



MUD LAKE WATER USERS

PROJECT-AT-A-GLANCE

FlexRake[®] FRHD units help an Idaho cooperative deliver reliable water supply to local farmers, reduce labor costs and eliminate worker safety concerns

SITE: *Owsley Pumping Station*

EQUIPMENT: *FlexRake[®] FRHD 2" Opening, 30-degree angle*

FLOW RATE: *160,000 GPM*

INSTALLED: *2019*

CLEARING THE TUMBLEWEEDS

In Eastern Idaho, tumbleweeds and other debris have plagued the cooperative Mud Lake Water Users, Inc. for years. This canal company is responsible for delivering water for irrigation to farmers in the region. The debris captured by their decades-old stationary screen was extremely labor-intensive to clear by hand multiple times a day during irrigation season. They needed to find a better way to protect the pumps in the adjacent pumping station, which were at risk of interrupting the necessary 160,000 gallon-per-minute capacity. An automated screening system installed in 2019 requires almost no maintenance, has secured the safety of their workers, is effectively protecting the expensive pumps, and allows Watermaster Shaun Grover to spend his time distributing water for crops instead of manually cleaning screens.

APPLICATION

Mud Lake Water Users, Inc. is a non-profit irrigation company formed in March of 1998 from the Owsley Canal, Jackett Canal and Holley Water Users. The company owns water rights for irrigation storage in Mud Lake, a natural closed basin in Eastern Idaho that is fed from the nearby Camas and Beaver Creek drainages and by artesian and pumped wells. Mud Lake is used as a reservoir for storage of irrigation water before the water travels through a series of supply canals, two major pump stations that lift water into the Owsley Canal and multiple minor canals and ditches that convey the water to 130 farms. Farmers use the delivered water from the canals to flood irrigate and pump the water into pressurized sprinkler systems for irrigation of crops, primarily alfalfa, potatoes, wheat, and silage corn.



THE PROBLEM


The canal is empty during winter, but during spring when the Owsley Canal is filled with water from Mud Lake for irrigation, the eastern Idaho terrain is so flat and windy that the lake and canal are overrun with tumbleweeds, willows, cattails, and cottonwood limbs and branches. And in late summer, after months of long days and sunshine, algae and moss form in the canal. Screening, therefore, is crucial to the operations of the MLWU. Without effective screening, the four 42" diameter, 200-horsepower pumps at the nearby Owsley Pumping Station would be in jeopardy. If debris gets through the screen and into the propellers, it can destroy the pumps or cause lost production time if pumps need to be shut down. During the irrigation season, from May 1st to October 31st, it's imperative that the water travels consistently to the crops. With each pump producing about 45,000 gallons per minute, there is no time for shutdown.

Shaun's main concern was the pumps. "When you drop the water level on a turbine pump, the air is more damaging than actual sand and dirt; it acts like dynamite, pitting and destroying the impellers and suction ring. By dropping the water level because of debris, you're putting premature wear and tear on the impellers and suction ring, damaging equipment and losing pumping efficiency. Then there's the cost and time to replace the equipment. You can't just go to the store to buy a nearly four-foot pump. If I lost just one of my pumps, it would cost around \$200,000 to replace...plus we would be down six months while we waited for a special-order pump to be built. That just can't happen."

A two-part screen constructed 50 years ago was the only protection for the pumps. A metal screen with a 1.5-inch opening caught underwater debris while another screen made of wooden two-by-fours spaced 1" apart caught the overflow on top of the water. To clean out the debris and protect the pumps, MLWU would hire people, often local high school students, to clean the old screens using pitchforks to toss the debris over the railing and onto the deck while standing on a platform that was less than three feet wide. Worker safety was a major concern since they were directly upstream of the adjacent pumping station. If a worker were to fall into the water, the pumps would need to be shut down immediately to prevent the workers from being sucked into the propellers. Shutting down the pumps causes moss to backflow and the canal level can drop.

Bottom line: pumping efficiency is lost, and it can take hours, even up to all day to catch up. In addition to needing to protect the pumps, MLWU was concerned about the risk to the workers being above a canal filled with six to eight feet of water with 480-volt power. Thankfully there had never been an incident, but they didn't want to continue to put their crew in jeopardy.

The process of manually clearing the old, dilapidated screen every few hours was labor intensive, expensive, and potentially dangerous. MLWU was concerned for the safety of their workers as well as the ongoing operations and maintenance of the screening system. They began to consider other ways to screen the debris.



"It has significantly reduced our manual labor needs and safety concerns."

WORKING TOWARD A SOLUTION



A large crew manually removes tumbleweeds from the original screening system in the Owsley canal.

In 2016, MLWU hired Civilize, PLLC Management and Engineering to conduct a feasibility study for upgrading their existing manual screening system to an automated technology. While it was evident from the study that automating their process would have long-term financial benefits, the initial capital investment was a concern to some of the board members. Having done it himself hundreds of times over 20 years, Shaun knew the cleaning process was extremely labor-intensive. He was always in favor of automation, knowing that efficiency issues could delay his farmers from receiving the water they needed for their crops. Insufficient water to irrigate the crops could result in an estimated 40% loss of the crop and tens of thousands of dollars depending on the weather, the type

of crop, and the stage of the crop. The money invested in automated screens would effectively guarantee adequate water for the duration of the summer.

In 2017, the opportunity to address their screening issues presented itself when the Idaho Transportation Department required a bridge removal project upstream of the Owsley Pumping Station. Because the new culvert crossing would be much narrower than the existing bridge, they would need to add a new screen in front of the new channel so it wouldn't jam with debris. Still reluctant to invest in an automated bar screen, MLWU had a 2-inch opening static steel screen installed in 2018.

The new static screen was in place for just one year. However, it did not improve their maintenance issues, and it actually made them worse. Because they kept the original metal and wooden screen adjacent to the pumping station to function as a secondary screen, they now needed to manually clean two screens multiple times a day! The board agreed it was time to make the investment into automation.

AUTOMATION IS THE ANSWER

The MLWU board looked at a couple of different automated screen manufacturers and Duperon stood out because of the longevity of both their equipment in the field and the company itself. If they were going to make a significant investment into automation, they wanted to feel sure they were getting the best value for their money and the Duperon warranty gave them the peace of mind they needed to proceed. One of the features important to Water Master, Shaun Grover and Board President, Steve Shively, was the front-clean, front-return design that the Duperon team had invented 35 years ago, with all moving parts accessible above the water line; there would be no lower sprockets, bearings, tracks or guides that would require underwater access. The minimal maintenance required could all be performed from the deck. Another factor in their decision was that the Duperon FlexRake® was also easy to integrate into their existing SCADA program.

Brent "Husk" Crowther from Civilize specified the equipment. He had worked with Duperon automated bar screens for wastewater applications and was pleased with the results. He felt it would offer the right solution to solve the Mud Lake Water Users' problems.

In 2019, two FlexRake® FRHD bar screens were installed at the 10-foot wide, 16.5-foot deep channel in the Owsley Canal, about 1.5 miles south of Mud Lake at the entrance to the new culvert. The primary Duperon screening system includes two screens set at a 30-degree angle with a 2" opening with a combined flow capacity rated 161.58 million gallons per day. The FlexRake FRHD provides continuous cleaning and is designed for applications where debris size, velocity, and flow are unpredictable. The FlexLink™ multifunctional link system with 5-pound stainless steel cast links and a strength of 60,000 pounds provides a durable system that can work effectively for decades. Jam Evasion™ technology allows the FlexLink multifunctional link system to lift and pivot around debris, allowing the automated screening system to adapt to a wide range of debris variations with up to 1,000 pounds of lifting capacity. One hundred sixty-five feet downstream of the FlexRake screening system, the original 1.5" metal screen adjacent to the Owsley Pumping Station was left in place as a secondary screen to catch any additional debris that might blow into the canal after (or behind) the FlexRake.

The FlexRake screens were prefabricated in the Duperon manufacturing plant in Saginaw, Michigan. The installation was unusual because the screen was installed with water already in the canal. Assembled in advance, the screens were lifted by the crane separately and mounted to the bottom of the canal at an pre-anchored footing plate and bolted to the top head wall. A few expected adjustments were made in real time so the screen could fit perfectly in the space, and the installation took just a few days. There were no issues.



The Duperon FlexRake has significantly reduced MLWU's manual labor needs and safety concerns, saving 53% of their labor costs or \$12,324 per year.

Duperon developed the new screening system specifically for these types of applications – Flex-Rake technology was designed to handle whatever ends up in an open channel. The specifying engineer, Brent, found the team at Duperon to be knowledgeable and helpful: “We relied on their experience. They answered lots of questions and were very involved and supportive.”

RESULTS

The automated screening system has been running for nearly two years now. Today, instead of cleaning the screens every few hours each day, MLWU clears the debris from the smaller secondary screen about once a week. They estimate that the difference between the old way – including labor and backhoe - is \$12,324 per year, a 53% savings in labor costs. Power costs for the new automated screen is negligible with the energy-efficient 0.5-horsepower motor of the Sumitomo drive system.

But it's not just cost savings that has made this project such a success. Shaun's daily routine used to be to get up in the morning, check the screening system first thing, then spend two hours each morning clearing out the screens manually. Then, depending on the day and the flows, he might have to come back again, up to two more times, to reclean. The new equipment has freed up Shaun's days, allowing him to focus on his first priority as watermaster: delivering the water to the farmers quickly.

Now he also has more time to address the other concerns of his stockholders, including maintenance and repairs on the canal, tending to the 35 deep wells that provide water for Mud Lake when snow runoff is insufficient, working on SCADA programming, monitoring the entire network, and generally running the business of the MLWU. In fact, since the watermaster lives on site and is on-call twenty-four hours a day for six months of the year, Shaun now even has time to spend with his wife and children.



FlexRake handles the heavy inflow of moss from the lake

Shaun says he can “highly recommend the system because it has significantly reduced our manual labor needs and safety concerns. We’ve increased our pumping efficiency and have consistent flows and, most importantly, I know my employees aren’t at risk. The new Duperon automated screens cost roughly the same as one pump. That’s been well worth it for us to know the pumps are protected. And we can now spend our time distributing water to the farmers instead of cleaning screens.”

ABOUT DUPERON

Duperon Corporation is the leader in innovative preliminary liquid/solids separation systems. For more than 35 years, Duperon has provided simple yet innovative solutions for a variety of screening and solids handling applications in the water and wastewater industry. Duperon technologies are designed and manufactured in Saginaw, Michigan.