DEPARTMENT OF NATURAL RESOURCES

Cold Spring Groundwater Study

Annual Report to the Legislature
07/13/2017

This report was prepared in response to Laws of 2016, Chapter 189, Article 3, Section 44, Part b

The commissioner must conduct necessary monitoring of stream flow and water levels and develop a groundwater model to determine the amount of water that can be sustainably pumped in the area of Cold Spring Creek for area businesses, agriculture, and city needs. Beginning July 1, 2017, the commissioner must submit an annual progress report to the chairs and ranking minority members of the house of representatives and senate committees and divisions with jurisdiction over environment and natural resources. The commissioner must submit a final report by January 15, 2022.

Estimated cost of preparing this report (as required by Minn. Stat. § 3.197) was $1,116.

Background

The 2016 Minnesota Legislature directed the Minnesota Department of Natural Resources (DNR) to "*conduct necessary monitoring of stream flow and water levels and develop a groundwater model to determine the amount of water that can be sustainably pumped in the area of Cold Spring Creek for area businesses, agriculture, and city needs.*"

Multiple scientific investigations demonstrate that groundwater pumping in and around the City of Cold Spring (the City) reduces groundwater flow into Cold Spring Creek, a designated trout stream. The glacial aquifer system, which is strongly connected to Cold Spring Creek, supplies groundwater to the City, Cold Spring Brewing Company (CSBC), other businesses, and numerous private wells and agricultural irrigation wells.

The City and CSBC are actively planning for potential growth and approaches to meet their current and anticipated water supply needs. To support these planning efforts, the DNR will be building an interim groundwater flow model in 2017 and the first part of 2018. This will be followed by a final (refined) model, which will be completed by January 2021. The interim model will use currently available data to approximate the effects of groundwater use on Cold Spring Creek. The model will calculate the effects of wells within the area of interest on streamflow. The results from the interim model will be sufficient to approximate how much water can be sustainably pumped from City and CSBC wells in relation to stream flow in Cold Spring Creek.

The interim groundwater model will use average conditions (rather than varying conditions) and will be used to guide ongoing data collection. Additional data and filling data gaps will reduce uncertainty in the final, refined groundwater model. We expect the results from the interim groundwater model to be slightly different from and less precise than the refined model. The refined model will be designed to calculate the effect on stream baseflow more precisely for CSBC and City wells as well as other groundwater appropriators. The DNR has selected the United States Geological Survey (USGS) MODFLOW groundwater flow model for both the interim and refined model analysis. MODFLOW is regularly updated and supported by the USGS, and it's considered an international standard for simulating and predicting groundwater conditions and groundwater/surface-water interactions.

To support work on both the interim and final models, the DNR will engage a technical advisory group. That group will provide input on key aspects of both model development and application.

Tasks completed thus far include:

- Identify study area
- Review and compile available data and identify data gaps
- Select groundwater model (USGS MODFLOW selected)

Tasks in-progress and scheduled for completion by June 30, 2018:

- Data Collection Work Plan
- Identify and engage stakeholders and technical advisory group
- Field data collection
- Develop an interim groundwater model

Data Collection and Area of Interest

The DNR will collect a majority of new data within the area of interest outlined in teal in Figure 1. However, groundwater flow from a larger area influences the area of interest. Therefore, the DNR will measure water levels throughout the data collection area outlined in red to ensure that the model boundaries are correct. The DNR recognizes there may be concerns about the size of the data collection area and groundwater model boundary. The DNR's technical advisory group will help ensure that DNR's approaches to data collection and groundwater modeling are appropriate for the intended purpose.

Data Summary

The Cold Spring Creek area has been scientifically studied since 1980. This long history provides data from multiple sources to help support the creation of a groundwater model. Available data on the hydrogeology and hydraulic properties of the groundwater system were compiled from a variety of sources, including, but not limited to, the following:

- Minnesota Department of Health (MDH) Minnesota Well Index (MWI)
- DNR observation wells
- DNR lake level measurement and bathymetry
- DNR streamflow measurements
- Minnesota Pollution Control Agency (MPCA) stream monitoring data
- USGS monitoring wells
- USGS groundwater and surface water levels
- Minnesota Department of Transportation (MDOT) boring logs
- DNR/MDH aquifer test database
- Correspondence with staff from MDH/DNR/USGS
- Midwestern Regional Climate Center (MRCC) climate data
- Multi-Resolution Land Characteristics Consortium (MRLC) land cover dataset
- Natural Resources Conservation Service (NRCS) soil maps and characteristics

The sources of data above provided the following information listed below:

- 10 monitoring wells
- 18 aquifer tests
- 16 monitoring locations on streams and rivers
- 10 monitored lake levels
- Three climate stations within the study area with a short period of record
- One climate station four miles north of the data collection boundary with over 100 years of record
- Soil maps
- Land use maps for 2001, 2006, and 2011
- One groundwater model
- One recharge model

Identified data gaps that will be addressed in constructing refined groundwater model include:

- Cold Spring Creek streambed conductance (i.e., ability of material comprising the streambed to transmit water vertically in and out of the stream)
- Spring locations
- Potentiometric surface at study area scale (i.e., groundwater level)
- Vertical hydraulic conductivity of till (i.e., ability of clay layers between aquifers to transmit water vertically from one aquifer to another)
- Daily pumping information from City and CSBC wells

DNR hydrologists are developing a work plan to help fill these data gaps for the refined model. Data collection aimed at these gaps started in summer of 2017.

Stakeholder Engagement

DNR staff are identifying technical and non-technical stakeholders throughout the study area including cities, industries, commercial users, and agricultural irrigators. The DNR is initiating engagement in summer of 2017, and stakeholders will be engaged throughout the process.

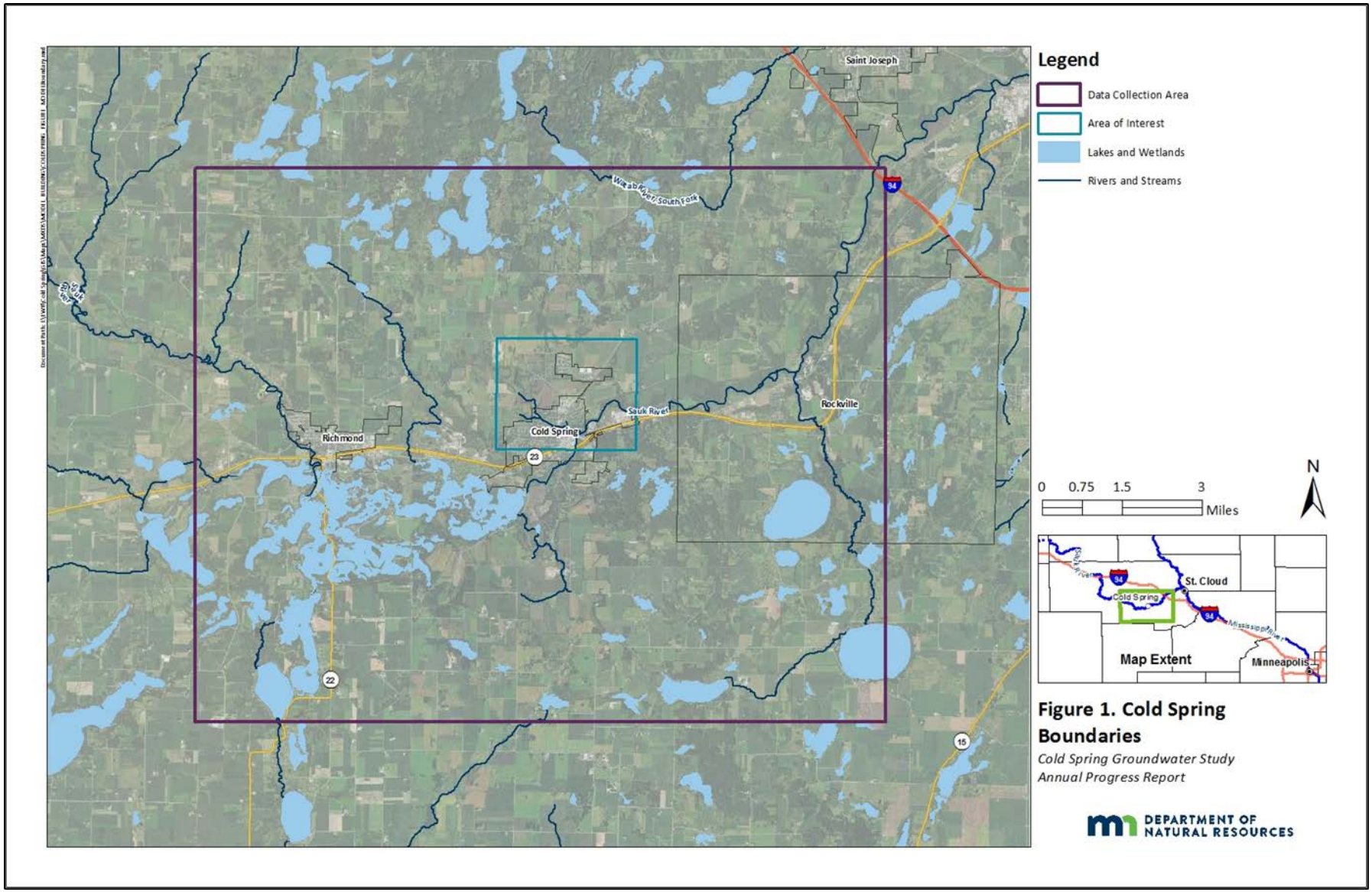

Figure 1. Cold Spring Boundaries

Cold Spring Groundwater Study Annual Progress Report

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