

University of Wisconsin-Extension

GEOLOGICAL AND NATURAL HISTORY SURVEY
3817 Mineral Point Road
Madison, Wisconsin 53705

James Robertson, State Geologist and Director

HISTORY OF MADISON LAKES ICE DURATION
(replaces WOFR 83-3,84-4,86-5,and 87-6)

by

Pamela Naber Knox

Open-File Report 1995-02
5 p.

This report represents work performed by the Geological and Natural History Survey, and is released to the open files in the interest of making the information more readily available. This report has not been edited or reviewed for conformity with Geological and Natural History Survey standards and nomenclature.

1995

HISTORY OF MADISON LAKES ICE DURATION

**Pamela Naber Knox
State Climatologist
Wisconsin Geological and Natural History Survey**

November 1995

Records for the annual dates of freezing and opening of Lakes Mendota and Monona have been kept for well over 100 years. Closing and opening dates are determined and recorded by the State Climatologist. Tables for these two lakes plus Lake Wingra are included in this document.

For Lake Mendota, the traditional "formula" for determining whether the lake is open or closed is whether or not it is possible to row a boat in a direct line from Picnic Point to Governor's Island without encountering fast ice (ice which is attached to shore). A second line, from Second Point to Fox Bluff, is generally also considered when making the determination of whether the lake is ice-free or ice-covered. Often, near-shore locations are ice-covered for several days before the lake completely freezes over.

For Lake Monona, the lake is considered ice-covered if all of the lake surface, with the exception of the man-made opening near the power plant, is covered by fast ice. If the lake freezes over at night, the State Climatologist determines on which day the lake probably became ice-covered. If the lake skims over with thin ice for a few hours but then breaks up, it is not considered closed. Occasionally, the lake will open up after it has frozen over if warm temperatures and winds return to the area. In those cases, two openings and closings are listed for the year.

Lake Wingra has less complete records than the two large lakes, but all available data are included on the attached table for completeness.

Statistics on the lake openings and closings are included in Table 1, and data for Lakes Mendota, Monona and Wingra are in Tables 2, 3 and 4, respectively. Climatological studies of the records of lake ice duration show that there was an abrupt warming in the climate around 1890, followed by nearly steady conditions until 1979. Since 1979 ice duration has slowly decreased; however, it is not possible to determine from the short record after 1979 whether that trend will continue, or if it signals global warming. Studies have also shown that ice duration tends to be less in years with a strong El Nino present in the Eastern Pacific Ocean. If you would like more information on these studies, please contact the State Climatology Office, 125 W. Dayton Street, Madison, WI, 53706, telephone 608.263.2374, email: stclim@macc.wisc.edu.

Table 1. Statistics on lake ice coverage for Madison lakes

	MENDOTA	MONONA	WINGRA
AVERAGE DATES AND DURATION OF ICE COVER			
Average Freeze Date	Dec 20	Dec 15	Nov 27
Average Opening Date	Apr 5	Apr 1	Mar 29
Average Duration, days	106	107	120
RECORD DATES FOR LAKE TO FREEZE			
Earliest Freeze Date	Nov 23, 1880	Nov 22, 1880	Nov 2, 1913
Second Earliest	Nov 25, 1857	Nov 23, 1857	Nov 5, 1991
Latest Freeze Date	Jan 30, 1932	Jan 30, 1932	Dec 29, 1877
Second Latest	Jan 14, 1890	Jan 14, 1890	Dec 12, 1888
RECORD DATES FOR LAKE TO OPEN			
Earliest Opening Date	Mar 8, 1983	Mar 6, 1983	Mar 2, 1882
Second Earliest	Mar 9, 1878	Mar 7, 1973	Mar 6, 1983
Latest Opening Date	May 6, 1857	May 4, 1857	Apr 29, 1881
Second Latest	May 3, 1881	May 1, 1881	Apr 19, 1975
RECORDS FOR DURATION OF ICE COVER, NUMBER OF DAYS AND SEASON			
Shortest Duration	54, 1982-83	56, 1982-83	70, 1877-78
Second Shortest	62, 1877-78	60, 1931-32	97, 1982-83
Longest Duration	161, 1880-81	160, 1880-81	164, 1880-81
Second Longest	151, 1856-57	151, 1856-57	145, 1887-88
PERIOD OF RECORD			
Range of Years	1852-1995	1851-1995	1877-1995
Number of closings	141	142	57
Number of openings	141	141	58
Number of durations	140	141	44

Table 2.

HISTORY OF FREEZING AND THAWING OF LAKE MENDOTA, 1853 to 1995

WINIER	LAKE MENDOTA			WINIER	LAKE MENDOTA			WINIER	LAKE MENDOTA		
	CLOSED	OPENED	DAYS		CLOSED	OPENED	DAYS		CLOSED	OPENED	DAYS
1849-50				1900-01	12 25	4 11	107	1950-51	12 11	4 12	122
1850-51				1901-02	12 15	3 30	105	1951-52	12 16	4 8	114
1851-52				1902-03	12 25	3 24	89	1952-53	12 30	3 21	81
1852-53		4 5		1903-04	12 13	4 17	126	1953-54	12 30	3 25	85
1853-54	12 27			1904-05	12 14	4 1	108	1954-55	1 2	4 4	92
1854-55				1905-06	1 1	4 8	97	1955-56	12 12	4 4	114
1855-56	12 18	4 14	118	1906-07	12 20	3 24	94	1956-57	12 14	4 4	111
1856-57	12 6	5 6	151	1907-08	1 1	3 24	83	1957-58	12 30	4 4	95
1857-58	11 25	3 26	121	1908-09	12 22	4 7	106	1958-59	12 9	4 14	126
1858-59	12 8	3 14	96	1909-10	12 18	3 26	98	1959-60	12 29	4 12	105
1859-60	12 7	3 26	110	1910-11	12 9	3 20	101	1960-61	12 19	4 6	108
1860-61	12 14	4 10	117	1911-12	12 28	4 14	108	1961-62	12 16	4 12	117
1861-62	12 2	4 13	132	1912-13	12 24	4 2	99	1962-63	12 12	4 3	112
1862-63	12 26	4 9	104	1913-14	1 12	4 10	88	1963-64	12 20	4 11	113
1863-64	12 18	4 21	125	1914-15	12 16	4 10	115	1964-65	12 15	4 14	120
1864-65	12 8	4 5	118	1915-16	12 28	4 8	102	1965-66	1 11	3 17	65
1865-66	12 14	4 18	125	1916-17	12 16	4 11	116	1966-67	12 26	4 3	98
1866-67	12 18	4 20	123	1917-18	12 11	4 5	115	1967-68	12 27	3 27	91
1867-68	12 12	3 31	110	1918-19	1 3	3 26	82	1968-69	12 17	12 19	-
1868-69	12 10	4 16	127	1919-20	12 9	3 28	110	"	12 25	4 10	108
1869-70	12 2	4 12	131	1920-21	12 25	3 16	81	1969-70	12 16	4 8	113
1870-71	12 24	4 2	99	1921-22	12 25	3 31	96	1970-71	12 24	4 13	110
1871-72	12 19	4 23	126	1922-23	12 16	4 20	125	1971-72	1 5	4 19	105
1872-73	11 30	4 23	144	1923-24	1 1	4 14	104	1972-73	12 7	3 14	97
1873-74	11 29	4 14	136	1924-25	12 19	4 3	105	1973-74	12 21	4 5	105
1874-75	12 10	4 15	126	1925-26	12 16	4 19	124	1974-75	1 2	4 19	107
1875-76	1 10	4 10	91	1926-27	12 6	3 19	103	1975-76	12 27	3 24	88
1876-77	12 8	4 17	130	1927-28	12 17	4 1	106	1976-77	12 3	3 28	115
1877-78	1 6	3 9	62	1928-29	12 21	3 27	96	1977-78	12 7	12 8	-
1878-79	12 21	4 12	112	1929-30	12 3	3 20	107	"	12 10	4 11	123
1879-80	12 17	3 25	99	1930-31	12 16	3 24	98	1978-79	12 10	12 13	-
1880-81	11 23	5 3	161	1931-32	1 30	4 4	65	"	12 25	4 19	118
1881-82	1 2	3 21	78	1932-33	12 10	4 4	115	1979-80	12 29	4 6	99
1882-83	12 10	4 13	124	1933-34	12 25	3 26	91	1980-81	12 20	3 23	93
1883-84	12 18	4 15	119	1934-35	12 24	3 28	94	1981-82	12 28	4 3	96
1884-85	12 17	4 20	124	1935-36	12 20	3 30	101	1982-83	1 13	3 8	54
1885-86	12 12	4 19	128	1936-37	12 7	12 30	-	1983-84	12 19	4 8	111
1886-87	12 5	4 15	131	"	1 5	4 13	121	1984-85	12 25	12 26	-
1887-88	12 24	4 15	113	1937-38	12 7	3 22	105	"	1 2	3 27	85
1888-89	1 2	3 31	88	1938-39	12 28	4 4	97	1985-86	12 14	3 31	107
1889-90	1 14	3 30	75	1939-40	1 2	4 16	105	1986-87	12 13	3 12	89
1890-91	12 26	4 16	111	1940-41	1 5	4 11	96	1987-88	1 2	3 29	87
1891-92	12 27	4 2	97	1941-42	1 3	3 26	82	1988-89	12 29	4 5	97
1892-93	12 16	4 7	112	1942-43	12 7	4 2	116	1989-90	12 12	3 15	93
1893-94	12 4	3 15	101	1943-44	12 16	4 8	114	1990-91	12 26	3 24	88
1894-95	12 28	4 8	101	1944-45	12 18	3 20	92	1991-92	12 18	3 26	99
1895-96	1 5	4 5	91	1945-46	12 13	3 21	98	1992-93	12 24	4 11	108
1896-97	12 21	4 10	110	1946-47	12 30	4 10	101	1993-94	12 27	3 31	94
1897-98	12 17	3 27	100	1947-48	12 21	4 3	104	1994-95	1 6	3 21	74
1898-99	12 9	4 18	130	1948-49	12 24	3 30	96	1995-96			
1899-00	12 27	4 17	111	1949-50	12 23	4 11	109				

Table 3.

HISTORY OF FREEZING AND THAWING OF LAKE MONONA, 1851 to 1995

LAKE MONONA				LAKE MONONA				LAKE MONONA			
WINTER	CLOSED	OPENED	DAYS	WINTER	CLOSED	OPENED	DAYS	WINTER	CLOSED	OPENED	DAYS
1849-50				1900-01	12 14	4 11	118	1950-51	12 11	4 8	118
1850-51				1901-02	12 14	3 27	103	1951-52	12 16	4 6	112
1851-52	12 13	3 25	103	1902-03	12 26	3 21	85	1952-53	12 17	3 20	93
1852-53				1903-04	11 27	4 15	140	1953-54	12 30	3 12	72
1853-54	12 21			1904-05	12 13	4 3	111	1954-55	12 31	3 24	83
1854-55				1905-06	12 14	4 8	115	1955-56	12 6	3 24	109
1855-56	12 18	4 14	118	1906-07	12 8	3 24	106	1956-57	12 13	3 15	92
1856-57	12 4	5 4	151	1907-08	12 11	3 26	106	1957-58	12 12	3 31	109
1857-58	11 23	3 22	119	1908-09	12 9	4 6	118	1958-59	12 8	4 12	125
1858-59	12 11	3 15	94	1909-10	12 18	3 24	96	1959-60	12 29	4 8	101
1859-60	12 6	3 26	111	1910-11	12 8	3 21	103	1960-61	12 19	3 27	98
1860-61	12 2	4 10	129	1911-12	12 18	4 9	113	1961-62	12 15	4 7	113
1861-62	12 1	4 13	133	1912-13	12 19	4 2	104	1962-63	12 12	4 3	112
1862-63	12 7	4 5	119	1913-14	12 27	3 20	83	1963-64	12 18	3 19	92
1863-64	12 11	4 20	131	1914-15	12 15	4 9	115	1964-65	12 15	4 8	114
1864-65	12 9	4 5	117	1915-16	12 15	4 4	111	1965-66	1 11	3 17	65
1865-66	12 14	4 18	125	1916-17	12 16	4 11	116	1966-67	1 5	4 3	88
1866-67	12 12	4 19	128	1917-18	12 8	4 3	116	1967-68	12 24	3 20	87
1867-68	12 14	3 31	108	1918-19	12 27	3 20	83	1968-69	12 15	3 26	101
1868-69	12 10	4 15	126	1919-20	12 3	3 28	116	1969-70	12 16	3 18	92
1869-70	11 24	4 11	138	1920-21	12 21	3 16	85	1970-71	12 15	3 18	93
1870-71	12 22	4 1	100	1921-22	12 19	3 25	96	1971-72	1 4	4 8	95
1871-72	11 30	4 20	142	1922-23	12 13	4 19	127	1972-73	12 7	3 7	90
1872-73	11 28	4 18	141	1923-24	1 1	4 13	103	1973-74	12 20	3 24	94
1873-74	11 29	4 14	136	1924-25	12 14	3 27	103	1974-75	1 2	4 7	95
1874-75	12 12	4 14	123	1925-26	12 10	4 15	126	1975-76	12 21	3 20	90
1875-76	1 10	4 10	91	1926-27	12 5	3 17	102	1976-77	12 1	3 14	103
1876-77	12 5	4 16	132	1927-28	12 9	3 26	108	1977-78	12 7	4 7	121
1877-78	1 6	3 9	62	1928-29	12 21	3 27	96	1978-79	12 9	4 5	117
1878-79	12 16	4 10	115	1929-30	12 3	3 17	104	1979-80	12 17	3 30	104
1879-80	12 16	3 18	93	1930-31	12 16	3 24	98	1980-81	12 20	3 16	86
1880-81	11 22	5 1	160	1931-32	1 30	3 30	60	1981-82	12 20	3 30	100
1881-82	1 1	3 19	77	1932-33	12 10	3 27	107	1982-83	1 9	3 6	56
1882-83	12 7	4 13	127	1933-34	12 13	3 26	103	1983-84	12 18	4 3	107
1883-84	12 17	4 15	120	1934-35	12 20	3 28	98	1984-85	12 24	3 26	92
1884-85	12 17	4 17	121	1935-36	12 11	3 27	107	1985-86	12 6	3 29	113
1885-86	12 7	4 17	131	1936-37	12 4	12 30	-	1986-87	12 13	3 8	85
1886-87	12 5	4 15	131	"	1 5	4 12	123	1987-88	12 25	3 25	91
1887-88	11 28	4 13	137	1937-38	12 1	3 22	111	1988-89	12 29	4 1	93
1888-89	12 29	3 26	87	1938-39	12 19	3 31	102	1989-90	12 7	3 15	98
1889-90	1 14	3 29	74	1939-40	12 31	4 11	102	1990-91	12 23	3 21	88
1890-91	12 24	4 16	113	1940-41	12 3	4 9	127	1991-92	12 16	3 16	91
1891-92	12 27	4 1	96	1941-42	12 29	3 24	85	1992-93	12 24	4 11	108
1892-93	12 11	4 7	117	1942-43	12 7	3 31	114	1993-94	12 26	3 31	95
1893-94	12 2	3 11	99	1943-44	12 14	3 24	101	1994-95	1 5	3 20	74
1894-95	12 25	4 8	104	1944-45	12 18	3 17	89	1995-96			
1895-96	12 4	4 1	119	1945-46	12 12	3 21	99				
1896-97	12 3	4 5	123	1946-47	12 18	4 5	108				
1897-98	12 15	3 26	101	1947-48	12 9	3 26	108				
1898-99	12 7	4 15	129	1948-49	12 24	3 26	92				
1899-00	12 25	4 16	112	1949-50	12 15	4 7	113				

Table 4.

HISTORY OF FREEZING AND THAWING OF LAKE WINGRA, 1877 to 1995

LAKE WINGRA					LAKE WINGRA					LAKE WINGRA				
WINIER	CLOSED	OPENED	DAYS		WINIER	CLOSED	OPENED	DAYS		WINIER	CLOSED	OPENED	DAYS	
1877-78	12 29	3 9	70		1928-29	11 29	3 25	116		1978-79	11 26	4 17	142	
1878-79	12 6	3 29	113		1929-30	11 17				1979-80	12 1	4 2	123	
1879-80	11 19	3 23	125		1930-31					1980-81	12 2	3 14	102	
1880-81	11 16	4 29	164		1931-32					1981-82	11 29			
1881-82	11 20	3 2	102		1932-33					1982-83	12 9	3 6	87	
1882-83	12 2	4 10	129		1933-34					1983-84	12 9	4 2	115	
1883-84	11 15	4 13	150		1934-35		3 25			1984-85	11 18	11 22		
1884-85	11 24	4 13	140		1935-36		3 24			"	12 4	3 20	110	
1885-86	12 5	4 15	131		1936-37		4 10			1985-86	11 25	3 29	124	
1886-87	11 24				1937-38		3 21			1986-87	11 13	3 8	115	
1887-88	11 20	4 13	145		1938-39	11 25	3 25	120		1987-88	12 5	12 8		
1888-89	12 12	3 24	102		1939-40		4 9			"	12 16	3 24	102	
1889-90		3 24			1940-41	11 13				1988-89	12 8	3 29	111	
1890-91	12 4				1941-42					1989-90	11 22	3 14	112	
1891-92		4 2			1942-43					1990-91	12 4	3 23	109	
1892-93	11 18	4 5	138		1943-44		3 24			1991-92	11 5	3 8	124	
1893-94	11 17	3 10	113		1944-45	12 2	3 17	105		1992-93	11 15	11 17		
1894-95	11 15				1945-46	11 24	3 20	116		"	11 27	4 9	135	
1895-96		3 30			1946-47					1993-94	11 28	12 9		
1896-97					1947-48		3 26			"	12 24	3 26	103	
1897-98					1948-49	12 7	3 27	110		1994-95	12 8	3 17	99	
1898-99					1949-50	11 25	4 7	133		1995-96				
1899-00					1950-51	11 23	4 9	137						
1900-01					1951-52									
1901-02					1952-53	11 28								
1902-03					1953-54									
1903-04					1954-55									
1904-05					1955-56									
1905-06					1956-57									
1906-07					1957-58									
1907-08					1958-59	11 27								
1908-09					1959-60	11 15								
1909-10					1960-61									
1910-11					1961-62									
1911-12					1962-63									
1912-13					1963-64									
1913-14	11 2				1964-65									
1914-15	11 29				1965-66									
1915-16		3 20			1966-67									
1916-17	11 27				1967-68									
1917-18					1968-69	12 7	4 9	123						
1918-19					1969-70	12 6	4 3	118						
1919-20					1970-71	12 9	4 10	122						
1920-21					1971-72	12 2	4 16	136						
1921-22					1972-73	11 30	3 14	104						
1922-23					1973-74		3 30							
1923-24					1974-75	12 9	4 19	131						
1924-25					1975-76	12 1	12 14							
1925-26					"	12 17	3 21	108						
1926-27	11 20				1976-77		3 15							
1927-28		3 24			1977-78	11 26	4 6	131						