

Gaining INSIGHT on Water Resources in Nebraska:

Development of a Comprehensive Web Tool to Evaluate Basin Water Supplies and Demands

Jessie R. Wietjes (jessie.wietjes@nebraska.gov), Integrated Water Management Analyst, Nebraska Department of Natural Resources

With growing populations and more irrigated acres than any other state, Nebraska faces the challenge of allocating variable water supplies between multiple interests. Early in 2014, the Nebraska Department of Natural Resources (Department) launched INSIGHT, an **Integrated Network of Scientific Information and GeoHydrologic Tools**, to facilitate effective water management. INSIGHT displays statewide water resources data from multiple sources and results of the hydrologic analysis conducted by the Department.

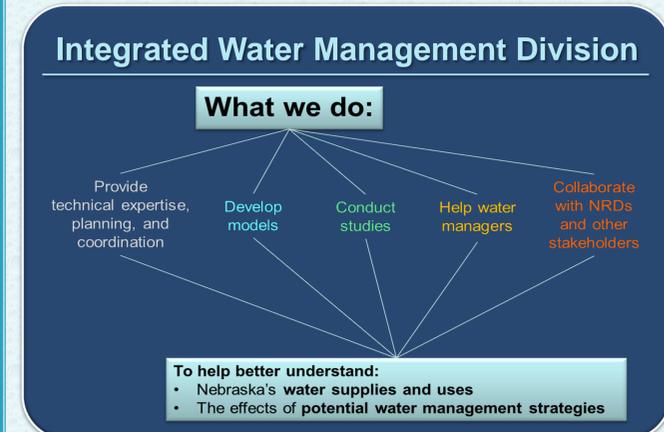
Nebraska's water supplies vary greatly across the state and over time, making planning essential to proper water management. This becomes even more important as water demands increase. Demands for Nebraska's water include:

- Groundwater and surface water irrigation
- Municipal and rural domestic use
- Hydropower and other industries
- Instream flows for wildlife
- Interstate compacts and agreements

The close connection between groundwater and surface water also complicate management as use of one impacts the other.



To assist in planning, the **Integrated Water Management Division** (Division) of the Department annually evaluates the availability of connected groundwater and surface water supplies to meet demands within each river basin. The Division has recently begun the process of adopting a new, innovative methodology for this assessment and staff have completed the first iteration of the technical analysis.



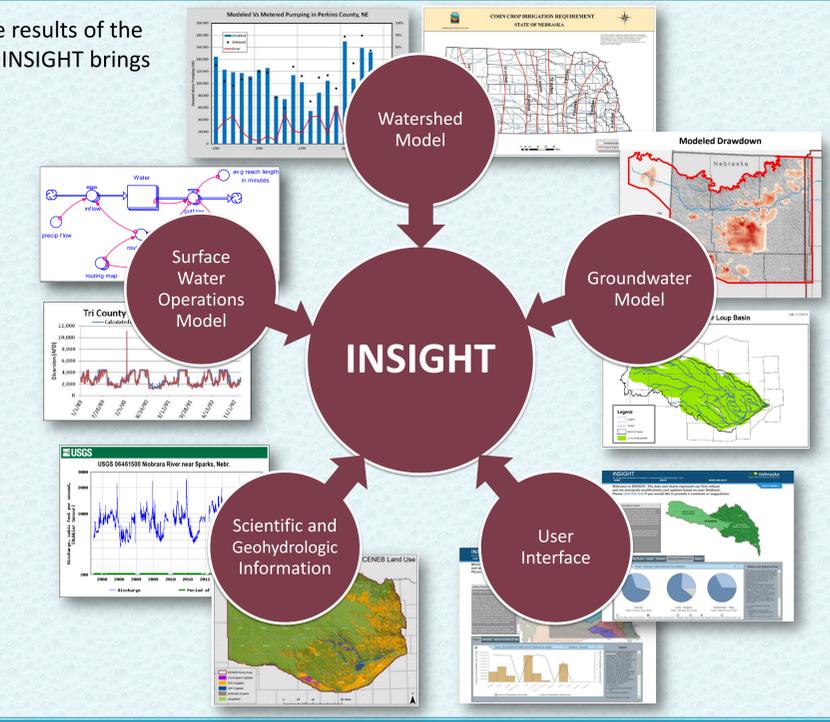
Recognizing the need to make the data and results of the assessment more accessible, the Department developed an interactive online interface to ensure water users across the state would have information about the current balance of supplies and demands in their local basin in order to support the development of long-term water plans.

INSIGHT is a graphical user interface that displays the results of the analysis of hydrologically connected water supplies. INSIGHT brings together data from multiple sources, including:

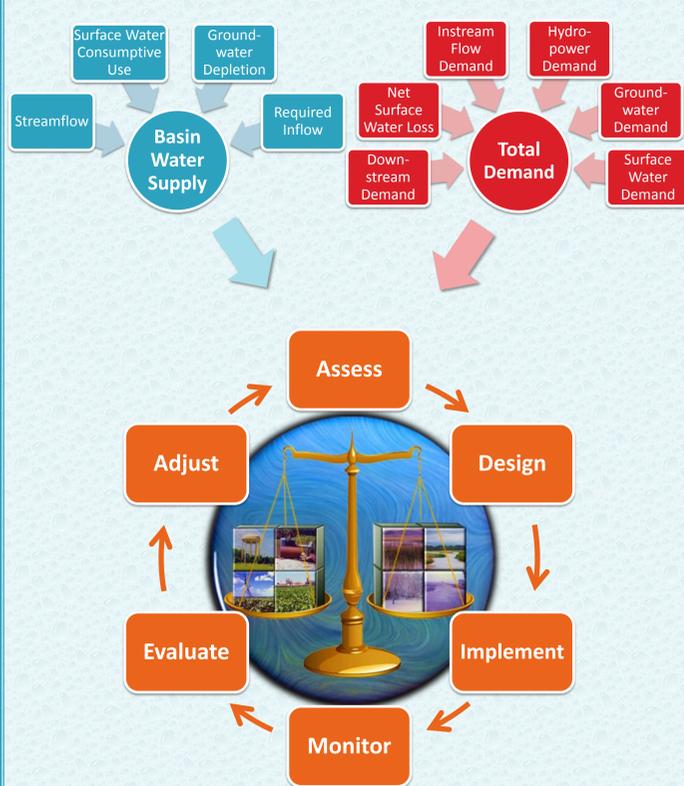
- Streamflow records
- Groundwater model outputs
- Crop irrigation requirements
- Surface water diversion records
- Surface water administration records
- Ground water pumping data
- Land use data
- Climate data

This data is then used to calculate the **Basin Water Supply** and **Total Demand** within a basin. The difference between these two gives a snapshot estimate of the **balance** between water supply and use within the basin.

Basin water supply, total demand, and near-term, long-term, and projected balances are displayed through various charts and graphs. All of the data and complete documentation of the analysis are freely available for users to view and download.



Nebraska water managers can use INSIGHT as part of an **adaptive management cycle** to develop plans. The cycle starts with the assessment supplies and uses within the basins: the Basin Water Supply and Total Demand of INSIGHT. A positive balance between the two indicates the water supply is sufficient to meet current demands. A negative balance indicates that at some point during the year, supplies may not be sufficient or sustainable for all demands.



After assessing the sustainability, managers will then design and implement management strategies to protect existing users and maintain or achieve balance. INSIGHT allows managers to evaluate the effectiveness of management strategies and track impacts of use and management into the future to aid in planning. If needed, the strategies and plans can be modified. Supplies and demands are then reassessed as the cycle continues.

All of this can be easily shared with the public through the charts INSIGHT displays to actively involve stakeholders in the development of long-term plans for their water resources.

The INSIGHT User Interface

Displays data available across the state and provides general information about the site

Overview of purpose and data available on the site and a link to the terminology page

Provides access to documentation, data, and other information about the analysis

Charts found on the statewide page include:

- Precipitation rates and volumes by basin
- Average basin water supply
- Average total demand
- Demand by Category
- Irrigated acres

Charts on the basin/subbasin pages include:

- Precipitation rates and volume
- Precipitation distribution
- Basin water supply
- Total demand and each demand category
- Average total demand by category
- Irrigated acres
- Near-term, long-term, and projected balance

Information on how to interact with the site

Click tabs to see other charts

Click to view full page chart

Chart of interest displayed here

Interactive map. Click to navigate to specific basin

Description of data displayed

Click a blue word to see the definition

Data available for three timeframes