

## DEVILS LAKE OUTLETS MILESTONE: ONE MILLION ACRE-FEET REMOVED



It is hard to believe after a very dry year in North Dakota, that Devils Lake is still being impacted by a flood that has lasted for a quarter century, but a monumental milestone reached this year is a reminder of the flood fighting work that continues in the Devils Lake basin. Thirteen years after completion of the West Devils Lake Outlet in 2005, and seven years after the East Devils Lake Outlet was completed in 2012, both projects combined have removed more than one million acre-feet of floodwater from Devils Lake.

In response to the rapid and record-breaking rise of Devils Lake, which started in 1993, the State of North Dakota pursued a three-pronged approach to fighting the flood; infrastructure protection, basin water management, and an outlet to the Sheyenne River. The outlets have been important in relieving the flooding in the basin and helping to prevent a potentially catastrophic spill of Stump Lake through Tolna Coulee, and then into the Sheyenne and Red rivers.

Over a billion dollars have been spent responding to Devils Lake flooding by raising and improving infrastructure, and implementing water management programs in the basin to attempt to reduce lake inflows. However, other than the impossible task of shutting off

the rain and snow, an outlet from the terminal lake (no natural outlet at its current elevation) was the only way to remove the water that kept raising the lake every year.

Construction of the West Devils Lake Outlet began in 2002. The West Devils Lake Outlet went into operation in late 2005, pumping water from Round Lake (a bay of Devils Lake), into the Sheyenne River. The original project had a capacity of 100 cubic feet per second (cfs), but it was significantly limited in its operation because of the requirements of the water discharge permit. As time passed, and a better understanding of the outlet and Sheyenne River were gained, operational guidelines were modified, allowing the outlet to run at full capacity.

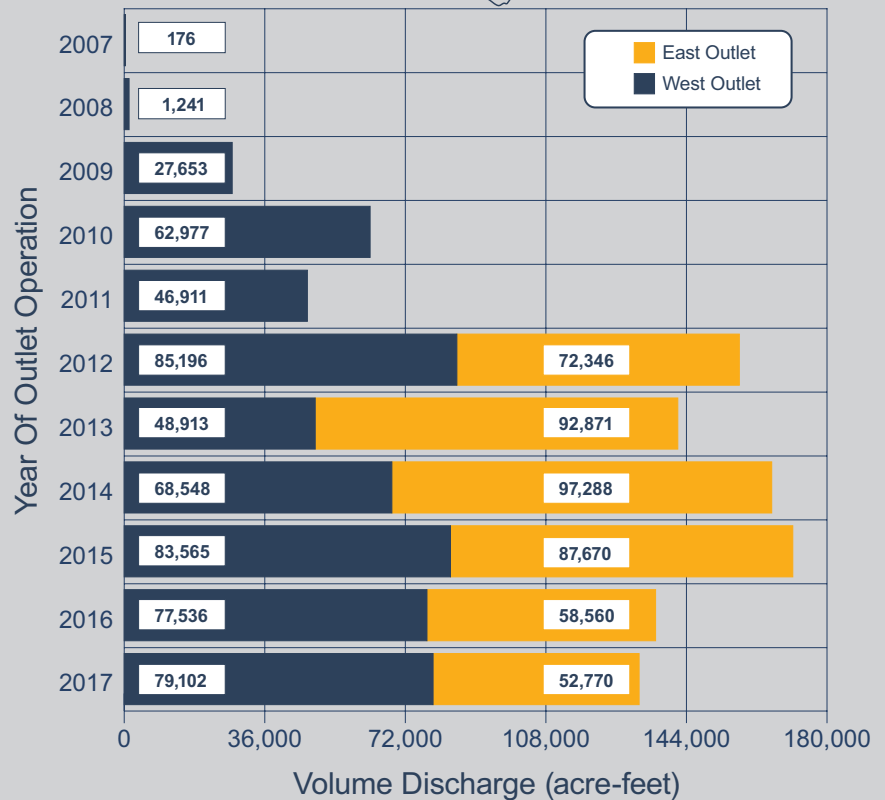
Even though the West Devils Lake Outlet was frequently operating at full capacity, the long-term wet cycle was still causing the lake inflows to greatly surpass outlet discharges. Because of this, the State Water Commission began the process of increasing the West Devils Lake Outlet's discharge capacity to 250 cfs in 2009. Although the pipeline and open channel portions of the outlet were already sized for that flow, additional pumps and power supply were needed to increase discharge capacity. Expansion of the West Devils Lake Outlet was completed in early 2010.

Even after more than doubling the pumping capacity of the West Devils Lake Outlet, inflows of water into Devils Lake were still too great, and the lake continued to rise. To further improve the ability to remove water from the lake, construction of an East Devils Lake Outlet was initiated in 2011, and completed in 2012. The East Devils Lake Outlet has a capacity of 350 cfs, which brings the total maximum discharge of the combined Devils Lake outlets to 600 cfs, or about 1,200 acre-feet per day. While the West Devils Lake Outlet is a combination of open channel and pipeline, the East Devils Lake Outlet is pipeline only, until it reaches its discharge point into the Tolna Coulee, which eventually flows into the Sheyenne River.

Operating at full capacity, both outlets working together now have the ability to remove about a foot of water from Devils Lake over the course of a full operating season. In recent years, the outlets have operated at reduced capacity to prevent exceedances of downstream water quantity and quality limitations. Even with reduced discharge, the outlets have exceeded 130,000 acre-feet of discharge every year since 2012.

Over 12 years of operation, the Devils Lake outlets have discharged approximately 1,043,482 acre-feet of water, resulting in a lake elevation nearly five and a half feet lower than it would be without the outlets. At its current elevation (November 2017) of 1,449.6 feet above mean sea level, the amount of water removed, equates to about 60,000 acres. This is land that would be flooded today without the Devils Lake outlets. Interestingly, the volume of water removed by the outlets from 2005-2017, is about 450,000 acre-feet greater than the total volume of Devils Lake and Stump Lake in 1992, prior to the start of the current wet cycle.

“Without the Devils Lake outlets, the lake would have been over five feet higher.” said State Engineer Garland Erbele “The tremendous success of these projects has protected roads and homes, and allowed nearly 91 square miles of inundated land to be used for farming and ranching again.”



A summary of outlet operations from 2005 through 2017. The West Devils Lake Outlet was first turned on towards the end of 2005 (38 acre-feet total), and was not operated in 2006 due to high natural sulfates in the Sheyenne River.

The hard work by Water Commission staff and innovation in response to challenges presented by the flooding has not ended. In 2017, staff made modifications to the West Outlet standpipes to control foaming, and had a pump motor refurbished in an effort to ensure long-term reliability of this important infrastructure.

After a dozen years of operation, the Devils Lake outlets have been slowly but surely turning the tide against a record flood, providing real relief to the people of that region.