

Moose Mountain Creek below Moose Mountain Reservoir
March 3, 2025 (Jared Ryan, Water Security Agency)



Souris River Basin Spring Runoff Outlook

As of March 3, 2025

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Basin Conditions

Rainfall during the 2024 growing season (April 1 to October 31) over the Saskatchewan portion of the Souris River Basin was generally below normal. The exception was in the lower portion of the Moose Mountain Creek Basin where precipitation accumulations were closer to normal (Figure 1). As shown in Figure 2, during the 60-days prior to freeze-up, the entire Saskatchewan portion of the basin received below normal precipitation accumulations. There was very little precipitation received throughout the basin in October and early November. As a result, prior to freeze-up in late November, topsoil moisture was generally considered to be below normal across the basin.

So far this winter, the precipitation accumulations have generally been near normal across the Saskatchewan portion of the basin. The exception is lower portions of the basin around and below the reservoirs where below normal accumulations have been observed (Figure 3). Over the past two weeks since the last update, no significant precipitation has occurred in the basin. Milder temperatures experienced at the end of February has resulted in a consolidation and gradual loss of the snowpack, but any melt has likely infiltrated and thus no significant runoff has been observed yet. The presence of ice within the snowpack and at the ground surface layer has the potential to impede soil infiltration capacities in the spring. As a result of the mid-winter melting of the snowpack and sublimation losses, the point snowfall data collected across the Saskatchewan portion of the Souris River Basin may overestimate the snow available for runoff in the basin. As of March 1, the snowpack is estimated to be below normal in the lower portions of the basin and near normal in the headwaters.

Snow Surveys

The Water Security Agency (WSA) conducted manual snow surveys in the Saskatchewan portion of the Souris River Basin from Feb. 24 to 27, 2025. The data collected during the manual snow surveys is represented as Total Water Equivalent (snow water equivalent plus any ice layer observed at the soil surface) in mm and is shown in Figure 4. This figure shows that 50 to 70 mm of SWE is available in the headwaters of the reservoirs, which is near to slightly above normal. Below the reservoirs, 30 to 50 mm of SWE was identified from the snow surveys, which is near to slightly below normal. A soil surface ice layer was observed at several sites across the Long Creek, Souris and Moose Mountain Creek basins and this collected data is shown in Figure 5.

Visual observations, as indicated on the February 24, 2025, satellite image (Figure 6), show near-complete snow cover throughout the basin. The manual snow surveys results generally confirmed the SWE values that were being represented by the SNODAS product (Figure 7), but in some areas, the recent melting patterns appears to have affected the accuracy of the SNODAS product. Generally, the snowpack ranges from above normal above the reservoirs to below normal below the reservoirs.

2025 Spring Runoff Forecast

As per the terms of the 1989 Canada-United States Agreement on Water Supply and Flood Control in the Souris River Basin, on February 1 and thereafter on the fifteenth and last day of the month until snowmelt runoff begins, the WSA, in coordination with the NWS, will prepare forecasts of the 30-day and 90-day spring runoff volumes for the basin.

Inflow estimates, based on conditions as of March 1, 2025, are outlined in Table 1. These volumes are the average of the WSA and NWS forecasts. Due to the lack of additional precipitation and the melting and sublimation losses from the snowpack, forecasted inflow volumes across the basin have decreased over the past two weeks. The snowpack currently ranges from below normal across lower portions of the basin to above normal in the headwaters above the reservoirs. Even with the variable snowpack in the basin, with the fall moisture conditions, runoff is expected to be near normal at all forecasted points. To illustrate the uncertainty in these forecasted volumes, estimates of the volumes associated with a 10 and 90 per cent probability of exceedance are included in the table.

The forecasted 50th percentile 30-day local runoff volume below the Canadian Reservoirs of 6,300 dam³ is below the 37,000 dam³ required to initiate flood operations under the terms of the 1989 Agreement. The forecasted unregulated 30-day volume at Sherwood of 60,400 dam³ is also well below the 216,110 dam³ threshold that can also initiate flood operations under the 1989 Agreement. With neither of the conditions being met, all are in agreement that operations will proceed based on non-flood operating rules, and no further reservoir drawdowns will be initiated at this time.

With Sherwood Natural volumes expected to be around the 50,000 dam³ threshold, operations during the freshet will proceed based on an assumption of Saskatchewan retaining up to 50 per cent of the natural flow. This will be reevaluated throughout the year and would revert to a 60-40 split if the computed natural flow is more than 50,000 dam³.

Table 1: March 1, 2025, Runoff Forecast for the Souris River Basin

	30-Day Runoff Volume (dam ³ x 10 ³)			90-Day Runoff Volume (dam ³ x 10 ³)			Peak Flow (m ³ /s)	Event Return Period (years)
	90% Exceedance Probability	50% Exceedance Probability	10% Exceedance Probability	90% Exceedance Probability	50% Exceedance Probability	10% Exceedance Probability		
Long Creek Near Noonan	8.5	12.9	29.0	11.5	17.5	39.3	20	1:2
Inflow into Rafferty Reservoir	4.3	15.0	66.1	6.2	21.7	95.5	18	1:2
Diversion to Rafferty Reservoir	2.0	6.4	0.0	5.0	11.0	0.0		
Inflow into Grant Devine Lake	5.9	11.4	28.2	8.7	16.9	41.9	19	1:2
Local Runoff	3.7	6.3	15.2	4.5	7.7	18.6	14	1:2
Sherwood Crossing Projected	9.4	20.1	62.3	14.3	27.9	119.0	14	1:2
Sherwood Crossing Natural	18.8	40.1	114.4	28.7	55.9	160.4	64	1:2
Sherwood Crossing Unregulated	22.3	45.6	138.5	30.9	63.8	195.3	71	1:2

Notes for the Forecast

During flood events, the 90-Per cent 90-Day inflow forecast to each of the reservoirs is used in Plates A-1, A-2, A-3 of the 1989 Agreement to determine target drawdown levels at Boundary, Rafferty, and Grant Devine Lakes respectively (Long Creek near Noonan, Inflow into Rafferty Reservoir, and Inflow into Grant Devine Lake in the above table).

Inflows into Rafferty Reservoir do not include diversion from Boundary Reservoir.

Local Runoff is the volume of runoff that is expected at the Sherwood Crossing from the basin below the Canadian reservoirs (Boundary, Rafferty, and Grant Devine). If this 30-day, 50 per cent probability of exceedance, Local Runoff volume exceeds 37,000 dam³, Flood Operations, as per Page A-26 of the 1989 Agreement, are initiated.

Sherwood Crossing Projected is equal to the expected runoff less planned reservoir storage at the Canadian Reservoirs to the end of the forecast period. This is the volume (and associated peak flow) that is expected to occur at the Sherwood Crossing based on local runoff and expected surpluses at the Canadian Reservoirs.

Sherwood Crossing Natural is equal to the expected runoff, less the volumes from the Yellow Grass and Tatagwa marshes, and minor project diversions. This is a simplified estimate of the natural flow volume at the Sherwood Crossing.

Sherwood Crossing Unregulated is equal to the expected runoff (including runoff from the Yellow Grass and Tatagwa marshes) that would be observed if the Canadian Reservoirs did not exist. If this best estimate (50 per cent probability of exceedance) 30-day Sherwood Crossing Unregulated volume exceeds 216,110 dam³, Flood Operations, as per page A-26 of the 1989 Agreement, are initiated. The best estimate 30-day volume is used in Plates A-5 and A 6 to determine target flows at Sherwood and Minot.

Proposed Reservoir Operations for the Spring of 2025

Please note that these are preliminary operating plans, based on forecasted inflows. Actual operating decisions will be made based on information available at the time.

Boundary Reservoir

On March 1, 2025, Boundary Reservoir was at an elevation of 559.60 m, approximately 6,500 dam³ or 1.23 m below the full supply level of 560.83 m.

Based on the projected runoff, flood operations are not in effect and no pre-runoff drawdown is required.

With average conditions going forward to spring melt, Boundary Reservoir is expected to fill in 2025 and there is a potential that the Boundary to Rafferty Diversion will be used to divert excess water into Rafferty Reservoir.

The preliminary operating plan for Boundary Reservoir is to store all inflows and divert any surplus runoff to Rafferty Reservoir.

Rafferty Reservoir

On March 1, 2025, Rafferty Reservoir was at an elevation of 549.29 m. This is 0.21 m below the Normal Drawdown Level of 549.5 m specified in the Agreement for the time prior to spring runoff, and 56,800 dam³ or 1.21 m below its full supply level (550.5m).

Based on the projected runoff, flood operations are not in effect and no pre-runoff drawdown is required.

With average conditions going forward to spring melt, Rafferty Reservoir is not projected to reach its full supply level in 2025.

The current operating plan for Rafferty Reservoir is to store all inflows, and make releases as needed at a controlled rate, respecting downstream constraints, including the target flow at the Sherwood Crossing. In the unlikely event that the reservoir is surcharged during the spring runoff event, the reservoir will be drawn down in a timely manner. Operations will take into consideration downstream flow constraints and obligations, including the Target Flows contained within the 1989 Agreement for the Sherwood Crossing.

Grant Devine Lake

On March 1, 2025, Grant Devine Lake was at an elevation of 560.85 m. This is 0.15 m below the Normal Drawdown Level of 561.0 m specified in the Agreement for the time prior to spring runoff, and 12,900 dam³ or 1.15 m below its full supply level (562.0 m).

Based on the projected runoff, flood operations are not in effect and no pre-runoff drawdown is required.

With average conditions going forward to spring melt, Grant Devine Lake is expected to reach its full supply level in 2025.

The preliminary operating plan for Grant Devine Lake is to store all inflows until the reservoir nears its FSL and then release water to limit any surcharge while taking into considerations downstream constraints and obligations, including the Sherwood Target Flow. In the event that the reservoir is surcharged during the spring runoff event, the reservoir will be returned to its FSL in a timely manner, taking into consideration downstream flow constraints and obligations, including the Target Flows contained within the 1989 Agreement for the Sherwood Crossing.

At this time, it appears that local flows below the Canadian Dams will not be sufficient to meet Canada's apportionment obligations. The balance will be monitored, and releases will be made, in consultation with downstream jurisdictions, to eliminate any deficit that may emerge. If needed, those releases would likely come from Grant Devine Dam unless there was a water supply benefit to releasing from Rafferty Dam.



Figure 1: 2024 Growing Season (April 1 to Oct. 31, 2024) Rainfall Per Cent of Normal



Figure 2: Per cent Normal Precipitation 60-days Prior to Freeze-up (September 17 to November 15, 2024)

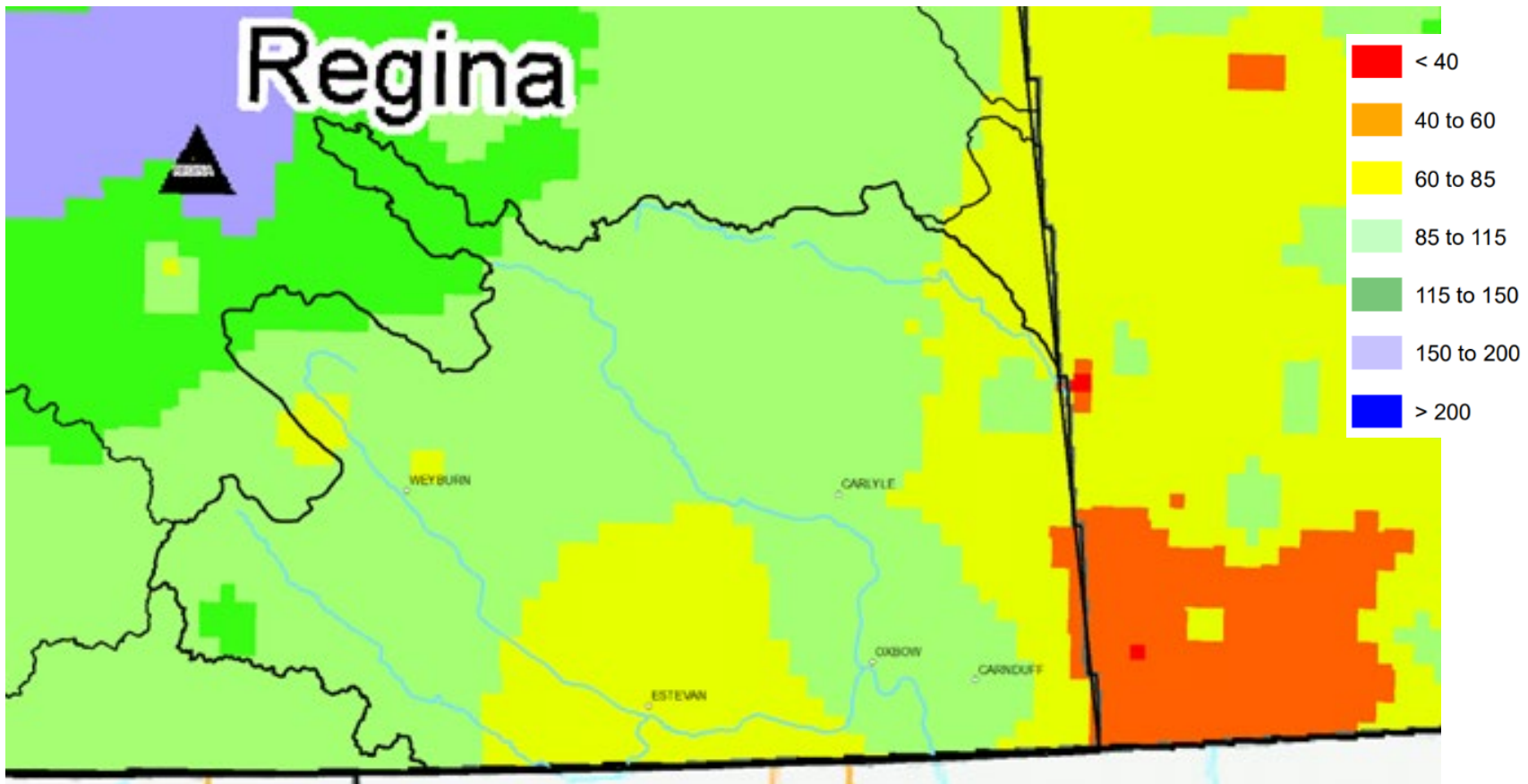


Figure 3: Percent Average Winter Precipitation (Nov. 1, 2024 – Feb. 27, 2025)
(Map Courtesy of Agriculture and Agri-Food Canada)

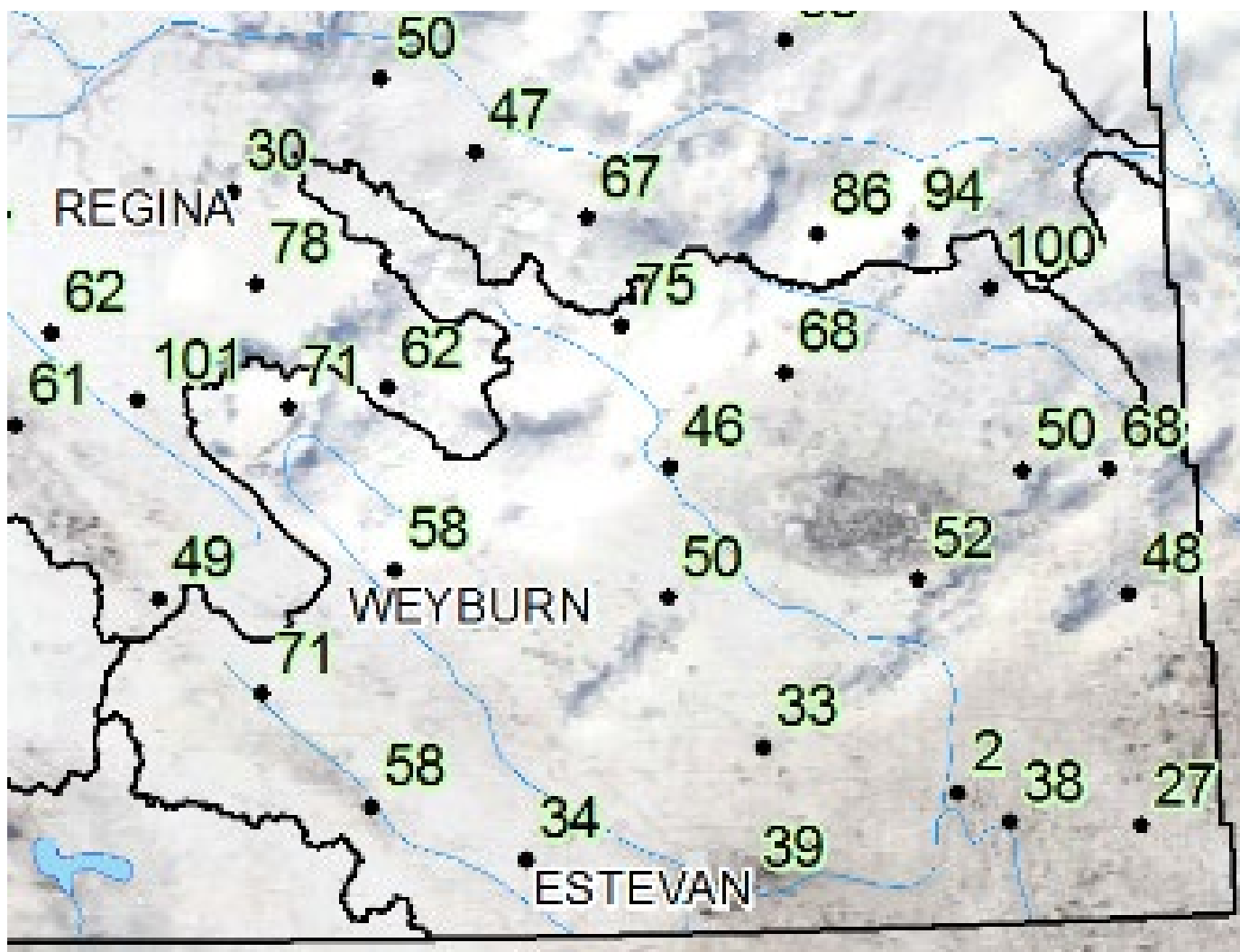


Figure 4: Feb. 24-27 Snow Survey Total Water Equivalent (mm)

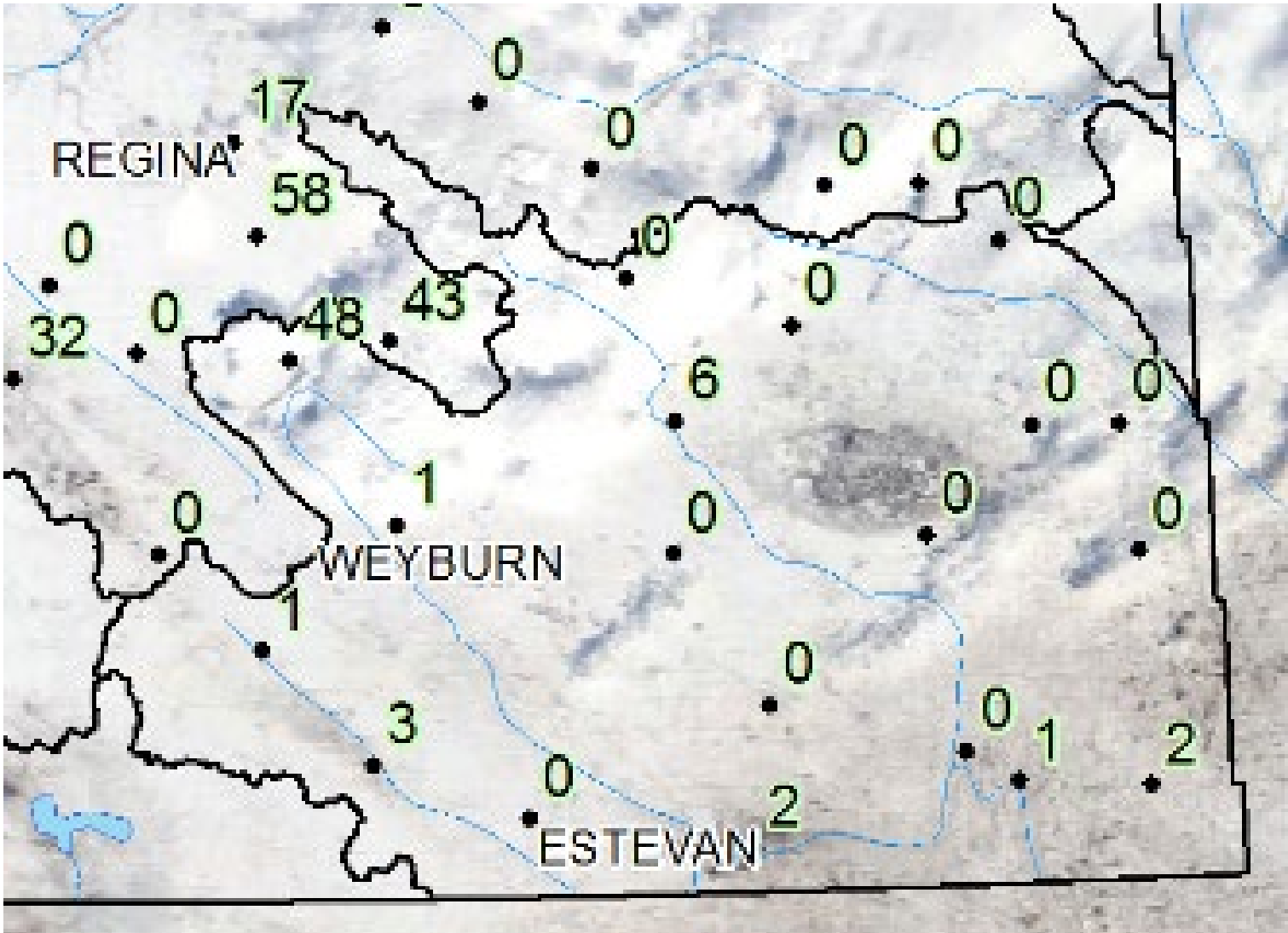


Figure 5: Depth of ice layer observed (mm) during Feb. 24-27, 2025 snow survey

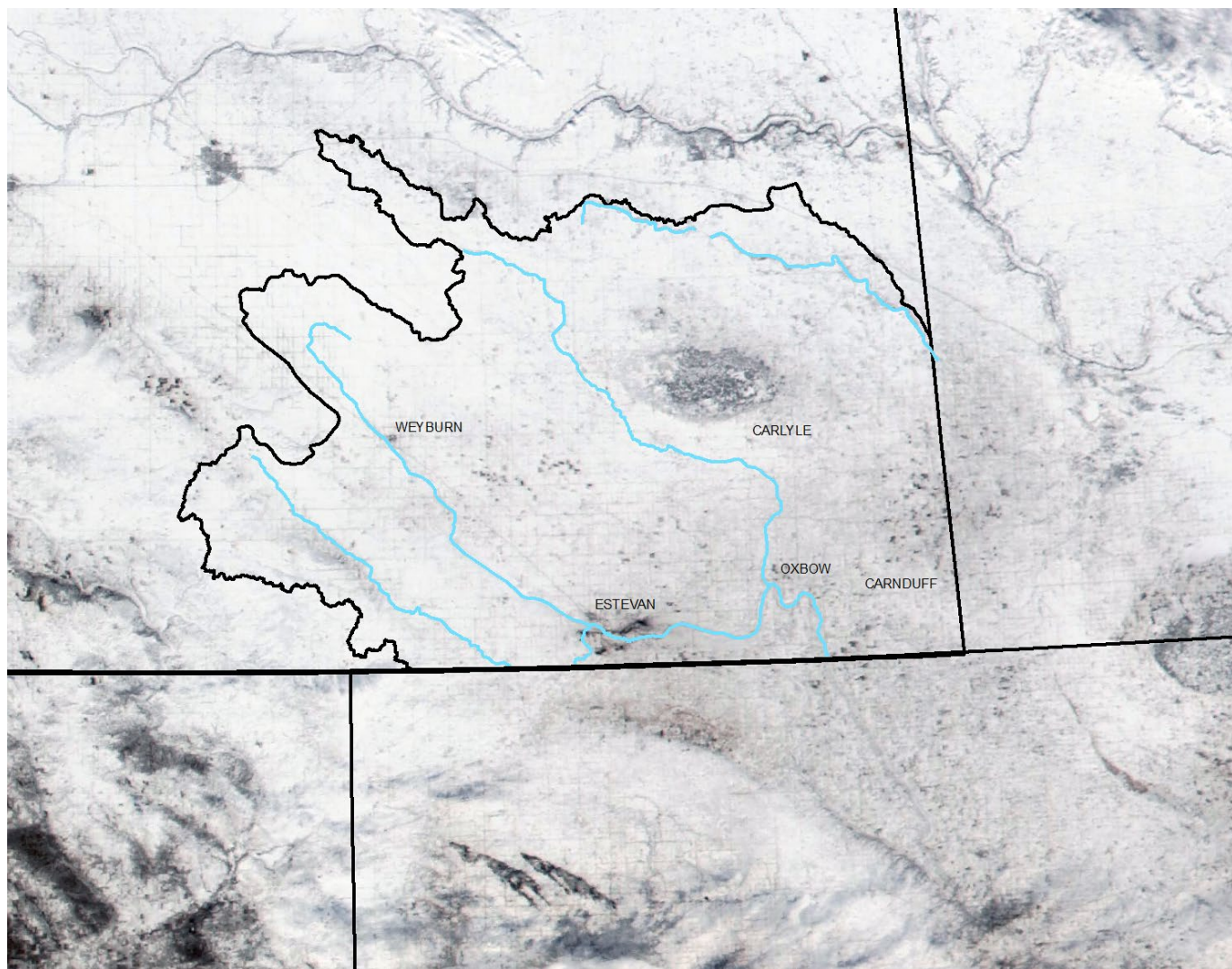


Figure 6: February 24, 2025 MODIS Satellite Image

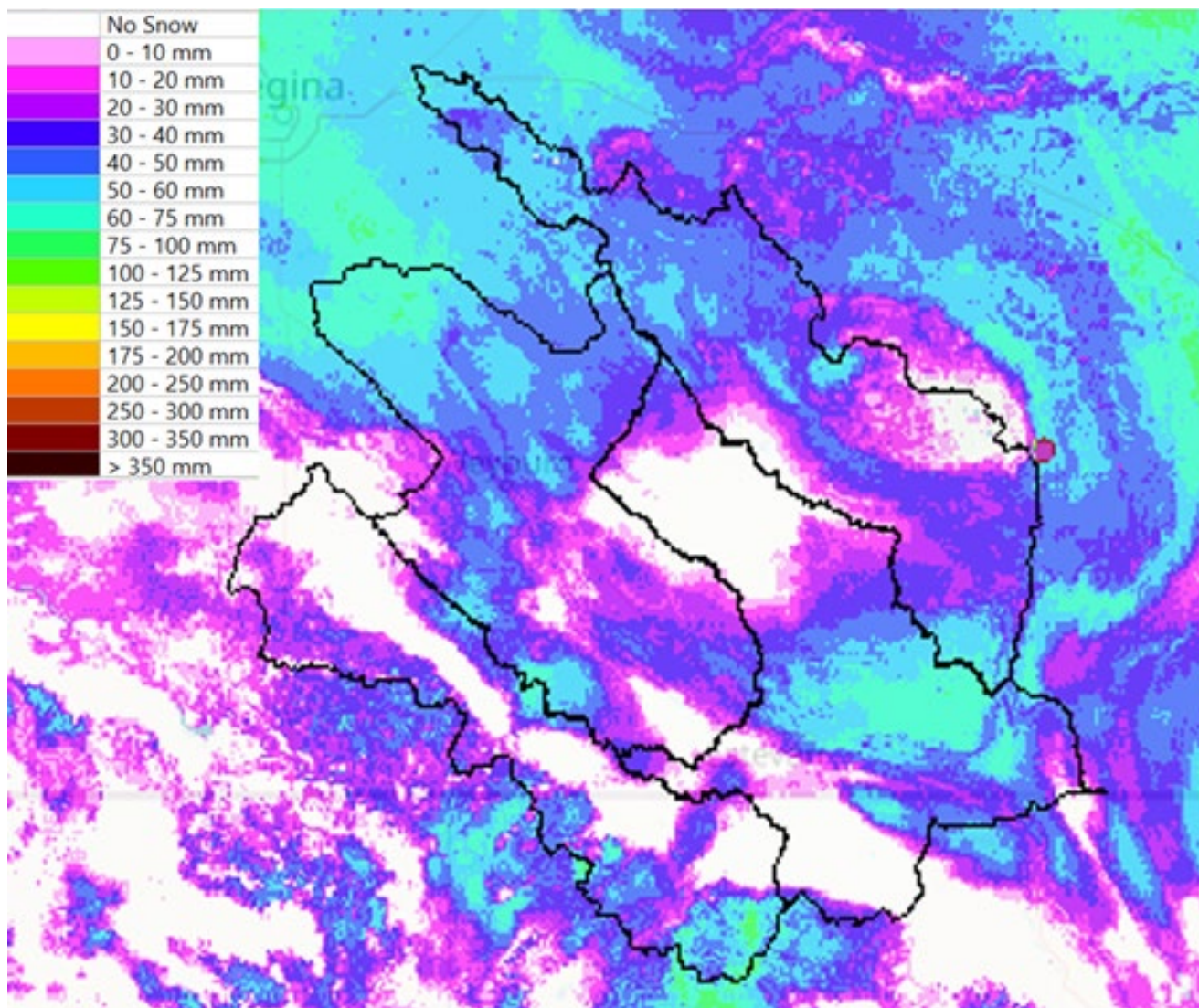


Figure 7: SNODAS SWE Estimates February 28, 2025