Malheur Lake Looks Different This Year

Vegetation is thriving as invasive carp numbers are dwindling.

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by Lauren Brown

Malheur Lake is thriving this year. After two dry years followed by a hearty snowpack and wet spring in 2023, fresh water inundated the lake in the perfect amount. In those arid periods, the sediments at the lake's bottom had the opportunity to consolidate and acquire oxygen, enabling a variety of wetland plants to sprout. The drought also led to a significant decline in invasive Common carp populations. These elements converged harmoniously, resulting in the emergence of uncommonly clear water conditions across a substantial portion of the Malheur Lake wetlands. “We recently visited the lake, and it looked like a different place,” said Sammy King, a research wildlife biologist from Louisiana State University who has been involved with studies at the lake. “The water was clear in many areas, tremendous production of submergent vegetation, thousands of acres of emergent vegetation and hundreds of thousands of waterbirds.”

From top to bottom, murky Malheur Lake 2020, Malheur Lake 2021 in the midst of drought and Malheur Lake 2023 with thriving vegetation and clear water photographed at the same location as the Malheur Lake 2020 image where there is no vegetation and turbid water.

Lake history

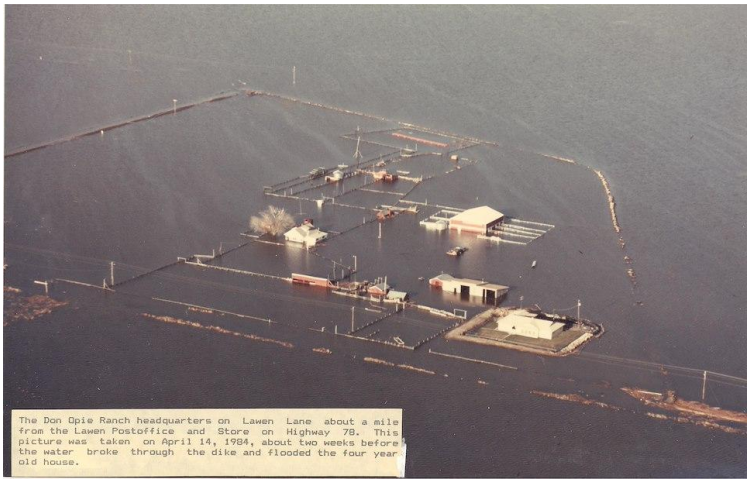
Over the years, the lake has gone through cycles of health and degradation. Former Malheur National Wildlife Refuge biologist Gary Ivey said historically the lake was a diverse deep clearwater marsh that was prime migratory bird habitat. Ivey said that sometime between the 1930s and the 1950s, carp were introduced into the lake. “In 1955, the refuge conducted its first huge rotenone project to try and kill off the carp. Ivey said photos from the refuge’s narratives state that over one million carp were killed.

Carp are destructive to the lake because they out-compete other fish and create turbidity through their suction-feeding eating methods of rooting through the lakebed and stirring sediment into the water column. Killing off more than one million of them helped to clear up the water.

In 1979, Ivey worked at the refuge as a temporary technician on a

nesting study and said the lake was beautiful. Two years prior, once again the lake had been treated with rotenone to kill off the carp. “The water was clear, and there were large stands of bulrush and cattails and lots of sago pondweed,” he said.

The flooded Opie Ranch in April 1994. Photo provided by the Harney County Library's Western History Room.



However, the refuge has never been able to kill all the carp, and they inevitably return to dominate the lake again.

The flooding of the 1980s increased the size of the lake to 171,000 acres. It was 17 feet deep at its maximum. The lake went over the highway and flooded the Narrows as well as several nearby ranches. Harney Lake and Malheur Lake became one big body of water, and for a while, it was the largest lake in Oregon, noted Ivey. “During that flood, the emergent marsh vegetation died out because the water was too deep,” he said. “There was no way we could do anything about the carp when the water was so high.”

In 1992, because of a drought, the lake receded to 200 to 300 surface acres. The lake and lower part of the Blitzen River were treated with rotenone to remove most of the carp. “In 1993, the lake looked pretty good. In 1994, it was fantastic,” Ivey said. After those floods the lake flipped to a completely turbid state and had very little clear water or submergent vegetation growth for decades.

Having seen the history of wet and dry year cycles, Ivey said he expects the lake to look good this year and very good next year before the carp population starts to dominate again.

Conditions improving

“If you just saw the lake this year, you would think it is in fantastic health. But we know better. We know the past history of the lake, the really recent history, and we are also trying to figure out what’s going to happen in the future,” said Casie Smith, an ecologist with the U.S. Geological Survey, who has been working on a mesocosm study at the lake for the last few years.

An underwater scene from Malheur Lake of Coontail Hornwort and other healthy, thriving underwater vegetation. Photo by Conrad Gowell.

In the mesocosm study, which was conducted in 2021 and 2023 (but not 2022 because of low water), a change in lake health is evident. “Between 2021 and 2023, we saw the maximum depth double,” Smith said. In 2021, the lake reached a maximum depth of 0.4 meters. This year, the depth of the lake was up to 0.8 meters. Smith said this was because increased snowpack on Steens Mountain created more runoff into the lake.

The flush of clear water coupled with soil conditions and vegetation from the dry cycles helped to lower the turbidity, allowing more light into the water column, which in turn helped plants grow. As a result, Smith noted that there was bulrush

poking out of the water in many places and much more sago pondweed, a high-quality food for many migratory birds.

King, research wildlife biologist and leader of the Louisiana Cooperative Fish and Wildlife Research Unit at Louisiana State University, advised a student studying plant establishment processes at Malheur Lake. He said they were trying to identify what was limiting plant establishment. One theory surmised that seeds were getting buried in the lake sediment and were unable to germinate. They collected soil samples and put them in pots in greenhouses to see what species of plants were present; they found that the seedbank was not limiting. They also looked at the number of plants established in the lake and followed them through the growing season. “During the 2021 growing season, plants did establish but there was poor survival presumably due to low soil moisture and extreme temperatures. During 2022, survival was higher,” he said.

A recent visit to the lake was surprising. “I have only been on the lake once this year, but the difference in vegetation coverage was astounding,” he said. He saw significant growth and expansion of both emergent and submergent vegetation.

King said that the conditions of the previous years allowed the lake to slowly recede, creating an environment where plants could establish, giving them enough moisture to stay alive during the summer. Relatively low winter lake levels minimized ice scour and allowed plants to survive until the spring when they got a flush of clear water.

He also noted that low water levels during the fall allowed the refuge to reduce the carp numbers, which was helpful because carp eat and disrupt the vegetation. “The multi-year combination of events is important for the plant establishment and survival,” he said.

Luck and hard work

Dominic Bachman, aquatic biologist at the Malheur National Wildlife Refuge, knows both luck and hard work were responsible for the improved conditions at the lake this year. Drought conditions in 2021 and 2022 killed off many of the carp. When Bachman first started working at Malheur Lake in 2019, he said carp were everywhere. “You could see a carp’s back sticking out of the muddy water just by looking down at almost any time,” he said. There was a lot of turbidity and wind and very few patches of submergent or new emergent vegetation, which would be eaten up by the birds and carp almost immediately. The water resembled chocolate milk.

Bachman said that arid systems, such as the one at the lake, are meant to dry up. It’s part of their cycle. In this case, in 2021 and 2022, the drying up of the lake also naturally killed many thousands of carp. Bachman said that 30,000 to 50,000 adult carp died off in 2021 and another 10,000 to 15,000 died the following year when the lake shrank to 4,000 acres and a half inch in depth. “Fish can’t live in that anymore,” Bachman said.

While the carp were dying off, the wind swept the water back and forth, for several miles, creating ideal moist soil conditions for vegetation. In the fall, this allowed many species of bulrush, cattails and burreeds to germinate by seed. This is

something that really hasn't happened for thirty years since the floods subsided. Even though we have had a dry lakebed we never had the right conditions for germination.

In the fall of 2022, the refuge, partners of the Harney Basin Wetlands Collaborative, and many other partners joined forces to remove 43 tons of carp. It took about 100 people over the course of three or four weeks to do the job, and Bachman said they basically removed the vast majority of the carp that were left after two dry years. He noted that the carp numbers were down to a couple hundred adults. “Then we got a really lucky situation where we had a big winter, good snowpack, good snowfall,” Bachman said. “We have a good flush of basically fresh water. That water is flowing into a lake that has a lot of vegetation growing in it, and not just the good hardstem bulrush and cattails that we’re excited about seeing, but also terrestrial vegetation -- the same kind of vegetation like foxtails that you battle in your backyard is growing out in this dry lakebed.” All these plants help to hold the lakebed together where the vegetation can thrive and reduce turbidity in the water column. After two years of dry cycles the soil sediments are very consolidated. It's like walking on solid ground which is very different from previous years where the lake bottom was extremely mucky.

Malheur refuge staff monitoring the impressive vegetation and clear water at Malheur Lake. Photo by Jill Bachman.

At its maximum this year, the lake grew to about 25,000 acres, and while portions of it are still cloudy and turbid, Bachman estimates that about 15,000 acres of the lake have some kind of plant growth on it. Prior to the floods of the 1980s when the lake had a good water year as much as 20,000 acres of submergent vegetation was seen growing. Since the 1980s floods the most clear water that has been seen is a few thousand acres.

“At least 10,000 acres are clear – crystal clear. You can see the bottom. You can see fish swimming in it 25 feet away, which is unbelievable for many people who have been out here on this lake,” he said. Bachman believes the lake is currently at a good depth that will allow the emergent vegetation to persist and expand vegetatively. “The lake has struggled to go in a positive direction ecology-wise for 32 years, so the fact that we’re even going in a positive direction is really exciting,” he said. The birds absolutely responded to the conditions on the lake. There were vast colonies of successful breeding waterbirds and incredible numbers of breeding and molting waterfowl using the lake this summer and fall.

Smith says questions regarding how quickly the carp population will rebound, whether winter ice will kill off vegetation, and how much snow will stack up in the mountains are key in the minds of those who study the lake. Young carp have been seen

and there was an algae bloom this summer, even so, the lake's improved health this year is thrilling to many who have been involved with the lake's restoration efforts. "We see that when the conditions are right, we can have a clear lake with the emergent and submergent vegetation that supports migratory birds," Smith said. Conditions this year provide a glimpse of what a revived Malheur Lake could resemble and it's genuinely thrilling.

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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