



Wise Roads

Weather Information System to Effectively
Reduce Oilfield Delays and Disruptions

Jonathan Rosencrans
WDEA Annual Meeting
October 13th, 2021



NDSU

UPPER GREAT PLAINS
TRANSPORTATION INSTITUTE
NORTH DAKOTA LOCAL TECHNICAL ASSISTANCE PROGRAM

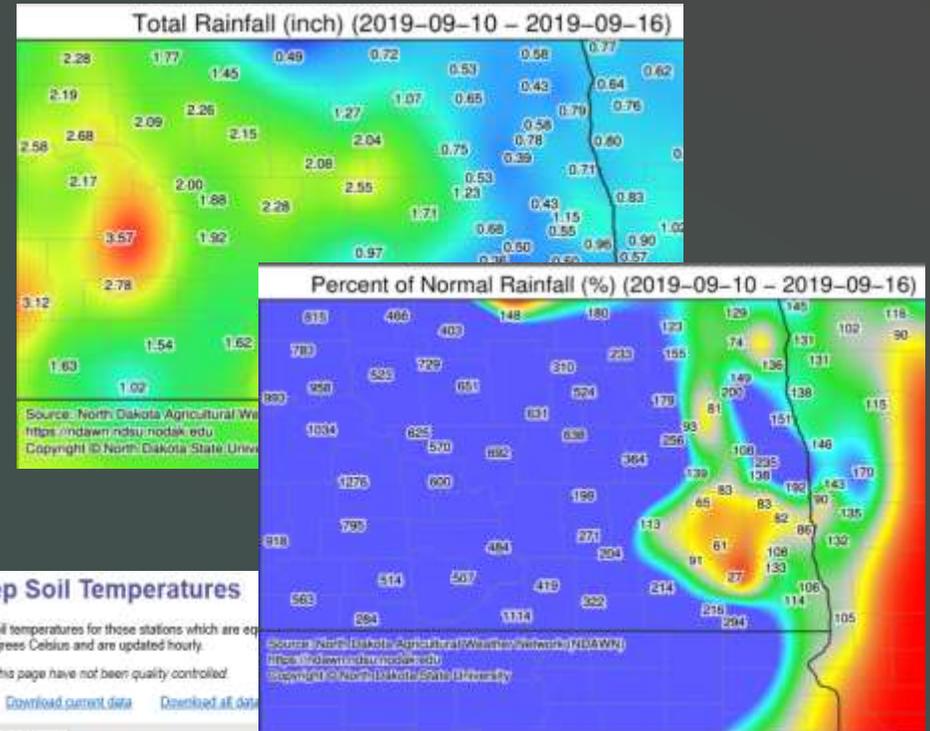
Problem

- When inclement weather strikes, local governments impose weight restrictions on gravel roads that prohibit the movement of oilfield truck traffic until road conditions improve



Solution

- Provide accurate weather information to assist road managers to precisely identify roads that require temporary weight restrictions and exclude those that do not.
- Provide weather forecasts to assist planning operations



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 | 58 °F | 57 °F | 56 °F | 55 °F | 54 °F | 53 °F | 52 °F | 52 °F | 51 °F | 50 °F |
| Arridon | 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 |
| Botineau | 17 Sep 21:00 CDT | 63 °F | 62 °F | 60 °F | 58 °F | 57 °F | 56 °F | 56 °F | 55 °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 |
| Canington | 17 Sep 21:00 CDT | 68 °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 | 69 °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 |
| Darhoff | 17 Sep 21:00 CDT | 68 °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 | 68 °F | 67 °F | 65 °F | 64 °F | 63 °F | 62 °F | 61 °F | 60 °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 |

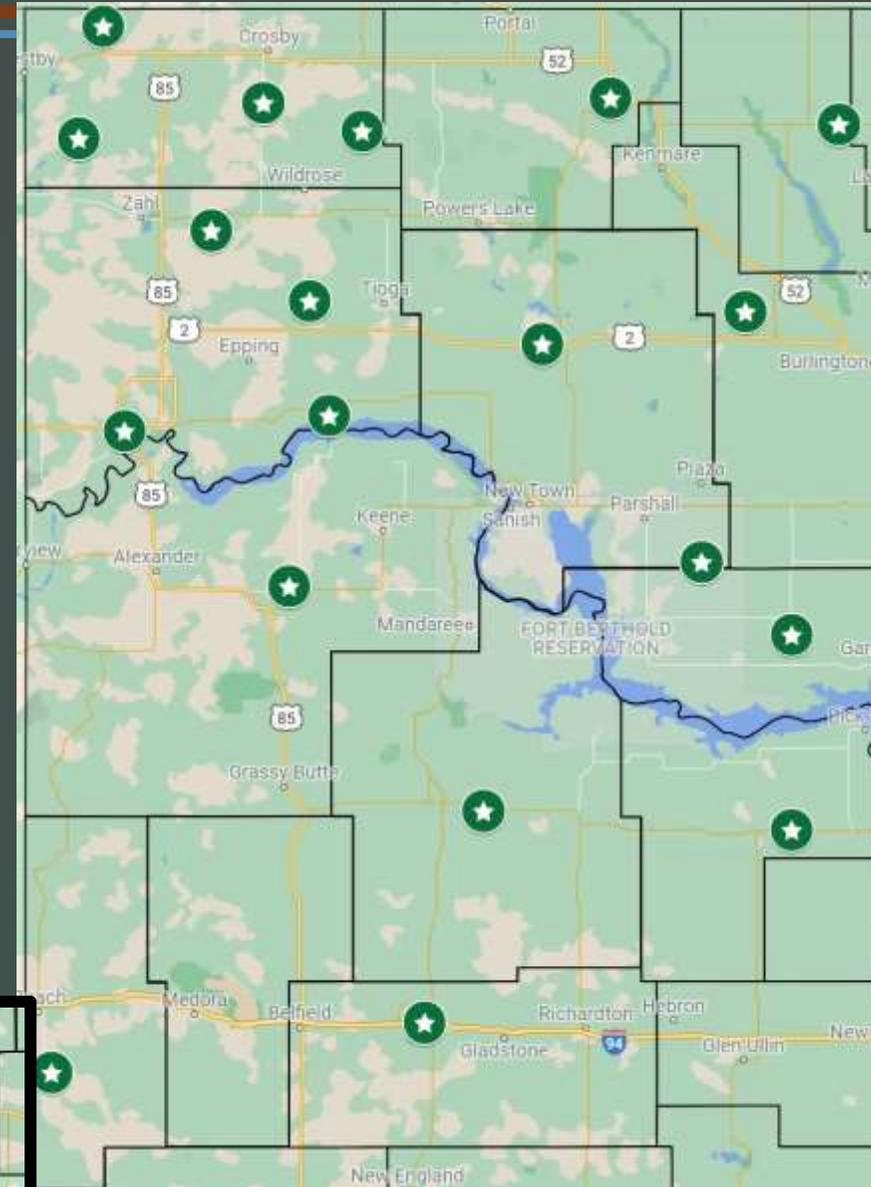
Wise Roads Project

- Expand the existing NDAWN network in oil producing counties
- Use high-density weather data, particularly rainfall, to precisely place weight restrictions
- Maximize benefit by working with research partners, agriculture, and industry

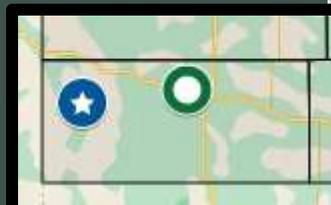


Spring 2019 NDAWN Stations

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

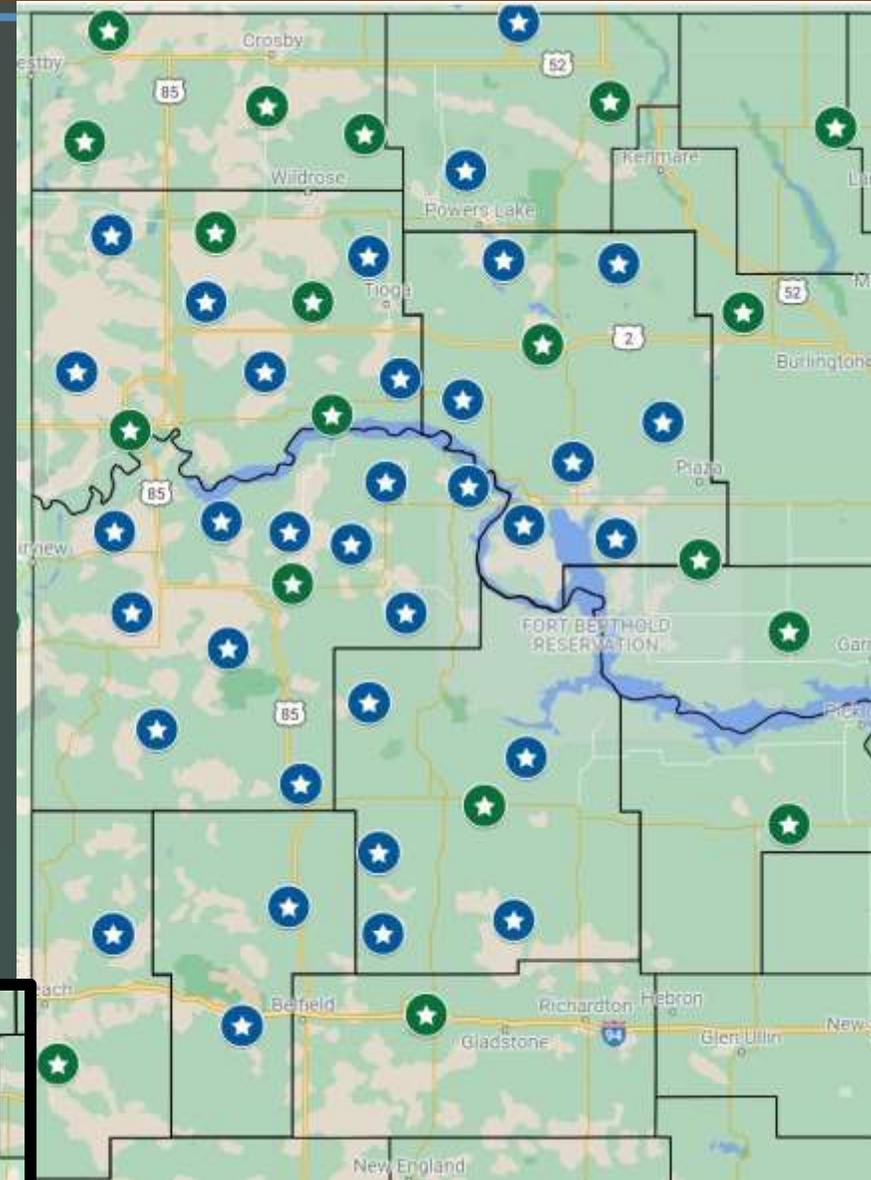


Bowman
County

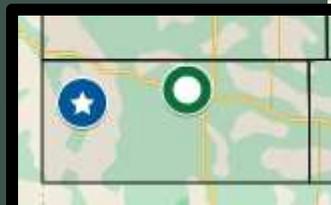


Current NDAWN Stations

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



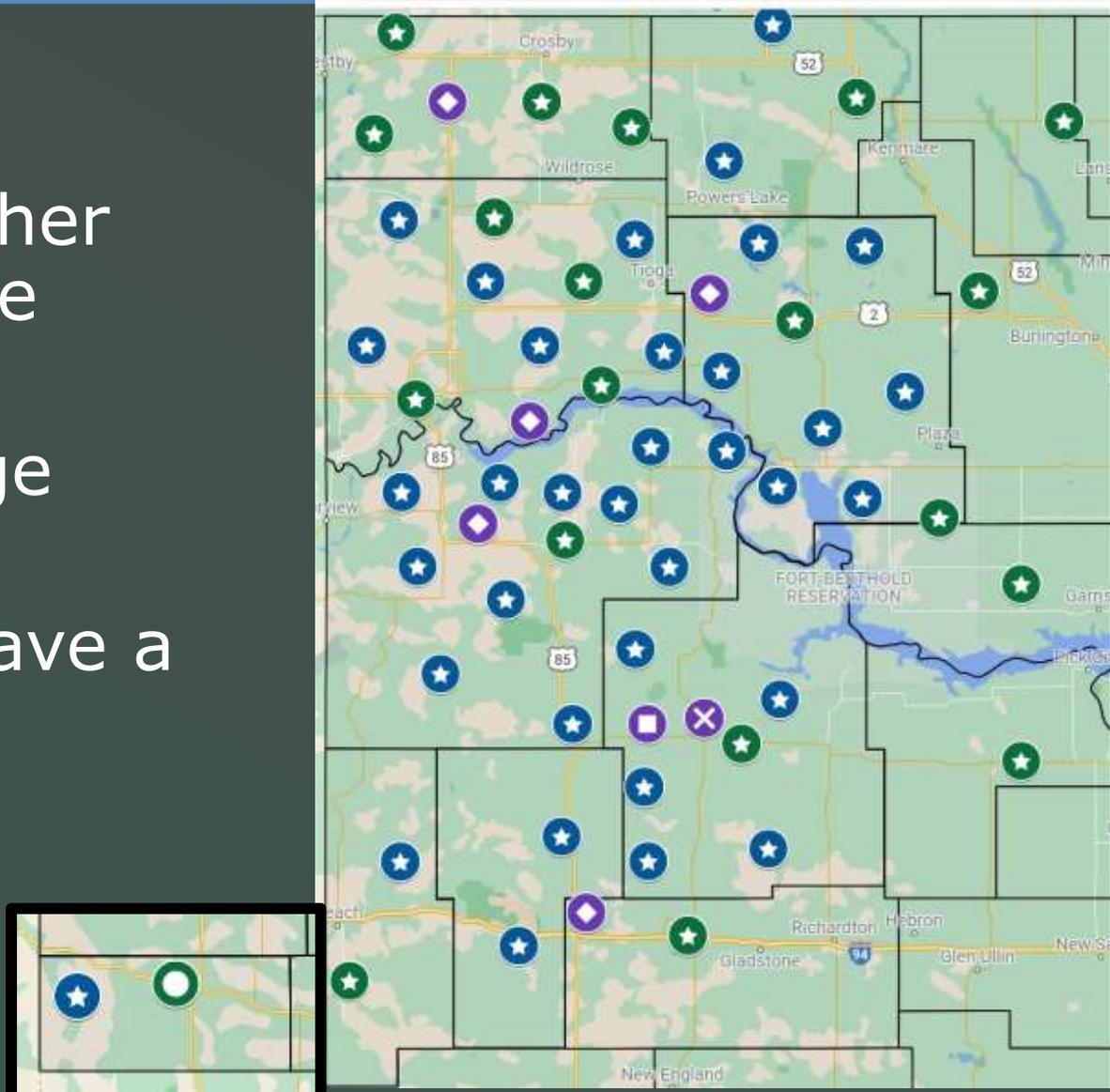
Bowman
County



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

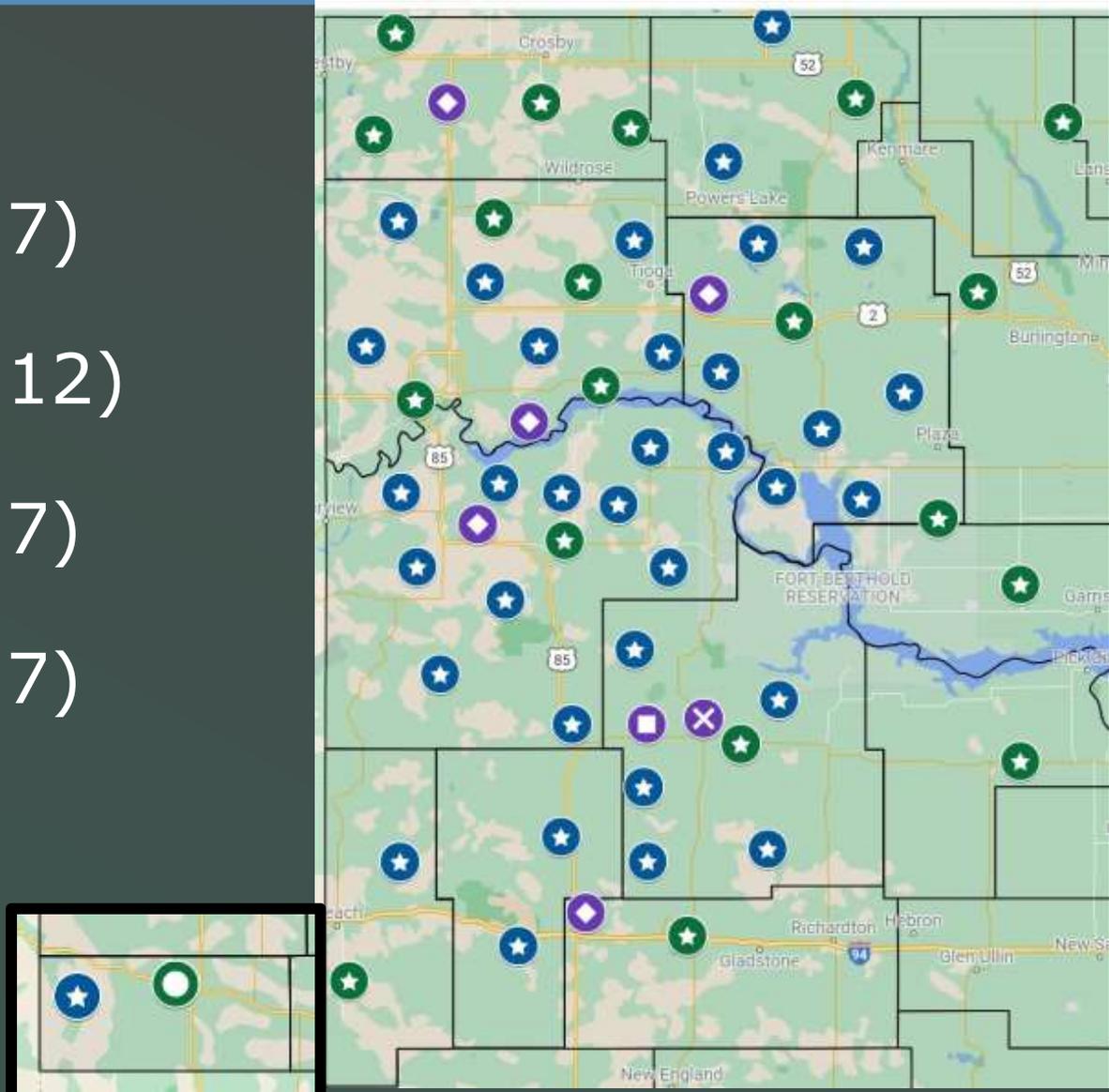
Bowman
County



Current NDAWN Stations

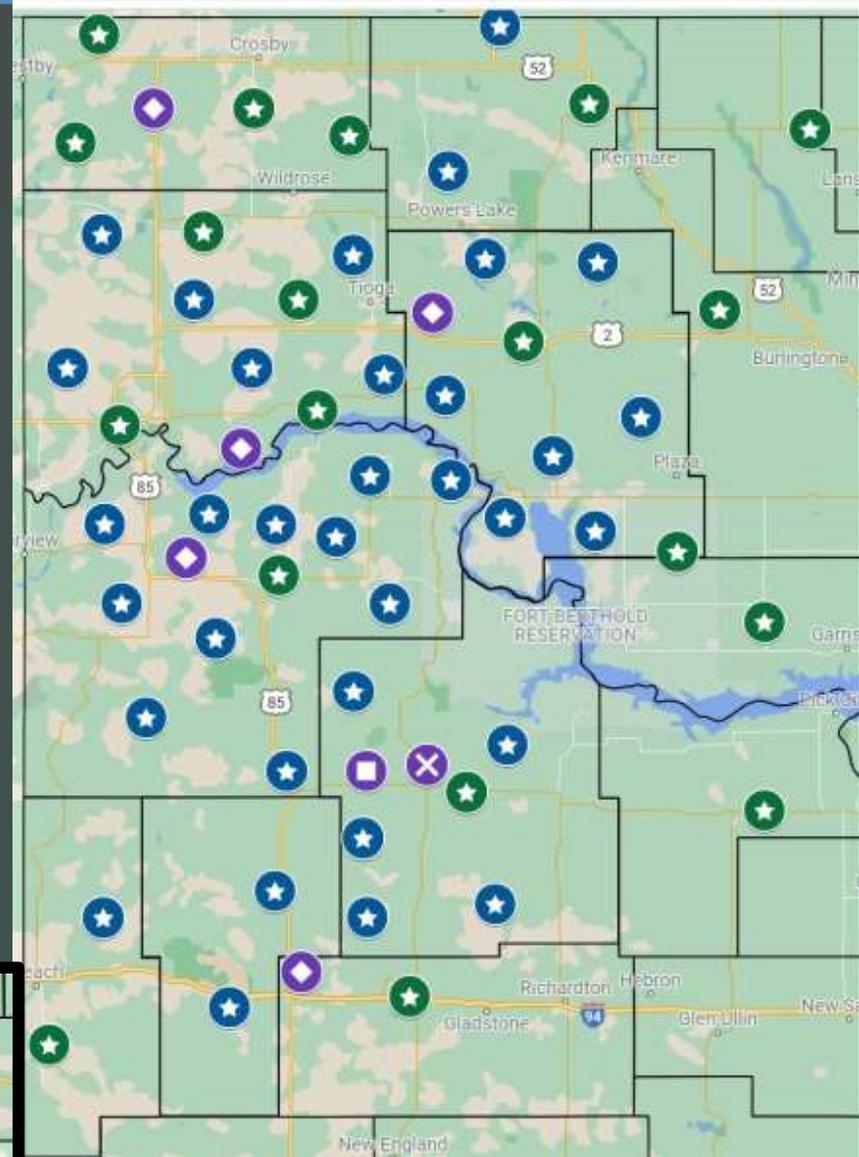
- Dunn: 8 (+7)
- McKenzie: 13 (+12)
- Mountrail: 10 (+7)
- Williams: 11 (+7)

Bowman
County

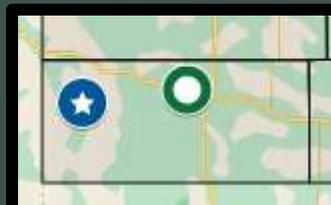


Current NDAWN Stations

- Billings: 2 (+2)
- Bowman: 2 (+1)
- Burke: 3 (+2)
- Divide: 5 (+1)
- Golden Valley: 2 (+1)
- Stark: 2 (+1)

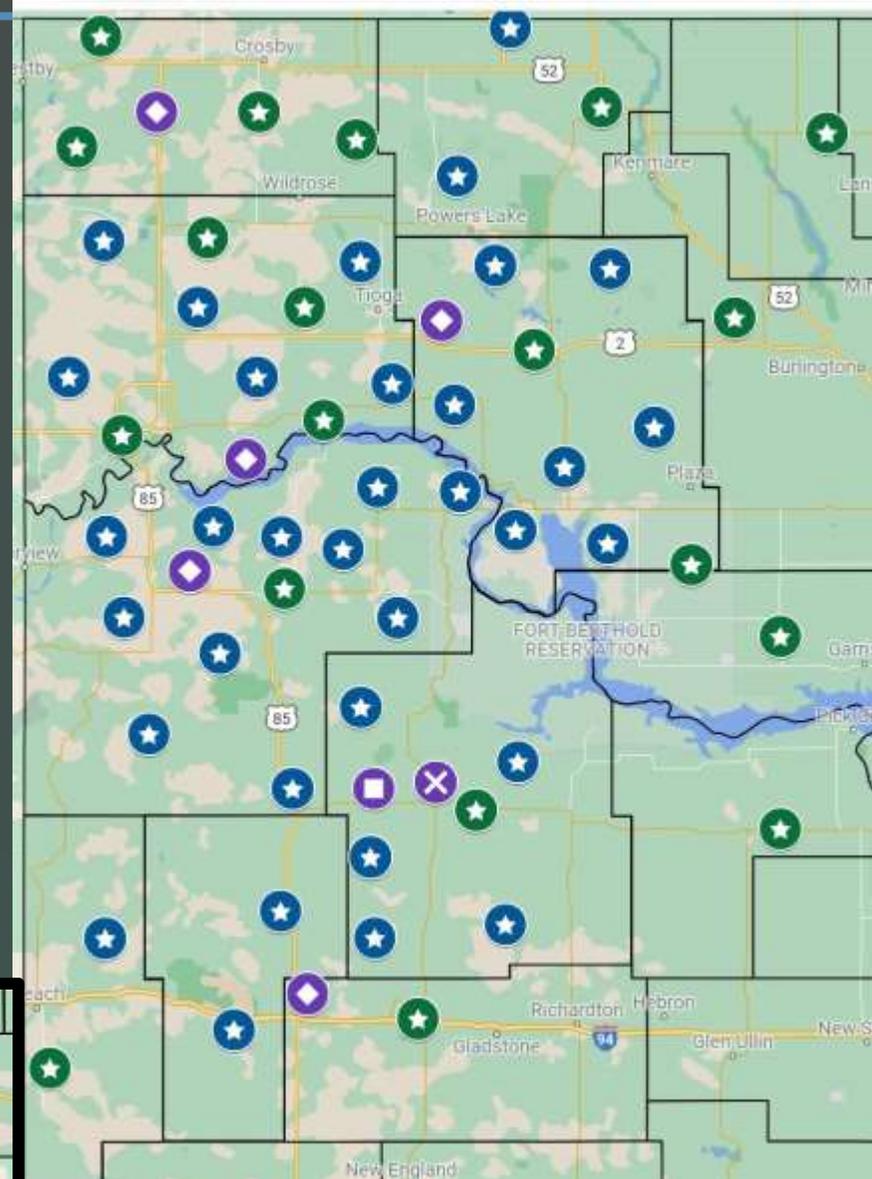


Bowman
County



Wise Roads: Phase 4

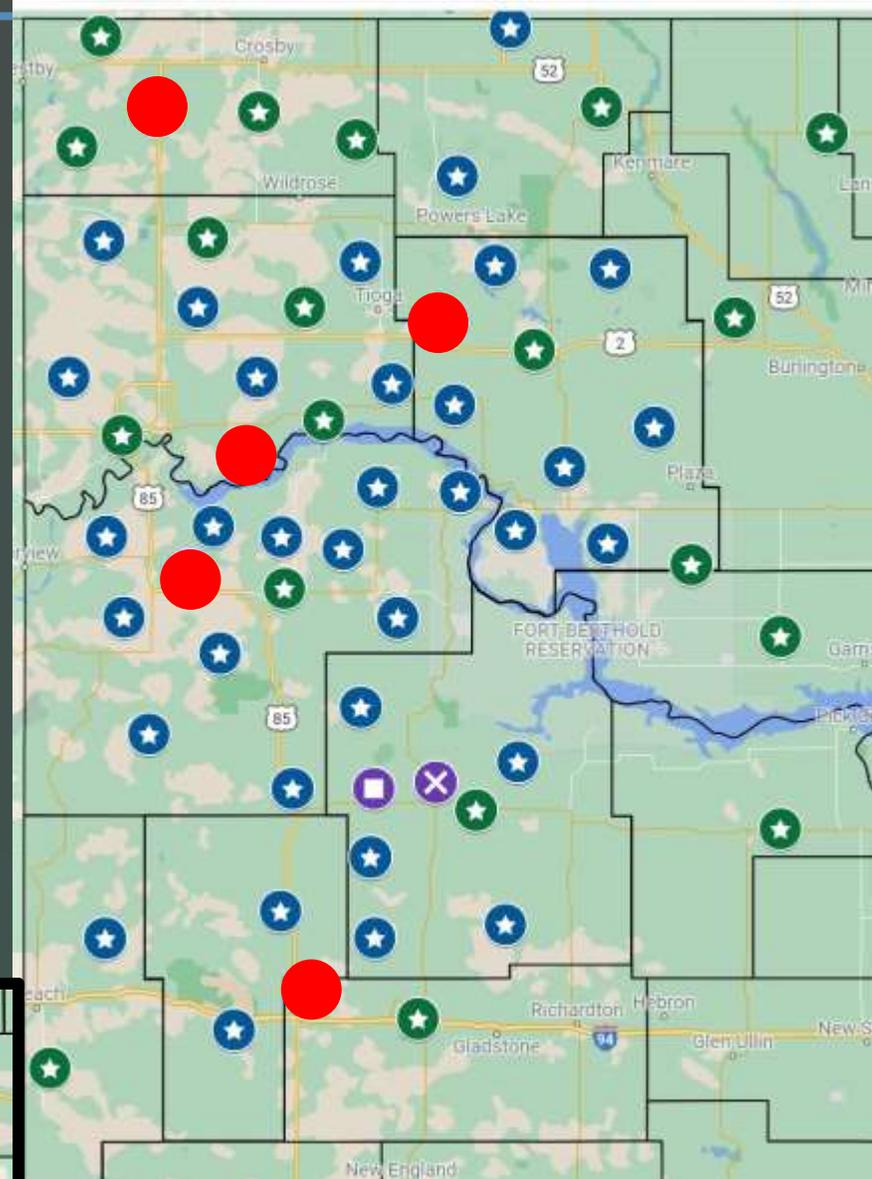
- Still working to add additional rain gauge only sites
- If connected to AC power can measure snow & sleet



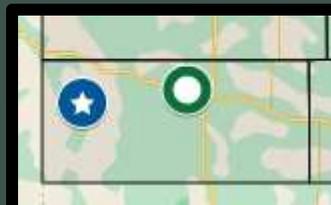
Bowman
County

Wise Roads: Phase 4

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



Bowman
County



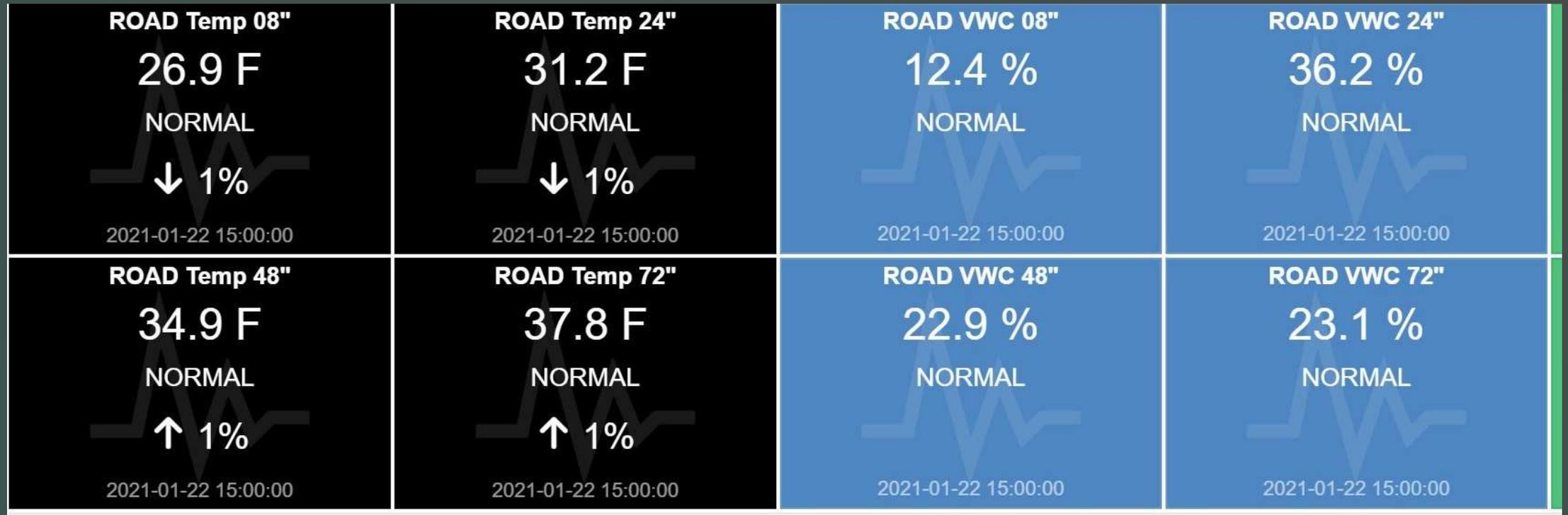
Road Temperature & Moisture Probes

- Installed at three 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

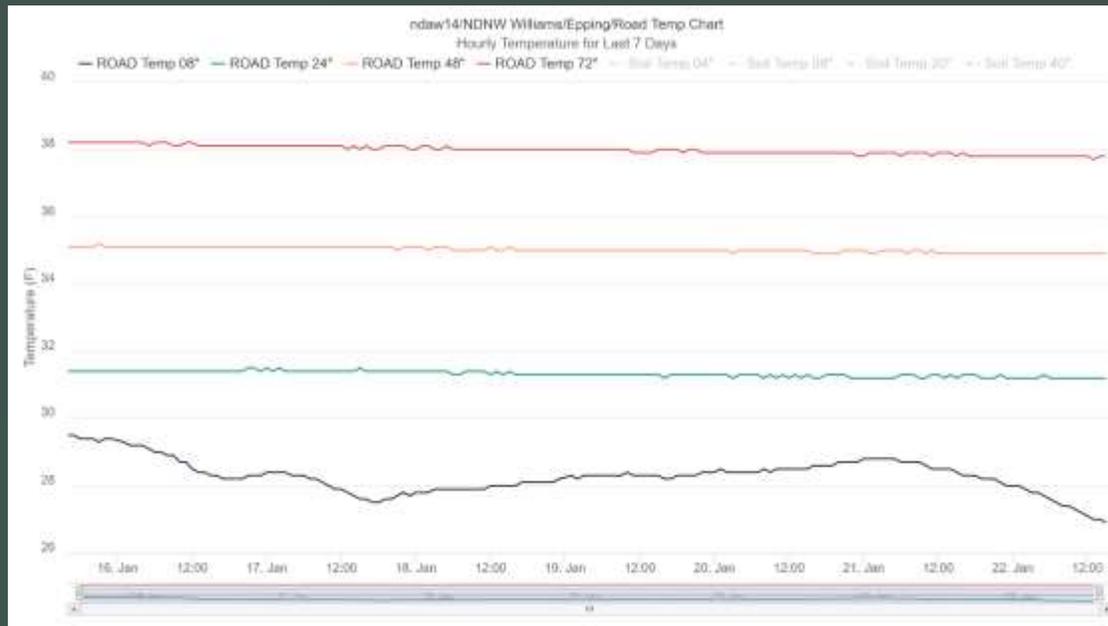
- Current Temperature and Moisture Data



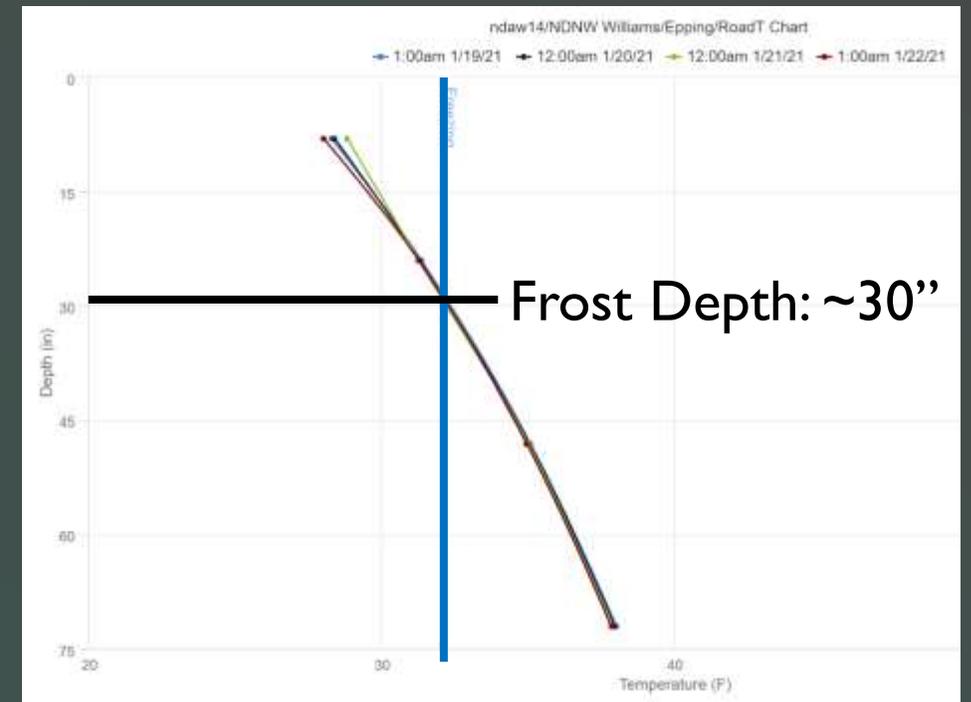
Road Temperature & Moisture Probes

- Temperature data charts

7 Day Temperature Chart



Temperature Profile



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]

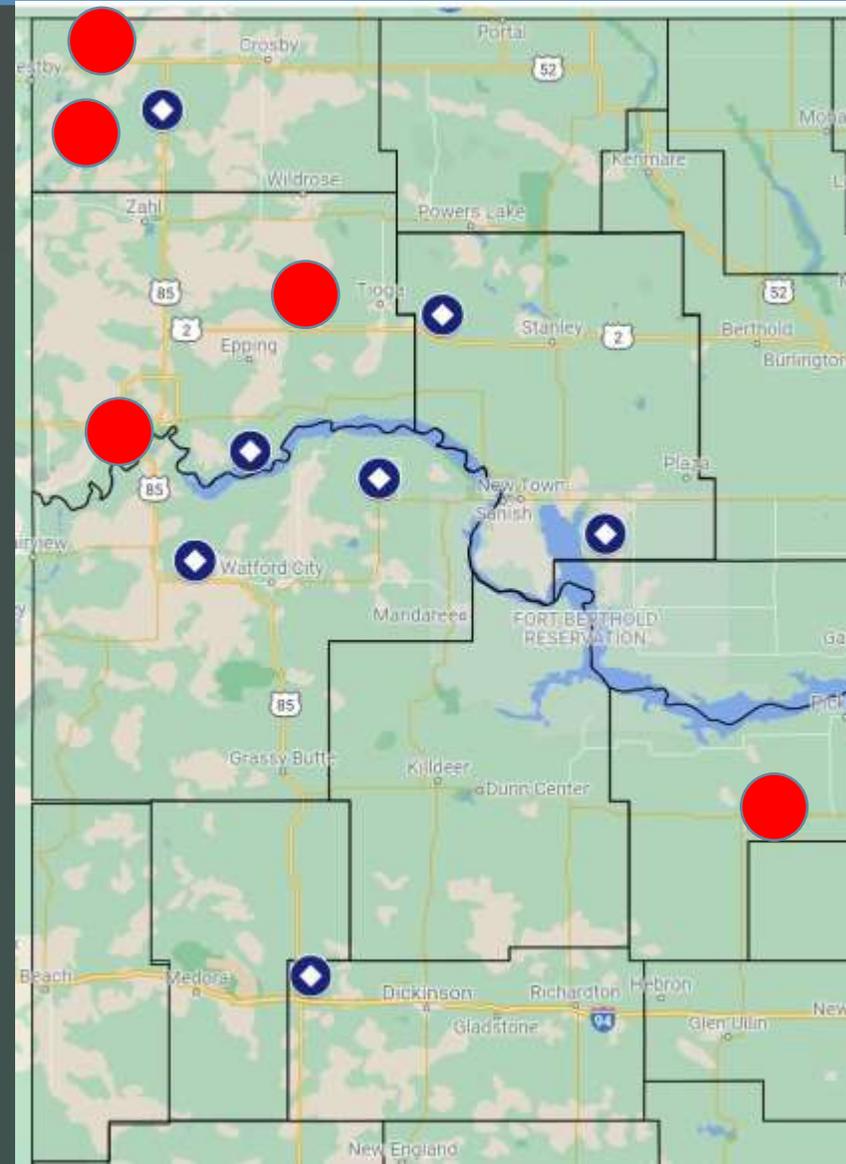
Login

or visit this link:

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

Missouri River Basin Project Update

- 4 additional all-season precipitation gauges were installed in the region
- Keene & Grassy Butte stations expected to be upgraded in 2022
- Snow depth sensors



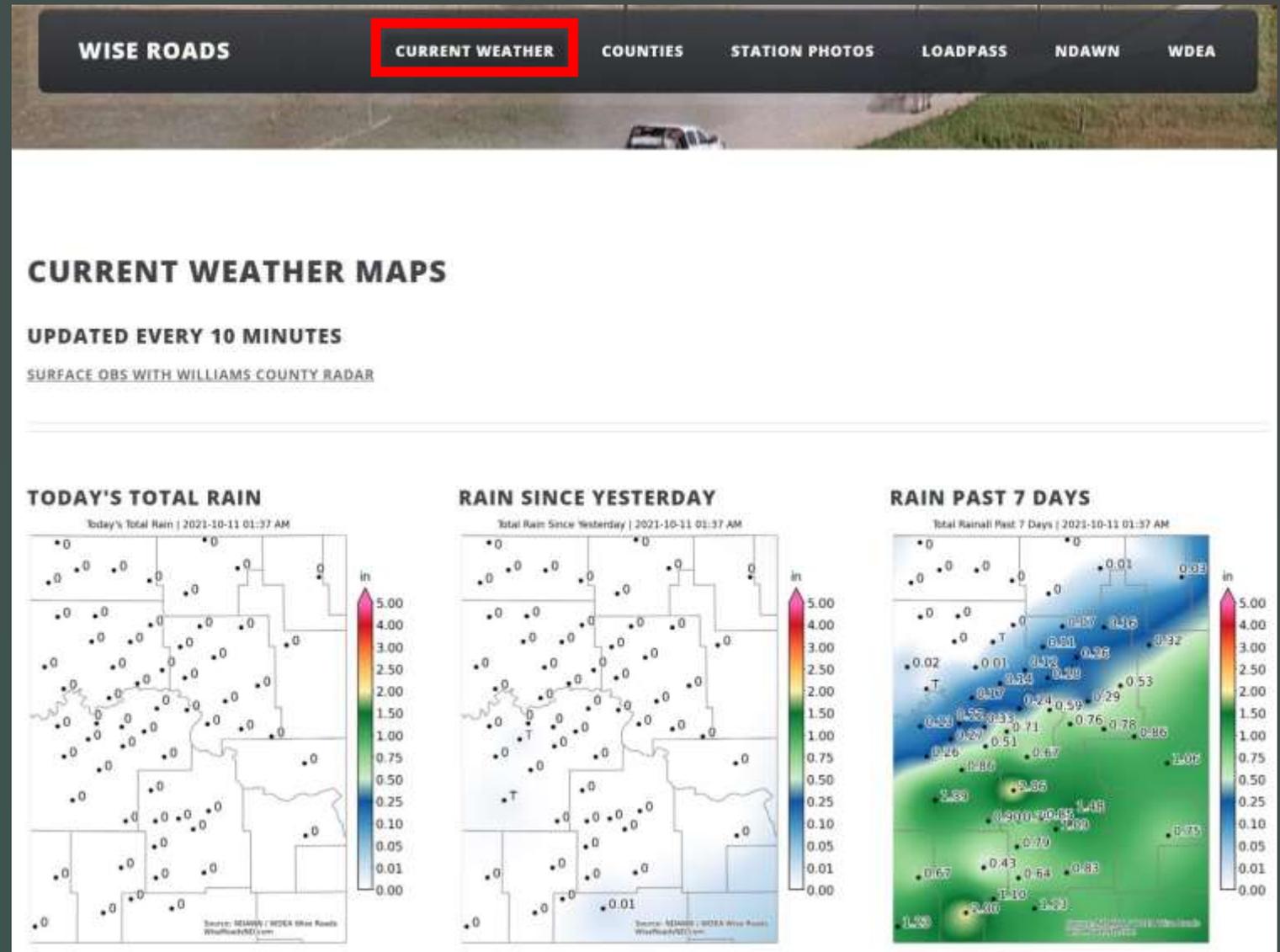
Weather Data Resources

- WiseRoadsND.com
 - Current weather maps of western ND
 - Most recent camera images
 - Links to each station's individual data
- NDAWN Website (NDAWN.org)
 - Rain gauge only stations not available
- NDAWN Inversion App
- NDDOT Roads Map
 - Website & App



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

WISE ROADS **CURRENT WEATHER** **COUNTIES** **STATION PHOTOS** **LOADPASS** **NDAWN** **WDEA**

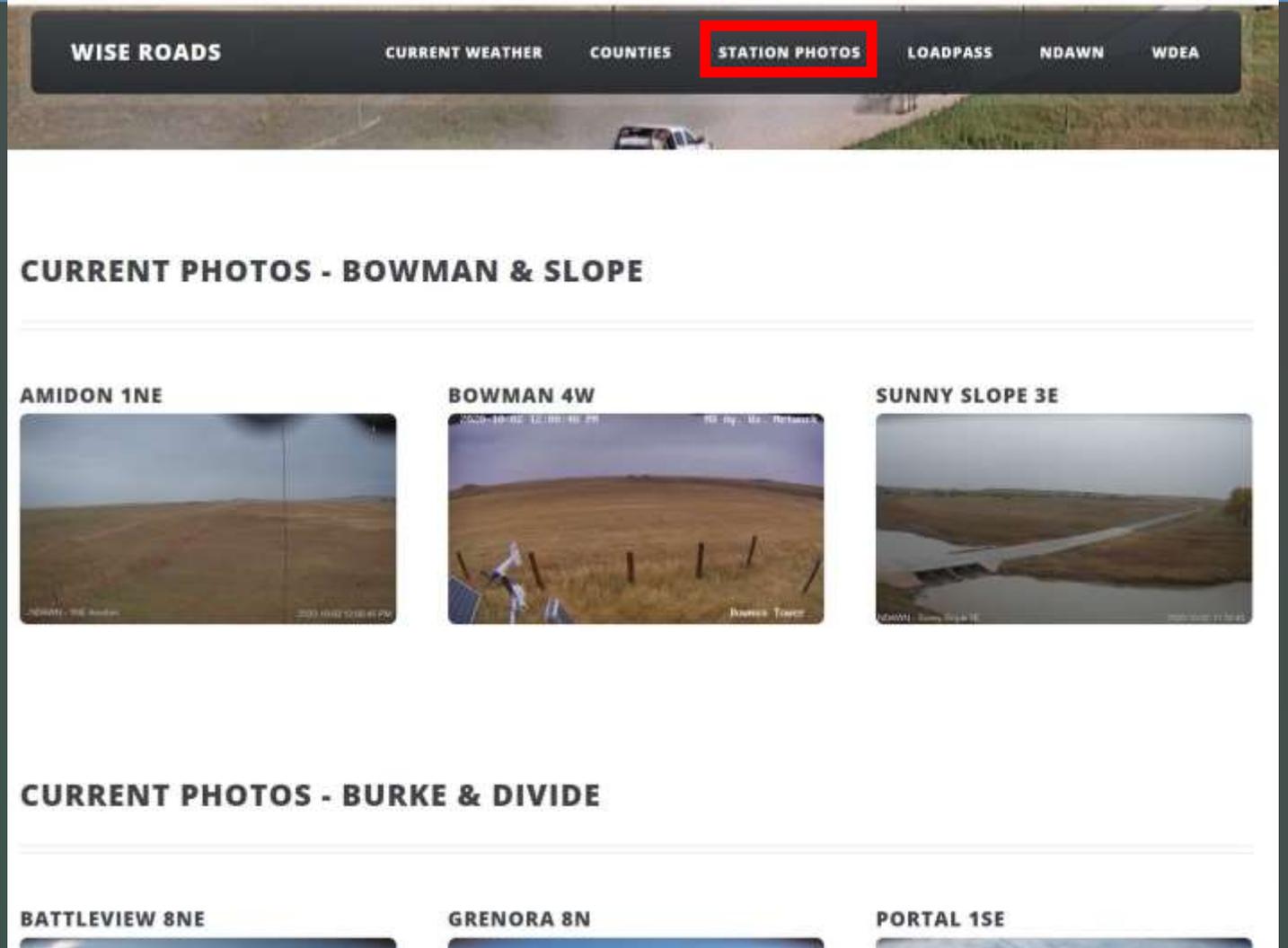
MCKENZIE COUNTY

[MCKENZIE COUNTY RAIN DASHBOARD](#)

| WEATHER DATA | SOIL DATA |
|--------------------------------|--------------------------------|
| Alexander | |
| Antelope Creek | Antelope Creek |
| Arnegard | Arnegard |
| Banks | |
| Charbonneau | Charbonneau |
| Croff | Croff |

WiseRoadsND.com – Station Photos

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



The screenshot displays the website's navigation menu at the top, with the "STATION PHOTOS" link highlighted in a red box. Below the menu, a large banner image shows a road with a vehicle. The main content area is titled "CURRENT PHOTOS - BOWMAN & SLOPE" and features three photo thumbnails: "AMIDON 1NE", "BOWMAN 4W", and "SUNNY SLOPE 3E". Each thumbnail includes a timestamp and location name. Below this section, the heading "CURRENT PHOTOS - BURKE & DIVIDE" is visible, followed by the start of three more photo thumbnails: "BATTLEVIEW 8NE", "GRENORA 8N", and "PORTAL 1SE".

WISE ROADS **CURRENT WEATHER** **COUNTIES** **STATION PHOTOS** **LOADPASS** **NDAWN** **WDEA**

CURRENT PHOTOS - BOWMAN & SLOPE

AMIDON 1NE
2023-10-02 12:00:45 PM
Bowman, ND

BOWMAN 4W
2023-10-02 12:00:45 PM
Bowman, ND

SUNNY SLOPE 3E
2023-10-02 12:00:45 PM
Bowman, ND

CURRENT PHOTOS - BURKE & DIVIDE

BATTLEVIEW 8NE **GRENORA 8N** **PORTAL 1SE**



Contact Info:

Phone:
701-629-5181

Email:
Jonathan@ndenergy.org



NDAWN -- Rat Lake 4NW

2020-02-18 04:47:55 PM



NDSU

UPPER GREAT PLAINS
TRANSPORTATION INSTITUTE
NORTH DAKOTA LOCAL TECHNICAL ASSISTANCE PROGRAM

WiseRoadsND.com

WISE ROADS

CURRENT WEATHER

COUNTIES

STATION PHOTOS

LOADPASS

NDAWN

WDEA

**WEATHER INFORMATION SYSTEM TO EFFECTIVELY
REDUCE OILFIELD DELAYS AND DISRUPTION**

DEVELOPED BY WDEA IN PARTNERSHIP WITH NDAWN AND NDLTAP

WEATHER STATION MAP

NDAWN.org – Current Weather



[NDSU](#)
[NDSU Agriculture](#)
[NDSU School of Natural Resource Sciences](#)

[NDAWN](#) » [Current weather](#)

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/m ² | --- |
| 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/m ² | 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/m ² | --- |
| 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/m ² | 1016.6 mb |
| Arnegard 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/m ² | --- |
| 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/m ² | 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/m ² | 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/m ² | --- |
| 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/m ² | --- |
| 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/m ² | 1020.7 mb |
| Boufelle 1N | ND-NW | ● 12 Dec 13:35 CST | 7° | 0° | SE ↘ | 11 mph | 14 mph | 82 % | 3° | 8° | 1° | --- | -0.4° | 28° | 28° | 150 W/m ² | 1019.2 mb |

NDAWN.org – Current Weather

