How Winter is Changing in the Tug Hill Region

JILLIAN LEE

NYS TUG HILL COMMISSION

2025 BLACK RIVER WATERSHED CONFERENCE

Acknowledgments

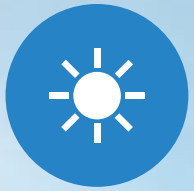
Dr. Melissa Godek, Associate Professor of Meteorology and Climatology, SUNY Oneonta

Dr. Scott Steiger, Professor of Meteorology, Director LESPaRC, SUNY Oswego

Dr. Natalie Umphlett, Climatologist, Cornell University

Emily Fell, Eastern Great Lakes Watershed Coordinator; Great Lakes Program and NYS Water Resources Institute at Cornell University

30,000’ View



WEATHER AND CLIMATE

DATA SOURCES

CLIMATE NORMALS

TUG HILL REGIONAL DATA

TUG HILL CLIMATE NORMALS

RESULTS

IMPLICATIONS

NEXT STEPS

Purpose?

Weather and Climate

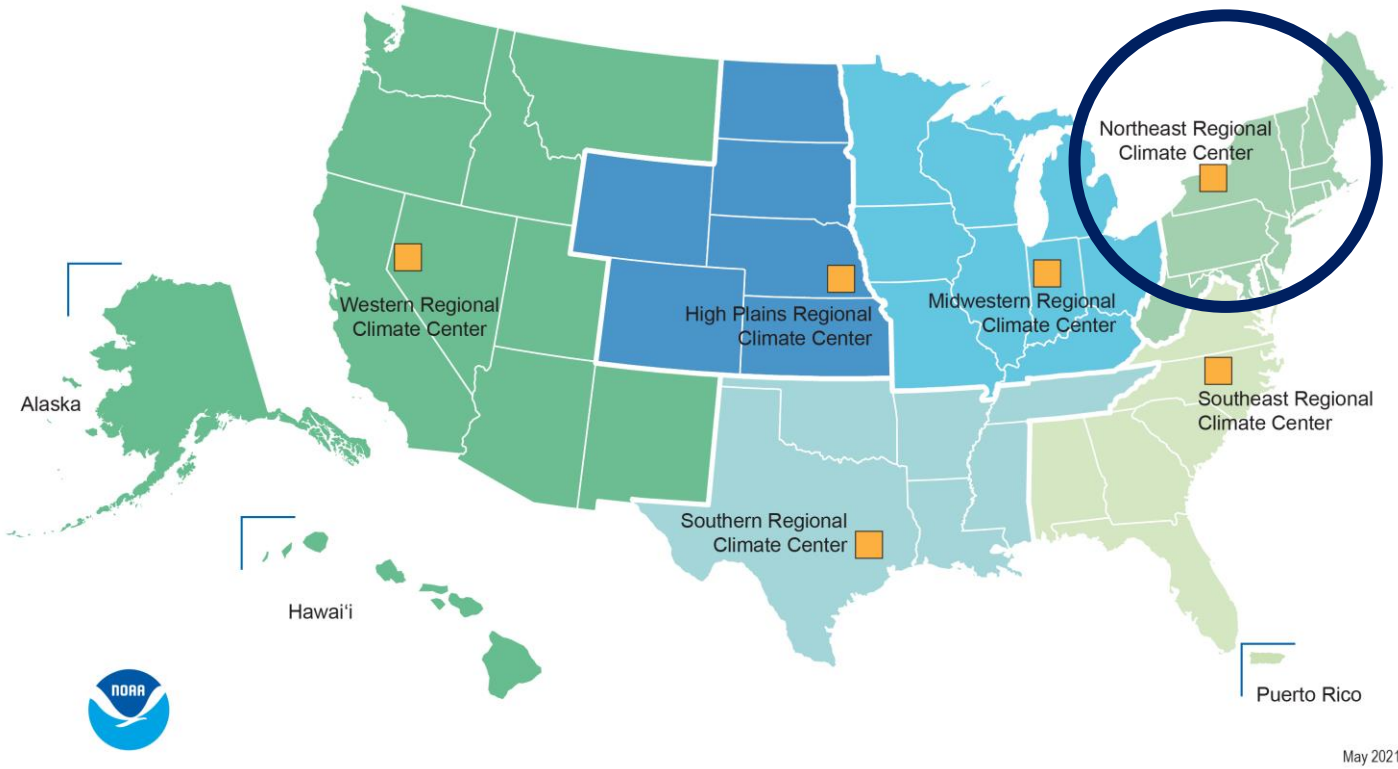
Weather

Climate

Data Sources

WORLD METEOROLOGICAL ORGANIZATION

NATIONAL CENTERS FOR ENVIRONMENTAL INFORMATION



https://www.nrcc.cornell.edu/

ipcc INTERGOVERNMENTAL PANEL ON climate change

WMO UNEP

Climate Normals

- Expected conditions from the recent (30-year) past
- 30-year averages for climate variables
- Data consist of annual/seasonal, monthly, daily, and hourly averages

Tree rings = weather data over time

The whole trunk = climate record

The average width of the rings = climate normal

(ex. wetter or drier than normal)

Wider or thinner rings = unusual years

(like El Niño or droughts)

Example

- Average maximum air temperature, February 2024: 34.2°F.
- Climate normal for February's average maximum air temperature: 27.2°F.
- February 2024 was 7° **above** the climate normal.
- This means that February was **warmer** than normal.

Tug Hill Regional Climate Data

Station	Data Analyzed	Time Frame
Bennetts Bridge	▪ Snowfall	1974-2024 (50 years)
Boonville	▪ Snowfall ▪ Average Minimum Air Temperature ▪ Average Maximum Air Temperature	
Highmarket	▪ Snowfall	
Lowville	▪ Snowfall ▪ Average Minimum Air Temperature ▪ Average Maximum Air Temperature	

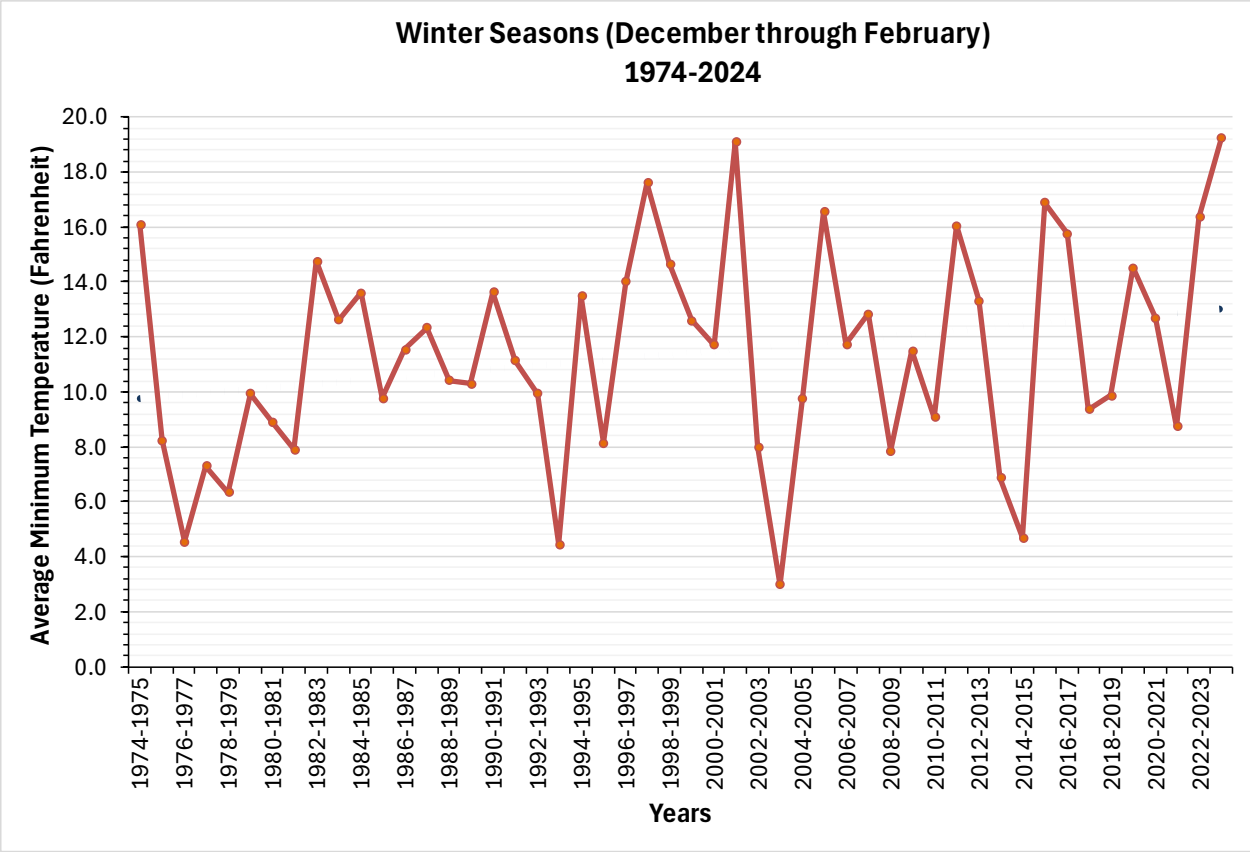
Air Temperature

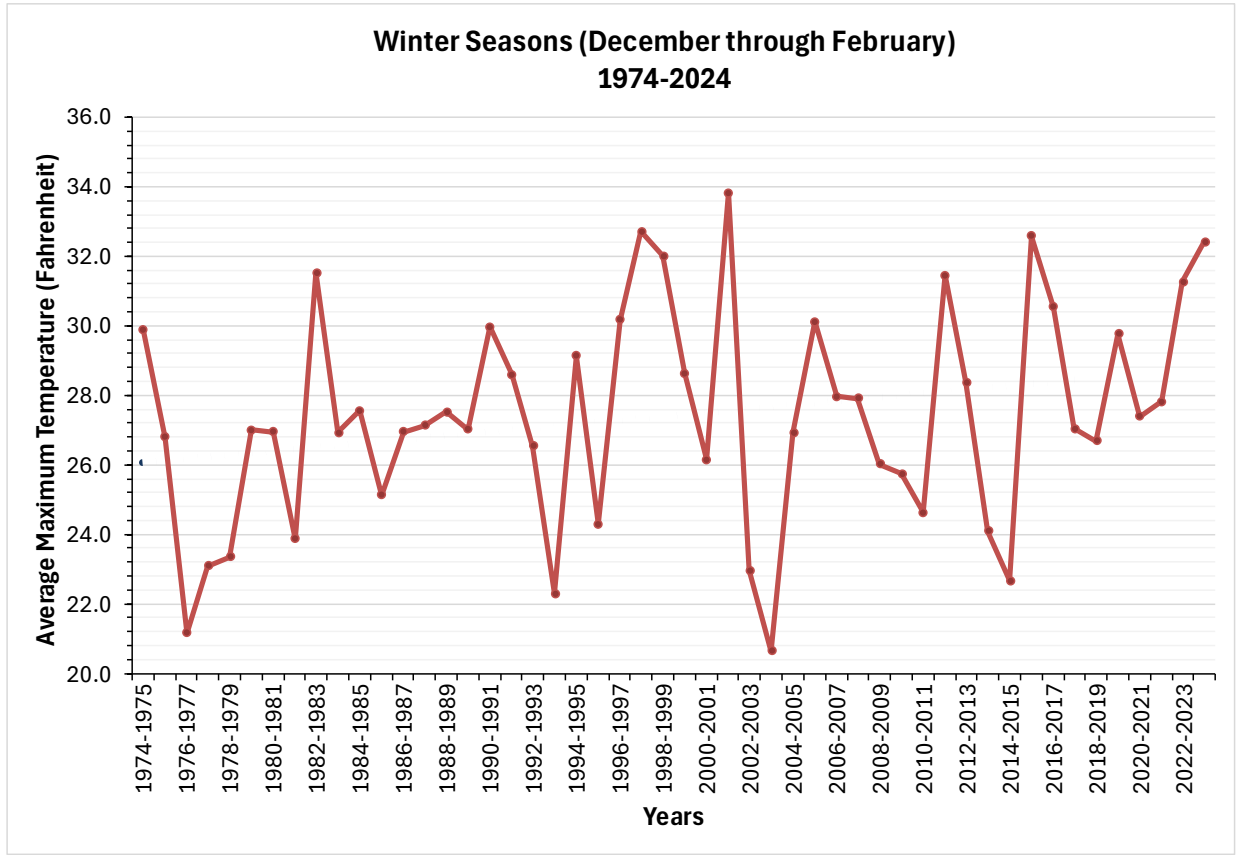
WINTER SEASON

DECEMBER-FEBRUARY

EXTENDED WINTER SEASON

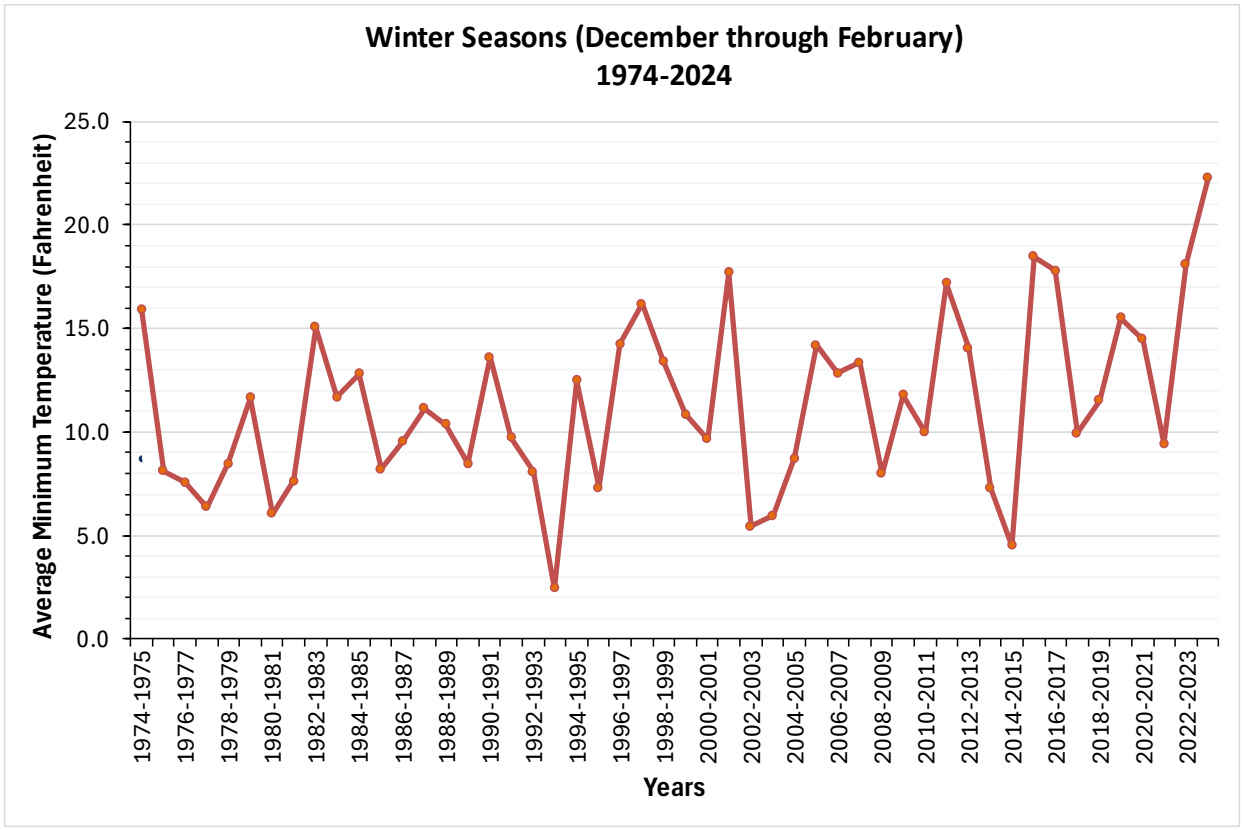
SEPTEMBER-MAY

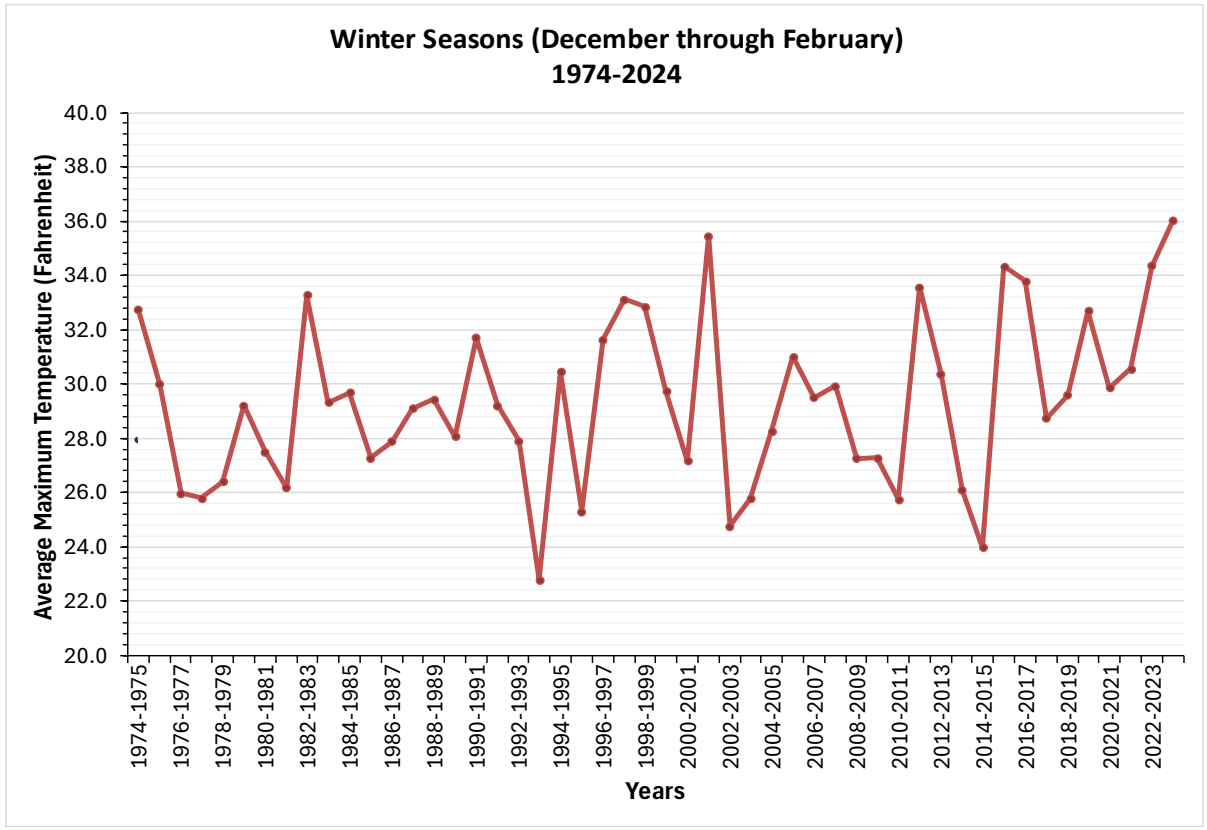




Boonville

Minimum and Maximum Avg Air Temp





Lowville

Minimum and Maximum Avg Air Temp

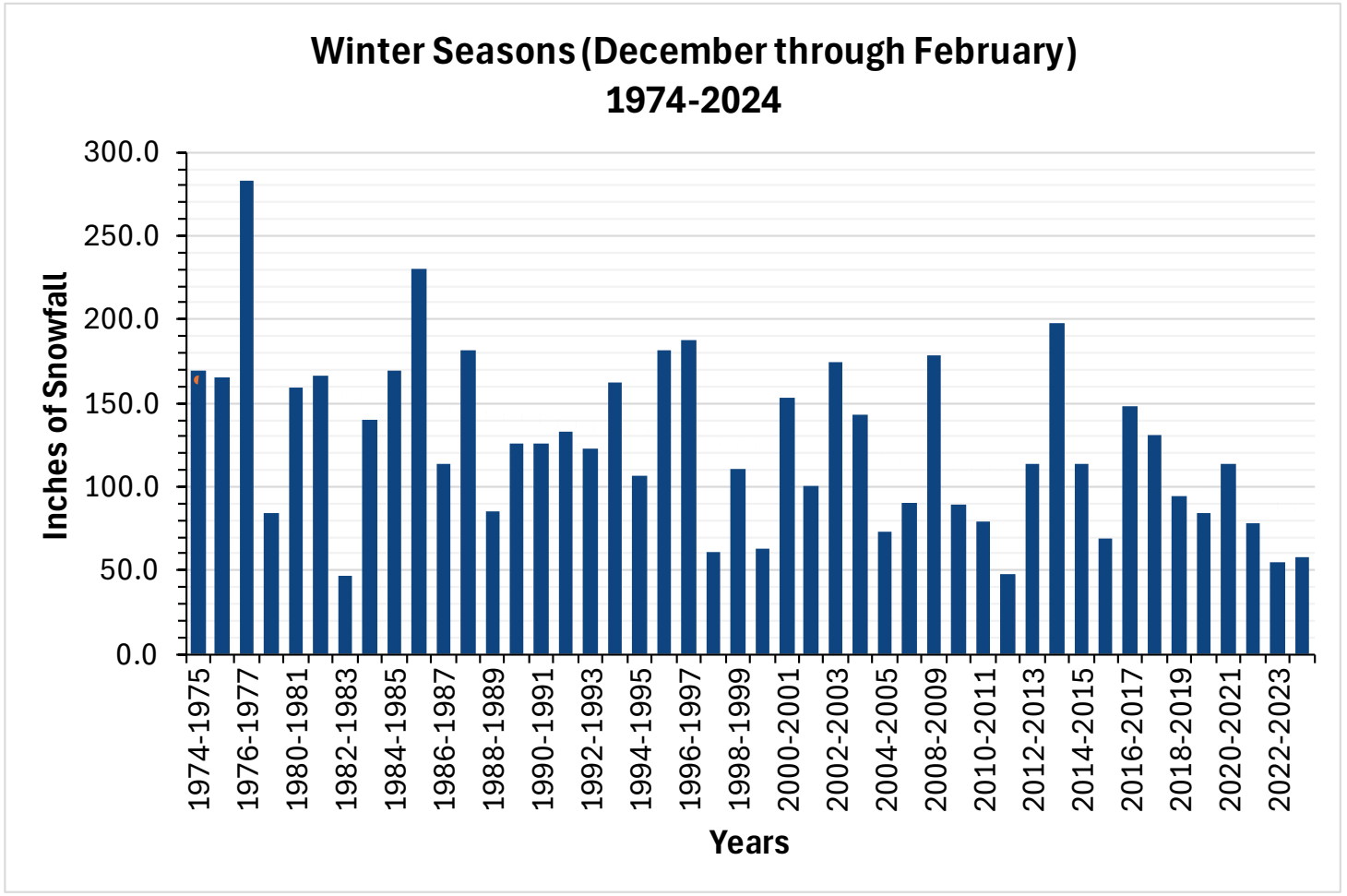
Snowfall

WINTER SEASON

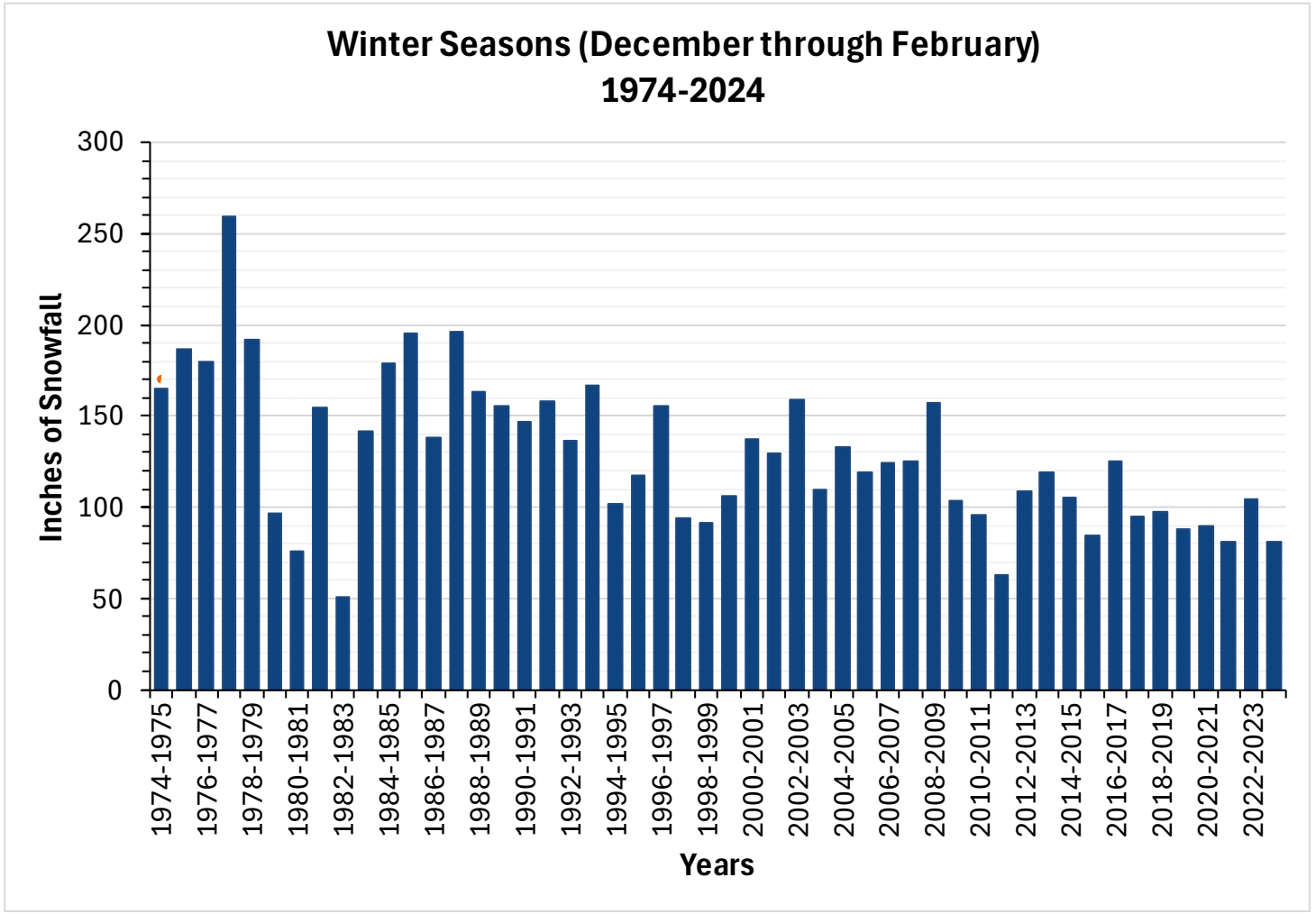
DECEMBER-FEBRUARY

EXTENDED WINTER SEASON

SEPTEMBER-MAY

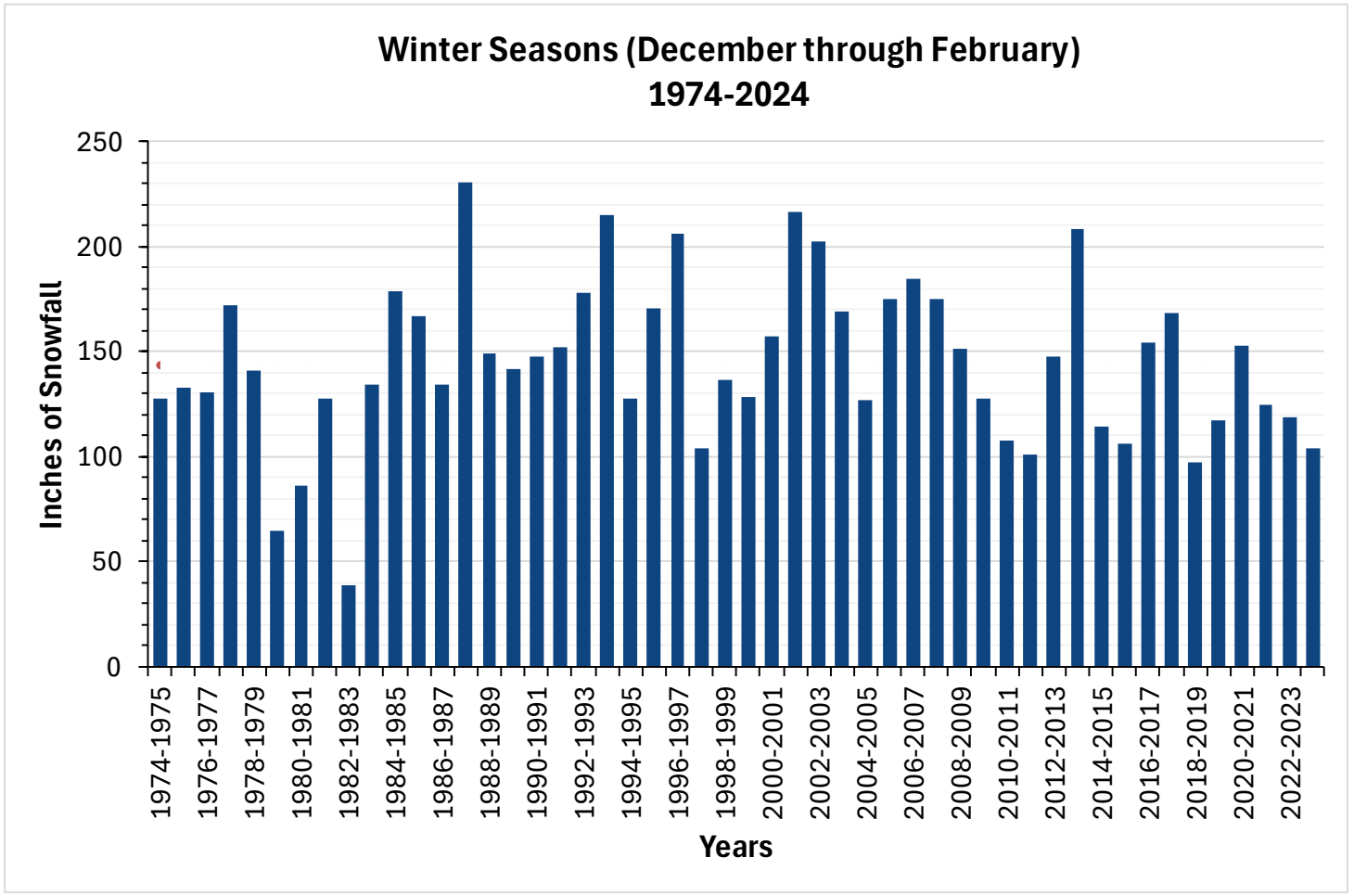


Bennetts Bridge


Winter Seasons (December through February)
1974-2024
Inches of Snowfall
300
250
200
150
100
50
0
1974-1975
1976-1977
1978-1979
1980-1981
1982-1983
1984-1985
1986-1987
1988-1989
1990-1991
1992-1993
1994-1995
1996-1997
1998-1999
2000-2001
2002-2003
2004-2005
2006-2007
2008-2009
2010-2011
2012-2013
2014-2015
2016-2017
2018-2019
2020-2021
2022-2023
Years


Weather Station Locations
Champion
Watertown
Rutland
Croghan
Watertown
Denmark
Adams
Rodman
Pinckney
Harrisburg
Lowville
Watson
Ellisburg
Lorraine
Worth
Montague
Martinsburg
Greig
Turin
Boylston
Highmarket 2 W
Lyonsdale
West Turin
Sandy Creek
Orwell
Redfield
Osceola
Richland
Bennetts Bridge
Leyden
Forestport
Albion
Lewis
Boonville 4 SSW
Mexico
Williamstown
Florence
Ava
Parish
Amboy
Annsville
Remsen
Camden
Western
Steuben
Hastings
Lee
West Monroe
Constantia
Vienna
Floyd
Trenton
Oneida Lake

Boonville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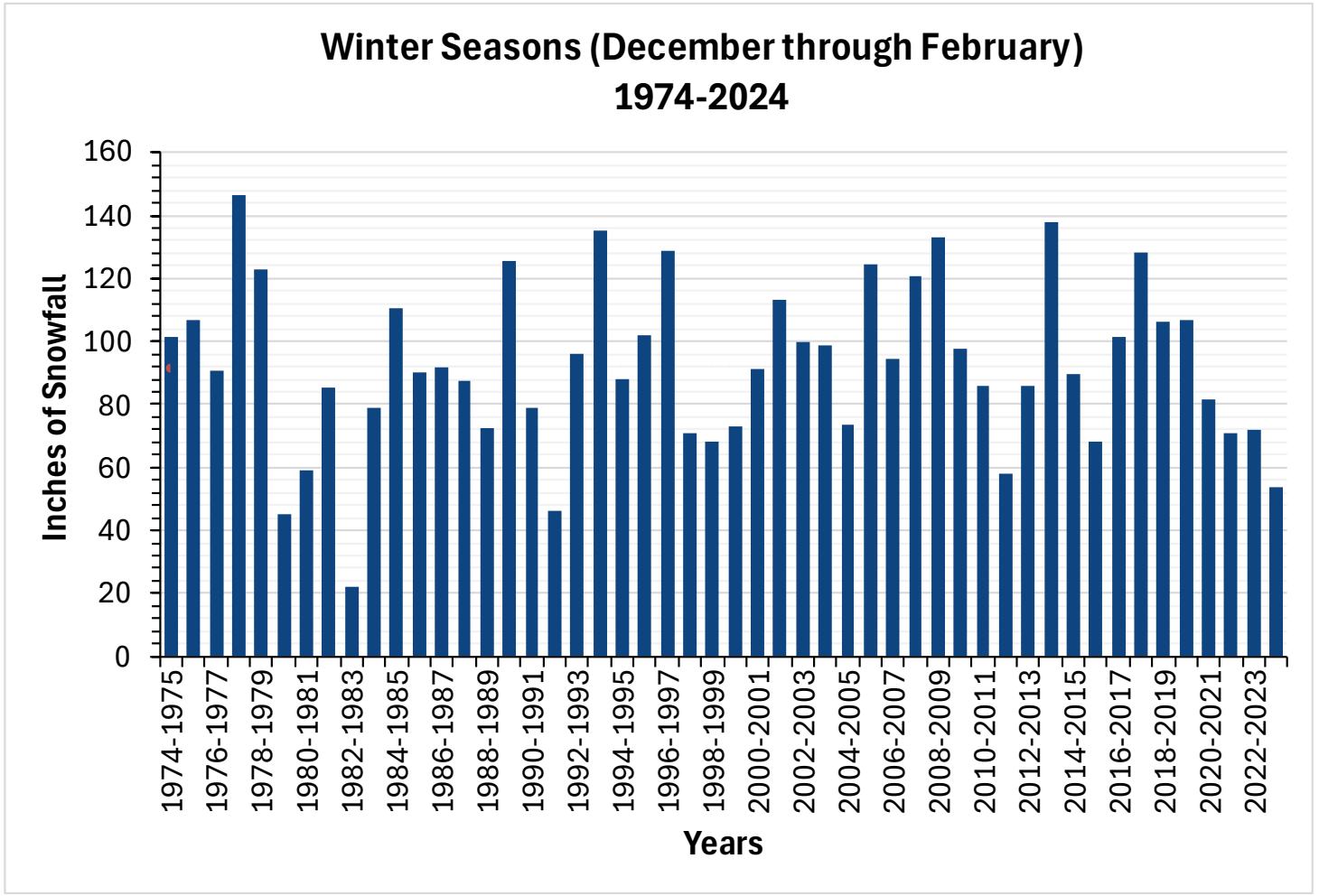
Highmarket


Winter Seasons (December through February)
1974-2024
Inches of Snowfall
0
20
40
60
80
100
120
140
160
1974-1975
1976-1977
1978-1979
1980-1981
1982-1983
1984-1985
1986-1987
1988-1989
1990-1991
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Lowville

Results

Air Temperature

Station	Average Minimum Air Temperature		Average Maximum Air Temperature	
	Winter Season	Extended Winter Season	Winter Season	Extended Winter Season
Boonville	Increasing/warming	Increasing/warming	Increasing/warming	Increasing/warming
Lowville				

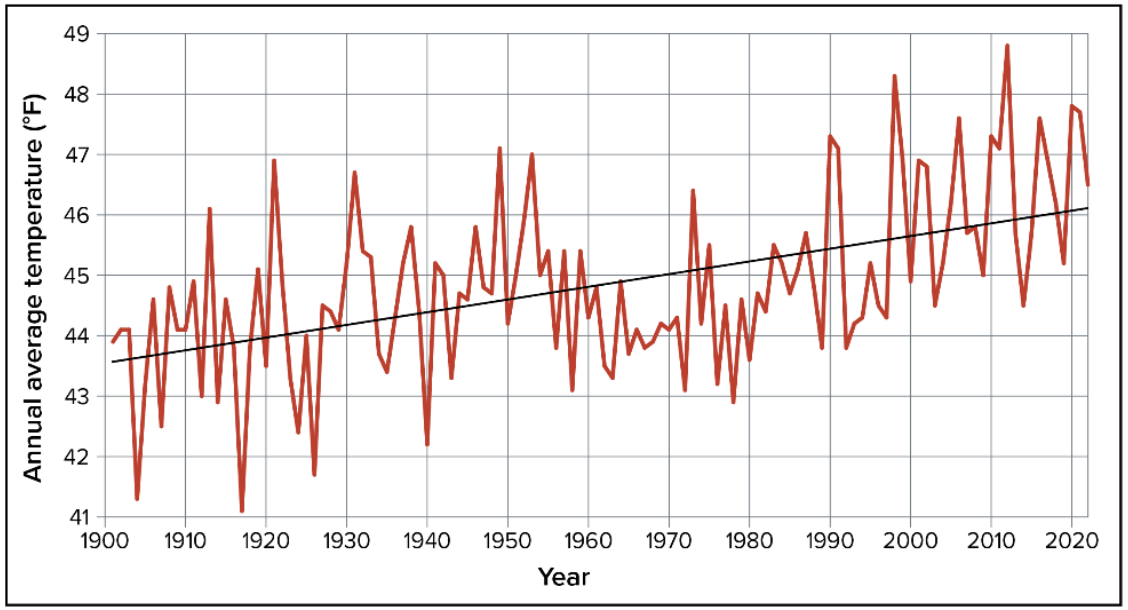
Snowfall

Station	Snowfall Trend	
	Winter Season	Extended Winter Season
Bennetts Bridge	Decreasing	Decreasing
Boonville	Decreasing	Decreasing
Highmarket	Steady/little change	Steady/little change
Lowville	Steady/little change	Steady/little change

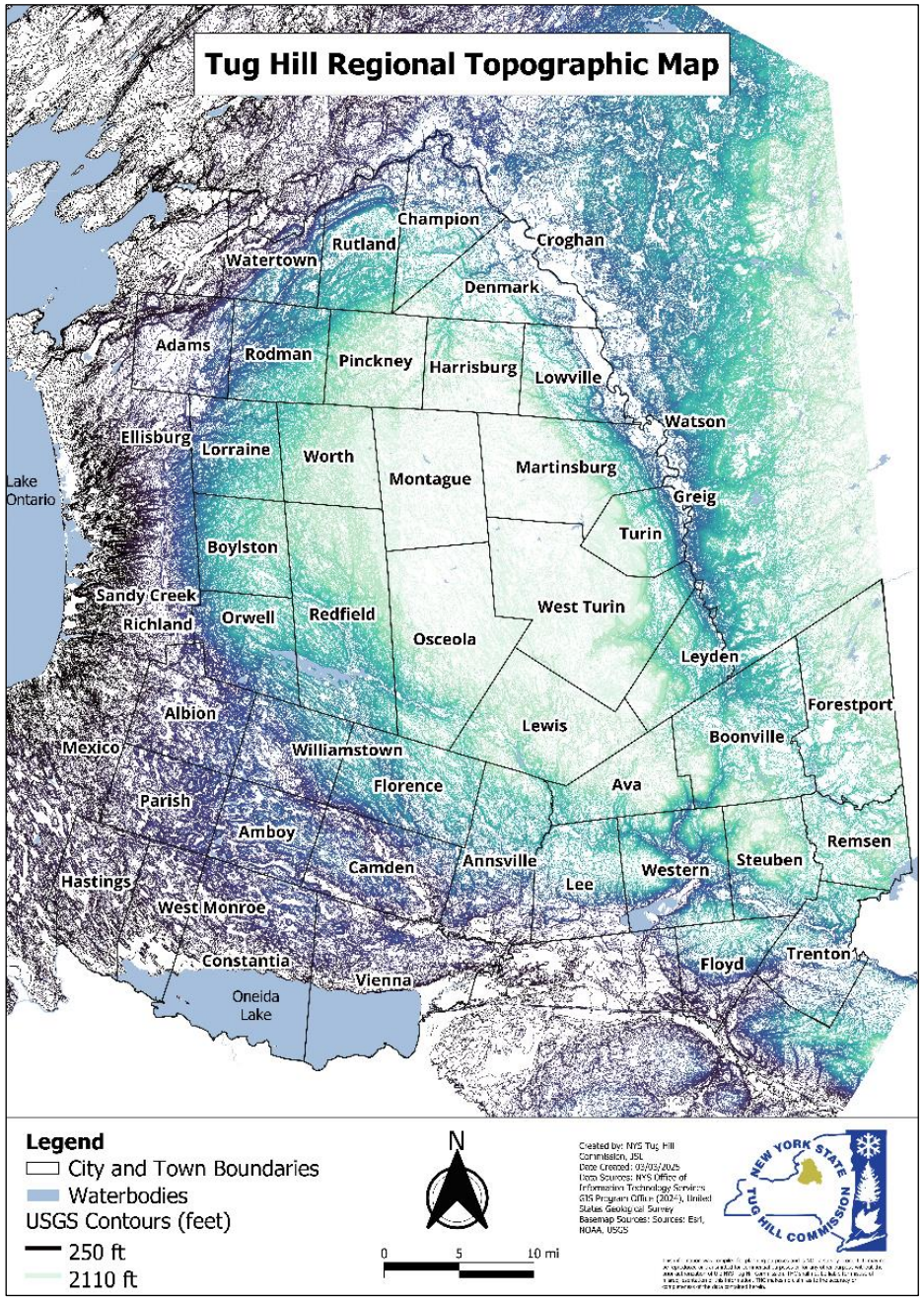
Our State is Warming

NYS Climate Impacts Assessment

- Since 1901, the average temperature has increased by almost 2.6°F
- The warmest 10-year period has been since 2000
- Projected temperature increases by 4.6-6.7°F by the 2050s and 6.1-10.9°F by the 2080s.



Annual average temperature in New York State, 1901-2022
Source: Lamie et al. 2024


Tug Hill Regional Topographic Map
Champion
Rutland
Croghan
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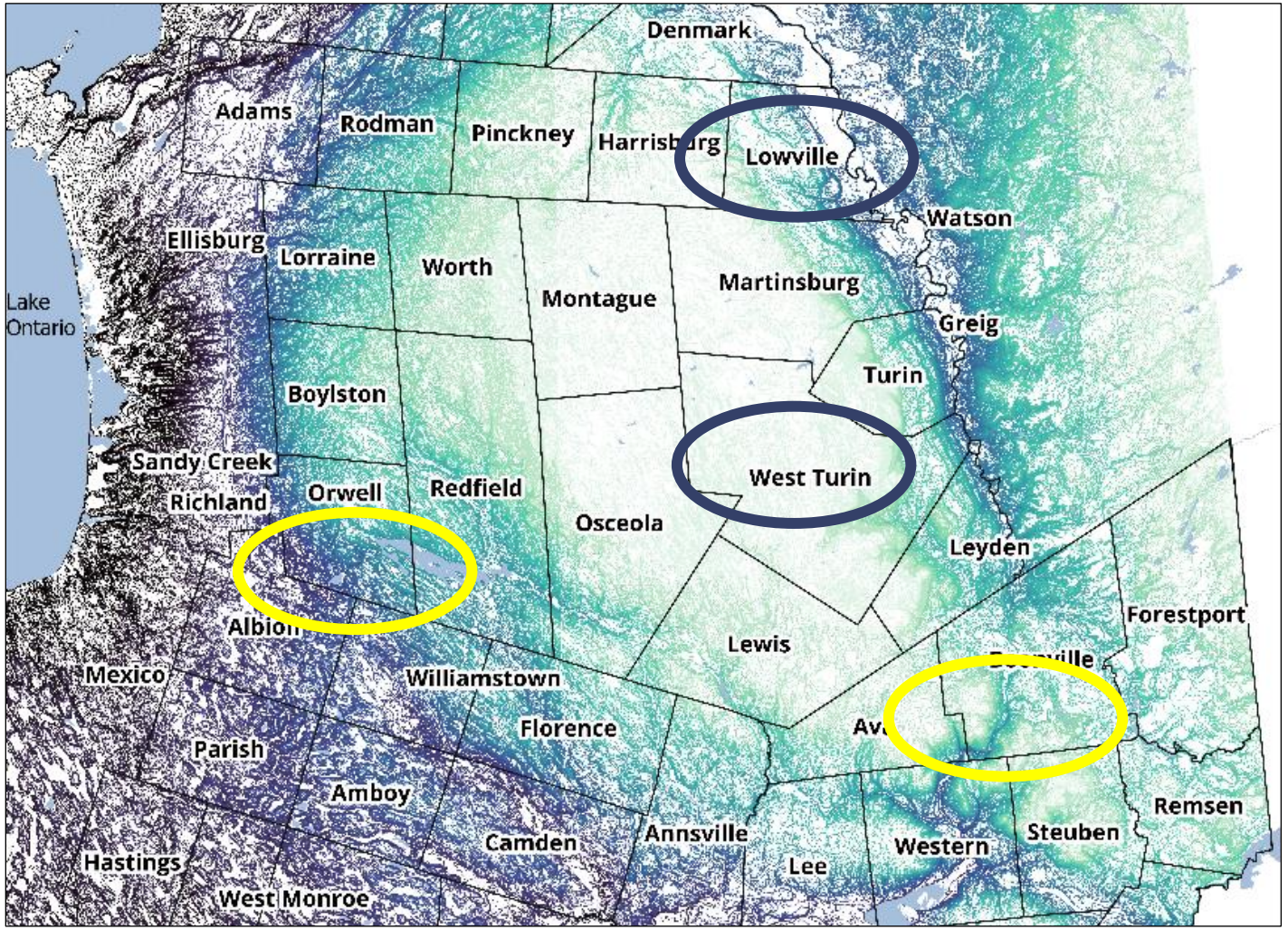
West Monroe
Constantia
Floyd
Trenton
Vienna
Oneida Lake
Legend
City and Town Boundaries
Waterbodies
USGS Contours (feet)
250 ft
2110 ft
N
0
5
10 mi
Created by: NYS Tug Hill Commission, JSL
Date Created: 03/03/2025
Data Sources: NYS Office of Information Technology Services GIS Program Office (2024), United States Geological Survey
Basemap Sources: Sources: Esri, NOAA, USGS
NEW YORK STATE TUG HILL COMMISSION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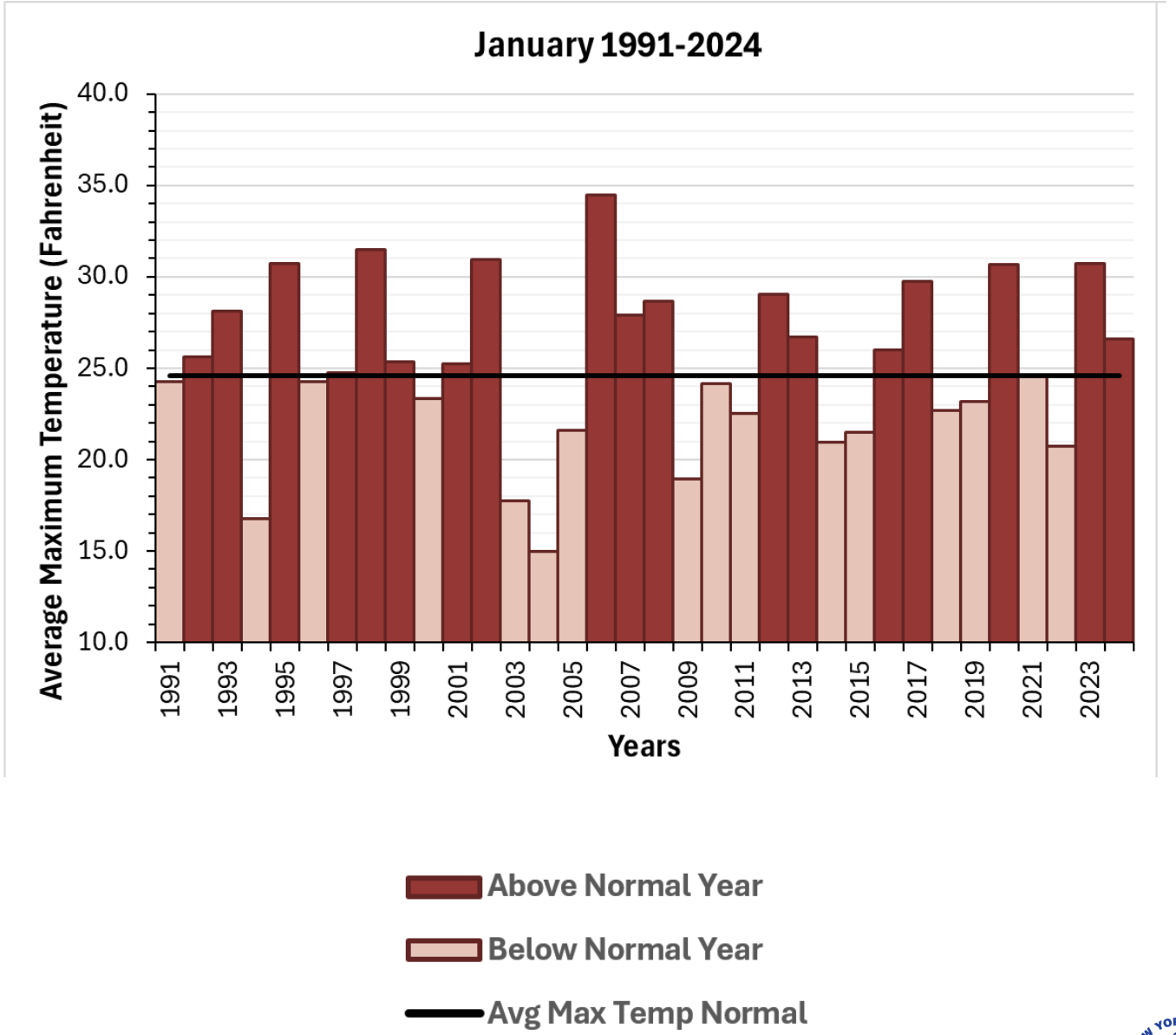
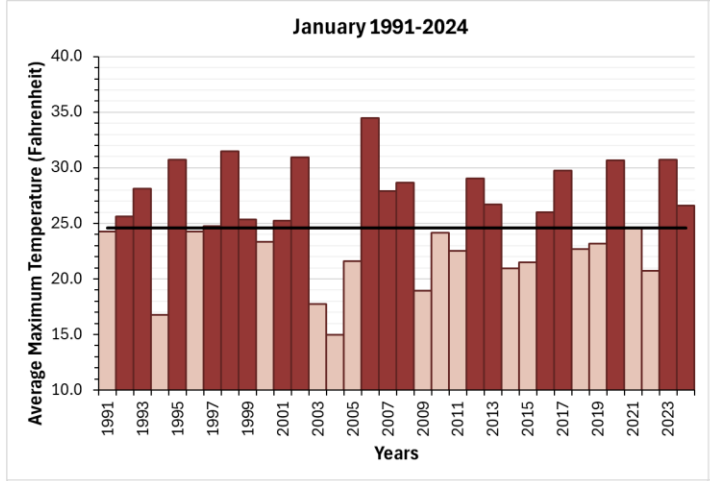
Climate Normals

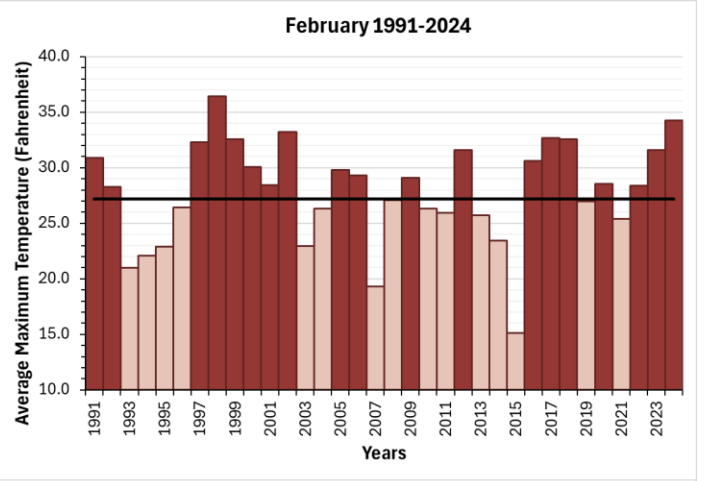
JANUARY, FEBRUARY, MARCH, NOVEMBER, AND DECEMBER 1991-2024

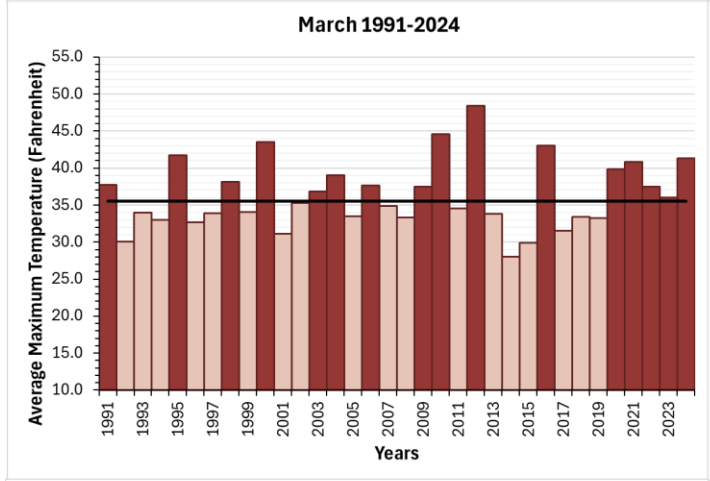


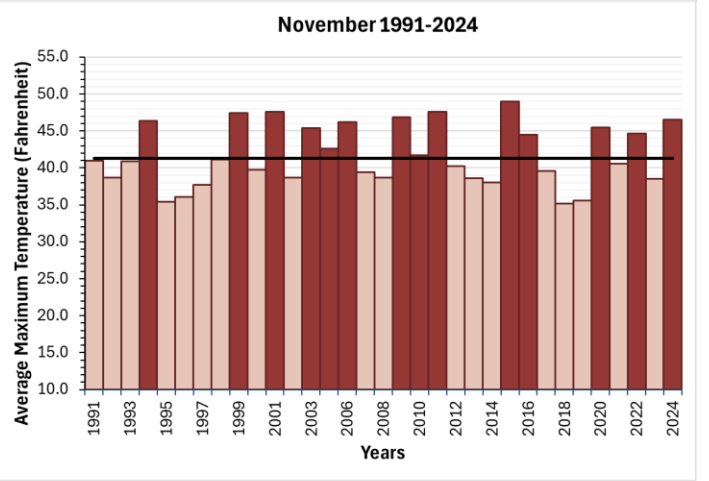
Boonville Avg Max Air Temp

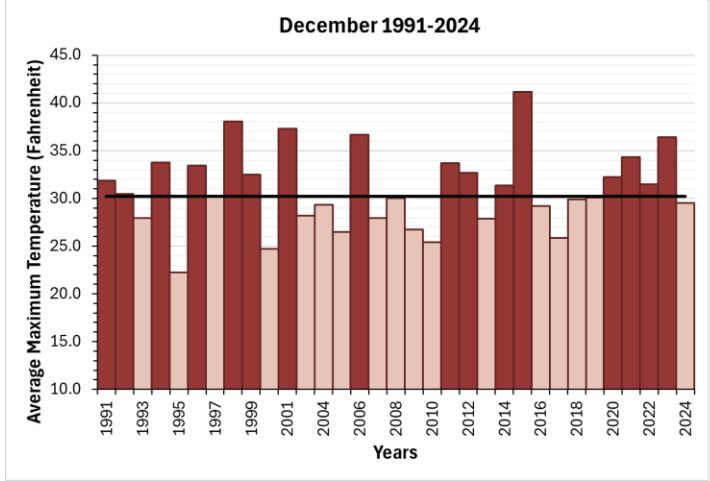
Compared to normal











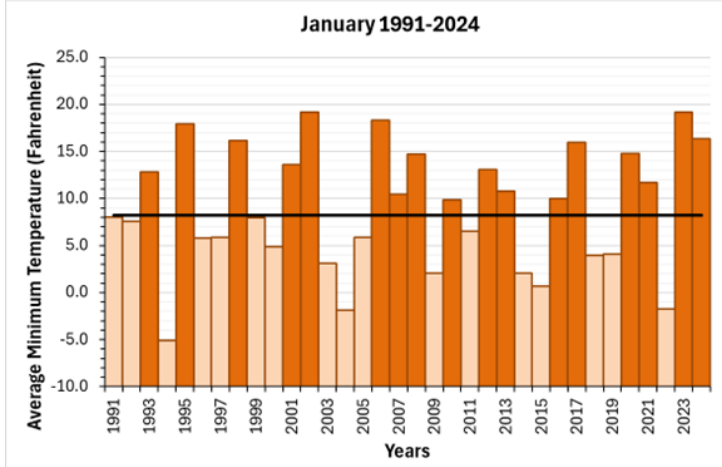
Above Normal Year

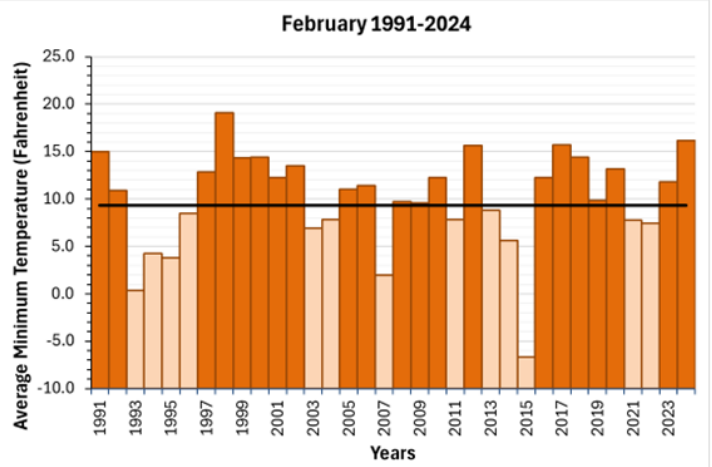
Below Normal Year

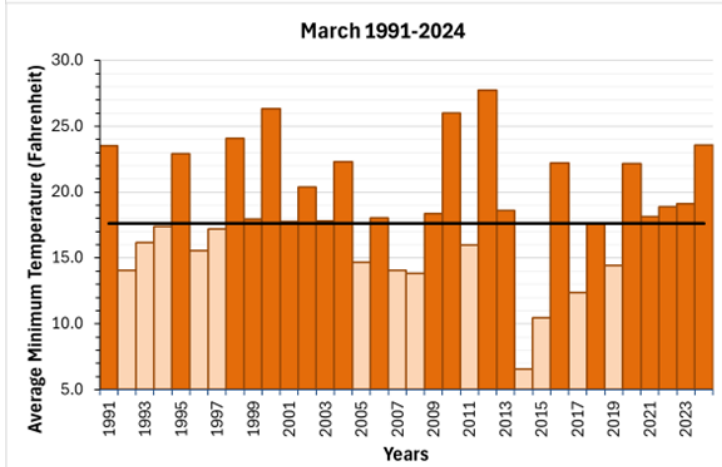
Avg Max Temp Normal

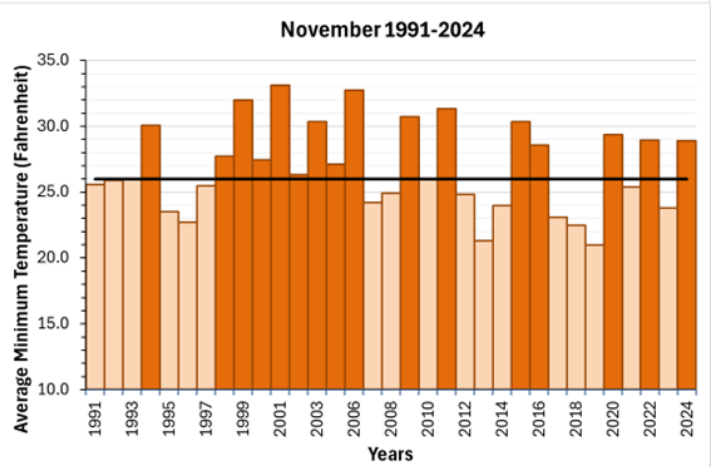
Boonville Avg Min Air Temp

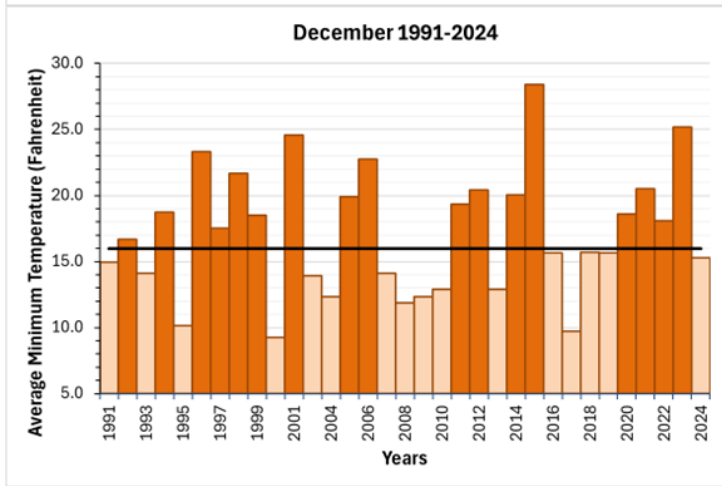
COMPARED TO NORMAL











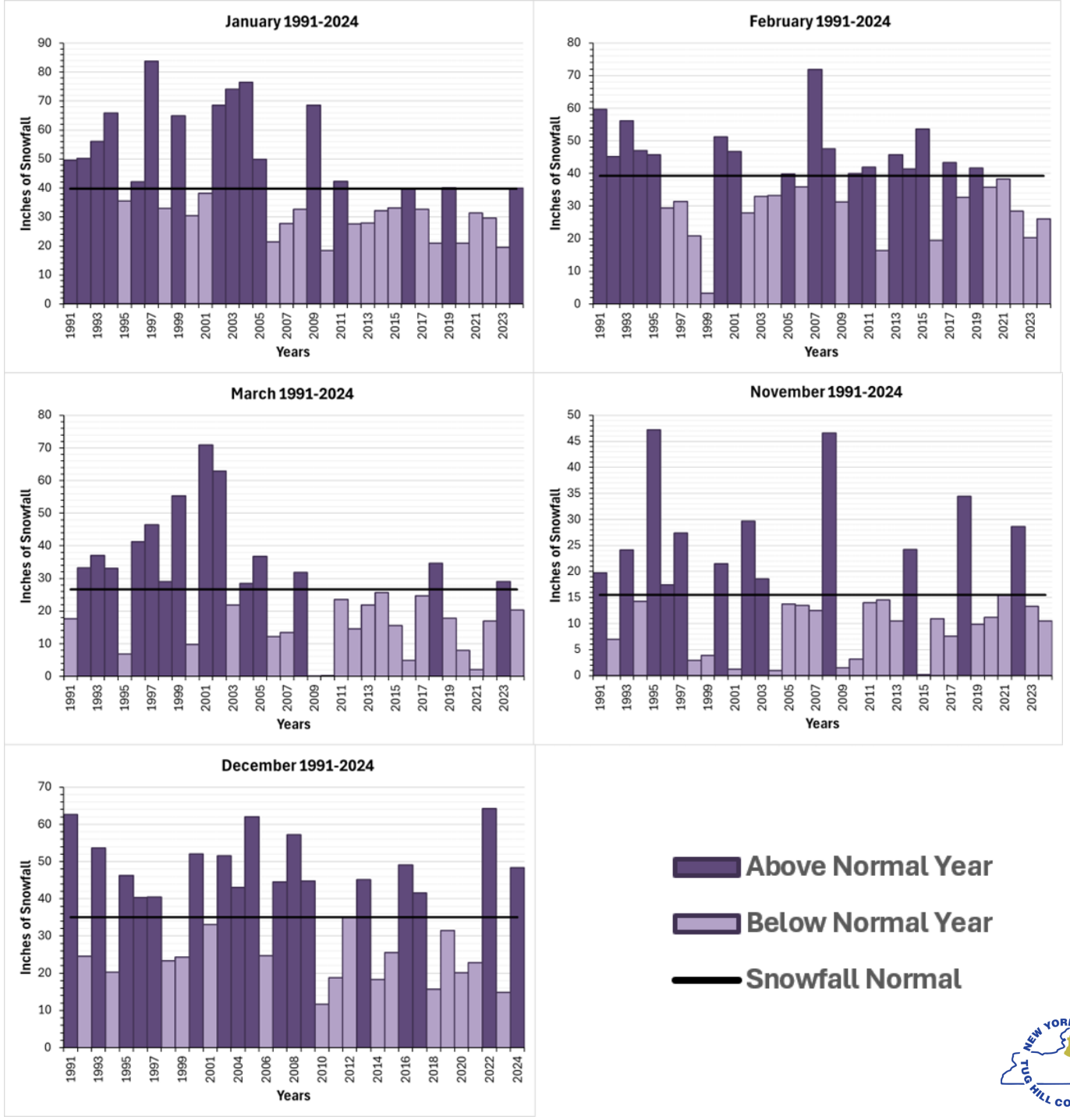
Above Normal Year

Below Normal Year

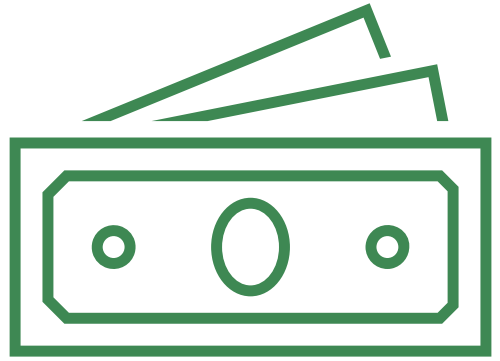
Avg Min Temp Normal

Boonville Avg Min Air Temp

COMPARED TO NORMAL



What does this mean for the Black River Watershed?



Connection
Collaboration
Social
Cohesion

Next Steps

- Winter seasons
  - Analyses of snowpack and the number of days above and below freezing
- Analyzing spring and summer temperatures and rainfall patterns
  - Intensity, frequency, and dry periods
- Developing a model

Questions?

https://tughill.org/publications/technical-issue-papers/

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