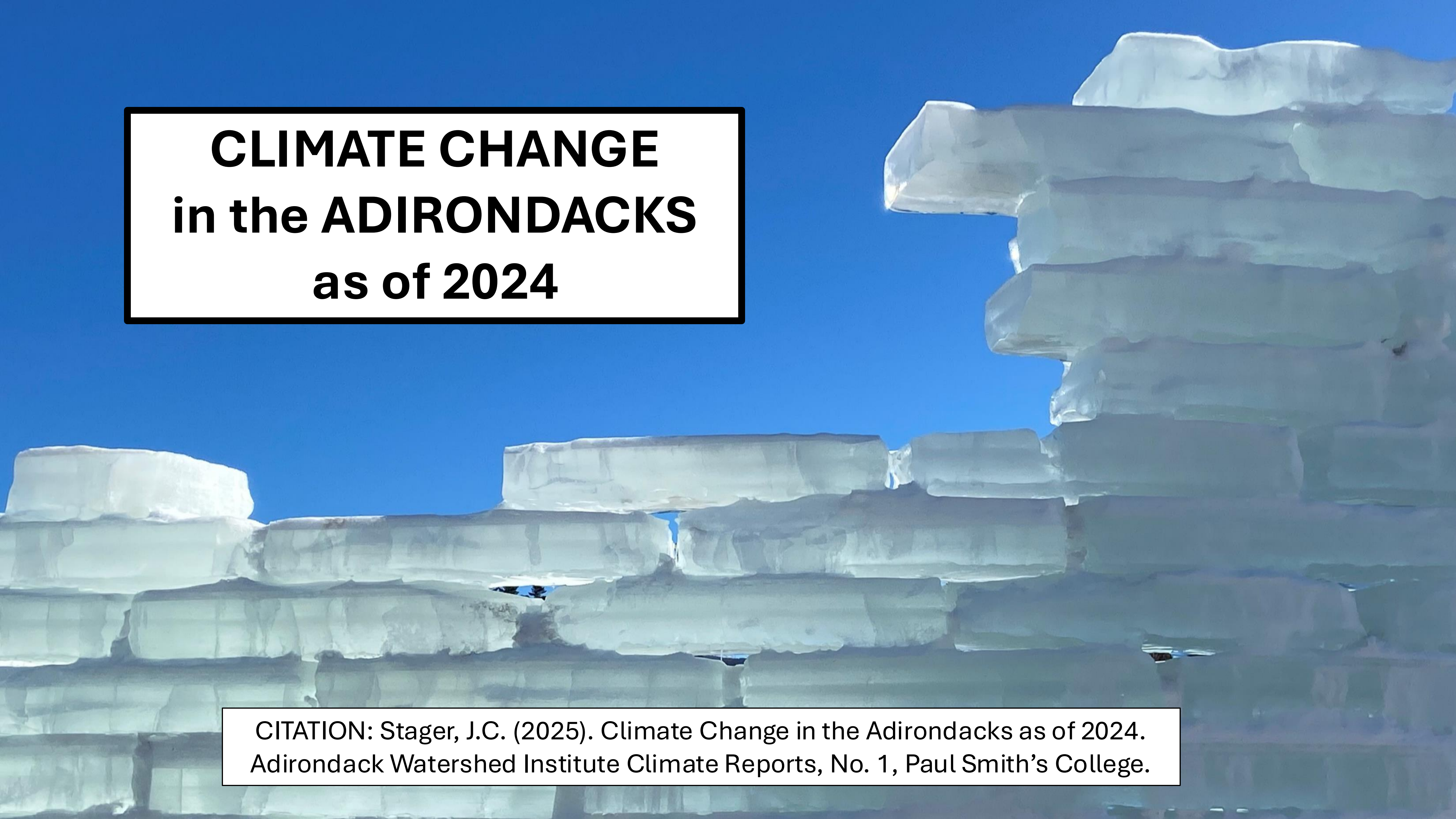


CLIMATE CHANGE in the ADIRONDACKS as of 2024

CITATION: Stager, J.C. (2025). Climate Change in the Adirondacks as of 2024. Adirondack Watershed Institute Climate Reports, No. 1, Paul Smith's College.

WELCOME
to this
HYBRID DOCUMENT

It is both a scientific report and a Powerpoint presentation.

Feel free to use any or all of it for research or educational purposes (*all photos and charts are for public use*).

THE BASICS: 1900-2024

WINTERS are becoming shorter and milder

SUMMERS are becoming longer and hotter

WETTER overall

1. WHAT HAS CHANGED?

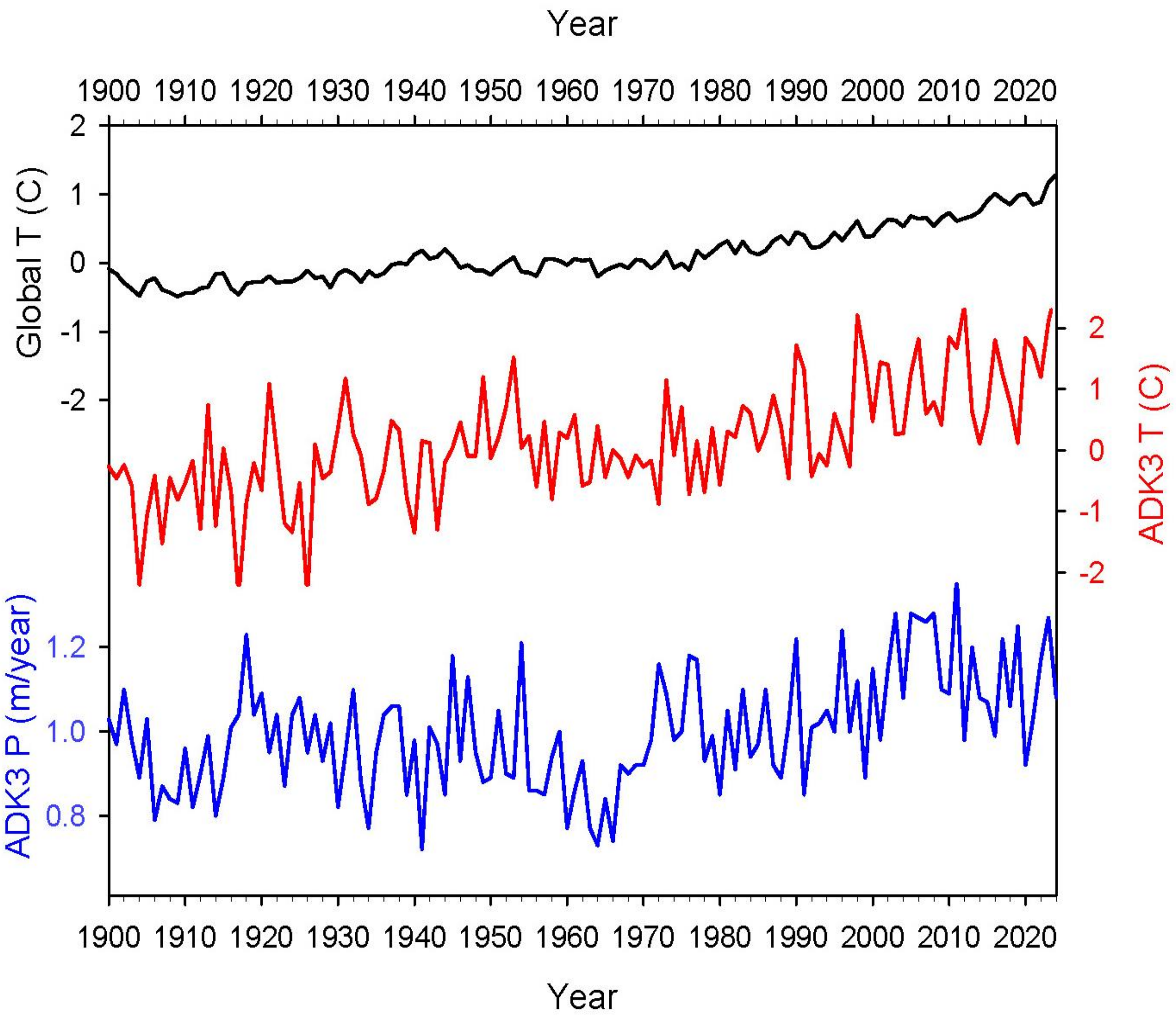
2. WHAT DOES IT MEAN?

3. WHAT COMES NEXT?

TRACKING ADIRONDACK CLIMATE

Monthly temperature and precipitation data from USHCN weather stations in Dannemora, Tupper Lake, and Indian Lake were combined into a record we call "**ADK3**."

For 1970-2024 we have ice and phenology records from Paul Smiths, as well.



#1: WHAT HAS CHANGED?

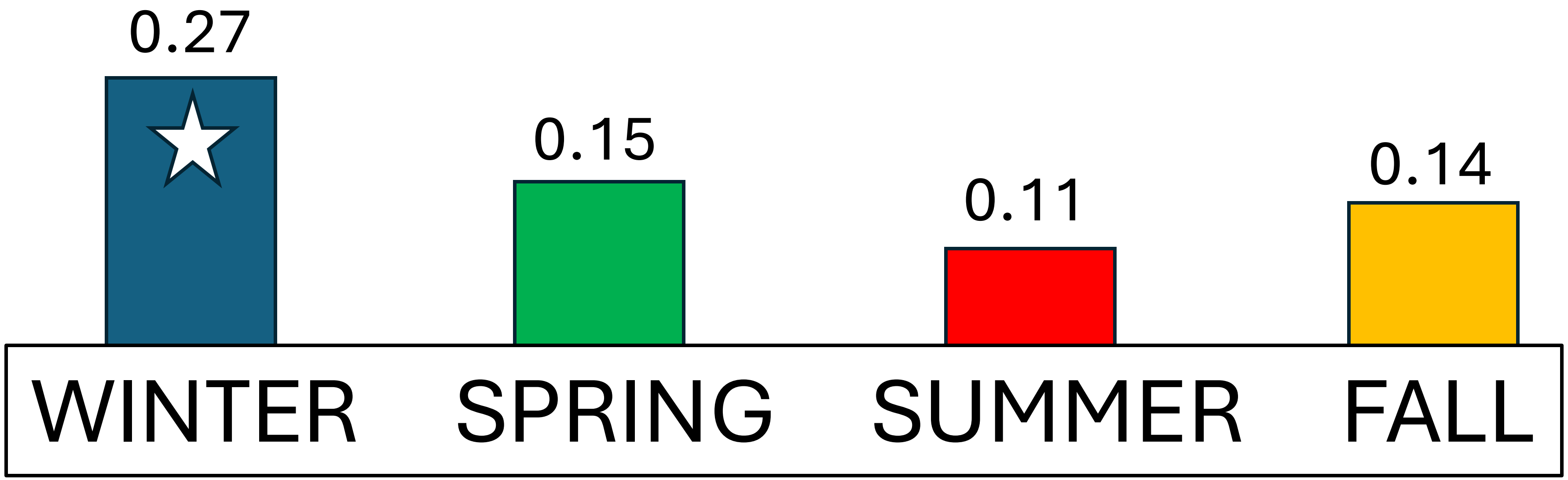
Like most mid/high-latitude areas, the Adirondacks are **warming** faster than the global average (ca. 1°C).

As of 2024, mean annual temperature rose by 1.9°C since 1900.

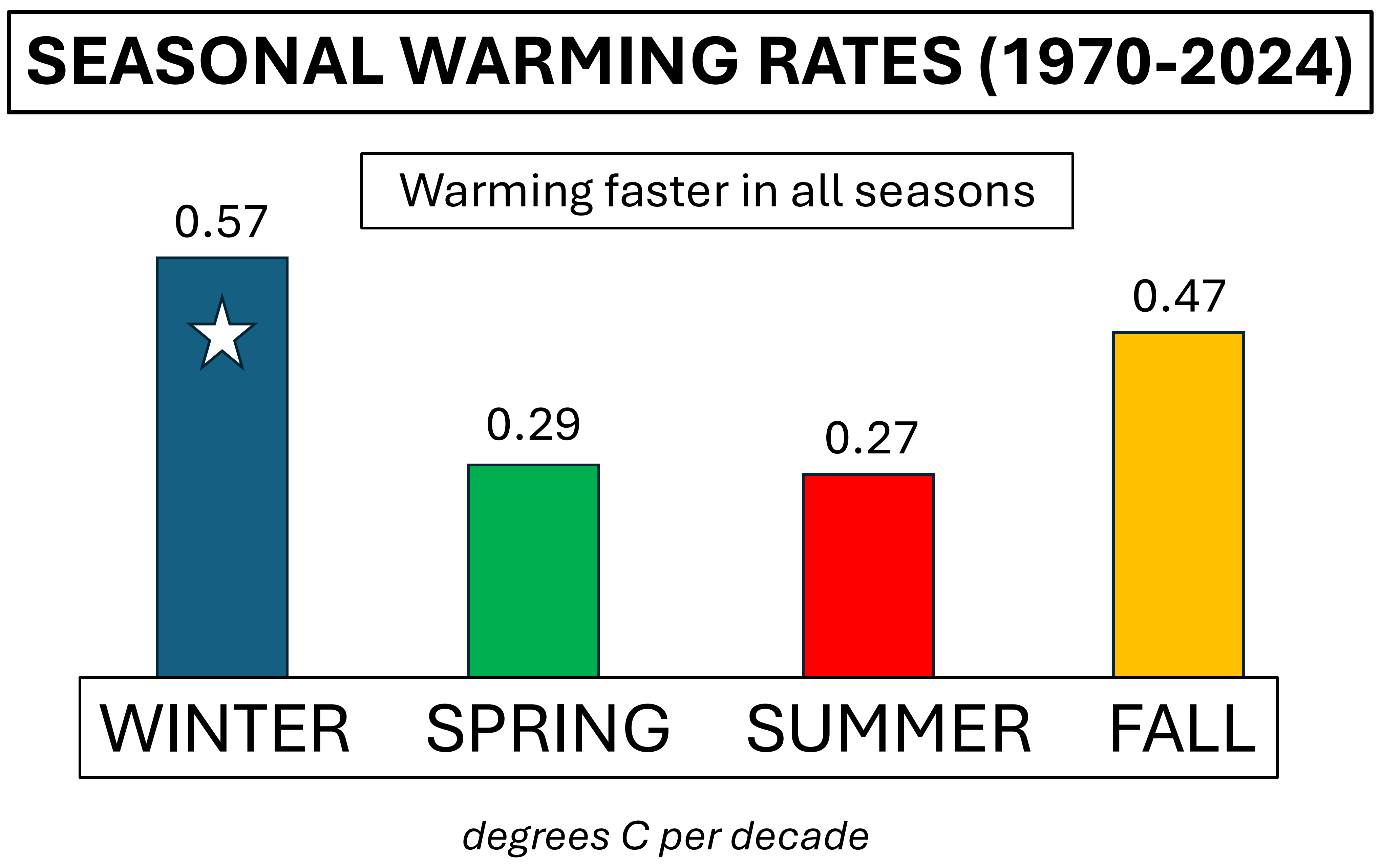
It is also **wetter** overall.

SEASONAL WARMING RATES (1900-2024)

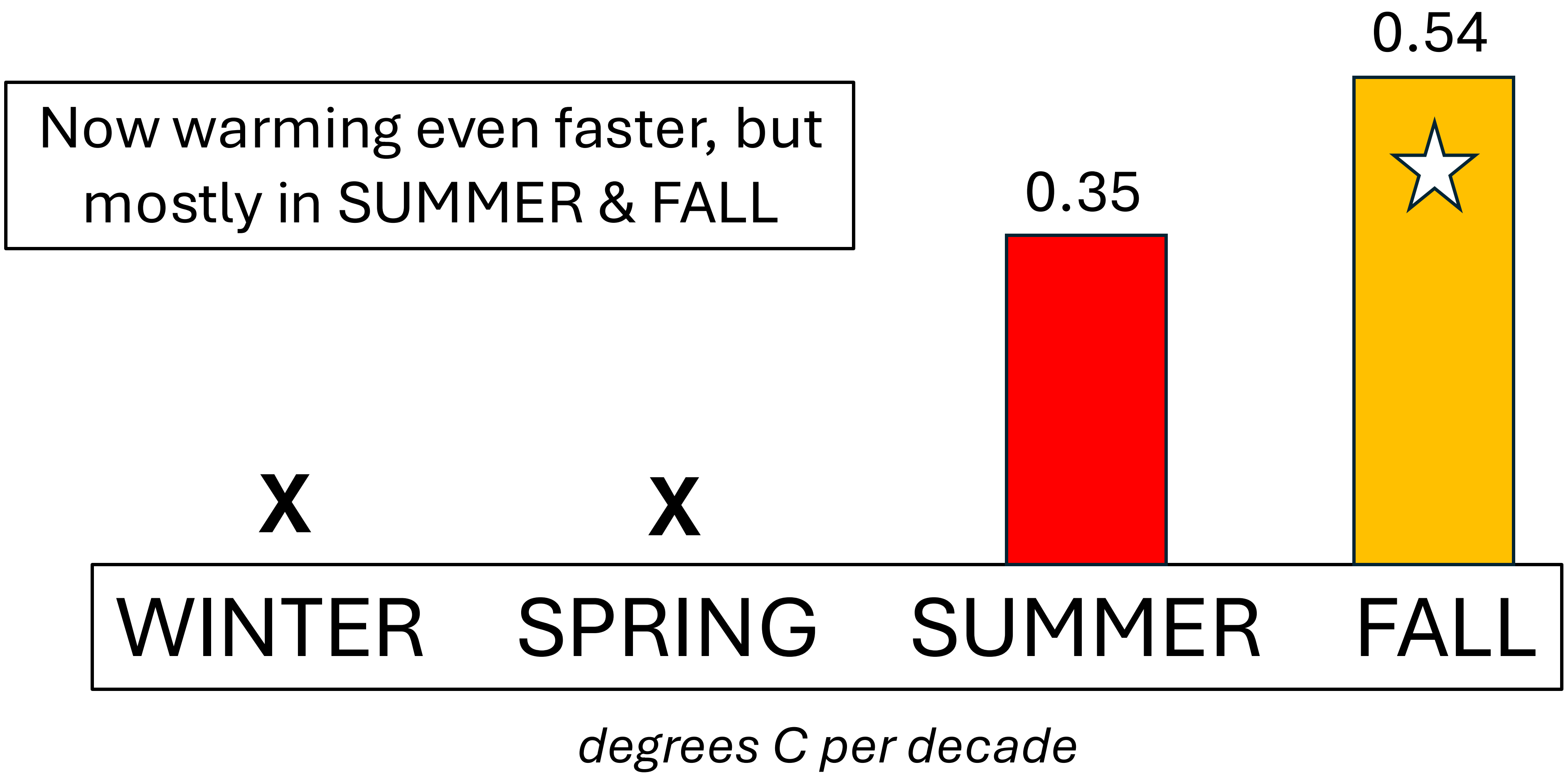
It has warmed year-round, especially in WINTER (*Dec-Feb*), but the next charts show that rates ***accelerated*** in more recent decades, especially in SUMMER (*July-Aug*) and FALL (*Sept-Nov)*



degrees C per decade


SEASONAL WARMING RATES (1970-2024)
Warming faster in all seasons
0.57
0.29
0.27
0.47
WINTER
SPRING
SUMMER
FALL
degrees C per decade

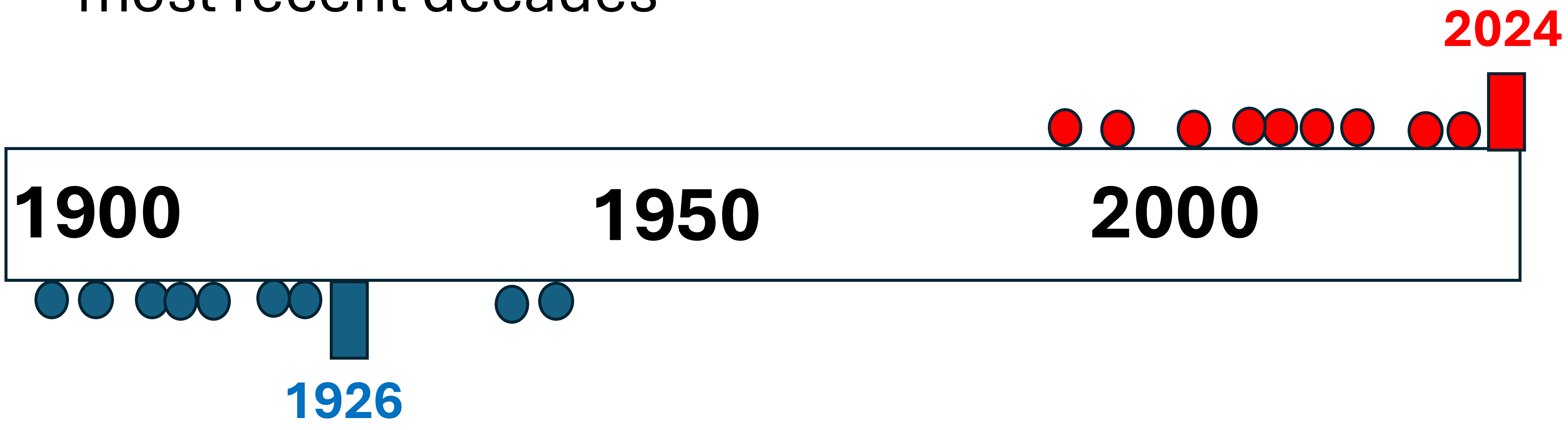
SEASONAL WARMING RATES (1990-2024)



All of our **warmest** years on record happened in the most recent decades

TEN WARMEST YEARS

(2024 was warmest of all)



TEN COOLEST YEARS

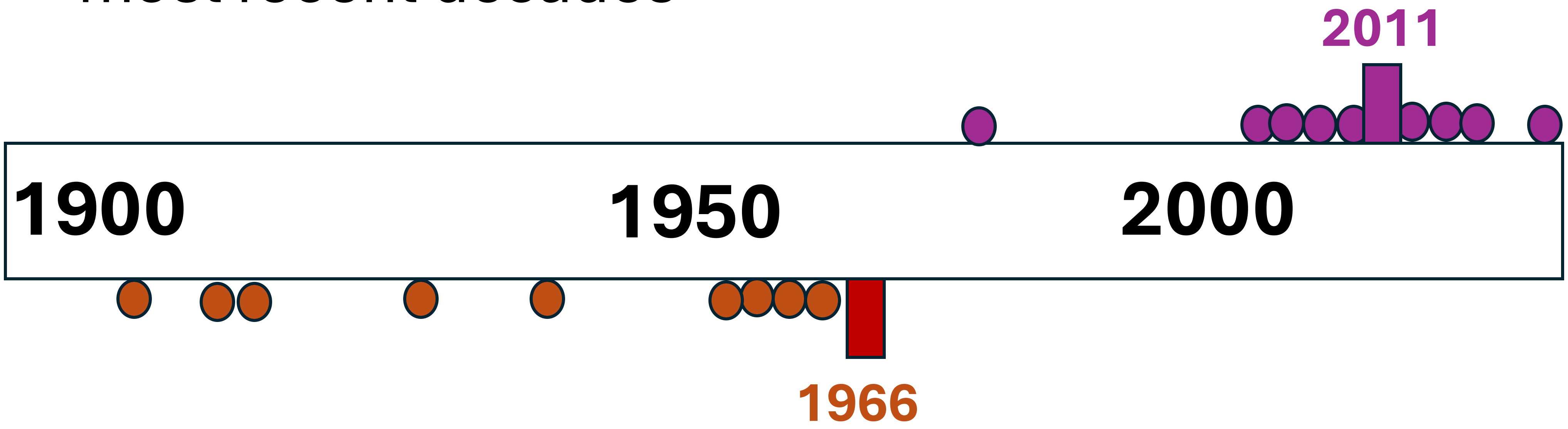
(1926 was coolest of all)

All of our **coolest** years on record happened in the first half of the 20th century

All of our **wettest** years on record happened in the most recent decades

TEN WETTEST YEARS

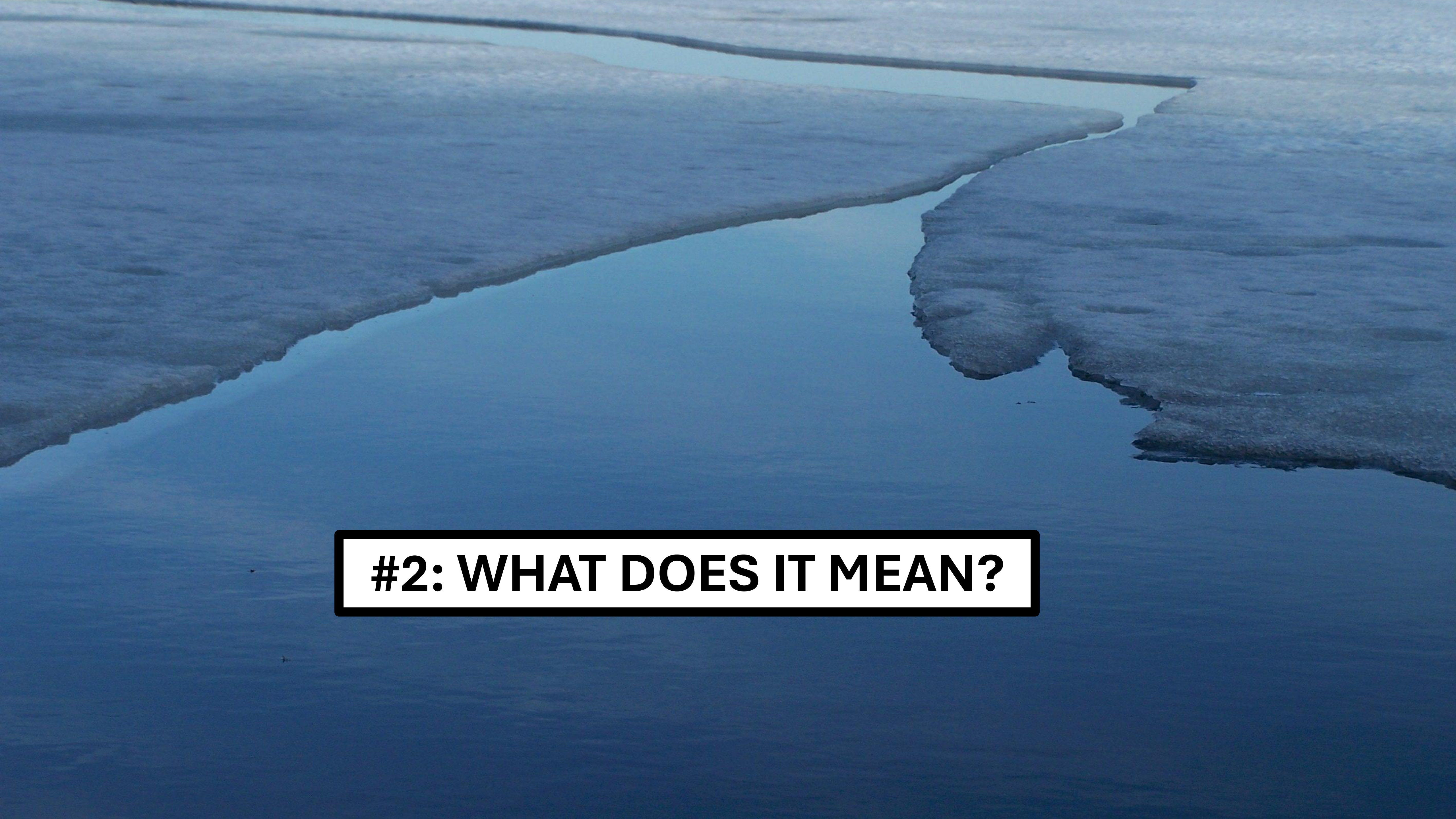
(2011 was wettest of all)



TEN DRIEST YEARS

(1966 was driest of all)

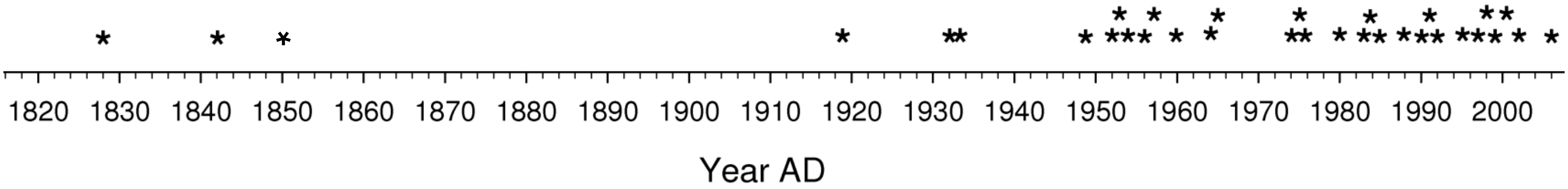
Most of our **driest** years on record happened early in the 20th century


#2: WHAT DOES IT MEAN?

LESS ICE ON THE LAKES

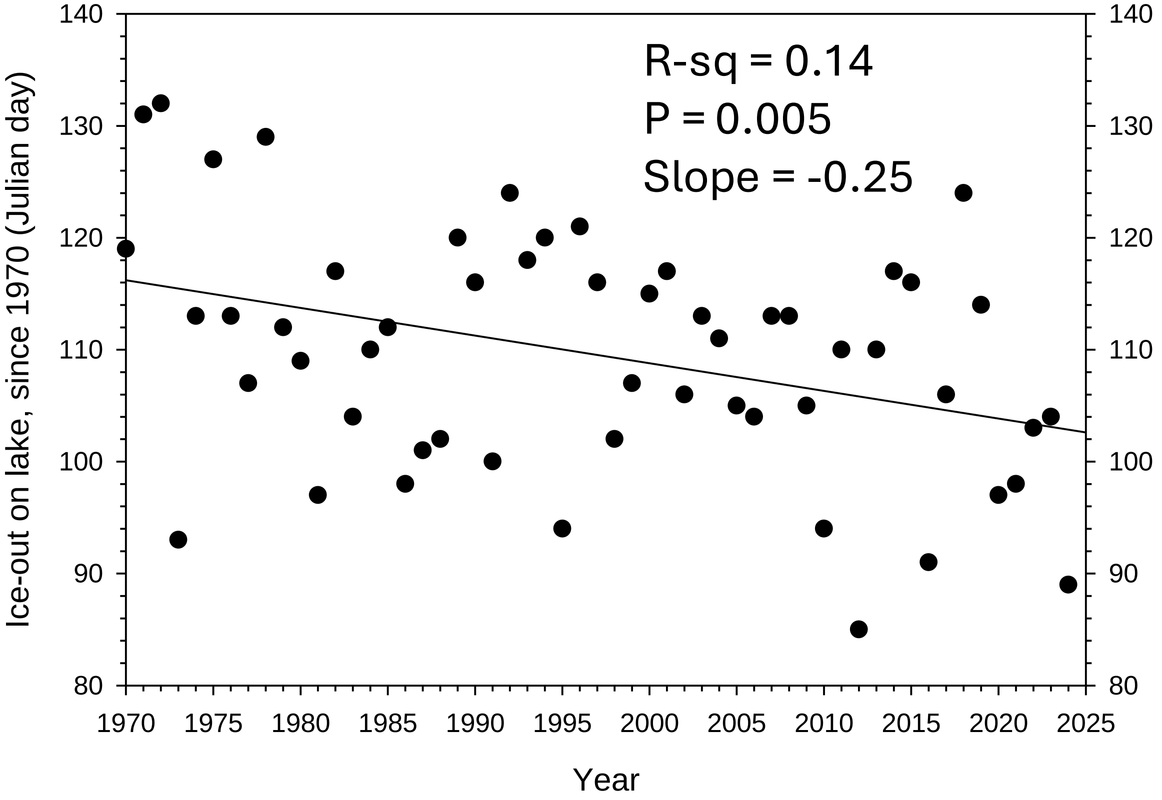
Most lakes freeze later and thaw earlier, with 1-3 weeks less ice cover
(Beier *et al.*, 2012)

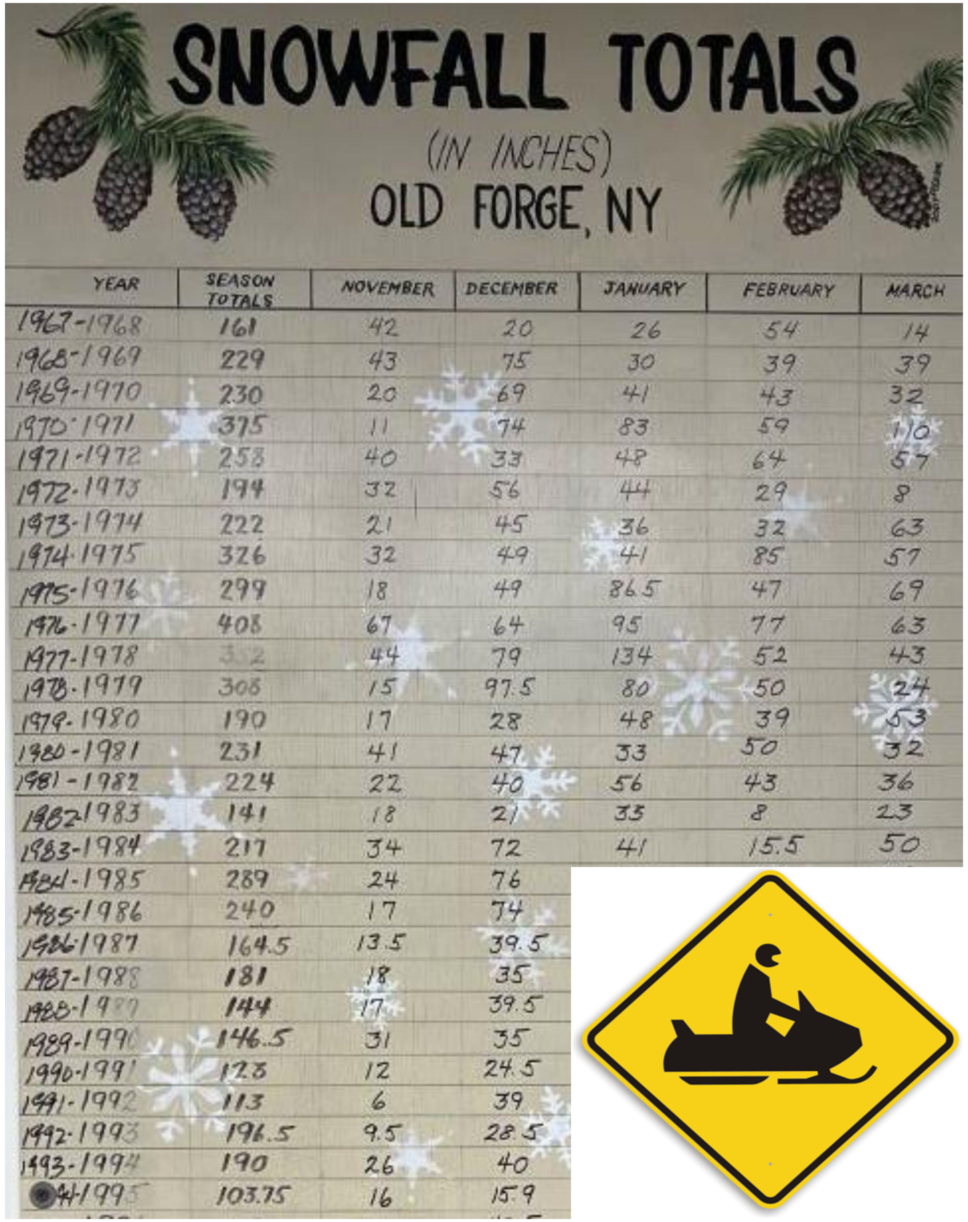
LAKE CHAMPLAIN
*** = main basin UNFROZEN**



LOWER ST. REGIS LAKE: ICE-OUT (1970-2024)

Ice-out is happening 2 weeks **earlier** than during the 1970s.



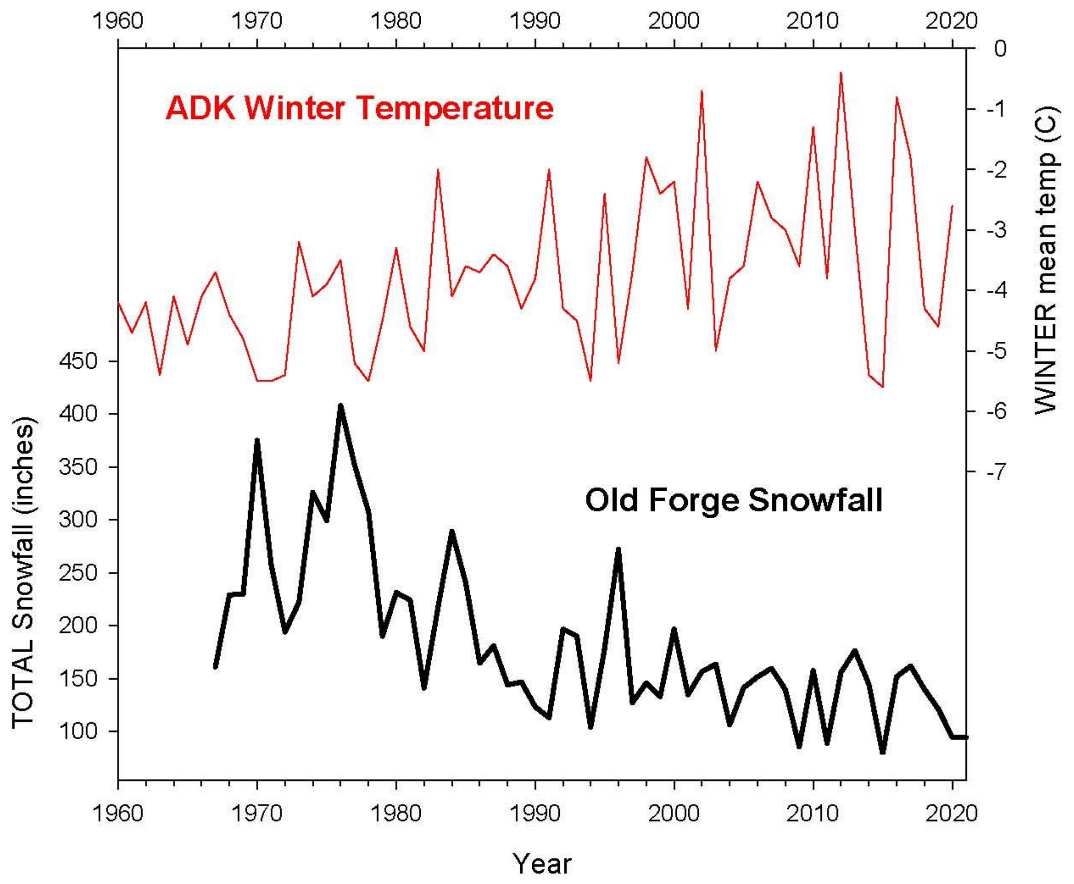


SNOWFALL TOTALS
(IN INCHES)
OLD FORGE, NY

YEAR	SEASON TOTALS	NOVEMBER	DECEMBER	JANUARY	FEBRUARY	MARCH
1967-1968	161	42	20	26	54	14
1968-1969	229	43	75	30	39	39
1969-1970	230	20	69	41	43	32
1970-1971	375	11	74	83	59	110
1971-1972	258	40	33	48	64	57
1972-1973	194	32	56	44	29	8
1973-1974	222	21	45	36	32	63
1974-1975	326	32	49	41	85	57
1975-1976	299	18	49	86.5	47	69
1976-1977	408	67	64	95	77	63
1977-1978	[illegible]	44	79	134	52	43
1978-1979	308	15	97.5	80	50	24
1979-1980	190	17	28	48	39	53
1980-1981	231	41	47	33	50	32
1981-1982	224	22	40	56	43	36
1982-1983	141	18	21	33	8	23
1983-1984	217	34	72	41	15.5	50
1984-1985	289	24	76			
1985-1986	240	17	74			
1986-1987	164.5	13.5	39.5			
1987-1988	181	18	35			
1988-1989	144	17	39.5			
1989-1990	146.5	31	35			
1990-1991	128	12	24.5			
1991-1992	113	6	39			
1992-1993	196.5	9.5	28.5			
1993-1994	190	26	40			
1994-1995	103.75	16	15.9			

(Full dataset is provided on the last page)

In the snowmobile mecca of Old Forge, a wall-chart in the Visitor Center shows decreasing **SNOWFALL** since the 1970s. Warming turned much of it to **RAIN**.

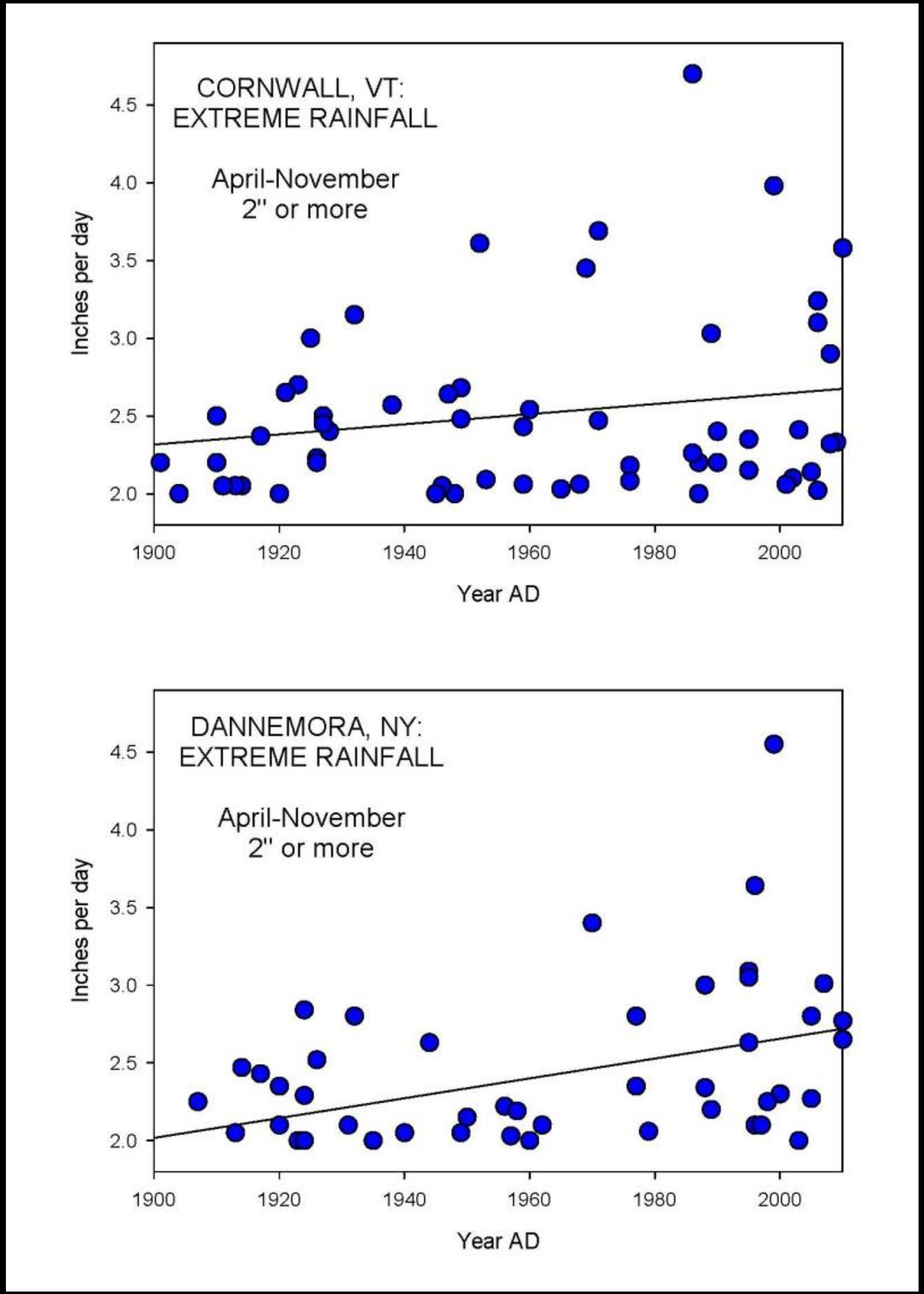


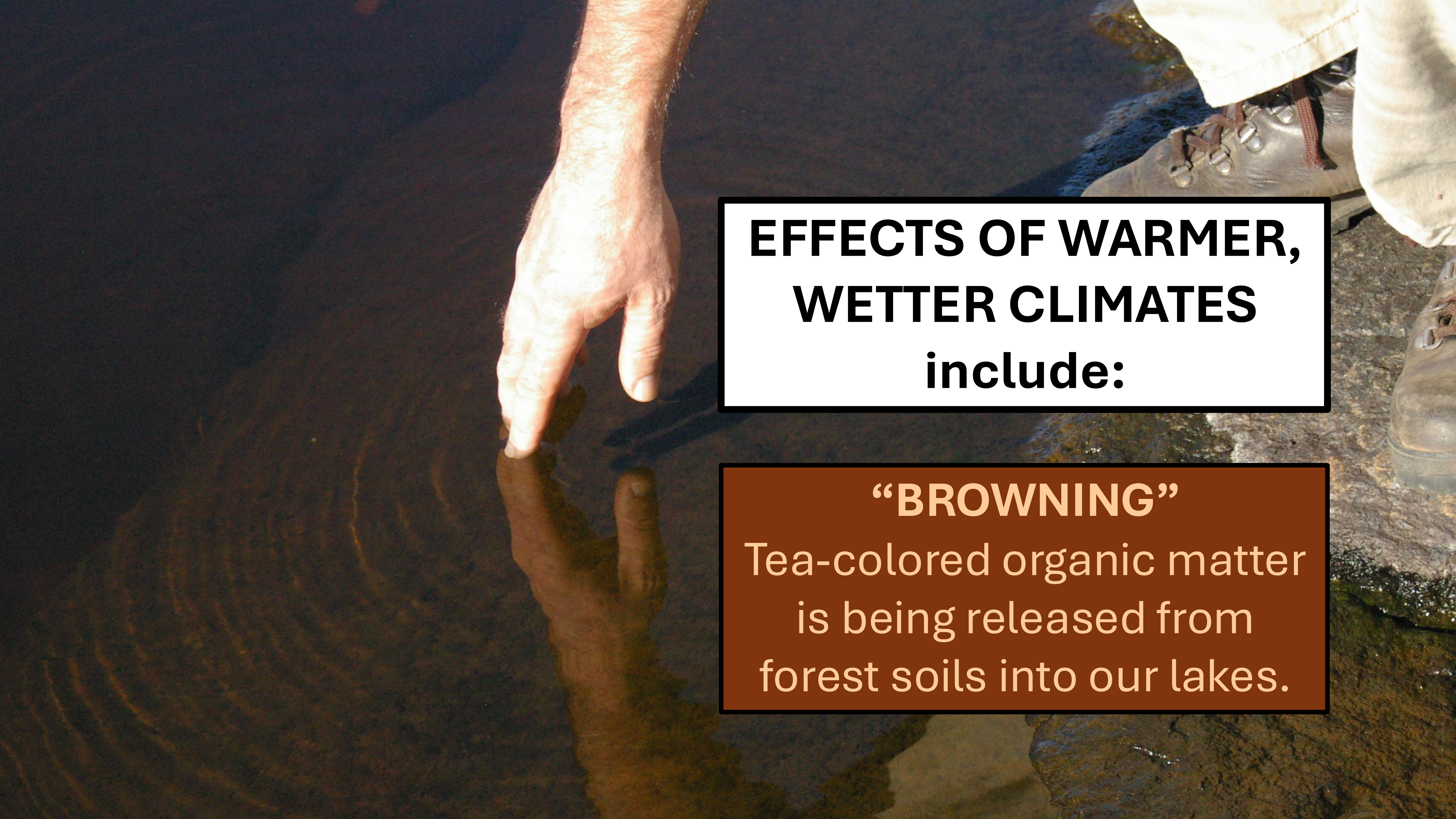

CHANGING PHENOLOGY
(seasonal behavior)

Monitoring at Paul Smith's College since 1990 shows that local amphibians and native bees are appearing **EARLIER** in Spring, but flowering-dates are not changing as much.

Monitoring by students in our Biology 111 labs shows that the surface of Lower Saint Regis Lake has **WARMED 2°C** in October since the 1990s.

Like most of the world, we have seen our extreme rainfall events become MORE extreme, on average



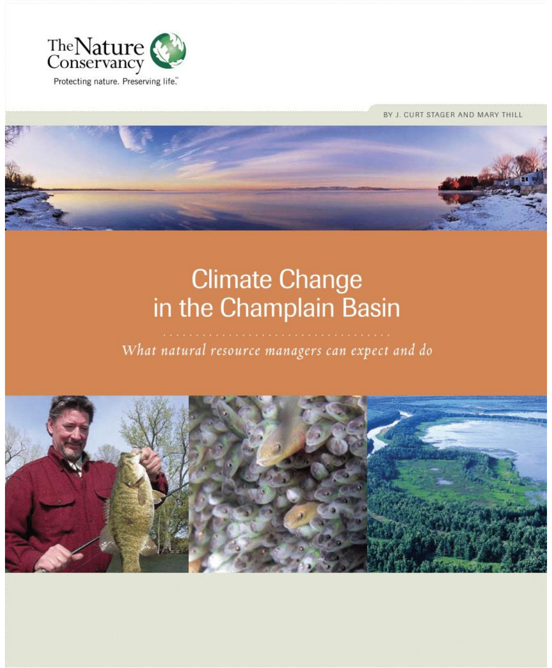

EFFECTS OF WARMER, WETTER CLIMATES include:
"BROWNING"
Tea-colored organic matter is being released from forest soils into our lakes.


STOP
RISING RIVERS
from more rainfall

RISING LAKE LEVELS

The waters of **Bear Pond** now cover tree roots along the shore and a formerly vegetated island.

#3: WHAT COMES NEXT?



Sixteen reputable global climate models were focused ("downscaled") to focus on the Adirondack-Champlain watershed.

They anticipate year-round **WARMING** by the end of this century, with the most warming in **WINTER**.

https://www.researchgate.net/publication/280204504_Climate_Change_in_the_Champlain_Basin_What_natural_resource_managers_can_expect_and_do

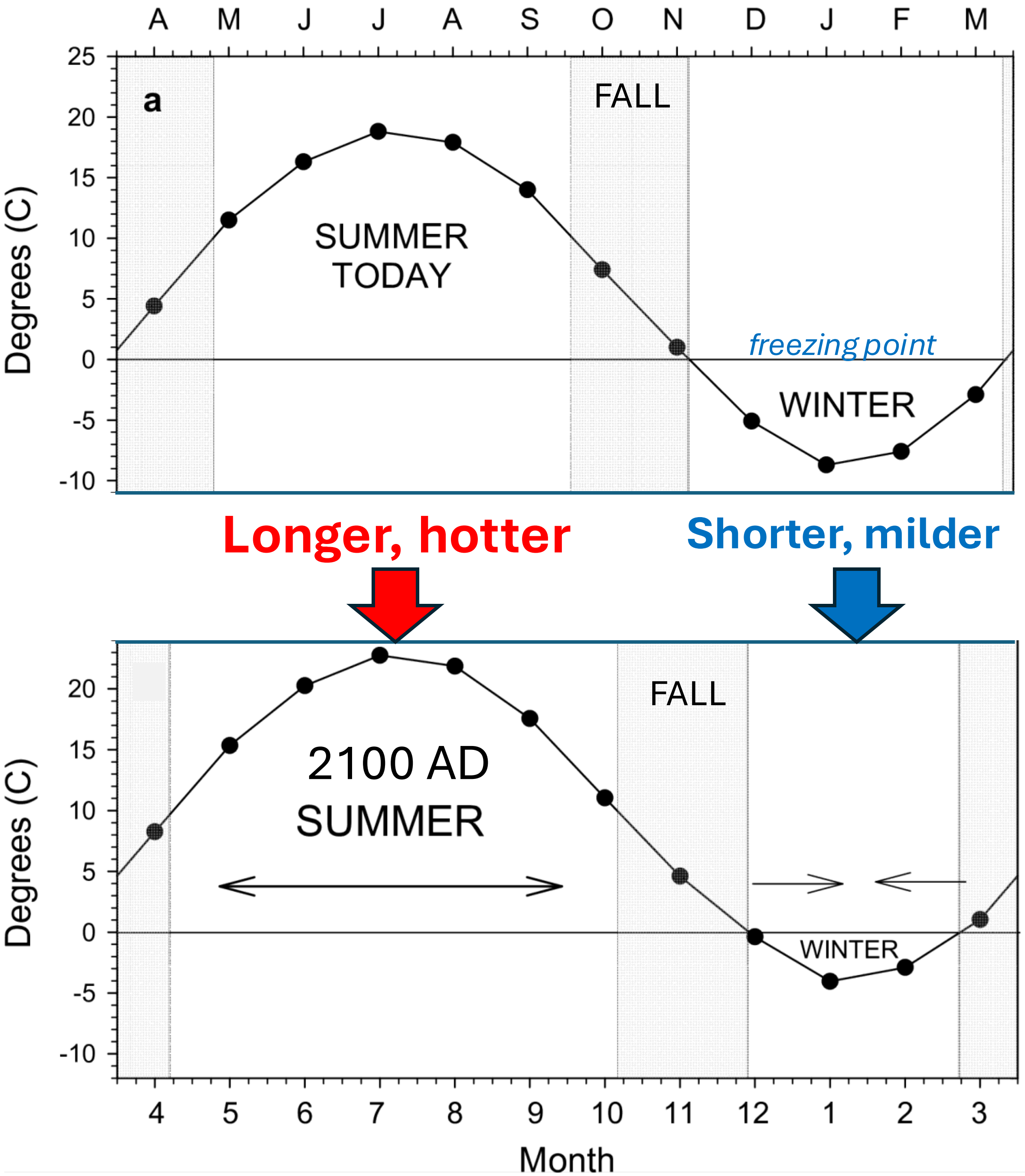
A2 EMISSIONS SCENARIO					
MODEL	Annual (°F)	Winter (°F)	Spring (°F)	Summer (°F)	Autumn (°F)
BCCR-BCM2.0	7.1	8.2	5.9	6.6	7.8
CGCM3.1(T47)	9.3	11.0	9.3	8.5	8.6
CNRM-CM3	8.0	9.2	6.7	7.7	8.6
CSIRO-Mk3.0	7.4	11.6	5.9	5.9	5.9
GFDL-CM2.0	9.6	10.7	8.3	10.4	9.2
GFDL-CM2.1	7.4	7.9	7.1	7.5	6.8
GISS-ER	6.1	7.7	6.5	5.1	5.2
INM-CM3.0	7.1	7.7	6.6	7.1	7.0
ipsl_cm4	11.0	11.2	11.3	9.9	-
MIROC3.2 (medres)	11.1	12.9	12.0	9.6	10.0
ECHO-G	9.0	9.7	7.7	9.2	9.5
ECHAM5/MPI-OM	8.7	9.6	8.8	8.4	8.3
MRI-GCM2.3.2	6.8	8.2	6.2	6.1	6.5
NCAR-CCSM3	9.0	9.9	8.2	10.1	8.0
NCAR-PCM	6.4	8.3	5.9	5.5	5.9
UKMO-HadCM3	10.0	8.7	8.7	12.7	9.6

HOW DO THESE PROJECTIONS COMPARE
to those modeled in the most recent
New York State Climate Impacts Assessment?

https://nysclimateimpacts.org/explore-by-region/the-adirondack-region/

VERY SIMILAR
for the extreme A2
emissions scenario:

Warming of 6-11 F
in the Adirondacks by
the end of this century,
especially in **WINTER**



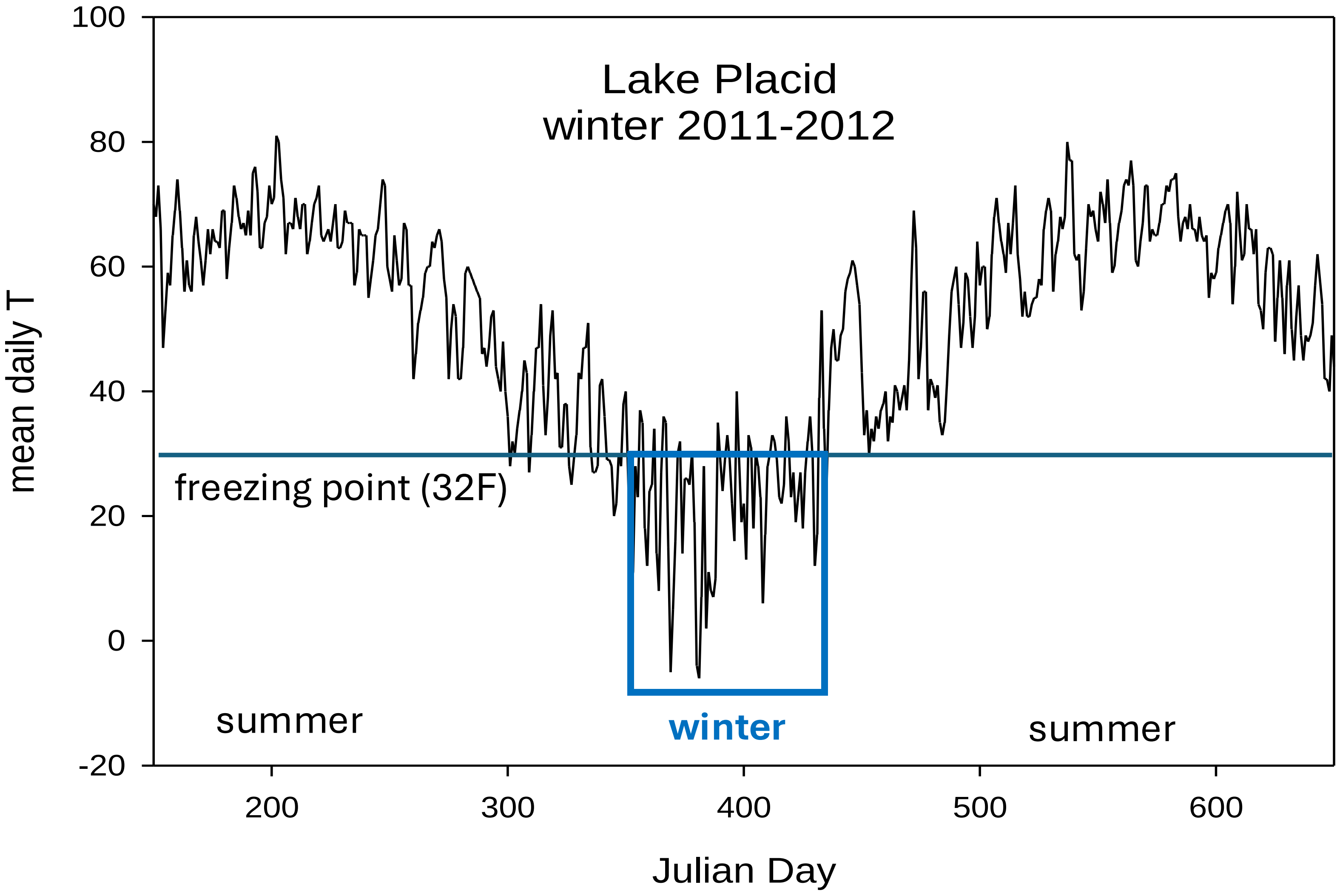
If today's carbon emission rates continue (A2 scenario), climate models for this region anticipate even **longer, hotter summers** and even **shorter, milder winters** by 2100 AD.

Winters could shorten by 1-2 months

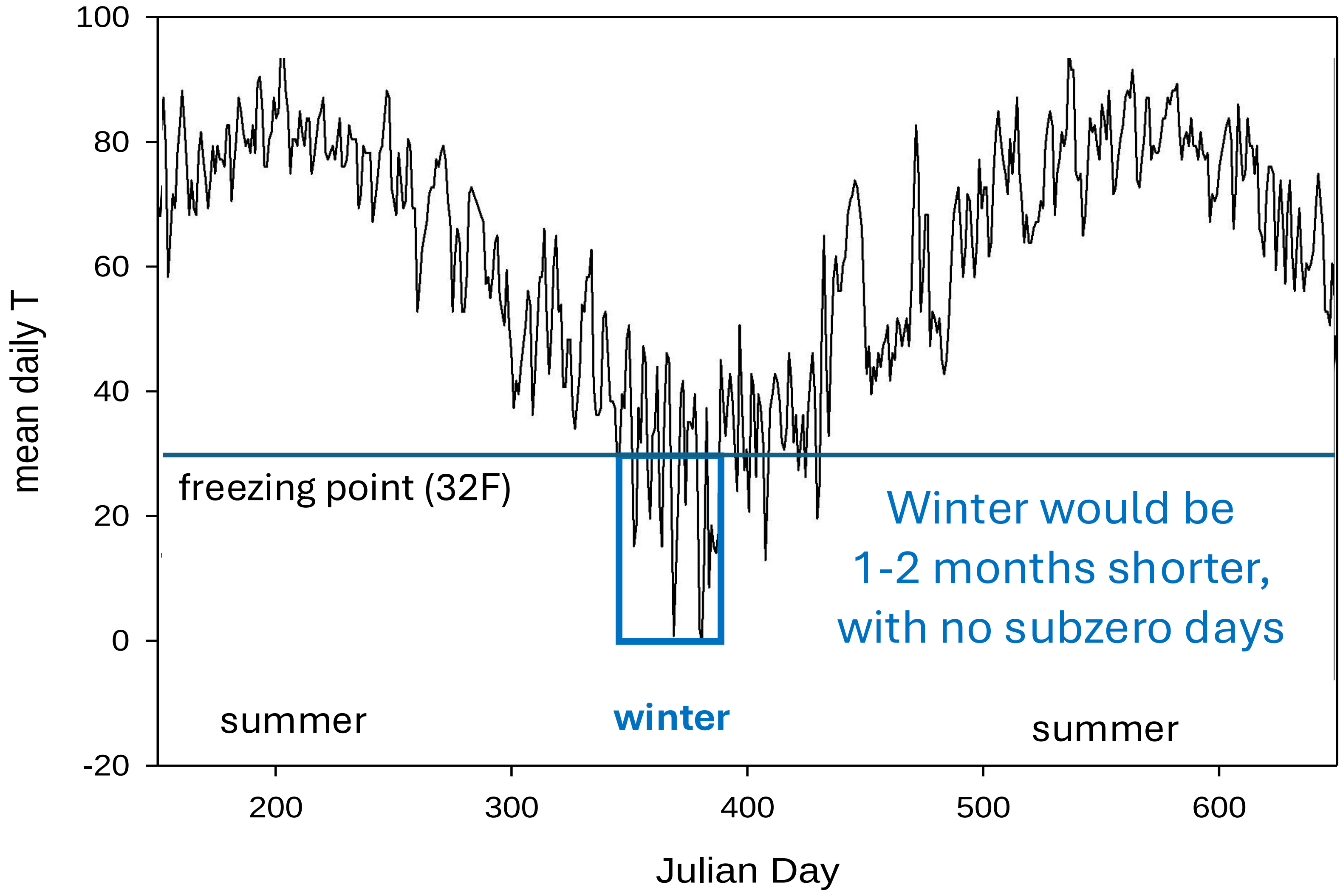
https://journals.plos.org/climate/article?id=10.1371/journal.pclm.0000047

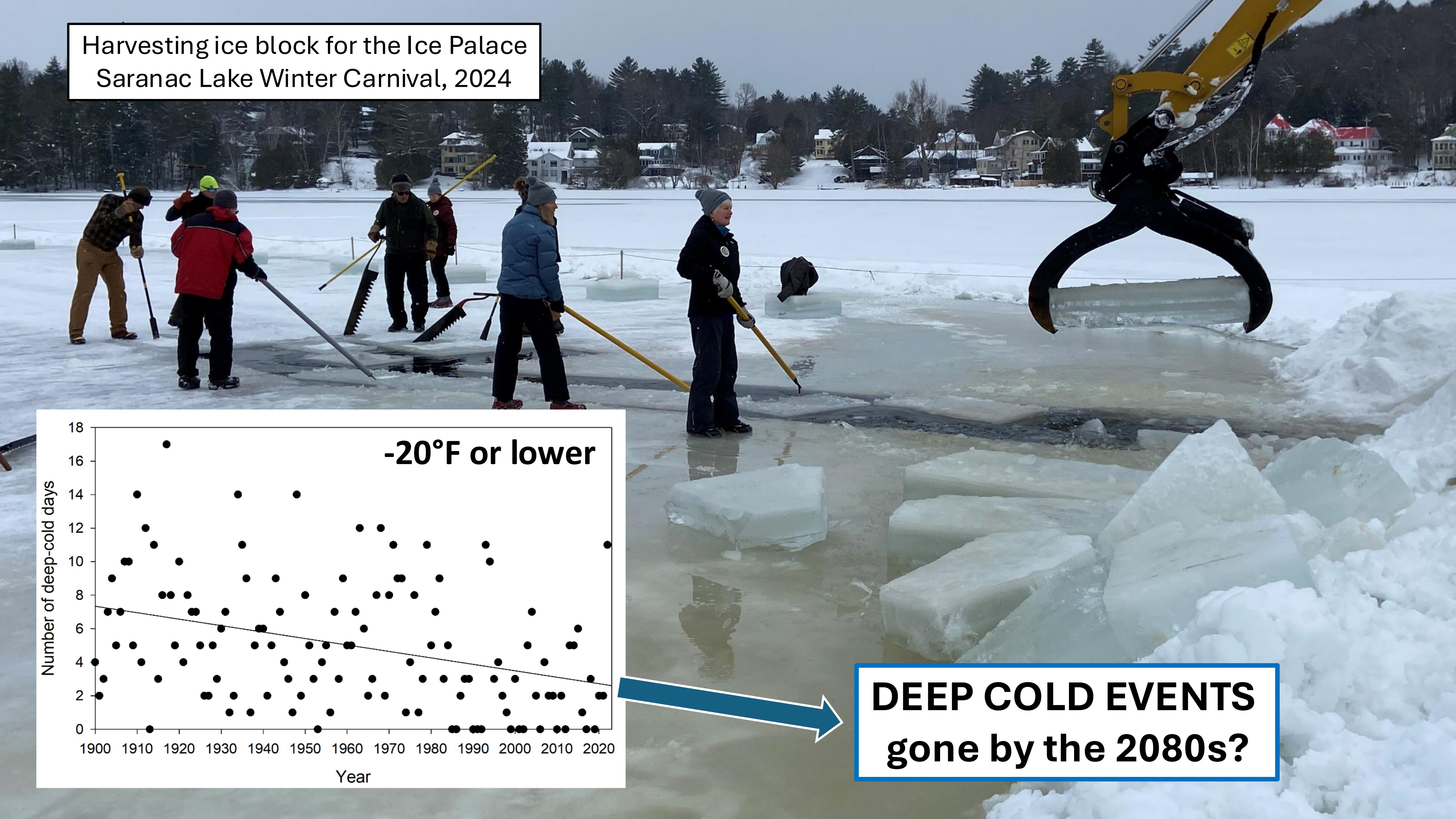

ENVISIONING SHORTER, MILDER WINTERS

EXAMPLE: THE MILD WINTER of 2011-2012

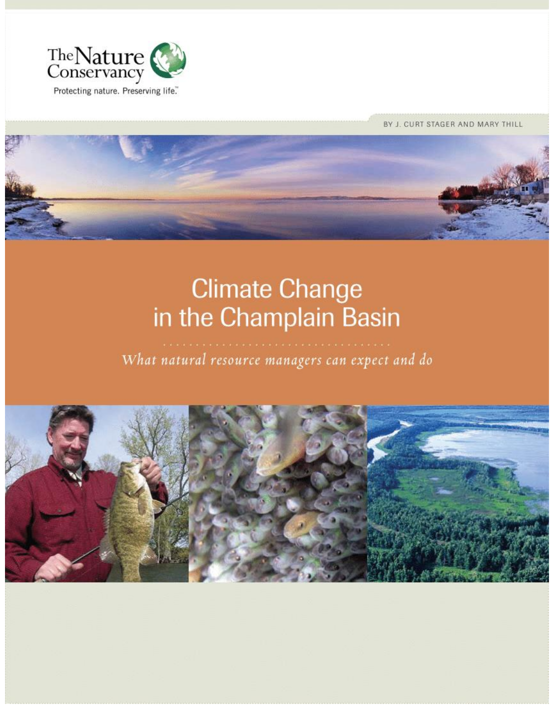


EXAMPLE: WITH A WARMER BASELINE IN 2100 AD




Harvesting ice block for the Ice Palace
Saranac Lake Winter Carnival, 2024
-20°F or lower
Number of deep-cold days
Year
DEEP COLD EVENTS
gone by the 2080s?

WHAT ABOUT PRECIPITATION?

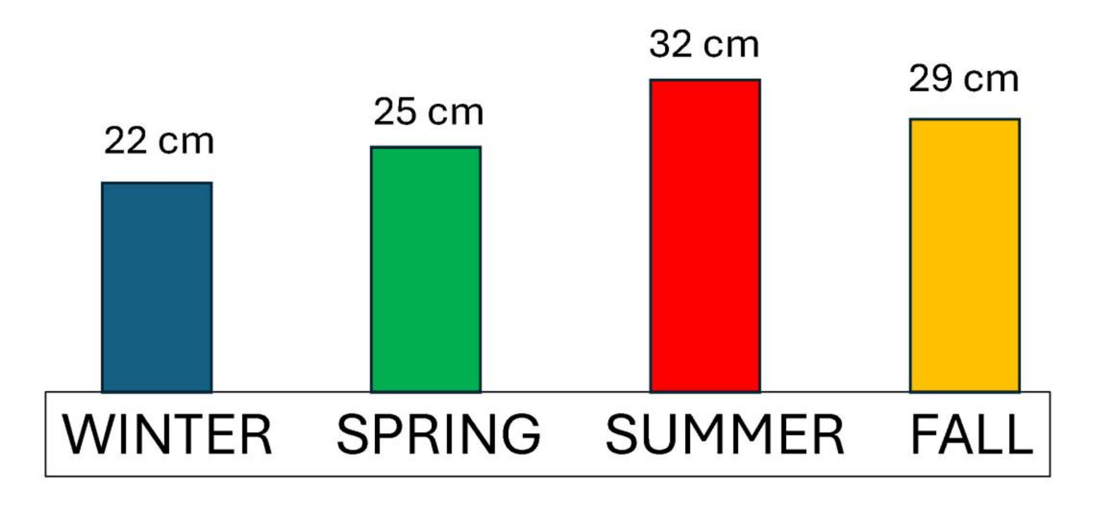


Future precipitation is more difficult to simulate accurately, and results vary depending on the model used.

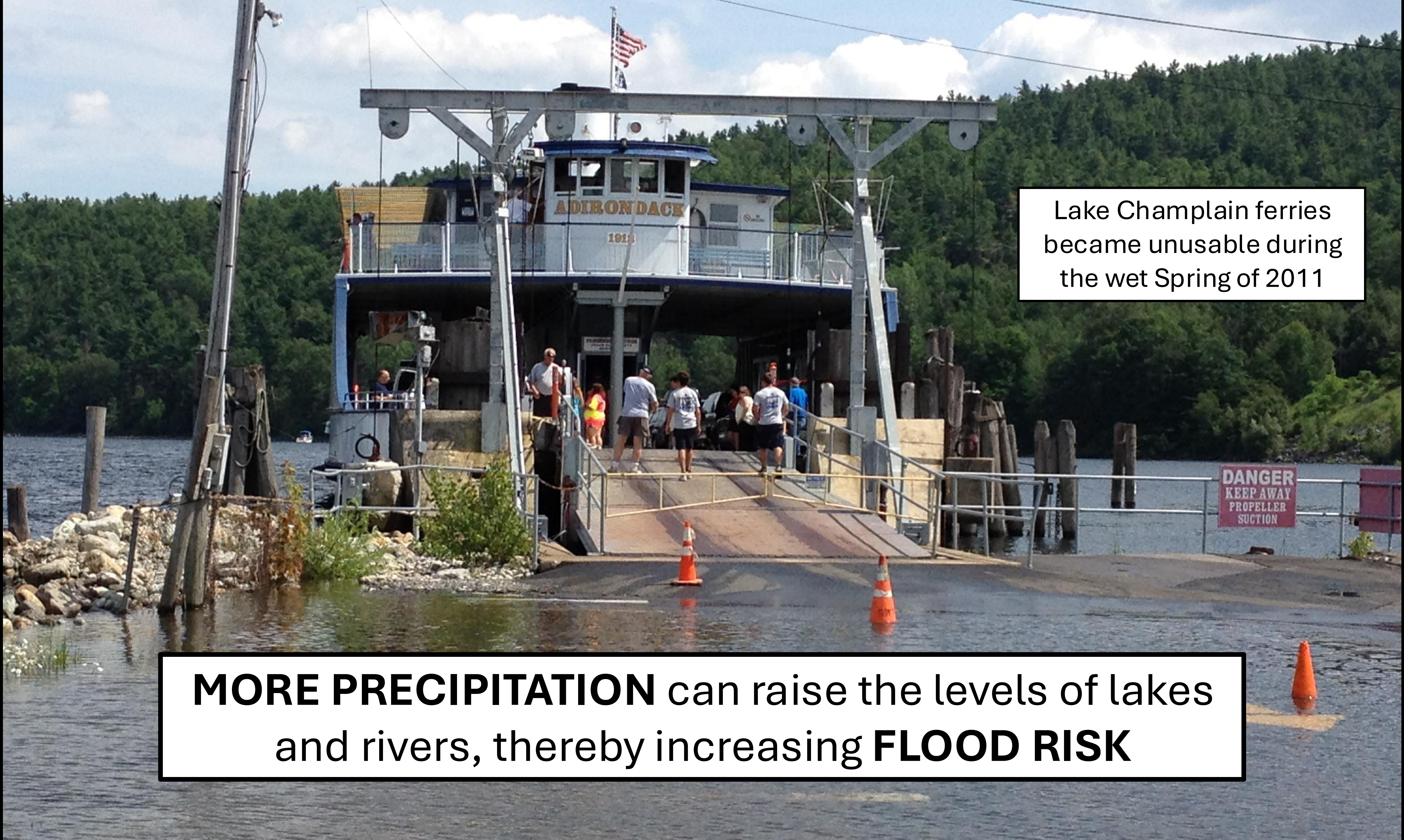
Most, but not all, of the models in our study anticipated **WETTER** conditions overall by the end of this century.

A2 EMISSIONS SCENARIO					
MODEL	Annual (in.)	Winter (in.)	Spring (in.)	Summer (in.)	Autumn (in.)
BCCR-BCM2.0	7.1	2.6	2.3	-	3.5
CGCM3.1(T47)	4.2	4.0	2.0	-1.4	-
CNRM-CM3	8.3	2.0	2.1	-	3.1
CSIRO-Mk3.0	5.9	-	-	-	2.0
GFDL-CM2.0	-	1.6	-	-2.2	-
GFDL-CM2.1	5.0	-	-	-	2.3
GISS-ER	9.9	2.4	3.9	1.7	1.8
INM-CM3.0	-	-	-	3.1	-
ipsl_cm4		-	-	-1.7	-
MIROC3.2 (medres)	-4.0	-	-	-2.3	-2.6
ECHO-G	4.4	2.2	3.4	-	-
ECHAM5/MPI-OM	4.9	-	-	-	2.5
MRI-GCM2.3.2	5.9	3.4	-	-	1.4
NCAR-CCSM3	4.6	2.4	-	-	-
NCAR-PCM	-	-	-	-	-
UKMO-HadCM3	4.0	2.0	-	-	-

More evidence for WETTER summers in a warmer future?



1. Our warmest months are also the WETTEST
2. ADK3 became warmer & WETTER since the 1960s
3. Consistent with models in the NYS Climate Impacts Assessment



Lake Champlain ferries became unusable during the wet Spring of 2011

MORE PRECIPITATION can raise the levels of lakes and rivers, thereby increasing **FLOOD RISK**


WARMER, WETTER SUMMERS
can also favor Harmful Algae Blooms

SUMMARY: Climate Change is HERE

(1) We are warming faster than the global average and our climate has also become wetter overall.
(2) We are already seeing the effects on phenology, water levels, storm intensity, and water quality.
(3) We expect more of the same in future, as well.

FOR MORE INFORMATION
about
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at Paul Smith's College:

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Professor of Natural Sciences,
Director of Climate Initiatives

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(518) 327-6342
https://www.paulsmiths.edu/directory/curt-stager/

SUGGESTED RESOURCES

Background information on Adirondack climate change studies, media, and controversies:
Stager, C. 2011. *Deep Future: The Next 100,000 Years of Life on Earth*. St Martin's Press.

Climate impacts and model projections for the Adirondack-Champlain region: Stager, J.C. and M. Thill. 2010. Climate change in the Champlain basin: What natural resources managers can expect and do. Report for The Nature Conservancy: https://www.researchgate.net/publication/280204504_Climate_Change_in_the_Champlain_Basin_What_natural_resource_managers_can_expect_and_do

Global temperature anomalies: https://data.giss.nasa.gov/gistemp/

Lake Champlain freeze dates: https://www.weather.gov/btv/lakeclose

Lake ice retreat: Beier, C.M., J.C. Stella, M. Dovčiak, S.A. McNulty, 2012. Local climatic drivers of changes in phenology at a boreal-temperate ecotone in eastern North America. *Climatic Change*, DOI: 10.1007/s10584-012-0455-z

New York State Climate Impacts Assessment:
https://nysclimateimpacts.org/explore-the-assessment/new-york-states-changing-climate/

Adirondack phenology & climate monitoring at Paul Smiths: Stager, J.C. *et al.,* 2022. Once and future changes in climate and phenology within the Adirondack uplands (New York, USA). *PLoS Climate:* https://journals.plos.org/climate/article?id=10.1371/journal.pclm.0000047

USA National Phenology Network:
https://www.usanpn.org/about/phenology#:~:text=Phenology%20is%20the%20study%20of,animals%2C%20and%20other%20living%20things

U.S. Historical Climatology Network climate data: https://www1.ncdc.noaa.gov/pub/data/ushcn/v2.5/

RAW CLIMATE DATA FOR THE ADIRONDACKS: 1900-2024

NOTES:

U.S. Historical Climatology Network sources of mean daily temperatures (ushcn.tavg.latest.FLs.52j.tar.gz) and daily precipitation (ushcn.prcp.latest.FLs.52j.tar.gz) for each month were downloaded from the following website: https://www.ncei.noaa.gov/pub/data/ushcn/v2.5/

Of five USHCN stations located within the Adirondack uplands, three with the fewest missing dates, strongest correlations between records, and a wide geographical distribution north, west, and south of the Paul Smiths study site were selected for analysis: Dannemora *(301966),* Tupper Lake *(308631)*, and Indian Lake *(304102),* respectively. Their monthly data were combined into a single composite titled "ADK3; the temperature records were averaged and the precipitation totals were summed for the 3 stations.

Temperature anomalies were used for comparison to global average temperatures, but the similarity of means and elevations among the ADK3 stations also made it feasible to focus most analyses on *temperature values*, which are more readily understood by general audiences.

The algorithm used for filling in missing data and flagging possible errors in the datasets can yield slightly different values from time to time: these particular data were downloaded on January 11, 2025.

ADK3 CLIMATE DATA (p. 1 of 5): Mean temperatures (degrees C) and precipitation totals (mm)

YEAR	WINTER	SPRING	SUMMER	FALL	ANNUAL		YEAR	WINT p	SPRING p	SUMM p	FALL p	TOTAL
1900	-9.4	1.6	17.5	7.8	4.5		1900	165.2	177.9	313.7	303.0	959.8
1901	-10.6	3.7	18.0	5.6	4.3		1901	147.9	239.3	359.7	214.9	961.9
1902	-9.0	4.8	15.5	7.6	4.5		1902	196.6	296.4	378.0	236.5	1107.5
1903	-8.8	5.4	14.6	6.0	4.2		1903	247.2	161.2	401.4	172.6	982.4
1904	-12.8	3.2	16.4	4.0	2.6		1904	194.4	186.0	264.5	256.1	901.0
1905	-12.7	3.1	16.7	5.8	3.7		1905	174.1	173.8	464.2	223.7	1035.8
1906	-7.5	1.9	17.5	6.3	4.4		1906	123.3	150.1	301.6	211.3	786.4
1907	-11.6	1.5	16.2	5.3	3.2		1907	163.6	175.6	170.9	341.4	851.6
1908	-9.4	3.2	17.0	7.6	4.3		1908	264.6	279.6	180.3	133.0	857.5
1909	-8.4	2.0	16.3	6.2	4.0		1909	260.9	242.8	183.0	165.1	851.8
1910	-9.5	5.2	16.5	5.6	4.2		1910	226.3	212.2	253.0	236.3	927.8
1911	-10.6	3.4	17.6	5.1	4.6		1911	200.4	170.6	218.9	233.8	823.7
1912	-10.1	2.1	15.5	6.7	3.5		1912	177.8	266.2	202.7	293.6	940.2
1913	-6.7	4.5	16.7	7.5	5.5		1913	188.0	286.6	186.1	320.3	981.0
1914	-9.8	3.0	16.0	6.2	3.5		1914	135.5	212.6	271.1	178.9	798.1
1915	-7.8	3.1	16.0	7.4	4.8		1915	213.6	116.1	376.3	165.8	871.9
1916	-8.8	1.9	17.1	6.4	4.1		1916	227.1	246.0	259.6	261.1	993.8
1917	-10.4	1.1	16.7	3.9	2.4		1917	238.3	248.4	315.2	273.1	1075.0
1918	-13.1	4.1	16.0	5.9	3.9		1918	217.5	223.1	301.2	443.9	1185.7
1919	-6.6	3.3	17.1	6.1	4.6		1919	190.7	339.1	268.4	302.8	1101.0
1920	-11.9	3.0	16.4	7.3	4.1		1920	185.0	213.7	311.0	267.7	977.4
1921	-7.0	6.8	18.0	6.6	5.8		1921	274.8	192.2	269.9	287.9	1024.8
1922	-9.3	4.5	16.6	6.7	4.7		1922	246.1	258.4	381.2	170.3	1055.9
1923	-10.9	1.1	16.0	6.5	3.6		1923	197.1	212.6	209.8	245.6	865.1
1924	-8.1	2.0	16.0	5.9	3.4		1924	256.3	241.6	280.0	260.3	1038.1

ADK3 CLIMATE DATA (p. 2 of 5): Mean temperatures (degrees C) and precipitation totals (mm)

YEAR	WINTER	SPRING	SUMMER	FALL	ANNUAL
1925	-8.3	3.5	16.9	4.5	4.2
1926	-9.9	-0.9	15.5	5.3	2.3
1927	-8.6	3.7	15.1	7.8	4.9
1928	-8.1	2.0	16.7	6.1	4.3
1929	-7.7	4.6	15.7	6.3	4.4
1930	-7.7	3.0	17.0	7.6	5.1
1931	-7.7	4.8	17.4	9.0	5.9
1932	-5.5	2.0	16.5	6.5	5.0
1933	-4.8	3.6	17.4	4.5	4.7
1934	-11.5	3.4	16.8	7.0	3.9
1935	-10.5	2.5	17.3	6.3	4.0
1936	-10.4	5.0	16.4	5.5	4.4
1937	-5.3	2.4	18.3	6.2	5.2
1938	-8.3	4.1	17.8	6.5	5.1
1939	-8.3	1.7	17.2	5.4	4.0
1940	-9.9	1.9	16.3	5.1	3.4
1941	-8.8	3.8	17.1	7.2	4.9
1942	-8.7	5.8	16.8	6.9	4.9
1943	-9.9	1.3	17.1	5.5	3.5
1944	-9.1	2.8	17.9	6.4	4.6
1945	-10.3	5.6	16.9	7.0	4.8
1946	-9.6	5.3	15.9	8.3	5.2
1947	-8.2	2.4	17.8	7.7	4.7
1948	-10.7	3.4	16.9	7.8	4.7
1949	-5.5	4.2	18.9	6.3	6.0

YEAR	WINT p	SPRING p	SUMM p	FALL p	TOTAL
1925	191.8	246.9	291.2	349.2	1079.1
1926	183.0	170.1	328.9	283.9	965.9
1927	154.4	157.6	274.9	376.5	963.4
1928	254.5	225.0	282.7	245.4	1007.6
1929	175.3	305.4	264.6	225.0	970.4
1930	212.3	262.2	260.1	149.3	883.8
1931	147.3	183.1	297.1	274.0	901.6
1932	229.9	195.1	372.9	313.7	1111.6
1933	167.7	289.6	193.5	216.8	867.7
1934	188.0	181.5	192.0	213.5	775.1
1935	211.2	186.5	366.4	221.3	985.4
1936	183.1	291.3	244.3	281.3	1000.0
1937	220.5	264.4	365.6	217.9	1068.3
1938	220.8	225.1	316.6	269.7	1032.2
1939	265.7	209.6	215.1	171.2	861.6
1940	164.0	262.2	276.0	254.3	956.5
1941	191.4	121.7	240.4	212.3	765.8
1942	146.6	245.5	258.2	305.3	955.6
1943	208.7	242.3	339.7	251.1	1041.7
1944	153.6	188.7	243.3	244.2	829.9
1945	186.3	322.6	243.2	444.3	1196.4
1946	155.4	200.7	225.2	284.6	866.0
1947	254.1	319.6	424.3	186.0	1184.0
1948	144.1	238.3	287.0	220.1	889.6
1949	249.7	204.0	232.6	219.4	905.7

ADK3 CLIMATE DATA (p. 3 of 5): Mean temperatures (degrees C) and precipitation totals (mm)

YEAR	WINTER	SPRING	SUMMER	FALL	ANNUAL
1950	-6.7	2.0	16.8	6.8	4.6
1951	-7.0	4.2	16.3	6.3	5.0
1952	-6.8	3.6	17.9	6.8	5.5
1953	-5.8	4.6	17.4	8.3	6.3
1954	-6.2	3.5	16.4	7.1	4.8
1955	-9.0	4.7	19.0	6.4	5.0
1956	-9.1	1.0	16.2	6.6	4.2
1957	-8.0	4.2	17.1	7.1	5.2
1958	-8.1	4.0	16.1	6.8	4.0
1959	-11.6	4.0	18.3	7.2	5.0
1960	-7.3	3.5	16.5	7.5	4.7
1961	-9.9	3.1	17.0	9.0	5.1
1962	-9.1	4.4	16.4	5.4	4.1
1963	-10.3	3.3	16.4	7.9	4.0
1964	-9.5	4.4	16.3	6.7	4.9
1965	-9.4	3.2	15.9	5.9	4.1
1966	-7.8	2.7	17.0	6.7	4.5
1967	-7.8	1.6	17.8	5.9	4.4
1968	-10.0	5.0	16.3	7.1	4.3
1969	-8.9	2.9	17.1	6.7	4.5
1970	-10.8	3.4	17.1	7.8	4.3
1971	-10.0	1.6	16.5	8.1	4.3
1972	-8.7	2.0	16.2	4.9	3.6
1973	-8.0	5.3	18.4	6.6	5.6
1974	-8.2	3.0	16.9	5.4	4.4

YEAR	WINT p	SPRING p	SUMM p	FALL p	TOTAL
1950	209.9	144.5	294.1	248.7	897.2
1951	225.9	239.1	313.5	242.2	1020.7
1952	217.6	232.3	254.2	184.1	888.3
1953	228.9	271.2	239.0	181.6	920.7
1954	267.9	313.7	279.1	334.0	1194.8
1955	173.0	227.7	289.0	243.4	933.1
1956	128.9	274.1	189.1	222.1	814.3
1957	170.2	183.0	236.1	221.5	810.7
1958	251.5	169.6	304.2	298.6	1023.8
1959	185.9	141.9	269.9	346.7	944.4
1960	220.9	177.0	195.2	233.0	826.1
1961	115.8	235.7	306.5	169.0	826.9
1962	183.8	167.1	324.6	252.9	928.4
1963	141.9	221.3	256.4	166.2	785.7
1964	148.7	209.8	220.4	126.3	705.2
1965	162.0	113.4	304.7	282.2	862.3
1966	151.9	144.9	231.7	175.4	703.9
1967	157.9	212.9	306.3	252.2	929.2
1968	118.2	230.5	210.2	304.3	863.2
1969	169.9	242.3	273.4	237.6	923.1
1970	174.6	188.9	278.3	264.7	906.5
1971	267.0	236.9	311.5	195.0	1010.4
1972	218.3	254.9	413.7	227.1	1114.1
1973	242.8	315.8	294.5	253.3	1106.4
1974	235.4	254.0	291.0	229.8	1010.2

ADK3 CLIMATE DATA (p. 4 of 5): Mean temperatures (degrees C) and precipitation totals (mm)

YEAR	WINTER	SPRING	SUMMER	FALL	ANNUAL
1975	-6.5	3.1	18.1	6.6	5.0
1976	-9.1	4.0	17.0	4.3	3.8
1977	-11.1	5.6	16.3	6.7	4.7
1978	-10.5	2.9	17.1	5.4	3.8
1979	-10.0	4.9	17.0	7.3	4.9
1980	-8.0	4.0	16.9	4.9	4.0
1981	-9.4	4.8	17.0	5.4	4.9
1982	-9.7	3.7	16.2	7.6	4.7
1983	-5.6	3.7	17.7	7.2	5.2
1984	-7.7	2.1	17.7	6.4	5.1
1985	-7.7	4.2	15.8	7.0	4.4
1986	-9.2	5.7	15.7	5.4	4.7
1987	-8.4	5.5	17.0	6.2	5.1
1988	-7.5	4.4	17.5	5.9	4.8
1989	-8.1	3.1	16.8	6.6	3.9
1990	-8.6	4.3	17.3	7.2	6.1
1991	-6.1	5.9	17.7	6.7	5.8
1992	-7.8	2.7	15.4	5.5	4.0
1993	-8.9	3.9	16.9	6.0	4.3
1994	-11.3	3.4	17.5	7.5	4.6
1995	-6.2	3.9	18.5	6.3	5.1
1996	-9.2	2.6	17.1	6.4	4.8
1997	-6.1	1.9	16.8	6.0	4.4
1998	-4.9	6.4	17.4	7.6	6.9
1999	-5.6	4.7	18.2	8.5	6.2

YEAR	WINT p	SPRING p	SUMM p	FALL p	TOTAL
1975	213.9	184.7	236.9	359.2	994.7
1976	258.9	296.1	373.5	274.0	1202.5
1977	136.3	229.2	320.3	434.3	1120.2
1978	269.6	208.5	264.2	215.9	958.2
1979	234.8	240.4	252.0	294.8	1022.1
1980	103.3	195.7	293.4	247.5	839.9
1981	190.0	187.7	309.1	373.5	1060.4
1982	206.9	182.4	281.4	249.6	920.3
1983	139.6	295.1	253.7	297.1	985.6
1984	259.0	268.9	268.0	189.4	985.3
1985	218.3	219.2	227.8	354.1	1019.4
1986	203.0	218.1	425.3	251.5	1097.9
1987	177.8	175.1	298.4	281.4	932.7
1988	130.9	153.8	273.7	347.3	905.7
1989	130.2	237.0	326.1	338.4	1031.8
1990	214.6	307.1	294.7	302.3	1118.7
1991	227.4	255.9	190.8	236.4	910.5
1992	184.1	255.7	292.0	308.9	1040.7
1993	215.3	253.9	264.3	276.3	1009.8
1994	194.6	262.3	373.1	224.3	1054.3
1995	176.7	132.4	274.0	413.6	996.6
1996	188.5	361.1	339.7	308.7	1198.0
1997	236.4	233.4	298.3	258.9	1027.0
1998	294.4	179.1	471.4	202.0	1146.9
1999	203.0	181.0	210.1	299.7	893.9

ADK3 CLIMATE DATA (p. 5 of 5): Mean temperatures (degrees C) and precipitation totals (mm)

YEAR	WINTER	SPRING	SUMMER	FALL	ANNUAL	YEAR	WINT p	SPRING p	SUMM p	FALL p	TOTAL
2000	-7.2	5.5	16.4	7.2	5.1	2000	216.3	400.5	287.8	177.4	1082.0
2001	-8.5	4.0	17.7	8.7	6.1	2001	216.4	259.0	296.0	238.0	1009.4
2002	-3.5	4.0	17.9	7.1	5.9	2002	226.4	336.8	273.8	335.0	1172.0
2003	-9.8	3.5	17.9	7.6	4.9	2003	172.2	278.8	337.9	396.1	1185.0
2004	-9.4	5.3	16.6	7.6	4.9	2004	248.2	305.8	360.6	209.5	1124.2
2005	-8.0	3.4	19.4	8.8	5.9	2005	238.4	237.7	360.8	455.8	1292.7
2006	-6.0	4.7	17.8	7.8	6.5	2006	287.1	281.4	365.4	339.7	1273.6
2007	-6.8	3.6	17.8	8.4	5.3	2007	280.1	295.0	266.6	377.4	1219.1
2008	-6.6	3.9	17.6	7.0	5.5	2008	352.6	264.6	402.9	263.0	1283.1
2009	-8.5	4.9	16.9	7.4	5.1	2009	260.3	271.3	345.4	263.4	1140.5
2010	-7.1	7.6	18.2	7.6	6.5	2010	199.6	190.7	394.2	335.7	1120.2
2011	-8.5	4.7	18.4	9.4	6.4	2011	179.6	525.3	369.6	288.0	1362.5
2012	-4.9	7.2	18.5	7.6	7.1	2012	197.5	193.8	254.6	273.6	919.5
2013	-6.3	4.4	17.6	6.8	5.3	2013	244.3	269.2	460.3	260.0	1233.7
2014	-9.1	2.7	17.1	7.4	4.8	2014	229.1	291.4	361.3	205.8	1087.6
2015	-10.3	4.0	17.3	8.9	5.4	2015	198.6	170.8	428.7	271.2	1069.4
2016	-3.9	5.0	18.5	8.8	6.6	2016	246.7	198.7	334.2	247.3	1026.9
2017	-4.7	3.8	17.2	8.8	6.0	2017	210.7	317.6	427.9	265.3	1221.5
2018	-7.6	3.7	18.5	6.6	5.5	2018	223.5	259.4	192.2	376.9	1051.9
2019	-8.5	3.4	17.8	6.5	4.9	2019	272.6	311.5	273.5	405.1	1262.7
2020	-5.6	4.7	18.8	7.9	6.5	2020	221.2	180.2	275.9	223.7	901.0
2021	-7.3	5.3	18.7	8.6	6.4	2021	210.8	194.4	368.3	282.6	1056.1
2022	-8.3	5.4	18.1	8.5	5.9	2022	219.5	288.8	346.8	252.7	1107.9
2023	-4.6	5.2	17.6	8.4	6.6	2023	275.5	258.3	491.8	233.3	1258.8
2024	-3.5	6.9	18.6	9.3	7.4	2024	263.5	304.9	391.0	184.7	1144.2

LINEAR TRENDS in MONTHLY ADK3 TEMPERATURE and PRECIPITATION

Note: a sustained increase in precipitation began in 1970, which is muted in the 1970-2024 time frame

T (1970-2024)	r2	slope	P	change
1	0.067	0.049	0.058	2.6
2	0.055	0.04	0.084	2.2
3	0.013	0.016	0.41	0.9
4	0.054	0.026	0.09	1.4
5	0.067	0.026	0.057	1.4
6	0.059	0.016	0.073	0.9
7	0.092	0.021	0.024	1.1
8	0.146	0.026	0.004	1.4
9	0.37	0.053	<0.0001	2.9
10	0.161	0.045	0.002	2.4
11	0.023	0.018	0.272	1.0
12	0.109	0.059	0.014	3.2
ANN	0.372	0.033	<0.0001	1.8
T (1990-2024)	r2	slope	P	change
1	0	0.004	0.945	0.1
2	0.015	0.032	0.477	1.1
3	0.007	0.019	0.641	0.6
4	0.005	0.012	0.677	0.4
5	0.113	0.056	0.049	1.9
6	0.001	0.003	0.882	0.1
7	0.174	0.05	0.013	1.7
8	0.097	0.031	0.069	1.1
9	0.27	0.067	0.001	2.3
10	0.141	0.059	0.027	2.0
11	0.005	0.014	0.677	0.5
12	0.018	0.032	0.447	1.1
ANN	0.158	0.032	0.018	1.1

P (1970-2024)	r2	slope	P	change
1	0.031	0.345	0.203	18.6
2	0.016	0.2	0.367	10.8
3	0.001	0.047	0.827	2.5
4	0.069	0.575	0.053	31.1
5	0.009	0.24	0.499	13.0
6	0.082	0.889	0.034	48.0
7	0.057	0.572	0.081	30.9
8	0.001	0.055	0.842	3.0
9	0.088	-0.629	0.028	-34.0
10	0.077	0.8	0.04	43.2
11	0.01	-0.19	0.463	-10.3
12	0.016	0.248	0.352	13.4
ANN	0.155	3.15	0.003	170.1
P (1990-2024)	r2	slope	P	change
1	0.012	-0.316	0.539	-10.7
2	0.024	0.372	0.369	12.6
3	0.004	-0.163	0.721	-5.5
4	0.003	0.198	0.766	6.7
5	0.0003	-0.081	0.913	-2.8
6	0.068	1.392	0.131	47.3
7	0.039	0.795	0.254	27.0
8	0.019	0.473	0.429	16.1
9	0.055	-0.596	0.177	-20.3
10	0.004	0.313	0.714	10.6
11	0.026	-0.481	0.354	-16.4
12	0.028	0.488	0.339	16.6
ANN	0.037	2.395	0.271	81.4

MONTHLY SNOWFALL at Old Forge (inches)

YEAR	Nov	Dec	Jan	Feb	March	April	TOTAL
1968	42	20	26	54	14		156
1969	43	75	30	39	39		226
1970	20	69	41	43	32		205
1971	11	74	83	59	110		337
1972	40	33	48	64	57		242
1973	32	56	44	29	8		169
1974	21	45	36	32	63		197
1975	32	49	41	85	57		264
1976	18	49	86.5	47	69		270
1977	67	64	95	77	63		366
1978	44	79	134	52	43		352
1979	15	97.5	80	50	24		267
1980	17	28	48	39	53		185
1981	41	47	33	50	32		203
1982	22	40	56	43	36		197
1983	18	21	33	8	23		103
1984	34	72	41	15.5	50		213
1985	24	76	73	52	39		264
1986	17	74	54	48	40		233
1987	13.5	39.5	40	37	10.5		141
1988	18	35	51	49.5	27.5		181
1989	17	39.5	40	37	10.5		144
1990	31	35	46	28.5	6		147
1991	12	24.5	48	33	5.5		123
1992	6	39	18	33	17		113
1993	9.5	28.5	45.5	59	47		190
1994	26	40	61	36	27		190
1995	16	15.9	29	37.8	5.1		104
1996	11	48.5	53	20.5	33		166

YEAR	Nov	Dec	Jan	Feb	March	April	TOTAL
1997	31	49.2	113	25.6	47.8		267
1998	26	45	22	15	19		127
1999	3.2	18.1	63.5	8	53		146
2000	11.1	40.2	30.3	43.3	8		133
2001	17.7	49.1	36.2	30.7	62.8		197
2002	1	34.3	48.1	27.2	24.2		135
2003	24.2	39.4	53.6	24.6	14.8		157
2004	17.8	41.1	47.5	31.3	25.4		163
2005	2.3	21.8	30.3	36.2	15.6		106
2006	10	29	48.4	39.7	14.2		141
2007	5.1	15.8	34.6	69	27		152
2008	12.3	40.7	34.9	38.3	33.3		160
2009	16.7	54.8	41.2	25.5	0.2		138
2010	1	39.2	19.6	25.5	0.2		86
2011	4	27.5	50.9	45.4	30.1		158
2012	4.3	16.3	36.5	20	11.5		89
2013	93	42.1	25.6	42	34.7		237
2014	10.4	54	49.8	32.7	31.2		178
2015	24.4	25.1	32.5	43.7	19		145
2016	1.6	18.8	41.7	11.1	5.7		79
2017	16.1	38.7	26.8	41	29.1	3.2	155
2018	8.9	61	24.7	35.4	31.8		162
2019	34.3	11.9	47.1	29.4	17.1		140
2020	8.8	26.8	44.6	32.3	8.5		121
2021	7.8	15	37	32.8	1.8		94
2022	8	13.4	23.3	37.6	11.8		94
2023	10	41.5	14	14.4	28.2		108
2024	15	8	37	15	14		89

Ice-out dates for Lower Saint Regis Lake (1970-2024)

YEAR	ICEOUT	YEAR	ICEOUT	YEAR	ICEOUT
1970	119	1990	116	2010	94
1971	131	1991	100	2011	110
1972	132	1992	124	2012	85
1973	93	1993	118	2013	110
1974	113	1994	120	2014	117
1975	127	1995	94	2015	116
1976	113	1996	121	2016	91
1977	107	1997	116	2017	106
1978	129	1998	102	2018	124
1979	112	1999	107	2019	114
1980	109	2000	115	2020	97
1981	97	2001	117	2021	98
1982	117	2002	106	2022	103
1983	104	2003	113	2023	104
1984	110	2004	111	2024	89
1985	112	2005	105		
1986	98	2006	104		
1987	101	2007	113		
1988	102	2008	113		
1989	120	2009	105		

The dates of ice-loss on the lake are listed as numerical **JULIAN DATES**, in which each day of the year is assigned a sequential number from 1 to 365 in normal years and 1 to 366 in leap years.

For example:
January 1 is “1”
December 31 is “365” or “366.”

https://people.biology.ucsd.edu/patrick/julian_cal.html