



FROM THE NORTH DAKOTA STATE WATER COMMISSION

## WATER COMMISSION STAYING AHEAD OF TECHNOLOGY CURVE

The primary mission of the Water Commission is to improve the quality of life and strengthen the economy of North Dakota by managing the water resources of the state for the benefit of its people. One way that the agency had been pursuing this goal, is in finding the most cost-effective and efficient means of developing modeling tools, such as through the use of Geographic Information System (GIS) software. GIS is simply put, a computerized data management system that is used to capture, store, manage, retrieve, analyze, and display spatial information.

One of the areas that the Water Commission uses GIS is in flood modeling. Flood modeling can be exceedingly complex, incorporating diverse and complicated methodologies to develop an estimate of the physical parameters of how a flood will react in a system, through variables such as precipitation amounts and timing, different soil types, elevation, land use, physical structures, and many others. Tools like GIS can allow one person to do the same amount of work in a few days that would have required many months just decades ago.

Water Commission IT staff have worked with various GIS programs to find those that have the best potential to meet agency needs. However each program has required some added work on the agency side through the development of additional support and functionality in order for these programs to meet agency needs.

After several years of in-office development work, the agency has begun widespread use of a GIS program that provided numerous advantages.

- The software is free
- Users can easily go into the computer codes and tweak parameters and values in order to fine tune the program, and gain a better understanding of how a specific model works
- Staff can also improve existing tools to better manage water resources
- The software is significantly faster at performing the same functions than other programs on the market

One example of an improvement facilitated by the ability to edit the tools used by agency staff, is a recent effort in hydrologic engineering computer modeling. Hydrologic modeling involves complex equations and consideration of many variables, such as surface runoff, subsurface flow, evapotranspiration, slope, and water velocity. One of the key elements involved in hydrologic modeling efforts is incorporating variables of the physical parameters of the soil.

Information on the physical properties of soils can be important, because different variables, such as the rate at which water infiltrates the soil, and how effectively that soil holds onto water once it has become wet, can impact factors such as the flood stage a river will see for differing amounts of precipitation over time. The standard hydrologic engineering approach uses a 60-year-old empirical process to characterize soil properties, which has some serious limitations. However, in North Dakota, we are fortunate to have extensive and fairly detailed soils maps for the entire state, which can be leveraged with open source GIS tools to

develop a more sophisticated, physically-based infiltration estimate.

With these more precise data tables, Water Commission staff have been using GIS to input the more precise soils data now available. This will lead to several possible, innovative products.

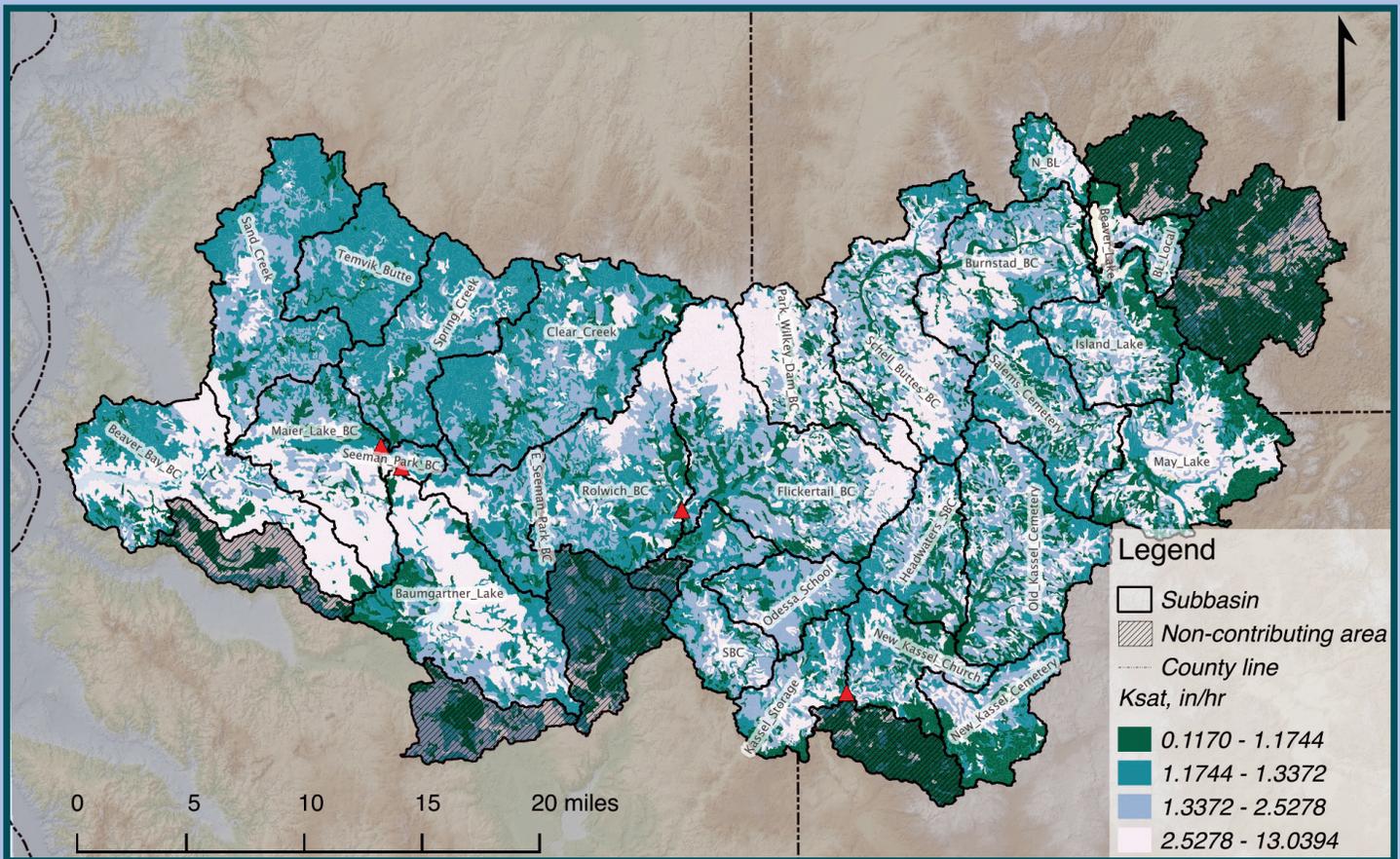
- Sophisticated soils data tables to be used in hydrologic modeling, freely available for use by the Water Commission

and any other entities that do that type of work

- The ability to use the high-density weather reporting data available in North Dakota to develop better calibration for existing flood prediction models
- The ability to more accurately model and understand “freak” events, such as the spring of 2013, where a predicted flood

ended up not occurring (see the July 2013 Oxbow in the North Dakota Water magazine for more information)

With innovative engineering tools such as GIS, the Water Commission is continuing its efforts in the development of better and faster technology for use by the agency and others.



An example of the work being done by Water Commission staff using GIS. This shows the variability in saturated hydraulic conductivity within Beaver Creek watershed located in Emmons, McIntosh, and Logan counties.



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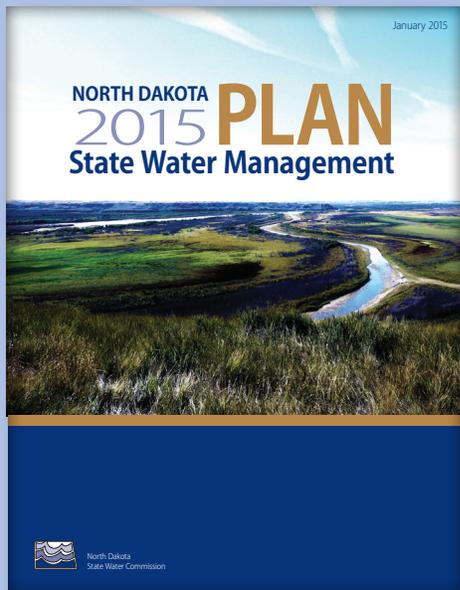
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# WATER COMMISSION RELEASES

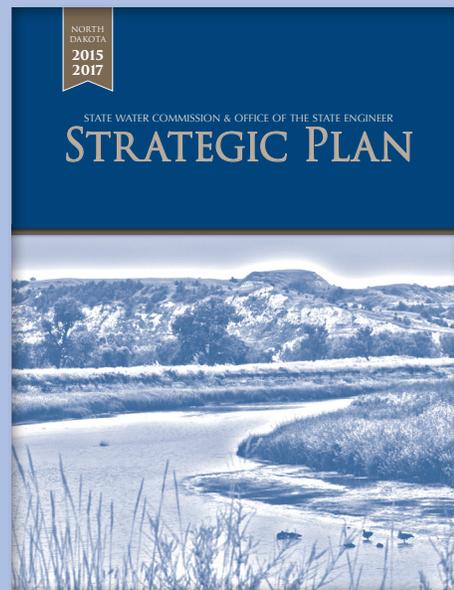
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## 2015 STATE WATER MANAGEMENT PLAN & 2015-2017 STRATEGIC PLAN



The North Dakota State Water Commission has completed a 2015 State Water Management Plan. The purpose of the 2015 Water Plan is to:

- Outline the planning process;
- Provide an overview of North Dakota's water resources – including characteristics and extent, and factors affecting availability for beneficial uses;
- Provide an overview of water appropriation responsibilities and evolving challenges associated with increasing demand for water;
- Provide a progress report on the state's priority water management and development efforts;
- Provide information regarding North Dakota's current and future water development project funding needs and priorities;
- Provide information regarding North Dakota's revenue sources for water development;
- Serve as a formal request for funding from the Resources Trust Fund;
- Provide information regarding water management and development special topics; and
- Identify goals and objectives to meet water management and development challenges.



The Water Commission and Office of the State Engineer have also completed a 2015-2017 Strategic Plan. The purpose of this publication is to clearly document agency direction and expectations through the 2015-2017 strategic planning timeframe. As part of the strategic planning process, the agency reevaluated its goals to ensure that our efforts are achieving the standards expected by the people of North Dakota.

### COPIES OF THE PLANS...

The 2015 State Water Management Plan & 2015-2017 State Water Commission & Office of the State Engineer Strategic Plan are available for download and review at [swc.nd.gov](http://swc.nd.gov).

Paper copies are available upon request by calling the Planning & Education Division at (701) 328-4989 or email [damartin@nd.gov](mailto:damartin@nd.gov).