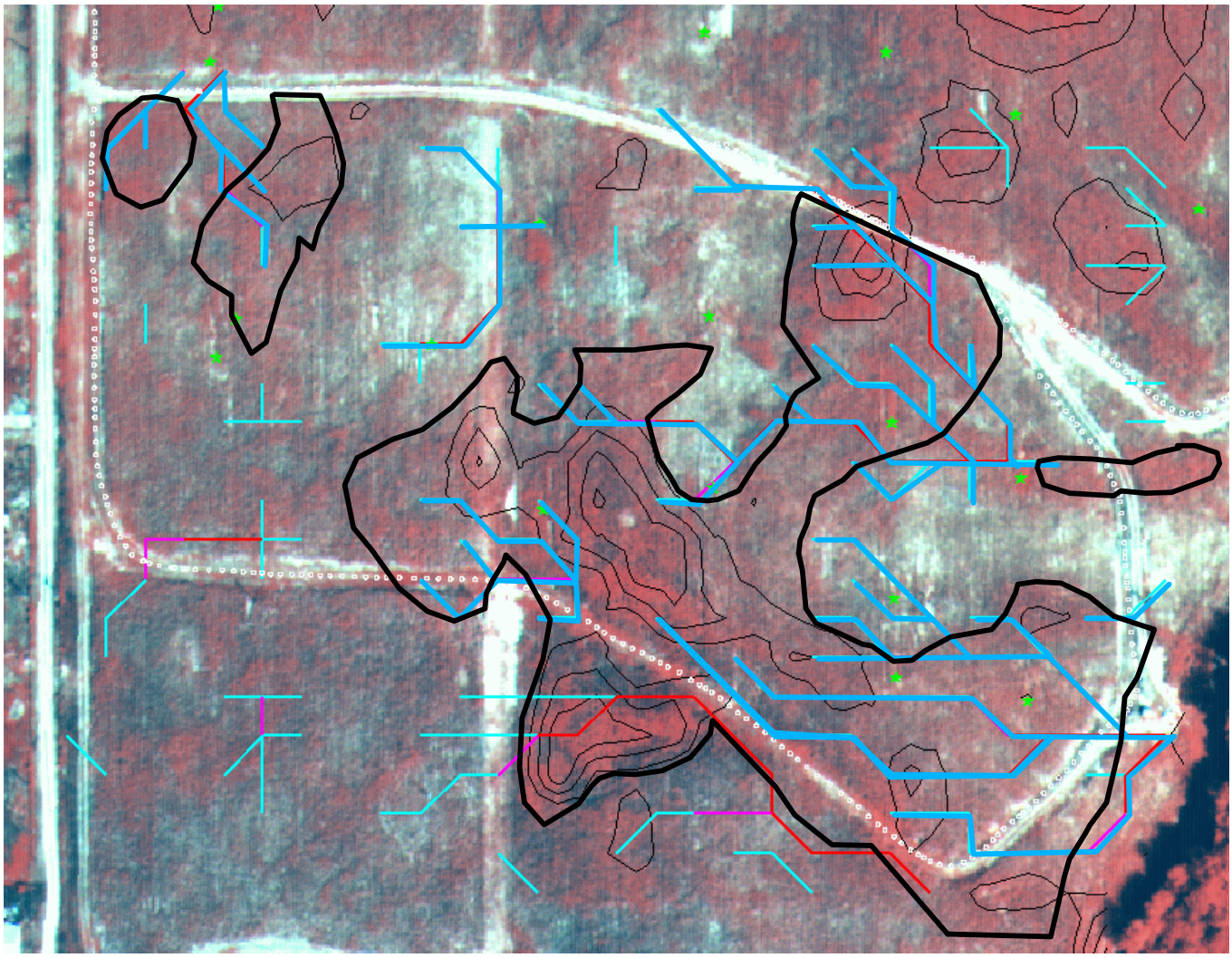
Subsurface Preferential Flow at the Small Watershed Scale

The major limitation to accurately quantifying and predicting chemical transport at the field and watershed scale is an accurate characterization of the subsurface preferential flow processes. Unfortunately, conventional sampling methods are extremely ineffective for measuring preferential fluxes of water and solutes. Preliminary results at OPE3 demonstrate that a sampling strategy based on ground-penetrating radar mapping of soil structures can accurately identify preferential subsurface flow pathways which are critical to determining an accurate chemical flux exiting a watershed. We are presently monitoring the matrix and preferential water flow pathways and the composition of the water flowing in these pathways (nitrate, bromide (tracer), phosphorous, and pesticides) so that subsurface chemical fluxes can be determined at the watershed-scale.



In this infrared image of Watershed B, red regions indicate vigorous vegetation, preferential flow pathways are denoted with blue lines, high yield regions are identified with thin black polygons, while regions influenced by subsurface flow are shown denoted by thick black polygons. Soil moisture locations are represented with green stars. Highest grain yields occurred where the preferential flow pathways are within 2m of the soil surface.

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