Restoration Studies in Full Swing at Malheur Lake

Three projects look at how to potentially reduce carp and turbidity as well as encourage the growth of emergent vegetation

By Lauren Brown
Photography by Dominic Bachman, Cassie Smith and Beth Boos

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As the Harney Basin Wetlands Collaborative, a collaborative of the High Desert Partnership, seeks to restore Malheur Lake, there are a trio of studies currently in progress that are examining where carp congregate, what affects water turbidity and what is causing the lack of emergent vegetation in the lake.

Carp and Redband Trout Radio Telemetry Study

Located on the Malheur National Wildlife Refuge (MNWR), Malheur Lake is large in size covering 19,600 hectares (about 48,433 acres) and shallow in depth with a max depth in some places of 1.26 meters (about 4.13 feet). As a result, it can be difficult to access for researchers conducting studies, and air boats must be used to travel from different areas on the lake. James Pearson, a fish biologist with the MNWR, is overseeing these three projects at the lake this spring. He is the lead researcher on the Carp and Redband Trout Radio Telemetry Study, a 2- to 3-year project that was funded last year and implemented spring of 2021.

The goal of the project is to identify a vulnerability in the carp population that can be exploited to increase the success of removing the fish from the lake. The common carp is an invasive fish that is not native to the Harney Basin. According to the U.S. Fish and Wildlife Service, common carp were first introduced to the basin in the 1920s. Over the last 60 years, the carp have multiplied dramatically causing poor water quality and depleting migratory bird resources and habitat. Carp are bottom feeders who uproot aquatic vegetation and produce silt plumes in the water column, which makes it hard for sunlight to penetrate the water so that plants and insects can thrive. Migratory birds depend on this vegetation for fuel as they stop in the Harney Basin on their way north in the spring.

Pictured: One of 36 carp that were tagged the last week of April in an effort to track their movement around Harney Basin's waterways.

Pearson acknowledged that it would be difficult to remove all the carp from the lake, but the radio telemetry study can help to shed light on where the majority of carp travel year after year to make removal of some of them more productive. To find out, Pearson

and his team tagged 36 common carp in late April. Stations have been set up in certain areas to scan the fish as they pass so they can be tracked.

In addition, 26 redband trout were tagged. “We want to see if there’s overlapping habitat with the carp,” Pearson said. “Because if we are going to do some kind of removal effort of the carp, we want to make sure that we are not adversely affecting the native redband trout populations that we are trying to protect.” More carp and redband trout will be tagged this year and next year.

Pearson also has a message for anglers who happen to catch a tagged carp or redband trout this fishing season. Tagged fish will have a radio antenna attached to them. “I would appreciate it if people who catch one of our tagged fish, that they immediately put the fish back in the water and let it go along on its journey because it’s going to be collecting data for us,” Pearson said. Anglers who catch a tagged fish are asked to either call Pearson at 541-589-2031 or email him at james_pearson@fws.gov. “Please let me know that you caught it, but immediately let it go along its way,” he said.

The Mesocosm Study

Carp are not the only thing that create turbid water by riling sediment from the lake bottom to be suspended in the water. Wind can do that too. The Mesocosm Project will examine different ways to reduce the turbidity in the water by 1) reducing the wind/wave action that resuspends sediment, and 2) causing suspended sediment particles in the water column to clump and settle to the lake bottom. Mesocosms are outdoor experimental plots that allow scientists to examine the natural environment under controlled conditions.

Pictured: A mesocosm structure in Malheur Lake that is reached by airboat.

Cassandra Smith, an ecologist with the U.S. Geological Survey, is heading up the project. This spring she led a team that deployed several mesocosms (or enclosures) into the lake to study the water under controlled conditions. Some of the work involved installing physical barriers with a v-shaped structure that faces the southwest where the predominant wind is generated. “The point is to try to reduce the wind/wave action behind the barrier and determine if that will reduce the suspended sediment enough to allow more of that photosynthetically active radiation [the amount of light available for photosynthesis] into the water column for the plants,” Smith said.

Some of the mesocosms will focus on returning suspended sediment to the lake bottom by adding a combination of alum and bentonite clay to the water to help clump and settle the suspended particles in the water column. In theory, the bentonite clay could create a capping layer on the lake bottom to keep the sediment from re-suspending when the wind kicks up.

Some of the mesocosms will use a combination of the two approaches to tackle turbidity.

“This year we’re focusing on changes in the water quality. Every week we are collecting data,” Smith said. “We’re going to look at how the water quality changes based on the treatments.”

All of the treatments used in this study could be scalable to try and restore portions of the lake in the future, Smith noted.

The Mesocosm Project is a two-year study. This year's enclosures will be pulled out in the fall and re-used next year for the second part of the study. "We're going to put submergent and emergent vegetation within the mesocosms to see if this reduction in turbidity actually translates to plant growth," Smith said. While the current wave reduction barriers are made of plastic, the expectation is that they will eventually become more organic as the research progresses.

"The hope is that we can actually use something organic, for example transplant some bulrush to create that wave reduction barrier and use more natural things and try to take the next step toward restoration," Smith said. "Then we could look at how it would work as we scale it up without using these plastic barriers that we have to go back and take out later."

Emergent Vegetation Study

The third study taking place at Malheur Lake this spring involves examining emergent vegetation in various enclosures in the lake.

Dominic Bachman is the Aquatic Health Coordinator for the Harney Basin Wetlands Collaborative and is helping with the emergent vegetation study. Bachman said that historically, the lake used to have an abundance of emergent vegetation, such as cattails and hard-stem bulrush. However, that is not the case now. There are small patches here and there, and Bachman said the goal is to try and get these patches to start recolonizing in the center of the lake.

Pictured: An emergent vegetation plot at Malheur Lake.

Reducing the wind/wave action could help as would reducing the carp population. Bachman said that another element that can deter emergent vegetation from growing is the ice action in the winter. "When there are a bunch of tules or hard-stem bulrush patches out there, the ice doesn't push a 2-mile-long sheet because it's hitting these little patches all the way along," Bachman said. "The ice action that we have now on this big open lake is really one of our enemies. It wipes out a lot of our emergent vegetation."

Last year, he helped set up a pilot study of six 16-foot by 16-foot plots looking at emergent vegetation at Malheur Lake. The plots were lined with hog panels to create an enclosure that small carp or muskrats could swim through, and some had hardwire cloth attached so that only tiny minnows could penetrate the barrier. There were also some control areas that were defined using only T-posts. "The interesting thing we found is that in places where we put one of these enclosures around an existing patch, that patch would grow a lot. It expanded and it basically grew and covered the entire 16-by-16 area and even grew out of it a little bit,"

Bachman said. “The ones where we just put T posts around them, they stayed exactly the same. They did not increase in size.”

Some of the enclosures lined with hardware cloth looked like mud flats last summer and then started to grow vegetation in the fall. The lake bottom outside of the enclosure had either no growth or small growth that was grazed off by something. During this spring's growing season they are seeing a lot of growth inside the enclosures that appeared to have been grown from seed and overwintered which is very rare on much of the lake. This has led Bachman to suspect that there might be something eating all of the new emergent vegetation growth, perhaps birds or muskrats, that are preventing some of the emergent vegetation from growing. More research is needed.

Fortunately, the results from this pilot study produced enough data to move forward with a larger study this spring, one helmed by Louisiana State University graduate student Beth Boos, whose past work with soils and aquatic macrophytes propelled her interest in the expansion of emergent vegetation at Malheur Lake.

This two-year study will take a closer look at whether wind or herbivory is limiting the growth of emergent vegetation by installing more enclosures around existing clumps of vegetation. Boos believes the enclosures will provide room for emergent vegetation to grow. “I will also be taking soil samples to determine seed bank composition,” she said. “These samples will be allowed to germinate in a greenhouse, and we are looking to confirm the presence of viable bulrush, cattail and other emergent vegetation.”

Boos believes that the enclosures will begin the re-establishment of vegetation through immediate growth of bulrush, but ultimately, the study will tell the tale. “Restoration on such a broad scale can only be assisted by more information, so we can target a specific area or technique,” she said.

Over the course of two years, the study will be constantly adjusted and updated as those involved try and figure out the source of the problem where emergent vegetation is concerned, Boos noted.

“We’re trying to study the vegetation in the places where it is growing and determine why it’s growing in those sites as well as where it isn’t growing and determine why it isn’t growing there,” Bachman said. Soil, water depth, elevation and the distance to freshwater input are all factors that can have an impact. “The hope is that we can figure out some restoration methodology,” Bachman said.

The Harney Basin Wetlands Collaborative has worked to obtain the funding for these studies with the intention of beginning the restoration process for Malheur Lake. “If we can figure out some ways to get the vegetation to grow as well as tie in with these other studies we’re doing: reducing turbidity, reducing carp and reducing wind fetch; we might have a real chance at making some pretty vast improvements out here,” Bachman said.

Since 2011, the Harney Basin Wetlands Collaborative is finding ways to improve the aquatic health and sustainability of Malheur Lake, and wild, flood-irrigated wet meadows across the Harney Basin. This effort is led by a diverse group of stakeholders, including local ranchers, conservation organizations, the Sovereign Nation of the Burns Paiute Tribe, government agencies, technical experts, scientists, area residents, nonprofit partners, and others who share a love and concern for the Harney Basin. For more information about HBWC go online to highdesertpartnership.org.

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

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