	388	291	277	256	264	1967	355	351	265	168	304	145
1925	350	442	377	243	303	236	1968	476	489	314	402	364	374
1926	486	468	407	354	330	305	1969	392	381	267	282	387	267
1927	336	399	255	197	210	175	1970	537	582	452	573	532	391
1928	306	345	233	201	162	150	1971	421	460	346	340	385	332
1929	310	276	341	244	295	249	1972	327	386	254	286	293	202
1930	328	296	335	219	254	149	1973	260	278	161	170	205	99
1931	283	302	147	146	99	60	1974	328	390	229	197	361	98
1932	113	93	83	74	73	74	1975	149	190	109	148	203	106
1933	116	172	140	77	106	77	1976	362	369	276	315	374	300
1934	573	504	427	379	311	276	1977	629	653	527	619	757	671
1935	368	480	353	230	253	144	1978	625	720	512	648	827	567
1936	527	791	582	469	556	449	1979	516	494	467	537	554	400
1937	146	240	156	60	107	39	1980	352	372	256	344	369	327
1938	297	432	268	173	186	100	1981	423	500	408	415	496	393
1939	280	375	231	109	149	72	1982	502	517	415	426	612	395
1940	516	550	439	416	423	363	1983	163	162	86	89	148	76

Summary Statistics	BUF	PTD	DET	ERI	TOL	CLV
maximum value	683	997	746	648	827	671
year	1918	1918	1904	1978	1978	1977
minimum value	92	93	60	30	53	30
year	1919	1932	1953	1953	1953	1953
average value	365	446	328	281	320	254

Appendix A (Continued)

Lake Ontario Seasonal Maximum FDD's (°C) 1898-1983

Year	KIN	TOR	OSW	ROC	Year	KIN	TOR	OSW	ROC
1898	529	354	296	238	1941	800	427	423	462
1899	699	541	435	371	1942	617	329	353	331
1900	694	523	446	413	1943	834	515	486	500
1901	694	502	473	446	1944	629	342	398	392
1902	630	439	428	419	1945	820	495	459	550
1903	552	399	387	296	1946	735	385	382	395
1904	1132	854	792	712	1947	631	342	308	320
1905	1134	755	756	649	1948	974	542	548	555
1906	528	286	277	196	1949	491	201	160	160
1907	961	577	549	453	1950	666	258	247	235
1908	711	421	375	303	1951	590	250	278	302
1909	580	288	271	179	1952	596	278	252	267
1910	560	406	409	382	1953	395	125	129	123
1911	858	437	462	358	1954	512	262	231	249
1912	888	654	616	565	1955	678	278	299	339
1913	437	271	243	217	1956	772	346	437	442
1914	730	453	491	413	1957	594	275	295	306
1915	518	407	386	329	1958	483	300	307	346
1916	706	471	480	413	1959	917	551	520	568
1917	818	563	523	486	1960	697	384	354	475
1918	1068	765	791	673	1961	699	408	449	495
1919	344	148	159	85	1962	708	463	379	450
1920	896	735	716	636	1963	820	558	488	609
1921	327	171	205	129	1964	644	312	462	371
1922	574	329	408	302	1965	646	337	398	371
1923	898	551	585	423	1966	525	284	268	284
1924	523	374	355	321	1967	619	342	222	281
1925	664	446	415	313	1968	735	438	501	470
1926	696	516	475	400	1969	647	349	380	346
1927	626	425	381	291	1970	943	500	579	539
1928	522	337	314	251	1971	873	436	464	486
1929	484	339	281	259	1972	650	328	369	317
1930	603	411	350	298	1973	613	225	275	213
1931	476	297	324	239	1974	722	341	346	299
1932	255	120	130	101	1975	501	255	194	164
1933	250	156	92	83	1976	742	255	405	358
1934	1018	685	642	504	1977	818	559	554	560
1935	778	476	499	376	1978	961	526	597	561
1936	841	589	567	516	1979	781	472	499	522
1937	399	191	166	124	1980	619	319	392	429
1938	590	378	324	263	1981	778	470	528	507
1939	630	380	348	273	1982	752	472	466	518
1940	855	524	574	513	1983	335	148	198	159

Summary Statistics	KIN	TOR	OSW	ROC
maximum value	1134	854	792	712
year	1905	1904	1904	1904
minimum value	250	120	92	83
year	1933	1932	1933	1933
average value	677	403	401	370

Appendix B: Julian Date of Maximum FDD's 1898-1983 by Lake and Station

Lake Superior Julian Date of Maximum FDD's 1898-1983

Year	FTW	HOU	DUL	MQT	SSM	Year	FTW	HOU	DUL	MQT	SSM
1898	98	96	95	96	97	1941	93	88	88	88	89
1899	95	96	94	94	100	1942	83	81	72	81	83
1900	86	89	85	90	91	1943	107	106	81	81	107
1901	91	90	90	90	90	1944	99	95	95	96	99
1902	81	79	79	66	79	1945	70	70	69	70	71
1903	95	65	87	65	65	1946	72	70	70	70	70
1904	112	112	112	88	112	1947	111	109	102	110	109
1905	80	80	80	80	81	1948	100	78	93	78	94
1906	87	87	87	87	90	1949	83	82	83	82	83
1907	110	110	108	110	110	1950	105	105	104	104	105
1908	95	95	94	95	99	1951	85	85	85	85	85
1909	106	100	106	100	104	1952	103	89	103	89	89
1910	77	76	69	76	77	1953	79	89	85	69	76
1911	98	98	98	97	98	1954	95	94	94	94	94
1912	100	94	91	94	94	1955	90	88	88	88	89
1913	98	87	87	87	87	1956	101	91	100	91	92
1914	103	102	103	103	103	1957	104	104	103	103	104
1915	93	92	92	92	93	1958	86	87	87	86	74
1916	88	100	99	99	84	1959	87	87	81	87	90
1917	104	105	79	79	105	1960	101	101	100	100	101
1918	74	74	74	74	86	1961	92	100	92	78	77
1919	91	91	91	73	91	1962	104	106	105	82	70
1920	99	103	103	80	104	1963	87	81	81	81	82
1921	91	90	90	81	91	1964	99	99	99	95	100
1922	90	89	90	90	90	1965	94	94	93	93	94
1923	104	105	101	105	107	1966	96	102	97	67	93
1924	93	92	92	92	93	1967	83	83	80	83	84
1925	82	81	81	81	82	1968	85	84	83	84	85
1926	108	108	96	97	109	1969	92	93	92	92	93
1927	98	87	86	62	69	1970	102	102	94	102	102
1928	111	111	111	80	111	1971	95	95	95	95	96
1929	91	83	83	69	92	1972	100	100	100	100	102
1930	92	91	91	91	92	1973	82	81	81	103	61
1931	91	90	89	91	91	1974	98	98	98	98	99
1932	95	95	95	95	95	1975	102	103	103	103	103
1933	102	88	103	88	89	1976	82	82	82	82	82
1934	91	91	91	91	104	1977	98	98	66	98	99
1935	107	98	98	77	94	1978	99	85	84	100	99
1936	101	99	99	99	99	1979	101	101	101	101	100
1937	93	93	93	93	93	1980	90	85	91	94	87
1938	98	74	74	74	74	1981	79	79	80	82	80
1939	106	102	102	102	103	1982	98	100	101	103	102
1940	105	104	94	88	105	1983	109	109	109	110	89

Summary Statistics	FTW	HOU	DUL	MQT	SSM
maximum value	112	112	112	110	112
year	1904	1904	1904	1907	1904
minimum value	70	65	66	62	61
year	1945	1903	1977	1927	1973
average value	95	93	91	89	92

Appendix B (Continued)

Lake Michigan Julian Date of Maximum FDD's 1898-1983

Year	ESC	TVC	GB	MSK	MIL	CHI	Year	ESC	TVC	GB	MSK	MIL	CHI
1898	96	64	64	65	64	64	1941	89	81	81	78	78	78
1899	95	95	94	95	93	94	1942	81	73	61	61	60	57
1900	88	90	89	88	81	81	1943	82	81	81	70	81	70
1901	91	80	89	75	66	65	1944	95	96	95	80	95	70
1902	78	53	52	64	52	52	1945	70	70	69	59	67	51
1903	65	64	61	60	60	56	1946	70	59	70	59	59	58
1904	112	88	88	81	77	58	1947	90	89	79	78	77	77
1905	81	80	80	74	74	74	1948	78	73	74	73	73	73
1906	88	84	84	84	84	83	1949	79	79	78	78	78	78
1907	73	70	68	69	68	54	1950	103	105	99	78	78	78
1908	95	70	69	65	64	60	1951	85	85	85	47	84	46
1909	85	82	81	81	77	18	1952	89	89	89	77	77	67
1910	77	76	69	61	59	56	1953	69	69	68	68	68	68
1911	94	94	65	66	63	41	1954	94	94	94	44	43	31
1912	94	87	85	85	85	84	1955	88	88	88	67	67	46
1913	87	87	86	67	66	66	1956	92	92	91	85	85	59
1914	103	82	99	81	71	70	1957	103	69	69	69	69	51
1915	94	93	90	93	64	40	1958	75	75	74	53	53	52
1916	84	84	83	83	83	77	1959	89	88	89	81	77	52
1917	81	78	78	65	64	64	1960	86	86	86	86	86	86
1918	74	70	75	70	53	53	1961	77	77	77	43	39	38
1919	91	74	66	68	66	11	1962	83	85	83	77	77	76
1920	103	75	80	74	68	68	1963	82	81	81	81	74	61
1921	88	63	68	59	58	18	1964	96	96	96	59	92	59
1922	90	81	63	62	61	48	1965	93	94	93	93	90	89
1923	107	102	99	91	91	54	1966	87	67	67	58	67	57
1924	93	93	93	80	79	56	1967	83	83	81	78	78	67
1925	81	74	74	64	63	62	1968	74	74	73	63	63	63
1926	109	98	96	76	76	75	1969	91	92	91	75	74	50
1927	63	63	63	63	52	27	1970	93	89	76	90	76	51
1928	111	80	79	71	70	66	1971	96	95	95	85	85	47
1929	70	69	69	69	69	54	1972	101	100	99	70	100	70
1930	92	89	88	48	47	47	1973	59	58	59	59	59	53
1931	90	91	70	46	45	23	1974	99	88	88	57	57	57
1932	95	84	84	84	84	75	1975	104	102	97	74	75	72
1933	88	85	84	70	52	49	1976	82	78	77	40	40	39
1934	91	89	90	87	87	70	1977	85	66	66	61	61	52
1935	77	73	73	73	59	59	1978	93	84	84	84	77	68
1936	99	79	79	66	67	53	1979	100	100	87	75	75	74
1937	93	89	86	86	86	59	1980	75	75	75	74	74	74
1938	74	70	69	68	68	32	1981	81	45	45	45	45	45
1939	102	80	79	79	77	60	1982	99	98	70	69	69	68
1940	88	88	88	86	86	86	1983	89	43	88	44	44	44

Summary Statistics	ESC	TVC	GB	MSK	MIL	CHI
maximum value	112	105	99	95	100	94
year	1904	1950	1914	1899	1972	1899
minimum value	59	43	45	40	39	11
year	1973	1983	1981	1976	1961	1919
average value	88	81	80	71	70	59

Appendix B (Continued)

Lake Huron Julian Date of Maximum FDD's 1898-1983

Year	PAS	ALP	BCI	STN	PTH	Year	PAS	ALP	BCI	STN	PTH
1898	65	64	65	-999	64	1941	90	89	81	-999	89
1899	96	96	98	-999	94	1942	84	72	62	-999	63
1900	88	89	90	-999	89	1943	106	82	71	-999	68
1901	90	89	81	-999	75	1944	98	96	81	-999	82
1902	67	78	31	-999	53	1945	70	70	52	-999	59
1903	65	61	61	-999	61	1946	70	70	59	-999	59
1904	89	89	78	-999	81	1947	94	89	89	-999	87
1905	81	81	75	-999	74	1948	78	78	73	-999	73
1906	90	90	84	-999	84	1949	79	79	79	-999	79
1907	80	70	69	-999	70	1950	105	104	79	-999	78
1908	95	95	70	-999	70	1951	86	85	47	-999	47
1909	86	82	81	-999	81	1952	89	89	76	-999	69
1910	77	77	57	-999	57	1953	70	69	68	-999	68
1911	94	94	67	-999	77	1954	94	94	44	-999	44
1912	95	94	85	-999	94	1955	89	88	67	-999	67
1913	87	87	67	-999	67	1956	92	92	85	-999	86
1914	83	103	82	-999	82	1957	105	103	69	-999	69
1915	94	93	68	-999	93	1958	73	72	53	-999	53
1916	84	84	83	-999	84	1959	88	88	77	-999	77
1917	81	81	78	-999	78	1960	87	101	86	-999	86
1918	75	75	75	-999	70	1961	80	79	47	-999	44
1919	92	73	69	-999	73	1962	84	69	69	-999	69
1920	81	80	74	-999	68	1963	82	81	74	-999	74
1921	77	77	58	-999	59	1964	96	96	59	-999	60
1922	92	90	62	-999	62	1965	95	94	94	-999	94
1923	107	104	91	-999	91	1966	91	67	67	-999	58
1924	93	93	81	-999	80	1967	84	83	80	-999	80
1925	82	74	64	-999	64	1968	74	74	66	-999	67
1926	110	109	76	-999	96	1969	93	90	75	-999	74
1927	69	68	63	-999	63	1970	95	95	75	-999	76
1928	70	92	71	-999	71	1971	98	96	85	-999	85
1929	70	69	69	-999	69	1972	101	100	99	-999	70
1930	93	92	35	-999	48	1973	60	58	59	-999	59
1931	80	90	45	-999	79	1974	89	89	58	-999	57
1932	95	95	84	-999	84	1975	104	102	74	-999	73
1933	89	88	70	-999	70	1976	83	78	40	-999	40
1934	89	89	87	-999	88	1977	85	62	61	-999	61
1935	77	73	73	-999	59	1978	85	85	-999	86	69
1936	99	78	67	-999	68	1979	75	75	-999	76	57
1937	92	93	86	-999	90	1980	78	75	-999	76	75
1938	74	74	69	-999	69	1981	80	79	-999	79	45
1939	103	102	80	-999	81	1982	99	99	-999	70	69
1940	88	88	88	-999	88	1983	89	90	-999	46	44

-999 = NO DATA

Summary Statistics	PAS	ALP	BCI	STN	PTH
maximum value	110	109	99	86	96
year	1926	1926	1972	1978	1926
minimum value	60	58	31	46	40
year	1973	1973	1902	1983	1976
average value	86	85	71	72	71

STN replaces station BCI, which was discontinued.

Appendix B (Continued)

Lakes St. Clair & Erie Julian Date of Maximum FDD's 1898-1983

Year	BUF	PTD	DET	ERI	TOL	CLV	Year	BUF	PTD	DET	ERI	TOL	CLV
1898	65	65	64	64	64	64	1941	89	89	78	89	79	81
1899	46	95	93	46	46	46	1942	60	65	62	60	62	63
1900	88	89	86	90	81	81	1943	68	68	68	68	68	9
1901	66	81	66	66	66	66	1944	81	82	80	70	70	51
1902	54	54	53	54	53	54	1945	52	60	51	51	51	51
1903	57	61	60	56	56	56	1946	59	59	59	59	56	56
1904	78	80	78	77	58	57	1947	90	90	78	78	77	68
1905	75	76	74	74	74	74	1948	73	74	73	73	73	73
1906	84	84	84	84	84	83	1949	79	79	78	42	42	42
1907	70	70	68	70	69	70	1950	79	79	78	78	78	78
1908	70	80	65	65	65	64	1951	47	47	47	46	47	41
1909	82	81	64	19	19	20	1952	77	76	69	77	68	-2
1910	57	77	57	56	57	56	1953	69	68	68	8	49	7
1911	66	94	66	67	42	42	1954	44	44	44	44	44	44
1912	86	86	85	86	85	85	1955	49	67	50	49	49	49
1913	67	67	67	67	67	67	1956	88	85	85	88	60	36
1914	83	82	82	82	71	71	1957	52	64	52	69	52	52
1915	91	90	41	91	41	41	1958	54	71	53	53	53	53
1916	84	85	84	84	83	83	1959	82	81	77	77	56	56
1917	78	81	65	65	65	65	1960	86	86	86	86	86	86
1918	75	75	53	53	53	53	1961	48	52	43	47	40	43
1919	67	74	12	12	12	12	1962	68	67	64	66	64	67
1920	68	75	68	68	68	68	1963	74	74	61	61	74	61
1921	57	64	59	57	33	34	1964	60	95	59	60	60	60
1922	62	63	62	62	48	49	1965	92	94	93	94	87	86
1923	91	91	91	56	55	55	1966	58	58	55	57	58	58
1924	80	80	77	80	62	79	1967	84	79	78	78	78	67
1925	63	64	64	35	34	35	1968	74	74	63	67	63	67
1926	76	76	76	76	76	76	1969	75	75	73	75	74	74
1927	63	63	63	63	27	27	1970	76	76	76	90	77	76
1928	81	71	71	70	70	70	1971	86	86	47	86	47	47
1929	69	69	54	55	54	54	1972	71	100	70	100	70	58
1930	48	48	48	48	48	48	1973	59	59	59	59	59	59
1931	75	73	45	72	23	23	1974	58	58	57	57	57	14
1932	84	84	84	81	75	75	1975	74	74	46	70	75	46
1933	88	70	49	-11	-11	-11	1976	40	40	40	40	40	40
1934	87	87	88	87	87	87	1977	54	62	52	52	52	52
1935	60	73	59	60	59	59	1978	77	77	68	77	77	69
1936	67	69	67	67	54	54	1979	51	59	57	59	59	51
1937	89	87	75	87	75	74	1980	75	76	75	75	73	72
1938	70	70	69	69	33	32	1981	45	46	45	45	45	45
1939	81	81	81	81	58	56	1982	69	69	68	68	69	68
1940	88	88	88	88	86	86	1983	45	45	44	45	45	44

Summary Statistics	BUF	PTD	DET	ERI	TOL	CLV
maximum value	92	100	93	100	87	87
year	1965	1972	1899	1972	1934	1934
minimum value	40	40	12	-11	-11	-11
year	1976	1976	1919	1933	1933	1933
average value	70	73	66	65	59	55

Negative values indicate dates from the previous year
(e.g. -11 = 354-365 = December 20, previous year)

Appendix B (Continued)

Lake Ontario Julian Date of Maximum FDD's 1898-1983

Year	KIN	TOR	OSW	ROC	Year	KIN	TOR	OSW	ROC
1898	65	65	64	64	1941	90	81	82	89
1899	92	93	92	46	1942	58	58	58	58
1900	88	88	86	86	1943	82	68	68	68
1901	79	81	78	76	1944	82	82	82	82
1902	69	54	54	54	1945	70	59	52	60
1903	62	56	56	56	1946	59	59	60	60
1904	89	81	78	77	1947	90	89	90	90
1905	81	76	76	75	1948	74	73	74	74
1906	84	84	84	84	1949	79	79	79	79
1907	93	70	71	70	1950	80	79	79	79
1908	96	80	70	70	1951	85	47	47	47
1909	83	81	82	81	1952	78	78	77	78
1910	77	57	57	57	1953	70	69	69	69
1911	94	93	94	66	1954	94	44	45	44
1912	95	86	86	86	1955	88	67	68	67
1913	67	67	67	67	1956	88	88	91	88
1914	83	81	82	81	1957	70	64	65	70
1915	90	77	90	90	1958	75	54	54	54
1916	84	84	84	84	1959	88	77	88	88
1917	81	78	79	78	1960	87	86	86	86
1918	75	70	75	70	1961	80	47	48	48
1919	74	67	74	51	1962	70	66	69	67
1920	75	69	81	68	1963	82	70	74	74
1921	64	64	64	57	1964	96	60	60	60
1922	63	63	62	62	1965	93	91	93	93
1923	92	91	91	91	1966	75	54	56	58
1924	80	80	80	80	1967	81	79	80	79
1925	75	64	64	36	1968	75	74	74	74
1926	102	76	89	76	1969	75	71	75	72
1927	64	63	64	63	1970	91	75	77	76
1928	71	71	71	71	1971	90	71	87	86
1929	70	69	69	56	1972	99	99	89	71
1930	84	48	48	48	1973	61	59	59	59
1931	74	74	74	73	1974	89	57	58	57
1932	85	84	85	84	1975	102	40	102	102
1933	84	75	71	71	1976	82	40	40	40
1934	89	88	88	84	1977	62	61	61	54
1935	73	68	73	60	1978	85	77	79	70
1936	68	68	68	67	1979	75	57	58	52
1937	90	89	90	89	1980	76	75	76	76
1938	75	70	70	69	1981	80	45	46	45
1939	88	81	81	81	1982	99	69	69	69
1940	88	88	88	88	1983	58	44	45	45

Summary Statistics	KIN	TOR	OSW	ROC
maximum value	102	99	102	102
year	1926	1972	1975	1975
minimum value	58	40	40	36
year	1942	1975	1976	1925
average value	80	71	73	70

Appendix C: Seasonal Maximum TDD's (°C) 1897-1983 by Lake and Station

Lake Superior Seasonal Maximum TDD's (°C) 1897-1983

Year	FTW	HOU	DUL	MQT	SSM	Year	FTW	HOU	DUL	MQT	SSM
1897	2358	2651	2756	2794	2568	1941	2581	3033	2900	3101	2901
1898	2315	2631	2726	2797	2662	1942	2362	2777	2607	2934	2663
1899	2326	2696	2760	2897	2646	1943	2325	2670	2688	2608	2481
1900	2661	2994	3068	3123	2946	1944	2516	2875	2729	2962	2722
1901	2414	2879	2781	2868	2818	1945	2165	2604	2522	2761	2564
1902	2165	2712	2563	2704	2609	1946	2369	2911	2788	3001	2664
1903	2236	2691	2643	2688	2589	1947	2375	2868	2709	2799	2673
1904	2147	2599	2397	2785	2378	1948	2524	2951	2928	3003	2771
1905	2244	2673	2503	2635	2554	1949	2498	2975	2818	3108	2765
1906	2402	2871	2641	2844	2766	1950	2094	2491	2284	2552	2298
1907	1964	2330	2159	2297	2123	1951	2244	2495	2404	2600	2494
1908	2479	2944	2593	2971	2763	1952	2383	2698	2709	2967	2621
1909	2344	2664	2419	2626	2521	1953	2467	2624	2766	3080	2767
1910	2544	2940	2879	2896	2634	1954	2273	2321	2491	2721	2488
1911	2329	2748	2514	2766	2608	1955	2765	2943	2962	3254	3038
1912	2212	2558	2441	2695	2461	1956	2301	2457	2498	2667	2430
1913	2292	2700	2451	2828	2601	1957	2387	2562	2589	2869	2610
1914	2525	2838	2655	2882	2734	1958	2423	2551	2623	2885	2538
1915	2408	2569	2419	2612	2591	1959	2445	2634	2595	2944	2678
1916	2437	2678	2520	2687	2596	1960	2457	2612	2659	2839	2649
1917	2108	2269	2133	2217	2111	1961	2441	2627	2661	2815	2675
1918	2244	2590	2531	2654	2482	1962	2254	2527	2414	2771	2667
1919	2482	2777	2582	2845	2849	1963	2545	2849	3045	3179	2834
1920	2544	2784	2716	2831	2712	1964	2316	2649	2655	2954	2679
1921	2753	3104	2873	3141	3068	1965	2158	2351	2413	2680	2365
1922	2565	2876	2717	2918	2773	1966	2325	2491	2498	2804	2540
1923	2433	2778	2644	2732	2581	1967	2174	2337	2437	2348	2369
1924	2271	2489	2435	2512	2393	1968	2332	2592	2624	2616	2673
1925	2359	2635	2602	2684	2502	1969	2312	2532	2622	2543	2476
1926	2140	2359	2362	2378	2263	1970	2451	2654	2706	2690	2669
1927	2356	2501	2411	2615	2522	1971	2456	2636	2654	2641	2559
1928	2331	2490	2449	2554	2421	1972	2233	2416	2330	2380	2488
1929	2314	2679	2595	2736	2589	1973	2463	2786	2627	2651	2718
1930	2592	2946	2845	3038	2811	1974	2214	2526	2371	2373	2481
1931	2817	3183	3051	3294	3061	1975	2534	2843	2648	2744	2832
1932	2562	2778	2723	2862	2699	1976	2380	2695	2676	2522	2559
1933	2514	2861	2657	2833	2797	1977	2459	2816	2791	2790	2592
1934	2354	2807	2649	2688	2561	1978	2375	2667	2797	2574	2597
1935	2419	2758	2472	2644	2597	1979	2234	2473	2529	2365	2488
1936	2140	2648	2697	2676	2513	1980	2407	2638	2660	2536	2466
1937	2238	2937	2714	2862	2782	1981	2421	2685	2608	2561	2415
1938	2394	3105	2880	3009	2895	1982	2296	2479	2515	2502	2433
1939	2218	2877	2683	2837	2531	1983	2502	2756	2756	2660	2757
1940	2252	2724	2706	2707	2633						

Summary Statistics	FTW	HOU	DUL	MQT	SSM
maximum value	2817	3183	3068	3294	3068
year	1931	1931	1900	1931	1921
minimum value	1964	2269	2133	2217	2111
year	1907	1917	1917	1917	1917
average value	2373	2694	2624	2759	2615

Appendix C (Continued)

Lake Michigan Seasonal Maximum TDD's (°C) 1897-1983

Year	ESC	TVC	GB	MSK	MIL	CHI	Year	ESC	TVC	GB	MSK	MIL	CHI
1897	2922	3297	3393	3417	3558	3819	1941	3089	3397	3703	3721	3747	4271
1898	2963	3109	3376	3519	3575	3827	1942	2882	3202	3381	3572	3524	4046
1899	2839	3506	3481	3646	3697	4017	1943	2800	3089	3274	3359	3343	3874
1900	3068	3520	3586	3701	3697	3873	1944	2980	3329	3486	3529	3550	4075
1901	2861	3276	3378	3612	3587	3778	1945	2711	3135	3277	3468	3390	3906
1902	2776	3214	3312	3555	3531	3824	1946	2943	3403	3446	3708	3635	4250
1903	2647	3174	3219	3485	3472	3721	1947	2874	3233	3344	3811	3448	3906
1904	2591	2884	3083	3319	3327	3572	1948	2956	3367	3526	3631	3694	4069
1905	2653	2932	3205	3513	3459	3856	1949	3053	3408	3503	3604	3688	4133
1906	2875	3365	3375	3464	3567	4026	1950	2539	2888	2860	3151	3242	3775
1907	2383	2959	2912	3034	3142	3669	1951	2693	2961	2960	3204	3210	3741
1908	2885	3469	3440	3486	3601	4168	1952	2906	3196	3203	3435	3552	4095
1909	2683	3172	3271	3278	3396	3873	1953	3091	3445	3410	3725	3808	4435
1910	2852	3286	3471	3502	3643	4127	1954	2819	3130	3113	3471	3581	4267
1911	2786	3278	3320	3547	3564	4140	1955	3245	3568	3494	3761	3820	4412
1912	2631	3268	3208	3422	3444	3945	1956	2744	3090	3047	3401	3444	4172
1913	2733	3441	3364	3597	3671	4210	1957	2811	3124	3066	3401	3300	4049
1914	2866	3391	3418	3666	3661	4288	1958	2861	3093	3143	3413	3482	4108
1915	2655	3104	3151	3246	3310	3840	1959	2900	3325	3239	3572	3528	3978
1916	2716	3221	3294	3431	3514	4078	1960	2899	3221	3116	3532	3280	3962
1917	2309	2822	2836	2845	3073	3535	1961	2898	3093	3224	3504	3384	3707
1918	2682	3318	3314	3289	3579	4141	1962	2827	3241	3314	3614	3381	3893
1919	2906	3433	3420	3549	3646	4137	1963	3028	3241	3513	3694	3610	4051
1920	2805	3307	3359	3318	3573	4076	1964	2838	3266	3376	3649	3526	3751
1921	3150	3796	3764	3671	3986	4599	1965	2491	2842	3184	3595	3347	3646
1922	2940	3540	3502	3380	3791	4326	1966	2827	3034	3067	3428	3278	3719
1923	2701	3236	3298	3404	3472	3931	1967	2641	2897	3023	3468	3274	3589
1924	2532	3029	3019	3111	3194	3719	1968	2884	3367	3359	3624	3656	4090
1925	2661	3288	3184	3262	3483	3972	1969	2830	3206	2994	3420	3180	3825
1926	2482	2886	2966	3192	3181	3527	1970	3004	3446	3397	3606	3568	4089
1927	2613	3294	3170	3378	3518	3947	1971	2872	3418	3354	3490	3363	4185
1928	2583	3166	3115	3247	3412	3773	1972	2590	2977	3185	3278	3134	3699
1929	2621	3210	3193	3187	3534	3895	1973	2978	3494	3558	3690	3688	4197
1930	2921	3567	3535	3381	3714	4077	1974	2637	3229	2972	3226	3234	3787
1931	3184	3702	3771	3847	4071	4407	1975	2941	3459	3293	3608	3505	4122
1932	2829	3281	3347	3398	3632	3892	1976	2634	3091	3154	3272	3472	3796
1933	2924	3388	3455	3463	3690	4094	1977	2901	3399	3551	3702	3672	4381
1934	2744	3417	3457	3574	3716	4175	1978	2835	3086	3203	3347	3439	3850
1935	2700	3140	3219	3216	3473	3830	1979	2710	2867	3071	3265	3448	3866
1936	2710	3231	3370	3472	3637	4043	1980	2892	3083	3216	3325	3333	3858
1937	2874	3319	3399	3386	3492	3741	1981	2754	3226	3230	3395	3221	3784
1938	3096	3707	3665	3678	3883	4274	1982	2695	3191	3127	3478	3394	3795
1939	2874	3393	3543	3576	3897	4203	1983	2930	3047	3187	3515	3586	3885
1940	2776	3206	3253	3325	3425	3754							

Summary Statistics	ESC	TVC	GB	MSK	MIL	CHI
maximum value	3245	3796	3771	3847	4071	4599
year	1955	1921	1931	1931	1931	1921
minimum value	2309	2822	2836	2845	3073	3527
year	1917	1917	1917	1917	1917	1926
average value	2810	3245	3294	3463	3511	3975

Appendix C (Continued)

Lake Huron Seasonal Maximum TDD's (°C) 1897-1983

Year	PAS	ALP	BCI	STN	PTH	Year	PAS	ALP	BCI	STN	PTH
1897	2864	2879	3377	-999	3430	1941	3262	3329	4088	-999	3588
1898	3118	3014	3406	-999	3641	1942	3144	3069	3813	-999	3411
1899	2952	2931	3394	-999	3574	1943	2858	2865	3569	-999	3324
1900	3197	3153	3699	-999	3645	1944	3092	3039	3802	-999	3527
1901	3125	2908	3556	-999	3401	1945	3045	2994	3720	-999	3430
1902	2951	2851	3352	-999	3411	1946	3054	3049	3849	-999	3866
1903	3005	2836	3379	-999	3373	1947	3114	3019	3641	-999	3565
1904	2722	2667	3229	-999	3125	1948	3224	3160	3979	-999	3798
1905	3020	2897	3478	-999	3377	1949	3236	3226	3955	-999	3853
1906	3066	3028	3606	-999	3490	1950	2819	2780	3515	-999	3471
1907	2691	2521	3129	-999	3011	1951	2969	2837	3554	-999	3602
1908	3174	3009	3654	-999	3517	1952	3026	3074	3897	-999	3752
1909	2811	2855	3442	-999	3254	1953	3093	3196	4058	-999	3951
1910	3021	3009	3659	-999	3408	1954	2792	2969	3766	-999	3721
1911	3080	2926	3677	-999	3415	1955	3203	3354	4166	-999	4156
1912	2894	2847	3522	-999	3336	1956	2683	2819	3648	-999	3605
1913	2986	2988	3604	-999	3516	1957	2832	2886	3734	-999	3695
1914	2952	2914	4171	-999	3438	1958	2836	2955	3784	-999	3744
1915	2961	2816	3344	-999	3232	1959	3020	3082	3781	-999	3927
1916	3091	2894	3577	-999	3407	1960	3001	2802	3539	-999	3750
1917	2619	2441	3166	-999	2915	1961	2949	2864	3544	-999	3854
1918	2953	2811	3693	-999	3397	1962	3019	2813	3608	-999	3858
1919	3200	3016	3728	-999	3567	1963	2943	3008	3702	-999	3952
1920	3043	2879	3620	-999	3429	1964	2952	2976	3514	-999	3855
1921	3417	3263	4047	-999	3863	1965	2698	2638	3256	-999	3603
1922	3049	3034	3729	-999	3593	1966	2783	2775	3308	-999	3699
1923	2793	2770	3443	-999	3335	1967	2710	2675	3293	-999	3556
1924	2700	2625	3253	-999	3150	1968	3018	3034	3686	-999	3866
1925	2668	2771	3429	-999	3298	1969	2869	2790	3440	-999	3694
1926	2450	2547	3186	-999	3036	1970	3012	3032	3606	-999	3713
1927	2717	2779	3539	-999	3408	1971	2996	2941	3509	-999	3681
1928	2774	2695	3517	-999	3355	1972	2658	2603	3223	-999	3143
1929	2752	2801	3362	-999	3382	1973	3165	3072	3829	-999	4007
1930	3033	2992	3769	-999	3528	1974	2756	2750	3400	-999	3416
1931	3285	3311	4050	-999	3856	1975	3129	3095	3671	-999	3686
1932	2907	2917	3568	-999	3376	1976	2873	2987	3460	-999	3362
1933	3078	3089	3720	-999	3646	1977	3345	3036	3802	-999	3820
1934	2971	2918	3713	-999	3823	1978	3112	2920	-999	3080	3567
1935	2943	2923	3604	-999	3485	1979	3943	2825	-999	3077	3557
1936	2822	2890	3735	-999	3460	1980	2812	2852	-999	2973	3465
1937	3042	2993	3488	-999	3296	1981	2923	2890	-999	3066	3571
1938	3279	3289	3940	-999	3713	1982	3018	2906	-999	3105	3560
1939	2933	3013	3845	-999	3705	1983	3040	2955	-999	3136	3761
1940	2856	2918	3443	-999	3229						

-999 = NO DATA

Summary Statistics	PAS	ALP	BCI	STN	PTH
maximum value	3943	3354	4171	3136	4156
year	1979	1955	1914	1983	1955
minimum value	2450	2441	3129	2973	2915
year	1926	1917	1907	1980	1917
average value	2977	2926	3612	3073	3550

STN replaces station BCI, which was discontinued

Appendix C (Continued)

Lakes St. Clair & Erie Seasonal Maximum TDD's (°C) 1897-1983

Year	BUF	PTD	DET	ERI	TOL	CLV	Year	BUF	PTD	DET	ERI	TOL	CLV
1897	3547	3456	3692	3630	3872	3794	1941	3691	3499	4168	4092	4283	4226
1898	3850	3846	3942	3915	4111	3955	1942	3539	3383	3962	3968	4085	4129
1899	3689	3559	3859	3843	4028	3974	1943	3227	3238	3729	3714	3703	3878
1900	3790	3753	3963	3945	4125	4023	1944	3700	3388	3947	3932	3867	4071
1901	3609	3354	3802	3679	3923	3788	1945	3678	3392	3877	4001	3855	4081
1902	3624	3433	3805	3731	3954	3830	1946	3836	3471	4113	4178	4072	4264
1903	3618	3421	3745	3688	3885	4023	1947	3620	3350	3748	3856	3794	3923
1904	3238	3078	3535	3398	3701	3505	1948	3817	3621	3978	4047	3999	4133
1905	3436	3136	3728	3665	3843	3736	1949	3847	3706	4007	3844	4092	4215
1906	3494	3329	3814	3676	3905	3799	1950	3417	3159	3640	3375	3648	3783
1907	3085	2820	3308	3093	3504	3396	1951	3556	3295	3756	3573	3769	3935
1908	3568	3312	3857	3837	4056	3937	1952	3669	3478	3964	3662	3985	4093
1909	3371	3101	3549	3540	3789	3626	1953	3845	3537	4150	3795	4150	4272
1910	3479	3260	3800	3712	4030	3719	1954	3563	3344	3841	3570	3922	4133
1911	3590	3276	3816	3807	4049	3894	1955	3895	3650	4204	3875	4134	4316
1912	3438	3193	3651	3686	3889	3809	1956	3472	3181	3764	3503	3777	3960
1913	3581	3331	3910	3863	4107	3907	1957	3639	3361	3791	3611	3785	4018
1914	3428	3358	3840	3707	4028	3896	1958	3542	3293	3856	3534	3768	3936
1915	3394	3183	3563	3622	3776	3678	1959	3845	3526	4026	3939	3941	4226
1916	3538	3209	3863	3758	3847	3825	1960	3656	3428	3905	3771	3755	3675
1917	2968	2720	3320	3272	3525	3381	1961	3532	3401	3941	3761	3634	3849
1918	3485	3100	3939	3886	4137	4082	1962	3473	3414	3971	3734	3874	3888
1919	3572	3350	3947	3884	4080	3974	1963	3479	3371	4136	3709	3821	3811
1920	3513	3248	3835	3809	3987	3886	1964	3519	3288	4023	3742	3759	3785
1921	3936	3883	4293	4274	4453	4322	1965	3365	3173	3811	3574	3583	3803
1922	3663	3650	4057	3981	4162	4076	1966	3372	3162	3857	3599	3669	3665
1923	3370	3283	3741	3740	3877	3825	1967	3526	3160	3784	3504	3453	3763
1924	3120	3066	3530	3446	3633	3525	1968	3718	3443	4200	3756	3916	3766
1925	3250	3129	3755	3697	3907	3806	1969	3489	3368	3771	3394	3631	3765
1926	2980	3106	3482	3423	3786	3581	1970	3698	3530	4063	3497	3783	3996
1927	3413	3359	3815	3792	3944	3922	1971	3568	3380	4068	3380	3785	3893
1928	3313	3486	3734	3743	3861	3839	1972	3269	3102	3625	3083	3473	3562
1929	3372	3768	3789	3745	3840	3868	1973	3851	3647	4191	3747	4037	4292
1930	3444	3705	4003	3829	4178	4064	1974	3393	3231	3936	3315	3610	3774
1931	3891	3610	4326	4213	4388	4359	1975	3671	3485	4203	3617	3750	3869
1932	3361	3252	3816	3682	3864	3891	1976	3311	3224	3992	3273	3540	3651
1933	3470	3576	3987	3884	4006	4117	1977	3740	3491	4350	3646	4021	4053
1934	3580	3513	3918	3937	4124	4124	1978	3443	3254	3883	3434	3706	4029
1935	3391	3271	3642	3733	3844	3911	1979	3642	3310	3641	3555	3675	3898
1936	3396	3429	3816	3901	4037	4064	1980	3554	3341	3849	3426	3670	3679
1937	3412	3239	3578	3652	3762	3767	1981	3562	3396	3986	3604	3625	3746
1938	3747	3405	4071	4103	4273	4283	1982	3603	3329	4307	3753	3765	4048
1939	3484	3378	3926	3906	4101	4169	1983	3661	3393	4139	3908	3783	4021
1940	3241	3069	3551	3759	3758	3799							

Summary Statistics	BUF	PTD	DET	ERI	TOL	CLV
maximum value	3936	3883	4350	4274	4453	4359
year	1921	1921	1977	1921	1921	1931
minimum value	2968	2720	3308	3083	3453	3381
year	1917	1917	1907	1972	1967	1917
average value	3531	3359	3874	3712	3884	3915

Appendix C (Continued)

Lake Ontario Seasonal Maximum TDD's (°C) 1897-1983

Year	KIN	TOR	OSW	ROC	Year	KIN	TOR	OSW	ROC
1897	3120	3301	3311	3578	1941	3373	3777	3631	3794
1898	3476	3552	3634	3901	1942	3330	3622	3592	3749
1899	3202	3359	3439	3713	1943	3013	3380	3248	3436
1900	3366	3600	3547	3921	1944	3190	3554	3461	3639
1901	3297	3392	3363	3563	1945	3191	3506	3562	3681
1902	3168	3298	3298	3592	1946	3314	3696	3668	3812
1903	3219	3338	3314	3621	1947	3269	3536	3501	3665
1904	2862	2999	3070	3370	1948	3395	3740	3633	3770
1905	2962	3265	3177	3557	1949	3410	3818	3785	3843
1906	3169	3444	3387	3651	1950	2982	3372	3337	3424
1907	2762	3012	3024	3284	1951	3163	3580	3463	3567
1908	3245	3448	3477	3750	1952	3346	3708	3585	3764
1909	3011	3227	3159	3433	1953	3441	3881	3742	3863
1910	3174	3419	3376	3614	1954	3309	3549	3423	3540
1911	3172	3486	3407	3683	1955	3551	3917	3681	3844
1912	3025	3277	3248	3527	1956	3043	3342	3236	3345
1913	3226	3560	3489	3768	1957	3434	3646	3624	3583
1914	3244	3457	3272	3600	1958	3364	3570	3434	3459
1915	3217	3386	3250	3526	1959	3499	3812	3689	3795
1916	3285	3465	3392	3679	1960	3451	3673	3544	3634
1917	2910	2995	2949	3149	1961	3474	3662	3611	3646
1918	3131	3427	3262	3664	1962	3362	3701	3484	3556
1919	3439	3619	3407	3694	1963	3384	3723	3350	3589
1920	3242	3461	3294	3657	1964	3326	3541	3407	3605
1921	3677	3879	3804	4118	1965	3111	3377	3291	3412
1922	3362	3610	3480	3765	1966	3295	3525	3479	3564
1923	3142	3281	3160	3477	1967	3246	3392	3452	3424
1924	2988	3108	3028	3294	1968	3451	3664	3494	3702
1925	3006	3232	3157	3517	1969	3187	3629	3499	3601
1926	2835	2962	2902	3238	1970	3443	3796	3664	3789
1927	3152	3355	3305	3643	1971	3293	3707	3464	3566
1928	3054	3278	3312	3611	1972	3004	3406	3188	3487
1929	3114	3346	3369	3595	1973	3399	3929	3838	4056
1930	3256	3478	3429	3694	1974	3016	3501	3391	3451
1931	3624	3806	3849	4143	1975	3311	3699	3636	3701
1932	3168	3347	3386	3583	1976	2931	3486	3312	3493
1933	3328	3439	3458	3725	1977	3122	3810	3561	3798
1934	3260	3457	3463	3764	1978	2939	3469	3369	3695
1935	3204	3406	3386	3623	1979	3090	3486	3581	3611
1936	3168	3445	3406	3702	1980	3025	3515	3423	3710
1937	3288	3408	3420	3580	1981	3034	3540	3451	3557
1938	3445	3697	3666	3969	1982	3094	3545	3545	3707
1939	2999	3485	3415	3728	1983	3149	3663	3602	3673
1940	3044	3262	3165	3433					

Summary Statistics	KIN	TOR	OSW	ROC
maximum value	3677	3929	3849	4143
year	1921	1973	1931	1931
minimum value	2762	2962	2902	3149
year	1907	1926	1926	1917
average value	3216	3500	3426	3636

Appendix D: Julian Date of Maximum TDD's 1897-1983 by Lake and Station

Lake Superior Julian Date of Maximum TDD's 1897-1983

Year	FTW	HOU	DUL	MQT	SSM	Year	FTW	HOU	DUL	MQT	SSM
1897	314	314	314	319	315	1941	323	339	323	339	326
1898	310	325	324	325	326	1942	294	329	323	329	324
1899	335	334	334	335	335	1943	309	312	309	312	312
1900	311	311	311	311	311	1944	320	331	325	331	326
1901	307	307	306	307	316	1945	303	312	306	321	322
1902	312	328	327	328	328	1946	320	320	319	325	325
1903	315	316	315	315	317	1947	312	312	311	311	311
1904	328	329	329	329	328	1948	313	316	312	340	340
1905	296	328	328	328	328	1949	316	317	317	321	318
1906	313	314	313	314	314	1950	305	311	310	313	312
1907	308	329	311	329	313	1951	299	303	302	303	304
1908	308	334	331	335	335	1952	310	323	323	331	331
1909	318	338	317	339	339	1953	328	327	325	342	342
1910	305	305	305	305	305	1954	325	325	322	333	328
1911	298	314	297	315	316	1955	315	316	305	319	318
1912	316	328	327	328	328	1956	313	319	319	320	325
1913	340	351	339	351	340	1957	311	319	311	323	323
1914	315	319	314	319	315	1958	324	324	322	327	324
1915	315	315	315	317	332	1959	305	305	305	308	308
1916	314	314	314	314	315	1960	331	331	331	340	333
1917	325	325	325	325	321	1961	309	320	306	319	338
1918	323	323	323	323	324	1962	338	338	338	338	339
1919	296	314	296	315	315	1963	325	326	326	332	327
1920	313	313	313	349	313	1964	320	322	321	322	322
1921	308	308	308	308	308	1965	311	311	311	316	317
1922	322	322	322	323	322	1966	301	301	304	331	304
1923	324	325	324	357	346	1967	306	306	306	306	316
1924	310	327	310	327	319	1968	308	309	309	310	315
1925	298	325	288	325	325	1969	315	315	315	315	316
1926	302	311	302	312	312	1970	315	316	315	316	316
1927	308	308	307	315	315	1971	322	322	322	322	323
1928	322	323	322	326	323	1972	316	316	312	316	317
1929	322	321	321	322	321	1973	305	306	305	306	338
1930	327	327	327	327	327	1974	315	315	315	315	324
1931	328	328	327	328	328	1975	314	323	323	324	324
1932	315	315	314	316	316	1976	307	310	289	289	311
1933	306	306	294	306	307	1977	314	314	313	314	325
1934	325	326	325	334	335	1978	313	314	313	314	322
1935	304	305	304	318	318	1979	308	311	309	309	311
1936	294	307	294	319	311	1980	311	311	313	311	311
1937	308	319	317	319	320	1981	322	322	321	322	322
1938	310	317	316	317	317	1982	307	307	306	307	316
1939	299	346	345	352	311	1983	312	313	313	313	313
1940	309	316	315	316	316						

Summary Statistics	FTW	HOU	DUL	MQT	SSM
maximum value	340	351	345	357	346
year	1913	1913	1939	1923	1923
minimum value	294	301	288	289	304
year	1936	1966	1925	1976	1951
average value	313	319	315	322	321

Appendix D (Continued)

Lake Michigan Julian Date of Maximum TDD's 1897-1983

Year	ESC	TVC	GB	MSK	MIL	CHI	Year	ESC	TVC	GB	MSK	MIL	CHI
1897	319	324	325	330	325	330	1941	339	339	339	360	339	360
1898	326	325	326	325	326	325	1942	329	329	329	330	329	329
1899	335	336	336	346	346	346	1943	313	343	312	343	343	344
1900	311	342	312	343	342	343	1944	332	333	332	334	332	332
1901	317	328	318	336	335	336	1945	325	342	322	342	324	342
1902	326	336	328	337	336	337	1946	325	345	325	346	345	346
1903	316	320	317	320	320	320	1947	311	312	311	328	326	326
1904	329	330	330	330	330	330	1948	340	340	340	341	341	341
1905	332	332	332	333	332	332	1949	321	323	318	324	323	324
1906	321	334	321	335	334	348	1950	323	323	323	326	323	323
1907	330	333	332	333	332	363	1951	303	342	303	342	342	342
1908	335	335	334	335	335	335	1952	331	331	331	331	331	346
1909	338	338	338	340	339	339	1953	342	345	328	348	343	347
1910	308	334	305	332	331	332	1954	333	334	324	335	332	332
1911	315	348	315	359	315	360	1955	319	327	319	327	319	327
1912	328	341	340	341	340	341	1956	325	326	320	346	326	341
1913	340	365	351	351	353	359	1957	323	333	323	359	322	359
1914	319	342	319	342	342	343	1958	327	329	324	329	329	329
1915	332	333	332	335	332	344	1959	308	315	308	352	315	315
1916	314	343	315	343	343	343	1960	333	341	333	341	340	341
1917	325	326	325	326	326	338	1961	338	340	338	340	340	340
1918	324	357	356	357	356	357	1962	338	341	338	341	339	338
1919	315	328	315	329	328	333	1963	332	333	332	333	332	332
1920	349	350	349	350	349	349	1964	323	323	322	333	322	323
1921	308	346	312	352	350	351	1965	331	347	330	348	347	358
1922	323	337	323	342	338	342	1966	331	331	331	331	331	334
1923	357	357	356	362	361	364	1967	316	330	316	355	346	355
1924	318	347	327	344	327	343	1968	339	339	330	339	339	339
1925	325	329	325	339	325	339	1969	316	322	316	322	316	336
1926	320	323	319	334	322	321	1970	338	337	324	338	337	346
1927	315	334	333	342	333	334	1971	324	350	324	350	324	350
1928	323	352	323	354	351	352	1972	317	332	319	332	325	326
1929	322	323	322	324	323	323	1973	339	340	339	340	339	339
1930	327	328	327	328	327	328	1974	328	328	327	328	328	350
1931	328	359	328	363	365	365	1975	324	325	324	349	349	349
1932	315	341	315	341	341	341	1976	311	325	311	331	311	331
1933	310	311	310	341	341	357	1977	324	325	324	325	324	328
1934	334	335	334	338	334	337	1978	323	322	317	323	322	331
1935	323	332	323	334	331	331	1979	332	331	331	345	331	365
1936	319	327	326	330	326	366	1980	336	336	328	344	343	343
1937	319	332	319	332	319	319	1981	341	341	323	342	323	342
1938	317	346	325	345	345	345	1982	326	340	339	362	340	362
1939	352	354	353	353	353	353	1983	327	328	327	332	332	332
1940	316	329	316	329	329	366							

Summary Statistics	ESC	TVC	GB	MSK	MIL	CHI
maximum value	357	365	356	363	365	366
year	1923	1913	1918	1931	1931	1936
minimum value	303	311	303	320	311	315
year	1951	1933	1951	1903	1976	1959
average value	326	335	326	339	334	341

Appendix D (Continued)

Lake Huron Julian Date of Maximum TDD's 1897-1983

Year	PAS	ALP	BCI	STN	PTH	Year	PAS	ALP	BCI	STN	PTH
1897	320	325	349	-999	350	1941	339	339	361	-999	340
1898	326	326	325	-999	326	1942	330	330	330	-999	330
1899	336	336	346	-999	346	1943	313	343	343	-999	343
1900	317	341	343	-999	342	1944	324	334	334	-999	334
1901	316	317	318	-999	328	1945	322	326	343	-999	344
1902	328	328	337	-999	337	1946	325	345	346	-999	334
1903	318	317	320	-999	320	1947	327	326	328	-999	328
1904	329	329	330	-999	329	1948	342	341	342	-999	351
1905	316	330	333	-999	333	1949	323	323	324	-999	324
1906	331	334	333	-999	334	1950	324	323	324	-999	324
1907	327	330	333	-999	332	1951	343	319	343	-999	343
1908	335	335	335	-999	335	1952	332	331	360	-999	360
1909	325	339	339	-999	339	1953	342	345	348	-999	348
1910	307	332	332	-999	332	1954	333	334	334	-999	334
1911	316	316	347	-999	350	1955	320	327	327	-999	328
1912	328	341	341	-999	341	1956	326	326	326	-999	359
1913	341	340	351	-999	351	1957	327	333	362	-999	362
1914	312	319	342	-999	342	1958	327	329	330	-999	330
1915	333	333	333	-999	332	1959	315	315	351	-999	352
1916	316	343	344	-999	344	1960	341	341	341	-999	342
1917	322	325	325	-999	326	1961	330	338	340	-999	341
1918	328	357	358	-999	357	1962	340	339	339	-999	340
1919	316	327	329	-999	333	1963	333	333	333	-999	333
1920	314	349	350	-999	349	1964	323	322	323	-999	333
1921	308	336	346	-999	338	1965	331	331	348	-999	349
1922	324	337	338	-999	338	1966	332	332	332	-999	344
1923	346	356	357	-999	357	1967	316	316	356	-999	356
1924	320	328	332	-999	332	1968	329	329	339	-999	339
1925	326	325	326	-999	339	1969	323	322	323	-999	331
1926	323	322	322	-999	322	1970	326	336	337	-999	338
1927	334	334	334	-999	334	1971	324	324	350	-999	350
1928	323	324	366	-999	352	1972	317	317	326	-999	332
1929	322	322	323	-999	322	1973	339	339	339	-999	343
1930	328	328	329	-999	328	1974	328	328	328	-999	328
1931	334	358	358	-999	358	1975	325	325	349	-999	349
1932	317	316	341	-999	342	1976	311	311	332	-999	332
1933	307	310	341	-999	341	1977	328	325	325	-999	328
1934	335	335	335	-999	338	1978	323	322	-999	323	329
1935	315	324	332	-999	333	1979	365	331	-999	332	331
1936	319	319	326	-999	329	1980	329	314	-999	320	344
1937	332	332	332	-999	332	1981	324	324	-999	338	341
1938	326	326	346	-999	345	1982	340	340	-999	341	362
1939	312	344	354	-999	334	1983	314	328	-999	333	332
1940	329	328	329	-999	329						

-999 = NO DATA

Summary Statistics	PAS	ALP	BCI	STN	PTH
maximum value	365	358	366	341	362
year	1979	1931	1928	1982	1957
minimum value	307	310	318	320	320
year	1910	1933	1901	1980	1903
average value	326	330	338	331	339

STN replaces station BCI, which was discontinued

Appendix D (Continued)

Lakes St. Clair & Erie Julian Date of Maximum TDD's 1897-1983

Year	BUF	PTD	DET	ERI	TOL	CLV	Year	BUF	PTD	DET	ERI	TOL	CLV
1897	350	350	349	351	350	350	1941	361	343	361	361	361	361
1898	326	326	326	326	326	326	1942	330	330	330	335	330	330
1899	358	358	346	357	347	357	1943	343	344	343	344	344	344
1900	343	343	342	343	343	343	1944	334	345	345	346	334	334
1901	348	329	336	348	336	348	1945	326	326	343	343	343	343
1902	337	338	337	338	337	338	1946	347	347	346	351	346	347
1903	321	321	320	321	321	321	1947	328	329	328	342	328	342
1904	329	330	330	330	330	334	1948	351	343	351	357	351	351
1905	363	333	333	363	333	363	1949	362	361	365	363	365	365
1906	334	335	334	350	349	349	1950	341	324	324	327	324	327
1907	344	332	334	364	364	364	1951	343	343	344	343	343	343
1908	336	335	336	336	336	365	1952	360	359	359	360	359	359
1909	341	341	339	341	339	339	1953	348	346	348	348	348	348
1910	333	332	332	334	333	333	1954	334	335	334	334	334	365
1911	361	359	360	361	360	361	1955	331	327	327	338	327	331
1912	366	341	341	366	341	342	1956	359	359	359	359	362	359
1913	358	341	351	359	354	359	1957	365	365	365	365	365	365
1914	339	339	342	344	341	344	1958	330	330	330	330	330	330
1915	333	332	332	333	333	333	1959	352	352	362	352	352	362
1916	344	344	344	344	344	344	1960	342	341	341	342	341	341
1917	326	322	326	326	326	338	1961	346	341	340	346	340	346
1918	359	328	358	359	358	359	1962	340	341	339	341	339	340
1919	334	327	333	334	333	334	1963	333	333	333	342	333	334
1920	350	350	349	350	350	349	1964	333	333	333	366	323	333
1921	338	338	351	354	351	351	1965	365	349	365	365	365	365
1922	339	339	339	342	342	342	1966	344	352	343	352	343	352
1923	365	356	363	365	365	365	1967	356	355	355	356	355	356
1924	332	332	332	344	343	354	1968	339	339	339	340	339	339
1925	340	339	339	346	346	346	1969	330	330	331	331	323	335
1926	334	335	334	334	334	334	1970	338	339	344	338	338	357
1927	349	334	334	349	350	350	1971	362	364	364	364	361	364
1928	352	352	352	364	352	352	1972	319	318	338	366	341	366
1929	324	331	323	323	323	331	1973	340	340	343	340	339	363
1930	328	329	328	346	328	347	1974	328	328	365	328	328	337
1931	358	359	364	365	365	365	1975	349	334	350	349	349	350
1932	342	342	342	342	342	342	1976	332	332	332	332	332	332
1933	341	341	341	358	358	358	1977	336	329	328	337	328	337
1934	338	339	338	338	337	338	1978	342	329	342	342	330	358
1935	334	333	332	350	332	352	1979	346	346	365	359	346	359
1936	326	327	326	366	366	366	1980	337	337	344	344	344	344
1937	332	333	332	332	332	332	1981	338	341	342	342	342	342
1938	346	346	346	346	346	346	1982	362	362	362	362	362	362
1939	354	355	354	354	354	354	1983	333	333	349	349	333	349
1940	365	329	329	366	366	366							

Summary Statistics	BUF	PTD	DET	ERI	TOL	CLV
maximum value	366	365	365	366	366	366
year	1912	1957	1949	1912	1936	1936
minimum value	319	318	320	321	321	321
year	1972	1972	1903	1903	1903	1903
average value	343	339	342	347	343	348

Appendix D (Continued)

Lake Ontario Julian Date of Maximum TDD's 1897-1983

Year	KIN	TOR	OSW	ROC	Year	KIN	TOR	OSW	ROC
1897	351	350	351	350	1941	339	339	340	340
1898	327	326	327	326	1942	330	330	331	330
1899	337	347	358	358	1943	336	344	343	343
1900	328	343	342	343	1944	333	345	334	334
1901	317	326	321	316	1945	323	343	332	326
1902	337	337	337	337	1946	346	346	347	347
1903	319	321	322	321	1947	317	329	329	329
1904	329	330	329	329	1948	348	348	349	348
1905	333	333	333	363	1949	324	324	362	324
1906	332	335	332	334	1950	324	341	338	338
1907	331	332	332	344	1951	343	345	344	343
1908	336	336	336	336	1952	347	360	361	360
1909	326	341	341	341	1953	348	348	349	348
1910	319	334	334	331	1954	334	334	334	334
1911	351	361	361	361	1955	320	331	331	328
1912	342	342	342	366	1956	327	359	359	359
1913	341	351	359	359	1957	327	365	365	365
1914	337	342	339	342	1958	330	330	330	330
1915	336	336	336	333	1959	344	352	352	352
1916	345	344	346	344	1960	342	342	342	342
1917	326	326	326	326	1961	341	346	347	346
1918	334	357	359	359	1962	342	342	342	342
1919	328	329	334	334	1963	333	333	334	333
1920	324	350	350	350	1964	334	333	334	334
1921	326	339	338	338	1965	338	365	365	365
1922	339	339	339	339	1966	334	351	352	352
1923	360	357	362	362	1967	317	356	356	356
1924	333	344	344	344	1968	330	340	340	340
1925	327	340	342	342	1969	323	330	331	333
1926	330	330	331	334	1970	337	337	338	337
1927	334	334	348	348	1971	325	350	351	325
1928	329	354	354	354	1972	318	336	319	366
1929	323	323	324	324	1973	340	347	344	344
1930	329	329	329	328	1974	328	364	329	328
1931	358	358	359	359	1975	335	364	349	349
1932	342	342	342	342	1976	333	333	333	333
1933	308	312	341	341	1977	329	337	337	337
1934	338	339	339	339	1978	323	328	324	342
1935	333	333	333	333	1979	346	346	346	346
1936	320	326	326	326	1980	337	337	338	337
1937	332	332	334	333	1981	338	342	339	338
1938	326	346	347	346	1982	341	363	342	363
1939	344	354	344	354	1983	335	340	341	350
1940	329	329	329	329					

Summary Statistics	KIN	TOR	OSW	ROC
maximum value	360	365	365	366
year	1923	1957	1957	1912
minimum value	308	312	319	316
year	1933	1933	1972	1901
average value	333	341	341	342

Appendix E: Seasonal Maximum FDD's and Associated Years in Descending Order
by Lake and Station

Lake Superior FDD's and Years in Descending Order

Rank	FDD				
	FTW	HOU	DUL	MQT	SSM
1	2003	1362	1738	1450	1467
2	1851	1354	1703	1391	1395
3	1807	1337	1685	1373	1393
4	1805	1328	1672	1260	1372
5	1784	1300	1671	1259	1371
6	1772	1295	1634	1241	1363
7	1766	1292	1628	1237	1312
8	1739	1279	1623	1236	1292
9	1739	1275	1588	1204	1291
10	1733	1268	1584	1198	1279
11	1726	1268	1547	1187	1261
12	1708	1257	1526	1154	1256
13	1684	1227	1523	1153	1254
14	1678	1224	1487	1081	1250
15	1667	1215	1484	1070	1209
16	1667	1197	1481	1066	1200
17	1658	1175	1479	1058	1192
18	1655	1140	1468	1043	1182
19	1641	1129	1467	1031	1176
20	1640	1101	1435	1030	1159
21	1629	1099	1434	1010	1149
22	1621	1096	1418	992	1139
23	1600	1094	1416	989	1134
24	1600	1091	1413	975	1118
25	1593	1085	1401	969	1117
26	1565	1072	1394	966	1103
27	1561	1071	1392	963	1100
28	1554	1061	1390	929	1088
29	1536	1060	1383	922	1081
30	1524	1047	1381	913	1075
31	1521	1045	1378	906	1074
32	1520	1036	1374	906	1069
33	1499	1036	1370	905	1063
34	1488	1034	1368	902	1059
35	1472	1032	1367	886	1048
36	1471	1026	1337	875	1038
37	1469	1018	1336	874	1034
38	1461	1014	1325	859	1023
39	1455	1011	1310	857	1014
40	1448	1010	1305	857	1013
41	1423	1004	1298	849	1012
42	1416	1001	1296	846	1006
43	1412	962	1295	823	1004

Rank	Year				
	FTW	HOU	DUL	MQT	SSM
1	1979	1904	1904	1979	1904
2	1965	1979	1979	1977	1918
3	1899	1912	1965	1972	1923
4	1904	1920	1912	1971	1934
5	1972	1917	1936	1982	1920
6	1943	1959	1972	1904	1912
7	1959	1948	1920	1978	1917
8	1950	1899	1917	1970	1899
9	1936	1965	1951	1912	1977
10	1967	1963	1950	1899	1959
11	1912	1972	1959	1974	1905
12	1948	1951	1982	1920	1963
13	1917	1923	1899	1917	1982
14	1923	1918	1956	1968	1979
15	1937	1977	1923	1918	1970
16	1957	1950	1971	1976	1943
17	1951	1970	1957	1923	1971
18	1939	1957	1918	1963	1936
19	1920	1943	1977	1980	1978
20	1982	1936	1970	1967	1907
21	1963	1952	1962	1969	1972
22	1970	1967	1974	1959	1948
23	1934	1905	1916	1975	1965
24	1974	1971	1978	1981	1926
25	1977	1982	1913	1934	1981
26	1978	1913	1967	1905	1930
27	1913	1934	1934	1936	1925
28	1971	1974	1937	1965	1950
29	1918	1916	1928	1943	1957
30	1952	1962	1943	1973	1974
31	1962	1926	1948	1948	1967
32	1925	1925	1952	1925	1928
33	1907	1907	1925	1916	1916
34	1956	1960	1963	1913	1939
35	1905	1930	1907	1926	1911
36	1976	1978	1949	1900	1968
37	1901	1928	1922	1962	1962
38	1941	1929	1930	1950	1956
39	1955	1900	1905	1930	1976
40	1938	1956	1960	1907	1922
41	1947	1901	1969	1901	1913
42	1926	1968	1975	1929	1927
43	1960	1964	1929	1939	1901

Appendix E (Continued)

Lake Superior FDD's and Years in Descending Order

FDD						Year					
Rank	FTW	HOU	DUL	MQT	SSM	Rank	FTW	HOU	DUL	MQT	SSM
44	1411	959	1292	814	991	44	1946	1933	1939	1957	1935
45	1396	958	1289	806	986	45	1898	1955	1976	1951	1900
46	1395	945	1271	795	985	46	1930	1947	1933	1928	1908
47	1394	938	1266	774	980	47	1969	1976	1926	1933	1945
48	1384	937	1265	764	974	48	1964	1949	1911	1937	1914
49	1379	932	1259	751	966	49	1928	1927	1966	1927	1938
50	1364	931	1253	745	946	50	1916	1937	1955	1922	1960
51	1364	924	1248	741	941	51	1980	1961	1927	1983	1961
52	1363	920	1203	726	939	52	1949	1922	1973	1915	1969
53	1356	916	1186	723	935	53	1944	1980	1954	1938	1980
54	1355	906	1177	714	933	54	1900	1966	1968	1945	1951
55	1355	891	1175	713	931	55	1968	1969	1980	1909	1975
56	1353	876	1166	711	928	56	1903	1915	1947	1947	1952
57	1352	874	1164	707	927	57	1966	1954	1946	1952	1946
58	1350	868	1164	695	926	58	1954	1939	1935	1960	1947
59	1337	863	1152	694	921	59	1922	1981	1915	1956	1940
60	1333	858	1148	693	918	60	1927	1914	1964	1911	1910
61	1324	854	1116	692	910	61	1933	1909	1901	1914	1929
62	1299	847	1101	687	909	62	1909	1958	1938	1910	1964
63	1293	844	1090	668	904	63	1961	1975	1910	1946	1937
64	1290	840	1090	668	902	64	1973	1946	1981	1935	1944
65	1287	832	1082	664	900	65	1945	1935	1909	1924	1955
66	1285	823	1081	662	889	66	1929	1973	1941	1906	1924
67	1281	820	1078	661	884	67	1911	1945	1906	1908	1941
68	1267	817	1054	653	884	68	1981	1898	1900	1898	1915
69	1262	807	1052	650	881	69	1975	1906	1958	1961	1898
70	1238	796	1051	634	872	70	1935	1910	1945	1955	1906
71	1203	794	1038	628	868	71	1924	1908	1953	1903	1909
72	1196	793	1034	625	839	72	1902	1938	1924	1941	1954
73	1194	790	1033	623	807	73	1914	1924	1914	1940	1942
74	1186	784	1027	614	792	74	1906	1911	1961	1949	1933
75	1175	783	1013	610	789	75	1908	1941	1944	1964	1902
76	1151	775	1010	603	778	76	1940	1953	1898	1902	1949
77	1139	770	985	596	778	77	1958	1944	1908	1944	1903
78	1121	712	970	578	775	78	1915	1902	1983	1958	1958
79	1119	710	954	543	749	79	1910	1903	1903	1966	1966
80	1075	688	937	539	749	80	1983	1940	1932	1954	1973
81	1074	686	930	501	724	81	1953	1983	1940	1942	1931
82	1018	621	886	481	686	82	1942	1921	1921	1953	1983
83	945	620	868	457	634	83	1921	1942	1902	1921	1953
84	914	609	851	435	626	84	1932	1932	1919	1931	1921
85	897	589	720	424	608	85	1919	1931	1942	1932	1919
86	879	513	690	403	575	86	1931	1919	1931	1919	1932

Winter Severity Class Lower Bounds	FTW	HOU	DUL	MQT	SSM
severe	1799	1320	1672	1260	1372
severer than normal	1657	1168	1477	1055	1190
normal	1263	809	1052	651	882
milder than normal	1035	640	899	487	697

Appendix E (Continued)

Lake Michigan FDD's and Years in Descending Order

FDD						
Rank	ESC	TVC	GB	MSK	MIL	CHI
1	1326	1109	1288	800	915	779
2	1256	1008	1199	783	896	757
3	1218	950	1190	705	875	737
4	1200	937	1181	699	838	723
5	1194	902	1179	681	837	715
6	1144	896	1149	675	818	692
7	1135	893	1143	669	816	633
8	1108	873	1141	664	801	612
9	1086	849	1134	659	798	608
10	1060	830	1095	642	787	601
11	1040	805	1079	609	786	598
12	1030	796	1050	573	774	587
13	1025	785	1049	565	769	567
14	989	769	1028	524	724	558
15	978	750	1019	503	709	549
16	971	740	1008	492	705	535
17	970	732	1003	485	704	520
18	968	726	993	479	701	488
19	963	703	976	476	691	484
20	959	685	963	448	667	483
21	953	663	949	448	639	462
22	939	655	947	447	639	458
23	934	647	943	437	615	444
24	933	645	937	421	607	439
25	925	638	936	419	585	436
26	920	631	873	411	544	421
27	908	626	860	409	544	421
28	908	622	854	404	543	408
29	881	622	853	400	526	399
30	871	619	843	399	522	394
31	865	614	827	399	517	391
32	859	605	823	398	515	389
33	852	603	817	391	504	383
34	849	598	811	388	501	377
35	842	595	808	386	499	375
36	836	594	804	382	499	375
37	834	591	799	380	491	365
38	818	580	786	380	489	358
39	816	576	780	375	489	339
40	814	574	774	371	486	337
41	813	571	774	369	481	329
42	808	566	768	368	479	327
43	801	552	759	365	477	326

Year						
Rank	ESC	TVC	GB	MSK	MIL	CHI
1	1904	1904	1904	1904	1904	1963
2	1912	1899	1977	1912	1963	1978
3	1899	1963	1912	1977	1977	1904
4	1920	1979	1979	1899	1959	1977
5	1917	1965	1959	1978	1912	1979
6	1923	1959	1899	1979	1978	1982
7	1918	1978	1978	1920	1979	1936
8	1959	1912	1920	1963	1899	1912
9	1963	1920	1917	1918	1982	1959
10	1905	1977	1963	1959	1920	1899
11	1977	1905	1951	1905	1917	1918
12	1936	1918	1971	1917	1918	1905
13	1972	1917	1918	1982	1936	1962
14	1965	1962	1936	1970	1971	1965
15	1934	1943	1905	1962	1962	1920
16	1926	1923	1962	1936	1905	1951
17	1930	1970	1970	1900	1943	1917
18	1979	1948	1972	1971	1951	1964
19	1943	1936	1948	1910	1965	1943
20	1948	1982	1965	1902	1948	1948
21	1929	1934	1943	1948	1970	1945
22	1916	1961	1982	1901	1910	1902
23	1913	1964	1929	1907	1972	1929
24	1925	1971	1956	1981	1929	1910
25	1978	1969	1923	1974	1945	1970
26	1982	1967	1952	1972	1964	1961
27	1901	1980	1926	1951	1960	1900
28	1928	1968	1957	1916	1967	1901
29	1962	1972	1950	1969	1925	1981
30	1950	1945	1916	1914	1923	1972
31	1970	1974	1925	1956	1926	1940
32	1951	1951	1922	1980	1981	1971
33	1900	1925	1910	1923	1916	1960
34	1971	1956	1967	1925	1900	1967
35	1939	1930	1901	1968	1902	1966
36	1922	1924	1964	1943	1957	1980
37	1974	1929	1969	1961	1947	1968
38	1907	1910	1960	1926	1946	1903
39	1956	1900	1945	1929	1966	1915
40	1937	1926	1955	1924	1930	1930
41	1933	1916	1930	1934	1901	1946
42	1945	1960	1928	1960	1940	1976
43	1957	1981	1913	1940	1958	1947

Appendix E (Continued)

Lake Michigan FDD's and Years in Descending Order

FDD							Year						
Rank	ESC	TVC	GB	MSK	MIL	CHI	Rank	ESC	TVC	GB	MSK	MIL	CHI
44	799	525	753	355	475	323	44	1915	1901	1900	1965	1980	1969
45	797	524	740	350	473	317	45	1927	1950	1968	1903	1915	1958
46	796	523	737	347	469	315	46	1968	1947	1974	1966	1969	1926
47	779	514	736	342	460	314	47	1910	1911	1927	1930	1974	1974
48	776	514	726	340	454	299	48	1967	1966	1976	1967	1956	1925
49	775	514	726	334	452	280	49	1938	1952	1934	1898	1968	1898
50	769	510	714	333	448	273	50	1924	1955	1975	1945	1898	1924
51	757	508	711	331	446	267	51	1976	1938	1937	1952	1961	1973
52	739	506	708	324	443	266	52	1952	1957	1924	1958	1973	1952
53	734	499	700	314	442	265	53	1914	1928	1915	1915	1913	1957
54	732	493	698	314	437	249	54	1981	1915	1935	1922	1952	1916
55	732	493	696	306	436	246	55	1935	1907	1938	1908	1924	1928
56	731	491	685	300	423	245	56	1898	1976	1981	1957	1903	1975
57	728	478	685	299	418	245	57	1911	1927	1980	1911	1922	1935
58	716	475	681	294	416	244	58	1906	1958	1898	1935	1935	1923
59	713	471	677	293	408	242	59	1960	1935	1939	1947	1928	1956
60	709	468	677	291	403	232	60	1947	1898	1941	1955	1975	1938
61	708	464	677	288	395	227	61	1909	1973	1946	1906	1942	1927
62	706	461	673	287	395	222	62	1961	1902	1907	1950	1950	1922
63	701	459	668	286	393	221	63	1975	1939	1902	1927	1976	1955
64	693	455	664	285	388	217	64	1902	1909	1903	1913	1927	1913
65	686	455	659	285	385	206	65	1940	1913	1947	1946	1955	1914
66	683	450	658	274	382	206	66	1908	1946	1966	1964	1941	1941
67	680	437	656	273	377	206	67	1941	1940	1911	1973	1907	1942
68	672	433	655	263	374	202	68	1903	1944	1958	1938	1949	1934
69	669	412	644	259	368	199	69	1946	1937	1940	1909	1934	1949
70	649	404	639	256	368	199	70	1955	1954	1906	1949	1944	1944
71	636	401	639	254	365	197	71	1973	1942	1961	1941	1914	1950
72	629	399	631	247	360	192	72	1964	1914	1949	1976	1938	1907
73	617	386	622	239	351	181	73	1969	1922	1953	1975	1911	1911
74	610	383	619	237	343	178	74	1949	1949	1914	1942	1937	1937
75	606	383	618	210	336	173	75	1944	1941	1909	1939	1908	1983
76	594	369	601	202	326	163	76	1980	1903	1973	1944	1906	1939
77	582	367	594	198	324	158	77	1958	1908	1933	1953	1939	1933
78	573	364	594	198	317	147	78	1954	1975	1908	1954	1909	1908
79	549	360	548	191	292	134	79	1966	1933	1954	1928	1933	1954
80	528	356	513	171	279	127	80	1942	1906	1944	1933	1953	1906
81	507	353	481	168	271	114	81	1931	1953	1942	1919	1954	1931
82	503	317	417	165	221	110	82	1932	1931	1932	1937	1919	1919
83	479	272	414	149	189	99	83	1953	1983	1931	1921	1983	1953
84	470	226	391	148	183	99	84	1921	1919	1983	1983	1931	1909
85	448	216	376	116	170	95	85	1919	1921	1919	1932	1921	1932
86	440	201	369	103	160	86	86	1983	1932	1921	1931	1932	1921

Winter Severity Class	Lower Bounds	ESC	TVC	GB	MSK	MIL	CHI
severe		1198	926	1180	694	838	721
severer than normal		970	731	1001	484	703	514
normal		670	416	646	260	369	200
milder than normal		504	328	436	166	236	111

Appendix E (Continued)

Lakes St.Clair & Erie FDD's and Years in Descending Order

Rank	FDD					
	BUF	PTD	DET	ERI	TOL	CLV
1	683	997	746	648	827	671
2	668	863	670	620	757	624
3	664	841	648	619	720	616
4	655	816	621	573	677	567
5	629	810	608	565	612	544
6	625	791	585	564	589	526
7	608	747	582	537	576	493
8	591	720	527	536	556	476
9	573	679	512	527	554	449
10	546	673	511	525	532	423
11	537	653	504	469	532	400
12	527	652	482	440	530	395
13	519	650	477	426	503	395
14	516	604	467	416	498	394
15	516	588	458	415	496	393
16	503	582	452	402	494	391
17	502	550	448	399	443	391
18	494	544	443	386	434	379
19	486	543	439	385	424	374
20	481	541	435	379	423	373
21	480	536	431	369	411	368
22	476	532	428	354	406	363
23	459	517	427	349	387	348
24	442	508	426	346	386	341
25	431	507	415	345	385	332
26	423	504	408	344	383	327
27	421	500	407	340	383	317
28	419	498	377	323	374	309
29	410	497	376	315	374	305
30	392	495	372	309	371	303
31	391	494	358	308	369	300
32	389	494	353	301	364	282
33	387	492	346	300	361	280
34	374	489	346	293	349	276
35	369	480	341	290	349	267
36	368	468	339	286	343	267
37	363	460	335	283	330	264
38	362	442	333	282	313	261
39	359	442	332	277	311	252
40	355	432	328	277	304	249
41	353	429	315	274	303	239
42	352	417	314	273	296	237
43	352	408	301	266	295	237

Rank	Year					
	BUF	PTD	DET	ERI	TOL	CLV
1	1918	1918	1904	1978	1978	1977
2	1905	1904	1912	1904	1977	1963
3	1920	1912	1918	1977	1963	1904
4	1904	1905	1963	1970	1904	1978
5	1977	1920	1920	1918	1982	1918
6	1978	1936	1905	1963	1918	1912
7	1963	1917	1936	1979	1912	1905
8	1912	1978	1977	1912	1936	1920
9	1934	1916	1978	1920	1979	1936
10	1961	1963	1899	1905	1970	1961
11	1970	1977	1917	1936	1905	1979
12	1936	1959	1959	1959	1920	1982
13	1959	1899	1948	1982	1945	1902
14	1940	1907	1979	1940	1959	1945
15	1979	1900	1901	1981	1981	1981
16	1917	1970	1970	1968	1948	1917
17	1982	1940	1910	1917	1962	1970
18	1948	1902	1945	1961	1917	1910
19	1926	1910	1940	1902	1902	1968
20	1945	1911	1943	1934	1940	1959
21	1943	1948	1900	1962	1961	1899
22	1968	1914	1962	1926	1899	1940
23	1962	1982	1934	1910	1969	1962
24	1907	1945	1902	1945	1943	1948
25	1916	1908	1982	1899	1971	1971
26	1981	1934	1981	1980	1901	1980
27	1971	1981	1926	1971	1951	1964
28	1900	1923	1925	1900	1964	1901
29	1923	1915	1916	1976	1976	1926
30	1969	1962	1915	1901	1910	1900
31	1960	1979	1961	1916	1980	1976
32	1914	1961	1935	1948	1968	1951
33	1901	1943	1907	1907	1974	1966
34	1910	1968	1971	1943	1900	1934
35	1902	1935	1929	1914	1965	1915
36	1935	1926	1903	1972	1915	1969
37	1941	1971	1930	1958	1926	1924
38	1976	1925	1951	1969	1956	1907
39	1915	1960	1914	1960	1934	1960
40	1967	1938	1923	1924	1967	1929
41	1899	1965	1908	1915	1925	1903
42	1980	1956	1968	1966	1903	1958
43	1956	1964	1911	1964	1929	1916

Appendix E (Continued)

Lakes St.Clair & Erie FDD's and Years in Descending Order

FDD							Year						
Rank	BUF	PTD	DET	ERI	TOL	CLV	Rank	BUF	PTD	DET	ERI	TOL	CLV
44	350	407	291	262	293	236	44	1925	1941	1946	1965	1972	1925
45	343	407	291	261	293	236	45	1946	1903	1924	1923	1966	1914
46	338	399	285	251	286	212	46	1924	1927	1913	1951	1946	1942
47	336	390	280	249	283	206	47	1927	1974	1960	1956	1958	1923
48	336	388	276	244	276	203	48	1964	1924	1976	1929	1960	1946
49	333	386	274	243	263	202	49	1911	1972	1898	1925	1947	1972
50	331	381	273	242	257	185	50	1965	1969	1947	1903	1916	1965
51	328	377	271	233	256	185	51	1930	1951	1956	1941	1924	1908
52	328	375	270	230	254	184	52	1966	1939	1965	1935	1957	1957
53	328	372	268	222	254	183	53	1974	1980	1938	1908	1930	1947
54	327	370	267	219	253	179	54	1972	1898	1969	1930	1935	1955
55	323	369	265	218	252	178	55	1942	1909	1967	1942	1907	1941
56	319	369	260	216	248	176	56	1944	1976	1942	1957	1914	1944
57	315	355	260	201	243	175	57	1958	1946	1958	1928	1944	1927
58	310	351	258	200	236	169	58	1929	1967	1966	1955	1942	1956
59	306	351	258	197	236	168	59	1928	1952	1941	1974	1923	1922
60	299	347	258	197	216	161	60	1922	1913	1922	1927	1955	1913
61	298	346	256	192	213	157	61	1947	1922	1980	1944	1941	1911
62	297	345	255	187	210	156	62	1938	1928	1927	1911	1927	1906
63	286	343	254	186	205	155	63	1903	1942	1972	1922	1973	1943
64	283	341	246	174	204	150	64	1931	1966	1957	1946	1952	1928
65	280	341	245	173	203	149	65	1908	1944	1952	1906	1908	1898
66	280	340	233	173	203	149	66	1939	1906	1928	1938	1975	1930
67	268	338	231	170	203	145	67	1955	1957	1939	1973	1922	1967
68	261	337	229	169	194	144	68	1957	1958	1944	1913	1913	1935
69	260	323	229	168	188	128	69	1973	1955	1974	1967	1911	1954
70	257	321	219	159	186	119	70	1951	1947	1964	1947	1938	1952
71	235	302	215	159	171	106	71	1952	1931	1955	1954	1898	1975
72	233	296	187	154	168	105	72	1898	1930	1906	1952	1906	1950
73	228	291	184	148	162	100	73	1954	1950	1950	1975	1928	1938
74	222	281	177	146	155	99	74	1950	1901	1954	1931	1954	1973
75	213	278	161	138	149	98	75	1913	1973	1973	1898	1939	1974
76	208	278	156	136	148	77	76	1906	1954	1937	1950	1983	1933
77	181	276	149	109	143	76	77	1909	1929	1909	1939	1950	1983
78	163	258	147	89	107	74	78	1983	1919	1931	1983	1937	1932
79	149	240	140	77	106	72	79	1975	1937	1933	1933	1933	1939
80	146	217	109	74	99	66	80	1937	1921	1975	1932	1931	1919
81	137	208	104	69	73	62	81	1921	1949	1949	1919	1919	1909
82	120	190	104	61	73	60	82	1949	1975	1921	1921	1909	1931
83	116	172	86	60	73	54	83	1933	1933	1983	1937	1932	1949
84	113	164	83	54	67	53	84	1932	1953	1932	1909	1949	1921
85	99	162	82	45	59	39	85	1953	1983	1919	1949	1921	1937
86	92	93	60	30	53	30	86	1919	1932	1953	1953	1953	1953

Winter Severity Class Lower Bounds	BUF	PTD	DET	ERI	TOL	CLV
severe	647	814	617	571	658	560
severer then normal	500	549	447	396	441	389
normal	260	326	229	168	189	131
milder then normal	125	195	104	63	73	61

Appendix E (Continued)

Lake Ontario FDD's and Years in Descending Order

FDD					Year				
Rank	KIN	TOR	OSW	ROC	Rank	KIN	TOR	OSW	ROC
1	1134	854	792	712	1	1905	1904	1904	1904
2	1132	765	791	673	2	1904	1918	1918	1918
3	1068	755	756	649	3	1918	1905	1905	1905
4	1018	735	716	636	4	1934	1920	1920	1920
5	974	685	642	609	5	1948	1934	1934	1963
6	961	654	616	568	6	1978	1912	1912	1959
7	961	589	597	565	7	1907	1936	1978	1912
8	943	577	585	561	8	1970	1907	1923	1978
9	917	563	579	560	9	1959	1917	1970	1977
10	898	559	574	555	10	1923	1977	1940	1948
11	896	558	567	550	11	1920	1963	1936	1945
12	888	551	554	539	12	1912	1923	1977	1970
13	873	551	549	522	13	1971	1959	1907	1979
14	858	542	548	518	14	1911	1948	1948	1982
15	855	541	528	516	15	1940	1899	1981	1936
16	841	526	523	513	16	1936	1978	1917	1940
17	834	524	520	507	17	1943	1940	1959	1981
18	820	523	501	504	18	1963	1900	1968	1934
19	820	516	499	500	19	1945	1926	1935	1943
20	818	515	499	495	20	1977	1943	1979	1961
21	818	502	491	486	21	1917	1901	1914	1917
22	800	500	488	486	22	1941	1970	1963	1971
23	781	495	486	475	23	1979	1945	1943	1960
24	778	476	480	470	24	1935	1935	1916	1968
25	778	472	475	462	25	1981	1979	1926	1941
26	772	472	473	453	26	1956	1982	1901	1907
27	752	471	466	450	27	1982	1916	1982	1962
28	742	470	464	446	28	1976	1981	1971	1901
29	735	463	462	442	29	1946	1962	1911	1956
30	735	453	462	429	30	1968	1914	1964	1980
31	730	446	459	423	31	1914	1925	1945	1923
32	722	439	449	419	32	1974	1902	1961	1902
33	711	438	446	413	33	1908	1968	1900	1914
34	708	437	437	413	34	1962	1911	1956	1900
35	706	436	435	413	35	1916	1971	1899	1916
36	699	427	428	400	36	1899	1941	1902	1926
37	699	425	423	395	37	1961	1927	1941	1946
38	697	421	415	392	38	1960	1908	1925	1944
39	696	411	409	382	39	1926	1930	1910	1910
40	694	408	408	376	40	1900	1961	1922	1935
41	694	407	405	371	41	1901	1915	1976	1899
42	678	406	398	371	42	1955	1910	1965	1964
43	666	399	398	371	43	1950	1903	1944	1965

Appendix E (Continued)

Lake Ontario FDD's and Years in Descending Order

FDD					Year				
Rank	KIN	TOR	OSW	ROC	Rank	KIN	TOR	OSW	ROC
44	664	385	392	358	44	1925	1946	1980	1976
45	650	384	387	358	45	1972	1960	1903	1911
46	647	380	386	346	46	1969	1939	1915	1969
47	646	378	382	346	47	1965	1938	1946	1958
48	644	374	381	339	48	1964	1924	1927	1955
49	631	354	380	331	49	1947	1898	1969	1942
50	630	349	379	329	50	1939	1969	1962	1915
51	630	346	375	321	51	1902	1956	1908	1924
52	629	342	369	320	52	1944	1944	1972	1947
53	626	342	355	317	53	1927	1947	1924	1972
54	619	342	354	313	54	1980	1967	1960	1925
55	619	341	353	306	55	1967	1974	1942	1957
56	617	339	350	303	56	1942	1929	1930	1908
57	613	337	348	302	57	1973	1928	1939	1922
58	603	337	346	302	58	1930	1965	1974	1951
59	596	329	324	299	59	1952	1922	1931	1974
60	594	329	324	298	60	1957	1942	1938	1930
61	590	328	314	296	61	1951	1972	1928	1903
62	590	319	308	291	62	1938	1980	1947	1927
63	580	312	307	284	63	1909	1964	1958	1966
64	574	300	299	281	64	1922	1958	1955	1967
65	560	297	296	273	65	1910	1931	1898	1939
66	552	288	295	267	66	1903	1909	1957	1952
67	529	286	281	263	67	1898	1906	1929	1938
68	528	284	278	259	68	1906	1966	1951	1929
69	525	278	277	251	69	1966	1952	1906	1928
70	523	278	275	249	70	1924	1955	1973	1954
71	522	275	271	239	71	1928	1957	1909	1931
72	518	271	268	238	72	1915	1913	1966	1898
73	512	262	252	235	73	1954	1954	1952	1950
74	501	258	247	217	74	1975	1950	1950	1913
75	491	255	243	213	75	1949	1975	1913	1973
76	484	255	231	196	76	1929	1976	1954	1906
77	483	250	222	179	77	1958	1951	1967	1909
78	476	225	205	164	78	1931	1973	1921	1975
79	437	201	198	160	79	1913	1949	1983	1949
80	399	191	194	159	80	1937	1937	1975	1983
81	395	171	166	129	81	1953	1921	1937	1921
82	344	156	160	124	82	1919	1933	1949	1937
83	335	148	159	123	83	1983	1983	1919	1953
84	327	148	130	101	84	1921	1919	1932	1932
85	255	125	129	85	85	1932	1953	1953	1919
86	250	120	92	83	86	1933	1932	1933	1933

Winter Severity Class	Lower Bounds	KIN	TOR	OSW	ROC
severe		1005	720	694	628
severer than normal		831	524	516	506
normal		526	279	277	253
milder than normal		359	160	162	126

Appendix F: FDD-Dates and Associated Years in Descending Order by
Lake and Station

Lake Superior FDD-Dates and Years in Descending Order

FDD-Dates						Year					
Rank	FTW	HOU	DUL	MQT	SSM	Rank	FTW	HOU	DUL	MQT	SSM
1	112	112	112	110	112	1	1904	1904	1904	1983	1904
2	111	111	111	110	111	2	1928	1928	1928	1947	1928
3	111	110	109	110	110	3	1947	1907	1983	1907	1907
4	110	109	108	105	109	4	1907	1947	1907	1923	1926
5	109	109	106	104	109	5	1983	1983	1909	1950	1947
6	108	108	105	103	107	6	1926	1926	1962	1982	1943
7	107	106	104	103	107	7	1943	1962	1950	1957	1923
8	107	106	103	103	105	8	1935	1943	1914	1975	1940
9	106	105	103	103	105	9	1909	1950	1952	1914	1917
10	106	105	103	103	105	10	1939	1917	1957	1973	1950
11	105	105	103	102	104	11	1950	1923	1933	1939	1957
12	105	104	103	102	104	12	1940	1940	1975	1970	1909
13	104	104	103	101	104	13	1962	1957	1920	1979	1920
14	104	103	102	100	104	14	1917	1975	1939	1972	1934
15	104	103	102	100	103	15	1957	1920	1947	1978	1914
16	104	102	101	100	103	16	1923	1939	1982	1909	1939
17	103	102	101	100	103	17	1952	1966	1923	1960	1975
18	103	102	101	99	102	18	1914	1970	1979	1916	1982
19	102	102	100	99	102	19	1933	1914	1956	1936	1970
20	102	101	100	98	102	20	1970	1979	1960	1974	1972
21	102	101	100	98	101	21	1975	1960	1972	1977	1960
22	101	100	99	97	100	22	1979	1972	1916	1926	1979
23	101	100	99	97	100	23	1936	1916	1964	1911	1964
24	101	100	99	96	100	24	1956	1961	1936	1944	1899
25	101	100	98	96	99	25	1960	1909	1911	1898	1974
26	100	100	98	95	99	26	1972	1982	1974	1971	1936
27	100	99	98	95	99	27	1912	1964	1935	1964	1977
28	100	99	97	95	99	28	1948	1936	1966	1908	1978
29	99	98	96	95	99	29	1944	1911	1926	1932	1944
30	99	98	95	94	99	30	1978	1977	1898	1954	1908
31	99	98	95	94	98	31	1920	1935	1971	1912	1911
32	99	98	95	94	97	32	1964	1974	1944	1980	1898
33	98	96	95	94	96	33	1982	1899	1932	1899	1971
34	98	96	94	93	95	34	1898	1898	1899	1937	1932
35	98	95	94	93	94	35	1938	1932	1970	1965	1948
36	98	95	94	92	94	36	1974	1971	1908	1924	1912
37	98	95	94	92	94	37	1911	1944	1940	1915	1965
38	98	95	94	92	94	38	1977	1908	1954	1969	1954
39	98	94	93	91	94	39	1927	1954	1948	1956	1935
40	98	94	93	91	93	40	1913	1912	1965	1934	1937
41	96	94	93	91	93	41	1966	1965	1937	1931	1969
42	95	93	92	91	93	42	1908	1969	1961	1930	1915
43	95	93	92	90	93	43	1932	1937	1969	1901	1966

Appendix F (Continued)

Lake Superior FDD-Dates and Years in Descending Order

FDD-Dates						Year					
Rank	FTW	HOU	DUL	MQT	SSM	Rank	FTW	HOU	DUL	MQT	SSM
44	95	92	92	90	93	44	1899	1924	1915	1922	1924
45	95	92	92	90	92	45	1971	1915	1924	1900	1930
46	95	91	91	89	92	46	1954	1930	1934	1952	1956
47	95	91	91	88	92	47	1903	1956	1912	1904	1929
48	94	91	91	88	91	48	1965	1934	1930	1933	1919
49	93	91	91	88	91	49	1915	1919	1919	1940	1921
50	93	90	91	88	91	50	1937	1921	1980	1941	1931
51	93	90	90	88	91	51	1941	1931	1921	1955	1900
52	93	90	90	87	90	52	1924	1901	1922	1913	1922
53	92	89	90	87	90	53	1930	1952	1901	1959	1901
54	92	89	89	87	90	54	1969	1953	1931	1906	1906
55	92	89	88	86	90	55	1961	1900	1955	1958	1959
56	91	89	88	85	89	56	1931	1922	1941	1951	1983
57	91	88	87	84	89	57	1934	1955	1903	1968	1941
58	91	88	87	83	89	58	1921	1933	1913	1967	1955
59	91	88	87	82	89	59	1901	1941	1906	1962	1933
60	91	87	87	82	89	60	1919	1906	1958	1976	1952
61	91	87	86	82	87	61	1929	1913	1927	1981	1913
62	90	87	85	82	87	62	1922	1958	1900	1949	1980
63	90	87	85	81	86	63	1980	1959	1951	1943	1918
64	90	87	85	81	85	64	1955	1927	1953	1925	1968
65	88	85	84	81	85	65	1916	1978	1978	1963	1951
66	87	85	83	81	84	66	1906	1980	1968	1921	1967
67	87	85	83	81	84	67	1959	1951	1949	1942	1916
68	87	84	83	80	83	68	1963	1968	1929	1920	1942
69	86	83	82	80	83	69	1900	1929	1976	1905	1949
70	86	83	81	80	82	70	1958	1967	1943	1928	1963
71	85	82	81	79	82	71	1951	1949	1959	1917	1925
72	85	82	81	78	82	72	1968	1976	1963	1961	1976
73	83	81	81	78	81	73	1967	1942	1925	1948	1905
74	83	81	81	77	80	74	1949	1925	1973	1935	1981
75	83	81	80	76	79	75	1942	1963	1905	1910	1902
76	82	81	80	74	77	76	1925	1973	1981	1918	1910
77	82	80	80	74	77	77	1973	1905	1967	1938	1961
78	82	79	79	73	76	78	1976	1902	1902	1919	1953
79	81	79	79	70	74	79	1902	1981	1917	1946	1958
80	80	78	74	70	74	80	1905	1948	1918	1945	1938
81	79	76	74	69	71	81	1981	1910	1938	1929	1945
82	79	74	72	69	70	82	1953	1918	1942	1953	1962
83	77	74	70	67	70	83	1910	1938	1946	1966	1946
84	74	70	69	66	69	84	1918	1945	1945	1902	1927
85	72	70	69	65	65	85	1946	1946	1910	1903	1903
86	70	65	66	62	61	86	1945	1903	1977	1927	1973

Winter Severity Class	Lower Bounds	FTW	HOU	DUL	MQT	SSM
severe		110	109	107	105	109
severer than normal		103	102	101	100	103
normal		86	83	82	80	83
milder than normal		79	75	73	69	70

Appendix F (Continued)

Lake Michigan FDD-Dates and Years in Descending Order

FDD-Dates							Year						
Rank	ESC	TVC	GB	MSK	MIL	CHI	Rank	ESC	TVC	GB	MSK	MIL	CHI
1	112	105	99	95	100	94	1	1904	1950	1950	1899	1972	1899
2	111	102	99	93	95	89	2	1928	1923	1972	1915	1944	1965
3	109	102	99	93	93	86	3	1926	1975	1914	1965	1899	1960
4	107	100	99	91	92	86	4	1923	1972	1923	1923	1964	1940
5	104	100	97	90	91	84	5	1975	1979	1975	1970	1923	1912
6	103	98	96	88	90	83	6	1920	1982	1964	1900	1965	1906
7	103	98	96	87	87	81	7	1950	1926	1926	1934	1934	1900
8	103	96	95	86	86	78	8	1957	1964	1944	1940	1960	1949
9	103	96	95	86	86	78	9	1914	1944	1971	1937	1937	1950
10	102	95	94	86	86	78	10	1939	1899	1954	1960	1940	1941
11	101	95	94	85	85	77	11	1972	1971	1899	1956	1971	1947
12	100	94	93	85	85	77	12	1979	1965	1965	1912	1956	1916
13	99	94	93	85	85	76	13	1974	1954	1924	1971	1912	1962
14	99	94	91	84	84	75	14	1936	1911	1969	1978	1951	1932
15	99	93	91	84	84	75	15	1982	1924	1956	1932	1906	1926
16	96	93	90	84	84	74	16	1898	1915	1934	1906	1932	1980
17	96	92	90	83	83	74	17	1964	1956	1915	1916	1916	1905
18	96	92	89	81	81	74	18	1971	1969	1900	1909	1900	1979
19	95	91	89	81	81	73	19	1944	1931	1959	1904	1943	1948
20	95	90	89	81	79	72	20	1899	1900	1901	1963	1924	1975
21	95	89	89	81	78	70	21	1908	1947	1952	1914	1941	1943
22	95	89	88	81	78	70	22	1932	1937	1974	1959	1949	1944
23	94	89	88	80	78	70	23	1911	1970	1955	1924	1967	1972
24	94	89	88	80	78	70	24	1954	1930	1930	1944	1950	1914
25	94	89	88	79	77	70	25	1915	1934	1983	1939	1939	1934
26	94	89	88	78	77	68	26	1912	1952	1940	1941	1947	1978
27	93	88	88	78	77	68	27	1937	1940	1904	1949	1904	1953
28	93	88	87	78	77	68	28	1978	1904	1979	1967	1978	1982
29	93	88	86	78	77	68	29	1970	1959	1960	1950	1952	1920
30	93	88	86	78	77	67	30	1924	1974	1913	1947	1959	1952
31	93	88	86	77	77	67	31	1965	1955	1937	1952	1909	1967
32	92	87	85	77	77	66	32	1930	1913	1951	1962	1962	1928
33	92	87	85	76	76	66	33	1956	1912	1912	1926	1970	1913
34	91	86	84	75	76	65	34	1934	1960	1978	1901	1926	1901
35	91	85	84	75	75	64	35	1969	1962	1932	1969	1979	1898
36	91	85	84	75	75	64	36	1919	1933	1933	1979	1975	1917
37	91	85	84	74	74	63	37	1901	1951	1906	1920	1905	1968
38	90	84	83	74	74	62	38	1931	1978	1962	1980	1980	1925
39	90	84	83	74	74	61	39	1922	1916	1916	1975	1963	1963
40	90	84	81	74	74	60	40	1947	1932	1943	1905	1969	1908
41	89	84	81	73	73	60	41	1983	1906	1963	1948	1948	1939
42	89	83	81	73	71	59	42	1952	1967	1941	1935	1914	1937
43	89	82	81	71	70	59	43	1941	1914	1967	1928	1928	1964

Appendix F (Continued)

Lake Michigan FDD-Dates and Years in Descending Order

FDD-Dates							Year						
Rank	ESC	TVC	GB	MSK	MIL	CHI	Rank	ESC	TVC	GB	MSK	MIL	CHI
44	89	82	81	70	69	59	44	1959	1909	1909	1918	1929	1935
45	88	81	80	70	69	59	45	1921	1963	1920	1943	1982	1956
46	88	81	80	70	69	58	46	1933	1943	1905	1972	1957	1946
47	88	81	79	70	68	58	47	1906	1941	1936	1933	1907	1904
48	88	81	79	69	68	57	48	1955	1922	1928	1982	1938	1974
49	88	80	79	69	68	57	49	1900	1905	1939	1907	1953	1942
50	88	80	79	69	68	57	50	1940	1928	1947	1957	1920	1966
51	87	80	78	69	67	56	51	1913	1901	1917	1929	1955	1910
52	87	80	78	68	67	56	52	1966	1939	1949	1919	1936	1903
53	86	79	77	68	67	56	53	1960	1949	1976	1938	1945	1924
54	85	79	77	68	67	54	54	1951	1936	1961	1953	1966	1907
55	85	78	76	67	66	54	55	1909	1976	1970	1913	1901	1929
56	85	78	75	67	66	54	56	1977	1917	1918	1955	1919	1923
57	84	77	75	66	66	53	57	1916	1961	1980	1936	1913	1973
58	83	76	74	66	64	53	58	1967	1910	1958	1911	1908	1918
59	83	75	74	65	64	53	59	1962	1980	1925	1898	1915	1936
60	82	75	74	65	64	52	60	1943	1920	1948	1917	1917	1959
61	82	75	73	65	64	52	61	1963	1958	1968	1908	1898	1902
62	82	74	73	64	63	52	62	1976	1919	1935	1925	1911	1958
63	81	74	70	64	63	52	63	1942	1968	1946	1902	1925	1977
64	81	74	70	63	63	51	64	1905	1925	1982	1927	1968	1945
65	81	73	70	63	61	51	65	1925	1942	1931	1968	1977	1957
66	81	73	69	62	61	51	66	1981	1948	1910	1922	1922	1970
67	81	73	69	61	60	50	67	1917	1935	1945	1910	1903	1969
68	79	70	69	61	60	49	68	1949	1945	1908	1977	1942	1933
69	78	70	69	61	59	48	69	1948	1907	1957	1942	1973	1922
70	78	70	69	60	59	47	70	1902	1908	1929	1903	1910	1971
71	77	70	69	59	59	47	71	1935	1918	1938	1945	1935	1930
72	77	70	68	59	59	46	72	1910	1938	1953	1973	1946	1951
73	77	69	68	59	58	46	73	1961	1953	1921	1946	1921	1955
74	75	69	68	59	57	45	74	1958	1957	1907	1921	1974	1981
75	75	69	67	59	53	44	75	1980	1929	1966	1964	1958	1983
76	74	67	66	58	53	41	76	1938	1966	1977	1966	1918	1911
77	74	66	66	57	52	40	77	1918	1977	1919	1974	1933	1915
78	74	64	65	53	52	39	78	1968	1898	1911	1958	1902	1976
79	73	64	64	48	52	38	79	1907	1903	1898	1930	1927	1961
80	70	63	63	47	47	32	80	1946	1921	1927	1951	1930	1938
81	70	63	63	46	45	31	81	1929	1927	1922	1931	1931	1954
82	70	59	61	45	45	27	82	1945	1946	1903	1981	1981	1927
83	69	58	61	44	44	23	83	1953	1973	1942	1983	1983	1931
84	65	53	59	44	43	18	84	1903	1902	1973	1954	1954	1909
85	63	45	52	43	40	18	85	1927	1981	1902	1961	1976	1921
86	59	43	45	40	39	11	86	1973	1983	1981	1976	1961	1919

Winter Severity Class Lower Bounds	ESC	TVC	GB	MSK	MIL	CHI
severe	106	100	98	91	92	85
severer than normal	96	92	90	83	83	74
normal	78	70	69	61	59	48
milder than normal	70	60	62	45	45	28

Appendix F (Continued)

Lake Huron FDD-Dates and Years in Descending Order

FDD-Dates					Year				
Rank	PAS	ALP	BCI*	PTH	Rank	PAS	ALP	BCI*	PTH
1	110	109	99	96	1	1926	1926	1972	1926
2	107	104	98	94	2	1923	1950	1899	1912
3	106	104	94	94	3	1943	1923	1965	1899
4	105	103	91	94	4	1950	1914	1923	1965
5	105	103	90	93	5	1957	1957	1900	1915
6	104	102	89	91	6	1975	1939	1947	1923
7	103	102	88	90	7	1939	1975	1940	1937
8	101	101	87	89	8	1972	1960	1934	1941
9	99	100	86	89	9	1936	1972	1960	1900
10	99	99	86	88	10	1982	1982	1937	1940
11	98	96	86	88	11	1944	1964	1978	1934
12	98	96	85	87	12	1971	1971	1971	1947
13	96	96	85	86	13	1899	1899	1912	1960
14	96	96	85	86	14	1964	1944	1956	1956
15	95	95	84	85	15	1912	1908	1906	1971
16	95	95	84	84	16	1965	1970	1932	1932
17	95	95	83	84	17	1970	1932	1916	1916
18	95	94	82	84	18	1908	1954	1914	1906
19	95	94	81	82	19	1932	1911	1944	1944
20	94	94	81	82	20	1954	1965	1924	1914
21	94	94	81	81	21	1947	1912	1941	1909
22	94	93	81	81	22	1911	1937	1901	1939
23	94	93	81	81	23	1915	1915	1909	1904
24	93	93	80	80	24	1924	1924	1967	1967
25	93	92	80	80	25	1969	1956	1939	1924
26	93	92	79	79	26	1930	1930	1981	1949
27	92	92	79	79	27	1956	1928	1950	1931
28	92	90	79	78	28	1919	1922	1949	1917
29	92	90	78	78	29	1922	1906	1917	1950
30	92	90	78	77	30	1937	1969	1904	1911
31	91	90	77	77	31	1966	1983	1959	1959
32	90	90	76	76	32	1941	1931	1926	1970
33	90	89	76	75	33	1901	1947	1952	1901
34	90	89	76	75	34	1906	1941	1979	1980
35	89	89	76	74	35	1974	1974	1980	1969
36	89	89	75	74	36	1983	1900	1905	1963
37	89	89	75	74	37	1955	1901	1969	1905
38	89	89	75	73	38	1933	1952	1970	1919
39	89	89	75	73	39	1934	1904	1918	1975
40	89	89	74	73	40	1952	1934	1963	1948
41	89	88	74	71	41	1904	1940	1920	1928
42	88	88	74	70	42	1959	1955	1975	1972
43	88	88	73	70	43	1900	1933	1935	1933

* FDD dates for 1978 to 1983 are for STN

Appendix F (Continued)

Lake Huron FDD-Dates and Years in Descending Order

FDD-Dates					Year				
Rank	PAS	ALP	BCI*	PTH	Rank	PAS	ALP	BCI*	PTH
44	88	88	73	70	44	1940	1959	1948	1908
45	87	87	71	70	45	1960	1913	1928	1918
46	87	85	71	70	46	1913	1978	1943	1907
47	86	85	70	69	47	1951	1951	1933	1938
48	86	84	70	69	48	1909	1916	1982	1929
49	85	83	70	69	49	1977	1967	1908	1982
50	85	82	69	69	50	1978	1943	1957	1962
51	84	82	69	69	51	1967	1909	1938	1952
52	84	81	69	69	52	1916	1905	1907	1957
53	84	81	69	69	53	1962	1963	1962	1978
54	84	81	69	68	54	1942	1917	1919	1943
55	83	80	69	68	55	1914	1920	1929	1953
56	83	79	68	68	56	1976	1949	1915	1936
57	82	79	68	68	57	1925	1961	1953	1920
58	82	79	67	67	58	1963	1981	1911	1913
59	81	78	67	67	59	1905	1902	1913	1955
60	81	78	67	67	60	1920	1936	1966	1968
61	81	78	67	64	61	1917	1948	1955	1898
62	80	78	67	64	62	1931	1976	1936	1925
63	80	77	66	63	63	1961	1910	1968	1927
64	80	77	65	63	64	1907	1921	1898	1942
65	80	75	64	62	65	1981	1918	1925	1922
66	79	75	63	61	66	1949	1979	1927	1977
67	78	75	62	61	67	1980	1980	1942	1903
68	78	74	62	60	68	1948	1968	1922	1964
69	77	74	61	59	69	1921	1938	1903	1946
70	77	74	61	59	70	1910	1925	1977	1921
71	77	73	59	59	71	1935	1919	1946	1973
72	75	73	59	59	72	1918	1935	1964	1935
73	75	72	59	59	73	1979	1958	1973	1945
74	74	72	58	58	74	1968	1942	1921	1966
75	74	70	58	57	75	1938	1907	1974	1974
76	73	70	57	57	76	1958	1945	1910	1910
77	70	70	53	57	77	1929	1946	1958	1979
78	70	69	52	53	78	1945	1953	1945	1902
79	70	69	47	53	79	1946	1962	1961	1958
80	70	69	47	48	80	1953	1929	1951	1930
81	70	68	46	47	81	1928	1927	1983	1951
82	69	67	45	45	82	1927	1966	1931	1981
83	67	64	44	44	83	1902	1898	1954	1961
84	65	62	40	44	84	1903	1977	1976	1954
85	65	61	35	44	85	1898	1903	1930	1983
86	60	58	31	40	86	1973	1973	1902	1976

Winter Severity Class	Lower Bounds	PAS	ALP	BCI*	PTH
severe		105	103	91	94
severer than normal		95	95	83	84
normal		77	74	61	59
milder than normal		69	67	45	46

* FDD dates for 1978 to 1983 are for STN

Appendix F (Continued)

Lakes St.Clair & Erie FDD-Dates and Years in Descending Order

FDD-Dates							Year						
Rank	BUF	PTD	DET	ERI	TOL	CLV	Rank	BUF	PTD	DET	ERI	TOL	CLV
1	92	100	93	100	87	87	1	1965	1972	1965	1972	1965	1934
2	91	95	93	94	87	86	2	1923	1899	1899	1965	1934	1940
3	91	95	91	91	86	86	3	1915	1964	1923	1915	1960	1960
4	90	94	88	90	86	86	4	1947	1965	1934	1900	1940	1965
5	89	94	88	90	85	85	5	1941	1911	1940	1970	1912	1912
6	89	91	86	89	84	83	6	1937	1923	1900	1941	1906	1916
7	88	90	86	88	83	83	7	1956	1915	1960	1956	1916	1906
8	88	90	85	88	81	81	8	1900	1947	1956	1940	1900	1900
9	88	89	85	87	79	81	9	1940	1941	1912	1937	1941	1941
10	88	89	84	87	78	79	10	1933	1900	1906	1934	1950	1924
11	87	88	84	86	78	78	11	1934	1940	1916	1971	1967	1950
12	86	87	84	86	77	76	12	1912	1934	1932	1912	1970	1970
13	86	87	82	86	77	76	13	1971	1937	1914	1960	1947	1926
14	86	86	81	84	77	75	14	1960	1971	1939	1916	1978	1932
15	84	86	80	84	76	74	15	1916	1912	1944	1906	1926	1969
16	84	86	78	82	75	74	16	1932	1960	1949	1914	1937	1905
17	84	85	78	81	75	74	17	1906	1956	1950	1939	1932	1937
18	84	85	78	81	75	73	18	1967	1916	1941	1932	1975	1948
19	83	84	78	80	74	72	19	1914	1932	1947	1924	1905	1980
20	82	84	78	78	74	71	20	1909	1906	1904	1947	1969	1914
21	82	82	78	78	74	70	21	1959	1944	1967	1967	1963	1907
22	81	82	77	78	73	70	22	1939	1914	1959	1950	1980	1928
23	81	81	77	77	73	69	23	1944	1909	1924	1959	1948	1978
24	81	81	76	77	71	68	24	1928	1939	1970	1978	1914	1982
25	80	81	76	77	70	68	25	1924	1917	1926	1952	1944	1920
26	79	81	75	77	70	68	26	1950	1901	1980	1904	1972	1947
27	79	81	75	76	70	67	27	1949	1959	1937	1926	1928	1968
28	78	80	74	75	69	67	28	1904	1904	1905	1980	1982	1962
29	78	80	73	75	69	67	29	1917	1924	1969	1969	1907	1913
30	77	80	73	74	68	67	30	1978	1908	1948	1905	1920	1967
31	77	79	71	73	68	66	31	1952	1949	1928	1948	1943	1901
32	76	79	70	72	68	65	32	1970	1967	1972	1931	1952	1917
33	76	79	69	70	67	64	33	1926	1950	1952	1907	1913	1908
34	75	77	69	70	66	64	34	1969	1978	1938	1928	1901	1898
35	75	77	68	70	65	63	35	1931	1910	1907	1975	1908	1942
36	75	76	68	70	65	61	36	1905	1952	1982	1944	1917	1963
37	75	76	68	69	64	60	37	1918	1926	1943	1938	1898	1964
38	75	76	68	69	64	59	38	1980	1980	1953	1957	1962	1973
39	74	76	68	68	63	59	39	1963	1905	1978	1982	1968	1935
40	74	76	68	68	62	58	40	1975	1970	1920	1920	1924	1972
41	74	75	67	68	62	58	41	1968	1918	1913	1943	1942	1966
42	73	75	67	67	60	57	42	1948	1920	1936	1968	1964	1904
43	71	75	66	67	60	56	43	1972	1969	1911	1936	1956	1903

Appendix F (Continued)

Lakes St. Clair & Erie FDD-Dates and Years in Descending Order

FDD-Dates							Year						
Rank	BUF	PTD	DET	ERI	TOL	CLV	Rank	BUF	PTD	DET	ERI	TOL	CLV
44	70	74	66	67	59	56	44	1907	1963	1901	1911	1979	1939
45	70	74	65	67	59	56	45	1938	1975	1917	1913	1973	1946
46	70	74	65	66	59	56	46	1908	1919	1908	1901	1935	1910
47	69	74	64	66	58	56	47	1953	1968	1925	1962	1939	1959
48	69	74	64	65	58	55	48	1982	1948	1962	1917	1904	1923
49	69	73	64	65	58	54	49	1929	1931	1898	1908	1966	1929
50	68	73	64	64	57	54	50	1920	1935	1909	1898	1910	1902
51	68	71	63	63	57	54	51	1943	1928	1927	1927	1974	1936
52	68	71	63	62	56	53	52	1962	1958	1968	1922	1959	1958
53	67	70	62	61	56	53	53	1913	1938	1942	1963	1946	1918
54	67	70	62	60	56	52	54	1919	1933	1922	1942	1903	1977
55	67	70	61	60	55	52	55	1936	1907	1963	1935	1923	1957
56	66	69	60	60	54	51	56	1901	1936	1903	1964	1936	1979
57	66	69	59	59	54	51	57	1911	1982	1935	1973	1929	1944
58	65	69	59	59	53	51	58	1898	1929	1921	1946	1958	1945
59	63	68	59	59	53	49	59	1927	1943	1973	1979	1902	1955
60	63	68	59	57	53	49	60	1925	1953	1946	1974	1918	1922
61	62	67	59	57	52	48	61	1922	1955	1964	1921	1977	1930
62	60	67	57	57	52	47	62	1964	1962	1979	1966	1957	1971
63	60	67	57	56	51	46	63	1935	1913	1974	1923	1945	1899
64	60	65	57	56	49	46	64	1942	1898	1910	1903	1955	1975
65	59	65	55	56	49	45	65	1973	1942	1966	1910	1953	1981
66	59	64	54	55	48	44	66	1946	1925	1929	1929	1930	1954
67	58	64	53	54	48	44	67	1966	1957	1918	1902	1922	1983
68	58	64	53	53	47	43	68	1974	1921	1902	1958	1971	1961
69	57	63	53	53	47	42	69	1921	1927	1958	1918	1951	1949
70	57	63	52	52	46	42	70	1903	1922	1957	1977	1899	1911
71	57	62	52	51	45	41	71	1910	1977	1977	1945	1983	1915
72	54	61	51	49	45	41	72	1958	1903	1945	1955	1981	1951
73	54	60	50	48	44	40	73	1977	1945	1955	1930	1954	1976
74	54	59	49	47	42	36	74	1902	1979	1933	1961	1911	1956
75	52	59	48	46	42	35	75	1945	1946	1930	1899	1949	1925
76	52	59	47	46	41	34	76	1957	1973	1951	1951	1915	1921
77	51	58	47	45	40	32	77	1979	1966	1971	1983	1976	1938
78	49	58	46	45	40	27	78	1955	1974	1975	1981	1961	1927
79	48	54	45	44	34	23	79	1930	1902	1931	1954	1925	1931
80	48	52	45	42	33	20	80	1961	1961	1981	1949	1921	1909
81	47	48	44	40	33	14	81	1951	1930	1983	1976	1938	1974
82	46	47	44	35	27	12	82	1899	1951	1954	1925	1927	1919
83	45	46	43	19	23	9	83	1983	1981	1961	1909	1931	1943
84	45	45	41	12	19	7	84	1981	1983	1915	1919	1909	1953
85	44	44	40	8	12	-2	85	1954	1954	1976	1953	1919	1952
86	40	40	12	-11	-11	-11	86	1976	1976	1919	1933	1933	1933

Negative values indicate dates from the previous year.

(e.g. -11 = 354-365 = December 20, previous year).

Winter Severity Class	Lower Bounds	BUF	PTD	DET	ERI	TOL	CLV
severe		90	94	88	90	86	86
severer than normal		84	85	78	81	75	74
normal		57	63	53	53	47	42
milder than normal		46	47	44	36	29	13

Appendix F (Continued)

Lake Ontario FDD-Dates and Years in Descending Order

FDD-Dates					Year				
Rank	KIN	TOR	OSW	ROC	Rank	KIN	TOR	OSW	ROC
1	102	99	102	102	1	1975	1972	1975	1975
2	102	93	94	93	2	1926	1911	1911	1965
3	99	93	93	91	3	1972	1899	1965	1923
4	99	91	92	90	4	1982	1965	1899	1915
5	96	91	91	90	5	1964	1923	1923	1947
6	96	89	91	89	6	1908	1937	1956	1941
7	95	89	90	89	7	1912	1947	1947	1937
8	94	88	90	88	8	1954	1956	1937	1956
9	94	88	90	88	9	1911	1940	1915	1959
10	93	88	89	88	10	1965	1900	1926	1940
11	93	88	89	86	11	1907	1934	1972	1912
12	92	86	88	86	12	1923	1960	1940	1900
13	92	86	88	86	13	1899	1912	1959	1960
14	91	84	88	86	14	1970	1916	1934	1971
15	90	84	87	84	15	1937	1932	1971	1916
16	90	84	86	84	16	1915	1906	1900	1932
17	90	82	86	84	17	1971	1944	1912	1906
18	90	81	86	84	18	1947	1939	1960	1934
19	90	81	85	82	19	1941	1941	1932	1944
20	89	81	84	81	20	1934	1914	1916	1914
21	89	81	84	81	21	1974	1909	1906	1939
22	89	81	82	81	22	1904	1904	1944	1909
23	88	81	82	80	23	1955	1901	1941	1924
24	88	80	82	79	24	1956	1924	1909	1949
25	88	80	82	79	25	1940	1908	1914	1950
26	88	79	81	79	26	1900	1950	1939	1967
27	88	79	81	78	27	1959	1949	1920	1952
28	88	79	80	78	28	1939	1967	1967	1917
29	87	78	80	77	29	1960	1952	1924	1904
30	85	78	79	76	30	1978	1917	1950	1980
31	85	77	79	76	31	1932	1959	1917	1901
32	85	77	79	76	32	1951	1978	1978	1970
33	84	77	79	76	33	1906	1915	1949	1926
34	84	76	78	75	34	1930	1926	1901	1905
35	84	76	78	74	35	1916	1905	1904	1968
36	84	75	77	74	36	1933	1933	1970	1948
37	83	75	77	74	37	1909	1980	1952	1963
38	83	75	76	73	38	1914	1970	1980	1931
39	82	74	76	72	39	1943	1931	1905	1969
40	82	74	75	71	40	1976	1968	1918	1972
41	82	73	75	71	41	1963	1948	1969	1933
42	82	71	74	71	42	1944	1969	1919	1928
43	81	71	74	70	43	1905	1971	1968	1918

Appendix F (Continued)

Lake Ontario FDD-Dates and Years in Descending Order

FDD-Dates					Year				
Rank	KIN	TOR	OSW	ROC	Rank	KIN	TOR	OSW	ROC
44	81	71	74	70	44	1967	1928	1931	1908
45	81	70	74	70	45	1917	1938	1963	1957
46	80	70	74	70	46	1924	1963	1948	1907
47	80	70	73	70	47	1950	1907	1935	1978
48	80	70	71	69	48	1981	1918	1928	1982
49	80	69	71	69	49	1961	1920	1933	1953
50	79	69	71	69	50	1949	1929	1907	1938
51	79	69	70	68	51	1901	1953	1938	1920
52	78	69	70	68	52	1952	1982	1908	1943
53	77	68	69	67	53	1910	1935	1962	1955
54	76	68	69	67	54	1980	1943	1953	1936
55	75	68	69	67	55	1920	1936	1929	1913
56	75	67	69	67	56	1958	1955	1982	1962
57	75	67	68	66	57	1925	1913	1943	1911
58	75	67	68	64	58	1966	1919	1955	1898
59	75	66	68	63	59	1968	1962	1936	1927
60	75	65	67	62	60	1969	1898	1913	1922
61	75	64	65	60	61	1938	1957	1957	1964
62	75	64	64	60	62	1918	1925	1898	1945
63	75	64	64	60	63	1979	1921	1925	1946
64	74	63	64	60	64	1948	1922	1927	1935
65	74	63	64	59	65	1931	1927	1921	1973
66	74	61	62	58	66	1919	1977	1922	1942
67	73	60	61	58	67	1935	1964	1977	1966
68	71	59	60	57	68	1928	1946	1964	1974
69	70	59	60	57	69	1945	1945	1946	1921
70	70	59	59	57	70	1929	1973	1973	1910
71	70	58	58	56	71	1953	1942	1979	1929
72	70	57	58	56	72	1957	1910	1974	1903
73	70	57	58	54	73	1962	1974	1942	1977
74	69	57	57	54	74	1902	1979	1910	1902
75	68	56	56	54	75	1936	1903	1903	1958
76	67	54	56	52	76	1913	1958	1966	1979
77	65	54	54	51	77	1898	1902	1958	1919
78	64	54	54	48	78	1927	1966	1902	1961
79	64	48	52	48	79	1921	1930	1945	1930
80	63	47	48	47	80	1922	1951	1961	1951
81	62	47	48	46	81	1903	1961	1930	1899
82	62	45	47	45	82	1977	1981	1951	1981
83	61	44	46	45	83	1973	1983	1981	1983
84	59	44	45	44	84	1946	1954	1954	1954
85	58	40	45	40	85	1983	1976	1983	1976
86	58	40	40	36	86	1942	1975	1976	1925

Winter Severity Class	Lower Bounds	KIN	TOR	OSW	ROC
severe		98	91	92	90
severer than normal		90	82	86	84
normal		70	59	60	57
milder than normal		62	46	47	45

Appendix G: Lake-Averaged FDD's and Associated Years in Descending
Order by Lake

FDD						Year					
Rank	SUP	MIC	HUR	ERI	ONT	Rank	SUP	MIC	HUR	ERI	ONT
1	1542	1034	1180	690	843	1	1979	1904	1904	1904	1904
2	1485	928	1104	664	793	2	1904	1912	1918	1918	1918
3	1429	920	1066	638	786	3	1912	1899	1920	1977	1905
4	1427	908	1026	629	727	4	1972	1963	1912	1978	1920
5	1405	892	1023	625	675	5	1899	1979	1963	1963	1934
6	1393	888	1014	618	657	6	1920	1977	1977	1912	1912
7	1385	878	1010	590	626	7	1917	1959	1905	1905	1978
8	1377	875	975	587	621	8	1977	1978	1934	1920	1948
9	1353	868	973	552	612	9	1959	1920	1959	1936	1959
10	1343	835	956	497	605	10	1965	1918	1923	1970	1970
11	1338	830	931	489	604	11	1923	1917	1917	1917	1963
12	1320	798	927	477	604	12	1970	1905	1899	1979	1936
13	1318	765	922	476	602	13	1982	1936	1978	1959	1977
14	1307	757	910	451	597	14	1918	1982	1970	1982	1907
15	1305	741	886	440	587	15	1963	1965	1936	1899	1940
16	1287	735	874	436	577	16	1971	1962	1979	1940	1923
17	1282	707	856	430	573	17	1948	1948	1982	1981	1917
18	1279	702	853	426	560	18	1936	1943	1971	1945	1945
19	1262	701	850	426	558	19	1950	1970	1926	1961	1943
20	1261	686	843	426	546	20	1943	1971	1965	1902	1979
21	1256	684	830	413	546	21	1978	1951	1943	1910	1981
22	1250	673	821	410	533	22	1967	1972	1962	1948	1982
23	1249	672	797	407	532	23	1974	1923	1972	1962	1971
24	1241	645	787	400	512	24	1934	1929	1948	1968	1968
25	1226	619	787	392	511	25	1951	1910	1967	1900	1901
26	1207	603	787	387	501	26	1957	1926	1960	1934	1941
27	1195	600	781	376	501	27	1905	1900	1907	1926	1926
28	1166	599	781	373	501	28	1913	1925	1916	1916	1900
29	1156	594	771	370	500	29	1925	1901	1961	1971	1935
30	1149	593	766	360	495	30	1962	1945	1925	1907	1914
31	1148	589	764	340	494	31	1907	1916	1968	1915	1916
32	1133	586	752	335	494	32	1976	1930	1981	1901	1961
33	1126	579	746	334	491	33	1916	1967	1930	1980	1899
34	1124	578	741	330	489	34	1926	1956	1900	1914	1911
35	1122	569	737	329	483	35	1968	1974	1901	1943	1962
36	1111	564	734	323	468	36	1930	1934	1976	1976	1956
37	1105	563	731	314	463	37	1952	1968	1956	1964	1902
38	1104	557	722	310	460	38	1939	1960	1974	1925	1960
39	1098	556	717	309	447	39	1937	1964	1945	1960	1946
40	1091	551	707	309	434	40	1956	1981	1940	1969	1925
41	1089	545	707	308	425	41	1928	1961	1914	1923	1910
42	1084	545	705	306	423	42	1901	1969	1935	1951	1908
43	1078	540	704	299	421	43	1969	1980	1908	1924	1980

Appendix G (Continued)

FDD						Year					
Rank	SUP	MIC	HUR	ERI	ONT	Rank	SUP	MIC	HUR	ERI	ONT
44	1072	534	699	294	419	44	1980	1957	1969	1903	1944
45	1058	533	683	291	419	45	1900	1902	1929	1966	1964
46	1053	532	683	283	413	46	1960	1924	1964	1965	1965
47	1047	525	680	282	407	47	1929	1952	1911	1908	1927
48	1039	523	677	281	405	48	1981	1950	1927	1935	1969
49	1028	517	675	279	403	49	1975	1915	1924	1972	1976
50	1026	515	668	278	397	50	1922	1913	1941	1958	1915
51	1021	508	660	274	395	51	1927	1907	1939	1929	1930
52	1017	501	659	273	393	52	1947	1928	1938	1911	1974
53	1014	499	658	272	390	53	1955	1947	1915	1956	1903
54	1004	496	654	261	388	54	1933	1922	1922	1941	1972
55	986	496	646	255	384	55	1964	1940	1957	1942	1942
56	980	491	636	254	382	56	1938	1898	1910	1946	1939
57	975	486	633	248	379	57	1973	1976	1947	1927	1922
58	973	486	633	240	378	58	1946	1927	1928	1957	1924
59	972	486	633	239	377	59	1949	1966	1913	1930	1947
60	959	478	624	233	370	60	1911	1946	1955	1944	1955
61	956	476	622	232	366	61	1961	1935	1902	1967	1938
62	947	475	621	231	347	62	1945	1938	1980	1922	1958
63	946	473	620	231	344	63	1909	1955	1946	1947	1967
64	943	470	606	229	343	64	1941	1958	1951	1974	1957
65	940	466	588	225	336	65	1935	1903	1906	1955	1928
66	938	462	585	224	334	66	1898	1911	1903	1938	1898
67	933	459	582	223	330	67	1966	1914	1950	1913	1951
68	929	449	581	222	326	68	1914	1939	1975	1928	1929
69	928	447	570	215	323	69	1954	1973	1909	1898	1952
70	923	438	565	204	322	70	1915	1975	1944	1952	1966
71	905	435	563	204	318	71	1944	1937	1973	1906	1950
72	895	428	559	181	315	72	1908	1941	1898	1939	1931
73	894	417	554	180	299	73	1906	1909	1952	1954	1909
74	892	412	551	177	298	74	1924	1906	1958	1973	1973
75	889	409	547	170	297	75	1910	1908	1966	1950	1906
76	870	408	538	156	294	76	1903	1949	1942	1931	1954
77	859	398	536	142	276	77	1958	1933	1937	1975	1913
78	835	389	536	141	255	78	1940	1944	1954	1909	1975
79	823	377	517	111	228	79	1902	1942	1931	1937	1949
80	814	358	490	109	200	80	1983	1954	1933	1933	1937
81	778	339	430	108	194	81	1953	1953	1949	1983	1983
82	720	275	394	108	191	82	1942	1931	1919	1919	1921
83	682	268	372	100	171	83	1921	1983	1953	1921	1953
84	661	259	369	94	164	84	1932	1919	1921	1949	1919
85	648	247	363	81	139	85	1931	1932	1983	1932	1932
86	620	245	344	66	135	86	1919	1921	1932	1953	1933

Winter Severity Class Lower Bounds	SUP	MIC	HUR	ERI	ONT
severe	1420	903	1025	628	711
severer than normal	1281	706	855	429	570
normal	928	447	572	216	324
milder than normal	737	294	405	108	192

Appendix H: Lake-Averaged FDD-Dates and Associated Years in Descending
Order by Lake

FDD-Dates						Year					
Rank	SUP	MIC	HUR	ERI	ONT	Rank	SUP	MIC	HUR	ERI	ONT
1	110	94	105	91	92	1	1907	1899	1926	1965	1965
2	109	93	102	87	91	2	1947	1923	1923	1934	1923
3	106	92	99	87	90	3	1983	1965	1950	1940	1947
4	106	91	98	86	89	4	1904	1950	1939	1900	1937
5	105	90	97	86	89	5	1950	1972	1975	1960	1956
6	105	89	96	85	88	6	1923	1926	1972	1912	1912
7	104	89	96	84	88	7	1926	1944	1899	1906	1940
8	104	88	96	84	88	8	1928	1975	1957	1916	1972
9	104	87	94	84	87	9	1957	1912	1965	1941	1900
10	103	87	94	81	87	10	1975	1900	1912	1937	1934
11	103	87	94	80	86	11	1939	1940	1971	1932	1915
12	103	86	94	79	86	12	1914	1934	1960	1972	1960
13	103	86	94	79	85	13	1909	1979	1944	1970	1959
14	101	86	93	78	85	14	1979	1971	1932	1924	1941
15	101	86	93	78	85	15	1970	1960	1982	1914	1911
16	101	85	93	78	84	16	1960	1932	1914	1950	1916
17	101	85	92	78	84	17	1982	1904	1947	1947	1932
18	100	85	92	76	84	18	1972	1906	1937	1926	1906
19	100	85	91	75	83	19	1940	1914	1970	1967	1975
20	99	85	91	74	83	20	1936	1956	1915	1905	1926
21	98	84	91	74	82	21	1943	1937	1956	1969	1971
22	98	84	90	74	82	22	1964	1924	1934	1980	1914
23	98	83	90	73	82	23	1911	1964	1911	1978	1909
24	98	83	90	73	82	24	1974	1916	1924	1948	1944
25	97	82	90	72	82	25	1944	1978	1908	1939	1939
26	97	82	89	71	80	26	1898	1947	1906	1928	1904
27	97	82	89	70	80	27	1920	1915	1940	1904	1967
28	96	82	89	70	80	28	1917	1952	1941	1907	1924
29	96	81	89	70	79	29	1899	1970	1904	1959	1949
30	95	81	89	70	79	30	1977	1959	1964	1923	1950
31	95	81	89	69	79	31	1935	1941	1900	1901	1917
32	95	80	88	69	78	32	1908	1969	1969	1944	1899
33	95	80	88	69	78	33	1932	1928	1943	1956	1901
34	95	80	87	69	78	34	1962	1962	1901	1917	1952
35	95	80	86	69	78	35	1971	1982	1959	1920	1970
36	95	80	85	68	77	36	1912	1939	1952	1982	1908
37	95	79	85	68	77	37	1916	1967	1933	1908	1905
38	94	78	85	68	77	38	1965	1949	1922	1968	1978
39	94	78	84	67	76	39	1978	1901	1909	1964	1980
40	94	78	84	67	74	40	1954	1920	1916	1913	1968
41	94	78	84	66	74	41	1956	1943	1978	1971	1907
42	93	78	84	66	74	42	1934	1963	1955	1962	1982
43	93	77	83	65	74	43	1952	1913	1954	1915	1948

Appendix H (Continued)

FDD-Dates						Year					
Rank	SUP	MIC	HUR	ERI	ONT	Rank	SUP	MIC	HUR	ERI	ONT
44	93	77	83	65	74	44	1937	1905	1913	1963	1963
45	93	75	83	64	74	45	1933	1936	1974	1898	1931
46	92	75	83	63	74	46	1915	1955	1936	1936	1933
47	92	75	83	63	73	47	1924	1980	1967	1911	1969
48	92	75	82	62	72	48	1969	1974	1928	1899	1920
49	91	74	82	62	72	49	1966	1948	1917	1942	1918
50	91	73	82	62	71	50	1930	1909	1930	1935	1928
51	91	73	82	61	71	51	1931	1911	1931	1975	1955
52	90	73	80	60	71	52	1901	1957	1920	1910	1938
53	90	73	80	59	70	53	1922	1933	1983	1973	1943
54	90	72	80	59	69	54	1913	1951	1963	1918	1953
55	89	72	80	58	68	55	1955	1917	1905	1946	1936
56	89	71	79	58	68	56	1980	1908	1949	1957	1962
57	89	70	79	58	67	57	1961	1925	1919	1903	1935
58	89	70	78	58	67	58	1941	1935	1948	1929	1913
59	88	70	77	57	67	59	1900	1898	1951	1966	1957
60	88	69	77	57	66	60	1921	1922	1980	1922	1964
61	87	69	76	57	65	61	1948	1930	1907	1958	1929
62	87	69	75	57	65	62	1919	1968	1966	1949	1919
63	87	68	75	56	64	63	1959	1907	1925	1979	1898
64	87	68	75	56	63	64	1906	1953	1918	1938	1974
65	85	68	75	54	63	65	1958	1954	1981	1977	1927
66	85	67	74	54	62	66	1951	1929	1921	1902	1921
67	84	67	74	53	62	67	1968	1918	1942	1945	1922
68	83	67	74	53	60	68	1929	1966	1935	1955	1946
69	83	67	74	51	60	69	1963	1910	1979	1952	1910
70	83	66	73	50	60	70	1967	1942	1968	1921	1945
71	83	66	73	50	59	71	1973	1977	1938	1931	1979
72	82	66	73	50	59	72	1976	1919	1910	1927	1973
73	82	65	73	50	59	73	1949	1938	1962	1943	1966
74	81	65	72	48	59	74	1925	1945	1976	1930	1977
75	81	64	72	47	58	75	1942	1958	1961	1925	1958
76	81	63	71	46	58	76	1927	1931	1929	1961	1942
77	80	62	71	45	57	77	1905	1946	1977	1951	1903
78	80	61	70	45	57	78	1953	1903	1953	1981	1925
79	80	61	68	45	57	79	1981	1921	1902	1983	1902
80	79	60	68	44	54	80	1938	1976	1946	1974	1930
81	76	59	68	44	53	81	1902	1902	1958	1954	1954
82	76	59	67	42	53	82	1910	1961	1898	1909	1961
83	76	58	67	40	53	83	1918	1983	1927	1976	1951
84	74	58	67	35	51	84	1903	1973	1945	1953	1981
85	70	57	62	28	47	85	1946	1927	1903	1919	1983
86	70	51	59	20	47	86	1945	1981	1973	1933	1976

Winter Severity Class Lower Bounds	SUP	MIC	HUR	ERI	ONT
severe	106	91	98	86	89
severer than normal	101	85	92	78	84
normal	83	67	74	51	60
milder than normal	76	59	67	43	53



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