



An Underwater Snapshot

Acoustic Doppler Current Profiler takes measurements in the Blitzen River for a study looking at water management, streamflow, and sediment

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by Lauren Brown

A recent study by a University of Oregon graduate doing work on the Malheur National Wildlife Refuge could help water managers identify areas of the Donner und Blitzen River that could use rehabilitation.



Sarah Weber graduated in June with degrees in Earth Sciences and Environmental Science. She worked as a technician for the refuge last year, where she collected data for her thesis, "Quantifying the Impact of Water Management on Streamflow and Sediment in the Donner und Blitzen River within Malheur National Wildlife Refuge." This year, having completed her thesis, she will return to the refuge as the Blitzen Sediment Technician, working as a High Desert Partnership employee to collect additional data.

Streamflow and sediment data collection

One key piece of equipment that enabled Weber to take the necessary measurements for her thesis was the Acoustic Doppler Current Profiler (ADCP). The ADCP was acquired by the Harney Basin Wetlands Collaborative, one of the six collaboratives of the High Desert Partnership, using funds from the Oregon legislature.

Josey Wilson is the Harney Basin Ecological Coordinator for the partnership and helps support the Harney Basin Wetlands Collaborative as well as the Malheur National Wildlife Refuge Comprehensive Conservation Plan Collaborative. She has been working with Weber on using the ADCP for data collection.

Wilson described the ADCP as a little boat that floats on the surface of the water. "It works by sending sound waves through the water column to the riverbed, creating an underwater profile of the stream," she said. From this data, the ADCP calculates streamflow and other channel characteristics. All the data collected by the ADCP is stored in data files on a field laptop. These streamflow files are then processed through a quality assurance software that summarizes the data into a PDF format, making the information easier to access.

Wilson noted that ADCP fieldwork is typically conducted from a bridge, with the instrument lowered by a rope, allowing workers to avoid the hazards of entering the water. Once the ADCP is safely in the water, Wilson explained, they begin at one end of the bridge and slowly walk across, moving the instrument across the channel to collect a cross-section of the stream. During the 2024 field season, Weber took measurements on 10 different occasions from March to September. Wilson helped with some of those collections.

Once the data collection was done, Weber got to work analyzing the numbers and writing her thesis, which she presented in May.

The results

What did Weber's thesis reveal? "We were able to quantify site-specific quality and quantity conditions along the length of the Blitzen River, many of which have not been quantified before," she said. "We got this first look at how turbidity and sediment are changing along the length of the river, and we saw that sediment is increasing in certain reaches during certain times."

This initial data will help inform her work this summer as she collects more data to assess whether or not they are seeing the same trends. All of this will help inform the refuge on the conditions of the river and how water management may play a role in certain places. "That way, they can do targeted river rehabilitation along the river if needed," Weber said. "That would not only help aquatic species and fish that are in the river itself but also help decrease that sediment load that is being delivered to Malheur Lake."

In 2023, the United States Geological Survey came out with a paper [Smith, C.D., and Wood, T.M., 2023, [*Implications of water, sediment, and nutrient budgets for the restoration of a shallow, turbid lake in semiarid southeastern Oregon*](#): U.S. Geological Survey Scientific Investigations Report 2023–5098] that found that the Blitzen River was delivering an increased sediment load to Malheur Lake, which was complicating restoration efforts. As water managers were trying to decrease turbidity in the lake, water entering the lake from the Blitzen River was increasing the amount of sediment available for resuspension there.

River rehabilitation in specific areas could potentially decrease the sediment load to the lake and help with restoration. "We're doing this more like a watershed approach to understand maintaining water quality," Weber said.

A necessary tool

The ADCP was essential to Weber's work. "We needed the ADCP for the streamflow measurements and that was helpful for us in order to calculate sediment loads at each of our sites," she said. The sediment loads are the total mass of sediment that is being transported at each site and can show how much sediment is being transported between sites as well as the overall net erosion across the system. "That is part of how we're identifying river reaches that may be negatively impacting water quality in terms of sediment," Weber said.

The streamflow measurements taken by the ADCP are important, too. They can show how the streamflow in the Blitzen is changing over time across the refuge, including streamflows that are coming from tributaries or going out to canals. "This helps the refuge with their water quantity monitoring and helps them with water usage reporting, effectively managing their water resources and understanding the status of the resources that they are managing, not only for canals and tributaries but also to keep a minimum of flow in the Blitzen to protect fish and aquatic habitat," Weber said.

Available for the community to use

Pictured is the ADCP during a training March 26-27, 2024, that the US Geological Survey provided to refuge staff and High Desert Partnership staff along the Donner Und Blitzen River. Picture by Brandon McMullen.

Weber and Wilson held a 5-hour training session in March to instruct those interested in using the ADCP for their own purposes. They may hold another training this summer based on interest from collaboratives and the community. Weber envisions many different folks using the ADCP for data collection. "That could be refuge staff, it could be ranchers or local water managers such as the Burns watermaster," she said. "There is a lot of opportunity for people who think that streamflow is a meaningful contribution to their work or knowledge about these streams." For individual ranching



operations, Weber said that the ADCP could help with water rights reporting or understanding how much water a ranch has to work with at any given time.

Weber is happy to see interest in streamflow and how that data can be collected with the ADCP. "It's exciting to see that interest in the public because that is really what we're doing it for," she said. Wilson emphasized the value of the ADCP, calling it a powerful tool for the Harney Basin and beyond. "It can be used on other river systems, and that data is so important for understanding long-term trends and changes in stream conditions."

This article is provided by High Desert Partnership; a Harney County nonprofit convening and supporting six collaboratives including the Harney Basin Wetlands Collaborative.

