

Wise Roads

Weather Information System to Effectively Reduce Oilfield Delays and Disruption

Western Energy Roundtable | May 12, 2022 | Watford City, North Dakota



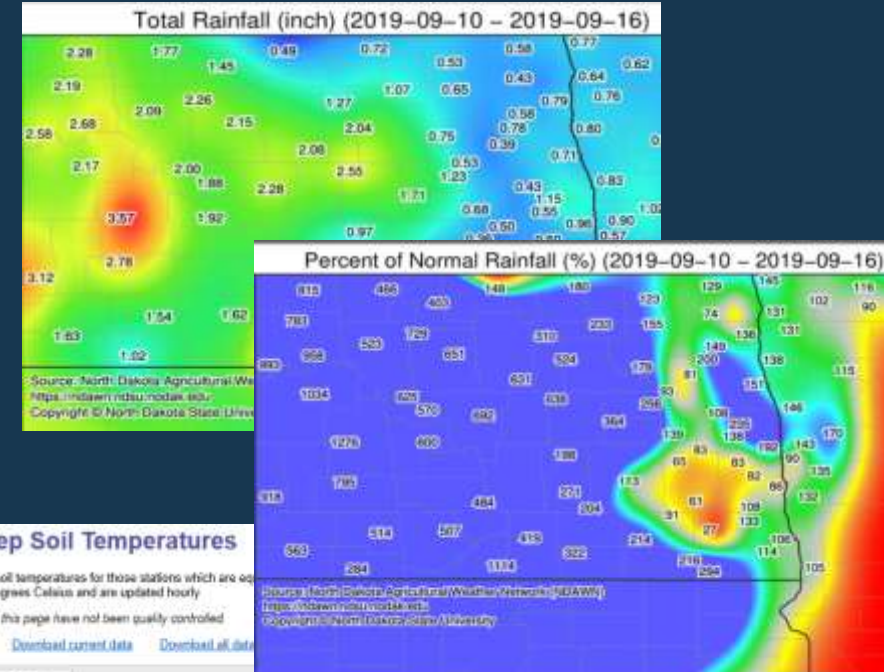
Starting the Project – The Problem

- Weight restrictions are placed during inclement weather
- Truck traffic is prohibited until conditions improve



Starting the Project – The Solution

- Provide accurate weather information
- Identify exact roads that require weight restrictions



Current Deep Soil Temperatures

This page shows deep soil temperatures for those stations which are equipped with probes. Values are in degrees Celsius and are updated hourly.

Disclaimer: The data on this page have not been quality controlled.

[Switch to metric units](#) [Download current data](#) [Download all data](#)

Station	Last Updated	5 cm (2 in)	10 cm (4 in)	20 cm (8 in)	30 cm (12 in)	40 cm (16 in)	50 cm (20 in)	60 cm (24 in)	80 cm (31 in)	100 cm (39 in)	125 cm (49 in)	150 cm (59 in)	175 cm (69 in)	200 cm (79 in)	225 cm (89 in)
Adams	17 Sep 21:00 CDT	66 °F	65 °F	63 °F	60 °F	57 °F	56 °F	55 °F	54 °F	53 °F	52 °F	52 °F	51 °F	50 °F	50 °F
Arvidson	17 Sep 21:00 CDT	67 °F	67 °F	65 °F	63 °F	62 °F	61 °F	61 °F	60 °F	59 °F	59 °F	58 °F	57 °F	56 °F	55 °F
Bottineau	17 Sep 21:00 CDT	63 °F	62 °F	60 °F	58 °F	57 °F	57 °F	56 °F	56 °F	55 °F	54 °F	54 °F	53 °F		
Bowman	17 Sep 21:00 CDT	65 °F	65 °F	65 °F	64 °F	62 °F	62 °F	61 °F	59 °F	59 °F	58 °F	57 °F	56 °F	55 °F	54 °F
Carlington	17 Sep 21:00 CDT	66 °F	67 °F	65 °F	63 °F	61 °F	60 °F	59 °F	58 °F	57 °F	57 °F	56 °F	56 °F		
Courtenay	17 Sep 21:00 CDT	75 °F	75 °F	73 °F	69 °F	66 °F	64 °F	62 °F	61 °F	60 °F	59 °F	59 °F	58 °F	57 °F	56 °F
Crane Creek	17 Sep 21:00 CDT	64 °F	64 °F	65 °F	63 °F	61 °F	60 °F	59 °F	58 °F	57 °F	57 °F	56 °F	56 °F	55 °F	54 °F
Croft	17 Sep 21:00 CDT	65 °F	67 °F	64 °F	62 °F	60 °F	59 °F	59 °F	58 °F	57 °F	56 °F	56 °F	55 °F	54 °F	53 °F
Danheff	17 Sep 21:00 CDT	66 °F	67 °F	65 °F	63 °F	61 °F	60 °F	59 °F	57 °F	57 °F	56 °F	55 °F	54 °F	53 °F	52 °F
Dickinson	17 Sep 21:00 CDT	66 °F	67 °F	65 °F	64 °F	63 °F	62 °F	61 °F	60 °F	59 °F	58 °F	58 °F			
Epping	17 Sep 21:00 CDT	65 °F	64 °F	62 °F	60 °F	59 °F	59 °F	58 °F	57 °F	57 °F	56 °F	56 °F	55 °F	54 °F	54 °F

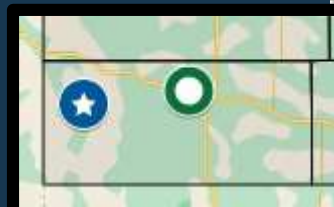
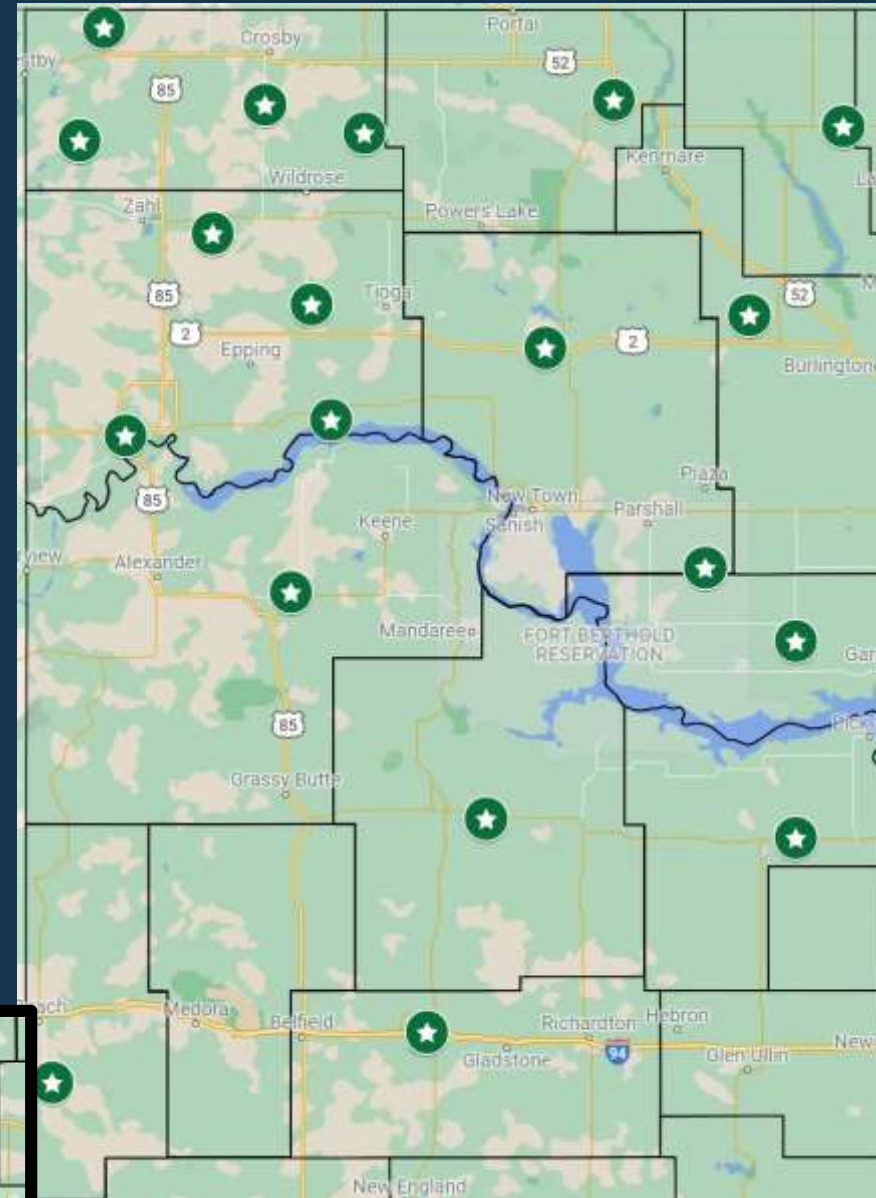
Starting the Project

- Expand existing NDAWN network
- Use high-density weather data
- Work with research partners, agriculture, and industry



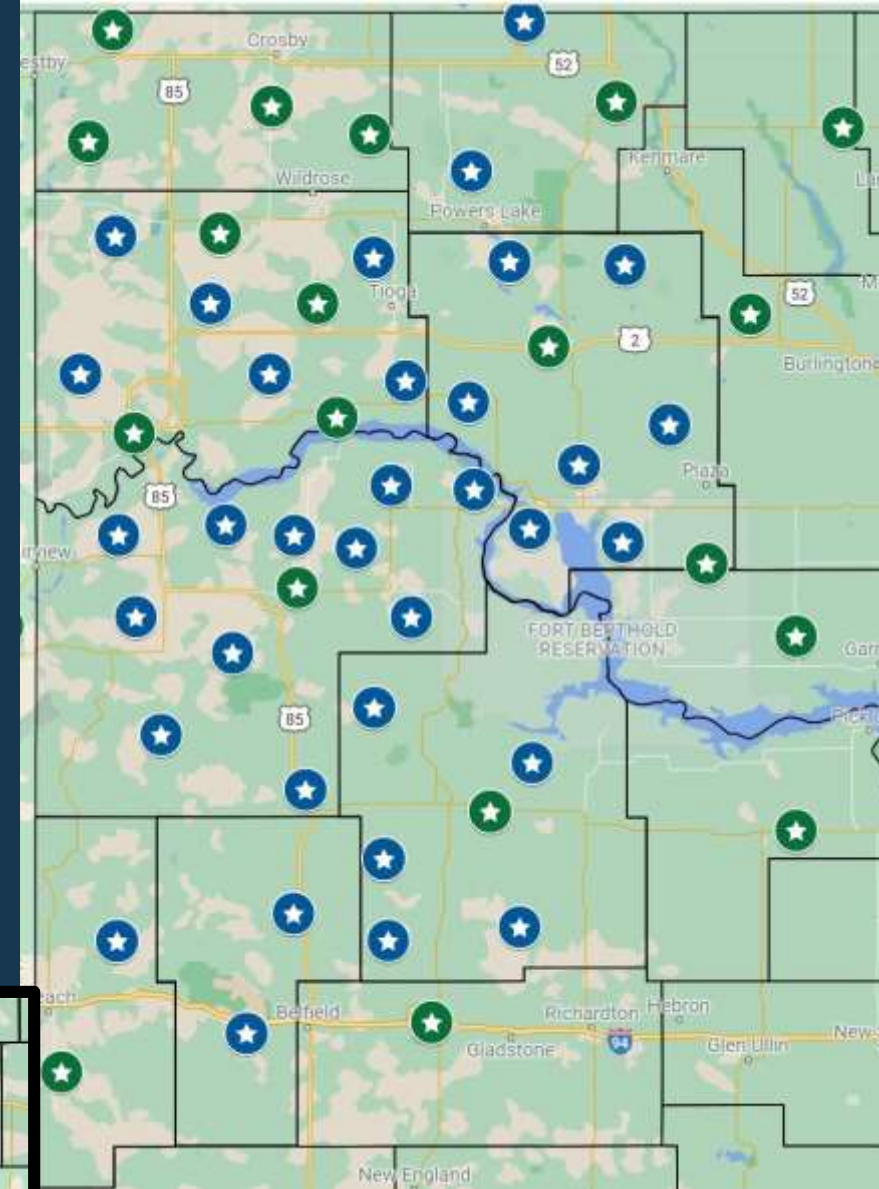
Spring 2019 NDAWN Stations

- 8 total weather stations in “Big Four” Counties
- McKenzie and Dunn each had 1 station
- >40 miles between some stations



Current NDAWN Stations

- 35 additional full-instrumentation weather stations installed since June 2019

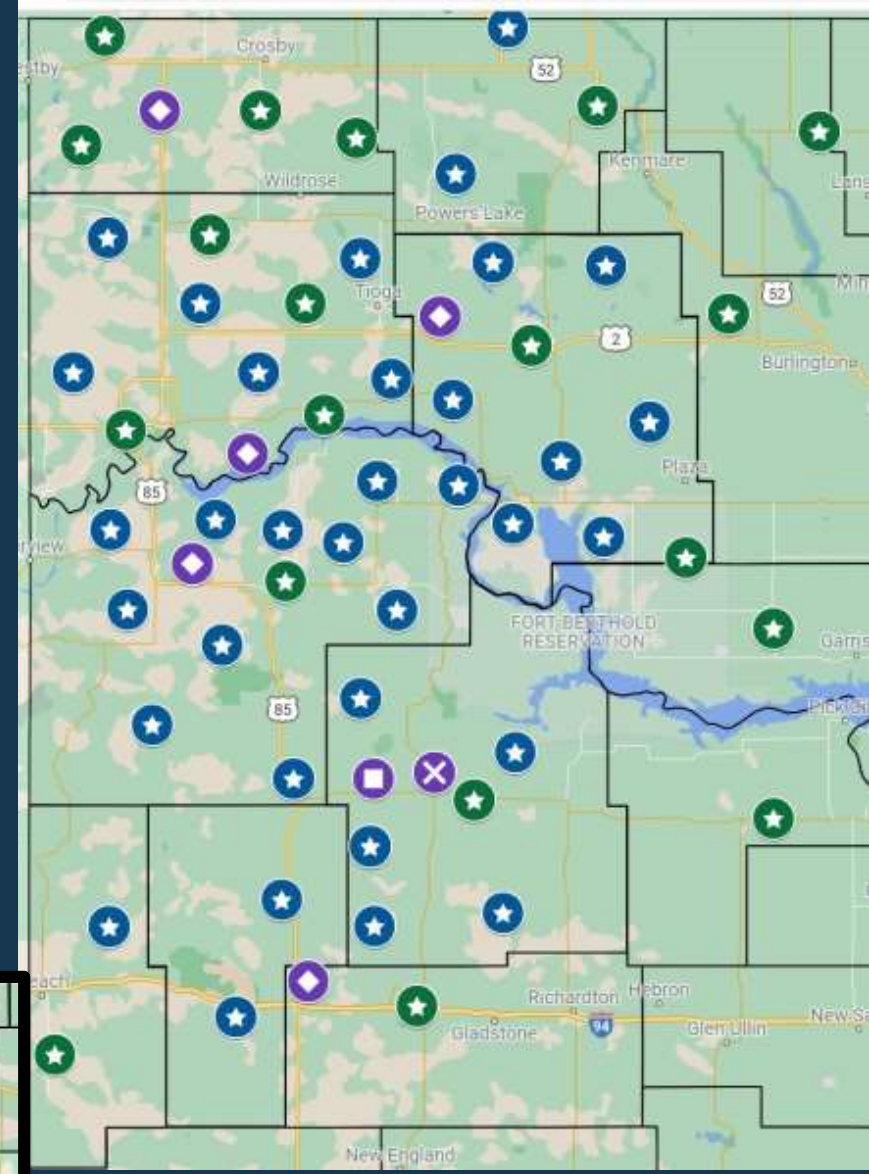
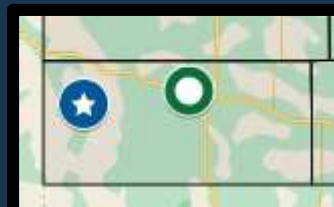


Bowman
County

Current NDAWN Stations

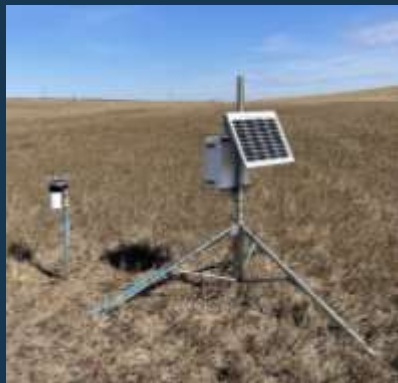
- 35 additional full-instrumentation weather stations installed since June 2019
- 7 additional rain gauge only sites
- “Big Four” counties have a total of 42 stations
- ~12 mile spacing

Bowman
County



Wise Roads: Phase 4

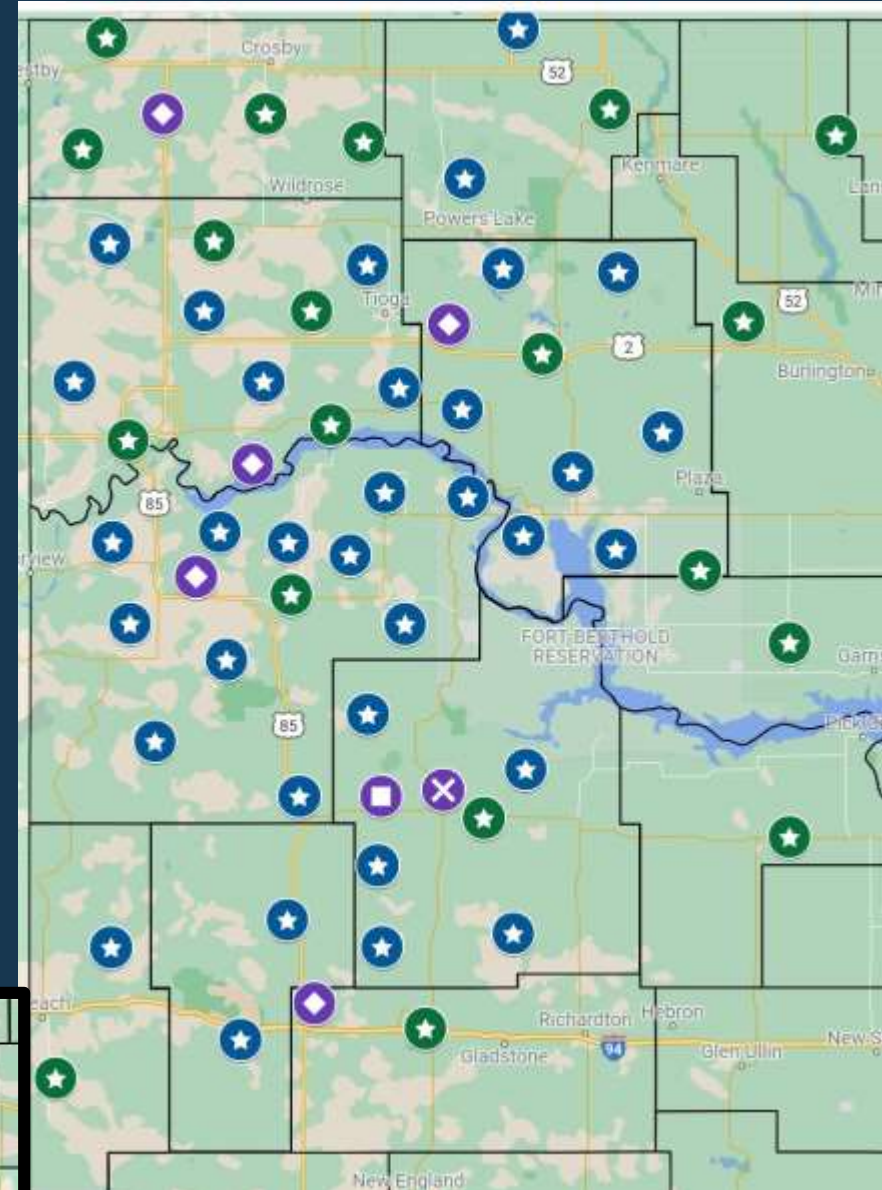
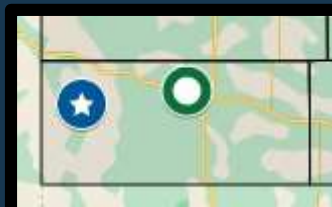
- Adding additional rain gauge only sites
- If connected to AC power can measure snow & sleet



NDAWN
NORTH DAKOTA AGRICULTURAL WEATHER NETWORK

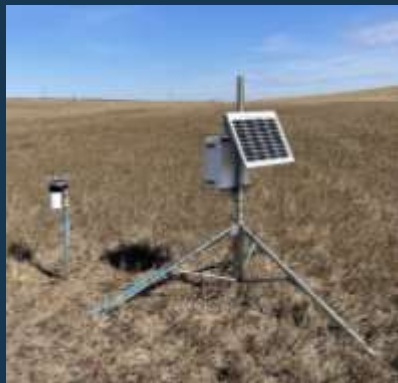


Bowman
County



Wise Roads: Phase 4

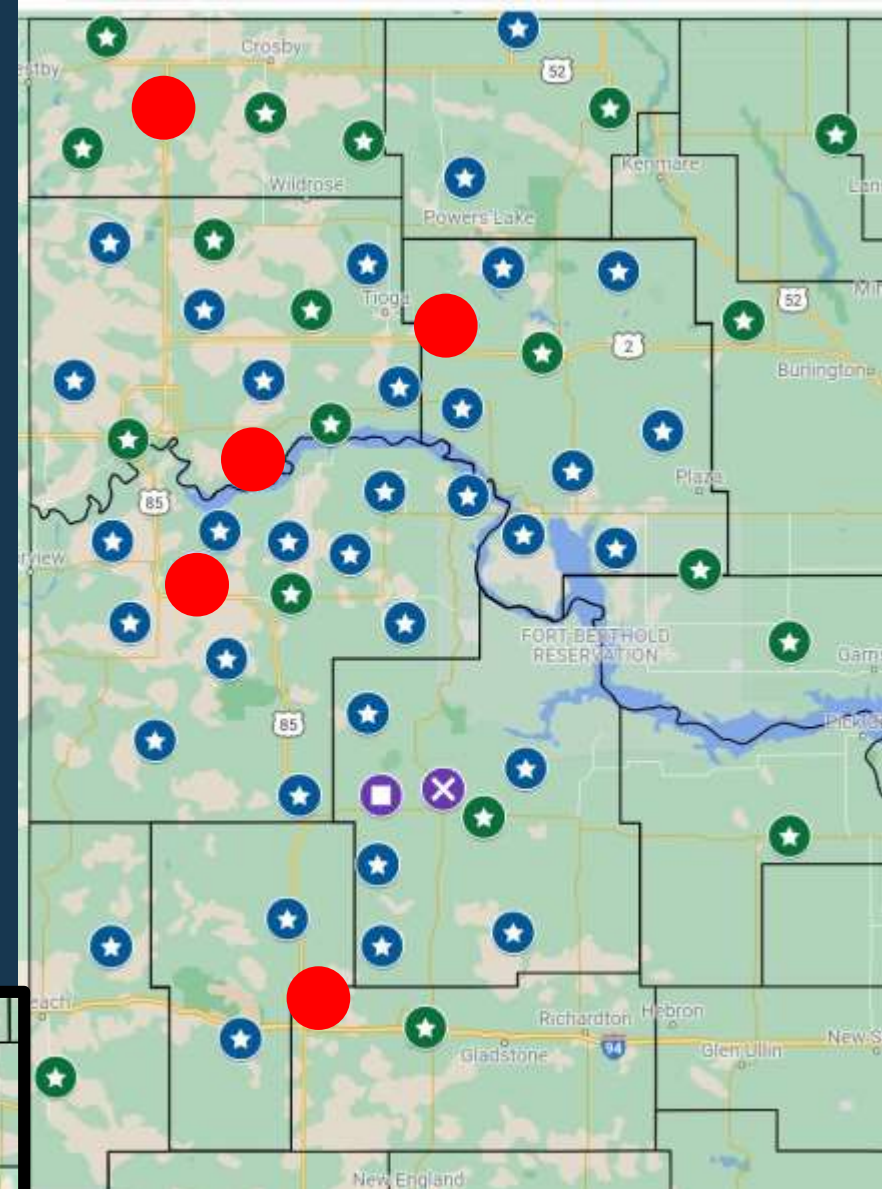
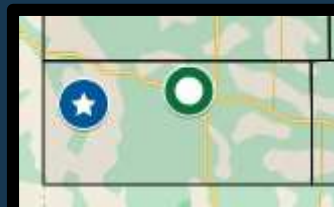
- 5 Wise Roads stations connected to AC Power
- 1 in each Mountrail, Divide, Williams, Stark, McKenzie



NDAWN
NORTH DAKOTA AGRICULTURAL WEATHER NETWORK



Bowman
County



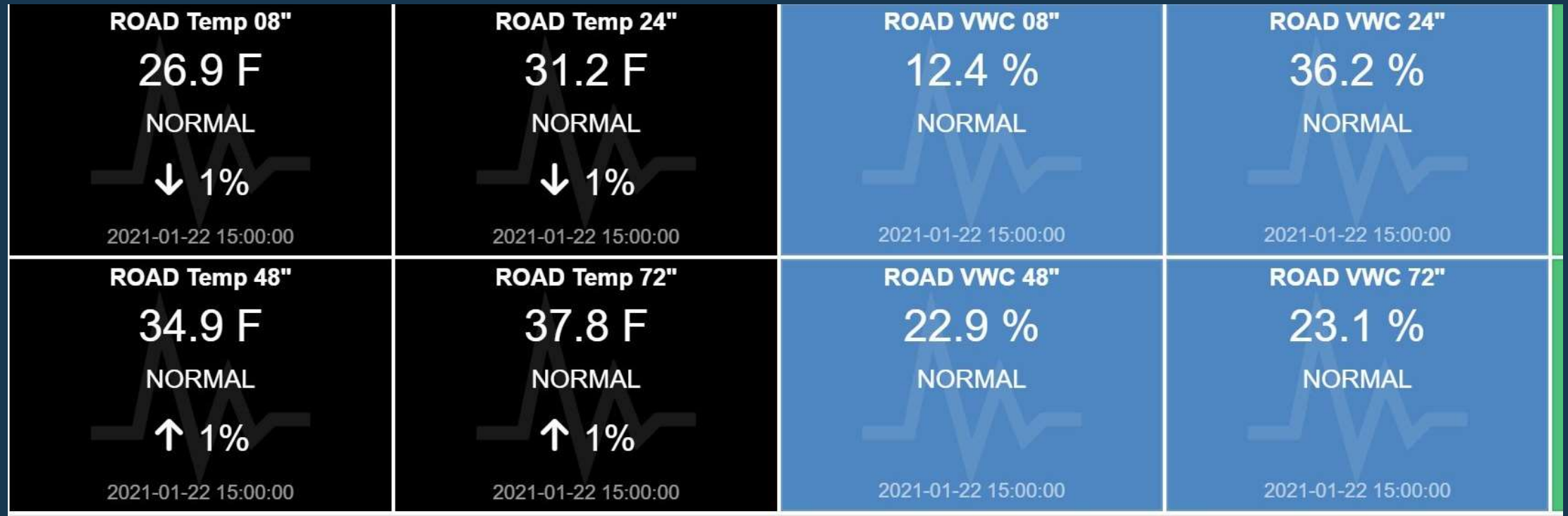
Road Temperature & Moisture Probes

- Installed at four locations
- Probes installed at 4 depths: 6-8", 24", 48", 72" from surface
- Temperature and volumetric water content (VWC) measured at each depth
- Used for monitoring frost depth and moisture infiltration



Road Temperature & Moisture Probes

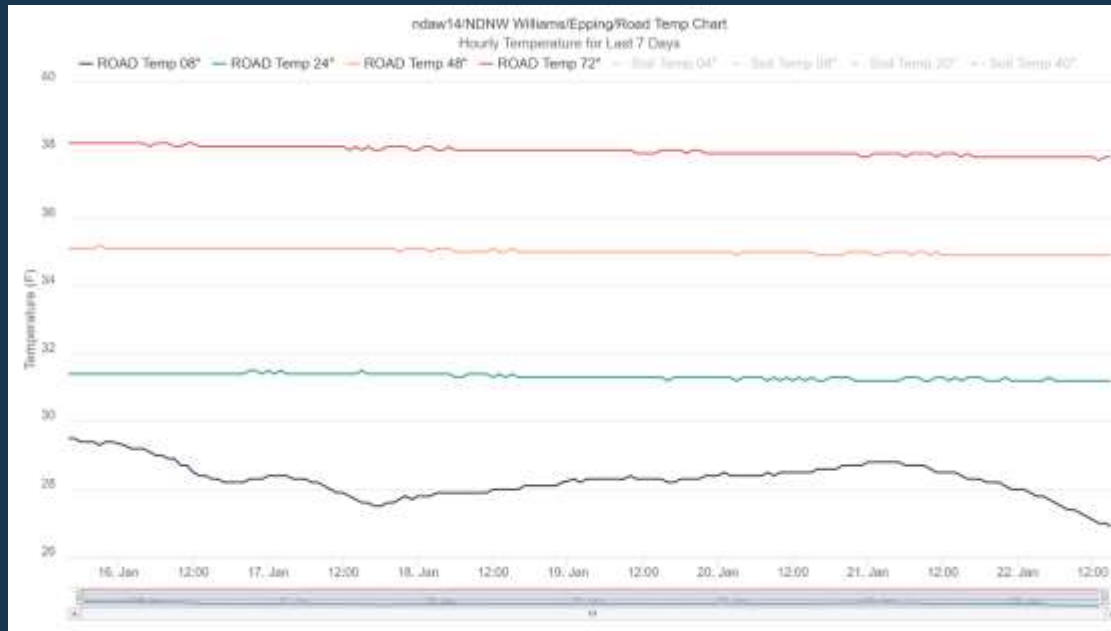
- Current Temperature and Moisture Data



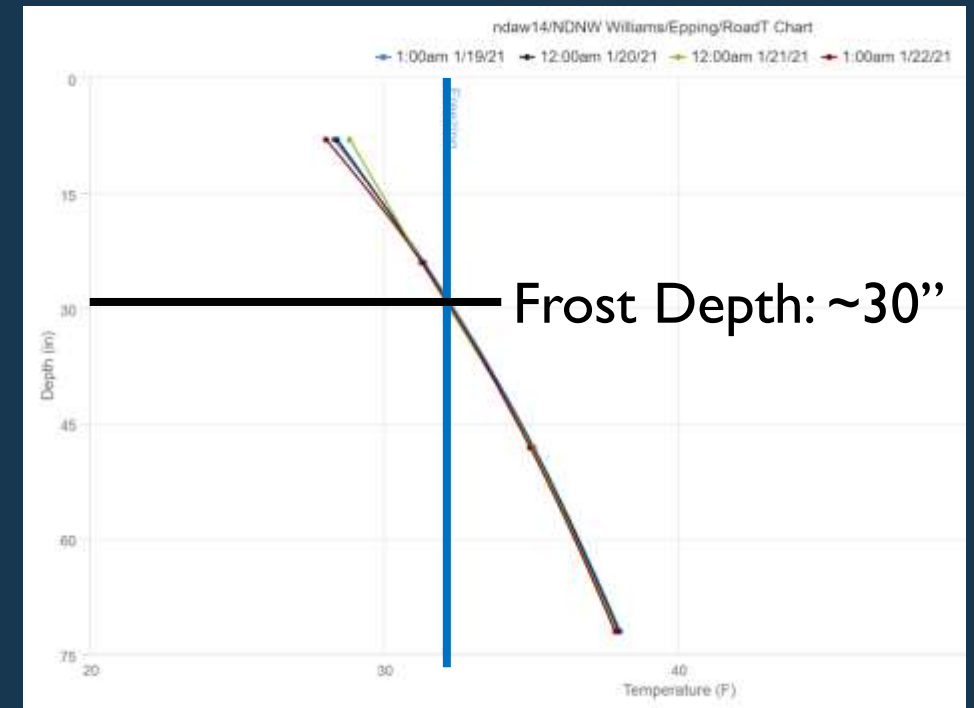
Road Temperature & Moisture Probes

- Temperature data charts

7 Day Temperature Chart

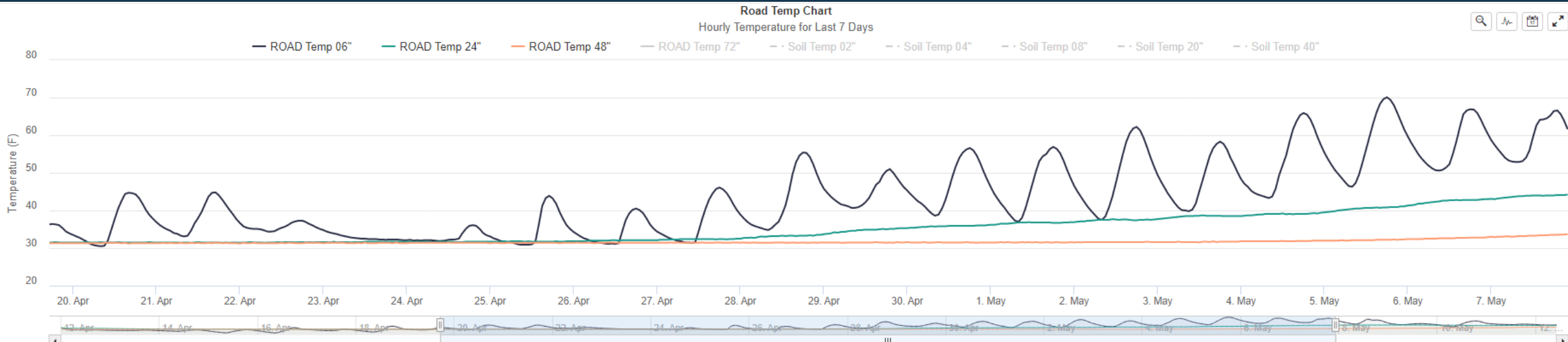


Temperature Profile



Road Temp Data – Rat Lake, Mountrail County

- 24" depth below 32F April 13 - 27
- 48" depth remained below freezing until May 5th



Road Moisture Data – Rat Lake, Mountrail County



Live Video Streaming

- Available on PC/Mac and mobile devices
- Live video with Pan/Tilt/Zoom capability



Rainfall Notifications

- Road managers receive email/text notifications when daily rainfall thresholds are reached
- Each county can set unique thresholds



NDSW Dunn/Hirschville/Campbell PakBus Logger/RG

Active Daily Total

Hirschville: .75" Daily Rain

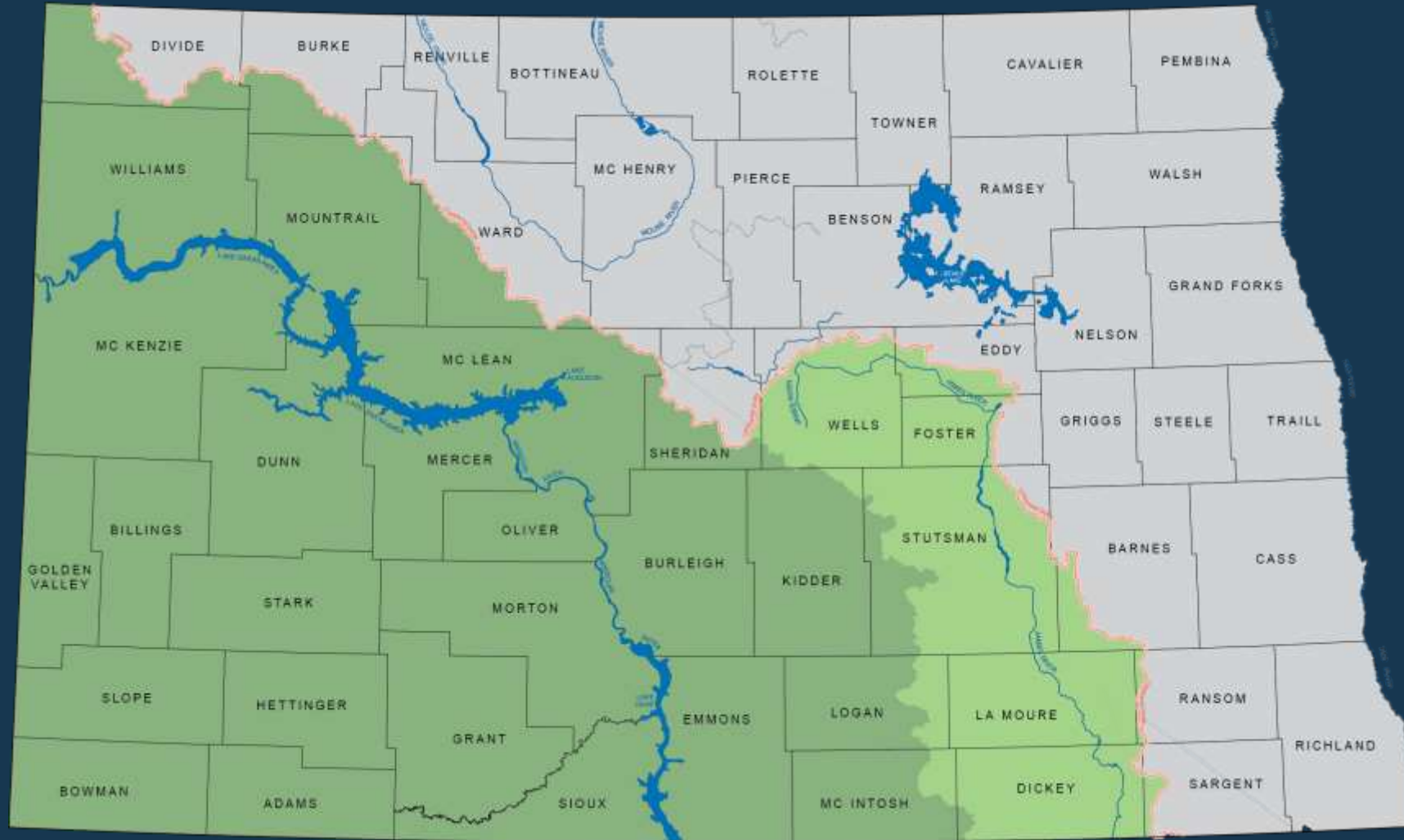
Current value is 0.76 in [0.75" Rain]

Login

or visit this link:

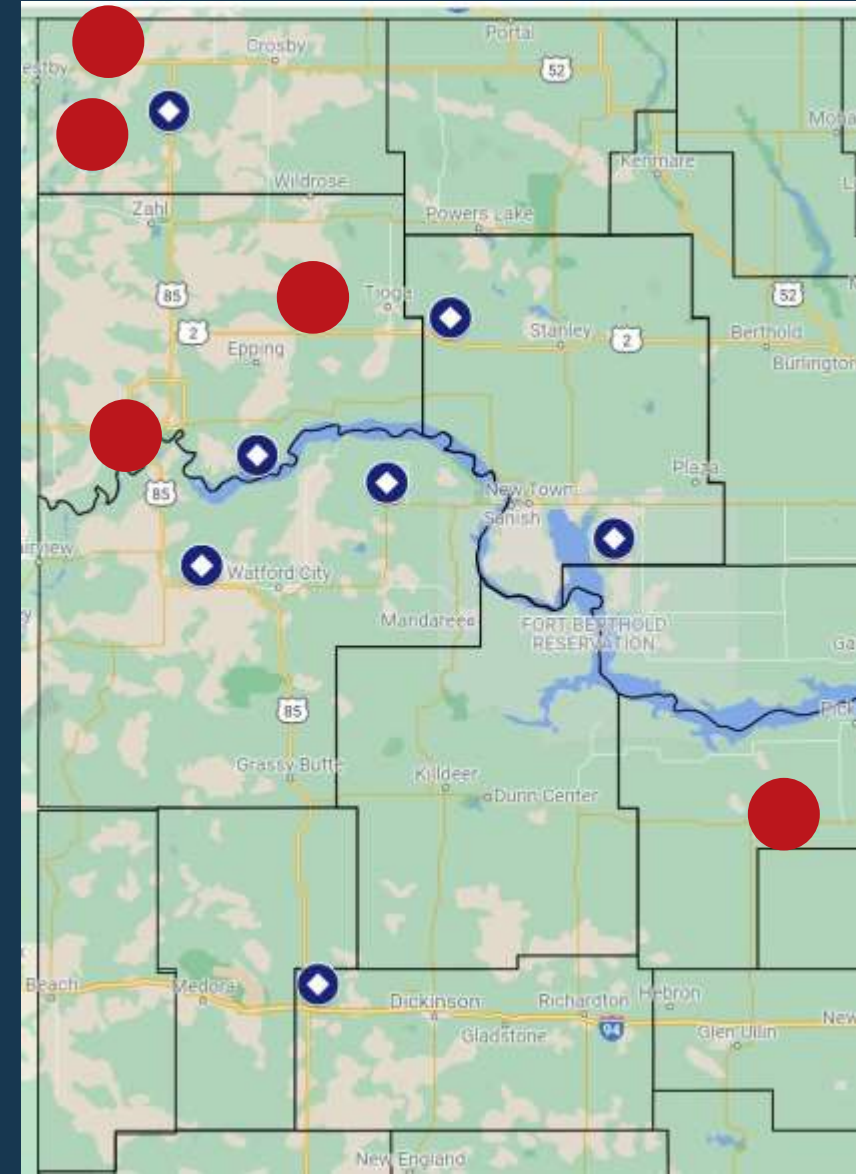
https://ndawn.eagle.io/ui/ndaw14/NDSW_Dunn/Hirschville/Campbell_PakBus_Logger/RG_Active_Daily_Total

Upper Missouri River Basin Project Update



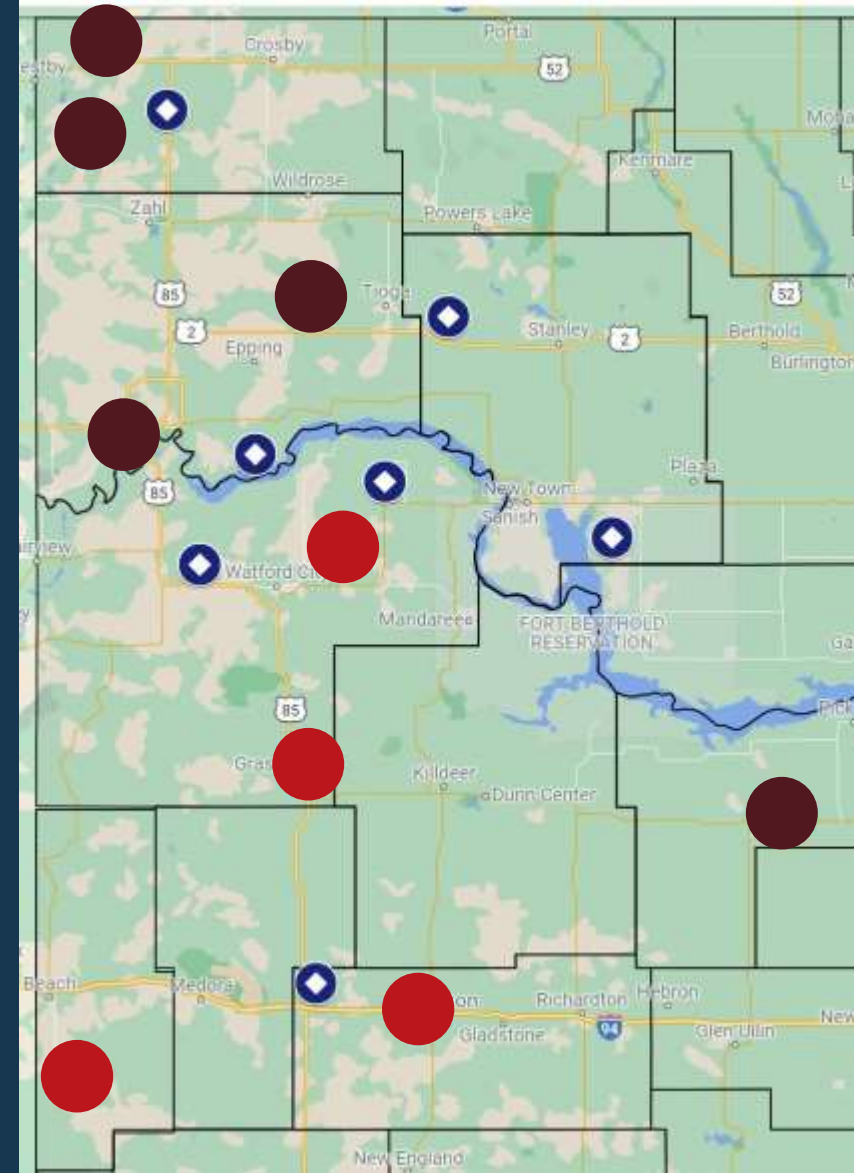
Missouri River Basin Project Update

- 4 additional all-season precipitation gauges were installed in the region



Missouri River Basin Project Update

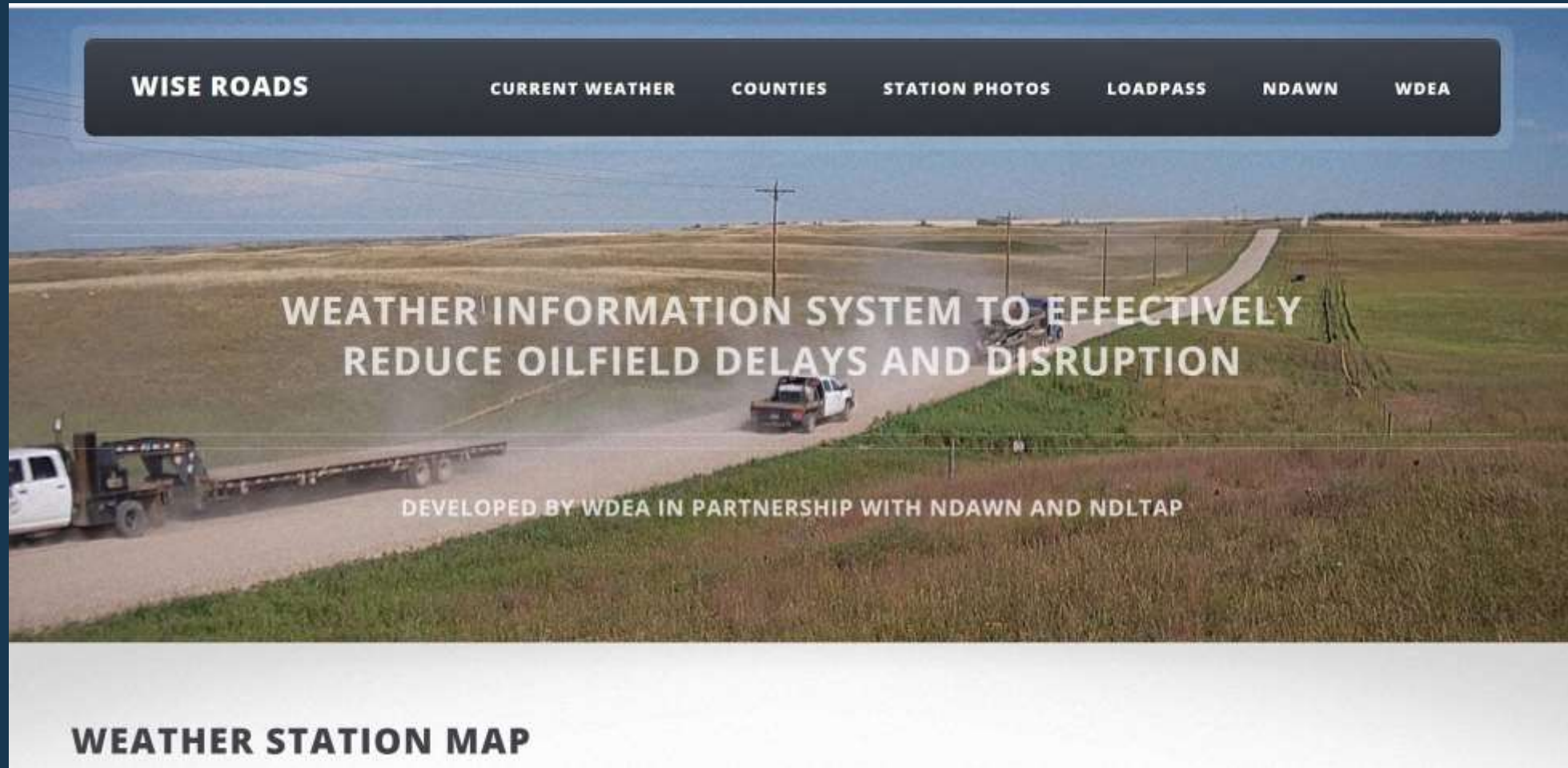
- 4 additional all-season precipitation gauges were installed in the region
- 2022 Upgrades:
 - Grassy Butte
 - Keene
 - Dickinson
 - Beach
 - NE Montana



Weather Data Resources

- WiseRoadsND.com
 - Current weather maps of western ND
 - Most recent camera images
 - Links to each station's individual data
- NDAWN.info
- NDAWN Inversion App
- NDDOT Roads Map
 - Website & App





- Weather station map



WEATHER STATION MAP

SUBSURFACE ROAD PROBES

Road probes are installed in gravel roads adjacent to select Wise Roads Stations. These probes measure the temperature and moisture (kilowatts) Water Content at four depths: 6"R, 20", 40", and 72".

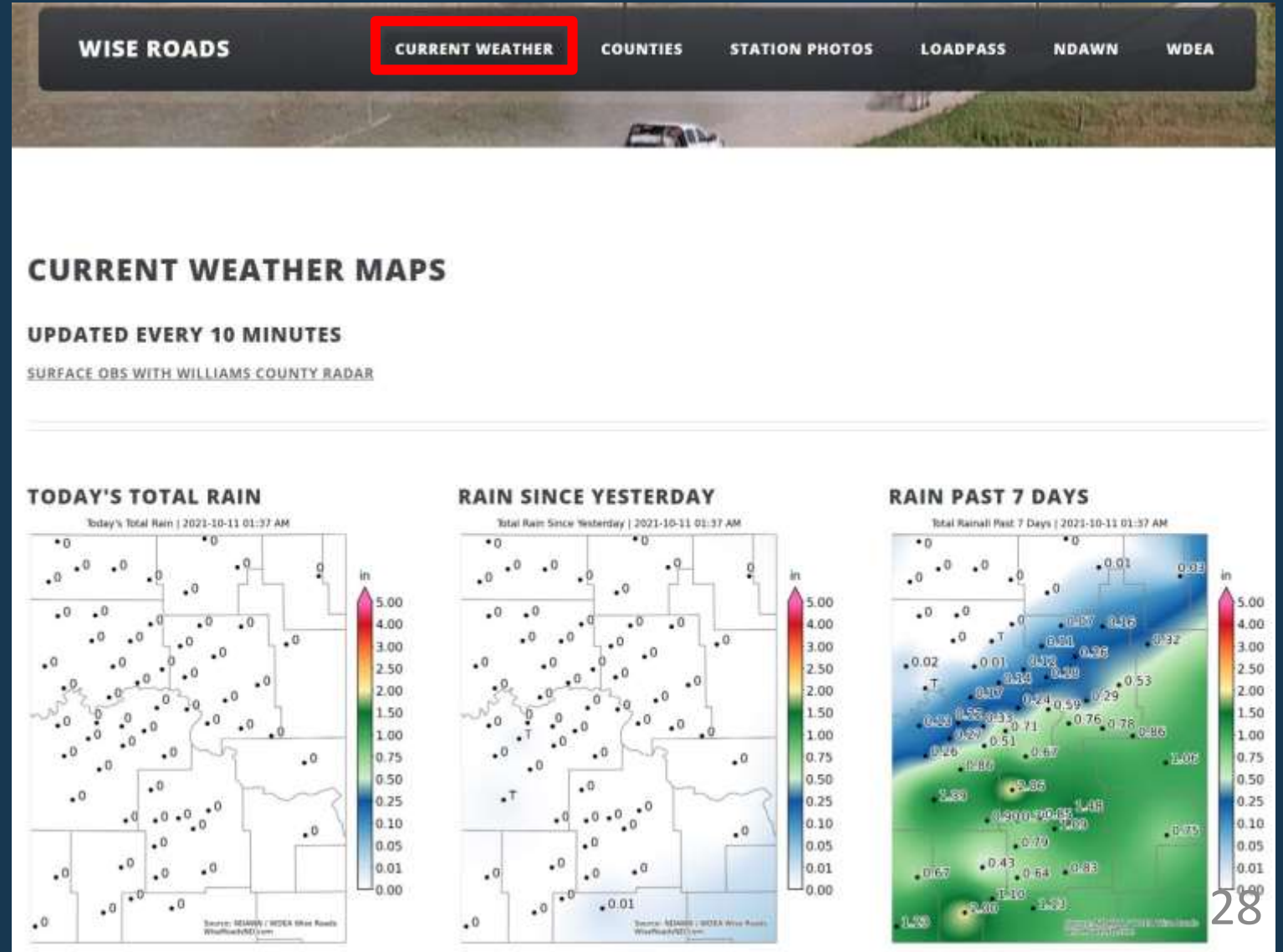
Data is available at the following stations:

- DUNN COUNTY: MEDICINE HOLE
- MCKENZIE COUNTY: BANKS
- MOUNTAINTOP COUNTY: RAT LAKE
- WILLIAMS COUNTY: EPPING

- [illegible]

WiseRoadsND.com – Current Weather

- 1-, 2-, & 7-Day rain totals
- Current temp & wind
- Today's max & min temp
- Today's Peak wind gust



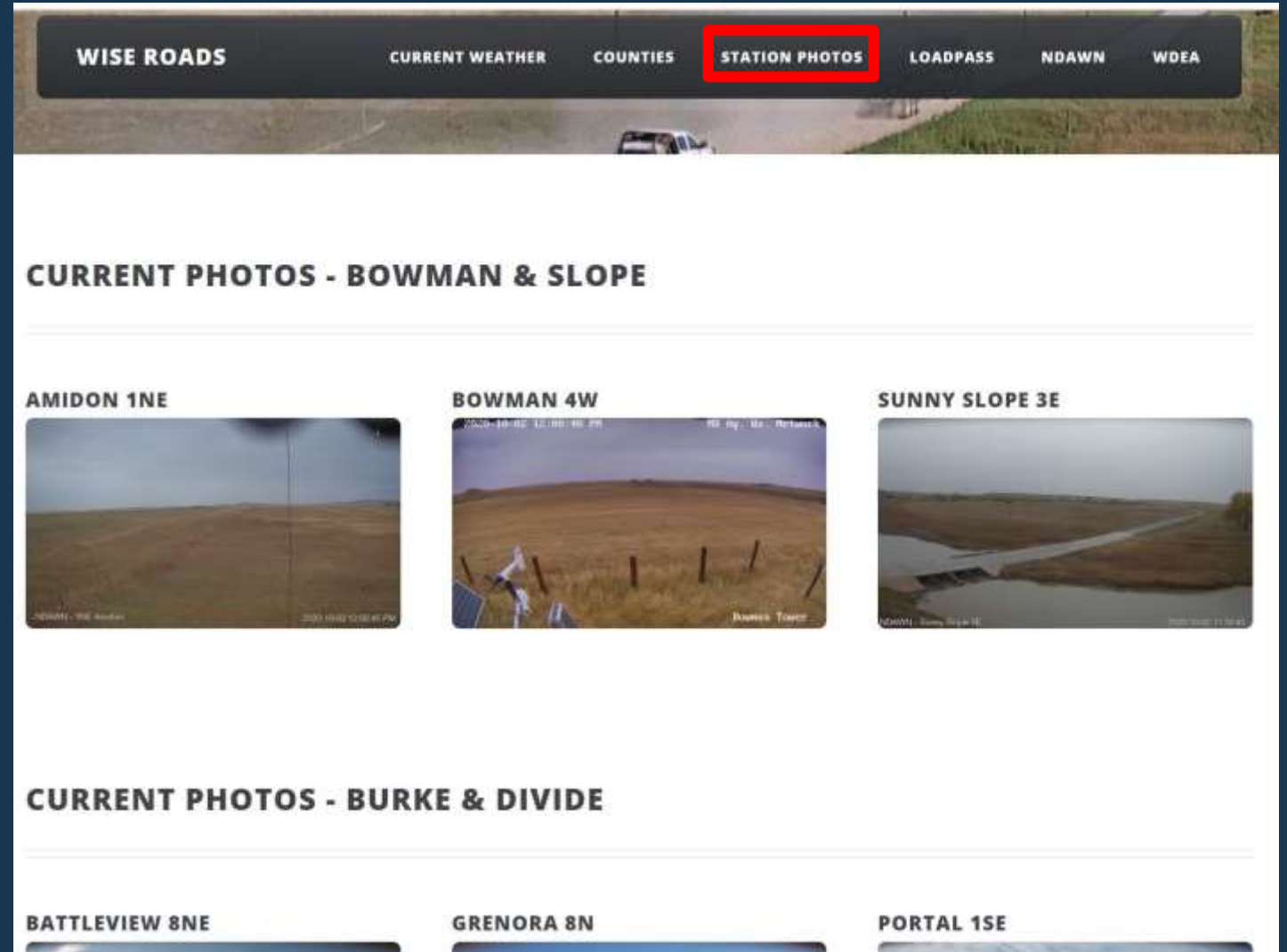
WiseRoadsND.com – Counties

- Maps showing all stations in the county
- Links to weather and soil data
- Latest camera images
- Road probe data

The screenshot shows the WiseRoadsND.com website interface. At the top, a dark navigation bar contains several menu items: WISE ROADS, CURRENT WEATHER, COUNTIES (highlighted with a red box), STATION PHOTOS, LOADPASS, NDAWN, and WDEA. Below the navigation bar, the main content area is titled 'MCKENZIE COUNTY' and includes a sub-link 'MCKENZIE COUNTY RAIN DASHBOARD'. The page is divided into two columns: 'WEATHER DATA' and 'SOIL DATA'. Each column contains a list of location names with links: Alexander, Antelope Creek, Arnegard, Banks, Charbonneau, and Croff. To the right of these lists is a map of McKenzie County showing the locations of these stations marked with dots. The map also shows the county's boundaries and major roads.

WiseRoadsND.com – Station Photos

- Latest camera images sorted by county
- All images are in HD and downloadable



Contact Information

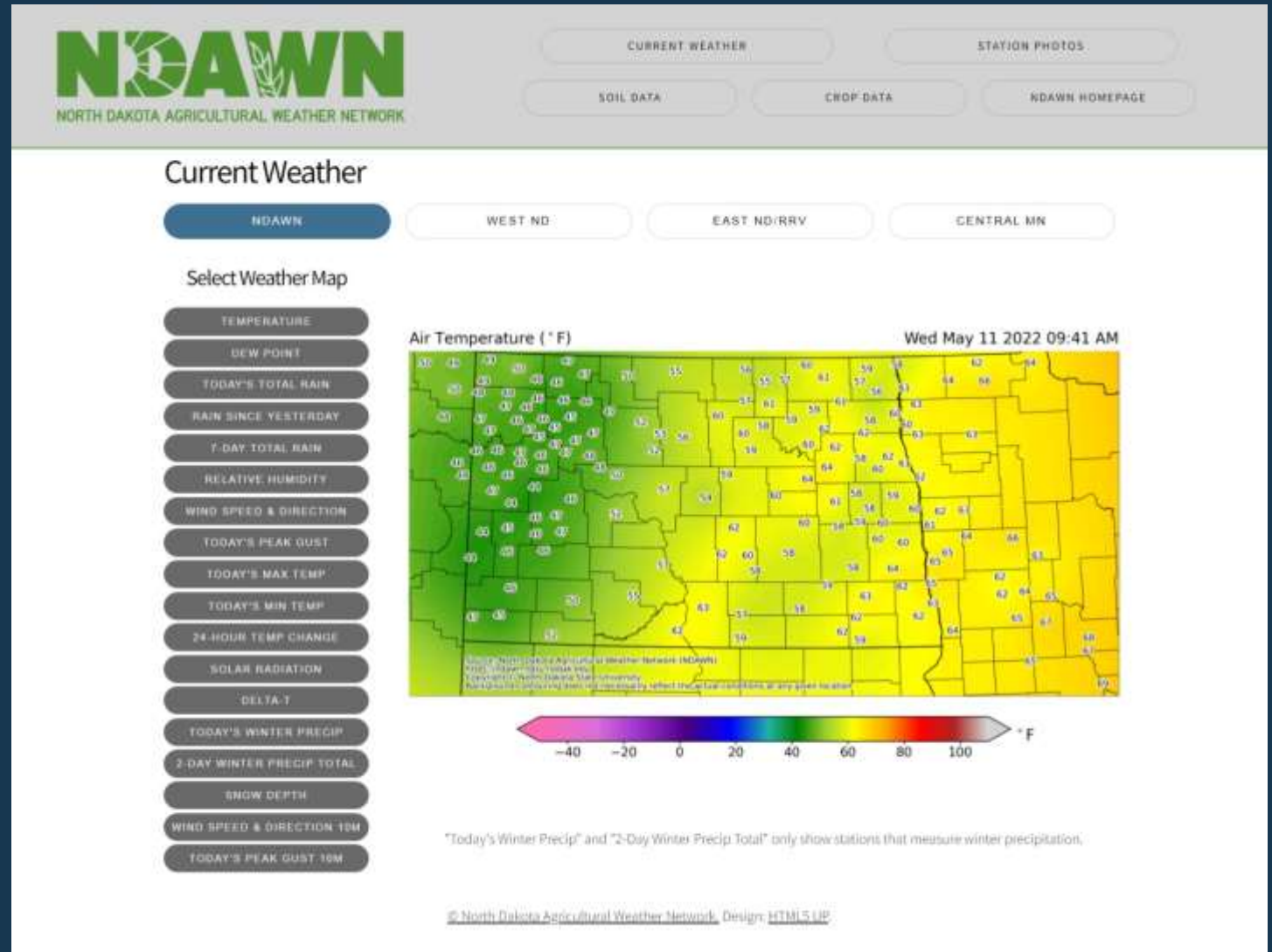
Jonathan Rosencrans

- Phone: 701-715-0236
- Email: jonathan.rosencrans@ndsu.edu




NDAWN.info

- Mobile friendly
- Weather, soil, & crop maps
- Station photos



NDAWN.org – Current Weather



North Dakota Agricultural Weather Network

NDSU

NDSU Agriculture

NDSU School of Natural Resource Sciences

NDAWN

HELP

WEATHER DATA

Current

Hourly

Daily

Weekly

Monthly

Yearly

NWS Daily Normals

NWS Monthly Normals

Monthly Report

Deep Soil Temperatures

Soil Moisture

APPLICATIONS

ACCOUNT

Current Weather

Show information

Table

Map

Show data from additional heights

Current																	
Station	Ag District	Last Updated	Air Temp	Wind Chill	Wind Dir	Wind Speed	Peak Gust	Rel Hum	Dew Point Temp	Est. Wet-bulb Temp	Est. ΔT	Inversion 9/1.5 m	Inversion 3/1 m	Bare Soil Temp	Turf Soil Temp	Solar Rad	Sea-level Baro Press
Ada 1N	MN-NW	12 Dec 13:35 CST	5°	-3°	NW	3 mph	4 mph	82 %	1°	4°	1°	---	-1.9°	33°	33°	253 W/m²	---
Adams 5N	ND-NE	12 Dec 13:35 CST	2°	-8°	ENE	4 mph	5 mph	85 %	-2°	1°	1°	0.1°	-0.3°	25°	30°	288 W/m²	1029.1 mb
Alamo 2S	ND-NW	12 Dec 13:35 CST	12°	-1°	SSE	9 mph	12 mph	85 %	9°	11°	1°	---	-0.2°	28°	28°	235 W/m²	---
Amidon 1NE	ND-SW	12 Dec 13:35 CST	26°	16°	SSE	9 mph	11 mph	86 %	22°	25°	1°	-1.7°	-0.9°	32°	33°	189 W/m²	1016.6 mb
Aregard 9N	ND-WC	12 Dec 13:30 CST	14°	4°	SE	6 mph	8 mph	90 %	11°	13°	1°	---	-0.3°	25°	30°	118 W/m²	---
Baker 1N	ND-NC	12 Dec 13:35 CST	3°	-17°	ESE	14 mph	17 mph	83 %	-2°	2°	1°	---	-0.4°	32°	33°	180 W/m²	1019.7 mb
Beach 9S	ND-SW	12 Dec 13:35 CST	22°	11°	SE	8 mph	12 mph	94 %	20°	21°	1°	---	-0.2°	32°	32°	288 W/m²	1019.5 mb
Becker 1W	MN-C	12 Dec 13:35 CST	13°	3°	N	5 mph	7 mph	79 %	8°	12°	1°	---	-0.6°	33°	33°	147 W/m²	---
Berthold 5NW	ND-NW	12 Dec 13:35 CST	8°	-5°	SE	7 mph	10 mph	85 %	4°	7°	1°	---	-0.2°	27°	28°	246 W/m²	---
Bottineau 14W	ND-NC	12 Dec 13:35 CST	5°	-13°	SE	13 mph	16 mph	80 %	0°	4°	1°	---	-0.3°	29°	29°	163 W/m²	1020.7 mb
Burlington 1N	ND-AM	12 Dec 13:35 CST	7°	0°	SE	11 mph	14 mph	82 %	3°	6°	1°	---	-0.4°	30°	30°	180 W/m²	1019.2 mb

NDAWN.org – Current Weather

