

The power of water

***Basin Electric, its members and employees,
impacted by historic flooding***

By Julie Slag



On June 1, 2011, the spillway gates at the Garrison Dam were opened to pass flood waters for the first time in the history of the dam.

Life was fairly predictable for homeowners, businesses, and rural communities near the sandbar-laden Missouri River basin in early May 2011. The Upper Great Plains had seen another cold, wet spring after a prolonged winter. Soggy fields prevented many farmers from seeding their crops. City dwellers had begun yard work, glad to enjoy the all-too-brief summertime.

For U.S. Army Corps of Engineers dam operators along the Missouri River's main stem, prediction is part of their job. Heavy snow pack in the western mountains hadn't begun to melt when unprecedented rainfall in eastern Montana swamped prairies already saturated from a wet winter. Excess storm water in overflowing rivers and streams surged into the reservoirs behind the great upper Missouri River dams at historic inflow rates.

The wet conditions and abnormal rainfall quickly changed pool levels at Fort Peck, Garrison and Oahe reservoirs. The Corps recalculated inflows and updated the required amount of controlled releases needed to push massive amounts of water through the Missouri River main stem.

Flooding along the Missouri River was commonplace prior to the construction of the dams in the late 1940s-50s. The Missouri flooded at Bismarck three times above 30 feet between 1881 and 1910. The last major flood in the area was in 1952, when the river reached 27.8 feet.



The Corps' federally mandated river operation responsibilities, which include main stem river flood control, wildlife protection, irrigation, erosion control, navigation, and dam and reservoir operation, have a significant impact on hourly hydro generation levels. Through

the cooperative's partnership with the Western Area Power Administration (Western) and its preference customers, many of whom are Basin Electric Class A, C and D members, Dave Raatz, Basin Electric manager of marketing and power supply planning, and staff work closely with Western to coordinate daily power scheduling and operations. Western is the federal hydropower marketer in the Upper Great Plains region.

“We will use a combination of all the avenues available to get the excess water out. It will go through the spillway gate. It is still a controlled release.”

Todd Lindquist, Garrison Dam operations manager

“High levels of water behind Garrison Dam isn't all that unusual. In the 1990s, Lake Sakakawea [reservoir] had filled up in three years after a prolonged drought. By 1993 the lake was up to 1,854 feet [maximum reservoir height]. Electric generation was high and a relatively small amount of water needed to be released through the spill tunnels,” Raatz says. “Then we had another drought, which ended in 2009. In the summer of 2010, the Corps held back water, in accordance to their operations procedures. Then, during the fall and early winter of 2010, the Corps began to move higher-than-normal amounts of water through the system, and the reservoir was reduced to an elevation of 1,837 feet in

February 2011.” Raatz says 1,837 feet is the normal Garrison pool elevation for accommodating spring runoff levels.

Due to rapidly changing conditions in Montana, northern Wyoming, and the western Dakotas, the Corps announced on May 31 that

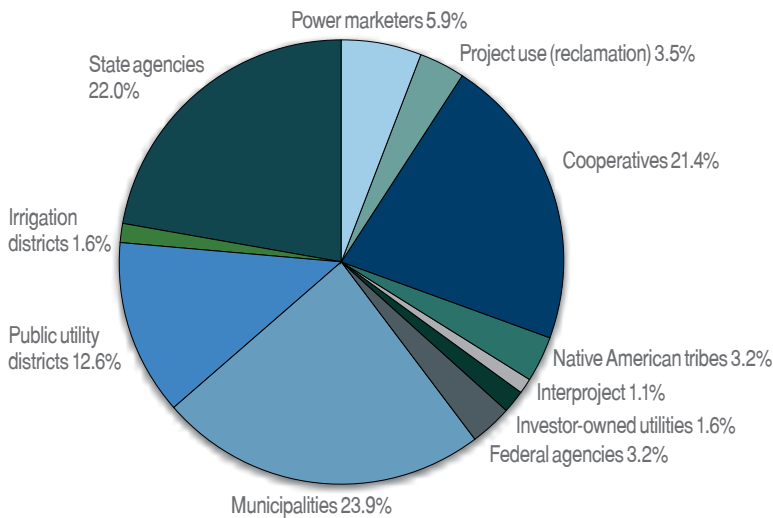
vacating unprecedented inflows from Fort Peck into the Garrison Dam reservoir would require an act of historic significance. For the first time since its construction, the dam's spillway would carry a graduated release to 150,000 cubic feet per second (cfs) of water down the main stem river system. Flows are anticipated to last weeks, maybe months.

In an interview with the Bismarck Tribune, Jody Farhat, chief of water management for the Corps, said the Corps is transferring flood storage from Oahe and Big Bend to Fort Randall, which has more storage available at this time. “The amount of rain has nearly filled the reservoirs, doing away with most of the flexibility we had built into our operations for this year,” Farhat said.

By July 1, the Missouri River had reached 19.24 feet at Bismarck. According to area officials, the cities' and counties' levee systems are built to withstand 20.6 feet plus another foot. Mark Clark of the Corps of Engineers said there was no expectation they would have to increase the 150,000 cfs of water now coursing through Garrison Dam spillway.

Continued ▶

Where Western's energy goes (MWh)



Source: <http://www.wapa.gov/newsroom/FactSheets/glance.htm>

Power regulation: balance and timing

The Corps proposed a schedule of graduated releases timed to help Missouri basin downstream communities prepare for high river levels and flood conditions. As homes and businesses became submerged by flood waters, the media and general public asked whether the Corps could have done more to prevent flooding.

Definitive answers about Missouri basin flooding will not be known for some time, but significant economic consequences exist for Basin Electric and its member systems in the power marketing sector if hydro levels remain abnormally high.

Raatz says the Corps' river operations and Western's power marketing operations intertwine. He says Basin Electric and Western's generation resources are dispatched as a single system in accordance with long-term contractual arrangements between the parties.

"This relationship provides for the most cost-effective way of serving Basin Electric and Western customers," he says. "Any extra generation not needed to serve our long-term contractual obligations is then sold to the wholesale electric market through the use of unloaded transmission capabilities."



According to Pete Kinney, manager of Western's Upper Great Plains Merchant Office, the Corps follows federal statutes and guidelines requiring them to balance the river system as a single entity. He says the Corps decides how much water must move through each dam and provides Western discretion on the hourly releases so Western can meet its firm load obligations, plus maximize the value of surplus electrical generation created with water releases from the dam.



(Left to right) Basin Electric employees Mike Zimmerman, Curt Pearson, Pat Sebastian, Em McKay, Cheri Wenzel, and Cole Johnson sandbag to save Don and Cheri Wenzel's home.

Ramping up the fight

Among those directly affected by rising water were 145 Basin Electric employees and their families.

As the Corps, the North Dakota National Guard, and state, city and county officials in Bismarck-Mandan coordinated information about projected water levels and established flood mitigation measures, Basin Electric CEO and General Manager Ron Harper took immediate action to release employees for property protection and salvage operations. Offices at headquarters emptied in late May and early June as employees engaged in personal and community sandbag operations.

Basin Electric employees took shifts over two weeks sandbagging and emptying homes, offering labor, time, and concern for each other and the community at large. The cooperative donated money to service organizations, allowed employees three days of paid time for sandbagging, delivered prepared food, donated packing boxes to flood refugees, and were joined in the fight by volunteers and members of the Basin Electric cooperative family. Some employees opened their homes to coworkers who had no other place to live.

On June 20, Basin Electric human resources staff calculated that 690 Basin Electric employees had put in 11,088 hours in flood mitigation labor between May 16 and June 18, 2011. [Read more about employees impacted by flooding on page 28.](#)



Photo credit: Chris Mangan/Capital Journal

Water from the Missouri River pours out all six gates of the Oahe Dam stilling basin north of Pierre, SD, on June 7, 2011.

He says the Corps has the final say on how much water comes through the Missouri River system by targeting water releases according to criteria designed to ensure safety and navigation.

“We have just come out of a nine-year long drought where the Missouri River set record low inflows, storage levels, and generation,” Kinney says. “Western was purchasing energy from the open market and our Joint Marketing Program, of which Basin Electric is a member, just to meet the obligation to our firm customers. Now, only the second year after the drought ended, we are generating 40 to 50 percent more than our obligation to our customers.”

Basin Electric and Western’s joint dispatch system works well, Raatz says. “From a system perspective, the philosophy has always been this: Hydro generation is higher during the daylight hours to maximize the amount of on-peak generation. Then hydro generation is reduced to help maximize coal-based generation during off-peak periods.”

“The combination of Basin steam and Western hydro works well together,” Kinney says. “Western’s Generation Control and Merchant Offices coordinate steam and hydro generation to serve customer loads and insure the reliable operation of our balancing area. Any generation over and above what is needed for loads

and reliable operation is surplus and can be sold in the open marketplace. Unfortunately, transmission availability in the Eastern Interconnect is limited and movement of such large surplus power levels causes congestion across areas where transmission capabilities are low.”

“Because of this situation, Basin has had to take some of its coal-based generation offline. We are also purchasing power from Western to meet a portion of our power supply obligations.”

Dave Raatz, Basin Electric

“Because of this situation, Basin has had to take some of its coal-based generation offline,” Raatz says. “We are also purchasing power from Western to meet a portion of our power supply obligations.”

“Unfortunately, both Basin Electric and Western are not able to move all of our surplus generation to market, and, as a result, we are being financially impacted,” Raatz says.

Historic regulation opportunity

Raatz says as a balancing area operator, Western is also responsible for adjusting generation on a second-by-second basis, regulating power to meet the instantaneous electrical needs of control area consumers.

“Western looks at the entire system and, on a four-second basis, moves hydro generation in response to load changes and wind generation changes, because electricity cannot be stored,” he says. “Current high levels of water releases

Continued ▶

are causing the Corps of Engineers to implement release restrictions that are limiting Western's ability to make large hydro generation changes. They could implement further restrictions, which would limit their ability to provide regulation power. As a result, Basin is reviewing our plant operational systems to see if Basin Electric can assist Western in providing necessary power regulation."

Raatz says it's normally easier for Western to move hydropower on a four-second basis than it is for baseload coal plant operators to make instantaneous power adjustments. He also says it's expensive to provide regulation power by using gas generation due to its higher operating cost.

"Basin Electric's new gas generation stations are capable of providing regulation power due to the significant amount of wind generation in the cooperative's resource portfolio. Basin Electric has set up controls at Groton Generation Station Unit 1 to regulate around the variable wind generation from one of its purchased power wind projects in South Dakota."

Raatz says these controls should help Basin Electric better understand the costs required to manage wind generation.

Raatz says Basin Electric has modified Groton Generation Station Unit 1's control system to accept a signal from Western, so Basin

Electric can assist Western with its control area regulation requirements, if needed. "This opportunity arose as a result of the high hydro releases and its impacts on Western hydro generation operations," he adds.

"Kevin Tschosik and his people in Basin Electric's distributed generation division can accept a signal from Western to provide regulation power," Raatz says. "Although it is in testing phase right now, we know it will work. Also, [Basin Electric's] Culbertson Generation Station in Montana is being set up in a similar manner to provide regulation power, if required."

Basin Electric has contractual obligations to be able to provide regulation power, but has not been asked to do so until this year, Raatz continues. "This is a very significant event for Basin Electric – it's the first time in our history Western has asked Basin Electric to make preparations to provide regulation power."

Western: feast or famine



According to Jody Sundsted, Western's Upper Great Plains Region power marketing manager, Missouri River basin flooding presents an additional concern for Western and its preference customers with contractual commitments to recover Western's drought-related costs accumulated during drought years through a "drought adder" in their hydropower rates. He says nine consecutive years of drought resulted in a reduction of hydropower generation, which caused purchased power and interest expenses to increase, and revenue from non-firm energy sales to decrease. Many of Western's preference customers are also Basin Electric members.

"During the dry years, Western had to purchase power elsewhere to provide power to its customers," Sundsted says. "There was a lot of discussion on how to implement a drought rate adder for the preference power community to pay for the extra drought-related costs. The flooding now has

significant impacts – the water is just pouring through the Missouri system, surplus releases cannot be timed to maximize value of hydro generation to the marketplace, and so potential additional revenue for paying down the drought adder is being lost.

"The key to understanding the impact of Missouri Basin flooding on power marketing is that you never want to just spill the water. You want to be able to adjust the timing of the flows to power demand," Sundsted says. "If these large water flows would have come over a longer time period, Western would have had time to maximize the value of its hydro generation. There's no market value in spilled flood water."

The flood fight along the Missouri River continues bringing uncertainty to Basin Electric, its employees, member systems, and Western. Whether measuring loss of home, personal property or livelihood, the overall economic impact will be substantial. From a system perspective, the flooding has created problems for the region's power generators that do not have a quick fix.

Raatz says current economic hurdles for selling bulk power – transmission constraints and an abundance of hydropower – are a major challenge that is having financial impacts on both Basin Electric and Western's electric customers.

“This is a very significant event for Basin Electric – it's the first time in our history Western has asked Basin Electric to make preparations to provide regulation power.”

Dave Raatz, Basin Electric



Photo credit: North Dakota National Guard

Co-op communities battle Mouse and Missouri

By Tracie Bettenhausen and Andrea Blowers

Basin Electric member cooperatives across five states are fighting flood waters at varying degrees. Some have been forced to shut off power to their consumers, some have lost power due to continued high water levels, and, in other cases, consumers have asked to have their main power shut off because nobody is living in their home. And, crews are watching transmission lines and substations.

Co-ops donate \$50,000 to Minot flood relief
Verendrye Electric Cooperative, Central Power Electric Cooperative, Basin Electric Power Cooperative, SRT Communications, and CoBank teamed up to donate \$50,000 to the Mid-Dakota Red Cross in Minot on June 27 to help with flood relief efforts. Each co-op pledged \$10,000.

Two separate rivers are the culprits: the Mouse River, also known as the Souris River, in northern North Dakota, and the Missouri River, which stretches from Montana to the Mississippi River in Illinois.

In Minot, ND, the Mouse River has caused a level of damage never before seen. A quarter of the city's population, 12,000 people, were forced to leave their homes. In many cases, water completely submerged the homes.

From a co-op perspective, the communities along the Mouse River have endured some of the most significant, concentrated impacts from flooding in and around Basin Electric's co-op communities. Tom Meland, general manager for Central Power Electric Cooperative in Minot, says eight of the co-op's 42 employees had to evacuate their homes due to flooding.

"We have one substation about half in the water and some of our transmission structures were washed out by flood waters," Meland says.

Homes and businesses along the Mouse River were inundated in late June. Verendrye Electric serves this area called Eastside Estates in southeast Minot.

Tom Rafferty, community relations manager for Verendrye Electric Cooperative in Velva, ND, says they've disconnected power to between 400-500 of their members and more than 1,000 of the co-op's members have been impacted by water.

Both Verendrye Electric and North Central Electric Cooperative in Bottineau, have struggled with travel in their areas.

Rafferty says there is currently one road open to go north and south in and around

Minot. "It takes between an hour and three hours to go 15 miles depending on the time of day you're traveling."

Wayne Martian, manager for North Central, says the biggest problem the co-op has had is getting from point A to point B. "Our main east/west road, Highway 5, closed because of high water, so we only have one crossing, which is near the Canadian border." North Central's system runs about 50 miles from the Canadian border south and about 100 miles across.

Capital Electric Cooperative and Mor-Gran-Sou Electric Cooperative, which serve consumers along the Missouri River outside Bismarck and Mandan and rural communities, have some consumers behind the dikes in the safe zone, but many in front of the dikes. A number of those consumers have requested to have their power shut off, because access to their homes is limited and potentially dangerous.

Continued ▶



Photo credit: Central Power Electric Cooperative

Central Power's Towner distribution substation flooded by the Mouse River.



Photo credit: West Central Electric Cooperative

Linemen from West Central and East River Electric Power cooperatives and South Dakota National Guard soldiers use a track digger to make holes under water for power poles.

“We estimated about 1,000 Capital Electric members have been affected by flooding,” says Wes Engbrecht, communications director for Capital Electric. “We’ve been very fortunate to have been able to maintain power for almost all of our customers.”

Jackie Miller, manager of member services for Mor-Gran-Sou Electric, says about 100 of their members have been impacted. In the interest of safety, the co-op disconnected power to about 35 homes along Square Butte Road and Rosie Lane west of Willow Road.

Officials from Harrison County Rural Electric Cooperative in Woodbine, IA, shut off power to nearly 200 services, most of which are irrigation lines. Western Iowa Power Cooperative in Denison, IA, also has nearly 200 outages. Jeff Bean, executive vice president and general manager, says the area’s economy relies heavily on agriculture, and much of the land is under water. “The co-op has been lending a helping hand and equipment where we can. It’s really sad to see these homes be inundated by water. Some of them are people’s dream homes,” Bean says.

In South Dakota, the cities of Pierre and Ft. Pierre faced flooding along the Missouri, and cooperatives had many accounts off line. Justin Bryan, area foreman of the Presho-Oacoma area of West Central Electric Cooperative in Murdo, SD, has a sandbag dike around his home. His wife, Pam, says, “You can always replace a home, but you can never replace a life. And thank God nobody has lost a life in this flood in South Dakota.”

Bon Homme Yankton Electric’s service area includes Gavins Point Dam. Downstream from the dam, more than 20 homes are dealing with water. But one loss hits home for the co-op – Larson’s Landing, a popular RV park. “One of our employees owns the park with his dad. It’s under water. It’s not his home, but it is his investment,” says Merlin Goehring, Bon Homme Yankton general manager.

Crops are impacted as well. After contacting farm service agencies, U.S. Department of Agriculture (USDA) offices, and agriculture departments in North Dakota, South Dakota, Montana and Iowa, it’s safe to estimate hundreds of thousands of acres, possibly millions, of Missouri basin cropland has been or will be affected by flooding. The USDA will release their estimate later this summer.

Ron Harper, Basin Electric CEO and general manager, says, “As a cooperative family, it’s been incredible to watch employees, members, families and friends join together to fight the rising waters charging in on our co-op communities. We’re just in the midst of these flood events and will only begin to understand their full impact when the water finally recedes. However, the strength and determination of our member co-ops had been demonstrated ten times over and I really couldn’t be more proud to be part of this co-op family.”

On the web

Find more photos, stories and video of the flood events on The Flip Side blog at basinelectric.wordpress.com.