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WETLAND RESTORATION ON THE LOWER COLORADO RIVER YIELDS PRACTICAL LESSONS FOR TWO COUNTRIES' ARID EXPANSES.

BY JONATHAN LERNER / PHOTOGRAPHY BY FRED PHILLIPS, ASLA

TOP LEFT
The Hunters Hole project site was regraded in March 2011.

TOP RIGHT
Hunters Hole planted in July 2012.

RIGHT
Hunters Hole with plant communities established in March 2014.
AESTHETICS apparently didn't figure in when the United States-Mexico border fence went up. The barrier has no consistent design. Some of it is corrugated steel, some mesh. In some places, it is augmented with barbed wire; in others it is composed of chain-link concrete barriers supporting an "anti-climb plate" tilted back overhead at a 45-degree angle. In urban areas where it went up earliest it can look rusty now, tattered with graffiti. But at the southwestern corner of Arizona where the international frontier follows the Colorado River for 22 miles, the fence has a tidy, machinist's precision. Here it consists of tall, square steel tubes below and smooth horizontal panels above. Anyone hoping to climb over would find nothing to grab for but the top edge, which is in any case unreachably high. Jagged mountain scarp is in the distance, but terrain along the river is flat, so the fence does not undulate with grade as it does in other locations. It's just a dark line scored across the sun-blasted landscape.

On this part of the border there is another fence as well, which intruders encounter first. Those on foot might climb through its barbed wire, or its mesh, or its steel rails, but it was designed to interdict vehicles, not people. Diversion of the Colorado's water upstream support vast agricultural regions in Arizona and California, and thirty metropolitan areas—Las Vegas, Los Angeles, and Phoenix among them. Apart from an occasional trickle, the river along here is dry. Any vehicle capable of maneuvering on powdery silt and fine sand could easily make the crossing. Before the fences went in, "that whole area was ground zero for illegal immigration," a major crossing point for both armed smugglers and undocumented migrants, recalls Carlos Dominguez, a special operations supervisor with the Department of Homeland Security. "You had haulers that would commit some serious crimes down there, from rape to robbery to assault, not only on the people coming across but also on border patrol agents." At one location on the U.S. side, called Hunters Hole, a spillway and siphon had been damaged by a flash flood, causing occasional overflows from the region's network of irrigation and drainage canals. As a consequence, this spot was thickly overgrown. "You had all this invasive vegetation like salt cedar that provided concealment for those bands. You couldn't see five feet in front of you," Dominguez says.

The region where the U.S.-Mexico border and the Colorado River corridor coincide is called the limnotope. That's a technical term meaning an edge zone. Though obscure in English, and only slightly less so in Spanish, it's common practice in this geologically and environmentally assessed locale. It comes from the Latin limus, boundary, and the Greek tropein, nourish, originally describing frontier regions that provided sustenance for armies. Today in the limnotope there are no massed troops, though just before the fence the National Guard was deployed there. Now you just see solitary border patrol agents, cruising in their green and white Chevy Tahoes; others must be somewhere remotely monitoring signals from the sensing equipment mounted on high poles here and there. But nourishment is definitely happening in the limnotope, an ambitious effort to reestablish native plant communities and the habitat they provide. In addressing the degradation of the river corridor, this undertaking transcends the international border. It has implications for law enforcement, too. A pile-up project on some 35 acres at Hunters Hole is in its ground zero. A similar-sized plot, across the border in the farming community of Colonia Miguel Aleman, Baja California, is ground zero plus one.

Leading the effort is Fred Phillips, ASLA, who is probably more experienced than anybody at repairing riverside wetland habitat in this desert environment. Two decades ago, just out of college, he went to work for the Colorado River Indian Tribes, designing and directing the restoration of some 1,000 acres along the river on their reservation near Parker, Arizona, two hours' drive north of the border (see "Desert Passages," LAM, March 2000). In 2000, he was hired by the Yuma Crossing National Heritage Area to do something similar in the river corridor adjacent to that historic city at the northern edge of the limnotope (see "The Yuma River Triumvirate," LAM, November 2006). Phillips is a hands-on kind of guy. The Yuma slough, when he went to work there, was all "freezing pit bulls, two-story plywood houses, people selling meth," he remembers. "There was 15 to 20-feet-high Mongrelites—you literally had to crawl on top of it. We would put on long-sleeve shirts, duct tape cardboard to our eyebrows, duct tape our gloves to the cardboard. We'd have a dust mask, a hat, and we would spend all day crawling through this nastiness. With mice, because of the dogs and the rodents we ran across." Now a 350-acre section of the Yuma East Wetlands is a thriving conservation and recreation area, with the remaining 450 acres permitted and ready to go. More recently, with funds from the Pacific Institute, Phillips's Flagstaff-based firm Fred Phillips Consulting created another 1,200 acres of wetland just above the Laguna Dam, 20 miles north of Yuma.

His approach, refined through trial and error over the course of all these projects, is conceptually pretty simple. Restoring the riverside landscape of the entire Colorado, and the natural flood cycle it once depended on, is out of the question. There is too much development and investment along the river to allow flooding. Besides, more water is already allocated to various users than actually flows in the Colorado, a situation exacerbated by the current long-term drought. In the limnotope and farther south in the delta, most of the river has no reliable flow at all. So Phillips looks for old ovens or locations near canals or wells, spots that can tap a water source with some regularity or that already have a relatively high water table; 1 feet of depth to water, for example, which can eke out monocots, cottons, as a pretty high water table to be in some parts. But wherever there has been any water, rampant invasive plant species will have thrived and must be cleared, a procedure tantamount to scraping the earth bare. More earth-moving is required to contour new zones hospitable to the various plant communities that will be reintroduced. Then, using newly rudimentary and, where possible, existing infrastructure—dikes, spillways, and stoplogs, pumps and pipes—Phillips establishes "food cells" that can hold what water is delivered to them as long as possible. To be sustainable, "we've got to restore the areas that are already supporting stuff and expand on that—create..."
an infrastructure where we can dump water in and keep it in," he says. As for all that earth moving, "We're not talking about
shovel restoration landscapes. It's wholesale reconstruction.
The Colorado, when it was flowing at 500,000 cubic feet per
second"—the river's largest known predam flow—"wasn't a
gentle river. It destroyed millions of cubic yards of dirt every
day. So a bulldozer is nothing compared to what a river can do!

The project at Hunters Hole was initiated by the Yuma
Crossing National Heritage Area, even though the heritage
area's defined boundaries do not extend into the limelitophte.
"That did not prevent this private nonprofit, on a voluntary
basis, from being involved," says Charles Flynn, its executive
director. The Hunters Hole effort drew on the visible success
of his organization's Yuma East Wetlands restoration, which
required not only sensitive environmental engineering but
also difficult publicizing among groups whose agendas often
conflict: local and federal government entities, the Quechan
Indian Tribe, environmental groups, and private landowners.
"Our attitude is, whatever we do on the East Wetlands can
serve as a model to extend up and down the river, however
long it takes. Where it's outside our ability to do directly with
our own funds, we can involve the other communities to come
see how it works," Flynn says, and to show "that these aren't
barriers that are impossible to bridge." The heritage area's
involvement is just one of many instances of Hunters Hole
participants operating outside their normal bailiwicks. The
productive synergies that can flow from a shared willingness
to do so may be as valuable as the landscape work itself.

Hunters Hole had an even more complex array of participants
than the East Wetlands project. Added to the mix were not
only the Mexican counterparts of the American governmental
entities and nongovernmental organizations (NGOs), but also
multiple law enforcement agencies on the U.S. side. In fact,
Phillip's first concept plan, in 2007, was titled A Demonstrata-
tion Project to Combine Environmental Restoration with Border
Protection and bore the tagline: "Innovations in Homeland
Security." He quips, "You've got to have an angle when
you're dealing with Border Patrol and Homeland Security.
That first plan was for all 445 acres of Hunters Hole, an area
many times larger than the pilot project that was eventually
executed. It proposed creating a five-mile-long "trough," he
excavating a historic oxbow channel to be filled from ground
walls, and using the spoils to construct a 12-foot-high perim-
eter levee that could be patrolled by border agents. The fence
had not yet been built in the limelitophite, and these features
were conceived as an alternative to it. Phillips also called,
of course, for reestablishment of appropriate habitat types.
He remembers, "Homeland Security was like, 'We just got
done building all the wall and the road in the corridor so we can
see all the criminals running across. why the hell would we
want a cottonwood-willow forest and a bunch of marshes?'"
also, without offering any detailed scheme, the concept plan
identified possible locations for a pilot restoration project on
the Mexican side.

Dominquez, of Homeland Security, has strong personal ties
to Hunters Hole. "It's a place where I grew up, and it's my office
space now, where I park," he says. Rich when there was water
dependably flowing in the river channel. "That's where my grand-
father would take us to swim and fish. During the fall there were
a lot of duck hunters. But before the restoration project, to see it
as a wasteland was very sad." Still, when he and his colleagues
considered Phillips's concept plan, "We were hesitant. We knew
they had done it over there in the East Wetlands, which before
was a bunch of hobo camps, a lot of drug use, a lot of crime," he
says. "But when he talked about the marsh, we were concerned.
The thought was, if this area is highly trafficked, we'll end
up with a lot of drug runners. Our mission is to protect the country's
borders, but at the same time, we're humanitarians. When some-
body's in distress, you don't care what nationality or legal status.
The most idea was eventually abandoned. For one thing, the soil proved impractically thirsty. In a test, Phillips’s team tried filling the oxbow from a Bureau of Reclamation well on the site. He says, “We turned on the pumps and let them run for two solid months, and filled up maybe two-thirds of the channel. It was dry in three days.” Then the fence was built, obviating the need for both the oxbow and the perimeter levee. Dubious law enforcement personnel were taken to visit the East Wetlands to inspect the improved visibility afforded by the open vistas, cottonwood, and willow habitats that would replace Hunters Hole’s invasive shrubs and grasses. The plan was also revised to include driveable roads that provide sight lines through the wetland area and across the riverbed into Mexico. “When we bulldozed the site, we designed it to their specs,” Phillips says. The border fence runs just to the American side of Hunters Hole: the restored wetland is U.S. territory, but it’s not really designed for recreation. There’s an agent present whenever the access gates are open. Someone who tried visiting there, Phillips notes, “would be watched by all the cameras, sensors, and border patrol agents the entire time.”

“I never in my wildest dreams thought that I would be working with people who preserve wildlife, people who were in the designing phase of landscape,” Dominguez says. If helping plan a wetland restoration was a stretch for this law enforcement officer, resolving and developing policy among a diverse international cohort of actors—hardly standard landscape architecture school curriculum—was a stretch for Phillips. His Mexican opposite number, Orrel Hinojosa, who is trained as a welder and spent four loss years working in the construction industry and now supervises wetland restoration projects at Colonia Miguel Aleman, had to stretch, too, Hinojosa, who works at the Mexican environmental NGO Pronatura Noroeste, was named a National Geographic Emerging Explorer in 2012. “I just wanted to do research with the birds and see how they respond to different conservation practices. And then I thought: well, I’ll really like to protect them.” That led him into “active restoration, and to water policy. But it all started with the birds.” The work in the Limoncho has engendered still more pushing of boundaries. The U.S. Bureau of Reclamation, for example, has reached across the border to help fund the project.
at Colonia Miguel Aleman and also contributes research support to restorations Hinojosa is involved in farther south in the Colorado delta. Groups of student volunteers from each country have worked on the sites on opposite sides, and the Yuma Crossing National Heritage Area sponsors an annual training workshop in the planning, planting propagation, and management techniques Phillips’s team has developed. Attended by staff from Pronatura Noroeste and the Sonoran Institute, another NGO supporting restoration work in the delta.

The planting design at Hunters Hole defines a sequence of zones, each with a different proximity to groundwater. The lowest are marshes planted with Olney’s three-square bulrush. Sandbar and Goodding’s willows, with understory plantings of inland salt grass, are on the adjacent—barely perceptible—slopes. Next highest are cottonwood groves with an understory seeded in blue grama and alkali sacaton. At the highest elevations are mesquite bosques, their understories seeded in a mix of desert marigold, evening primrose, brittlebush, and globe mallow. “Water log trees, open areas, understory—that’s the key to wildlife habit.” That diversity encourages a diversity of animal species as well,” Phillips says. Planting plans are similar at the other restoration sites he has designed, including Colonia Miguel Aleman, where “groundwater conditions are fairly good, with depths between seven and 15 feet,” says Hinojosa. “The site is in an old meander, and we have irrigation water rights.” From a trust established by Mexican environmental groups.

Marshes edgy with willow? Sure, but for an observer unfamiliar with desert environments it seems almost delusional to refer to cotonwood and mesquite groves, standing in parched soil and interspersed with brittlebush and alkali sacaton, as “wetlands,” according everybody associated with these projects casually does. More accurately described, these efforts are recreating riparian areas, each section of which, no matter how dry it appears, is directly affected by the associated streams or springs, even upland mesquites tolerant to the annual xeris, occasionally flooded, and the management of these new habitats calls for replicating such periodic inundations. “Riparian...
areas make up about 5 percent of the total landmass in the Southwest, and they support a third of all plant and animal species." Phillips says, "The density of life is amazing. And 95 percent of it has been destroyed." Riparian habitat's survival in the desert depends principally on water supply. While at Colonia Miguel Aleman, the water trust can guarantee that Hunters Hole's future water supplies remain constant. Since May, the site has been under the management of the Bureau of Reclamation. Phillips worries that they are beginning to slack off, whether because they lack his team's vision and commitment or because of garden-variety bureaucratic inertia. "You've got to see that, with the trees drying out," he observed in frustration on his first visit to the site after several months' absence. "With a manipulated system, you still have to do some kind of management on it. We're building little dams to hold water back, to restore wetlands from impacts from big dams. You've got to manage weeds—new exotics are coming in every year. You've got to manage the water." Over an eight-week period last spring, in a historic effort to temporarily recharge the Colorado River corridor in Mexico, from the border through the delta to the sea, there was a "pulse flow release" of 300,000 acre-feet of water—a "lack of a napkin number." Phillips says tartly, "If you're going to dump $170 million worth of water past a dam, in a 20-year drought, to restore a river, you should probably have some idea what the infiltration rate into the soil is going to be." According to a preliminary monitoring analysis by researchers from the University of Arizona, the Sonoran Institute, and the Nature Conservancy published three months later, "less than 1 percent of the total pulse flow release mixed with tidal waters from the Gulf of California." Throughout the river corridor, water tables rose, and there was considerable germination of both native and invasive plant species as a result of the release, although Hirasawa and Phillips expect most of this new vegetation to die in the absence of continuing water delivery. "Most of the pulse flow's water infiltrated to groundwater..."
transpired from plants, evaporated from soil and water surfaces, or was retainted in soil and topographic depressions,” the analysis reported.

Four months after the release, on a relatively mild August afternoon—the temperature is only 105—Phillips and Himojosa stood gazing over the riverbed, once again bone-dry, in San Luis Rio Colorado, the Mexican border town where Himojosa is based. When the channel was flowing, “this place was packed. People fishing, dancing, music blasting,” Phillips says. Environmental benefits aside, “it was a raging success—for PR. For people who have been staring at a dry riverbed for 30 years, it was awesome.” Himojosa adds. “There is a vision developing here now—people get so excited in San Luis. It is not to have the river running, but maybe maintain a mile [filled with water], a small river park, do some native plantings. It would be lovely.” Another positive aspect of the pulse flow was the dialogue between the two governments that led to it. “From this time we started working together, it’s a complete change,” says Himojosa, who was involved in the negotiations. “It used to be very difficult just to get a meeting with them to talk about environmental flows. Now they are very active in these negotiations, very active in the restorations.” He applauds the binational International Boundary and Water Commission, Mexico’s National Water Commission, and the U.S. Department of the Interior. “They understand we have this debt with the environment.” This spring, the National Heritage Area is hosting a conference in Yuma to evaluate the pulse flow and further the discussion about how to restore flows in the limnosome and delta.

The long-term prospects for achieving that? Himojosa enumerates some challenges. “A big one is the basic recognition that the environment needs water, that it’s a rightful water use,” he says. “That has been moving forward but is not complete. And it’s combined with the legal obstacles that prevent that happening.” Like the overallocation of water within the United States.

Then there is “inertia” among water users, in particular farmers, many of whom grow cotton, wheat, or alfalfa, thirsty plants of questionable suitability to this environment. “The value of the crop is less than the value it takes to produce it,” he says. “Solving the delta water problem needs to address that, too.”

But project by project, repaired wetland habitat acreage is accumulating along the Colorado. So is the increasingly refined expertise that can be applied to this problem throughout the U.S. and West. Phillips himself has begun work at several sites in the Rio Grande watershed, in Texas. He says, “Hunters Hole and Colonia Miguel Aleman are meant to be catalysts. Like, ‘Hey, this is what we can do on our borders if water working together’

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Project Credits

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