

Projected Climate Information

Location: Rankin Ridge Grassland Restoration Project, Custer County, SD

Background: The summary table below describes **changes in the future climate by 2050** (2040-2069) relative to the 1971-2000 (Historical Value) period under a moderate emissions scenario (RCP 4.5) and a higher emissions scenario (RCP 8.5).

Climate Metric	Definition	Historical Value	RCP 4.5	RCP 8.5
Winter Mean Temperature (°F) (change relative to historical by °F)	Average air temperature for December, January, and February	26.9°	31.5°	32.8°
Summer Mean Temperature (°F) (change relative to historical by °F)	Average air temperature for June, July, and August	67.3°	72.2°	74.0°
Winter Precipitation (in) (% change relative to historical)	Average precipitation for December, January, and February	1.32"	1.56"	1.70"
Spring Precipitation (in) (% change relative to historical)	Average precipitation for March, April, and May	6.82"	7.73"	8.09"
Summer Precipitation (in) (% change relative to historical)	Average precipitation for June, July, and August	8.09"	7.67"	7.60"
Annual Climatic Water Deficit (in) (% change relative to historical)	Annual evaporative demand that exceeds soil moisture	6.01"	8.82"	9.89"
Annual Snow Water Equivalent (in) (% change relative to historical)	Annual depth of water that would cover the ground if the snow cover was in a liquid state	0.18"	0.08"	0.07"
Length of Growing Season (days)	Days per year when soil temperatures 20 inches below the soil surface are higher than biologic zero	139 days	155 days	162 days
Annual "Very High" Fire Danger Days (days)	Days per year when fires will start easily from most causes, spread rapidly, and can be difficult to control	37 days	48 days	51 days

Dataset: MACA-METDATA v2 (4-km downscaled climate projections), MWBM forced by MACAv2-METDATA (4-km hydrology projections) and gridMET (4-km historical). Winter is Dec, Jan, Feb; Spring is Mar, Apr, May; Summer is Jun, Jul, Aug. Compiled via ClimateToolbox.org. Coordinates used: 43° 37' 23.3"N, 103° 29' 9.6"W

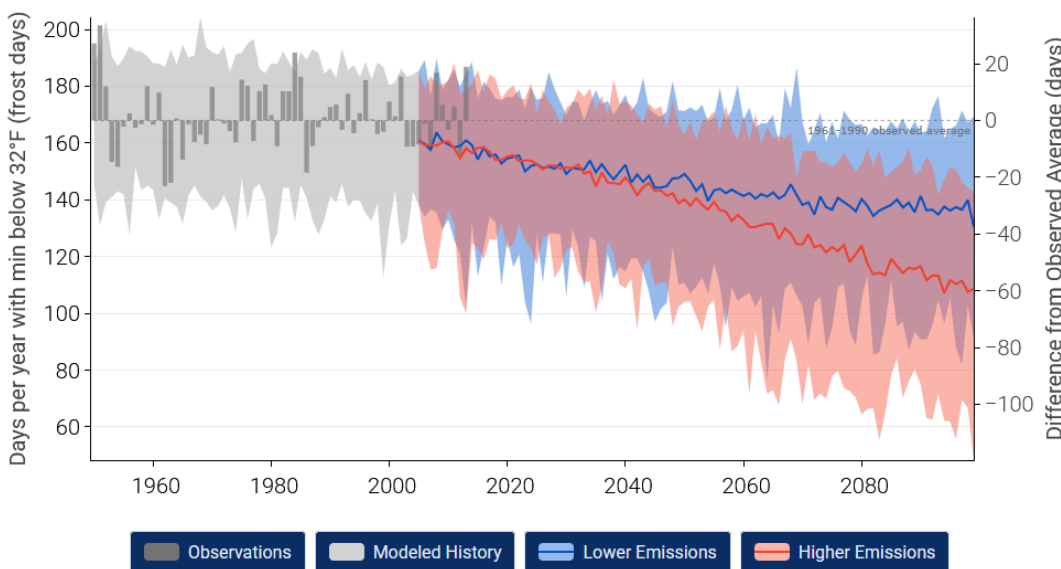
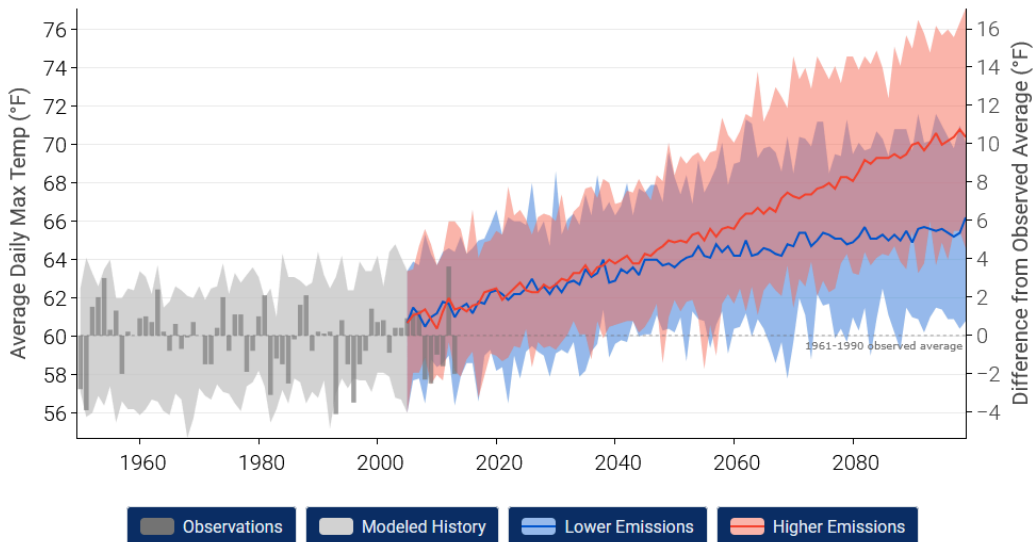
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Average Daily Maximum Temperature

This figure represents **projected future average daily max temperatures (°F) by 2100** relative to observed historical values under a moderate emissions scenario (RCP 4.5) and a higher emissions scenario (RCP 8.5).

Dataset: U.S. Federal Government, 2025: U.S. Climate Resilience Toolkit Climate Explorer. [Online] <https://crt-climate-explorer.nemac.org/>



Average Annual Frost Days

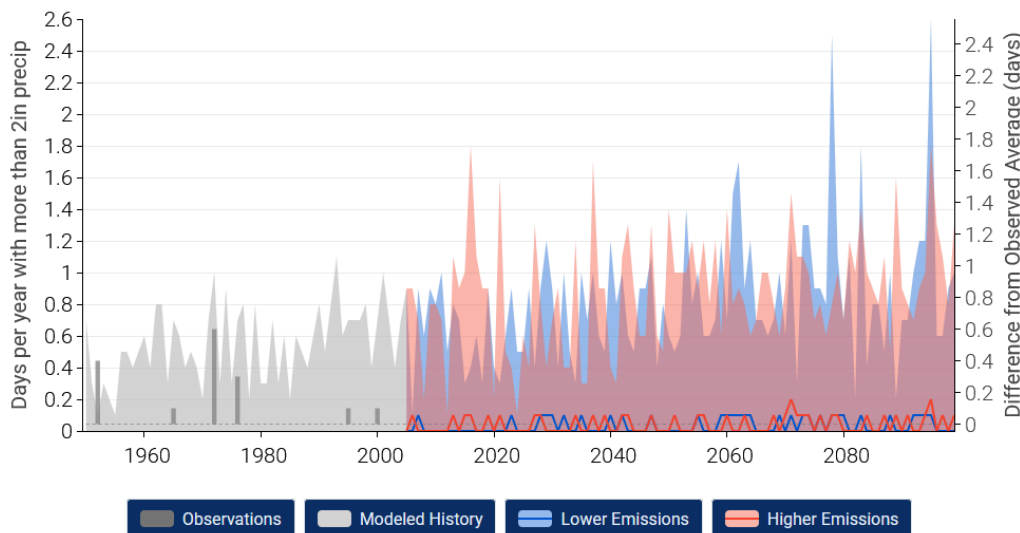
This figure represents the **projected days per year with a minimum temperature below 32 °F (frost days) by 2100** relative to observed historical values under a moderate emissions scenario (RCP 4.5) and a higher emissions scenario (RCP 8.5).

Dataset: U.S. Federal Government, 2025: U.S. Climate Resilience Toolkit Climate Explorer. [Online] <https://crt-climate-explorer.nemac.org/>

Annual Days of Extreme Precipitation

This figure represents the **projected days per year with more than 2" of precipitation by 2100** relative to observed historical values under a moderate emissions scenario (RCP 4.5) and a higher emissions scenario (RCP 8.5).

Dataset: U.S. Federal Government, 2025: U.S. Climate Resilience Toolkit Climate Explorer. [Online] <https://crt-climate-explorer.nemac.org/>

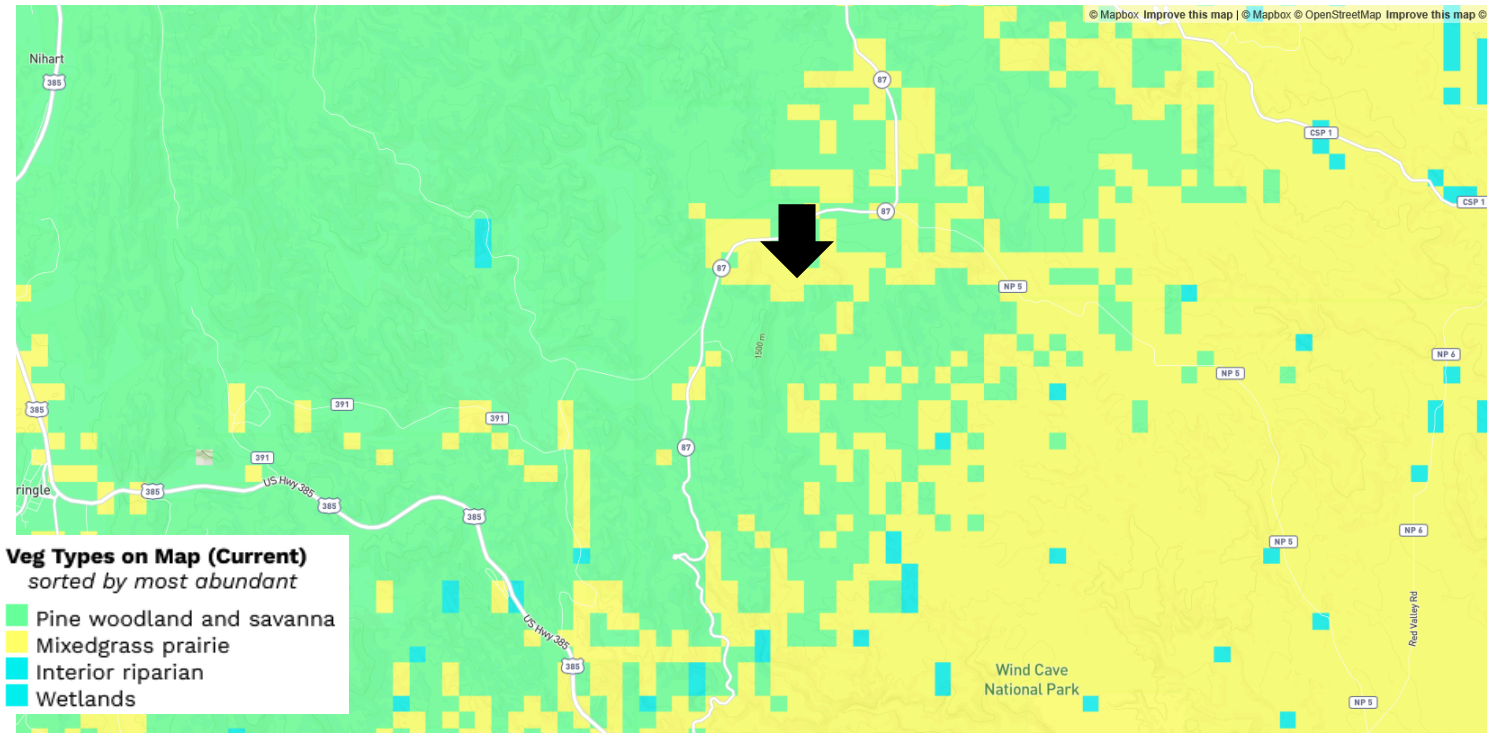


Current Vs Future Vegetation Cover

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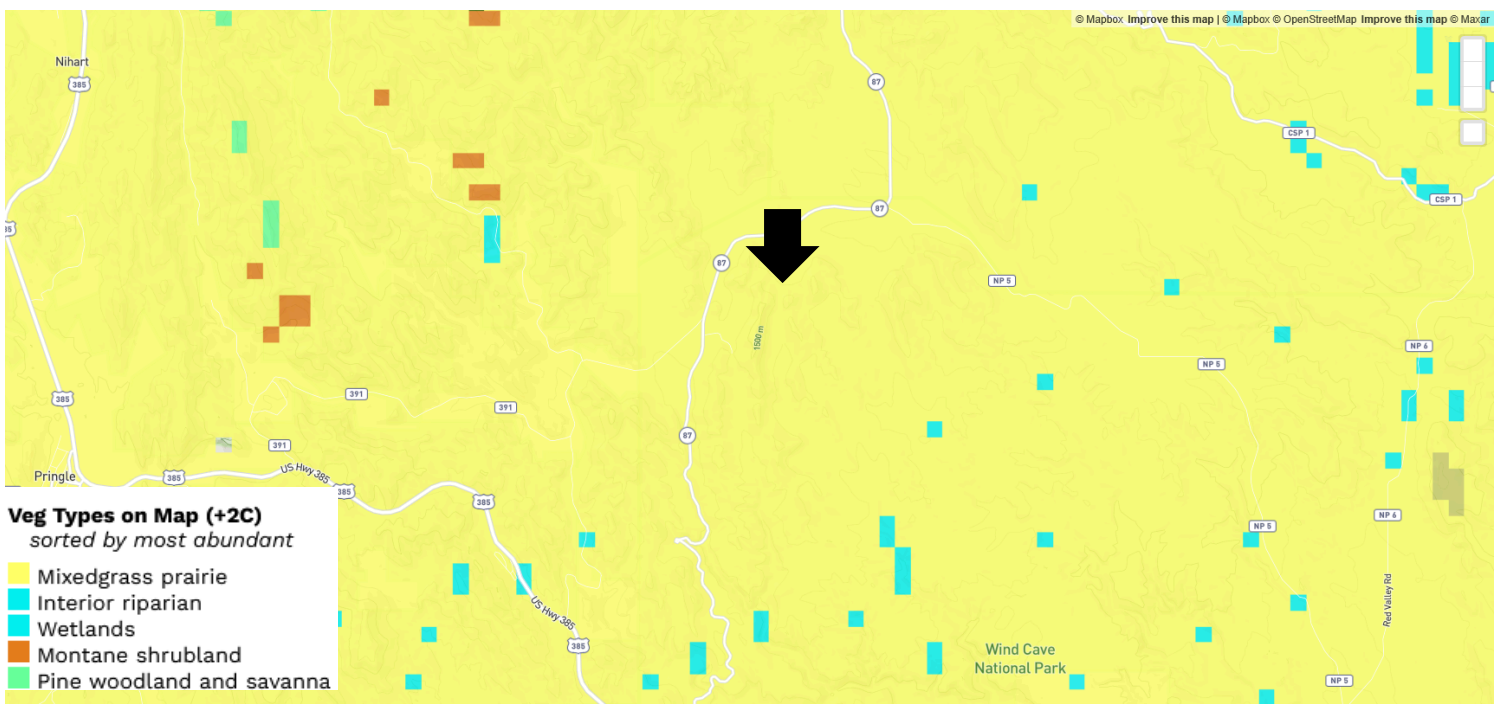


Current Vegetation



This figure represents **current primary vegetation cover** (based on climate averages from 1961-1990) for the project area.

Projected Future Vegetation



This figure represents **projected primary vegetation cover** (based on climate averages from 2070-2099) for the project area.

Dataset: Hoecker, T. J., K. T. Davis, C. Littlefield, et al. 2026. "Alternative Future Vegetation Pathways Reveal Potential Transformations of Western US Ecosystems." *Global Change Biology* 32, no. 3: e70795. <https://doi.org/10.1111/gcb.70795>.