

# Mendota Ice Duration Graphs

by C Kohn, Agricultural Sciences, Waterford WI



Name: \_\_\_\_\_ Hour \_\_\_\_\_ Date: \_\_\_\_\_

Date Assignment is due: \_\_\_\_\_ Why late? \_\_\_\_\_ Score: + ✓ -  
Day of Week Date If your project was late, describe why

**Directions:** In this lab you and a partner will be creating a line or bar graph showing how ice duration on Lake Mendota has changed year by year since 1855. Lake Mendota in Madison WI is the most-studied lake in the world. It is an excellent measurement of changes to climate because the amount of ice cover in this lake reflects the long term trends in temperature over the course of an entire year. This is precisely the problem with climate – it is long term and often beyond what daily temperatures can convey. Ice duration (the number of days that a lake is completely frozen over each winter) is a very valuable figure because it reflects ALL of the daily temperatures for that season. A single hot or cold day will not drastically change the ice duration. It takes *large* shifts in the climate to significantly alter the ice duration over a period of time. In this case, a significant change would be a shift of 10% or more in the number of days that the lake is completely frozen over.

To create your graph, you will need large graph paper, like the kind you'd use for drawing landscape designs or blueprints, not the notebook-sized paper. Use the following steps to create your graph (follow these steps carefully!):

1. Determine how much paper you will need and how you will create your graph. You will be graphing every year since 1855. The years will be graphed on the x-axis (horizontal axis), so make sure that you have enough space for 160 years of data.
2. The y-axis (vertical axis) will be used to measure ice duration for that year. This is the “Days of Ice” part of the data table. You can use whatever scale seems most appropriate to create your graph; for example, it might make sense to have each square on the graph paper represent 3 years.
  - a. Keep in mind that your y-axis does not have to start at 0. You may want to find the year with the shortest days of ice and have your y-axis start at a number just below this figure in order to use less paper.
3. Your x-axis and y-axis need to be labeled with what they show. Be sure to label them clearly so that anyone can understand what the graph shows.
4. Include lines that show the 10-year averages of the ice duration. These lines should be drawn across the years they represent (e.g. 1855-1865).
5. Your graph should also include a caption that explains what this data shows, and what this data indicates. A great way to write a caption is with the following: “In this graph you can see.... This data indicates that.... This is important to understand because....” .
6. A good scientific presentation should be professional, with absolutely no spelling or grammar errors. You should also include color if possible to make your presentation eye-catching. Finally, the more that you can type and print, the better (although the graph itself must be created by hand, not on a computer).
  - a. As you work, look for trends in what you see. Are the 10-year averages increasing, decreasing, or staying the same? What does this indicate?

You should work with a partner on this project (it is too big of a project for one person to complete in the time allotted). Students in the past have succeeded by starting at opposite ends of their graph. For example, Partner A may start with 1855 and work forward, while Partner B will start at 2015 and work backwards. Each of you should have your name on your graph. Use your time wisely and start your work in **pencil** in case you make a mistake. Do a nice job – your instructor may have a prize for the best graph.

# HISTORY OF FREEZING AND THAWING OF LAKE MENDOTA, 1852-53 to 2015

## Wisconsin State Climatology Office

WINTER	CLOSED	OPENED	DAYS	WINTER	CLOSED	OPENED	DAYS
1852-53	---	5 Apr	---	1876-77	8 Dec	17 Apr	130
1853-54	27 Dec	---	---	1877-78	6 Jan	9 Mar	62
1854-55	---	---	---	1878-79	21 Dec	12 Apr	112
1855-56	18 Dec	14 Apr	118	1879-80	17 Dec	25 Mar	99
1856-57	6 Dec	6 May	151	1880-81	23 Nov	3 May	161
1857-58	25 Nov	26 Mar	121	1881-82	2 Jan	21 Mar	78
1858-59	8 Dec	14 Mar	96	1882-83	10 Dec	13 Apr	124
1859-60	7 Dec	26 Mar	110	1883-84	18 Dec	15 Apr	119
1860-61	14 Dec	10 Apr	117	1884-85	17 Dec	20 Apr	124
1861-62	2 Dec	13 Apr	132	1885-86	12 Dec	19 Apr	128
1862-63	26 Dec	9 Apr	104	1886-87	5 Dec	15 Apr	131
1863-64	18 Dec	21 Apr	125	1887-88	24 Dec	15 Apr	113
1864-65	8 Dec	5 Apr	118	1888-89	2 Jan	31 Mar	88
1865-66	14 Dec	18 Apr	125	1889-90	14 Jan	30 Mar	75
1866-67	18 Dec	20 Apr	123	1890-91	26 Dec	16 Apr	111
1867-68	12 Dec	31 Mar	110	1891-92	27 Dec	2 Apr	97
1868-69	10 Dec	16 Apr	127	1892-93	16 Dec	7 Apr	112
1869-70	2 Dec	12 Apr	131	1893-94	4 Dec	15 Mar	101
1870-71	24 Dec	2 Apr	99	1894-95	28 Dec	8 Apr	101
1871-72	19 Dec	23 Apr	126	1895-96	5 Jan	5 Apr	91
1872-73	30 Nov	23 Apr	144	1896-97	21 Dec	10 Apr	110
1873-74	29 Nov	14 Apr	136	1897-98	17 Dec	27 Mar	100
1874-75	10 Dec	15 Apr	126	1898-99	9 Dec	18 Apr	130
1875-76	10 Jan	10 Apr	91	1899-00	27 Dec	17 Apr	111
WINTER	CLOSED	OPENED	DAYS	WINTER	CLOSED	OPENED	DAYS
1900-01	25 Dec	11 Apr	107	1926-27	6 Dec	19 Mar	103
1901-02	15 Dec	30 Mar	105	1927-28	17 Dec	1 Apr	106
1902-03	25 Dec	24 Mar	89	1928-29	21 Dec	27 Mar	96
1903-04	13 Dec	17 Apr	126	1929-30	3 Dec	20 Mar	107
1904-05	14 Dec	1 Apr	108	1930-31	16 Dec	24 Mar	98
1905-06	1 Jan	8 Apr	97	1931-32	30 Jan	4 Apr	65
1906-07	20 Dec	24 Mar	94	1932-33	10 Dec	4 Apr	115
1907-08	1 Jan	24 Mar	83	1933-34	25 Dec	26 Mar	91
1908-09	22 Dec	7 Apr	106	1934-35	24 Dec	28 Mar	94
1909-10	18 Dec	26 Mar	98	1935-36	20 Dec	30 Mar	101
1910-11	9 Dec	20 Mar	101	1936-37	7 Dec	30 Dec	-
1911-12	28 Dec	14 Apr	108	"	5 Jan	13 Apr	121
1912-13	24 Dec	2 Apr	99	1937-38	7 Dec	22 Mar	105
1913-14	12 Jan	10 Apr	88	1938-39	28 Dec	4 Apr	97
1914-15	16 Dec	10 Apr	115	1939-40	2 Jan	16 Apr	105
1915-16	28 Dec	8 Apr	102	1940-41	5 Jan	11 Apr	96
1916-17	16 Dec	11 Apr	116	1941-42	3 Jan	26 Mar	82
1917-18	11 Dec	5 Apr	115	1942-43	7 Dec	2 Apr	116
1918-19	3 Jan	26 Mar	82	1943-44	16 Dec	8 Apr	114
1919-20	9 Dec	28 Mar	110	1944-45	18 Dec	20 Mar	92
1920-21	25 Dec	16 Mar	81	1945-46	13 Dec	21 Mar	98
1921-22	25 Dec	31 Mar	96	1946-47	30 Dec	10 Apr	101
1922-23	16 Dec	20 Apr	125	1947-48	21 Dec	3 Apr	104
1923-24	1 Jan	14 Apr	104	1948-49	24 Dec	30 Mar	96
1924-25	19 Dec	3 Apr	105	1949-50	23 Dec	11 Apr	109
1925-26	16 Dec	19 Apr	124				

WINTER	CLOSED	OPENED	DAYS	WINTER	CLOSED	OPENED	DAYS
1950-51	11 Dec	12 Apr	122	1976-77	3 Dec	28 Mar	115
1951-52	16 Dec	8 Apr	114	1977-78	7 Dec	8 Dec	-
1952-53	30 Dec	21 Mar	81	"	10 Dec	11 Apr	123
1953-54	30 Dec	25 Mar	85	1978-79	10 Dec	13 Dec	-
1954-55	2 Jan	4 Apr	92	"	25 Dec	19 Apr	118
1955-56	12 Dec	4 Apr	114	1979-80	29 Dec	6 Apr	99
1956-57	14 Dec	4 Apr	111	1980-81	20 Dec	23 Mar	93
1957-58	30 Dec	4 Apr	95	1981-82	28 Dec	3 Apr	96
1958-59	9 Dec	14 Apr	126	1982-83	13 Jan	8 Mar	54
1959-60	29 Dec	12 Apr	105	1983-84	19 Dec	8 Apr	111
1960-61	19 Dec	6 Apr	108	1984-85	25 Dec	26 Dec	-
1961-62	16 Dec	12 Apr	117	"	2 Jan	27 Mar	85
1962-63	12 Dec	3 Apr	112	1985-86	14 Dec	31 Mar	107
1963-64	20 Dec	11 Apr	113	1986-87	13 Dec	12 Mar	89
1964-65	15 Dec	14 Apr	120	1987-88	2 Jan	29 Mar	87
1965-66	11 Jan	17 Mar	65	1988-89	29 Dec	5 Apr	97
1966-67	26 Dec	3 Apr	98	1989-90	12 Dec	15 Mar	93
1967-68	27 Dec	27 Mar	91	1990-91	26 Dec	24 Mar	88
1968-69	17 Dec	19 Dec	-	1991-92	18 Dec	26 Mar	99
"	25 Dec	10 Apr	108	1992-93	24 Dec	11 Apr	108
1969-70	16 Dec	8 Apr	113	1993-94	27 Dec	31 Mar	94
1970-71	24 Dec	13 Apr	110	1994-95	6 Jan	21 Mar	74
1971-72	5 Jan	19 Apr	105	1995-96	10 Dec	7 Apr	119
1972-73	7 Dec	14 Mar	97	1996-97	20 Dec	1 Apr	102
1973-74	21 Dec	5 Apr	105	1997-98	11 Jan	27 Feb	47
1974-75	2 Jan	19 Apr	107	1998-99	30 Dec	21 Mar	82
1975-76	27 Dec	24 Mar	88	1999-00	14 Jan	7 Mar	53
WINTER	CLOSED	OPENED	DAYS	WINTER	CLOSED	OPENED	DAYS
2000-01	13 Dec	7 Apr	115	2006-07	20 Jan	27 Mar	66
2001-02	2 Jan	12 Jan	--	2007-08	26 Dec	10 Apr	106
"	4 Mar	15 Mar	21	2008-09	16 Dec	23 Mar	97
2002-03	4 Jan	3 Apr	89	2009-10	29 Dec	26 Mar	87
2003-04	7 Jan	27 Mar	80	2010-11	15 Dec	3 Apr	109
2004-05	25 Dec	5 Apr	101	2011-12	14 Jan	11 Mar	57
2005-06	19 Dec	24 Mar	95	2012-13	14 Jan	11 Apr	87
				2013-14	16 Dec	12 Apr	117
				2014-15	2 Jan	3 Apr	91

Learn how this data affects ice fishing! Visit <http://climatewisconsin.org/story/ice-fishing>

## Lake Mendota Grading Sheet

Names: \_\_\_\_\_ Hour: \_\_\_\_\_

Accuracy & Completeness:	1	2	3	4	5
Neatness & Effort:	1	2	3	4	5
Axes labeled accurately?	1	2	3	4	5
Caption written accurately?	1	2	3	4	5
10-yr averages shown accurately?	1	2	3	4	5
<b>Total Score:</b>	_____ / 25				

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<b>Total Score:</b>	_____ / 25				