The Oxbow
FROM THE NORTH DAKOTA STATE WATER COMMISSION

Cooperation improves water data

Information provided by Doug Emerson, USGS

The North Dakota State Water Commission (NDSWC) and the U.S. Geological Survey (USGS) have been working together for what seems to be forever to conduct hydrologic studies and collect data throughout the State. The first cooperative agreement was in 1903 for collection of streamflow data. In the early 1980's, a cooperative arrangement was made between the NDSWC and USGS to provide construction assistance at the USGS's streamflow gaging stations in order to improve accuracy and reliability of the streamflow data. The arrangement consisted of the NDSWC providing their construction crew and equipment, and the USGS providing funds to pay for materials.

Milt Lindvig, Director of the Water Appropriation Division for the NDSWC, and Russ Harkness, Chief of the Records and Information Section for the USGS in Bismarck have worked together to plan and implement cooperative construction work every year. Each winter a planning meeting is held to coordinate the summer construction schedule. Russ Harkness noted, "If it wasn't for the cooperation of the State Water Commission and their energetic crew, we would not have been able to provide nearly the quality of data that we do now. This working relationship has not only been a huge benefit for the USGS and our monitoring program but also for all those users of the data."

Why do we need streamflow data?

Today, the USGS maintains and operates about 100 streamflow gaging stations, about 35 crest stage gaging stations, and about 30 lake and river stage gaging stations in North Dakota. The data are used for: designing water storage and treatment facilities; flood and drought warnings and forecasts; managing and operating reservoirs for flood control, hydropower, and water supply; designing bridges, culverts, and other hydraulic structures that will function safely during floods; maintaining water quality and developing cost-effective plans to improve water quality; hydrologic research; and planning canoeing or kayaking trips to avoid unsafe or unsatisfactory river conditions.

What is a gaging station?

A streamflow gaging station is located along a suitable river or stream site. The gage house contains equipment that measures and records the height of the water surface (gage height or stage). A gage house also can include equipment that measures water quality parameters such as temperature, pH, dissolved oxygen, and dissolved chemicals. Some gage houses also contain instruments for measuring weather conditions such as air temperature, precipitation, and wind speed. Stations are equipped with telemetry that allows the data to be provided on a real-time basis on the USGS's web page (http://nd.water.usgs.gov).

Streamflow gaging stations house equipment that record water level data through the use of a stilling well or a bubble system. For a stilling well, the well is connected to the stream with pipes such that when the water level changes in the stream, the level simultaneously changes in the well. A float in the well is connected to a recorder or data collection platform.

A bubble system requires a long open-ended pipe that extends from the river to the gage house. One end of the

The light colored brick indicates the historic high water mark (the flood of 1952) on the recently completed gaging station for the Missouri River at Bismarck.

pipe is fixed securely below the water surface. Pressurized air is forced through the pipe from inside the gage and out a submerged opening called an orifice. Because the pressure in the pipe is determined by how deep the water is over the orifice, a change in the height of the river produces a corresponding change in the pressure in the pipe. This change then is converted to an electronic signal by a transducer inside the gage house. Data from the transducer is fed to a recorder, or data-collection platform, which records the corresponding river height.

Some construction jobs

The USGS has had a construction need over the years at selected streamflow gaging stations to help provide or improve streamflow data. These needs vary from rebuilding a gaging house that was destroyed by ice during a spring flood to installing a sheet pile weir to improve the stage/discharge relation. One of the larger construction jobs was the removal of the old concrete and rock control structure at the Souris River near Foxholm streamflow gaging station. The old control was in disrepair. The NDSWC crew removed the old structure and installed a steel-piling weir with a low flow measuring section. Improvements such as this one greatly improved the relation between the gage height and the flow, improved the accuracy of low flow measurements, and improved the overall discharge record.

A more recent accomplishment by the NDSWC's crew was the replacement of the "Missouri River at Bismarck" streamflow gaging station this last May. The old wooden gage house was replaced by a new brick gage house. The gage house contains instrumentation for collecting data and provides a place for educational displays. The light line of brick on the face of the structure indicates the historic high water mark that occurred during the flood of 1952 (see photo). ■

Looking out for Lake Sakakawea

In recent years, Lake Sakakawea and the thousands who recreate along its shores, or depend on the area's recreation for their livelihood, have been faced with the threat of falling water levels, inadequate lake access, and limited infrastructure.

Fortunately, for the thousands that make their way to this oasis in West-central North Dakota, there is an organization that has taken an interest in minimizing the problems and maximizing the benefits of this valuable resource. Simply put, they are interested in making this great lake even better. They appropriately call themselves "Friends of Lake Sakakawea" (FOLS).

Back in 2000, FOLS began their efforts through a meeting with Senator Byron Dorgan to resolve several potential problems that were mounting against the lake and its fishery. Since that first meeting, FOLS has already had their share of successes, but they continue to evolve and organize to further their cause today and into the future.

Made up of area cabin owners, chamber representatives, city representatives, boat owners, state and federal officials, and area business owners, FOLS has used these partnerships to make several improvements to the Lake Sakakawea area.

Some of the more significant improvements include more than $1 million in repairs and updates to area boat ramps and the development of a common vision for the lake area.

In recent months, FOLS has been taking the necessary steps to advance their organization to the next level. These efforts include the development of organizational bylaws and they will soon have elected officers to assist them with carrying out their vision.

In the coming years, FOLS hopes to: establish a strong voice with our State Legislature; partner with area businesses and recreation destinations to draw more people to the Lake Sakakawea area; work with state and federal government agencies and private interests to improve area infrastructure, such as roads, drinking water, ramps, and camping facilities; work towards the completion and implementation of a revised reservoir master plan; and remind people of the tremendous economic and recreational opportunities that the lake's outstanding fishery provides.

Memberships are currently being sought to help the organization fund the hiring of a part-time director and to help the organization continue with its efforts to facilitate improved management of Lake Sakakawea.

FOLS Membership Fees:
Family Membership - $50
Silver Business Membership - $100
Gold Business Membership - $250
Platinum Business Membership - $1,000+

For more information or a membership brochure, call (701) 463-2201 or check out FOLS's new website at www.lakesakakawea.com. ■

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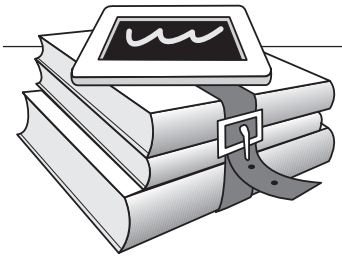

THE WATER PRIMER

The Red River: A Profile in Time

PART II: SELKIRK'S COLONY TO THE FLOOD OF RECORD

By Mike Noone

This is the second in a series of articles that will break down the history of the Red River basin into four distinct phases; each important in helping us gain a better understanding of how the natural, social, and economic environment that exists today came into being.

The earliest Europeans came into the Red River valley in search of valuable pelts that could be sold back in Europe. Fur trappers were transitory in nature however, and seldom settled in one place permanently. The first permanent European settlement in the Red River valley called the "Selkirk Colony," was built in 1811 near present day Winnipeg, Manitoba. These early settlers were comprised mainly of displaced Scottish tenant farmers, hoping to improve their lot in life. These early inhabitants of the Red River valley made use of the fertile soils, and despite periodic setbacks, experienced several phenomenal crop years.

These hardy farmers were given their first taste of the fickle nature of the Red River, when in the spring of 1826, a major flood struck their settlement. The Red River rose 9 feet in 24 hours. Between the start of flooding on May 2 and May 5, the settlers were all forced to abandon their homes along the Red River for higher ground. The Red River continued to flood for 19 days, and one person drowned. It took nearly a month and a half after the start of the flood before the settlers could return to their homes.

This experience was hardly unique according to the nearby tribes, and presaged the coming floods in the future that both the first generation and their descendants in the future were going to experience.

Settlers living along the Red River were periodically confronted with the dangers of living in a floodplain. The flooding from 1851 through 1853 was so bad that no farming occurred at all in the Red River valley near Pembina, North Dakota. D. Anderson is quoted as saying "*The river was like that of a vast lake studded with houses, of many of which the projecting gable was the only visible part*" May 21, 1852.

The 1850s saw the decline of the bison trade, as the large herds were increasingly reduced from over hunting. Entrepreneurial traders moving goods along the Red River in steamboats eventually replaced the buffalo hunters. Trade goods were still needed in the Selkirk Colony, and the riverboats filled that need. Beginning in 1859 with the "*Anson Northrup,*" steamboat trade played an important role in the history of the Red River valley, and it lasted for more than 50 years, before the last steamboat, the "*Fram,*" sank at Grand Forks in 1912.

In 1878, the first railroad lines were completed between Duluth and Moorhead, Minnesota, and to Winnipeg, Manitoba. The construction of the railroad opened the Red River valley to increasing numbers of settlers, where before most travel had been by wagon or boat. The Timber Culture and Homestead Acts provided settlers with 160 acres of land, which was a huge amount to people from the Old World. These new hardworking immigrants, many of them from northern Europe, quickly set to tilling the incredibly fertile soils of the Red River valley.

The downside to increasing land access for potential farmers was that there were more and more people living along the floodplain. The increasing number of settlements in the Red River valley were especially hard hit by the flood of 1897, which was the greatest flood of record in the southern part of the valley, having a peak flow of 85,000 cfs at Grand Forks. In words eerily reminiscent of the devastating flood that struck the valley in 1997, the event is described "*severe blizzards during the winter of 1896-97 produced heavy snow accumulations evidenced by drifts as deep as 20 to 30 feet which nearly covered many houses.*"

Unfortunately, this would not be the last major flood to afflict the inhabitants of the valley.

In the upcoming articles, the continuing influence that the unpredictable nature of the Red River has had upon the people of the Red River valley will be further explored. ■