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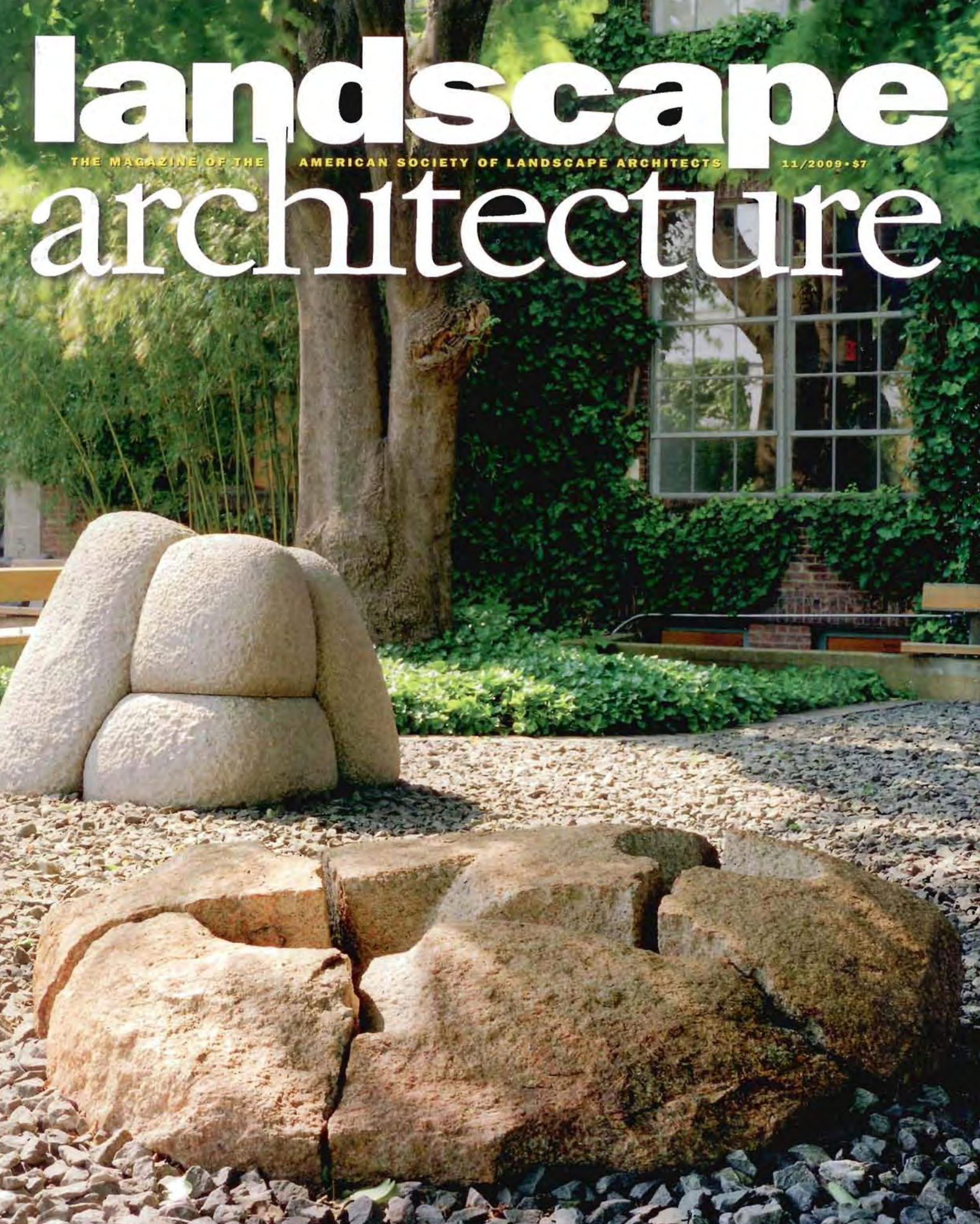

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The Noguchi Museum in New York City celebrates the legacy of Isamu Noguchi, page 84.
Photograph by Elizabeth Felicella, Courtesy the Noguchi Museum, New York

PAUL CROSBY, PAUL CROSBY ARCHITECTURAL PHOTOGRAPHY

A Cor-Ten steel wall runs along upper and lower terraces in the Speckman House Landscape, a 2009 ASLA Residential Honor Award winner. 54

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THE SAME RIVER TWICE

A massive project returns diversity and health to lower Colorado River wetlands and suggests new definitions of landscape restoration. By Kim Sorvig

IN A GRASSY AMPHITHEATER whose surroundings were until recently the Yuma, Arizona, city dump, landscape architect Fred Phillips, ASLA, plays the harmonica, celebrating the resurrection of this part of the Colorado River. Quechan tribal members in full regalia (his clients) have just finished a traditional dance. Consultants from Phillips's team bang the bass, guitar, and drums; one is a Mexican ornithologist, Phillips's counterpart and liaison where the river restoration crosses the international border.

College students, tired but vibrant from a long day's restoration work, are trying to decide between partying and heading for tents among the cottonwoods. For six years, Yuma East Wetlands has attracted volunteers reptesenting 15 countries and 10 Indian tribes. They come to plant thousands of native trees and grasses alongside Phillips's usual crews, to learn about the ebb and flow of rivers and cultures, and to enjoy events ranging from native music to demonstrations of the martial art Ki-Aikido during the annual Youth Cultural Festival.

Yuma East Wetlands (YEW) challenges preconceptions about ecological restoration, cross-cultural relations, small cities—maybe even about what landscape architects do.

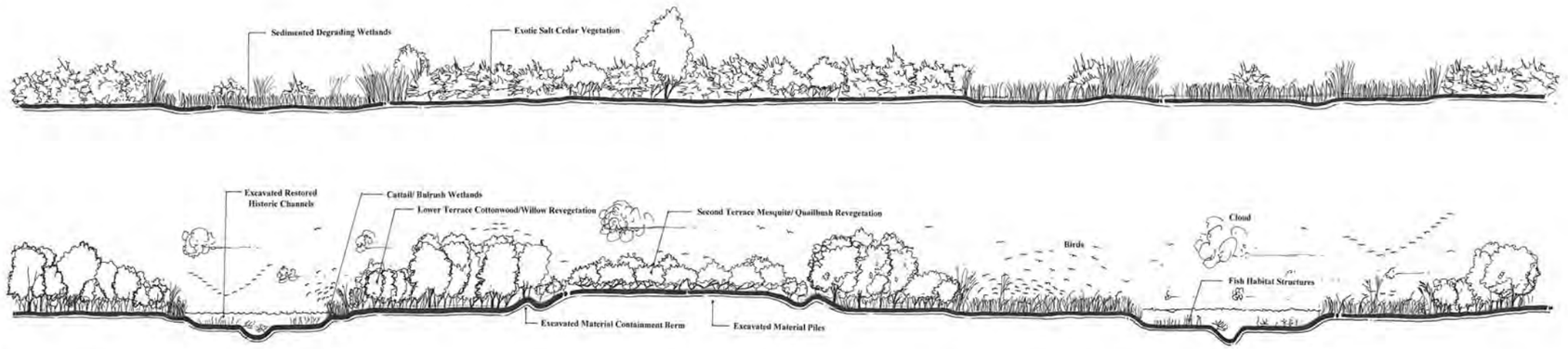
An aerial view, *top,* shows Yuma East Wetlands two years after rechanneling and replacing exotic species with native plants. Prior to restoration, *above,* YEW was dominated with dry river channels, exotic tamarisk, wildcat dumps, hoboes, and crime.

Says Phillips, "They hired me because they thought I was crazy enough to take this thing on." Serious and successful though it is, this huge, unlikely project does resemble inspired lunacy. Phillips's path to the project—starting as a sink-or-swim intern on a different river project for a different Indian tribe, fresh from his landscape architecture studies at Purdue—was unconventional to say the least (see "Desert Passage," *Landscape Architecture,* March 2000). "I learned restoration," Phillips observes, "the same way I learned guitar and harmonica"—by listening, sharing, and playing.

Clearly, it worked.

A project this large affects several scales—site, city, and region. The 1,400-acre site straddles the California/Arizona line, just north of Mexico. When Phillips first saw it, it was a thicket—not just of

FRED PHILLIPS, ASLA; ALL IMAGES



A location map shows YEW in southwest Arizona, *top left*. Two cross sections, *above right*, show prior degraded conditions (top) and after channel excavation restored flow, native marsh, and riparian forest (bottom). In the initial concept design for YEW, *below*, the city of Yuma on the west is connected to YEW via parks.

invasive plants, but of jurisdictions. The Quechan Indian Tribe owns about half, but four private landowners, the city, and 12 federal agencies are also involved. It took a year and a half to agree on a plan "that didn't define boundaries, but defined what we needed to do," says Phillips.

At the city scale, East Wetlands is only one of seven districts being revitalized by the Yuma Crossing National Heritage Area (YCNHA). The Colorado River links these zones, cutting across ecology and culture. Because of Yuma's historic river crossing and territorial prison (an invisible presence in the recent movie *3:10 to Yuma*), the National Park Service is very much involved, but the list of sponsors and consultants runs to two pages: state and federal congressmen, Arizona's former governor, and agencies from the Yuma County Farm Bureau to Homeland Security.

YEW—which former Interior Secretary Bruce Babbitt, Honorary ASLA, once judged impossible to restore—is a model for river projects up and down the Colorado, in other arid states, and abroad. Working with Mexican environmental group Pro-Natura, Yuma East's team is restoring a cross-border wetland so derelict it was a smuggler's haven. Even law enforcement agencies are pleased: Clearing overgrown nonnative vegetation reduced criminal activity, says Phillips's boss, Charlie Flynn, executive director of YCNHA.

"Experts wrote off these wetlands as a lost cause" because of extreme soil salinity and overcommitted water resources, says Flynn. "But they've gone from 'I don't think it's possible' to 'We'd like to do something like this.'"

"It's amazing what the Colorado River does," Phillips observes. "It serves 11 million people and farms that feed a good chunk of America."

The costs of that servitude, however, have been staggering.

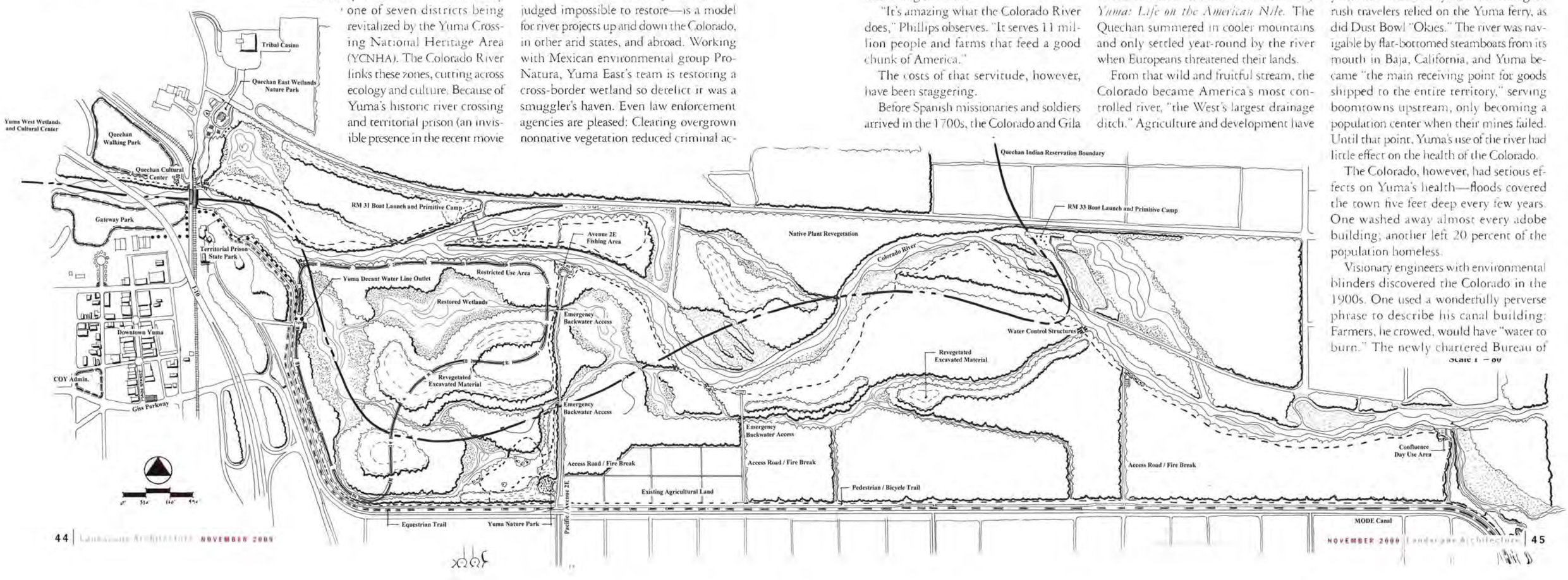
Before Spanish missionaries and soldiers arrived in the 1700s, the Colorado and Gila rivers joined at what would become Yuma. Flood flows of 300,000 cubic feet per second (compared to maybe 2,000 today) watered and fertilized this floodplain. The Quechan depended on the rich ecosystem for winter crops, though "not even they liked the area well enough to make it a permanent home," writes historian Rosalie Crowe in *Early Yuma: Life on the American Nile*. The Quechan summered in cooler mountains and only settled year-round by the river when Europeans threatened their lands.

From that wild and fruitful stream, the Colorado became America's most controlled river, "the West's largest drainage ditch." Agriculture and development have taken 95 percent of its riparian zone; even more of its historic flows are diverted to Los Angeles and to Imperial Valley fields.

The first European settlers valued the Colorado not as water supply but as transporation. The nearest safe crossing was Green River, Utah, 500 miles northeast beyond the Grand Canyon. California gold rush travelers relied on the Yuma ferry, as did Dust Bowl "Okies." The river was navigable by flat-bottomed steamboats from its mouth in Baja, California, and Yuma became "the main receiving point for goods shipped to the entire territory," serving boomtowns upstream, only becoming a population center when their mines failed. Until that point, Yuma's use of the river had little effect on the health of the Colorado.

The Colorado, however, had serious effects on Yuma's health—floods covered the town five feet deep every few years. One washed away almost every adobe building; another left 20 percent of the population homeless.

Visionary engineers with environmental blinders discovered the Colorado in the 1900s. One used a wonderfully perverse phrase to describe his canal building: Farmers, he crowed, would have "water to burn." The newly chartered Bureau of



Reclamation built the mile-wide Laguna Dam, and then a 900-foot siphon to bring canal water to Yuma's fields. Boosters publicized a desert made to bloom (as if it hadn't before), hundreds of thousands of irrigated acres (with soil-killing salinization), and a river prevented from flooding (and from bringing life-giving silts to the floodplain).

"The conventional attitude," says Phillips, "is we've got all this water just flowing downstream! We need to store it! When it gets past here it just goes to Mexico, and you can't have that!"

As for wetlands, they are pumped dry, only to be watered. Annually, 300,000 acre-feet (about 98 billion gallons) of saline groundwater trades places with irrigation taken out of the river; pumping keeps the water table low enough for agriculture and septic tanks, too low for wetlands. Dam floodgates are opened and closed on schedules dictated by economics; Phillips speaks of "the people who operate the river."

An aerial view from above downtown Yuma at Ocean-to-Ocean Bridge shows agricultural fields just cleared of tamarisk, ready for flood irrigation, on the left, and riverbanks and wetlands three years after restoration on the upper right.

Its life cycle and seasonal rhythm sliced, diced, and repackaged, the Colorado no longer supports cottonwood and mesquite forests (or "bosques," from the Spanish),

nor even salt-grass flats. Absent these native woods and marshes, salt cedar, 20-foot-tall phragmites, and arundo reeds took over. Native birds and animals declined. In their place came creatures and events suited to dysfunctional habitat: hoboes, meth labs, dumping, wildfires.

Fortunately, those nuisances caught Yuma's attention, and along with the decline of a downtown that had turned its back on the river, prompted restoration efforts.

Those who think environmental restoration is about nature may be surprised by YEW's starting points: a dump and a bridge.

In the 1980s, citizens pushed to reclaim a 110-acre landfill just downstream from the historic ferry crossing. It took until 1999 to start capping the landfill with soil from city projects, planting lawn and trees, building a lake, a playground, and a solar-electric demonstration facility. Today, this project is called West Wetlands Park (WWP).

WWP, however, had no hint of marsh except a reed-choked no-man's-land between it and the river. Eventually the desire for waterside access motivated a pilot

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revegetation project between WWP and the river. Today, 50-foot-tall cottonwoods and willows shade walking trails. Without this success, the much more ambitious East Wetlands would never have been restored.

The bridge that spans this desert river is named, bizarrely, the Ocean-to-Ocean Bridge. Its narrow truss replaced the historic ferry, then was itself replaced by Interstate 8. In 2002, it was restored; its name in lights forms a surreal backdrop to Yuma's riverfront parkland.

The bridge promoted East Wetlands restoration by forging two essential links: visually, between revegetation downstream and overrun East Wetlands upstream; and socially, between the Quechan community on one bank of the river and the city on the other.

Collaborations evolved slowly, recalls Brian Golding Sr., the Quechan tribal economic development director. The bridge project helped overcome initial hesitance. Golding, who has degrees in regional planning and law and also serves on the YCNHA board, notes that the Heritage Area itself formed a bridge, neither city nor tribal, but connecting both.

About this time Phillips joined YCNHA full-time, by now a veteran of several river restoration projects, most for tribal governments. His first task was consensus building among city, tribe, and area farmers.

"There were about 600 farmers ready to kill us," Phillips grins. They feared the Heritage Area designation and the wetlands: "All these endangered species would change their farming practices. But over time," he continues, "just like with the tribe, we've developed a really good relationship."

The key to relationship building was only partly environmental—some who now actively support the project started out in opposition. At least equally important was the desire to reestablish lost links to the river—and among people.

This paradox reflects major changes in what it means to restore natural landscapes. On a great number of sites today, it is clear that human use of land and water has been shortsighted and destructive, but equally clear that complete repair of our mistakes is both physically and politically impossible. In cases like that, what is "restoration"? What can humans accomplish, if we are crazy enough to take it on?

"I've done restoration," Phillips says, "from Lee's Ferry to the Grand Canyon, all the way down the delta. Yuma is by far the most difficult site I've ever dealt with."

The YEW south channel project during construction shows piles of tamarisk *(above,* in the foreground, and *below)* that await burning. An "after" photo, *bottom,* shows the same area flooded with pumped groundwater and infrequent high river flows.

Three problems distinguished East Wetlands: extreme salinity, limited water flows, and astonishingly dense invasive plants.

Of these, only one could be attacked directly—the vegetation. That took the hardest, dirtiest work imaginable. Existing-condition surveys required climbing over 20-foot reed beds and crawling through tunnels under tamarisk. Heavy work clothes needed reinforcement with duct tape and cardboard. Dust masks were mandatory, white at daybreak, black on emerging from the jungle. Water samples proved almost as salty as seawater.

Despite these difficulties, the team mapped current wet spots and flows, plus historic channels from archives and aerial photos.

"We looked at some historic photographs," Phillips remembers. "This salt cedar used to be marsh, so we dug down and found all this root mass of bulrush. We put water on the site, and it grew into a

marsh within four months. That was acreage we didn't have to plant."

Such situations are a restorationist's ideal: Just add water, and history repeats itself. But what about areas where soil, water, and salinity have changed so irrevocably that historically documented vegetation simply can't grow? This challenges the fundamental idea that restoration means re-creating the past, specific and accurate to location and time.

Restorationists, says Phillips, "used to try pushing salts out of a site, but I've sort of given up on that." Even with unlimited

On a great number of sites today, it is clear that human use of land and water has been shortsighted and destructive, but equally clear that complete repair of our mistakes is both physically and politically impossible.

funds, massive flooding is the only way to remove salt from a mile-wide floodplain. Looking at the big picture, Phillips chooses regionally appropriate planting that can thrive in current conditions.

"Cottonwood," says Phillips, "if you haven't got some kind of fresh water, you may as well not plant them. They'll get 20 feet high and crap out after three years. Mesquite, sandbar willow, reeds, and rushes aren't so dependent on fresh water." But even those fail in some of Yuma's extremes. Salt grass thrives by the sea in the Colorado delta and "has become a lifesaver plant here. It'll grow in conditions too saline for anything but salt cedar." Historic records provide precedent: Cottonwood/willow, mesquite, and "huge flats of grass and alkali plants that shorebirds and neotropical migratory birds like" used to grow there.

Phillips's plantings, carefully monitored, have met five-year growth expectations in three years. Wetland bird and mammal density doubled, and diversity

increased 75 percent. Several areas, established for five years, show biodiversity equaling undisturbed riparian forests.

Here is a crucial question: Is it "restoration" to return biodiversity without re-creating historic patterns? Site-specific conditions are ever changing in floodplains; historic data provides a snapshot, a useful but partial guide. Overall, the larger ecosystem is a mosaic of vegetation types; proportional coverage by each type remains fairly constant, but what grows at a given location at a given time does not.

Unlike restoring a historic garden, large-scale restoration cannot use site-specific details as a baseline. Instead, what is restored is the larger-scale pattern and proportion.

Unlike restoring a historic garden, large-scale restoration cannot use site-specific details as a baseline. Instead, what is restored is the larger-scale pattern and proportion.

The good news is, as far as living rivers go, this approach revivifies critical habitat.

Managing water is restoration's most difficult challenge, often a tenuous proposition.

There is no restoring the historic Colorado River: Today's flows are shadows of yesterday's; soil-replenishing floods are actively prevented; and the U.S. Bureau of "Reclamation" actively pumps billions of gallons of water yearly to lower the water table and create dry land for agriculture and development. Phillips's creative solution is rather ironic: Fill the wetlands with those billions of gallons, instead of dumping them into the river downstream. "Pumped groundwater is essential to this project," Phillips says, "and really to any project below the Laguna Dam."

Groundwater is far more saline than river water, and getting fresh river water is tricky.

The water level in the wetlands, controlled by adjustable-height dams called "stop logs," is actually higher than the river most of the time. River level is controlled by releases at Hoover Dam, three days upstream. "When we get a big rain that dumps water on the farmers' fields, they call the dam operators and say, 'Hey, hey, we don't want any more; cancel it!' But it takes three days," Phillips laughs. "Maybe 10 times a year (when an unwanted release raises the river), we pull all the stop logs and flood the place. Which is neat, mimicking natural cycles."

The mimicry isn't perfect, and water politics—the West's most competitive sport—could change overnight, eliminating critical freshwater flooding. The river's "operators" have built a new reservoir upstream. "When it's done," says Phillips pensively, "they'll be able to capture 90 percent of critical freshwater spikes that we get down here—what they now call nonstorable flows." In dry years the wetlands will have only salty groundwater, "unless management of some of this water changes as people see the value of what we're doing," he muses hopefully.

Conventionally, restoration/conservation has been valued by purist standards: faithfully re-creating historic landscapes, presettlement ecosystems, prized scenic vistas. Those standards aren't wrong—they produced some of the world's most beloved places and protected ecosystems that might otherwise be extinct. But the same standards have too often left protected places vulnerable to unforeseen changes—human and ecological—and are frequently, as here at Yuma, poorly applicable to large-scale inhabited landscapes.

How will people see the value, and change the management, of Yuma's wetlands and of similar projects inspired by this restoration?

Three answers: One concerns scientists; one, the city; and the third, the Quechan, whose values are the oldest tied to the original river.

Unlike the great majority of "sustainable" projects, scientific monitoring is built into YEW. Public, Environmental Protection Agency, and parks funding requires documentation. But from the landscape consultant's perspective, monitoring goes far beyond dotting bureaucratic i's. Phillips has built research costs into his

budgets and grants and uses the information to refine designs at every step.

Data collection is impressive: baseline and changes in soil salinity; water depth and quality; abundance and diversity of insects, birds, and mammals; germination and survival of plantings; bioengineering performance; and comparisons of native versus nonnative plant communities.

This research informs each new season or area of work at Yuma and provides practical, applied testing of restoration techniques. This is the antithesis, incidentally, of designer-reward systems such as the Sustainable Sites Initiative, which demand academic blessing before taking on-site action.

"This restoration is changing the face of Yuma," says Charlie Flynn. He isn't exaggerating.

YCNHA has found more than $50 million for the city's riverfront, encouraging redevelopment of Main Street linking river to town, long-abandoned riverside Southern Pacific railyards, and two other neighborhoods.

The riverfront focuses on the "Pivot Point" interpretive plaza, where a railroad bridge once swung aside for steamboats passing up- or downriver. Designed by Ann Arbor, Michigan, landscape architect Howard Deardorff, ASLA, the plaza will display a 1907 Baldwin locomotive, with information about the crossing, diversion, and use of the Colorado. Daily, coordinated recordings will make the ghost of the railroad move down Main Street along long-vanished tracks.

Terry Murphy from the Lower Colorado River Multi-Species Conservation Plan inspects three-month-old honey mesquite (planted at six inches tall) and alkali sacaton grass (from seed). Six months earlier, phragmites and tamarisk had been removed. Flooding produced high-quality habitat quickly.

Flynn speaks of reversing "a pattern across the country of ignoring the importance of rivers in the life of communities" (see "Return on Investment," *Landscape Architecture,* April 2009). By restoring not only the wetlands, but also the built riverfront, Yuma is creating jobs and markets, training skilled workers for a projected $500 million lower-Colorado restoration industry. "Fred's working himself out of his hands-on job," says Flynn, "but the expertise we're building is an opportunity for Yuma as a community."

The Quechan Tribe has seen economic benefits, too: restoration jobs for Quechan workers. At first, work was basic, available to even the least-skilled applicants. By now, tribal members have earned professional qualifications and will take over management of the project from Phillips. His most current design is a park envisioned by tribal elders. The tribe is developing capacity to supply native plants for restoration projects.

But something even more important has happened. "There's the ecological aspect," says Phillips, "and the cultural one. The tribal elders will say, 'You know, we haven't been able to find this plant forever'—things they used to harvest for practical reasons, or ceremonies, or medicine. And Mark or James or I will say, 'How much do you need?' And we'll come in the next day with big bundles of it."

In restoring the river, a piece of a culture's past has gained a future. Phillips, whose career in restoration grew unexpectedly from a college class about Native American cul-

tures, seems more pleased with this accomplishment than with anything else.

At Yuma, restoration is about restoring present and future health, rather than reinstating the past. A doctor can cure a 60-year-old of sickness but can't make the person 16 again, nor prevent the patient's surroundings from undoing the cure. At Yuma East Wetlands, the doctors are in, and other landscape architects need to be listening.

Kim Sorvig is a landscape architect, design critic, and environmental author who resides in Santa Fe, New Mexico.

PROJECT CREDITS **Client/owners:** Yuma Crossing National Heritage Area, Quechan Indian Tribe, City of Yuma, U.S. Bureau of Reclamation, Arizona Game and Fish Department, Bureau of Land Management, Yuma County, Bill Ogram. **Project management:** Fred Phillips Consulting, Yuma Crossing National Heritage Area, Quechan Indian Tribe EDA. **YEW project restoration design and engineering firms:** Fred Phillips Consulting (Fred Phillips, ASLA; David Blanchard; Ann Hadley; Bob Chambers); Sheppard Wesnitzer Engineering (the late Frank Protiva, Bill Polak); Natural Channel Design (the late Tom Moody, Mark Wirtanen); Stevens Ecological Consulting; Ecosystems Management International. **General contractors:** PG&E Construction, JSA Inc., Copper River Inc., Fred Phillips Consulting, Taylorbird Enterprises, I & R Contractors, Ortiz Bros Inc., Water Tech Inc., Southwest Hydrosystems. **Wildlife biology consultants:** Fred Phillips Consulting, Southwest Biomes, Arizona Western College. **Yuma East Wetlands project funders:** U.S. Bureau of Reclamation, Yuma area office; City of Yuma, Arizona, Water Protection Fund; Environmental Protection Agency; Quechan Indian Nation; Yuma Crossing National Heritage Area; National Fish and Wildlife Foundation; U.S. Fish and Wildlife Service; Sonoran joint venture; U.S. Bureau of Land Management; Arizona Game and Fish; North American Wetlands Conservation Council; Lower Colorado River Multi-Species Conservation Plan.

Resources

■ Slide shows and a wealth of information on the Yuma East Wetlands project and restoration on the Colorado River are available at *fredphillipsconsulting.com.*