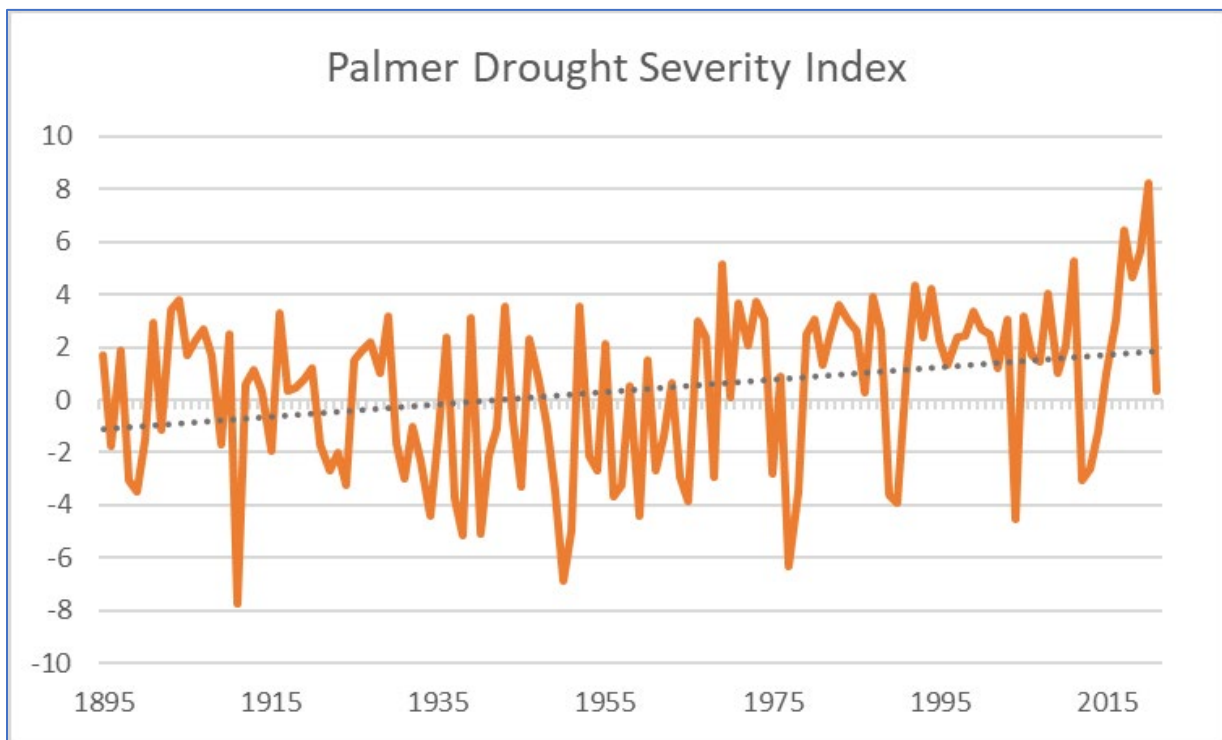
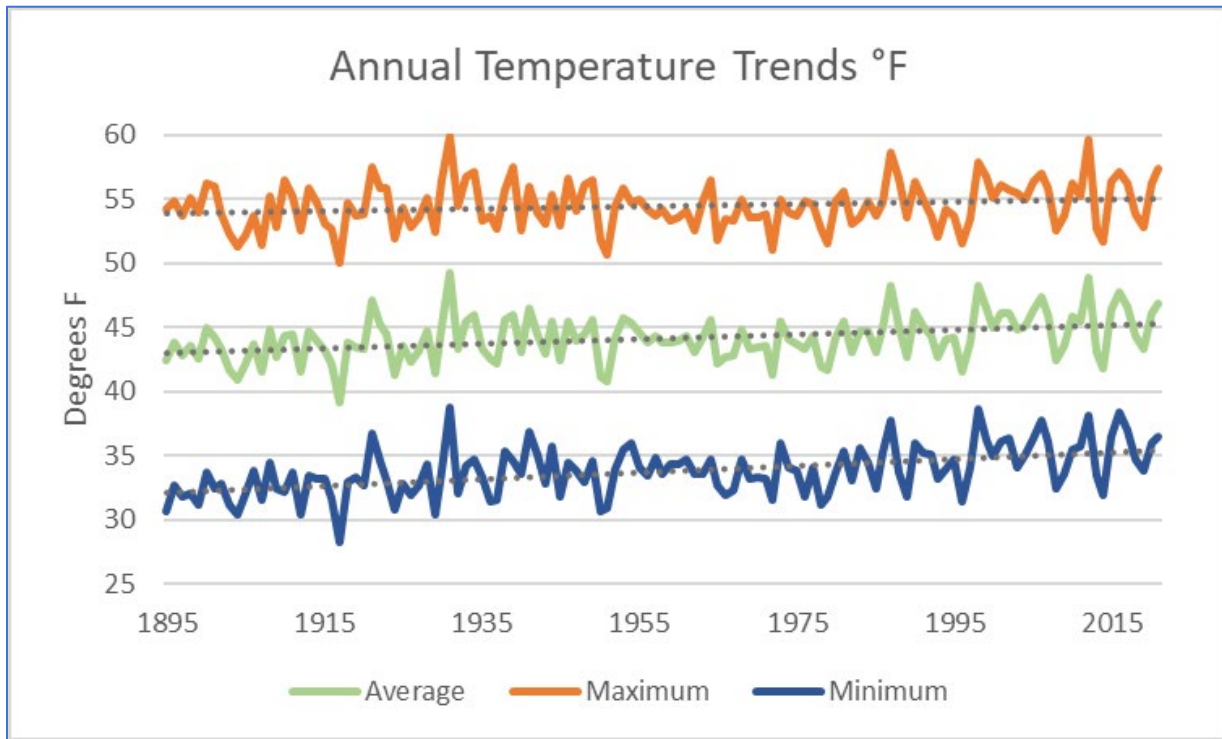
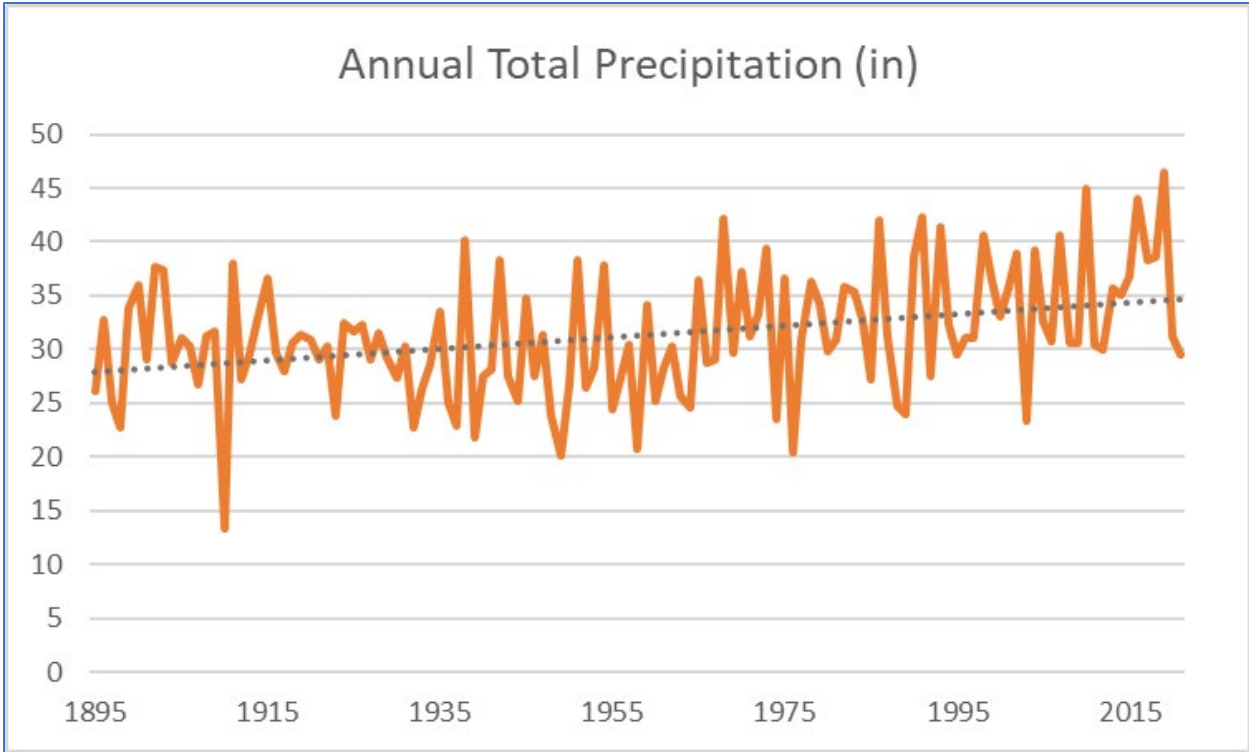


Attachment H

Climate Change Projections in the Proposed Project Area
Gorman Creek, Wabasha County, Minnesota

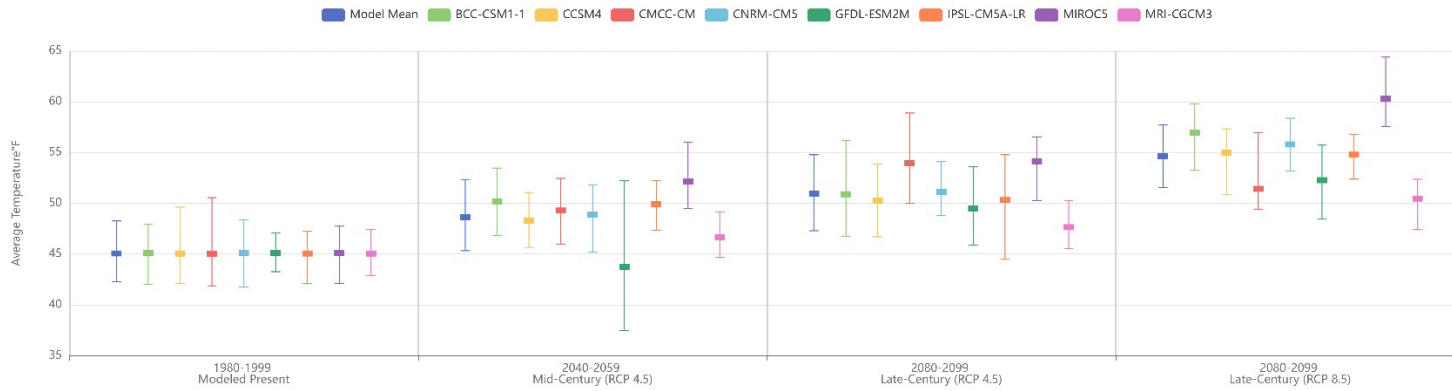
Selected Climatic Trends, Wabasha County, Minnesota- 1895-2021





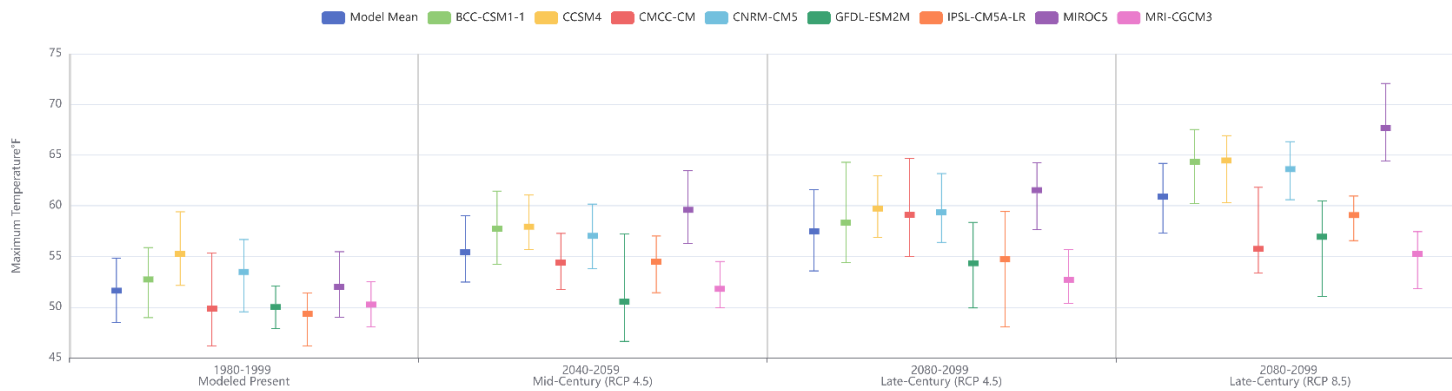
Recent and Projected Future Average Temperature For Wabasha; January-December

Graph generated by Minnesota Department of Natural Resources using data from University of Minnesota climate modeling. These values may differ from those published in national and global climate assessments.



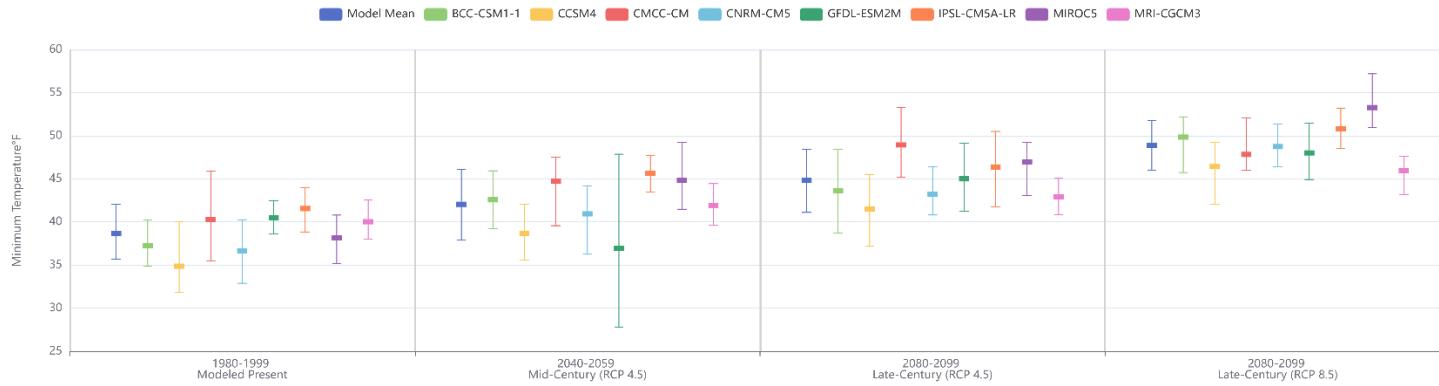
Recent and Projected Future Maximum Temperature For Wabasha; January-December

Graph generated by Minnesota Department of Natural Resources using data from University of Minnesota climate modeling. These values may differ from those published in national and global climate assessments.



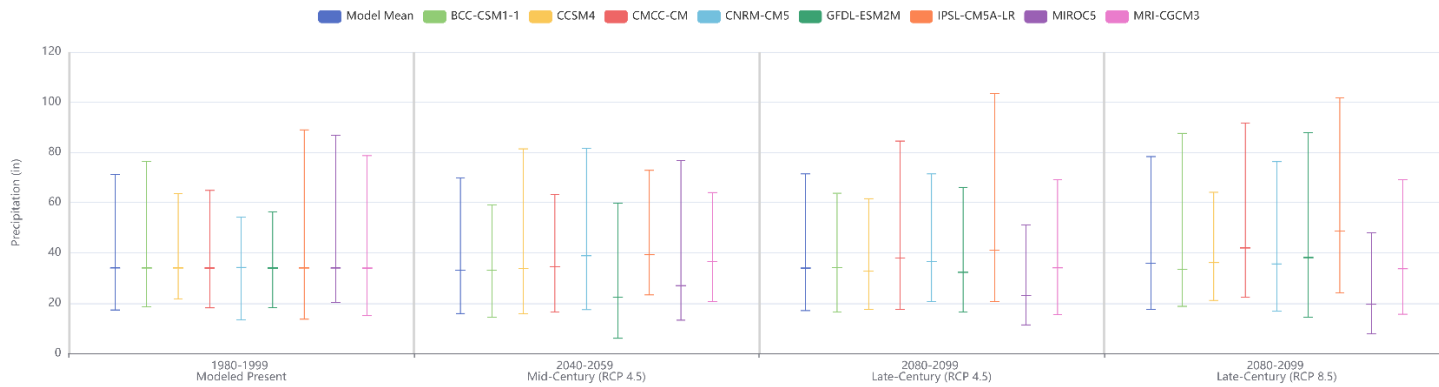
Recent and Projected Future Minimum Temperature For Wabasha; January-December

Graph generated by Minnesota Department of Natural Resources using data from University of Minnesota climate modeling. These values may differ from those published in national and global climate assessments.



Recent and Projected Future Precipitation For Wabasha; January-December

Graph generated by Minnesota Department of Natural Resources using data from University of Minnesota climate modeling. These values may differ from those published in national and global climate assessments.



Climate Explorer Metadata

Document Version: 1

Date: 04/09/2021

Notes: This is the original document, describing data used in Climate Explorer tool, at [website]

Contents:

- Information for “Historical” portal
- Information for “Projected (Future)” portal

Information for “Historical” portal

Purpose

Graph and analyze year-to-year variations and longer-term trends in Minnesota’s climate. Creates a time series of climate data of one value per year, based on the area, range of months, range of years, and climate variable selected.

Data background

Gridded datasets at 5 km or 4 km resolution, with geometrically-averaged values determined by area(s) selected for a given variable and monthly period, by year, for range of years selected. Two data sources:

Temperature: 5 km gridded monthly values (can be summarized as multi-month periods). Available as *Average*, *Maximum*, and *Minimum Temperature*, representing the monthly or multi-month mean of the daily average, daily high (maximum), or daily low (minimum) temperatures. Data from NOAA National Centers for Environmental Information (<https://www.ncdc.noaa.gov/monitoring-references/maps/us-climate-divisions.php#grdd>).

Precipitation: 5 km gridded monthly values (can be summarized as multi-month periods), representing the monthly or multi-month sum (total) precipitation. Data from NOAA National Centers for Environmental Information (<https://www.ncdc.noaa.gov/monitoring-references/maps/us-climate-divisions.php#grdd>)

PDSI and SCPDSI (Palmer Drought Severity Index and “Self-Calibrating” Palmer Drought Severity Index): 4 km gridded derived products based on monthly temperature and precipitation data produced by PRISM (<http://www.prism.oregonstate.edu/>), and accessed through the Western Regional Climate Center (<https://wrcc.dri.edu/wwdt/about.php>). Available only as single monthly value per year.

Timeframes

Temperature and precipitation: single monthly value per year, or aggregated multiple-month values spanning durations of 2 - 12, 18, 24, 36, 48, and 60 months, plus annual and year-to-date values. All temperature values averaged and all precipitation values summed over selected months. Year-to-date is January through most-recent complete month, typically available by the 10th day of the present month. When selection overlaps end/beginning of year, value is plotted as belonging to the final year of range.

PDSI and SCPDSI: Available only as single monthly value per year; multi-month aggregations not available.

Years and months available: All variables available January 1895 through most recent month.

Information for “Projected (Future)” portal

Purpose

Graph and analyze climate projections for mid-century (2040-2059) and late-century (2080-2099; low and high emissions), and compare to the modeled recent-past (1980-1999). Graphs the average and range for each 20-year period/scenario and for each model, based on the area, portion of the year, and climate variable selected.

Data background

General circulation global climate models obtained from CMIP5 (Coupled Model Intercomparison Project, Phase 5; see: <https://pcmdi.llnl.gov/mips/cmip5/>), and dynamically-downscaled to ~ 10 km resolution using Weather Forecasting & Research (WRF) model, at University of Minnesota, in service of project described at: <https://conservancy.umn.edu/handle/11299/209130>.

Timeframes

Each downscaled model was run for three time frames, producing a total of four scenarios: Modeled Present (1980-99); Mid-Century (2040-2059) at Representative Concentration Pathway (RCP) 4.5; Late-Century (2080-2099) at RCP 4.5; and Late-Century (2080-2099) at RCP 8.5.

Model Definitions

Term	Definition
RCP	Representative Concentration Pathway: A greenhouse gas concentration scenario used by the Intergovernmental Panel on Climate Change in the fifth Assessment Report.
RCP 4.5	An intermediate scenario in which emissions decline after peaking around 2040.

Term	Definition
RCP 8.5	An extreme, or worst-case scenario in which emissions continue rising through the 21st century.

Originating General Circulation Model Information

Model Name	Description	Institution
Model Mean	Average of all models listed below	See below
BCC-CSM1-1	Climate System Model, Beijing Climate Center	China Meteorological Administration (China)
CCSM4	Community Climate System Model	Department of Energy/University Corporation for Atmospheric Research (USA)
CMCC-CM	Coupled Ocean-Atmosphere Model	Centro Euro-Mediterraneo per Cambiamenti Climatici (Italy)
CNRM-CM5	Climate Model 5	National Centre for Meteorological Research / Centre Europeen de Recherche et Formation Avancees en Calcul Scientifique (France)
GFDL-ESM2M	Earth System Model (Modular ocean)	NOAA Geophysical Fluid Dynamics Laboratory (US)
IPSL-CM5A-LR	Climate Model 5A, Low Resolution	Institut Pierre-Simon Laplace (France)
MIROC5	Model for Interdisciplinary Research On Climate	Atmosphere and Ocean Research Institute (The University of Tokyo), National Institute for Environmental Studies, and Japan Agency for Marine-Earth Science and Technology (Japan)
MRI-CGCM3	Coupled General Circulation Model 3	Meteorological Research Institute (Japan)

Graph and Data Definitions

Term	Definition
Lowerrange ("Lower Range")	The lowest value for of each 20-year period/scenario, given the area, variable, and month(s) selected.

Term	Definition
Mean	The average value of each 20-year period/scenario, given the area, variable, and month(s) selected.
Median	The middle value of each 20-year period/scenario, given the area, variable, and month(s) selected. Because 20 is an even number, the median represents the average of the two middle values (i.e., the 10th smallest and 10th largest).
Upperrange ("Upper Range")	The highest value of each 20-year period/scenario, given the area, variable, and month(s) selected.