The Oxbow
FROM THE NORTH DAKOTA STATE WATER COMMISSION

City of Garrison Receiving Funding for Improved Water Supply Intake

The City of Garrison, located near the northeast corner or Lake Sakakawea in McLean County has been experiencing problems with its water supply intake due to decreasing water levels on Lake Sakakawea. Currently, Garrison's water supply intake lies above ground, and as Lake Sakakawea drops, more line is exposed, increasing the likelihood of freeze-up problems as colder weather approaches. In response, the Water Commission approved a grant in the amount of $106,351 at its Oct. 12 meeting in Bismarck to assist with a project to alleviate the problem.

This photo shows the old 24-inch intake pipe that was installed in 1992. The pipe was covered with dirt last fall but because of wave action and declining lake levels, the pipeline was once again exposed.

Northern Improvement begins construction on Garrison's new raw water intake.

According the City of Garrison, declining water levels have not only impacted the usefulness of the water supply intake line, but also the way in which the city treats its water. During years when Lake Sakakawea is at higher, or normal elevations, the temperature of the water drawn into Garrison's treatment plant is between 62 and 64 degrees Fahrenheit Over the course of this last summer, the temperature of the water arriving at the treatment plant was as warm as 70 degrees. As a result, the city has been experiencing higher water treatment costs, and issues with water odor.

To address its looming water supply problem, the City of Garrison recently hired Bartlett and West Engineers Inc. to design an improved water supply intake system. The proposed project will involve boring an eight-inch line, 1,210 feet under the lake to an elevation of 1,773 feet above mean sea level (amsl), and to set two pumps on a rack at an elevation of 1,778 feet amsl. As of mid-October, Lake Sakakawea was at an elevation of 1,809 feet amsl, which would put the pumps 31 feet below the lake's surface.

With the line being bored, it will eliminate any problems with freeze-up. However, if lake levels continue to decline, the City of Garrison could still have problems with the elevation of its pumps, and it is possible that it may have to seek an alternative water source in the future.

On Sept. 8, bids were opened for the raw water intake improvement project. However, because of large differences between the bids received and the engineer's estimate, there was clearly a high degree of uncertainty as to potential problems that might arise in the construction field. Northern Improvement Co. of Fargo was awarded the contract with a bid of $212,703, and had just started construction in mid-October. The project was scheduled for completion in the first part of November.

Missouri River Joint Water Board Receives $70,000 SWC Grant

At the Oct. 12 State Water Commission meeting in Bismarck, the Missouri River Joint Water Board made a formal request to be the local sponsor of a Missouri River-related improvement project that came about as part of the Water Resource Development Act of 2000. The Missouri River Joint Board was approved as the local sponsor and received a grant from the Commission in the amount of $70,000 to cover the local share of administering the project.

The Water Resource Development Act of 2000 includes under Title VII, the Missouri River Protection and Improvement Act, North Dakota. The purposes of the Act are to reduce siltation on the Missouri River, improve conservation in the Missouri River watershed, protect recreational opportunities, improve water quality, and protect cultural and historic resource sites from erosion. The Act also establishes a task force that is made up of federal, state, local, and tribal governments, and representatives of other interest groups. The United States Army Corps of Engineers is the lead federal agency for this project.

The first phase of work to be carried out under the Act is an assessment of:

• Siltation on the Missouri River and how it impacts federal, state, and regional economies, recreation, hydropower, fish and wildlife, and flood control;

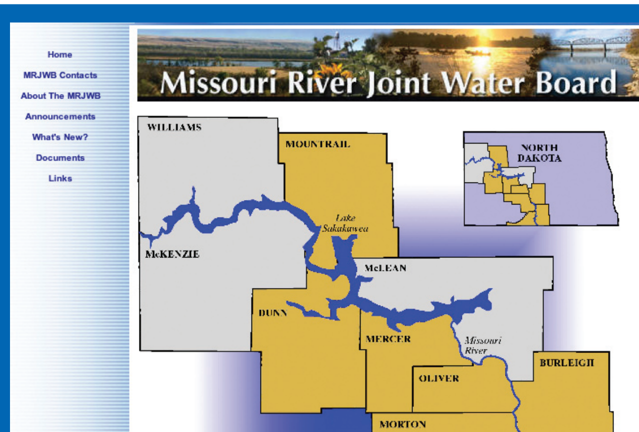
• The status and health of cultural and historic resource sites along the Missouri River;

• The severity and extent of erosion along the Missouri River and its tributaries in North Dakota; and

• Any other pertinent issues that are identified by the task force.

The assessment will provide recommendations and cost estimates for mitigations efforts, and it will help to identify federal, state, and local funding sources and programs for the implementation of various projects. As part of this effort, no new field data will be collected, and no new modeling or physical analysis will be performed. Only existing information will be used.

The estimated cost of the assessment phase is $280,000. This phase requires a local contribution of at least 25 percent or $70,000.



Visit the Missouri River Joint Water Board's new website:

http://missouri-joint-board.tripod.com/

Drought Indices: So Many to Choose From

By Michael Noone

Parts of North Dakota have been in and out of drought frequently over the last few years, and in 2006, the entire state was in either a mild or severe drought. A question that is often asked is how does one determine whether or not you are in a drought? Like so many seemingly simple questions, the answer requires some explanation. There are in fact a number of different means of measuring drought. The simplest is for a person to base his/her determination on use. If your well is dry, or your crops are scorched, you know it is a drought. But how bad is that drought relative to another area or other years? And what needs to happen for that drought to end?

Those questions, in part, have led to the development of a number of different drought indices. In the following text, several drought indices will be examined, with a brief discussion of how they are used, and their assets and limitations as a methodology.

Percent of Normal: This method simply divides actual precipitation in inches by the "normal" precipitation for that area (typically the 30-year mean precipitation), and then multiplies that number by 100 to get a percentage.

Pros: This method is effective when it is being used for a single region or a single season.

Cons: Because the average of something is not always reflective of the actual number, this method can yield results that are easily misunderstood. Because this method takes the average, it is not well suited for dealing with situations that are well beyond the average; i.e. low frequency events such as extreme droughts.

Palmer Drought Severity Index (PDSI): This is a meteorological drought index that is calculated based upon potential evapotranspiration, precipitation, temperature, and previous soil moisture. In North Dakota, the PDSI is one of the most frequently used drought indices.

Pros: This is a good index for areas that receive fairly consistent amounts of moisture geographically. And because the method has been used for over 40 years, it allows for a better historical perspective.

Cons: It lags drought emergence, so it is not as well suited for areas where moisture is deposited irregularly, or for areas that have extreme variations in elevation. With this method, time scales can be misleading. This method does not account for the timing and retention of precipitation, such as the case if a six-inch rainfall were to fall in 30 minutes on very dry soil, where retention of precipitation would be poor.

Standardized Precipitation Index (SPI): This is an index based on the probability of precipitation for any time scale, compared to long-term records of precipitation. Variables considered are precipitation, soil moisture, ground water, stream flow, and reservoir storage.

Pros: This method can be used for different time scales, providing early warning of drought and helping to assess drought severity. This method is also less complex than the PDSI.

Cons: Because the results are based upon preliminary data and then compared to long-term climatological data, these values may differ from actual precipitation experienced.

Crop Moisture Index (CMI): Derived from the PDSI, it uses mean temperature and total precipitation for each week to evaluate short-term moisture conditions across major crop producing regions.

Pros: It is a useful tool for identifying agricultural droughts.

Cons: It is not intended for assessment of long-term droughts, and the method's rapid response to short-term weather swings may mask long-term drought. This method also only covers the growing season, and may be inapplicable during seed germination.

Reclamation Drought Index (RDI): The RDI is calculated at the river basin level, incorporating precipitation, snowpack, stream flow, and reservoir levels. The RDI also uses a temperature-based demand component that considers time as a variable.

Pros: It includes a temperature component, thus allowing calculation of evaporation.

Cons: The RDI is unique to each river basin, thus cross-basin comparison of results is of limited value.

Deciles: This method groups precipitation from the period of record into five broad "deciles" of 20 percent each.

Pros: It provides a historically accurate statistical measurement of precipitation, and probability of future drought.

Cons: Because the Decile method is completely reliant on precipitation records, a long period of record is required for any meaningful results. In addition, events that fall outside the range of what occurred during the period of record are not accounted for.

Drought Monitor: According to the National Drought Mitigation Center, the Drought Monitor combines key indices of rainfall and drought to produce a weekly map depicting drought intensity. Since drought often affects various activities differently, the map indicates whether drought is affecting agriculture, fire danger, or water supplies. The Drought Monitor is produced through a joint effort between the National Weather Service's Climate Prediction Center, the U.S. Department of Agriculture, and the National Drought Mitigation Center at the University of Nebraska-Lincoln.

Pros: The Drought Monitor summarizes the complexities of various drought indices providing a single, simple, visually-intuitive summary of drought conditions.

Cons: Different drought indices operate on different time scales, and the average of those time scales may not always be representative of widely varying results from different indices, or conditions on the ground.

In general, the limiting factor for every method is that an insufficient amount of historical precipitation data is available. With only decades, rather than centuries of data available, it only makes it more difficult to identify climatic trends and our drought vulnerabilities.

There are a number of different drought evaluation methodologies available. As has been shown in this article, each method has its good and bad points. The method that you choose to use should be determined by what your needs are, and the limitations of the models.

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