

Water Quantity Additional Questions

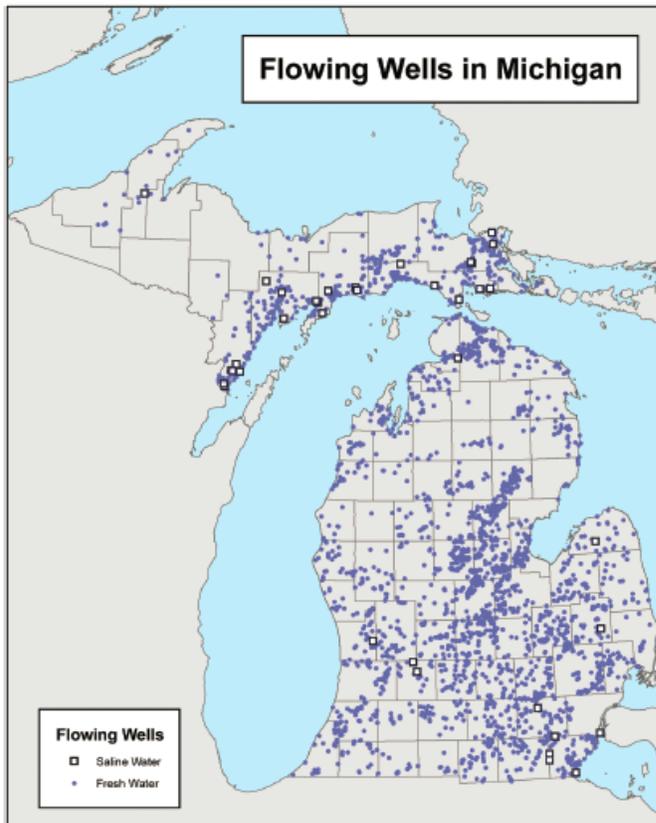
Thank you to Jim Milne and Dave Lusch for their answers.

Question: Monroe County has karst geology and an artesian well (blue hole) in the Erie Marsh. What does this say about our water resources?

Answer: Jim- Limestone bedrock can be dissolved by groundwater, creating karst topography, which can include caverns and sinkholes when the overlying deposits collapse. There are bedrock carbonate formations around the rim of the Michigan Basin so you can encounter this in SE MI and the Presque Isle County area. I am more familiar with karst topography in Presque Isle County and offshore in Lake Huron and there were reports of karst sinkholes on Grosse Ile.

Dave- The surficial glacial deposits in Monroe County are mostly fine-textured and do not yield very much groundwater to wells. The bedrock formations beneath Monroe County are dominated by carbonates (limestone and dolostone) which do yield moderate amounts of groundwater to wells. The presence of karst features, like sinkholes, is a clear indication that surface runoff can easily make its way into the bedrock aquifer systems. This means that pathogens as well as agricultural pesticides and

herbicides can easily contaminate the groundwater in the bedrock aquifers. *Under no circumstances should sinkholes be used as surface water drains.*



Artesian wells are not karst features. They are wells which have penetrated a confined aquifer system (either glacial or bedrock) which is under pressure, causing the groundwater in the well to rise above the top of the aquifer. Sometimes, the pressure is great enough that the groundwater in the well flows out at the surface. The Well Construction Code for the State of Michigan requires licensed well drilling contractors to control the flow of high-pressure artesian wells in order to preserve the artesian nature of the local aquifer. Flowing wells are found throughout Michigan (see graphic below).

Question: Can you discuss the water impact of the deep hazardous waste wells in MI? I have heard there are 9 sites.

Answer: The underground injection regulations include requirements that require the injection zones to be located below potable aquifers and they also have well construction (well casing and grouting) requirements to protect potable aquifers from contamination. With respect to the Great Lakes Compact, the bedrock formations where the injections occur are deeper than, and hydraulically isolated from, the Great Lakes Basin's hydrologic system. Therefore, from a water

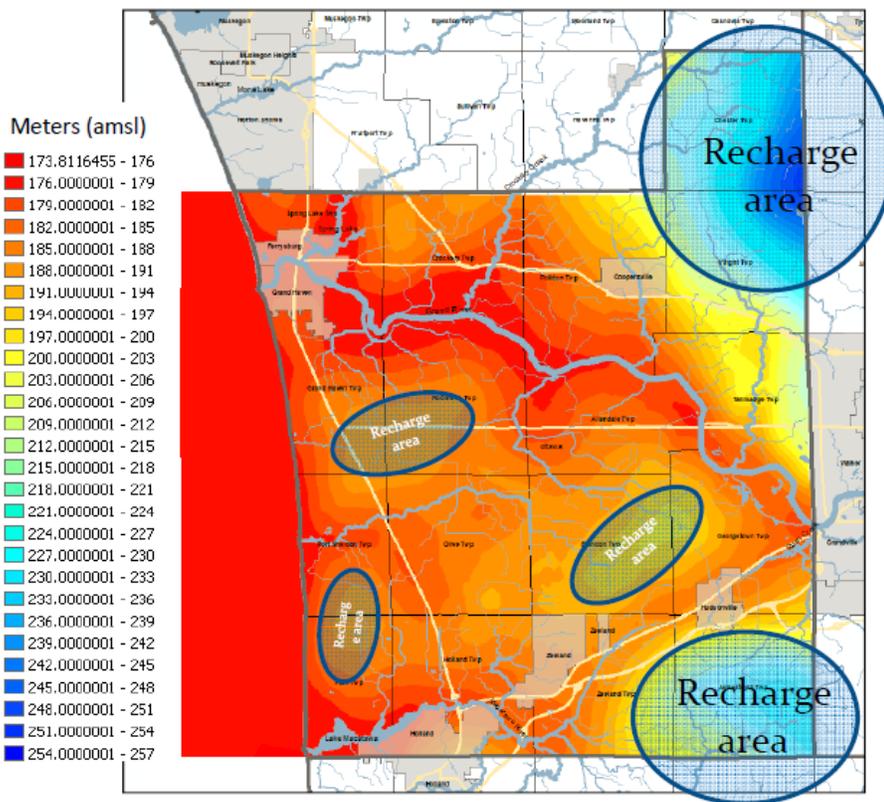
balance perspective, the deep well injections are a consumptive use as far as the Great Lakes Compact is concerned.

Question: With high infiltration soils, are there specific recharge areas to the glacial aquifer. Much of Robinson Township in Ottawa County falls into the category.

Answer: Jim- Highly permeable soils are recharge areas for the underlying glacial aquifers. Care should be taken to identify these recharge areas from a land use perspective to avoid the risk of groundwater contamination and from a sustainable groundwater use perspective to allow for recharge to the underlying glacial and bedrock aquifers.

Dave- You are correct – most of Robinson Twp (and most of Ottawa County) are covered with soils that have medium-high to high infiltration capacities. The second (and more important) criterion for mapping recharge areas is localized mounding of the water table. As shown in the graphic below, there are two master recharge areas for the unconfined glacial aquifer in Ottawa County. One in Chester and Wright townships in the northeastern corner of the county and a second one in Jamestown Township in the southeast corner of the county. In addition, there are three secondary recharge areas in Ottawa County. The first occupies the SW quarter of Robinson Twp and the SE corner of Grand Haven Twp. The second covers east-central Blendon Twp. The third secondary recharge area spans south-central Port Sheldon

Twp
Park



and north-central Twp.

Question: So does this still matter for those communities who are connected to the surface waters and not to wells?

Answer: Dave- Surface water and groundwater are interconnected parts of a single hydrologic system. We also need to protect public trust

waters for aquatic natural resources, recreational, and other public trust uses in addition to drinking water. Groundwater provides base flow to streams, which in turn drain eventually to the Great Lakes, which are the source for many of our public water supply systems in Michigan.

Question: Would a well used for lawn irrigation near a retention style designed lake cause the lake level to go down over a person of three months in the hot summer?

Answer: Dave- Possibly, if the lake is hydraulically connected to the aquifer where the irrigation well is screened and the cone of depression from pumping the well extends out to the lake.