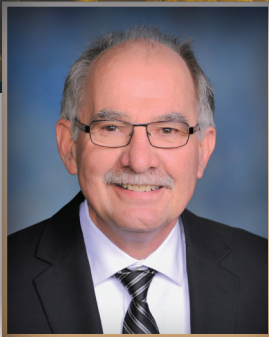


The Current

2017 Issue II



Garland Erbele, P.E.
State Engineer &
Chief Engineer-Secretary

A NEWSLETTER FROM NORTH DAKOTA'S OFFICE OF THE STATE ENGINEER & STATE WATER COMMISSION

The saying goes “If you don’t like the weather in [insert any Midwest state here], just wait a couple of hours.” Add in a couple of weeks, or better yet, a couple of months, and who knows what to expect?

As I look back at how the winter of 2016-2017 began, to where we are today, that saying particularly rings true. By January 1, the far western portions of North Dakota, and the more commonly flood-prone Red River basin in eastern North Dakota had received either average or slightly above average snowfall amounts, but nothing completely out of the ordinary. In contrast, the Minot and Bottineau weather stations in the Mouse River basin had received record snowfall amounts. The same was true for Bismarck in the Missouri River basin.

By January 2, Bismarck had received 53.1 inches of snow for the season, an all-time record for that time of year. This put Bismarck on pace to break the season total record of 101.6 inches set in the winter of 1996-1997. In addition, by the end of January, the National Weather service was predicting the potential for major flooding across much of northern North Dakota, and near record runoff into Devils Lake.

Naturally, that prompted a lot of questions from media and the general public about the potential for spring flooding.

Fast forward to the end of March...

Bismarck and Minot received little additional snowfall during the remainder of winter. Bismarck went from a record-setting pace by the first part of January, to only getting an additional 18.5 inches, totaling 71.6 inches through the end of March. Due to a mild February, much of the lower Red River basin had little or no snowpack left to speak of. And the same could be said for nearly all of the James and Missouri River basins in North Dakota.

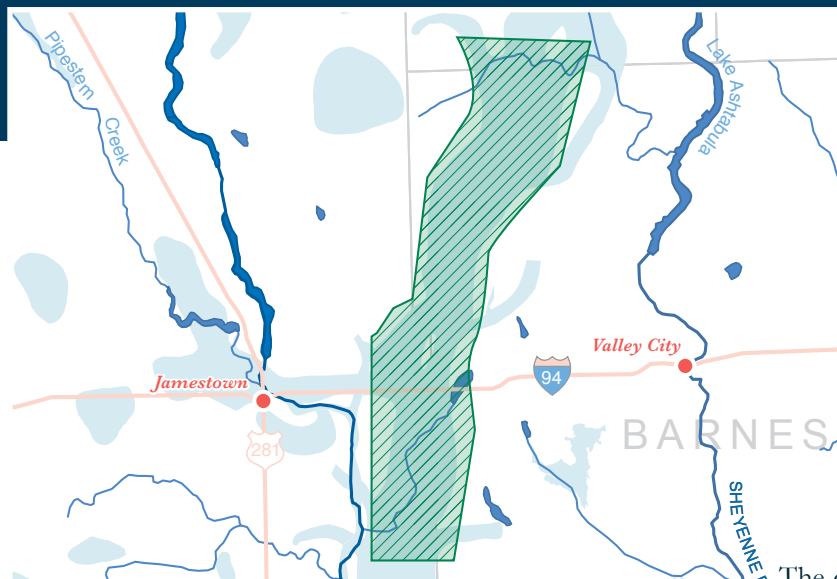
(continued)

Can You Find The Water Drop?



This water drop is hidden
somewhere in this issue.

SPIRITWOOD AQUIFER AIRBORNE ELECTROMAGNETIC SURVEY EXCEEDS EXPECTATIONS



The extent of the survey covered an area approximately 5 miles wide, extending from Walum in the north to Montpelier in the south. In total, the survey involved 288 sq. miles.

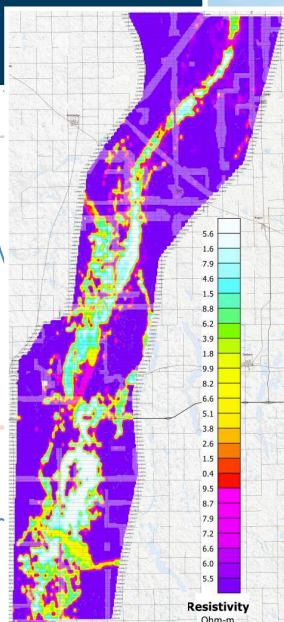
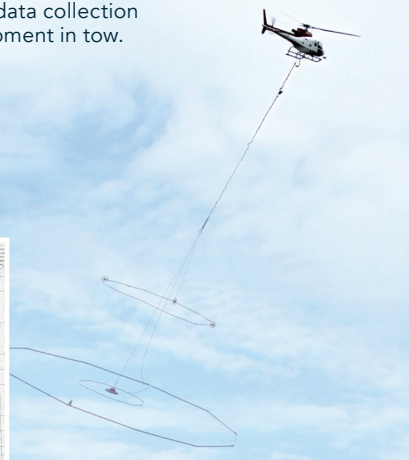
During the fall of 2016, the State Water Commission's (SWC) Appropriations Division contracted with Geotech Ltd. to conduct a cutting-edge survey of the Spiritwood aquifer east of Jamestown, ND – from the air.

The survey, using a technology known as Airborne Electromagnetics (AEM), took place October 4-22 and covered an area from Montpelier to Walum. AEM utilizes a helicopter, towing an antenna about 100 feet above the ground. This antenna sends and receives electromagnetic signals that characterize the conductivity of materials below land surface. The survey consisted of 1,212 miles of flight lines flown east and west, perpendicular to the Spiritwood channel. East and west lines were spaced every 400 meters, with north and south lines spaced at 5,000 meters. The benefits of AEM are its non-invasive approach to data collection and its ability to collect data over large areas in a very short period of time.

The Spiritwood aquifer was chosen based on recent demands for ground water and its high density of hydrogeologic data consisting of lithologic logs, observation wells, and aquifer tests that have been collected by the SWC for decades and could be used to help validate data from the AEM survey.

Jon Patch, Water Appropriations Division Director, compares it to “getting an MRI of the earth,” he explained. “The data allows us to see the deepest and most transmissive part of the aquifer and really identify the geometry of the glacial environment.”

Geotech helicopter with data collection equipment in tow.



This image shows the resistivity of the earth at 90 meters depth throughout the survey area. Darker colors such as purples, represent clays and shales. Brighter colors represent sands and gravels. Finding the location and geometry of the deep channel of the Spiritwood aquifer shown in this image, was the main goal of the study.

The cost of the contract with Geotech was \$236,000. Because of the expertise of Water Appropriations Division staff, the agency has an in-house ability to analyze and interpret the data. Therefore, the SWC's contract was about half of the original cost estimate to conduct this project.

The results were highly effective at mapping the geometry of the Spiritwood aquifer, and identified locations of additional aquifer channels that branched off of it. The data also confirmed the extent of the aquifer's boundaries.

“The AEM survey was a huge success,” says David Hisz, a Water Commission Ground Water Hydrologist. “The results from this survey will be extremely valuable to the State Water Commission and the citizens of North Dakota.”

Early analysis of the data is showing agreement between the AEM survey data and geologic information from test holes and observation wells that have been installed by the agency in the past. During the 2017 drilling season, the SWC Appropriations Division and their well drilling crew will install a number of additional ground water observation wells to confirm and validate data obtained from this survey.

The Spiritwood aquifer AEM survey will help the SWC with the management of the aquifer by understanding its storage capacity, aquifer depth, and recovery properties. The information gleaned from this survey will also help staff make scientifically-backed decisions in the management and appropriation of the important ground water resources of the state. Results from this work suggest this technology would work well in a number of North Dakota's buried aquifer systems.

Keep Your Beaches Clean Enters its Fourth Year



The boating and beach season will be here before we know it. This means that the North Dakota Office of the State Engineer will be continuing its “Keep Your Beaches Clean” campaign - now in its fourth year.

“Keep Your Beaches Clean” is a public education campaign that focuses on two ND Century Code statutes, which the North Dakota Office of the State Engineer is responsible for enforcing. These rules have to do with littering and possession of glass containers on sovereign lands. Sovereign Lands are those areas lying within the ordinary high water mark of navigable lakes and streams, including the beds and islands.

The fine for littering on beaches and sandbars carries a maximum penalty of \$250, while possession of glass containers carries a fine of \$100. Educational signs have been installed at popular recreation access points and boat ramps along the Missouri River, with other navigable waterways slated for signage in the future. Agency staff will also be taking part in public events and working with the media to promote the “Keep Your Beaches Clean” program.

To do your part, when visiting beaches and sandbars, please choose aluminum and plastic containers over glass. Also, plan ahead and bring a trash bag with you to keep your trash contained. Whatever you bring with you, make sure to take it home.

The Office of the State Engineer has partnered with the North Dakota Game & Fish Department to assist with law enforcement. However, it is important to note that any local law enforcement officials have the authority to enforce these codes.

Anyone witnessing littering or glass container violations can call the Report All Poachers line at (800) 472-2121, and to inform violators that those acts are finable offenses.



March 29 Commission Meeting

COST-SHARE APPROVALS

Grand Forks Co. Legal Drain No. 58	\$1,481,850
GCDC Mile Marker 15 Irrigation	\$321,781
Wells Co. Hurdsfield Legal Drain	\$644,292
Richland-Sargent Co. Legal Drain No. 7, Phase II	\$378,000
Walsh Co. Drain No.30-1	\$282,307
Walsh Co. Drain No.87/McLeod	\$3,369,820
Williams Co. Epping Dam Safety Repair	\$127,089
Cass Co. Drain No. 14 Channel Improvements	\$741,562
Cass Co. Sheyenne-Maple Flood Control District No. 2	\$1,035,358
Lisbon Permanent Flood Control Project-Levee D	\$3,600,000
Mouse River (Minot) Flood Mitigation	
Broadway Pump Station	\$15,197,000
Peterson Coulee Outlet	\$1,427,022
Independent Peer Review-Phases BU-1 and BU-5	\$171,909
Minot Property Acquisitions	\$3,979,656
TOTAL FUNDING APPROVED	\$32,757,646

CONTINUED - OFFICE OF THE STATE ENGINEER & STATE WATER COMMISSION

In contrast, northern North Dakota still had fair amounts of snowpack remaining, so the potential for major flooding along the Park and Pembina Rivers in the northern Red River Valley remained. In addition, near record runoff was still a threat for Devils Lake. In short, some areas of the state saw drastic changes to their flood risks, while others changed very little.

So what happened?

There are multiple circumstances in determining possible spring flooding. One consideration is soil moisture conditions that are present in the fall before freeze up. This has proven to be a significantly important factor over the years in the Devils Lake and Red River Basins. Other important factors that needed to be considered way back in January were future snowfall amounts for the remainder of winter, the timing of spring melt, future rainfall events, and highly unpredictable ice jams. Simply put, that’s a lot of unknowns to consider.

While some watersheds in North Dakota prepare for what may be a challenging spring in terms of flooding, other areas of the state may be asking – are we in the clear for 2017? To that I would say; there’s still a few weeks of spring ahead of us, and who knows what kind of rainfall May and June might bring. Stay tuned...

Garland Erbele
State Engineer and Chief Engineer-Secretary

DLOMAC TO MEET IN MAY

A meeting of the state's Devils Lake Outlets Management Advisory Committee (DLOMAC) has been scheduled for May 4 in Carrington, at 1:00pm at the Chieftain Inn.

The DLOMAC serves the purpose of advising the Governor and State Water Commission regarding operations of the state's two Devils Lake outlets. The committee is involved in recommending criteria for the operation of each outlet based on discharge volumes, water quality considerations, and the risk of a natural overflow of Devils Lake into the Sheyenne River.

Items to be covered at the May 4 meeting include:

- 2016/2017 precipitation information and the 2017 forecast;
- Water quality sampling and monitoring results;
- Outlet and Tolna Coulee control structure status reports
- 2017 outlet operations; and
- Status reports from all committee members.

The DLOMAC was created by the North Dakota Legislature in 1997. Membership on the board includes the Governor's designee (State Engineer), representatives from Barnes, Benson, Ramsey, Towner, and Nelson counties, the Devils

Lake Basin Joint Water Resource Board, Spirit Lake Nation, the cities of Devils Lake, Fargo, Grand Forks, Lisbon or Fort Ransom, and Valley City, members appointed by the Governor of Minnesota and Premiere of Manitoba, and two State Legislature members from the House and Senate.

For more information on the Devils Lake outlets, please go to http://swc.state.nd.us/basins/devils_lake/outlets/



DL BASIN CONDITIONS & FORECAST

In 2016, despite the Devils Lake outlets discharging 136,096 acre-feet of water, heavy rains from July through freeze-up caused the lake to hover right around an elevation of 1,450' above mean sea level (amsl) all year. Following the wet fall of 2016, the basin also experienced a heavy snowpack. Current probabilistic outlooks (March 23) predict a 50% chance of the lake reaching 1453.4' amsl, which is a little less than 6 inches below the record high set in 2011.

WEATHER OBSERVATION VOLUNTEERS WANTED

Are you interested in the weather? Do you keep track of precipitation in your area? Every volunteer for the Atmospheric Resource Board Cooperative Observer Network (ARBCON) is provided with a 4-inch diameter, cylindrical rain gauge for measuring rain and/or snowfall. This is the same gauge used by National Weather Service volunteer observers and the national observation network, CoCoRaHS.

Volunteers report daily rain (and/or snow) totals to the Atmospheric Resource Board (ARB) via the Internet or postage paid postcards. Each month the data is compiled and a rainfall map for the month is created and posted on the ARB website at swc.nd.gov/arb/ndarbcon. On the website there is also an interactive mapping tool that can be used to view daily rainfall reports from around the state, or view the total rainfall for a multiday period of the users' choice.

All ARBCON observers report rainfall and hail data daily during the growing season, from April 1 through September 30. A smaller number of observers, around 150, also report

daily snowfall in the winter months. These winter observers are also asked to measure the total snowpack on the ground once or twice a month. These measurements are critical in forecasting the amount of runoff there might be for spring flooding potential, a yearly concern in many areas of North Dakota.

ARBCON data is used by several local, state, and federal agencies for a variety of uses, including assessing drought, excessive rainfall, hail, and spring flood potential. It has also been used by private companies and universities for various research projects and analysis.

ARBCON volunteers have been collecting precipitation data every year since 1977, and started collecting snowfall data in October, 2010. Currently ARBCON has just over 500 volunteers, but we are always looking to add more observers throughout the state. If you would like to volunteer for ARBCON and contribute to this valuable dataset, call Dan Brothers at (701) 328-2788 or email at dabrothers@nd.gov.

Large Scale Automated Engineering To Improve State Flood Mapping Efforts

As reported in a March 2017 Oxbow article, the Federal Emergency Management Agency (FEMA) started on a Large Scale Automated Engineering Project (LSAEP) to assess county-wide floodplains in North Dakota. FEMA Region VIII, based out of Denver, Colorado, originally requested funding to provide 32 counties in the eastern half of North Dakota with base-level floodplain modeling at an approximate cost of \$2 million.

Region VIII has since requested further funding to include North Dakota's remaining 21 western counties in the LSAEP for an additional \$3 million, bringing the statewide cost of the project to approximately \$5 million. The higher cost for the western portion is due to a significantly greater number of stream miles in comparison to the eastern portion. At present, the LSAEP is projected to be completed in its entirety in late 2018.

FEMA has also requested an additional \$10 million to upgrade portions of the base-level data to the quality level required by FEMA's guides and specifications. These funds will be distributed as grant dollars through the Cooperating Technical Partners (CTP) Program, a collaborative partnership between FEMA and the State Water Commission.

Benefits to North Dakota

Dating back to the early 2000s, North Dakota's efforts to achieve statewide Light Detection and Ranging (LiDAR) coverage will allow FEMA to leverage state data to complete the LSAEP. As a result, FEMA will be able to provide updated flood risk assessments to communities across the state, many of which are located in areas with dated FIRMs or unmapped flood risk. The data generated from this project can be used to:

- Help guide communities with their planning/zoning decisions for future development;
- Allow communities to understand their risks and have digital data to help with public outreach and education; and
- Enable more information to plan evacuation routes and sandbagging efforts.

Future Education and Outreach

Starting in late summer 2017, representatives from FEMA and the State Water Commission will begin the process of community outreach by conducting a series of meetings across the state. These meetings will be aimed at informing the public, elected officials, and other stakeholders about the benefits of the LSAEP and how to use the project to their community's advantage. Dates and locations have not yet been decided, but look for announcements through mailings, articles, and social media such as the State Water Commission's Facebook page (www.facebook.com/NDStateWater/) in the coming months.

Court Approves Design Work On NAWS Project

In March, the Circuit Court of Appeals in Washington, DC issued a victory for North Dakota on the Northwest Area Water Supply (NAWS) Project, approving the state's request to be allowed to begin paper design work of a water treatment plant.

The Water Commission began construction on the NAWS project in April 2002. However, that same year, a legal challenge was led by the Province of Manitoba to stop the construction of NAWS, claiming that the Environmental Assessment (EA) conducted for the project was inadequate under the National Environmental Policy Act (NEPA). The legal challenges have continued since that time, but in 2013, the court modified a 2005 ruling, which halted further design and construction - pending the completion of further NEPA review.

The design work on the water treatment plant that was approved by the Circuit Court of Appeals is expected to take approximately 20 months, at a cost of approximately \$5 million. After design, construction is expected to take an additional two years.

North Dakota has been working to design and build the NAWS project for almost twenty years, with the goal of bringing a high quality and reliable supply of drinking water to approximately 81,000 citizens in Minot, surrounding communities, and rural areas. Unfortunately, those efforts have been thwarted by the Province of Manitoba and State of Missouri through continued litigation.

The oral arguments for the underlying case were heard March 30 in front of the District Court in Washington, DC. The state is currently waiting on a summary judgment.

2017 WATER EDUCATION EVENTS

April 11	Morton County Water Festival - Mandan Nazarene Church
April 20	Bismarck Earth Day Festival - McCabe Church
April 20	Earth Day Family Night - Bismarck Career Academy
April 20	Bottineau Water Festival - Dakota College at Bottineau
April 23	Super Science Sunday - Grand Forks
May 3-4	Grand Forks Water Festival - East Grand Heritage Farm
May TBD	Red River Water Festival - Wahpeton
May 10	Fort Totten Water Festival - Fort Totten
May 16-17	Bismarck Water Festival - Jack Science Center
June 20-22	ND Teacher Resource Coalition - Medora
July 9-14	Watershed Institute - Dakota College at Bottineau



NORTH DAKOTA STATE WATER COMMISSION

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