PRAIRIE WIND TRAJECTORY AND CEREAL RUST RISK REPORT for June 18-24, 2024

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Agriculture and Agri-Food Canada (AAFC) and Environment and Climate Change Canada (ECCC) have been working together to study the potential of trajectories for monitoring insect movements since the late 1990s. Trajectory models are used to deliver an early-warning system for the origin and destination of migratory invasive species, including plant pathogens. Plant pathologists have shown that trajectories can assist with the prediction of plant disease infestations. We receive two types of model output from ECCC: reverse trajectories and forward trajectories.

'Reverse trajectories' refer to air currents that are tracked back in time from specified Canadian locations over a five-day period prior to their arrival date. If plant pathogens are present in the air currents that originate from these southern locations, they may be deposited on the Prairies at sites along the trajectory, depending on the local weather conditions at the time that the trajectories pass over our area (e.g. rain showers, etc.). Reverse trajectories are the best available estimate of the ''true'' 3D wind fields at a specific point. They are based on observations, satellite and radiosonde data.

Disclaimer

Information related to trajectory events based on forecast and diagnostic wind fields and cereal rust risk is experimental, and is **OFFERED TO THE PUBLIC FOR INFORMATIONAL PURPOSES ONLY**. Agriculture and Agri-Food Canada, Environment Canada, and their employees assume no liability from the use of this information.

1. RUST DEVELOPMENT IN SOURCE LOCATIONS

a. Pacific Northwest (PNW)

i. Earlier PCDMN cereal rust risk updates outlined previous stripe rust risk forecasts and symptom observations in the PNW by Dr. X Chen from USDA ARS/Washington State University (https://prairiecropdisease.com/cereal-rust-risk/; https://prairiecropdisease.com/).

ii. Previous reports from the PNW suggested an increased risk of stripe rust and observations of increased levels of symptoms, especially in breeding trials and nurseries. However, surveys by Dr. Chen at the end of May indicated limited development in commercial winter wheat and spring wheat and barley fields (Dr. Chen, stripe rust update, May 31, 2024, https://www.wawg.org/stripe-rust-update-05-31-high-rust-pressure-present/). Dr. Chen indicated the lack of observations in commercial fields was likely related to the use of resistant varieties as well as fungicide application. However, significant symptoms of stripe rust were observed by Dr. Chen on goat grass in various locations including in and around commercial winter wheat fields, park areas and roadsides. Interestingly, Dr. Chen reported stripe rust in a winter barley research field in the Pullman region, although it was at lower levels as compared to winter wheat trials. In a previous report Dr. Chen noted the observation of a hot spot of elevated severity in a commercial field. In his May 31st report Dr. Chen indicated that there have been recent reports of stripe rust re-developing in commercial winter wheat fields that had been previously sprayed. Potential cool weather conditions may promote further development and Dr. Chen is encouraging farmers to think about a second fungicide application using products labeled for post head emergence and where the preharvest interval is suitable. Dr. Chen also cautions about stripe rust risk in spring wheat and barley and the potential need for fungicide application with susceptible varieties. Further updates from the PNW on the stripe rust situation will be evaluated as they become available.

iii. **As of June 28, 2024, although no further updates are available, the relatively limited development of stripe rust in commercial fields suggests the PNW may not be a significant source of rust spores**

currently. However, potential further development in commercial PNW winter and spring wheat fields could increase this risk. The PCDMN will adjust their risk assessment for the PNW as new updates on the PNW stripe rust situation become available.

iv. An initial report via the Montana State University (MSU) on June 14, 2024 Ag Alert mentioned the first report of stripe rust in MSU winter wheat research trials in Sidney and Creston, MT, while other stripe rust reports have come from Chouteau County, MT. The MSU Schutter Diagnostic Lab, MSU, and Dr. U. McKelvy, MSU are also concerned that forecast cooler moister conditions, especially in SW Montana may facilitate further stripe rust development and impact (https://t.co/qfbJO8Qdos; https://www.ars.usda.gov/ARSUserFiles/50620500/CRBs/2024%20CRB%20June%2014.pdf).

v. Further reports on June 24, 26 and 27, 2024 have been received regarding stripe rust observations and samples from Choteau County again, but also from wheat fields at MSU research facilities at Sidney and Creston, Montana (hhttps://x.com/MSU_Extension/status/1805359999775916211; ttps://www.lewistownnews.com/news/producers-should-be-alert-for-wheat-stripe-rust/article_af5e0938-331e-11ef-a4cb-378f4cc3cb51.htmlkhttps://www.roundupweb.com/story/2024/06/26/agriculture/stripe-rust-reported-in-the-area/20821.html).

vi. Over the last week the first report of stripe rust in Manitoba was received from south central Manitoba in a field of SY Manness, which has an intermediate level of resistance (D. Kaminski, Manitoba Agriculture, https://www.gov.mb.ca/agriculture/crops/seasonal-reports/crop-pest-update/pubs/crop-pest-update-2024-06-27.pdf; https://x.com/field2fieldag/status/1805614987030774175). Previous reports regarding symptoms were received from research trials at AAFC Lethbridge by Dr. R. Aboukhaddour, AAFC Lethbridge (https://x.com/ReemWheat/status/1791567749489312080). In addition, early development of stripe rust in disease nurseries at Abbotsford and Creston, BC was reported by Dr. G. Brar, U of Alberta, formerly of UBC, and likely reflect overwintering on winter wheat breeding lines (https://x.com/gurcharn_brar/status/1779910374051209644).

vii. Given the recent appearance of stripe rust in Montana, Prairie wheat producers in southern Alberta and southern Saskatchewan should be vigilant regarding the appearance of stripe rust, especially in susceptible varieties, although varieties with intermediate levels of resistance may also be somewhat at risk. In addition, growers in Manitoba should be on the alert regarding stripe rust given the recent report of symptoms in a single field over the last week.

b. **Texas/Oklahoma**

i. Texas and Oklahoma crops are mostly mature and have been or will soon be harvested. In Texas as of June 23, 2024, 74% of the winter wheat crop has been harvested, while in Oklahoma 95% of the winter wheat crop has been harvested (https://quickstats.nass.usda.gov/results/218B6322-CB54-3AE4-899B-2B4BABAE1193; https://quickstats.nass.usda.gov/results/9FBE6ADA-AB95-38E8-8B75-FF059977266E). Given that Texas and Oklahoma winter wheat crops are mature and harvesting is nearing completion, they no longer represent a significant source of rust inoculum for the Prairie region.

c. **Kansas/Nebraska**

i. Earlier PCDMN cereal rust risk updates outlined previous observations and concerns regarding rusts in Kansas and Nebraska winter wheat crops (https://prairiecropdisease.com/cereal-rust-risk/; https://prairiecropdisease.com/).

ii. In mid June update Dr. DeWolf indicated that stripe rust has been found in most Kansas counties, with areas in central and western Kansas having increased levels (Dr. E. DeWolf, Update on Wheat Rusts in Kansas, Cereal Rust Survey CEREAL-RUST-SURVEY@LISTS.UMN.EDU, June 12, 2024; https://www.ars.usda.gov/ARSUserFiles/50620500/CRBs/2024%20CRB%20June%2014.pdf). Figure 1 shows the most recent distribution of stripe rust in Kansas counties (https://wheat.agpestmonitor.org/stripe-rust/ (as of June 28, 2024). Dr. DeWolf also indicated that leaf rust was found in a number of Kansas regions, but is not expected to cause significant damage,

while some stem rust has also been noted, especially in relation to its earlier appearance in 2024. Finally, he also reported that oat crown rust was found in Riley County, Kansas.

iii. USDA crop progress reports indicate that as of June 23, 2024, 94% of the Kansas winter wheat crop is mature, with 53% of the crop being harvested (https://quickstats.nass.usda.gov/results/7697AE4A-A089-347D-BD9E-C773202FAA83; https://quickstats.nass.usda.gov/results/B84A3FA8-068A-3F77-ACDE-24B9ABCE69F5). **As Kansas winter wheat crops mature and are harvested, stripe rust will no longer be active and thus Kansas will no longer represent a significant source of rust inoculum.**

iv. The most recent update from Dr. S. Wegulo, UNL, indicates that stripe rust is present in all wheat producing areas of Nebraska, with up to severe levels being observed in irrigated fields or where rainfall occurred (Dr. S. Wegulo, Update from Nebraska, CEREAL-RUST-SURVEY@LISTS.UMN.EDU, June 13, 2024; https://cropwatch.unl.edu/2024/wheat-disease-update-june-14-2024; https://www.ars.usda.gov/ARSUserFiles/50620500/CRBs/2024%20CRB%20June%2014.pdf). Dr. Wegulo also mentions that leaf rust at low levels was found 14 days previously and mainly in southern regions, but is not expected to affect productivity. Figures 2 and 3 provide updates on the distribution of stripe and leaf rust in Nebraska, respectively and as of June 13, 2024.

v. USDA crop progress reports indicate that as of June 23, 2024, 2% of the Kansas winter wheat crop has been harvested (https://quickstats.nass.usda.gov/results/169297FC-CD7B-3C41-AB00-D274A38FB2E6). As Nebraska winter wheat crops mature and are harvested, stripe rust would no longer be active and thus Nebraska will no longer represent a significant source of rust inoculum in about 1-3 weeks depending on region and Nebraska crop growth stage.

vi. **As of June 28, 2024, there is a low-moderate risk associated with the Kansas/Nebraska region being a significant source of stripe and leaf rust inoculum for dispersal into the Prairie region of Canada. Note the risk from Nebraska crops would be moderate, but the crop is starting to move towards maturity with harvest starting in some regions.** As winter wheat matures in Kansas and Nebraska and harvest continues, this region will no longer represent a significant source of stripe rust inoculum for the Prairie region in 2024. Nebraska crops are beyond the window for fungicide application, but will continue to be a potential stripe rust source until they start to mature and are harvested (https://cropwatch.unl.edu/2024/wheat-disease-update-june-14-2024).

vii. Of interest are the continuing numerous reports of stripe rust in southern Ontario winter wheat fields, where inoculum has likely arrived from neighbouring states south and west of Ontario, e.g. Louisiana through to Michigan and northwest New York State (Figure 1).

d. **The Dakotas, Wisconsin, and Minnesota**

i. On May 27, 2024, Dr. M. Shires reported the detection of stripe rust in multiple areas in Brookings County, South Dakota, while the SDSU Winter Wheat Breeding program reported stripe rust in a variety trial in the same county (https://x.com/maddishires/status/1795078948113563786; https://x.com/WheatInnovation/status/1794915400012206296).

ii. S. Thapa, SDSU Graduate Research Assistant, reported increased levels of stripe rust on SDSU winter wheat breeding plots, while Dr. M. Shires, SDSU Assistant Professor reported stripe rust at low levels in the Pierre region of SD and widespread low levels in the south central areas of SD on May 31, 2024 (https://twitter.com/SubashSDSU/status/1797005319253709055; https://twitter.com/maddishires/status/1796665662539964802; https://twitter.com/maddishires/status/1796585340767252918).

iii. Most recently T. Pawar, Research Associate, SDSU reported severe levels of stripe rust in plots at the SDSU Volga research farm (https://x.com/PawarTapish/status/1798442920711971315).

iv. During the week of May 20-24, 2024, Dr. D.L. Smith, University of Wisconsin-Madison, reported stripe rust in two Wisconsin counties (Figure 1 [note it appears that not all jurisdictions in the USA are using the Wheat AgPestMonitor reporting system] https://badgercropdoc.com/2024/05/24/wisconsin-winter-wheat-disease-update-may-24-2024/). There have been more recent reports of stripe rust in Wisconsin (S. Conley, Small Grain Specialist, University of Wisconsin, https://x.com/badgerbean/status/1799215404809679160). While on June 12, 2024, Dr. D. Smith reported increased stripe rust development on susceptible wheat varieties in

the Arlington region of Wisconsin (https://twitter.com/badgercropdoc/status/1801012395822772261).

v. In early June 2024, stripe rust was confirmed in Cass County Minnesota (https://x.com/arthuragronomy/status/1799501650765250916), while there have been several other reports from Dr. A. Friskop, Extension Plant Pathologist, NDSU, of stripe rust in winter wheat and spring wheat and these observations are thought to be fairly early for this disease (https://x.com/NDSUcerealpath/status/1798814635480748533; https://www.ndsu.edu/agriculture/sites/default/files/2024-06/6%20CPR%20June%2013%202024_F.pdf). Dr. Friskop indicates that predicted lower temperatures and rainfall may favour further development in North Dakota.

vi. Reports of stripe rust continue in Minnesota and North Dakota (M. Rugg, Wheat Breeder, The Arthur Companies, https://x.com/NPWheat/status/1804294566054343001).

e. The third USDA Cereal Rust Bulletin coordinated by Dr. Oluseyi Fajolu, USDA Cereal Disease Laboratory, St. Paul, MN, provides a general overview of observations of various rust issues and complements what is reported above for Kansas, Nebraska, South Dakota, North Dakota, Minnesota and Wisconsin (https://www.ars.usda.gov/ARSUserFiles/50620500/CRBs/2024%20CRB%20June%2014.pdf).

1. **Given the close proximity of stripe rust affected wheat in North Dakota and Minnesota, Prairie wheat growers, especially in eastern Saskatchewan and Manitoba, should be extra vigilant regarding the appearance of stripe rust.**

2. Reverse trajectories (RT)

a. Since April 1, 2024 the majority of reverse trajectories that have crossed the prairies have originated from the Pacific Northwest (Idaho, Oregon and Washington). The number of reverse trajectories that originated over Kansas and Nebraska continues to be approximately half of the total number for the same time period in 2023.

b. This past week meteorological conditions have been warm and wet across southern Manitoba. Many locations reported precipitation amounts in the range of 20-50 mm (June 17-23, 2024). Since April 1, southern Manitoba has had rainfall amounts that have been greater than 200% of average cumulative amounts. Surface (<5 mm depth) soil moisture was relatively high over the past 7 days (data not shown). Reverse trajectories have crossed over a number of these locations. For example, Carman had 8 reverse trajectories (6 from the Pacific Northwest and 2 originating over Kansas and Nebraska). Results for June 17-22 indicate that reverse trajectories, passing over Kansas and Nebraska were less than 1000 m above ground level and were approximately 500 m above ground level when air parcels crossed into Manitoba on June 21 (Figure 10). **Similar to last week, results suggest that potential risk of introduction of pathogens into Manitoba could be high for those trajectories that occurred from June 18-24, 2024.**

c. **Pacific Northwest (Washington, Oregon, Idaho)** – Since April 1, 856 reverse trajectories have passed over the prairies from the Pacific Northwest (751 last week). Most of these trajectories have passed over the southern prairies (Figures 6 and 7; Table 1). These trajectories rarely move into the Peace River region of British Columbia and Alberta. On June 23 one of these trajectories passed over Fort St. John (Figure 4). Since May 29 there has been a significant increase in the number of reverse trajectories that have originated from the Pacific Northwest and this trend has continued over this past week there (Figure 5). On June 24 there were 30 locations that were predicted to have trajectories that passed over the Pacific Northwest on the way to the prairies (Table 1). Overall, there were a total of 105 trajectories from the PNW that passed over Prairie locations. The Prairie locations with elevated numbers of trajectories from June 18-24, 2024 included CARMAN, MB with six trajectories, and LETHBRIDGE, AB and WEYBURN, SK, with five trajectories each (Table 1). OLDS, AB, GAINSBOROUGH, GRENFELL, MOOSE JAW, REGINA, and SWIFT CURRENT each had four trajectories, while three trajectories occurred for BEISEKER, CALGARY, EDMONTON, LACOMBE, MEDICINE HAT, and VULCAN, AB, KINDERSLEY, SASKATOON, TISDALE, WATROUS, and YORKTON, SK, and RUSSELL and SELKIRK, MB.

   i. **For the week of June 18 to 24, 2024, there was a moderate-high risk associated with the PNW region being a significant source of wind trajectories for dispersal of the stripe rust pathogen into the Prairie region of Canada. Note, locations with 3-6 trajectories would have a higher risk.**

d. **Oklahoma and Texas – Given the status of winter wheat harvest in TX/OK, this region no longer represents an important source of rust inoculum for the Prairie region and risk reports will no longer include TX/OK for 2024.**

e. **Nebraska and Kansas –** Reverse trajectories, originating from Kansas and Nebraska, have primarily passed over Manitoba and southeastern Saskatchewan (April 1 – June 24, 2024) (Figures 8 and 9). Wind dispersal models predicted that most of this past week's reverse trajectories crossed over Manitoba and southeastern Saskatchewan on June 11, 15 and 16. These trajectories rarely enter southern Alberta. On June 24 one of these trajectories was predicted to pass over near Lethbridge (Table 2). Overall, there were a total of 46 trajectories from the KS/NE region that passed over Prairie locations. From June 18-24, 2024, three wind trajectories each passed over GAINSBOROUGH and WEYBURN, SK, and ARBORG, BRANDON, PORTAGE, RUSSELL and SELKIRK, MB (Table 2).

   i. **For the week of June 18-24, 2024, there is low to moderate risk associated with the KS/NE region being a significant source of wind trajectories for dispersal of the stripe rust pathogen into the Prairie region of Canada. The risk would be increased for locations with three trajectories each.**

3. Prairie Crop Development, Weather Conditions, and Overwintering of Rust

a. **Winter wheat** – Winter wheat continues growth in mid-June with fall-seeded crops finished flowering and progressing into the soft dough stage, depending on the crop (winter wheat versus fall rye), province and region (https://www.gov.mb.ca/agriculture/crops/seasonal-reports/crop-report/pubs/crop-report-2024-06-25.pdf).

b. **Spring wheat** – Across the prairie region spring wheat is continuing to develop from the tillering, to flag leaf emergence and beyond depending on the province and region (https://open.alberta.ca/dataset/a8632ff6-a50d-496c-8dc6-7cee941b5977/resource/af8ca0d7-59cb-4eef-b98e-dcca50cdb4e4/download/agi-itrb-alberta-crop-report-2024-06-11-abbreviated-report.pdf; https://publications.saskatchewan.ca/api/v1/products/123595/formats/144359/download; https://www.gov.mb.ca/agriculture/crops/seasonal-reports/crop-report/pubs/crop-report-2024-06-25.pdf).

c. **Weather synopsis** – Growing season temperatures have been marginally warmer than average while rainfall amounts continue to be well above average. Manitoba continues to have warm temperatures and above normal precipitation. The average 30 day temperature (May 25 – June 23, 2024) was 13.2 °C and was 0.8°C cooler than the long term average temperature. Warmest temperatures were observed across Manitoba and the southern prairies (Figure 11). Most of the prairies have reported 30 day rainfall amounts that were normal to above normal. Rainfall amounts have been greatest in eastern regions and continue to be driest across most of Alberta up to June 23, 2024 (Figure 12). Average cumulative rainfall (mm) over the past 30 days was 71 mm and was 138% of climate normal values (164% last week). Provincial 30 day values were 54 mm, 73 mm and 97 mm for Alberta, Saskatchewan and Manitoba. What a difference a year makes. In 2023 the average temperature for May 27 to June 25 was 17.6 °C (4.4 °C warmer than 2024) and the prairie wide average cumulative rainfall was 56 mm (104% of climate normals).

d. Since April 1, the 2024 growing season average temperature has been similar to climate normal values. Warmest average temperatures were observed across a region extending from Winnipeg to Saskatoon and southwest to Lethbridge (Figure 13). Growing season rainfall has been above normal across most of the prairies (Figure 14). Near normal precipitation amounts occurred across western Alberta and western areas of the Peace River region. During May rain amounts were well above average. Over the past few weeks rainfall amounts have been moving closer to long term normal values. As of May 12, rain amounts were 221% of long term average values. Current rain amounts have been 168% (191% last week) of climate normals. Cumulative rainfall has been lowest for a large region than is west of a line that extends from Regina to Grande Prairie (Figure 15).

4. Overall, Rust Risk Assessment and Need For In-Crop Scouting

a. **Pacific Northwest** – There were moderate-high numbers of reverse wind trajectories that passed over the PNW region and into the Prairies, while the most recent reports available indicate that stripe rust development is limited in commercial fields, although there are concerns that it could restart in previously sprayed commercial crops. Prairie winter wheat crops are generally progressing from flowering to grain filling, while much of the spring wheat crop is moving into to the tillering and stem elongation stages, with some reports of crops at the heading stage in Manitoba. This past week meteorological conditions have been warm and wet across southern Manitoba. **Overall, as of June 26, 2024, the risk of stripe rust appearance from the PNW is low-moderate and scouting for this disease in the Prairie region as a result of PNW rust inoculum is generally not urgent, although areas with an increased number of trajectories may be at higher risk (Figure 16). The recent appearance of stripe rust in Montana brings the stripe rust issue very close to the Prairies, especially the central to western regions, so scouting for stripe rust is advised for fields planted to varieties that have susceptible to intermediate resistance ratings.**

b. **Kansas-Nebraska corridor** – There were 46 reverse wind trajectories that passed over the KS/NE region and into the Prairies from June 18-24, 2024, while in May and earlier in June stripe and leaf rust (Kansas) development were reported in commercial winter wheat fields in this region. However, Kansas winter wheat crops are progressing and as of June 23, 2024, 94% of the crop mature, with 53% being harvested in Kansas. **Therefore, the Kansas winter wheat will no longer represent a significant source of rust inoculum.** However, the most recent reports from Nebraska (June 14, 2024) indicate that stripe rust is present in all wheat producing areas, with up to severe levels being observed in irrigated fields or where rainfall occurred. Prairie winter wheat crops are generally progressing from flowering to grain filling, while much of the spring wheat crop is moving into to the tillering, stem elongation and flag leaf emergence stages, with some reports of crops at the heading stage in Manitoba. This past week meteorological conditions have been warm and wet across southern Manitoba. Rainfall in regions with higher amounts could facilitate deposition of rust spores into cereal crops and subsequent disease development. **Overall, as of June 26, 2024, the risk of stem, leaf, stripe, and crown rust appearance from Kansas-Nebraska corridor inoculum is low-moderate and scouting for these diseases in the Prairies is generally not urgent, although areas with an increased number of trajectories may be at higher risk (Figure 17). The early and widespread appearance of stripe rust in the PNW and KS/NE regions is still concerning, while continuing stripe rust observations from North Dakota, South Dakota, Minnesota and Wisconsin bring the stripe rust issue very close to the Prairies, especially the central to eastern regions. Thus, scouting for stripe rust is advised for fields planted to varieties that have susceptible to intermediate resistance ratings, especially in the central to eastern Prairie regions.**

c. This past week meteorological conditions have been warm and wet across southern Manitoba. Many locations reported precipitation amounts in the range of 20-50 mm (June 17-23, 2024). Since April 1, southern Manitoba has had rainfall amounts that have been greater than 200% of average cumulative amounts. Surface (<5 mm depth) soil moisture was relatively high over the past 7 days. Reverse trajectories have crossed over a number of these locations. For example, Carman had 8 reverse trajectories (6 from the Pacific Northwest and 2 originating over Kansas and Nebraska). Results for June 17-22 indicate that reverse trajectories, passing over Kansas and Nebraska were less than 1000 m above ground level and were approximately 500 m above ground level when air parcels crossed into Manitoba on June 21 (Figure 10). **Similar to last week, these results suggest that potential risk of introduction of pathogens into Manitoba could be high for those trajectories that occurred from June 18-24, 2024. Thus, scouting for stripe rust symptoms is advised in winter and spring wheat crops, especially in Manitoba.**

d. Prairie winter wheat fields are most at risk as they are at the flag leaf to flowering stages, but fortunately most current winter wheat varieties have intermediate to high levels of resistance, although AC Radiant, CDC Buteo, AAC Elevate, Broadview, and CDC Falcon are rated as susceptible (https://www.seed.ab.ca/variety-data/cereals/; https://saskseed.ca/wp-content/uploads/2020/12/2024-Varieties-of-Grain-Crops.pdf; https://www.seedmb.ca/pdf-editions-and-separate-section-pdfs/). In terms of spring wheat (various classes) and durum the following varieties are either an S or MS: 5700PR, AAC Cameron, AAC Iceberg, AAC Tisdale, AAC Tomkins, AAC Warman, AAC Whitefox, AC Foremost , Cardale, CDC

Abound, CDC Adamant, CDC Flare, CDC Pilar, Faller, Prosper, SY Natron, SY Rorke, SY Torach, and Unity. **If you are growing a stripe rust susceptible variety, it will be important to keep an eye on your crops for stripe rust especially and follow further PCDMN cereal risk updates (https://prairiecropdisease.com/cereal-rust-risk/). Furthermore, the recent Manitoba observation of stripe rust was from a variety with an intermediate rating so monitoring crops planted with varieties with intermediate resistance should also be considered.**

5. Contacts for rust research and extension expertise

a. **Research**

i. Reem Aboukhaddour, A. Laroche, AAFC Lethbridge, AB, reem.aboukhaddour@agr.gc.ca, andre.laroche@agr.gc.ca. Stripe rust;
ii. H.R. Kutcher, University of Saskatchewan, Saskatoon, SK, randy.kutcher@usask.ca. Stripe rust;
iii. B. McCallum, AAFC Morden, MB, brent.mccallum@agr.gc.ca. Leaf rust and stripe rust;
iv. J. Menzies, AAFC Brandon/Morden, MB, jim.menzies@agr.gc.ca. Stem rust of wheat and oat, crown rust of oat.
v. S. Rehman, Western Crop Innovations (formerly Olds College), Field Crop Development Centre, Lacombe, AB, srehman@oldscollege.ca. Stripe and leaf rust;
vi. G. Brar, University of Alberta, gurcharn.brar@ualberta.ca. Stripe rust.

b. **Extension**

i. Alberta Ministry of Agriculture and Irrigation, Mike Harding, michael.harding@gov.ab.ca;
ii. Saskatchewan Ministry of Agriculture, Alireza Akhavan, alireza.akhavan@gov.sk.ca;
iii. Manitoba Ministry of Agriculture, David Kaminski, david.kaminski@gov.mb.ca.

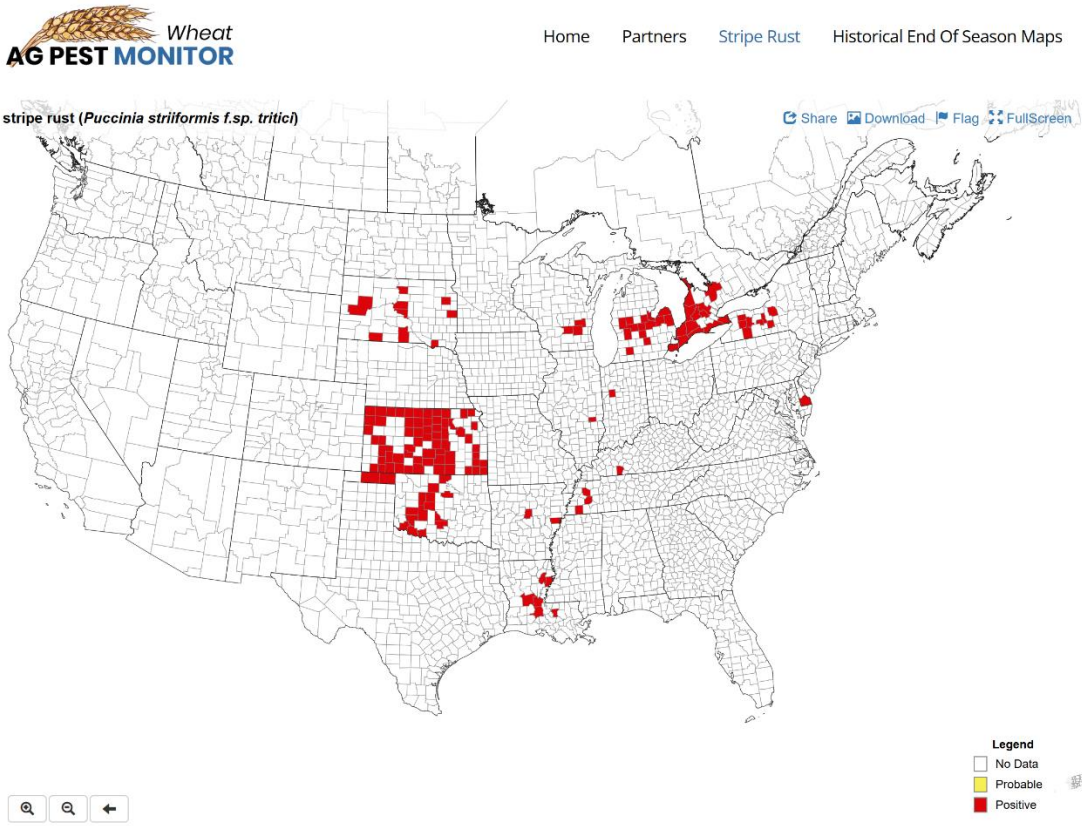

Figure 1. USA stripe rust observations, June 28, 2024 query of the AG PEST MONITOR: Wheat, https://wheat.agpestmonitor.org/stripe-rust/. Note, not all jurisdictions use the Ag Pest Monitor to indicate the presence of rust infections in wheat.

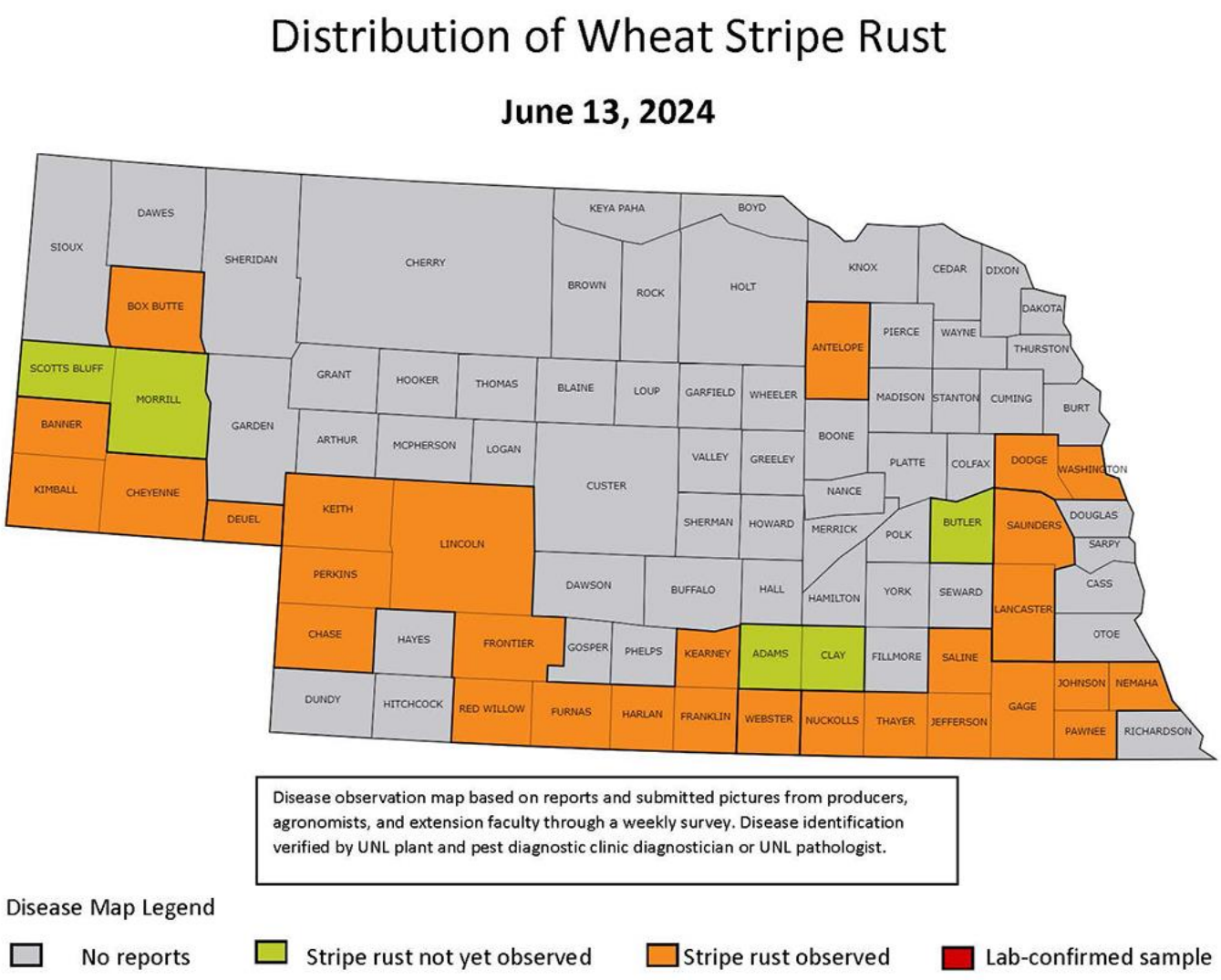

Figure 2. Stripe rust detections in Nebraska counties as of June 13, 2024 (Dr. S. Wegulo et al. June 14, 2024, https://cropwatch.unl.edu/2024/wheat-disease-update-june-14-2024).

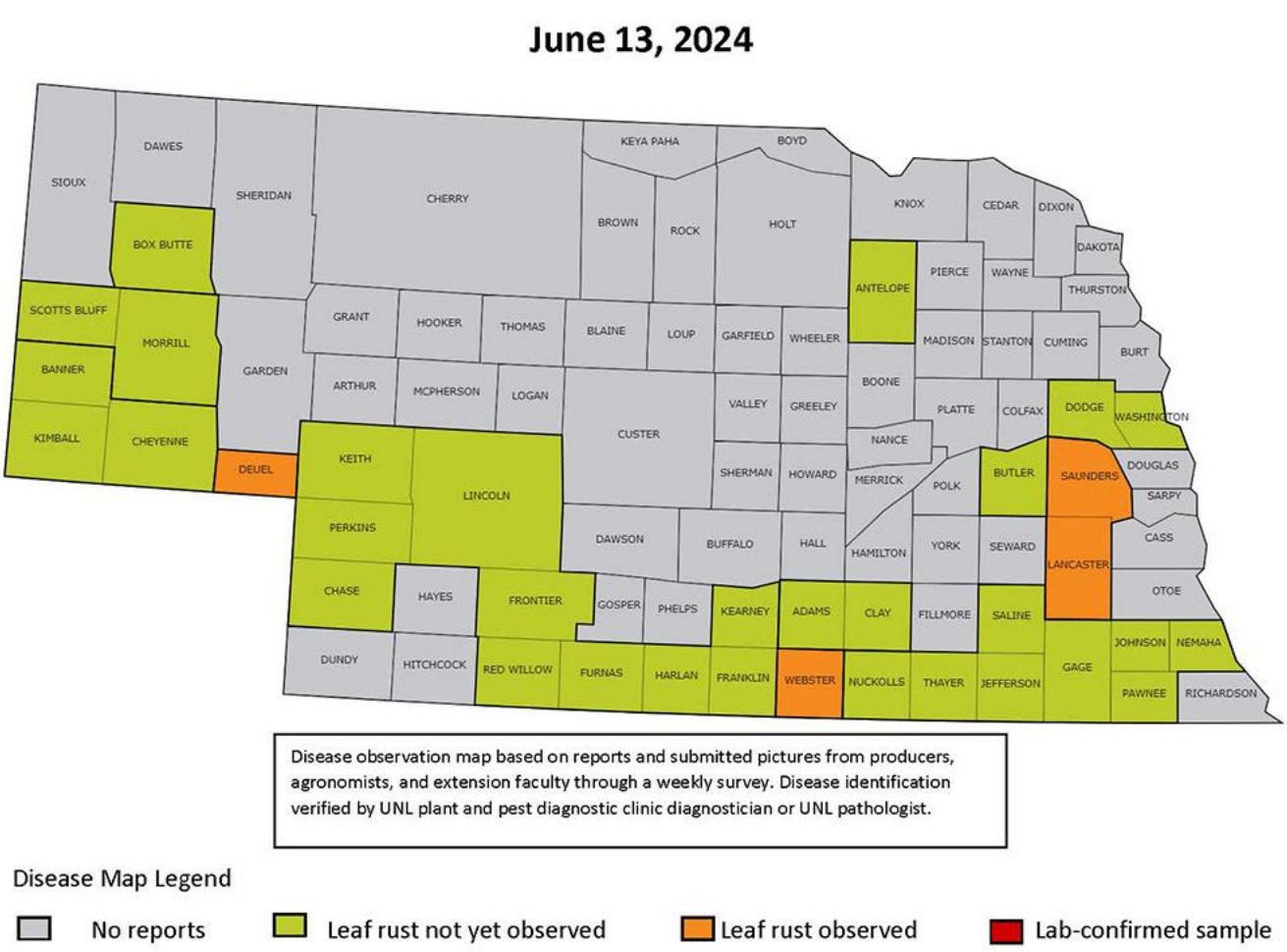

Figure 3. Leaf rust detections in Nebraska counties as of June 13, 2024 (Dr. S. Wegulo et al. June 14, 2024, https://cropwatch.unl.edu/2024/wheat-disease-update-june-14-2024).

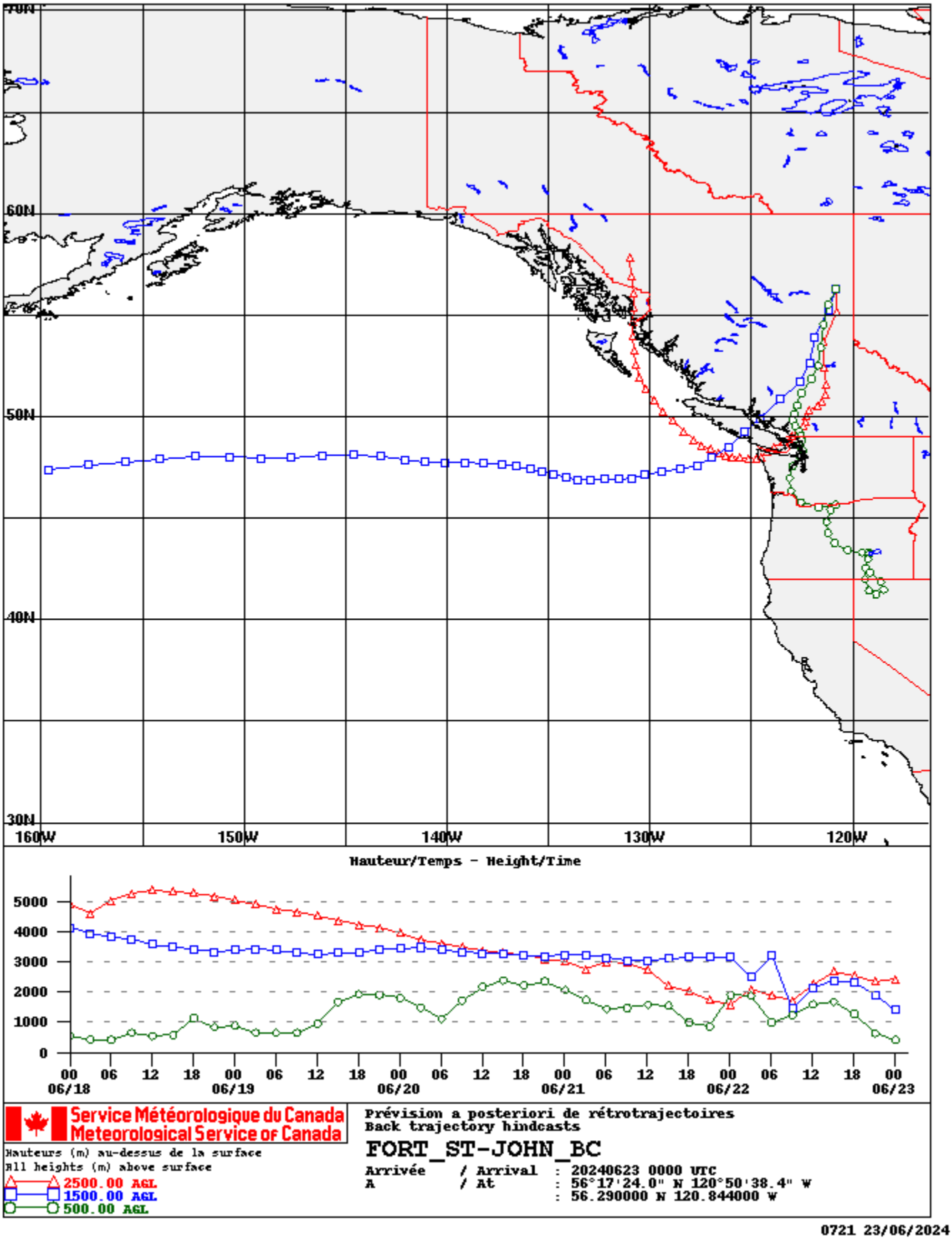

Figure 4. Reverse trajectories for Fort St. John, BC for the period of June 18-23, 2024.

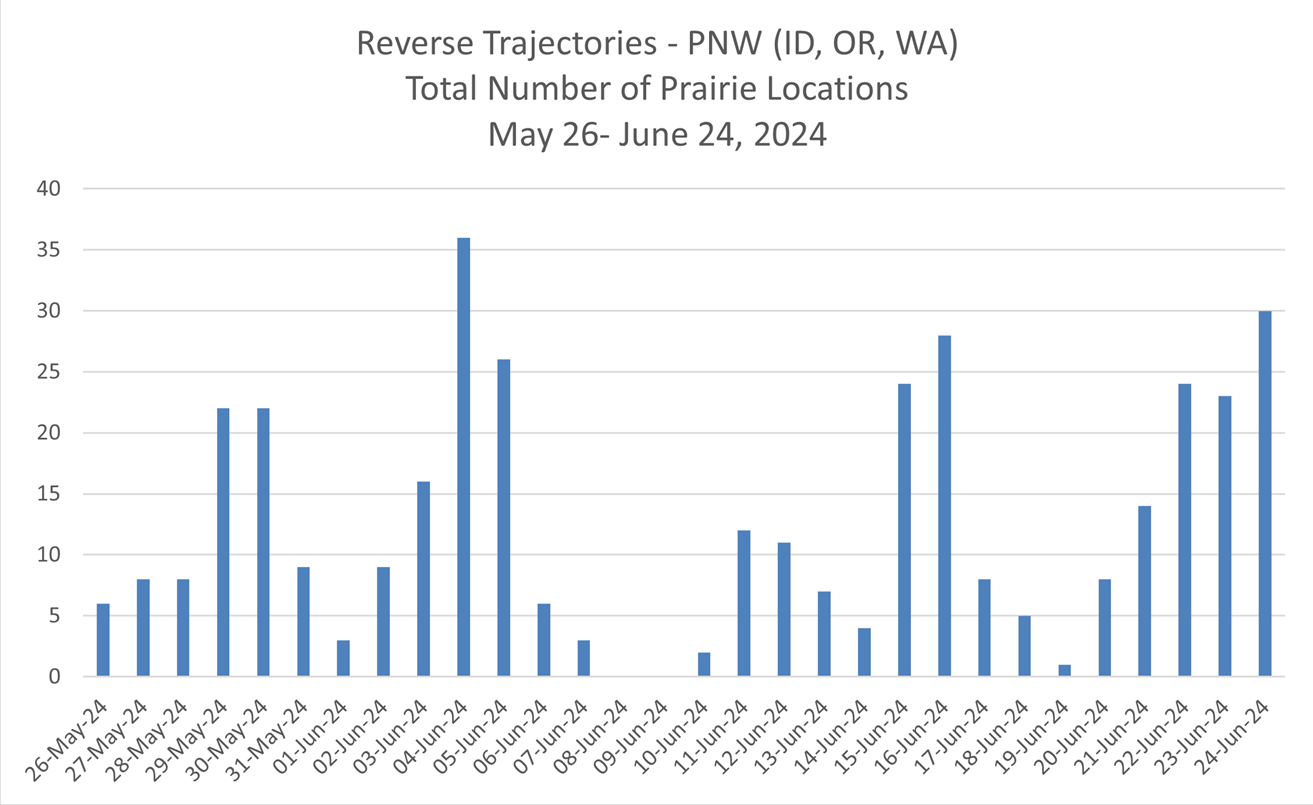

Figure 5. Reverse trajectory locations and daily number of events, for reverse trajectory events originating from the Pacific Northwest region of the USA, May 26 – June 24, 2024.

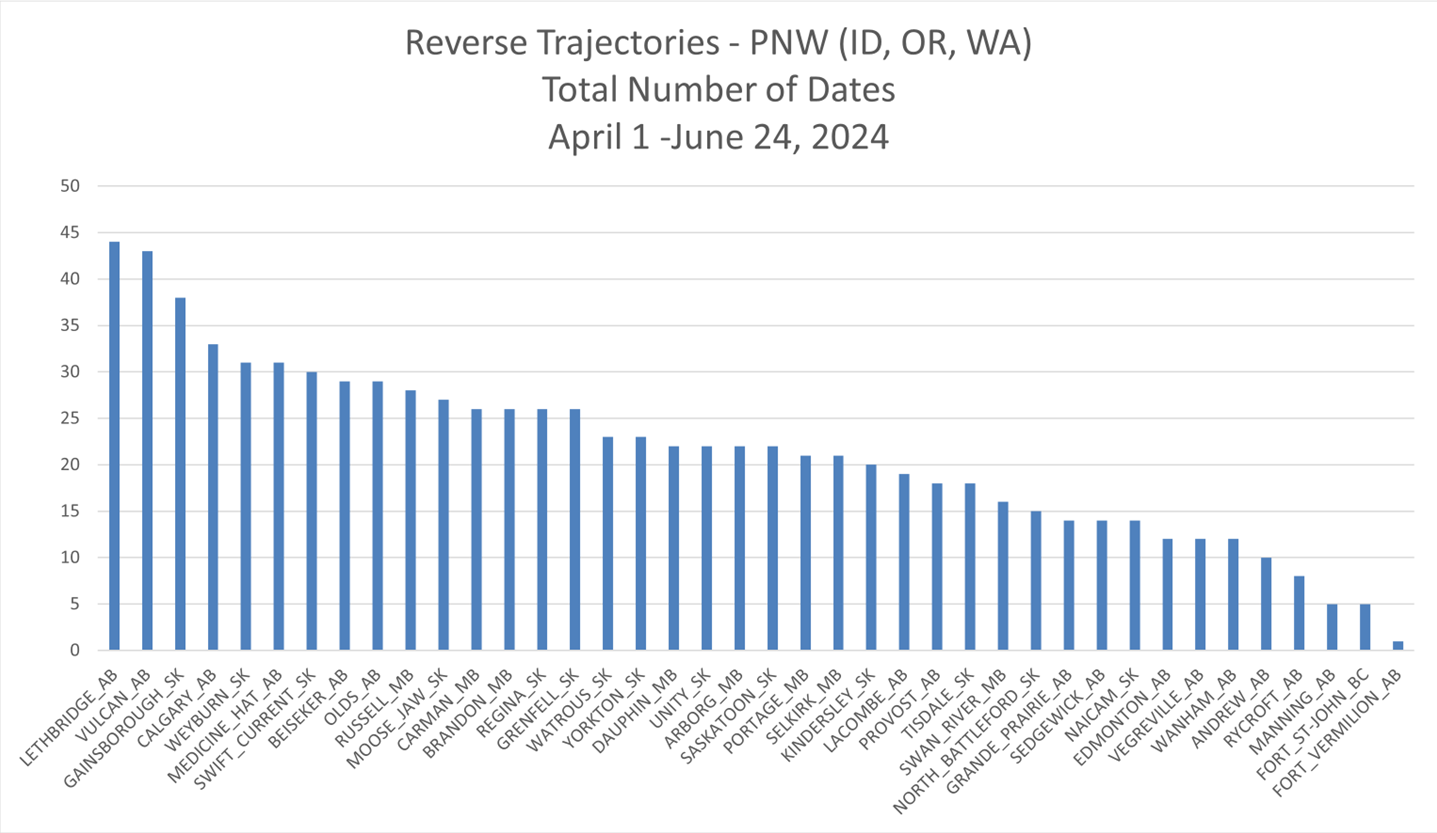

Figure 6. Reverse trajectory locations and number of events, for reverse trajectory events originating from the Pacific Northwest region of the USA, April 1 – June 24, 2024.

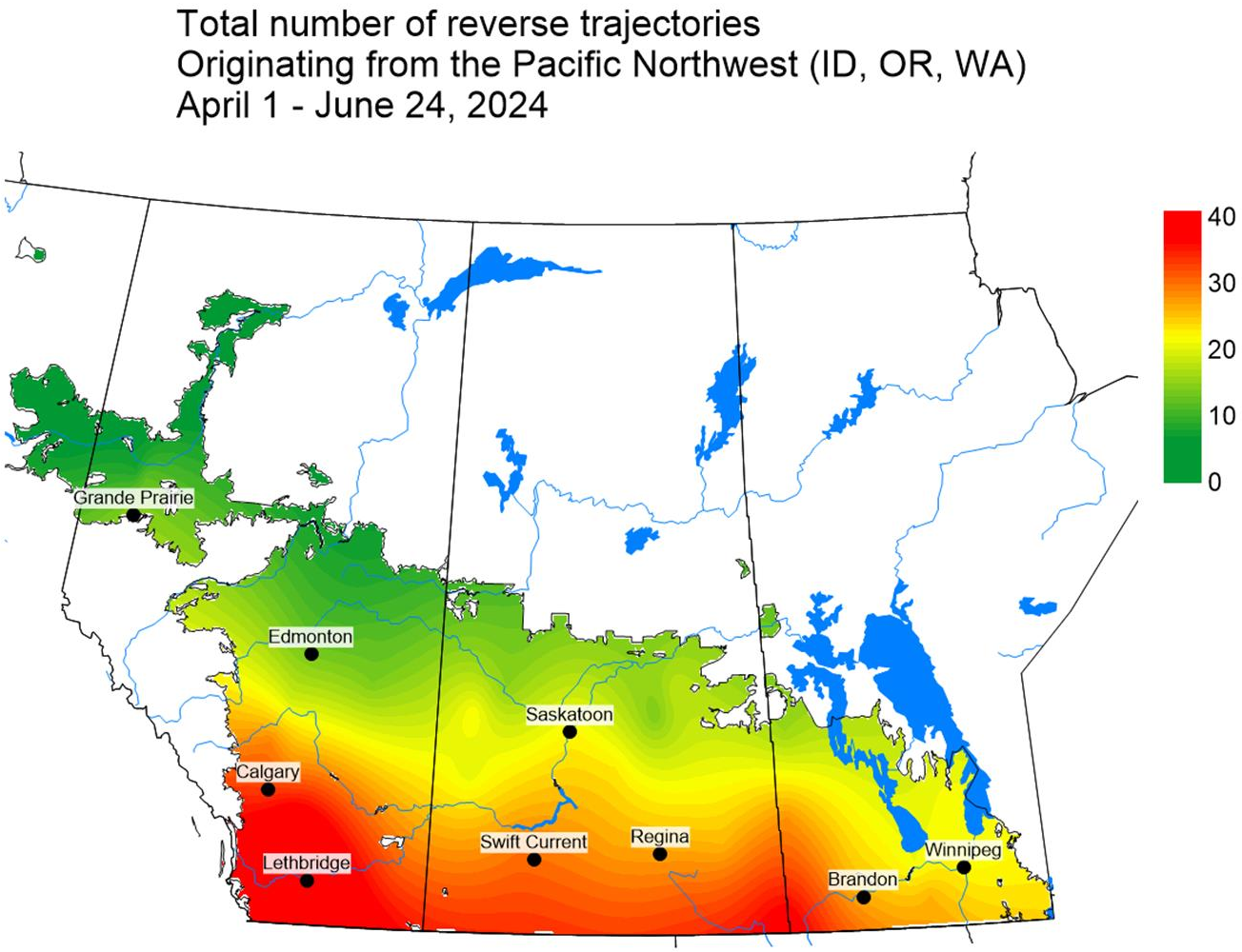

Figure 7. Total number of dates with reverse trajectories originating from the Pacific Northwest region of the USA that have crossed the Prairies between April 1 – June 24, 2024.

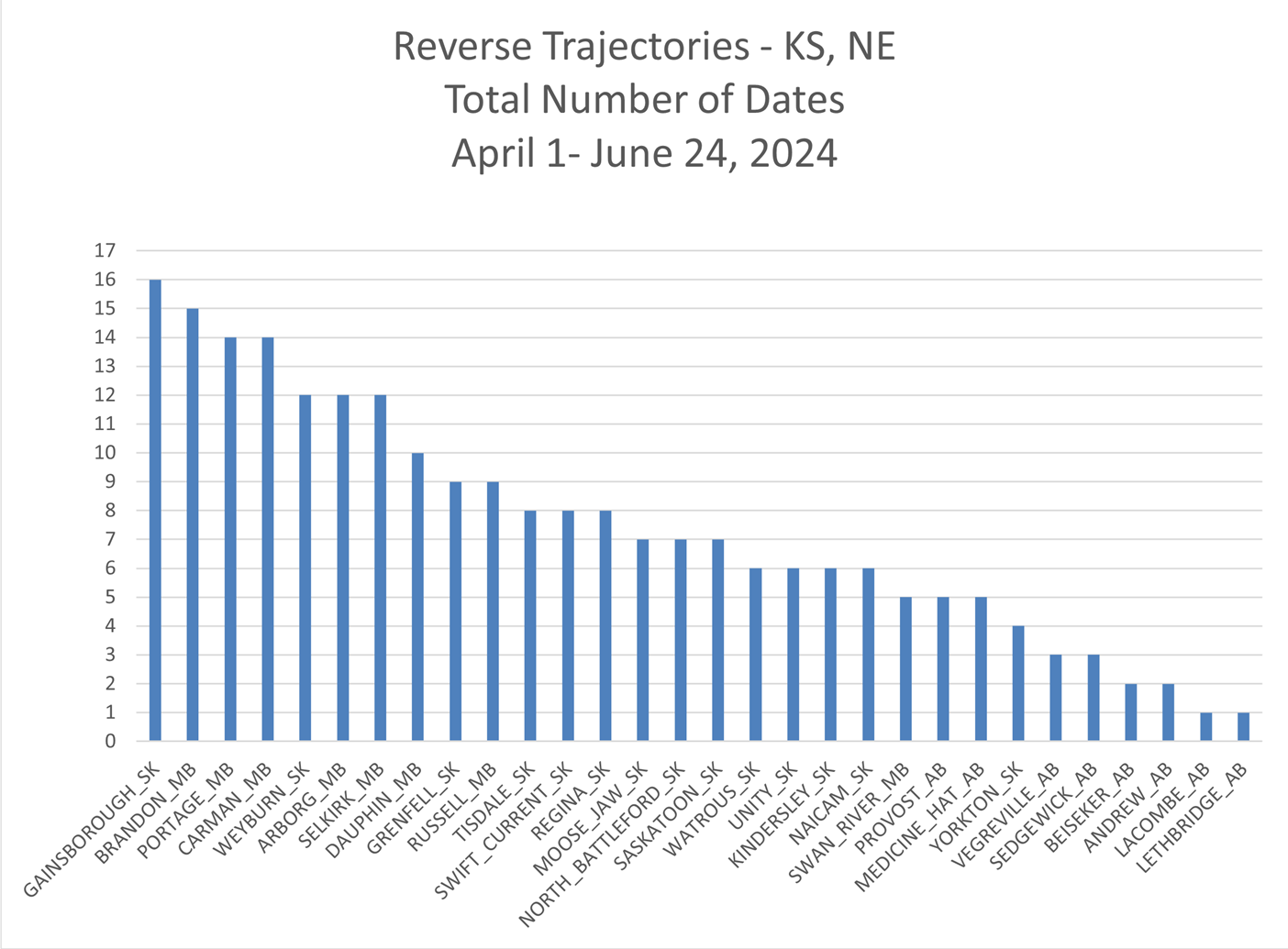

Figure 8. Reverse trajectory locations and number of events, for reverse trajectory events originating from Kansas and Nebraska, USA, April 1 – June 24, 2024.

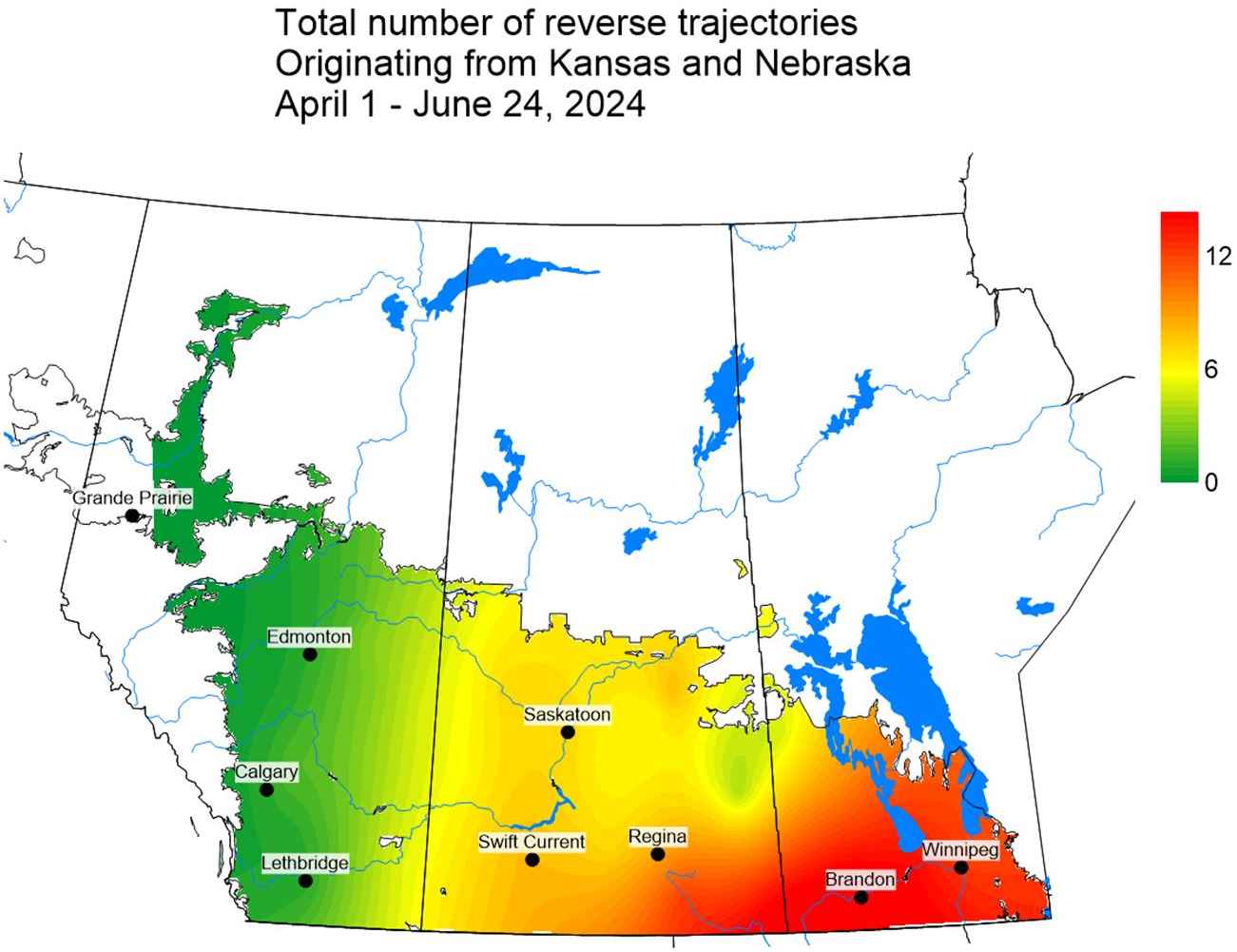

Figure 9. Total number of dates with reverse trajectories originating from Kansas and Nebraska that have crossed the Prairies between April 1 – June 24, 2024.

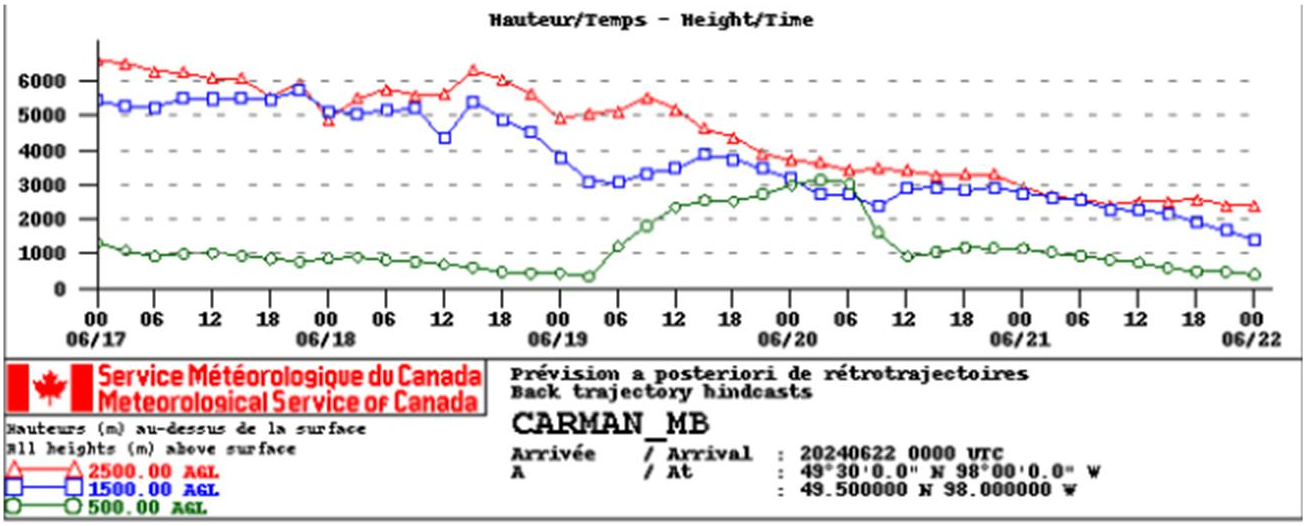

Figure 10. Reverse trajectories for Carman for June 17-22, 2024. Y axis values represent meters above ground level.

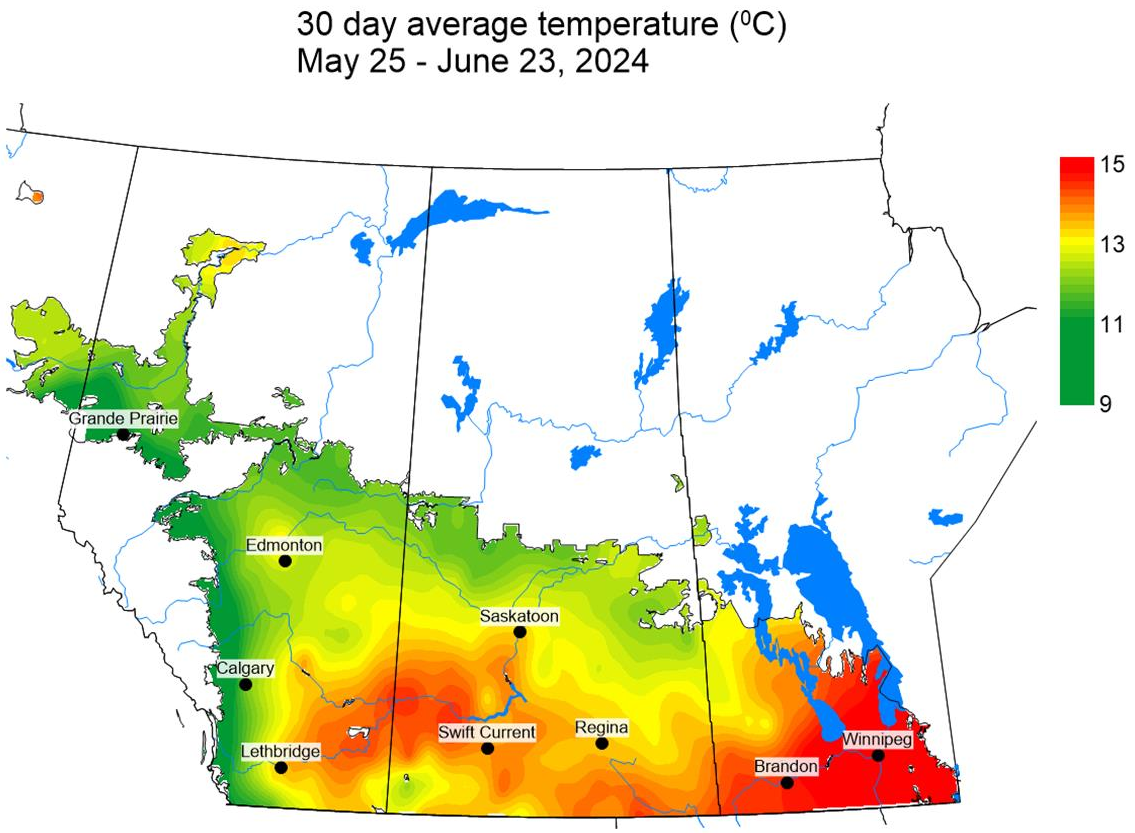

Figure 11. 30-day average temperature (°C) observed across the Canadian prairies for the period of May 25 - June 23, 2024.

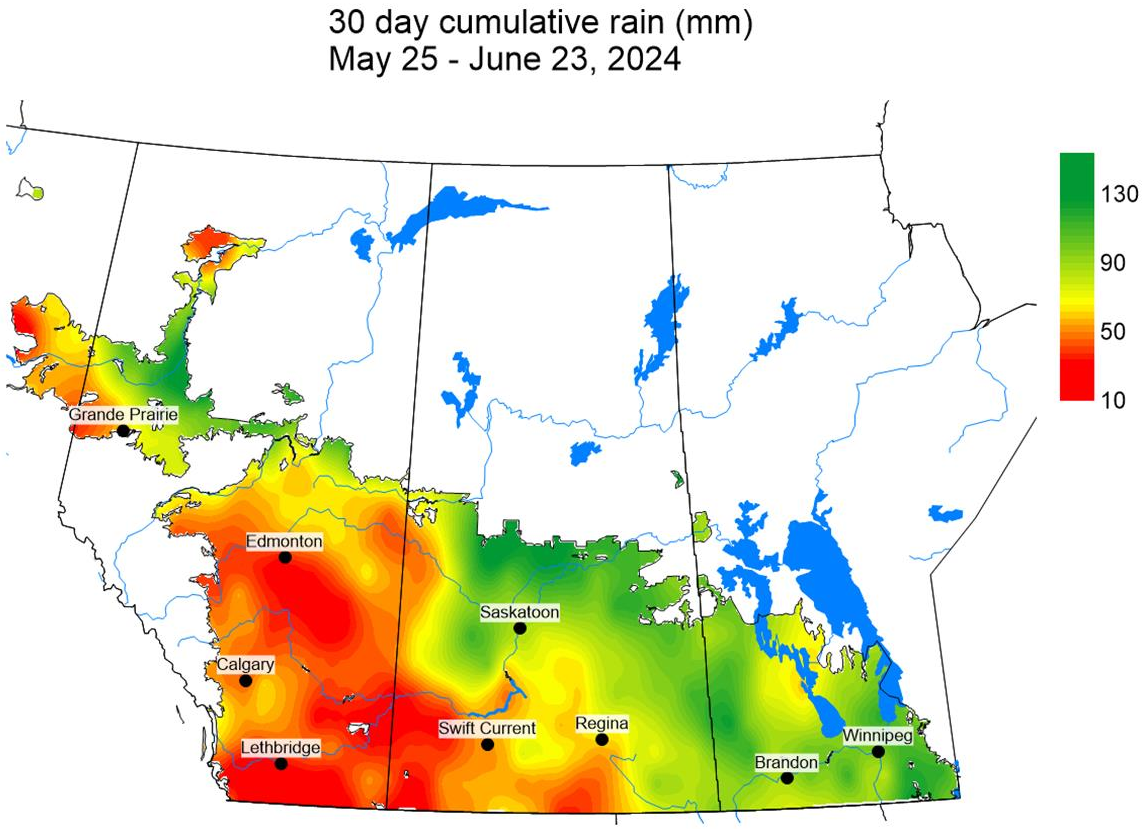

Figure 12. 30-day cumulative rainfall (mm) observed across the Canadian prairies for the period of May 25 - June 23, 2024.

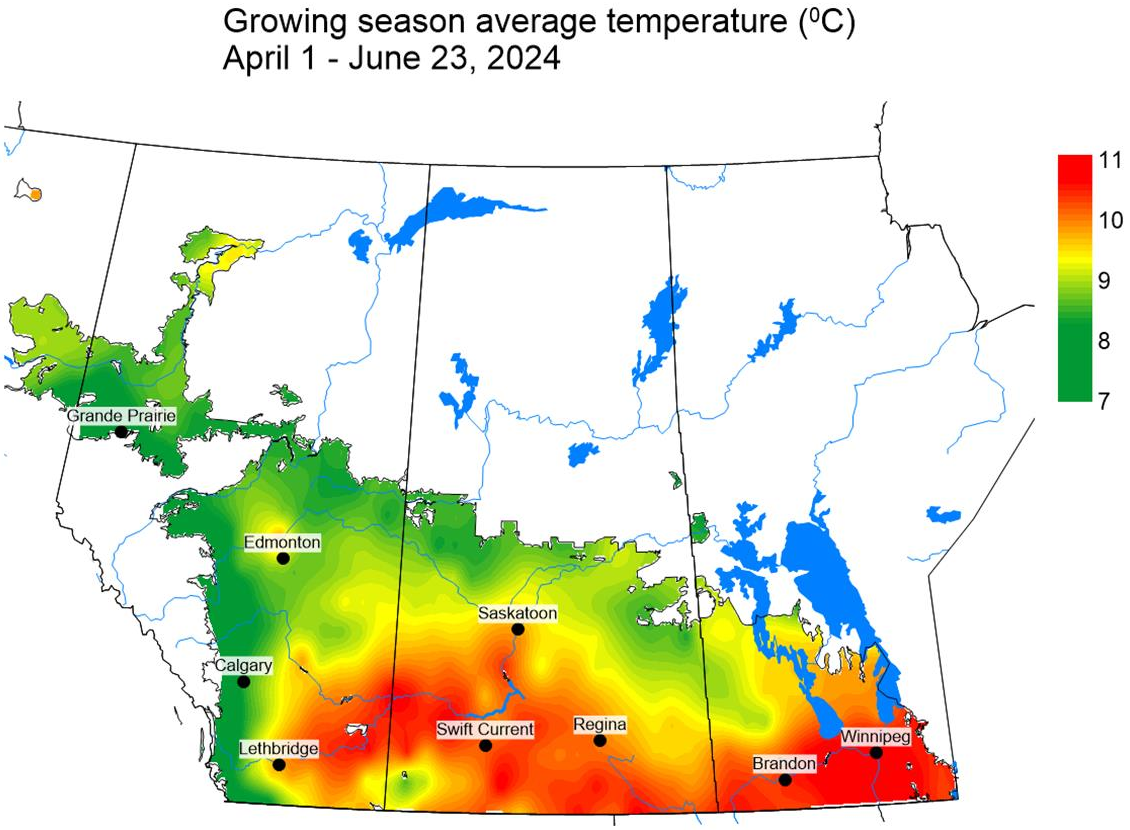

Figure 13. Growing season average temperature (⁰C) observed across the Canadian prairies for the period of April 1 – June 23, 2024.

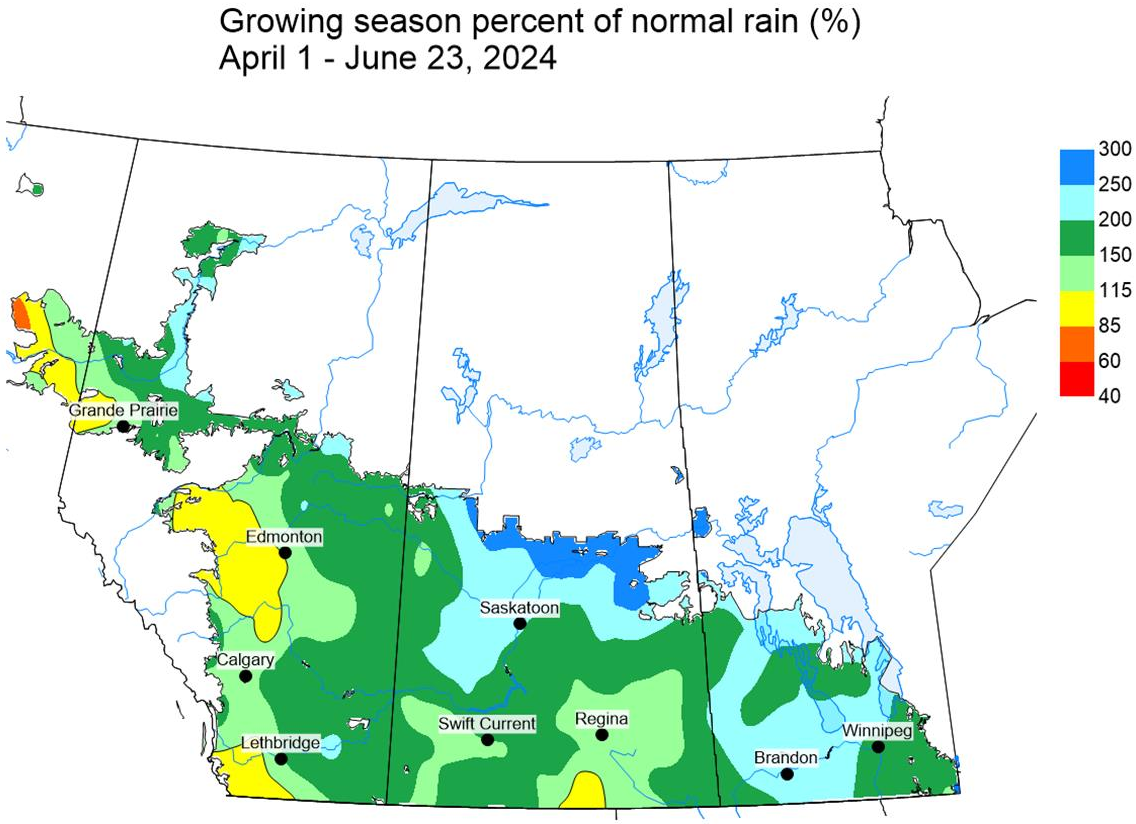

Figure 14. Growing season percent of normal rain (%) observed across the Canadian prairies for the period of April 1 – June 23, 2024.

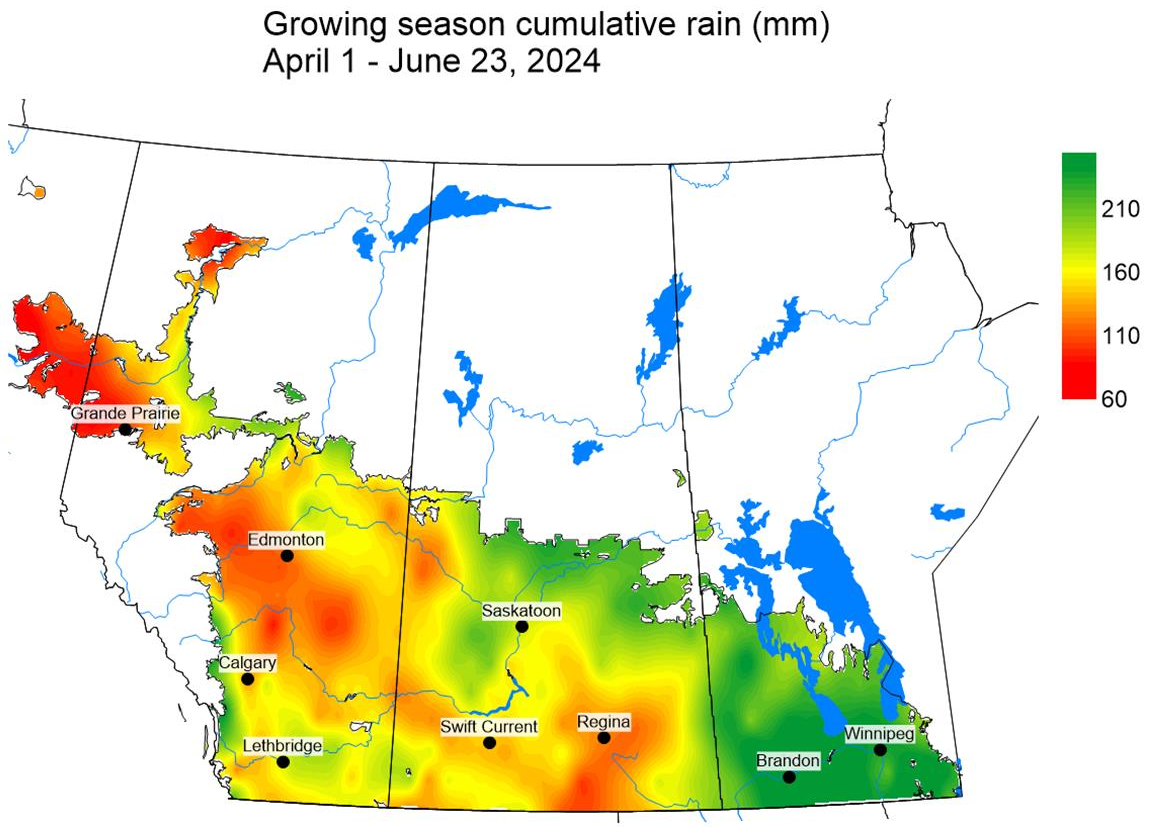

Figure 15. Growing season cumulative rainfall (mm) observed across the Canadian prairies for the period of April 1 – June 23, 2024.

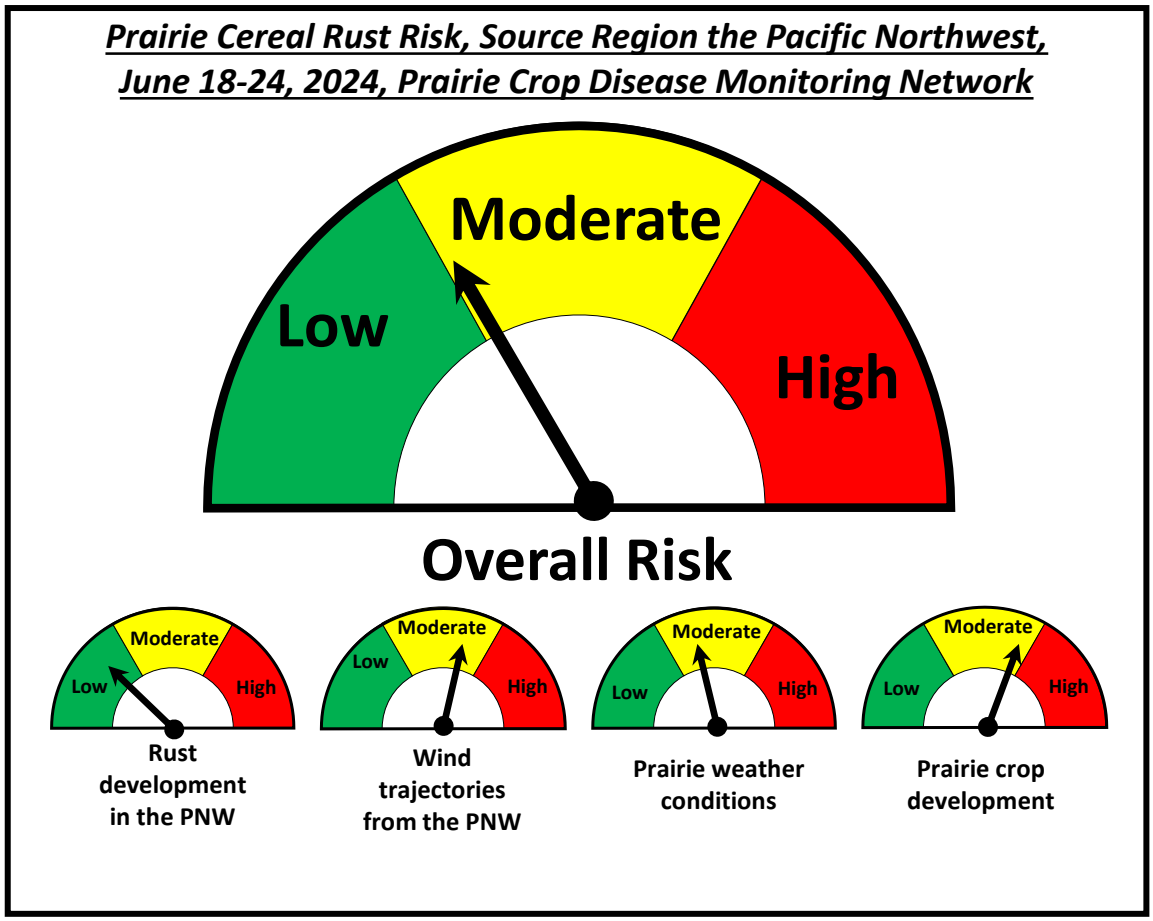

Figure 16. Prairie cereal risk speedometers for stripe rust from the Pacific Northwest, June 18-24, 2024.

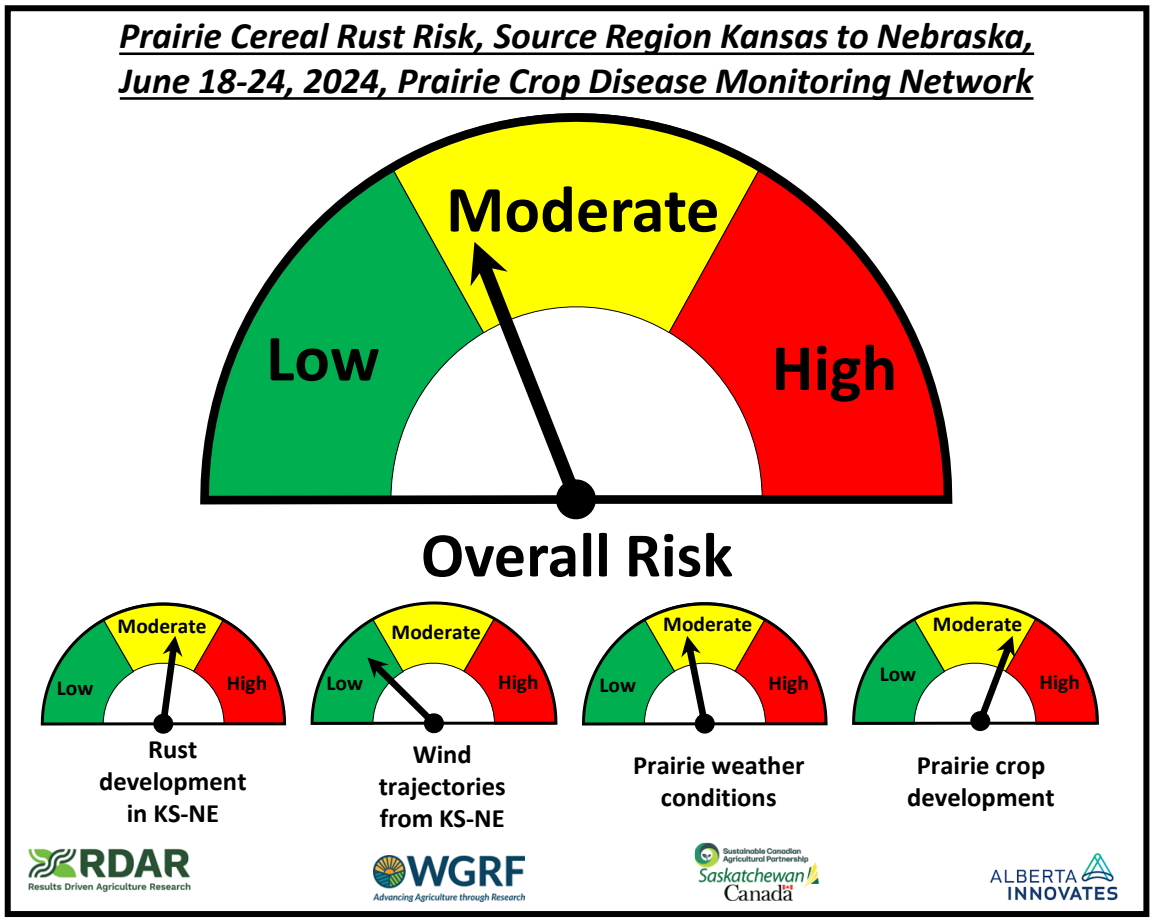

Figure 17. Prairie cereal risk speedometers for stripe/leaf rust from the Kansas/Nebraska region, June 18-24, 2024.

Table 1. Reverse trajectory locations, arrival dates, and number of events, for reverse trajectory events originating from the Pacific Northwest region of the USA, June 18-24, 2024.

Location	Province	18-Jun-24	19-Jun-24	20-Jun-24	21-Jun-24	22-Jun-24	23-Jun-24	24-Jun-24	Total trajectories/location
CARMAN	MB	1		1	1	1	1	1	6
LETHBRIDGE	AB			1	1	1	1	1	5
WEYBURN	SK	1		1	1	1		1	5
OLDS	AB				1	1	1	1	4
GAINSBOROUGH	SK			1	1		1	1	4
GRENFELL	SK			1	1		1	1	4
MOOSE JAW	SK	1			1	1	1		4
REGINA	SK	1		1	1	1			4
SWIFT CURRENT	SK	1		1	1			1	4
BEISEKER	AB					1	1	1	3
CALGARY	AB					1	1	1	3
EDMONTON	AB					1	1	1	3
LACOMBE	AB					1	1	1	3
MEDICINE HAT	AB				1	1		1	3
VULCAN	AB					1	1	1	3
RUSSELL	MB			1		1		1	3
SELKIRK	MB				1	1	1		3
KINDERSLEY	SK					1	1	1	3
SASKATOON	SK					1	1	1	3
TISDALE	SK					1	1	1	3
WATROUS	SK					1	1	1	3
YORKTON	SK					1	1	1	3
SEDGEWICK	AB						1	1	2
VEGREVILLE	AB					1		1	2
ARBORG	MB				1		1		2
BRANDON	MB				1	1			2
DAUPHIN	MB					1		1	2
PORTAGE	MB		1		1				2
SWAN RIVER	MB					1	1		2
NAICAM	SK						1	1	2
NORTH BATTLEFORD	SK					1		1	2
UNITY	SK						1	1	2
ANDREW	AB							1	1
GRANDE PRAIRIE	AB							1	1
MANNING	AB							1	1
PROVOST	AB							1	1
WANHAM	AB							1	1
FORT ST-JOHN	BC						1		1
Total trajectories per date		**5**	**1**	**8**	**14**	**24**	**23**	**30**	**105**

Table 2. Reverse trajectory locations, arrival dates, and number of events, for reverse trajectory events originating from Kansas and Nebraska, USA, June 18-24, 2024.

Location	Province	18-Jun-24	19-Jun-24	21-Jun-24	22-Jun-24	23-Jun-24	24-Jun-24	Total trajectories/location
ARBORG	MB			1		1	1	3
BRANDON	MB			1		1	1	3
PORTAGE	MB			1		1	1	3
RUSSELL	MB				1	1	1	3
SELKIRK	MB		1	1		1		3
GAINSBOROUGH	SK	1		1	1			3
WEYBURN	SK				1	1	1	3
CARMAN	MB				1	1		2
GRENFELL	SK				1	1		2
KINDERSLEY	SK				1	1		2
MOOSE JAW	SK				1		1	2
NAICAM	SK				1	1		2
SWIFT CURRENT	SK				1		1	2
TISDALE	SK					1	1	2
UNITY	SK				1	1		2
BEISEKER	AB				1			1
CALGARY	AB				1			1
LETHBRIDGE	AB				1			1
MEDICINE HAT	AB				1			1
VULCAN	AB				1			1
NORTH BATTLEFORD	SK				1			1
REGINA	SK				1			1
SASKATOON	SK						1	1
WATROUS	SK						1	1
Total trajectories per date		**1**	**1**	**5**	**17**	**12**	**10**	**46**