MAMRE PRESCRIBED FIRE UNIT

DECLARED WILDFIRE

REVIEW

FINAL REPORT
July 12, 2024

Prepared By: Jamie Farmer **Date:** 7/12/2024

Jamie Farmer, ZFMO

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Scott Glup, Agency Administrator

Mamre Pile Prescribed Fire Escape Review, USFWS Region 3, Litchfield Wetland Management District.

Litchfield Wetland Management District implemented a pile prescribed fire on the Mamre Waterfowl Production Area (WPA) on March 27, 2024. This operation was to ignite 11 individual tree piles that were a byproduct of a tree removal project on the WPA completed in the fall of 2022. On April 6, 2024, the fire escaped under red flag conditions and burned a portion of the WPA and then burning onto private land.

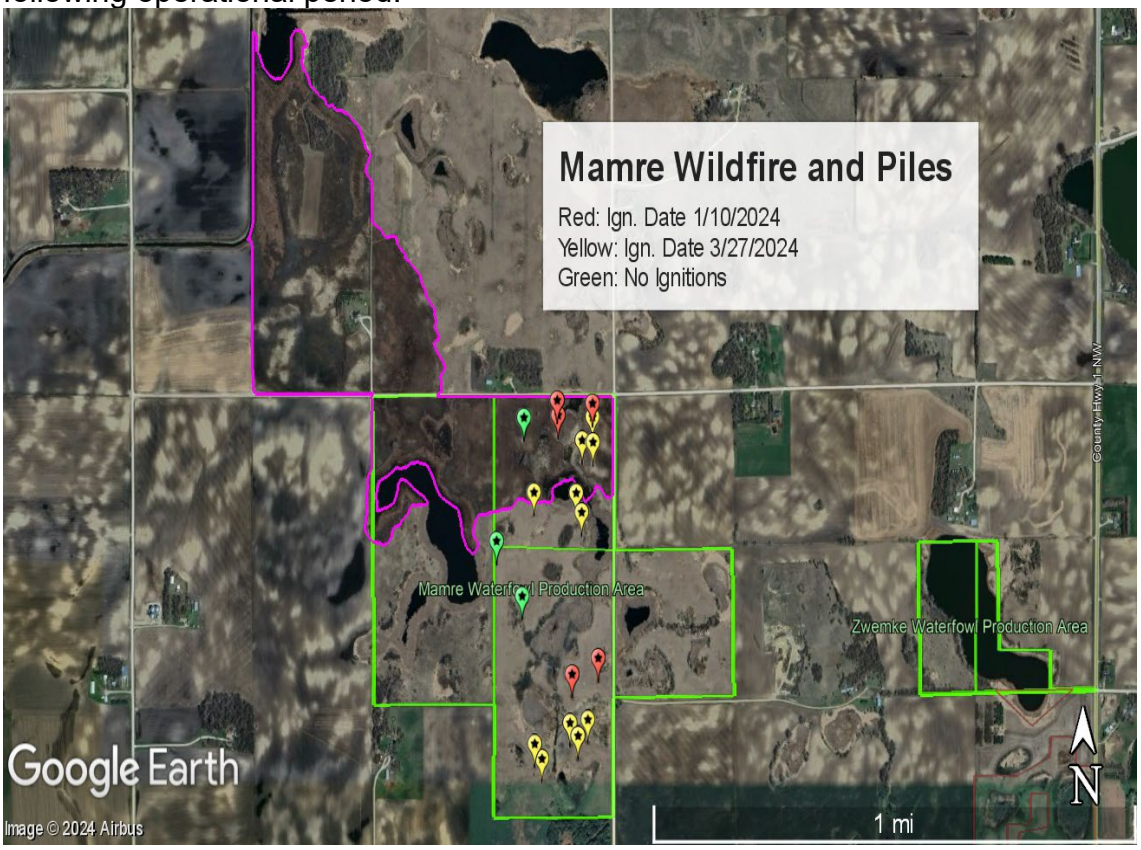
The Review Team consisted of:
Jake Froyum - Region 4 Fire Specialist, Minnesota Department of Natural Resources
Andy Wolfram - Firefighter, Mdewakanton Sioux Public Safety/Fire Department
Jamie Farmer - South Zone FMO, U.S. Fish and Wildlife Service (RXB2)

The following participated in the review and/or were involved in the prescribed fire:
David Blatz - Firefighter, Litchfield Wetland Management District
Todd Boonstra - Deputy Project Leader, Litchfield Wetland Management District
Seth Grimm - Deputy Regional Fire Management Coordinator (RXB2)

SUMMARY

A prescribed burn pile operation was initiated on Mamre Waterfowl Production Area (WPA) in Section 21, Mamre Township, Kandiyohi County, MN on March 27, 2024, at approximately 1100 hours. This operation was to ignite 11 individual tree piles that were a byproduct of a tree removal project on the WPA completed in the fall of 2022. Fuels within the piles varied in size and species type. Climate conditions on the 27th, were partly clear skies with west winds. There was approximately 1 to 1.5 feet of fresh snow on the ground received over the previous days. Ignitions were completed by 1500 and close out with Kandiyohi County Dispatch was completed by the burn boss.

On April 6th Kandiyohi County Dispatch was alerted to a wildfire in the “wildlife area” and toned out Pennock Volunteer Fire Department at 1312. Shortly thereafter additional departments were requested through mutual aid including New London, Sunberg, and Willmar Fire Departments. Fire suppression activities were the priority during the initial response, and it wasn’t until the next shift (April 7th) that the fire was determined to have originated on Service lands and determined to be an escaped prescribed fire. The fire was declared a wildfire by the Agency Administrator during suppression efforts after site inspections by the District FMO and concurrence by the Zone AFMO. The wildfire burned 147 acres including 93 acres of private land and 54 acres of US Fish and Wildlife Service (USFWS) lands. The forward spread of the fire was stopped during initial suppression activities on April 6th and containment was gained during the following operational period.



An analysis of seasonal severity, weather events, and on-site conditions leading up to the wildfire declaration.

The state of Minnesota had a warm winter with below average snowfall. The fire area was considered in the (D1) abnormally dry category by the U.S. Drought Monitor (April 2 rating) during the week of the escape. The area was in a consistent element of drought for two years and as of March 19th had a drought monitor rating of (D1) moderate drought but was reduced to (D0) abnormally dry due to significant snowfall between March 20th and April 1st.

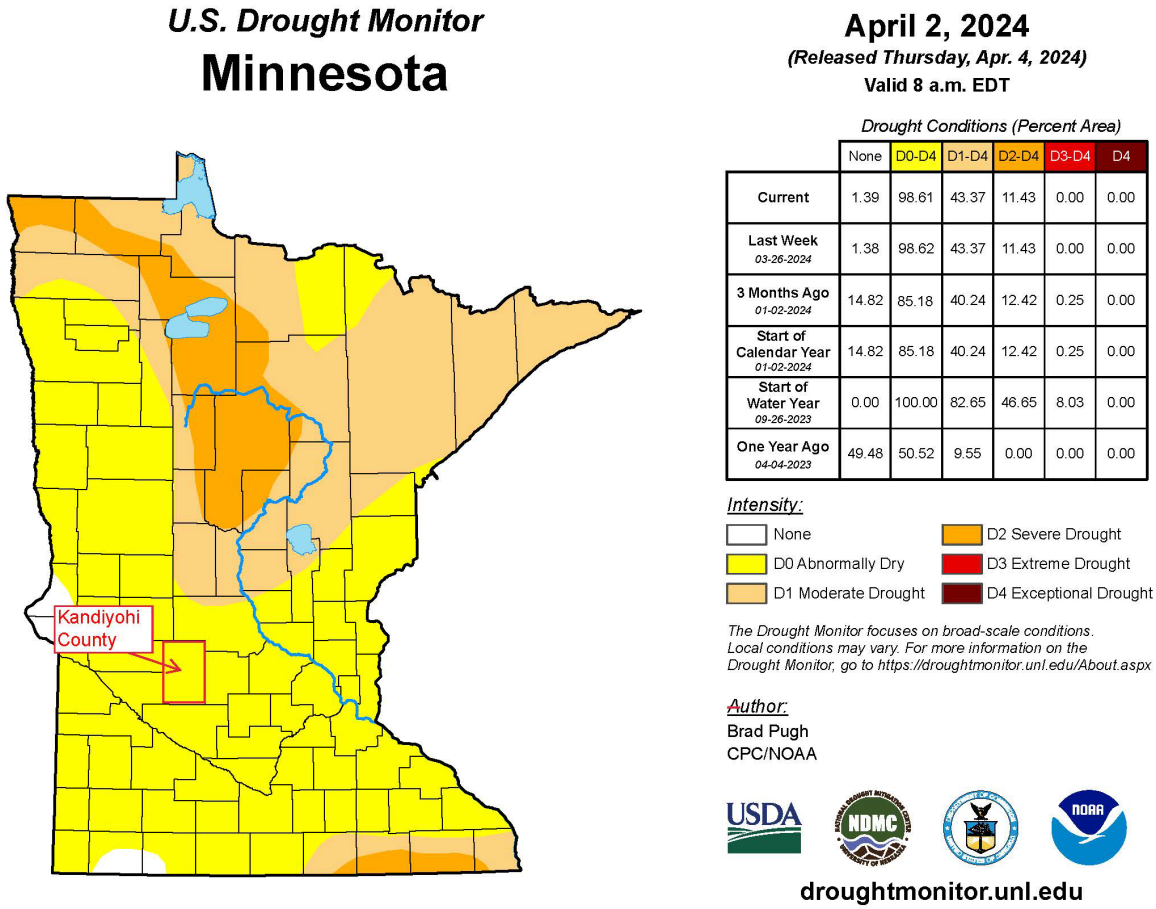
The US Drought Monitor summary map identifies general drought areas, labeling droughts by intensity, with D1 being the least intense and D4 being the most intense. D0 areas are either drying out and possibly heading for drought or are recovering from drought but not yet back to normal.

The district tracks fire danger indices calculated from observations from the Remote Automated Weather Station (RAWS) located at Litchfield WMD. Both National Fire Danger Rating System (NFDRS) and Canadian fire danger indices are used.

Fire danger indices that measure seasonal severity are:

> Drought Code (DC): Measures long term dryness in the fuels. It is a longer-term index than the NFDRS 1000-hour fuel moisture. It can be useful in predicting the level of mop-up needed and the consumption of large fuels. It should be used in relation to peat fire starts. The forecasted DC on 4/5/24 was 58 or moderate. In Minnesota when the DC is in the 0-79 range fire danger related to organic soils is considered Low.
>
> Buildup Index (BUI): This index is based on the DC and the Duff Moisture Code (DMC) It provides a relative indication of the amount of fuel available for combustion. This is similar to the NFDRS Energy Release Component. The forecasted BUI on 4/5/24 was 20. In Minnesota when the BUI is in the 19-33.9 range fire danger is in the Moderate category indicating heavier fuels may be involved with combustion.
>
> 1,000 Hour Fuel Moisture: Defined as the quantity of moisture in dead fuels consisting of round wood 3-8 inches in diameter fuel expressed as a percentage of the weight when thoroughly dried. The forecasted 1,000-hour fuel moisture on 4/5 was 21%. In Minnesota, 20-21% 1,000-hour fuel moisture is an indicator that heavier fuels are wet and will have difficulty igniting.

In NFDRS, if danger rating calculations are suspended in the dormant season, default dormant fuel moistures are provided for 100-hr (10%-25%) and 1000-hr (15%-30%) fuel moistures when calculations are restarted in the spring. Default values are established with climate class designation for the location. Due to the time of the year and the late snowfall there is little confidence in the 1,000-hr fuel moisture rating.



Findings

- All weather parameters were within prescription during initial ignitions.
- Prescription parameters with snow cover were met with the late spring snowfall that had occurred, but conditions were unseasonably warm and dry for that time of year.
- The project went out of prescription when the snow cover fell below 2 inches before the fire was out.

Recommendations

- Leadership should recognize and expect rapid snow melt and surrounding fuel availability during atypical warmer/ dryer winters.
- Update mental model to accommodate rapidly changing weather pattens and expect rapid snow loss the later it is in springtime versus mid-winter.
- Strategically choose pile units for proximity to the workforce for similar environmental conditions and unit awareness.
- Validate local snowpack by site visits or local feedback.

An analysis of the actions taken leading up to the wildfire declaration for consistency with the prescribed fire plan.

The prescribed fire plan was current and valid, spot weather request was submitted and received for the implementation and consistent with the prescribed fire plan parameters. All identified notifications had been made prior to initiating the project. The escape occurred nine days after the ignition operation and caused a delay in the wildfire declaration. The plan came out of its prescription when the snow level dropped below the allowable 2 inches for winter pile burning conditions.

Findings

- Complexity analysis summary cites "burn pile areas would be short duration (smoldering phase < 72 hours)"
- Plan Constraints cite "only 10 burn piles per one square mile will be ignited during an operational period. This will minimize residual smoke outputs and lessen the potential for negative impacts on smoke sensitive receptors (homes, roads, etc.) after the first operational period." 11 piles were lit on the 27th.
- Contracted tree removal and contractor constructed piles were denser and contained larger diameter material than they typically have due to issues with the contractor.
- Piles were only checked on the day following ignitions and were not adequately patrolled as identified in the prescribed fire plan. This was due to an assumption that the area had as much snow still on the ground as the office location of the fire staff. The burn unit that was lit is ~34 miles (45 minutes) away and only had snow in the ditch on the day of the escape.

Recommendations

- While the number of piles ignited did not have a direct effect on the escape it is cited in the plan and should be followed or removed from future plans.
- Taking into consideration the large piles and density of material in the construction of the piles on this unit, extensive follow up should have been expected prior to ignition.
- Following the burn plan requirement for Patrolling and Mop-up of winter piles: "will be monitored the following subsequent days unless deemed not necessary by a RXB2, Agency Administrator or Hub FMO."
    - Validate snowpack on burn unit to determine need for patrolling and mop-up.
- Insert specific language into the burn plan that cites reasons for not monitoring (rain, snow, disturbed soils, ect).
- Continue follow-up monitoring until the fire is declared out.

An analysis of the prescribed fire plan for consistency with policy:

The Programmatic Interagency Prescribed Fire Burn Plan applies for all units administered by the US Fish and Wildlife Service within the Litchfield Wetland Management District (WMD). The WMD includes seven counties: Kandiyohi, McLeod, Meeker, Renville, Stearns, Todd, and Wright.

Findings

- The prescribed fire plan was valid with appropriate signatures.
- Element 2A - Agency Administration Ignition Authorization was signed for a defined period of 01/10/24 and 03/15/24, while the burn was ignited on 03/27/24.
- Element 2A - Agency Administration Ignitions Authorization was signed by the units Fire Management Specialist and not the burn boss of record for the Mamre prescribed fire.
- Fire Management Specialist who signed Element 2A was on a 120-day detail away from the home unit.
- The prescribed fire plans Element 17 - Contingency Plan has inaccurate language. "Excluding minor slop overs and spot fires, a prescribed burn **may** be declared a wildfire if the fire burns on to non-FWS lands not covered by a private land burning agreement."

Recommendations

- Update language in Element 17 to "**will** be declared a wildfire if the fire burns onto non-FWS lands not covered by a private land burning agreement."
- Element 2A - Agency Administration Ignitions Authorization was signed by the units Fire Management Specialist and not the burn boss of record for the Mamre prescribed fire. While this is still within policy, it contributed to Element 2A dates falling outside of this prescribed fire operation.
- When a critical leadership position is absent from the unit, increased communication and complete review of the prescribed fire plan and associated documents is needed before implementing a prescribed fire by any burn boss, whether they are from the host unit or off unit.

An analysis of the prescribed fire plan and associated environmental parameters:

All environmental parameters were met prior to ignition and during implementation on the Mamre prescribed fire. The D0 drought code of abnormally dry was within the prescription.

Findings

- District went from moderate drought ranking to abnormally dry due to a spring snowstorm.

- The D0 drought code of abnormally dry was not impactful to the escape.
- Environmental parameters rapidly changed from March 27 to April 6 with warming and rapid snow melt.

Recommendations

- Increased awareness of rapidly changing weather patterns on the shoulder season of winter. Late spring and early fall snowfalls have the potential for melting rapidly and exposing burnable vegetation.

A review of the approving line officer's qualifications, experience and involvement including adequate program oversight:

Litchfield Wetland Management District (WMD) Project Leader completed Agency Administrator training in 2005 and has been leading the Litchfield WMD fire program for over 20 years. The Project Leader has demonstrated a strong commitment to fire management and is extremely involved. The Deputy Project Leader completed Agency Administrator training in 2020 and came to the Litchfield WMD in 2022. The Deputy is engaged in the fire program and is currently a red-carded firefighter as well.

Findings

- The Project Leader is the most experienced Agency Administrator and was on leave when the incident occurred.
- Litchfield's Deputy Project Leader is fully qualified.

Recommendations

- Validate a communication plan for unexpected events when critical leadership personnel are away from their normal work duties.
- No other recommendations.

A review of the qualifications and experience of key personnel involved:

Both employees were qualified for their positions on the prescribed fire. The burn boss has functioned in that role 22 times during their time at Litchfield WMD. The second employee is an experienced firefighter holding a FFT1 qualification. The stations primary fire leadership position was committed on a 120-day detail with the Interagency Prescribed Fire Training Center and was not present during the prescribed fire implementation and later the escape.

Findings

- All personnel were qualified for their roles during fire activities related to the Mamre WPA prescribed fire.
- The stations primary fire leadership position was committed on a 120-day detail with the Interagency Prescribed Fire Training Center and was not present during the prescribed fire implementation and later the escape.

Recommendations

- Recognize that having a key leadership position vacant or absent creates additional stress on the system while removing additional oversight and experience for planning and operations. Oversight needs to be redirected in order to ensure operations and planning are compliant with NWCG and FWS policy.

A summary of causal agents contributing to the wildfire declaration:

Casual Factor: Failure to adequately patrol the burn until declared out due to a perception that environmental conditions at the headquarters matched that of the burn unit 45 minutes away.

Contributing Factor: Rapid snow melt that was faster on site at the burn unit compared to the district headquarters where fire employees are located.

Contributing Factor: The amount of snowfall gave a false sense of security for the pile unit to not be patrolled. The seasonality of the snow contributed to accelerated snow melt exposing fuel around the piles.

Contributing Factor: Perceived pressure to catch up or keep up with pile burning to deal with the volume of tree/fuel removal projects on the Litchfield WMD.

Contributing Factor: Key fire leadership personnel committed elsewhere added stress and internal pressure to perform well for the remaining fire staff.

Determine the level of awareness and understanding of procedures and guidance of the personnel involved:

All Litchfield WMD personnel involved with the prescribed fire have extensive experience in current national, regional, and local policy, procedures and guidance. They are experts in managing the fuel models in the area and have an open learning environment.

Findings

- There is a high degree of awareness and understanding of policy by all burn bosses and Agency Administrators. There is openness and sound communication and a willingness to learn from mistakes and from others in the fire management community.

Recommendations

- No recommendation necessary.

Establish accountability:

The Agency Administrator and Fire Management Specialist need to verify that all current and future prescribed fire plans have the most recent language for Element 17. Burn boss and Agency Administrator will continue to have robust discussions on Go/No-Go for prescribed fire days considering all weather, staffing, complexities, and other variables that influence the success of the fire program. Follow-up monitoring is required by the prescribed fire plan unless the burn boss type 2 (RXB2), Agency Administrator or Hub FMO deem it unnecessary.

Findings

- Element 2A - Agency Administrator Ignition Authorization was utilized with an outdated signature. The authorization was dated for implementation between 1/10/24 and 3/15/24. The burn unit was lit on 3/27/2024 and needed an updated signature to be within policy.
- Burn boss and agency administrator did communicate and agree to the plan to burn the piles at Mamre WPA but did not update signatures.

Recommendations

- Burn boss validate dates and signatures on Element 2A are current and burn implementation is within the signature window.
- Add language to the burn plan clarifying what factors would be considered for the burn boss, Agency Administrator or Hub FMO to deem monitoring of the prescribed fire unit not necessary.
- Update Element 17 regarding contingency resources and that fire **will** be declared a wildfire if burning private lands is not covered under a private land burning agreement.

Synopsis of Lessons Learned

1) Regular follow-up is always critical when managing pile burns due to their potential to hold heat for extended periods of time. Ensure that the prescribed fire plan adequately articulates the nature and extent for which post-ignition follow-up is needed and how it is to be documented.

2) Agency Administration Ignition Authorization (Element 2A) was signed by the Agency Administrator for a defined period. While conditions were the same as when it was originally signed and this did not contribute to the escape, the signatures expired on 3/15/24 and needed to be re-authorized prior to ignition.

3) “Pile pressure” to keep up with the ongoing land restoration efforts underway at the Litchfield WMD, either real or perceived, has added significant workload to the fire management staff.

4) Litchfield personnel were all welcoming and supportive of the review team and process, offering an extensive in-briefing and site visit as well as being available for follow up data requests.

Additional Documents Available in the Incident File:
-Prescribed Fire Plan
-Agency Administrator Ignitions Authorization
-Prescribed Fire Go/No Go Checklist
-Spot Weather Forecast
-Narrative notes from burn boss
-AA wildfire declaration memo
-Digital photos
-Prescribed fire crew red card qualifications
-Incident timeline

FIRE ENVIRONMENT FORECAST

FORECAST NUMBER: 16	**TYPE OF FIRE:** **Initial Attack**
FIRE NAME: MNICS Statewide Forecast	**OPERATIONAL PERIOD: 04/06 – 04/07**
DATE ISSUED: 04/06	**TIME ISSUED:** 0900
UNIT: **MN-MNCC**	**SIGNED:** **Travis Verdegan** **Typed/printed: Travis Verdegan**

INPUTS

WEATHER SUMMARY:

Red Flag Warning has been issued for the western edge of the state today.

Over the last 48 hours precip has been absent from the state.

Today skies look to remain clear and sunny, Tomorrow cloud will start building in during the day as chances for precip favor the southern half of the state.

Temps in the mid 50s are forecast for the whole state today, a few locations hitting the 60s would not be a surprise. Tomorrow looks similar expect in the south where some cooler air may accompany the forecasted precip.

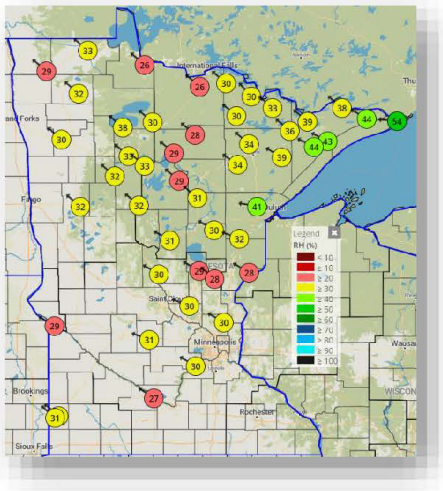
Very strong winds, 20 -25 mph are forecast from the SE for today and tomorrow. Gusts may get up as high as 40 mph.

RH minimums are forecast into the 20s and 30s today and tomorrow the state looks to get split in half with drier air to the north and more moisture to the south.

The best chances for precip start Sunday in the south, carry over into Monday across the whole state, and linger into Tuesday for the north.

Hot-Dry-Windy Index – Above Normal to Well Above Normal

Figure 1 - Forecasted 1700 RH 04/06/24.



OUTPUTS

FIRE ENVIROMENT GENERAL:

Fire activity over the last few days has been increasing by the day and that pattern is expected to continue today. By tomorrow we may see a drop in potential across the southern end of the state sufficient to produce lower numbers of fires, however the north will still have strong potential ahead of any cloud cover/precip moving in.

Strong winds will impact the whole state today and where fine fuels have been exposed to continuous drying potential for extremely rapid and challenging rates of spread exist today. Tomorrow that potential remains in the FBP model however conditions do look to drop off some.

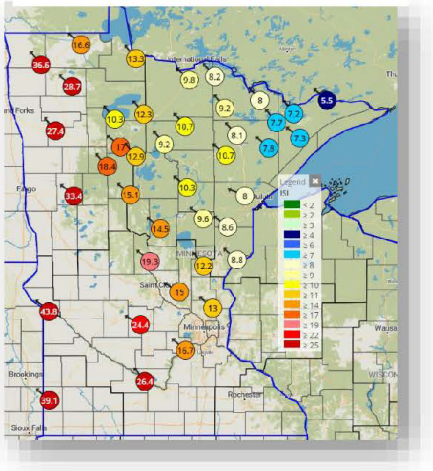
A wide spread in potential exists from fine fuels that have been snow free for a number of days to hardwood fuels that may not even be available to burn in many locations. Expect a lot of variability from fuel type to fuel type today, or from place to place.

Please report any pertinent observations from the field especially any observations of heavier fuels being consumed or torching and crown fire behavior.

Fine Dead Fuel Moisture: 6% Unshaded – 9% Shaded

Prob. of Ignition: 50% Unshaded – 30% Shaded

Figure 2 - Forecasted Daily ISI 04/06/24.



Note: This is a general fire behavior forecast for the state of Minnesota. It is designed to provide wildland fire managers with an overall geographic area view of fire behavior potential and to help wildland firefighters with the fire order "initiate all actions based on current and expected fire behavior". Firefighters must use onsite observations and spot weather forecasts to calculate site-specific fire behavior for individual wildland fires. Fire behavior spread rates describe only surface fire conditions and do not factor crowning or spotting.

SPECIFIC FIRE BEHAVIOR:

MN FFMC:88 BUI:25 WS:20 Effective ISI: 16.3	**Flame Length**	**Rate of Spread (ft/min ≈ ch/hr)**	**Fire Type**	**60 Minute Spread Size (acres)**
Grass (100% cured – 3 tons/acre)	19 – 20	180 – 185	surface	346
Lowland Grass (100% cured – 5 tons/acre)	24 – 25	180 – 185	surface	346
Young Jack Pine & Boreal Spruce (120% FMC)	15 – 16	55 – 60	torching	45
Pine Plntn. & Mat. JP	7 – 8	30 – 35	surface	14
Mixdwood (25% Fir) & Red & White Pine Timber	7 – 8	20 – 25	surface	8
Hardwood/Aspen	5 – 6	11 – 13	surface	2

Outlook:

Lower chances for precip maintain themselves through next week however these are expected to be scattered and light in nature if they come to fruition at all. A trend towards warmer temps will keep build up progressing and we should expect to see more and more fuel beds become available where precip stays to a minimum. Crown fire behavior potential should be on the rise with advanced drying in heaver fuels.

CPC 6 – 10 and 8 – 14 day outlooks show a significant warming trend with better chances for drier than normal conditions into the middle of the month.

After last weeks improvement in the drought monitor this weeks release shows things holding in place with nearly all the state at least abnormally dry or higher.

Figure 3 - Weekly Summary Forecast for Northwestern MN Issued by NWS Grand Forks

Goodridge, MN Weekly Summary	Sat Apr 6	Sun Apr 7	Mon Apr 8	Tue Apr 9	Wed Apr 10	Thu Apr 11	Fri Apr 12	Sat Apr 13
Max Temp, °F	56	54	45	52	58	51	51	58
Min Temp, °F	35	34	36	37	36	36	32	38
Max RH, %	56	77	92	100	96	82	78	73
Min RH, %	29	37	76	56	47	44	39	45
Max Dewpoint, °F	28	34	38	38	39	35	30	37
Min Dewpoint, °F	21	28	34	37	35	29	26	29
Max Wind, mph	25	23	16	12	14	20	15	16
Min Wind, mph	16	16	6	6	7	9	10	12
Max Wind Gust, time/dir.	11 AM ↖	8 AM ↖	12 AM ←	2 PM →	6 PM ↘	4 PM ↘	12 AM ↘	12 PM ↗
Max Wind Gust, mph	35	33	24	17	20	30	22	24
Min Wind Gust, mph	26	25	9	9	9	13	16	17
Max Cloud Cover, %	56	88	89	78	53	32	61	56
Min Cloud Cover, %	17	10	79	39	34	16	19	34
Max Prob. of Precip., %	1	25	55	38	15	20	12	20

Figure 4 – Weekly Summary Forecast for Northeastern MN Issued by the NWS Duluth

Nett Lake, MN Weekly Summary	Sat Apr 6	Sun Apr 7	Mon Apr 8	Tue Apr 9	Wed Apr 10	Thu Apr 11	Fri Apr 12	Sat Apr 13
Max Temp, °F	54	54	45	47	56	52	50	55
Min Temp, °F	32	30	36	35	34	35	31	32
Max RH, %	61	81	92	100	92	89	81	78
Min RH, %	25	32	70	63	45	41	36	41
Max Dewpoint, °F	25	31	36	36	38	36	29	33
Min Dewpoint, °F	19	24	32	35	32	28	24	26
Max Wind, mph	13	15	13	12	12	17	16	16
Min Wind, mph	6	8	6	6	5	7	9	9
Max Wind Gust, time/dir.	3 PM ↖	12 PM ↖	10 AM ←	2 PM →	3 PM ↘	3 PM ↘	2 PM ↘	12 PM ↑
Max Wind Gust, mph	22	25	20	17	17	25	24	24
Min Wind Gust, mph	16	18	8	8	7	10	14	14
Max Cloud Cover, %	33	90	89	86	55	43	52	56
Min Cloud Cover, %	11	14	80	57	44	28	33	39
Max Prob. of Precip., %	0	25	66	49	18	28	14	23

Note: This is a general fire behavior forecast for the state of Minnesota. It is designed to provide wildland fire managers with an overall geographic area view of fire behavior potential and to help wildland firefighters with the fire order "initiate all actions based on current and expected fire behavior". Firefighters must use onsite observations and spot weather forecasts to calculate site-specific fire behavior for individual wildland fires. Fire behavior spread rates describe only surface fire conditions and do not factor crowning or spotting.