Gaining INSIGHT on Water Resources in Nebraska:

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

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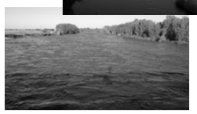
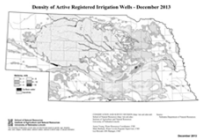
With growing populations and more irrigated acres than any other state, Nebraska faces the challenge of allocating variable water supplies between multiple interests. The Nebraska Department of Natural Resources (Department) has developed INSIGHT, an **Integrated Network of Scientific Information and 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, which makes planning essential to proper water management. This becomes even more important as water demands increase. Demands for Nebraska's water include:

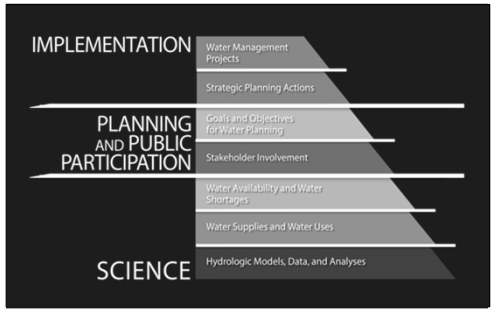
- Groundwater and surface water irrigation
- Municipal and rural domestic use
- Hydropower and other industries
- Instream flows for wildlife
- Interstate compacts and agreements

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





The **Integrated Water Management Division** (Division) of the Department annually evaluates the availability of hydrologically connected groundwater and surface water supplies to meet demands within each river basin.
The results of this evaluation provide the foundation for water planning and public participation.



Recognizing the need to make the data and results of the evaluation more accessible, the Department developed an interactive web interface which allows water users across the state to easily obtain the supply and demand data for their local basins to aid in development of long-term water plans.

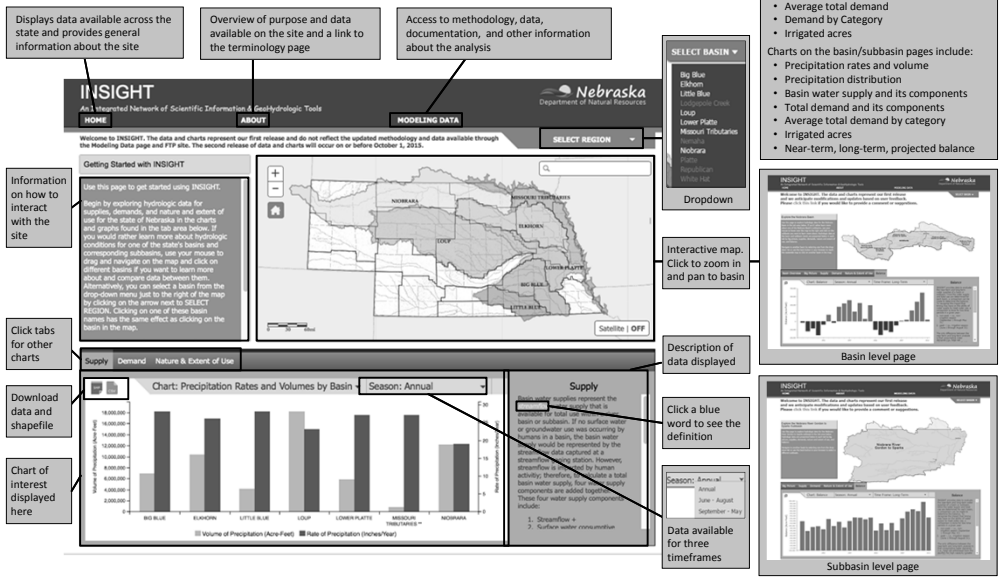
INSIGHT is a graphical user interface that displays the results of the analysis of hydrologically connected water supplies. INSIGHT brings together data from multiple sources, including:

- Streamgage records
- Groundwater model outputs
- Crop water needs
- Land use
- Climate data
- Ground water pumping
- Surface water diversions
- Water administration records

This data is used to calculate the **Basin Water Supply** and **Total Demand**. The difference between these gives an estimate of the balance of 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. All of the data and documentation of the analysis are freely available for users to view and download.

The INSIGHT User Interface



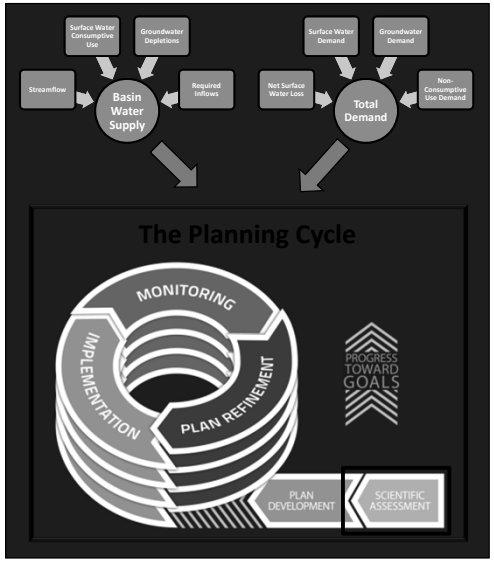
Charts found on the statewide page include:

- 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 and its components
- Total demand and its components
- Average total demand by category
- Irrigated acres
- Near-term, long-term, projected balance

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, strategies and plans can be modified then supplies and demands reassessed as the cycle continues.

All of this is 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.

Nebraska
Department of Natural Resources
www.dnr.nebraska.gov/insight/