

## STRATEGY FOR THE MANAGEMENT OF IOWA'S WATER RESOURCES

**Background:** The issue of water quantity – how much water is available – has come to light in Iowa and across the nation due to climatic changes and recent increases in major industries that use water in their operations. Basic questions asked include:

1. **Is there enough water? Can our area provide enough water for a new industrial user?**
2. **Will we run out of water? Will my well run dry?**
3. **What quantity of water use is sustainable? How much water should we allow in a new permit?**

While Iowa is not facing an immediate statewide water shortage, there have been localized shortages, leading to concerns about sustainability and potential economic growth. How Iowa manages its water resources for both quality and quantity has the potential to impact the state's economic growth for years to come.

To help evaluate the potential impact of large water users, the Iowa Department of Natural Resources has initiated a Water Resource Management Plan. Part of this Plan is to use computer simulation models, sometimes called Groundwater Availability Models (GAM), to evaluate current and future water use and its potential impact on an aquifer. The DNR will be first focusing on groundwater resources since over 80% of Iowans rely on groundwater for their drinking water supplies – as do many major industrial users.

In order to be able to answer these and other related questions, the DNR is working to collect, process, and evaluate samples of rock materials from wells that have been drilled in Iowa – concentrating first on the Dakota aquifer in NW Iowa. In addition, the DNR is collecting and organizing data collected from operating wells around the state – including well construction details, pumping rates, water level measurements, and water quality. The information that geologists gather and interpret is then used to construct the GAM. This computer model is then tested using known data, and then used to predict the impact of additional groundwater wells, the effects of long-term pumping of multiple wells, or the long-term implications of climate and precipitation changes. This information can then be used to determine acceptable limits for well operators, and can help us to answer the above questions. Additional data and information collected from operating wells and new geological drilling will be added to the model to improve its accuracy – this is what is referred to as maintenance of the model.

**Costs:** In order to develop and maintain this computer model for the major water resources in the State of Iowa, the DNR has prioritized the groundwater and surface water areas of the state, determined the level of effort required for each of those areas, and has prepared a detailed business plan for the next 10 years. The complete report is available at [http://www.iowadnr.com/water/files/mgt\\_strategy.pdf](http://www.iowadnr.com/water/files/mgt_strategy.pdf). The summary of that plan for the three fiscal years is the following:

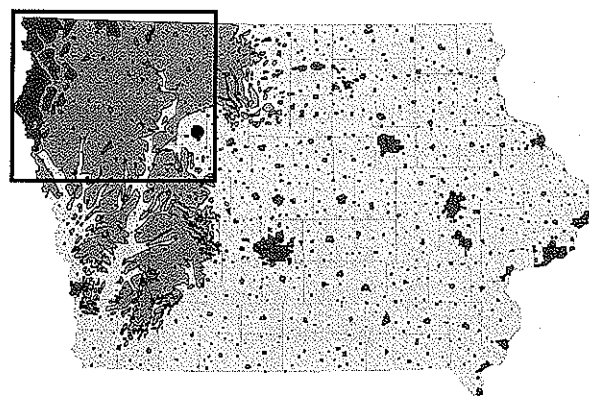
	FY08	FY09	FY10
Stream Gauge Installation	\$0	\$187,000	\$0
Stream Gauges	\$30,000	\$97,000	\$102,000
Groundwater Level Monitoring	\$60,000	\$105,000	\$110,000
Targeted Water Resource Data Collection	\$0	\$336,000	\$353,000
Characterization of Water Resources	\$425,000	\$512,000	\$543,000
Maintenance of Water Resource Characteristics	\$0	\$0	\$275,000
Development of Predictive Models and Web-based Database	\$165,000	\$347,000	\$325,000
Maintenance of Predictive Models and Web-based Database	\$0	\$0	\$125,000
Policy Review	\$0	\$0	\$0
Water Allocation Permitting	\$300,000	\$600,000	\$636,000
<b>Total</b>	<b>\$980,000</b>	<b>\$2,184,000</b>	<b>\$2,469,000</b>
Existing Level of Effort	\$500,000	\$500,000	\$500,000
Environment First	\$480,000	\$480,000	\$480,000
Funding Needed		\$1,204,000	\$1,489,000

## Work Completed in FY08:

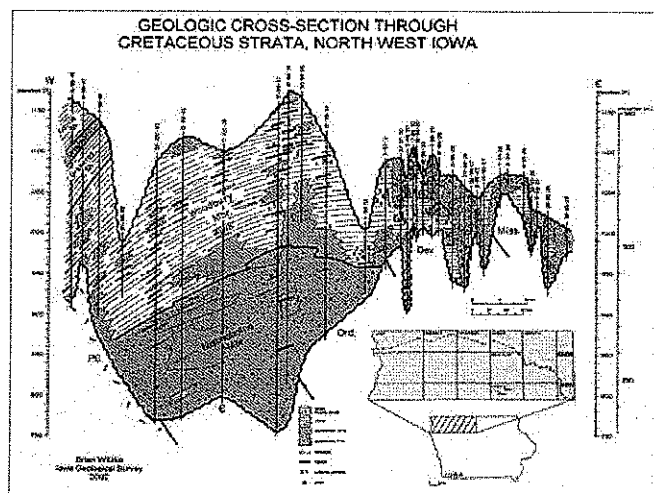
**Study Area:** For FY08, the DNR initiated a pilot project for the Dakota Sandstone Aquifer in northwest Iowa to serve as an example for the type of work to be done throughout the state. DNR staff geologists collected, processed, and analyzed data for the study area, built a groundwater availability model (GAM), and then calibrated that model using known groundwater information.

**Results:** The GAM for the Dakota aquifer was used to evaluate a 10-year water-use permit for a proposed ethanol plant west of Hartley, Iowa. The City of Hartley has three active public wells pumping from the Dakota aquifer. The proposed ethanol plant has 4 production wells that will be pumped on a rotational basis. The water-use permit called for a continual water withdrawal of 1,100 gpm or 1.6 million gallons per day. This compares to an average daily usage of 300,000 gallons per day by the City of Hartley.

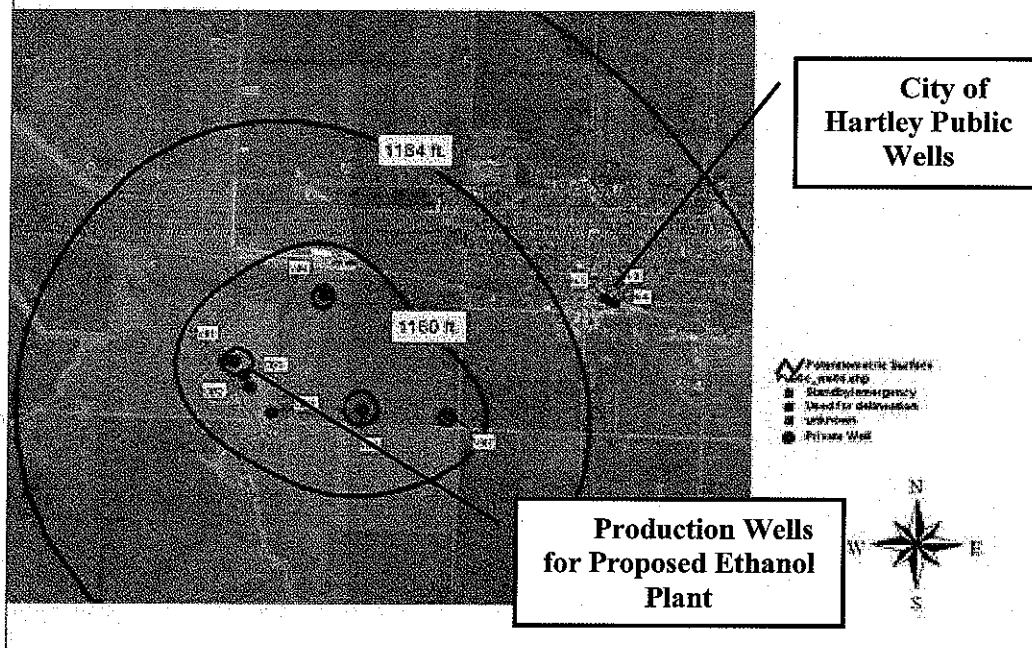
Test wells drilled for the proposed plant were pumped for three days, and the data collected during that three day test was used to calibrate the GAM. The DNR then used the GAM to simulate a variety of conditions – including the effects of pumping those wells for a period of ten years. It was determined that after ten years of pumping, the water level in the City wells would drop about 17-feet. The current water level above the pumps in the city wells is 60 feet. Based on the model results, there is a margin of safety of about 43 feet for the City of Hartley wells during the 10-year ethanol plant water use permit. Permitting decisions can be made based on this information.



FY08 Study Area – Dakota Aquifer



### Hartley VeraSun Ethanol Permit Evaluation Potentiometric Surface after 10-years of Pumping



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