

## Particle Tracks for Residential Drinking Water Wells Near Several Dairies in the Lower Yakima Valley

These maps were developed by EPA using data from a U S Geological Survey (USGS) study:

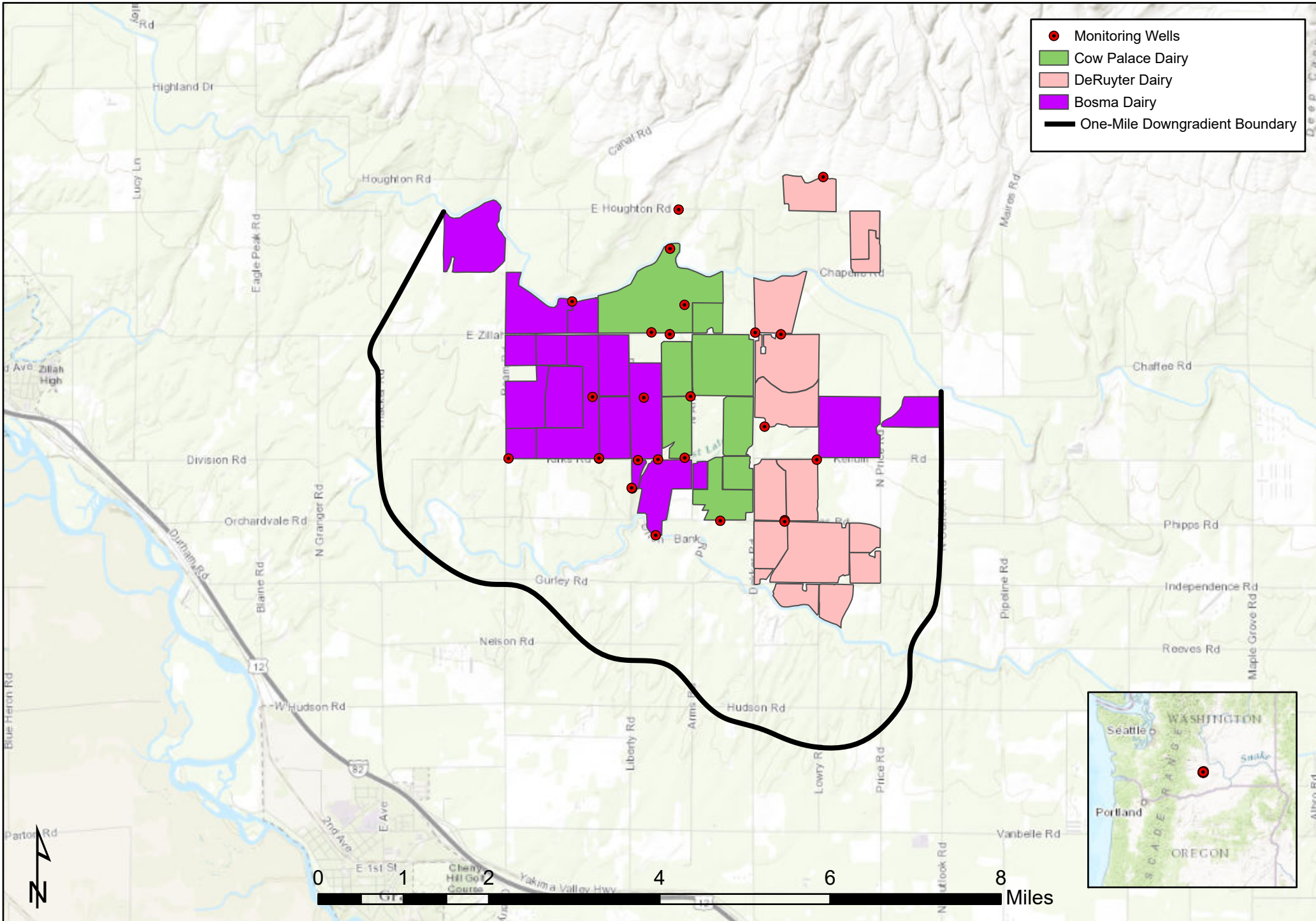
<https://pubs.er.usgs.gov/publication/sir20155149>

The slides show the predicted groundwater recharge areas for some residential drinking water wells that are located northeast of Granger, Washington (see Figures 10 and 11 in the USGS Report). The predicted recharge areas, depicted in the slides as particle tracks that were developed by USGS with the groundwater models MODFLOW and MODPATH, utilized groundwater data that were obtained over a wider area over many years, as explained in the study.

The drinking water wells are located generally downgradient of several large dairies. In 2013, those dairies signed a Safe Drinking Water Act Administrative Order on Consent with EPA to reduce nitrate loadings from their facilities to the drinking water aquifer. EPA's slides show the particle tracks for individual drinking water wells and their spatial relationship to the general area and dairies' facilities. Each drinking water well exceeded the drinking water standard for nitrate of 10mg/L. The modeling effort used information including the geographic locations and approximate depths of the wells, groundwater flow information, and other aquifer characteristics. The data were used to estimate the locations where water entering a residential well screen infiltrated to the water table surface of the aquifer. EPA's maps provide the approximate times of travel, in years, of the particle tracks. The times of travel were generated by the groundwater models. There are a number of tracks shown for each individual domestic well because the modeling included estimates for many points in the vicinity of the well screen, to accommodate uncertainty. The particle tracks indicate the predicted groundwater recharge areas for the domestic wells.

Please refer to the USGS study for more information about the data, the particle tracks, and their limitations.

# Yakima Dairy Cluster

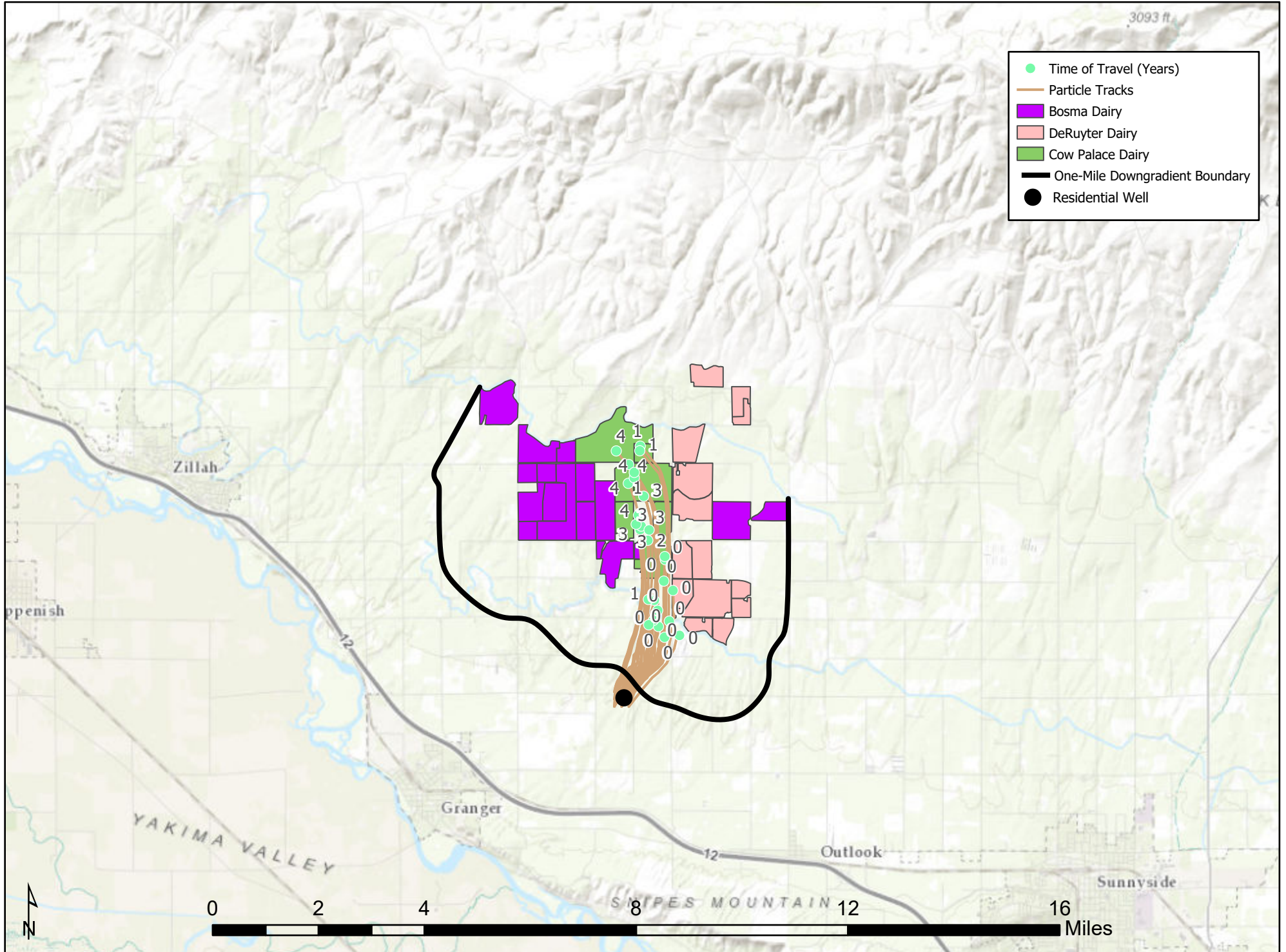








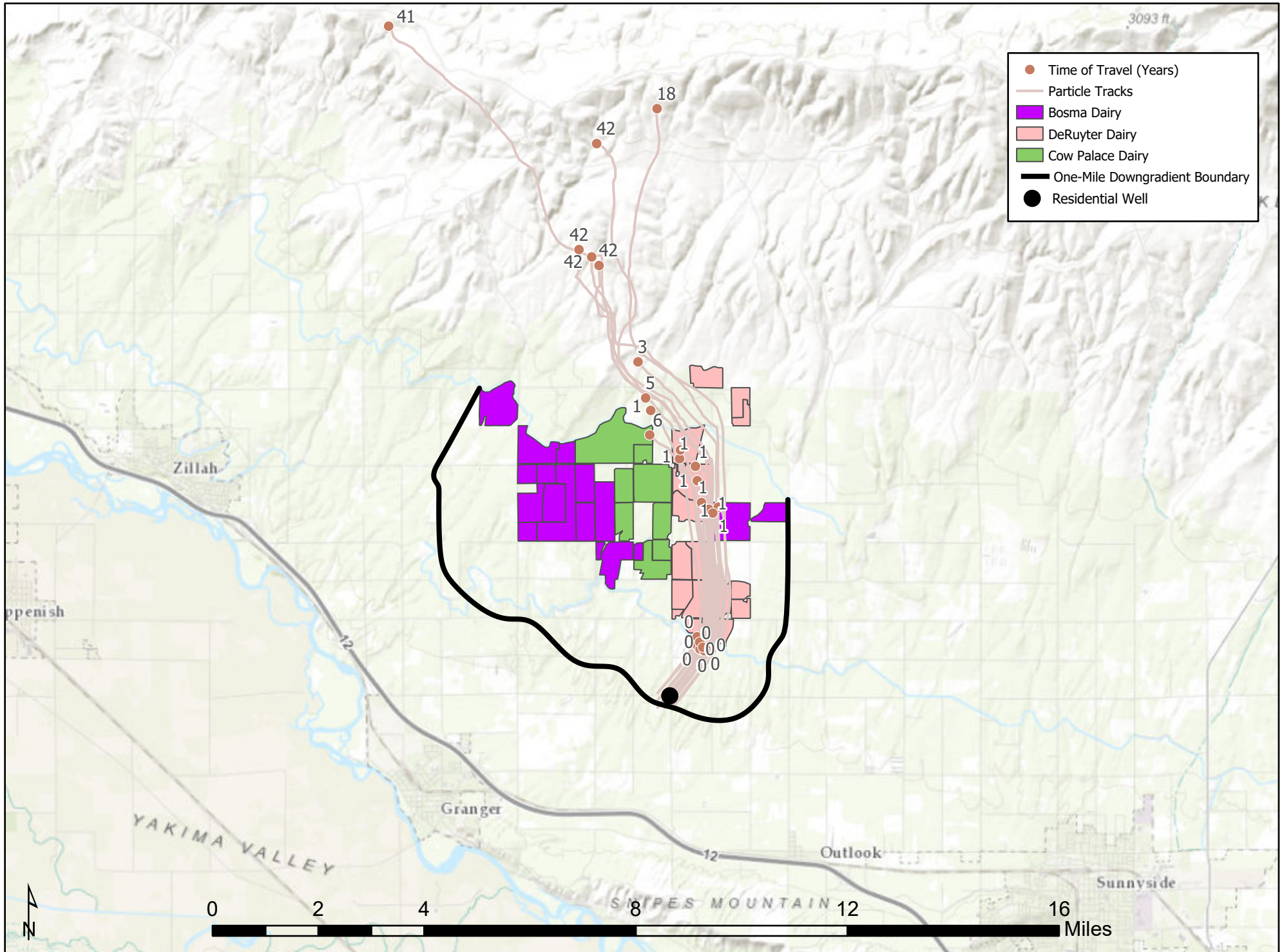
# Particle Tracks for One Residential Drinking Water Well that Exceeds the Nitrate MCL (10 mg/L)



\* EPA generated set of figures based on USGS data



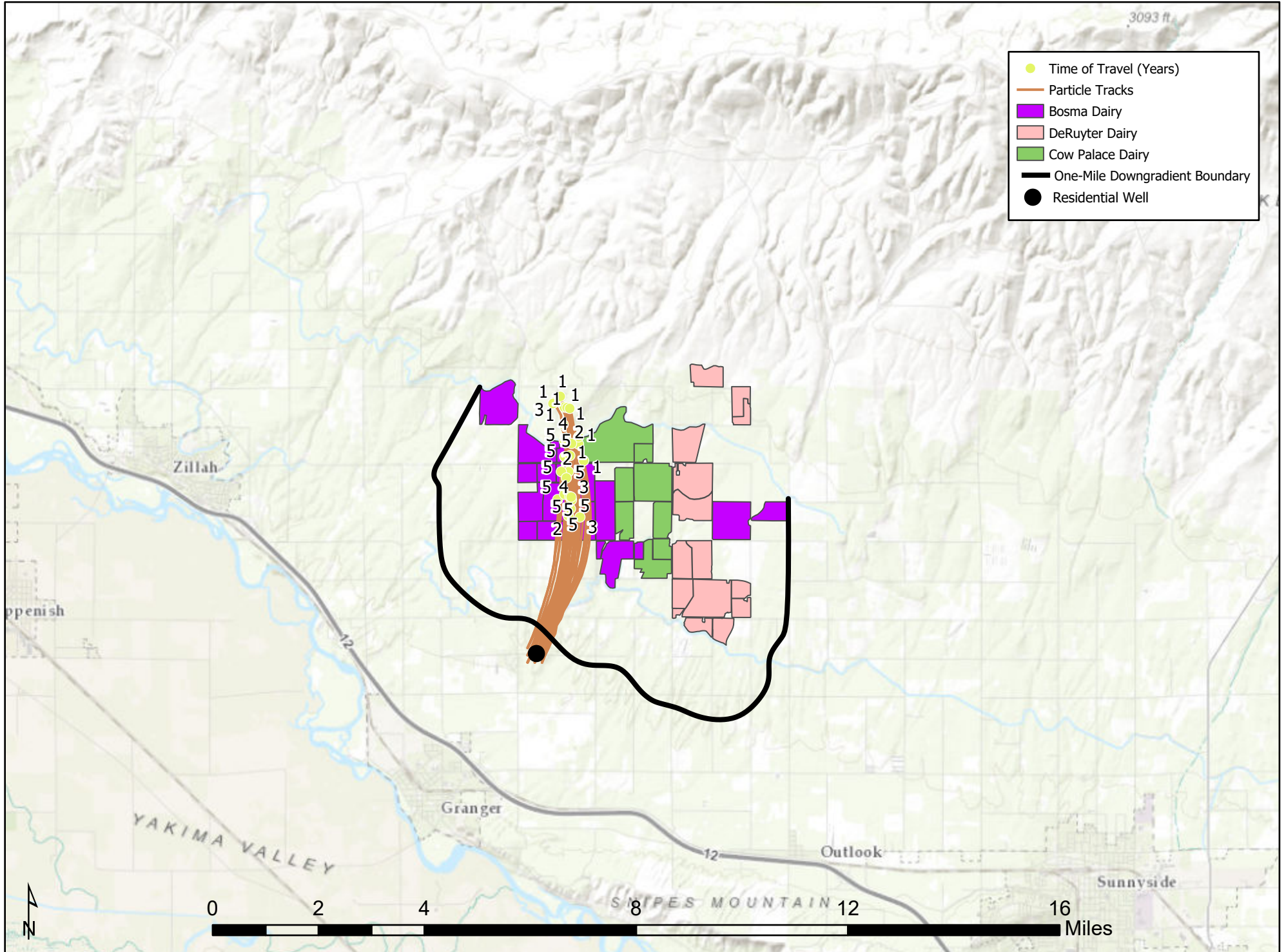
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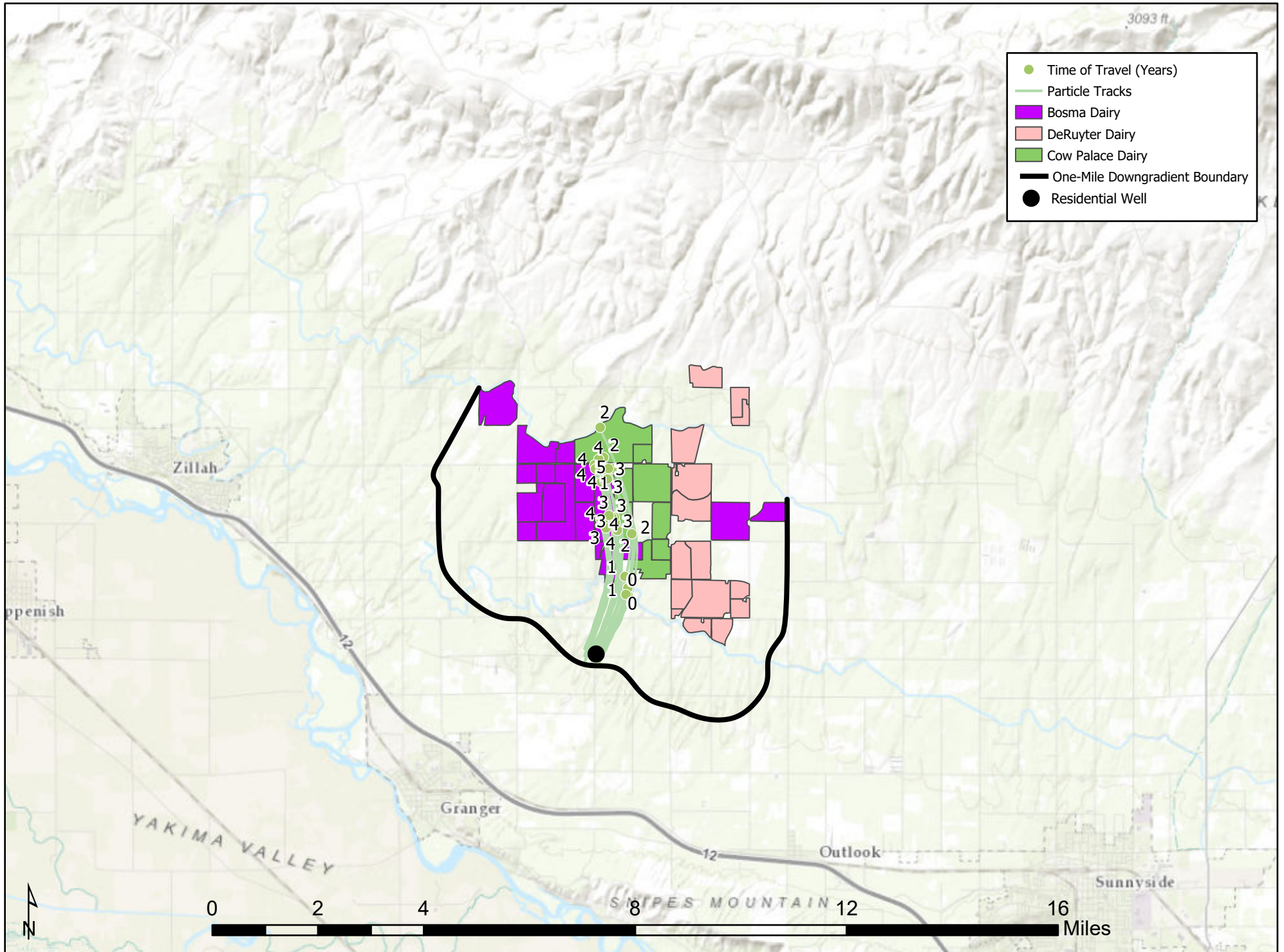
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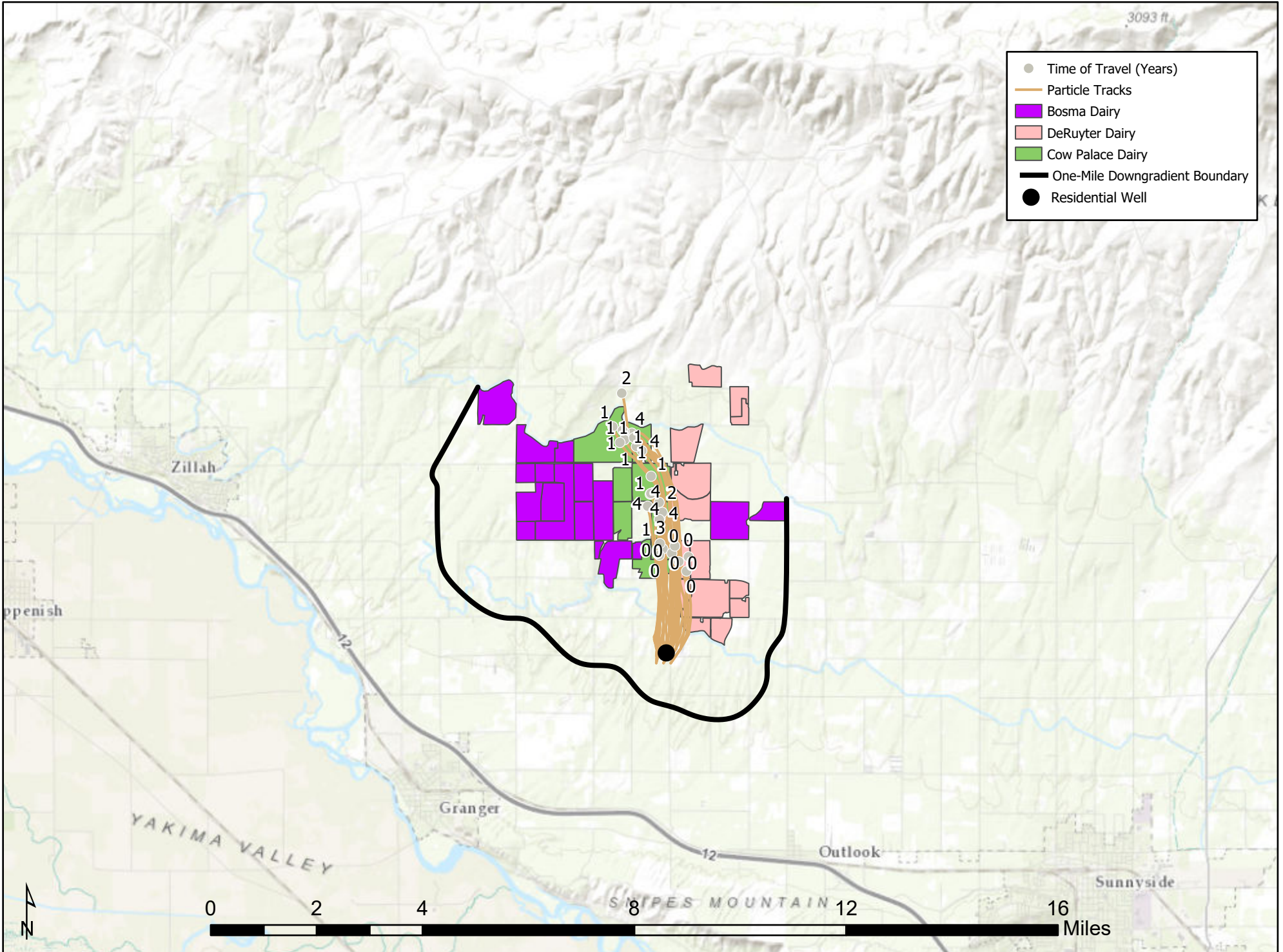


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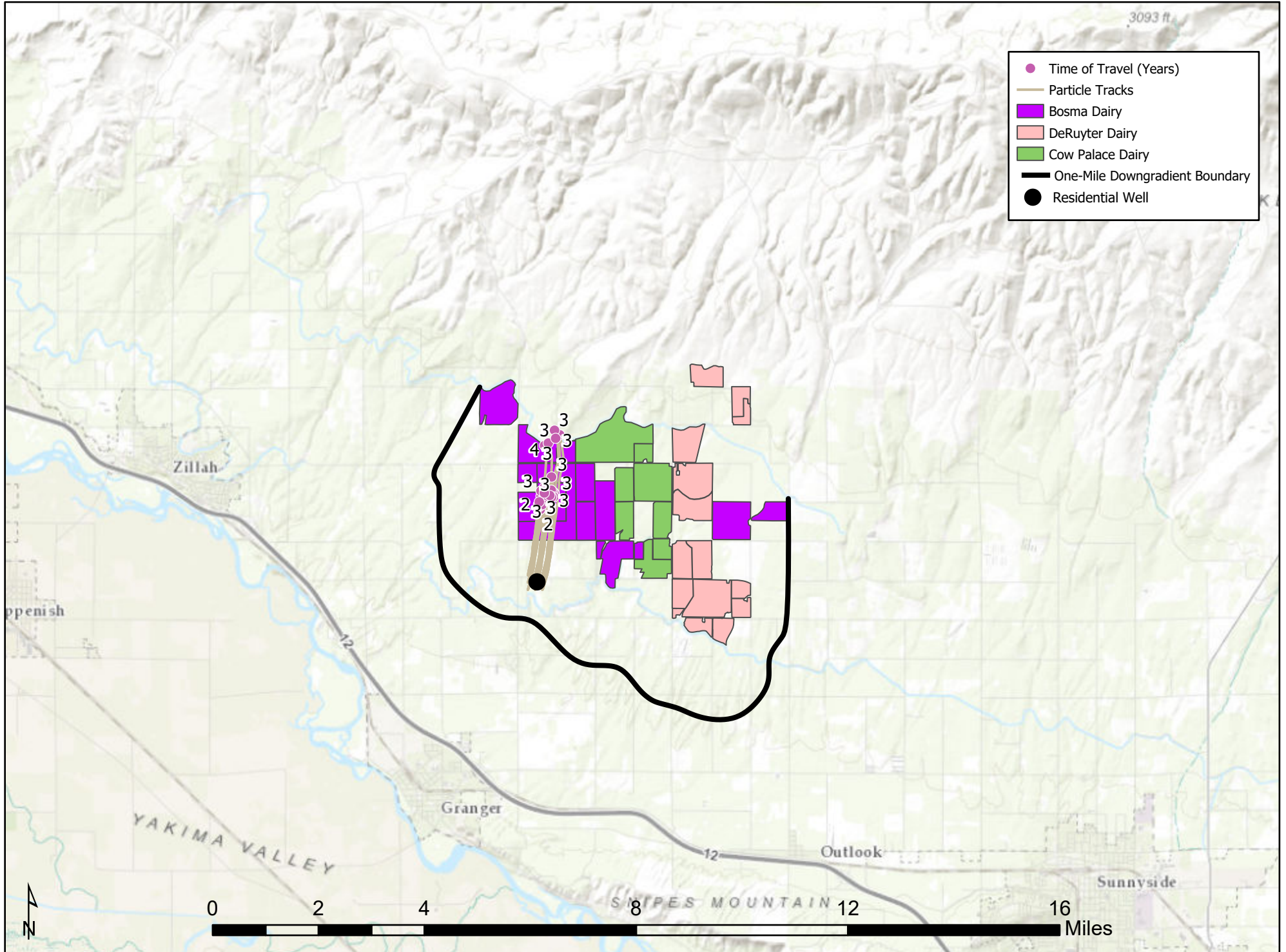


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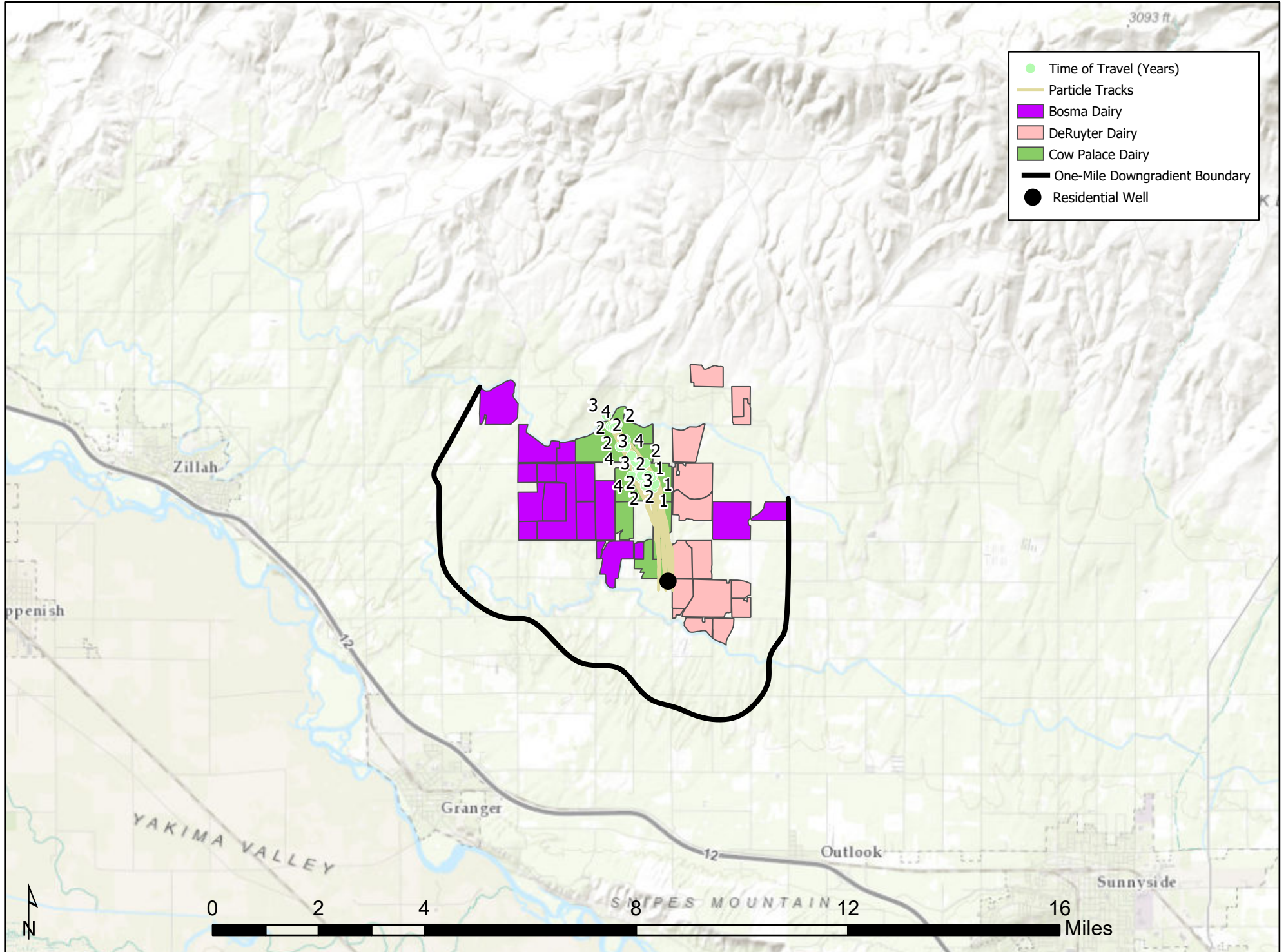
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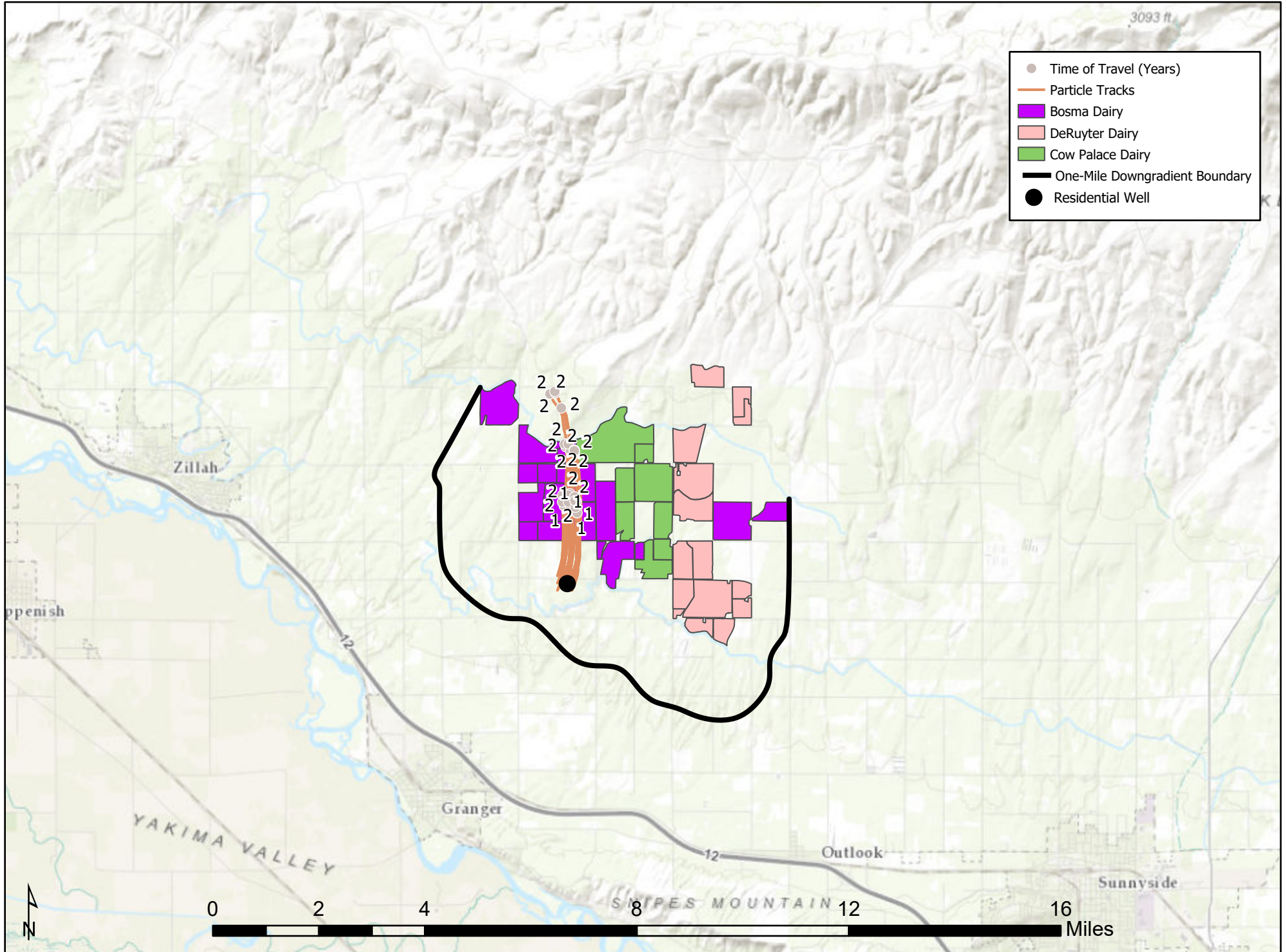


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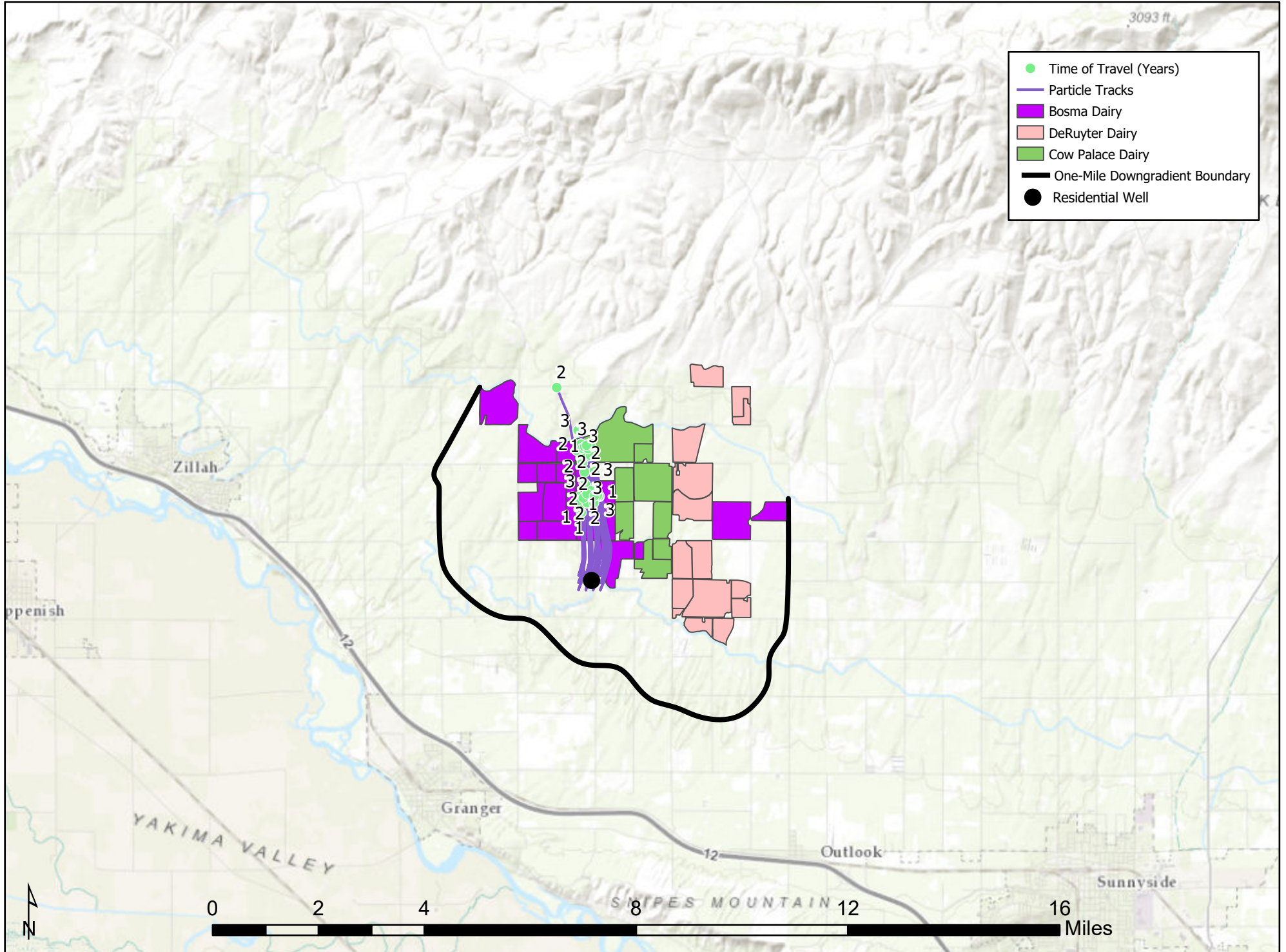
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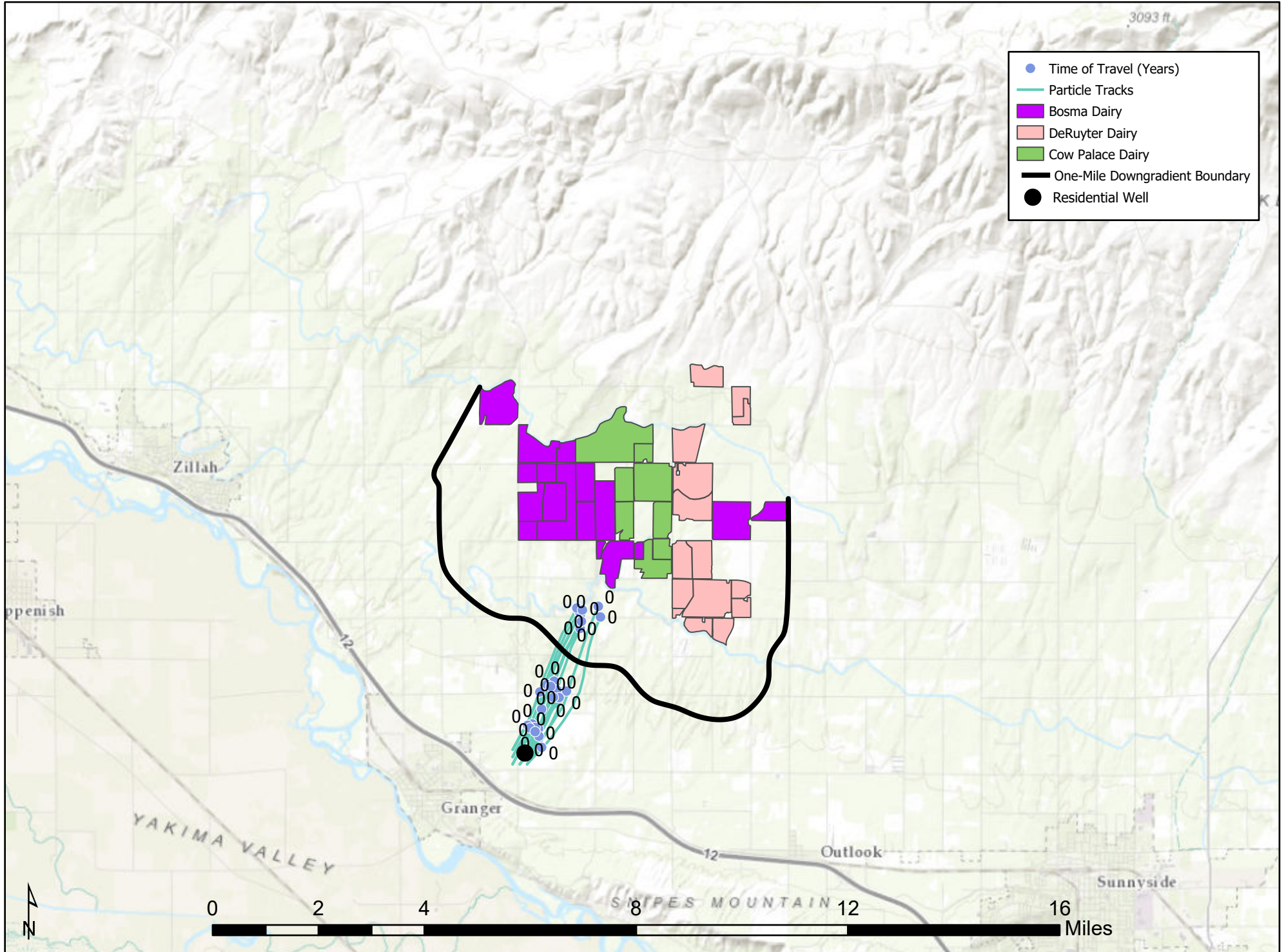
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