

Colorado River Delta flows help birds, plants, groundwater

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Hector Zamora, a monitoring team member and doctoral candidate in the UA department of geosciences, at a site that was cleared in advance of the pulse flow. The willows pictured here germinated after the pulse flow. Credit: Karl W. Flessa, University of Arizona

Two growing seasons after the engineered spring flood of the Colorado River Delta in 2014, the delta's birds, plants and groundwater continue to benefit, according to the latest monitoring report prepared for the International Boundary and Water Commission by a binational University of Arizona-led team.

"This short-term event has had lasting consequences. This really demonstrates that a little bit of water does a lot of environmental good," said Karl W. Flessa, UA professor of geosciences and co-chief scientist of the Minute 319 monitoring team.

"Some of the cottonwoods that germinated during the initial pulse flow are now more than 10 feet tall," Flessa said.

The interim report, released by the International Boundary and Water Commission on October 19, 2016, documents the effects of the environmental flows in the delta from the initial release of a pulse of water from March 23 through May 18, 2014, plus subsequent supplemental deliveries of water through December 2015.

The report:

http://www.ibwc.gov/Files/Minutes%20319/2016_EFM_InterimReport_Min319.pdf

Minute 319 is the 2012 addition to the 1944 U.S.-Mexico Water Treaty that authorized environmental flows of water into the Colorado River Delta from 2013 to 2017.

Birdlife responded to the post-flood burgeoning of vegetation, and bird diversity is still higher than before, the monitoring team reports. Migratory waterbirds, nesting waterbirds and nesting riparian birds all increased in abundance.

Upstream dams and water diversions for farms and cities in both countries have dried up most of the river south of the border. With the exception of a few wet years, the river has not reached the Gulf of California since 1960.

Eloise Kendy said, "This is the first time environmental water has ever been delivered across an international boundary." Kendy is a senior freshwater scientist with The Nature Conservancy's North America Water Program.

"The level of collaboration was really unprecedented - from two national governments to the individual farmers whose irrigation canals were used for some of the water deliveries," she said.

Flessa, Kendy and Karen Schlatter of Sonoran Institute compiled and edited the "Minute 319 Colorado River Limitrophe and Delta Environmental Flows Monitoring Interim Report," on behalf of the

binational partnership of many people and federal agencies, universities, and non-governmental organizations that monitored the Colorado River Delta under Minute 319.

Some of the water from the pulse flow and subsequent smaller environmental flows recharged the groundwater, which had both ecological and social benefits, Kendy said. The vegetation greened up in areas that received surface water and also in some areas that did not.

"The farmers were happy because it recharged the aquifer they use for groundwater irrigation," she said. "And plants that were outside the inundation zone got a big drink of water."

Before 1960, spring floods regularly roared down the Colorado River, scouring the river bottom and overtopping the bank, thereby creating the conditions necessary for cottonwood and willow trees to germinate and establish.



Martha Gomez-Sapiens, a monitoring team member and postdoctoral research associate in the UA department of geosciences, stands on a riverbank next to willows and cottonwoods that germinated as result of the pulse flow. Credit: Karl W. Flessa, University of Arizona

An invasive plant species known as salt cedar or tamarisk is now the dominant plant along the river. Cottonwoods and willows need bare ground and

sunlight to germinate, so they cannot establish themselves on tamarisk-covered riverbanks, Schlatter, a restoration ecologist of the Sonoran Institute's Colorado River Delta Program, said.

The March 2014 pulse flow delivered a fraction of the water the pre-1960 spring floods delivered. People from Sonoran Institute and Pronatura Noroeste cleared some areas of non-native vegetation beforehand. The researchers hoped that reducing competition would allow native plants such as willows and cottonwoods to germinate and grow after the pulse flow.

"We mechanically cleared the tamarisk vegetation from the riverbank and old oxbows," Schlatter said. "We reconnected the meanders to the main river channels so when the pulse flow came there were these nice backwater areas where the conditions were good for the establishment of native trees."

Now in those restoration areas, cottonwood and willow seeds that germinated after the pulse flow have become trees 3 to 4 meters tall (10 to 13 feet), and bird diversity and abundance has increased, she said.

"Now we have diverse habitat types, including lagoons, cottonwoods-willow forest, mesquite bosque and marshes," she said. "We are seeing a much higher diversity of riparian bird species in the restoration sites compared to other areas along the river."

The abundance of 19 bird species of conservation concern, including vermilion flycatchers, hooded orioles and yellow-breasted chats, was 43 percent higher at the restoration sites than at other sites in the floodplain, the monitoring team found.

In addition, the pulse flow reduced soil salinity in some areas that had been targeted for restoration, Schlatter said. "We didn't expect that - it is a huge bonus."

Reducing the soil salinity makes conditions more favorable for native plant species.

If there's another pulse flow, she suggests mechanically clearing tamarisk and other non-

native vegetation from the river's bank.

"We're not going to get a huge flood on the Colorado River anymore," Schlatter said. "If the flood isn't going to provide the same ecological processes floods did in the past, we will have to have active management."

Other UA members of the monitoring team are Ed Glenn of the UA department of soil, water and environmental science and Martha Gomez-Sapiens and Hector Zamora of the UA department of geosciences.

The International Boundary and Water Commission in El Paso, Texas, funded the UA portion of the Minute 319 monitoring program.

Carlos de la Parra of the Colegio de la Frontera Norte is co-chief scientist of the Minute 319 monitoring team. Key contributors to the report include Osvel Hinojosa of Pronatura Noroeste, Jorge Ramírez and Jesus Eliana Rodriguez Burgueño of the Universidad Autónoma de Baja California, Francisco Zamora of Sonoran Institute, Jeffrey Kennedy of the U.S. Geological Survey and Dale Turner of The Nature Conservancy.

The Minute 319 monitoring team includes more than 21 scientists from universities, government agencies and nongovernmental organizations from both Mexico and the U.S., including El Colegio de la Frontera Norte, the Ensenada-based Pronatura Noroeste, The Nature Conservancy, the Tucson-based Sonoran Institute, the Universidad Autónoma de Baja California, the University of Arizona, the U.S. Geological Survey and the U.S. Bureau of Reclamation.

Provided by University of Arizona

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