



## **Mapping hydrologic connectivity of geographically isolated wetlands**

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Geographically isolated wetlands (GIWs) are characterized as depressional landscape features completely surrounded by uplands. These small and typically circular landscape features represent a vast majority of wetlands in various landscapes in North America (98% of all wetlands in the Prairie Pothole Region). Geographical isolation, however, does not imply the hydrological isolation. Although geospatial data (e.g., aerial photos) suggested that GIWs lack a persistent surface water connection, the groundwater connection between GIWs and navigable downstream waters can be substantial with large fluxes at the regional scales. The surface/subsurface connections among GIWs and between GIWs and navigable waters are difficult to map and quantify. This is intimately tied to the fact that an efficient incorporation of these small geometric features and characterization of the mechanisms behind these connectivities are challenging within grid-based simulators. We used a physically-based grid-free groundwater-surface water interaction and surface flow routing schemes to map and assess the watershed-scale GIWs connectivity within an extensively studied watershed at the Canadian prairie pothole region with high density of GIWs. The results showed that there is a persistent subsurface connectivity among GIWs and between GIWs and navigable waters. Surface connection was rare and only occurred during extreme events. The results of this paper have significant implications for developing scientifically grounded environmental policy for protection of GIWs within North American Prairie.