The Microclimate of the Ekalaka/Ekalaka Hills Region

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Overview: The Ekalaka/Ekalaka Hills region, located in Carter County, MT (MT037), is susceptible to several different types of high-impact weather phenomena. Ekalaka sits at just over 3400 ft in elevation, while the hills, just a few miles south of town extend up to approximately 4100 ft.

From late fall to early spring, winds from a northerly direction may flow up the 600-700 ft incline from Ekalaka to the top of the Ekalaka Hills, generating upslope snow/rain. Snow accumulations in the hills can be several inches greater than surrounding areas. This can lead to hazardous conditions for people and livestock in the region. When the snow melts, some of the runoff may flow back down the hills and end up in the valleys in and around the town of Ekalaka, increasing the potential for flooding in low-lying areas, especially if a good portion of the ground is frozen. Under clear, calm conditions and/or with a low-level inversion present, this additional moisture combined with snowmelt in the valleys may increase the potential for fog, impacting vehicle operators on local/state roads and highways (such as State Highways 7 and 323) and aviation in and around the Ekalaka Airport. The upslope flow may also result in persistent low clouds, providing an additional flying hazard for aviators in and around the Ekalaka Airport.

In the late spring and summer, the Ekalaka Hills also likely help initiate or enhance convection. Warm, moist air may be lifted orographically up the hills; especially if/as low-level moisture is advected into the region from the south or southeast. This process may produce locally stronger convection, resulting in more intense thunderstorm activity and rainfall (rates) locally (i.e. increasing the potential for severe weather and flash flooding).

Any time of year, a strong southerly or southeasterly wind may also generate downslope flow from the Ekalaka Hills northward into Ekalaka, resulting in drier and slightly warmer conditions north of the hills. If conditions have been persistently dry for some time, the additional drying due to the downslope flow may increase the risk of fire(s) locally.

Diagnosis Challenges: Weather radar data below 15 – 20 kft is unavailable due to the isolated location in southeastern MT. As all of the phenomena described above are either strictly low-level phenomena or are initiated in the low levels, a lack of low-level radar data makes it extremely difficult to determine exactly what is happening in the region. Furthermore, because this region is small, many of the processes responsible for producing the aforementioned weather phenomena are not easily captured by NWP models and are often parameterized.

Forecasting Tips: Forecasters must rely on real- or near real-time data such as automated weather observations and weather satellite images/loops to correctly assess what is occurring. COOP and CoCoRaHS observers play a sizable role in assisting with the diagnosis/forecast process. As such, they should be called and/or utilized as necessary. Within AWIPS/GFE, SERP

points in and around the Ekalaka region have been added – using these points in conjunction with observed data and knowledge of local effects will help increase the accuracy of forecasts and warnings in/near Ekalaka.

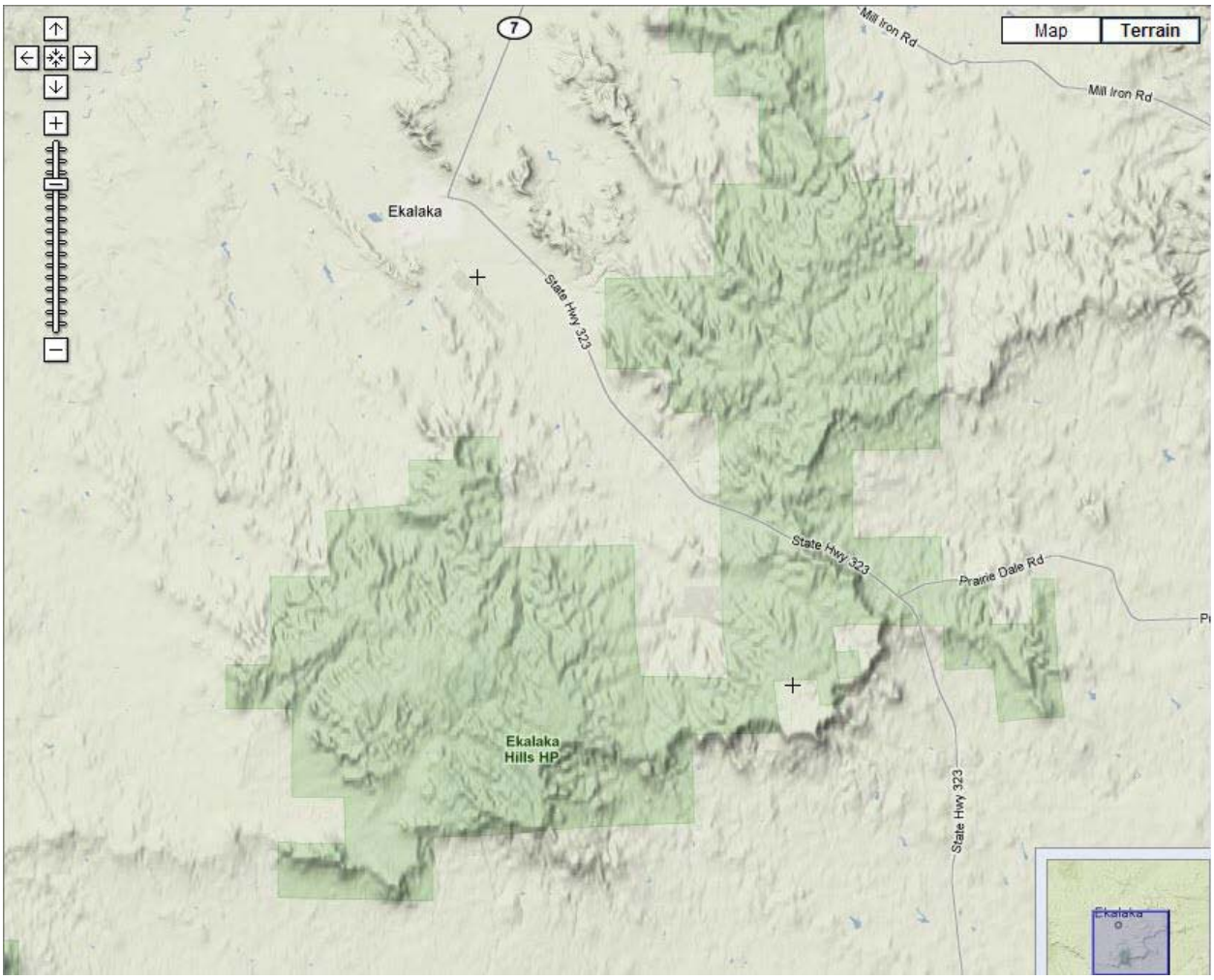

Figure 1 The Ekalaka/Ekalaka Hills region (with terrain)