WEEKLY WIND TRAJECTORY REPORT for May 13, 2021 – Weiss[1], Vankosky[1], Trudel[2]

1 Agriculture and Agri-Food Canada
2 Environment and Climate Change Canada

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, such as diamondback moth. In addition, plant pathologists have shown that trajectories can assist with the prediction of plant disease infestations and are also beginning to utilize these same data. 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. Of particular interest are those trajectories that, prior to their arrival in Canada, originated over northwestern and southern USA and Mexico, anywhere diamondback moth populations overwinter and adults are actively migrating. If diamondback adults are present in the air currents that originate from these southern locations, the moths 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.

'Forward trajectories' have a similar purpose; however, the modelling process begins at sites in USA & Mexico. The model output predicts the pathway of a trajectory. Again, of interest to us are the winds that eventually end up passing over the Prairies.

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1. **Reverse trajectories**

Since May 1, 2021 the majority of reverse trajectories that have crossed the prairies originated from the Pacific Northwest (Idaho, Oregon and Washington). This week there have been an increasing number of reverse trajectories that moved north from Kansas and Nebraska (Fig. 1).

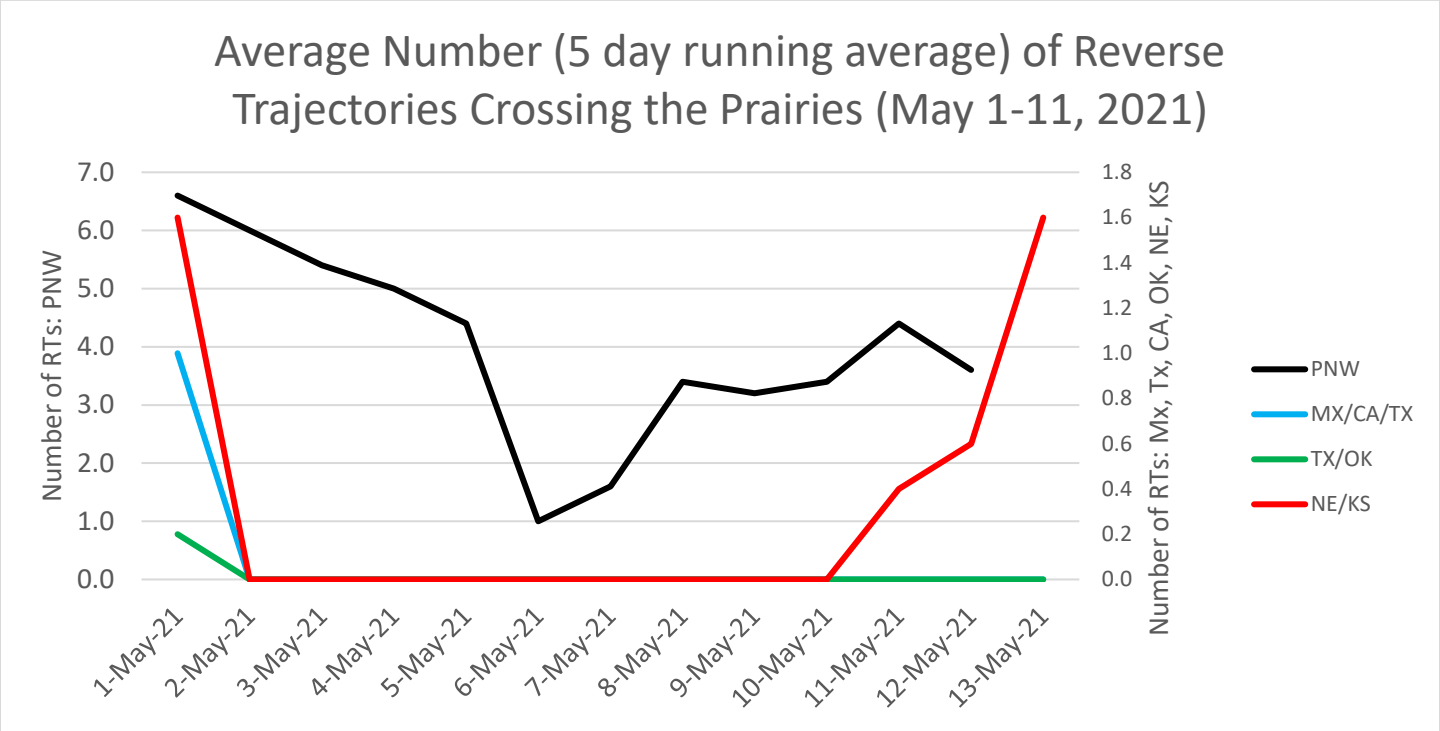

Figure 1. The average number (based on a 5 day running average) of reverse trajectories (RTs) that have crossed the prairies for the period of May 1-13, 2021.

a. Pacific Northwest (Idaho, Oregon, Washington) – The majority of Pacific Northwest reverse trajectories have been reported to pass over southern Alberta (Fig. 2).

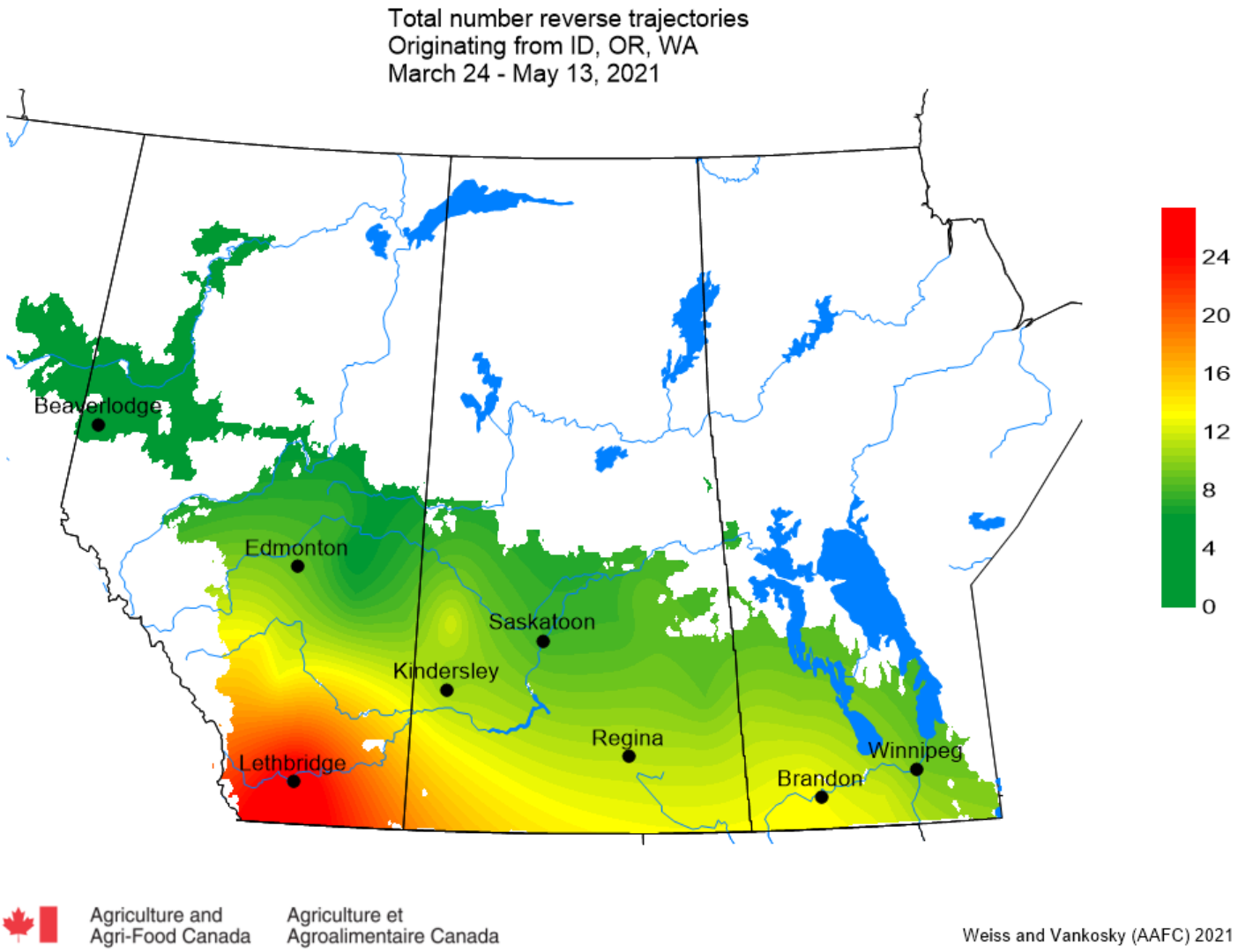

Figure 2. Total number of dates with reverse trajectories originating over the Pacific Northwest (PNW) (Idaho, Oregon, and Washington) that have crossed the prairies between March 24 and May 13, 2021.

b. Mexico and southwest USA (Texas, California) – Since last week there have not been any trajectories that originated in these areas that have crossed the prairies.

c. Oklahoma and Texas –Since last week there have not been any trajectories originating in Oklahoma or Texas that have crossed the prairies.

d. Kansas and Nebraska –This week reverse trajectories were reported for Alberta (Andrew, Sedgewick), Saskatchewan (Gainsborough, Grenfell, Kindersley, Regina, Yorkton) and Manitoba (Brandon) (Fig. 3).

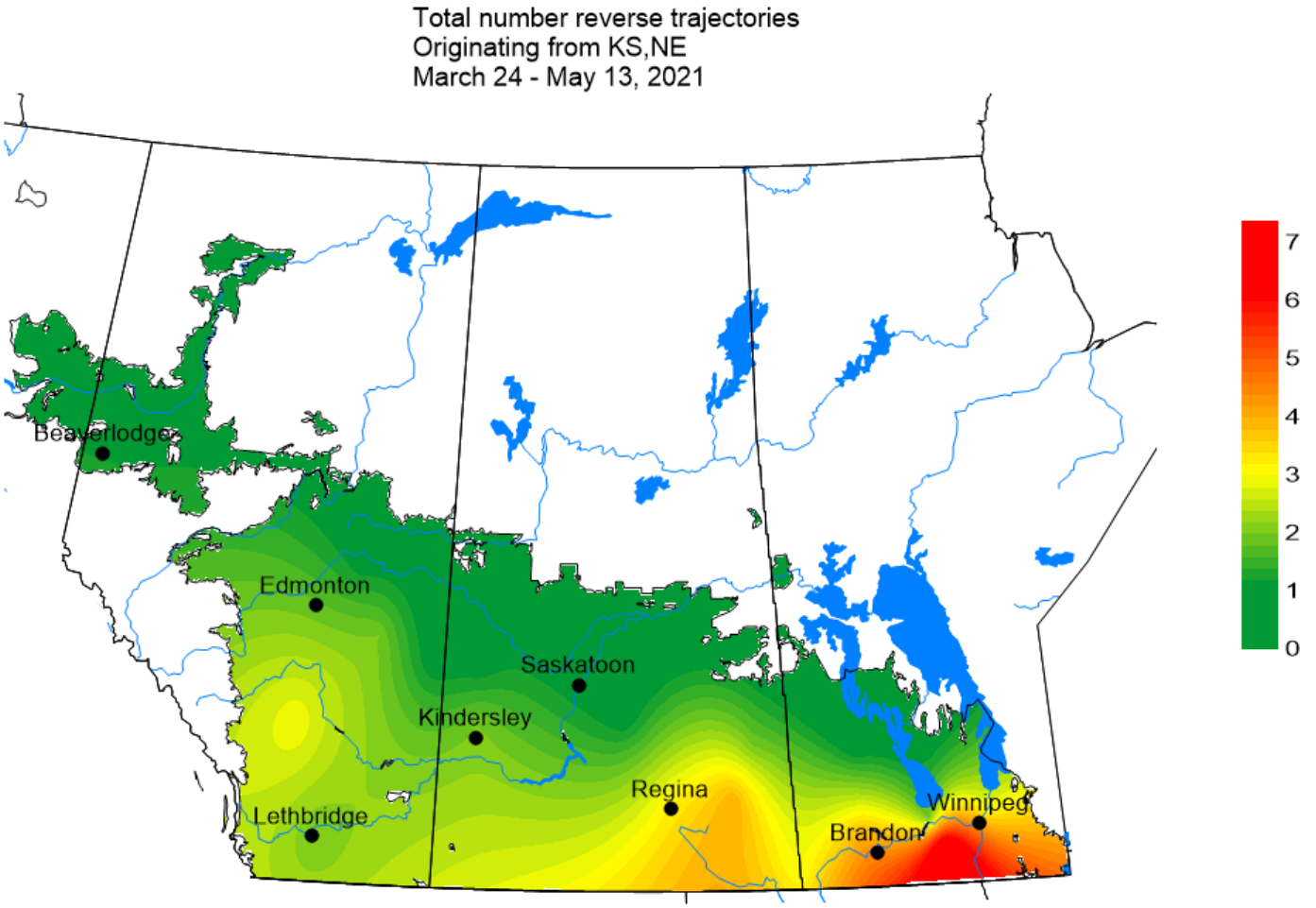

Figure 3. The total number of dates with reverse trajectories originating over Kansas and Nebraska that have crossed the prairies between March 24 and May 13, 2021.

2. Forward trajectories (FT) –

Forward trajectories, originating from Mexico and USA have crossed a number of prairie locations since May 1, 2021. Based on average totals (averaged across a five day period), the greatest number of forward trajectories were observed to originate between May 5 and 8 (blue bars) and entered the prairies between May 6-9 (Fig. 4).

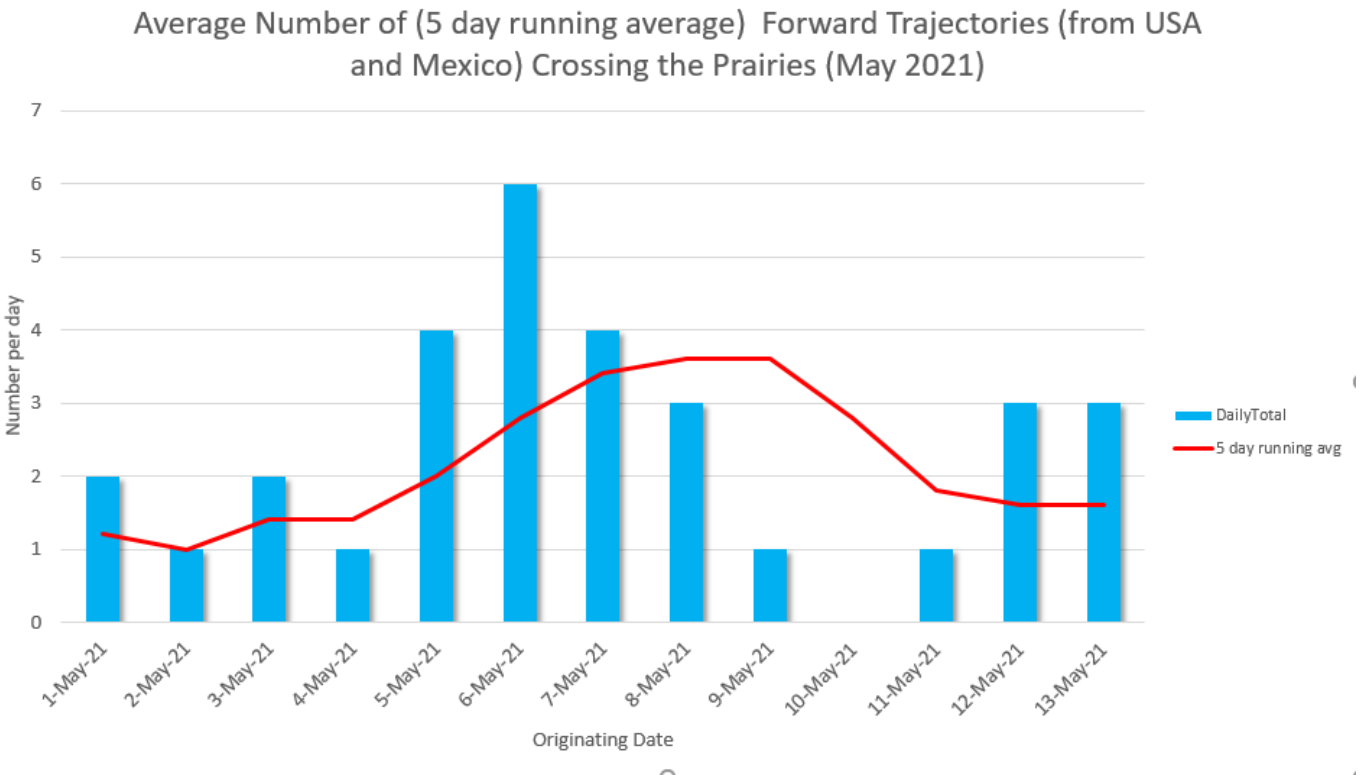

Figure 4. The average number (based on a 5 day running average) of forward trajectories that have crossed the prairies for the period of May 1- 13, 2021.

The following map presents the total number of dates (since March 24, 2021) with forward trajectories that have crossed the Canadian prairies (Fig. 5). Results indicate that the greatest number of forward trajectories entering Canada originated from the Pacific Northwest (Idaho, Oregon, Washington).

PRAIRIE PEST MONITORING NETWORK

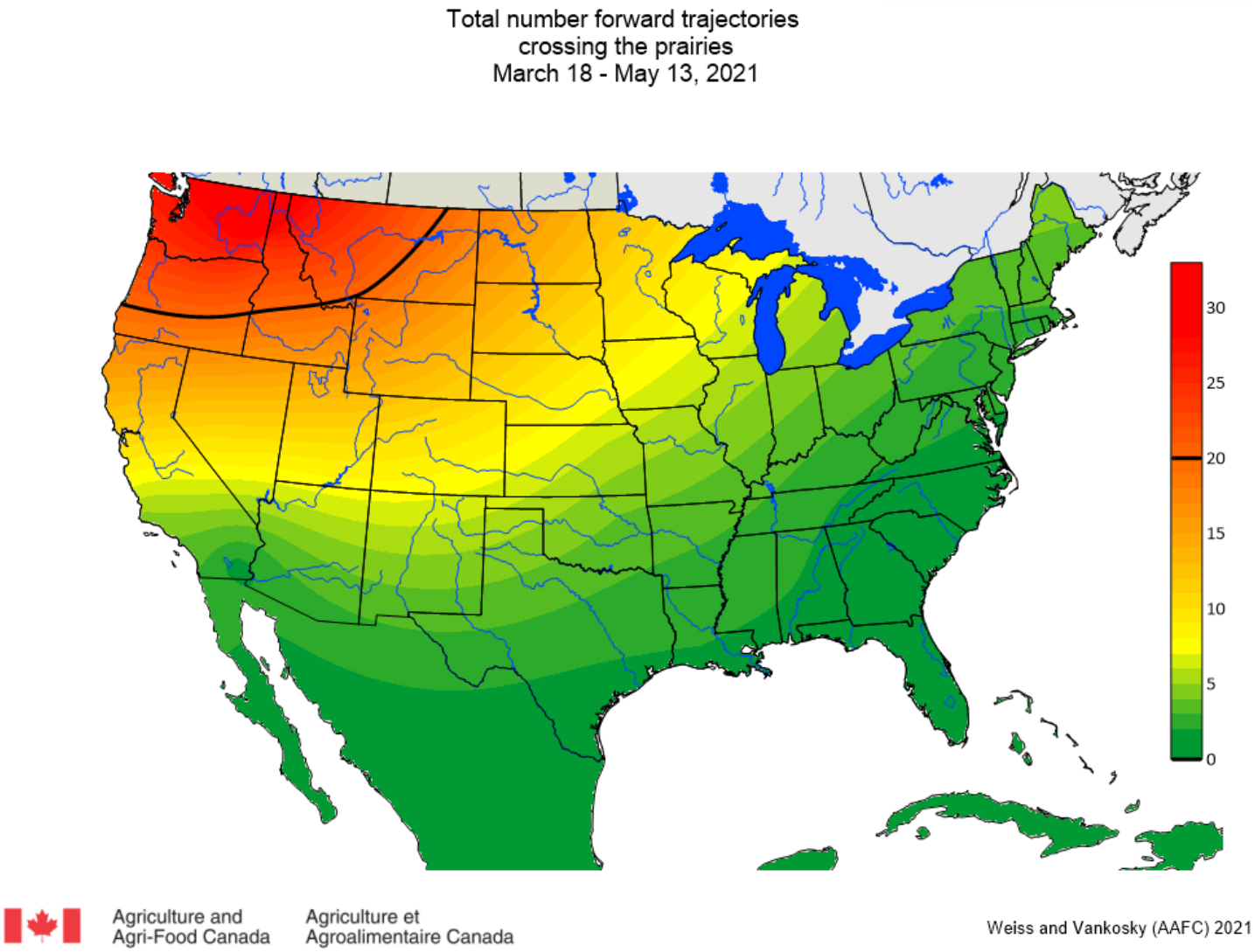

Figure 5. The total number of dates with forward trajectories, originating from various regions of the United States and Mexico, that crossed the prairies between March 24 and May 13, 2021.