KERP

Pima County's urban oasis

INTRODUCTION

We are standing on the edge of a crater-like hole that's invisible from the surrounding streets. A 2.2-mile paved path for pedestrians and bicyclists hugs the perimeter and is often used by office workers from the nearby government buildings as a place for lunch hour exercise.

A member of the Tucson Audubon Society looks into this giant basin near Kino Parkway and Ajo Way and remarks on the ponds and vegetation, including willow, ash, cottonwood and mesquite trees that have emerged in what was once little more than a barren ditch.

The nearby office buildings disguise the natural environment. It takes some effort to remember we are in the middle of the Sonoran Desert, where 12 inches of rain in a 12-month period is considered a wet year. The Audubon member is looking through the trees at a Great Egret standing motionless on the bank of the pond. A moment later a flash of red darts across his field of vision, and an Anna's Hummingbird settles lightly on a thin branch in bare mesquite.

Due to the high diversity of birds at KERP, it has become a popular birding location

In less than an hour of wandering the periphery of this manmade flood control project and riparian habitat, the birder points out two Night Herons, a Neotropic Cormorant, a Yellow-rumped Warbler, a Great Blue Heron perched on an iron rail, a Cooper's Hawk and two swallows.

The giant hole is the Ed Pastor Kino Environmental Restoration Project, or KERP, named for the Arizona congressman instrumental in shepherding the project through Congress. It is a tranquil oasis where the practical and the aesthetic are perfectly blended.

Its practical value is no more obvious than the fact that most of Tucson is built on a huge slab of earth that slopes downhill from the southeast to the west. Were this not true, the ponds where birdwatchers congregate would not exist. The ponds are there because of a carefully designed flood control project that collects and captures in a series of detention basins the rainwater from a 17-square mile area extending downhill from the vicinity of Davis-Monthan Air Force Base.

KERP is the end result of a massive water harvesting system. The harvested rainwater is used to irrigate the Pima's County's Kino Sports Complex, saving taxpayers well over $100,000 a year — the approximate cost of irrigation water needed for the fields in the sports complex. The same water source irrigates the lush wildlife habitat that attracts a wide variety of birdlife and natural history buffs.

Most important, KERP protects homes and businesses downstream from the devastating flooding that would result were water allowed to flow unchecked from the East Side of Tucson to the Santa Cruz River.

WATER IN THE DESERT

If you stand today on the banks of the Santa Cruz River near downtown Tucson or the Rillito Creek at Craycroft Road, you would be forgiven if you thought the usually dry riverbeds have been a feature of this landscape for hundreds of years. In fact, for thousands of years the Santa Cruz River and Rillito Creek were anything but dry. Indeed, they provided year-round water for the people and plants and animals that once thrived there.

Some 15,000 years ago, the physical environment of the region was markedly different than it is today. With the wetter and cooler climate during the last Ice Age, large mammals that have long been extinct— the Pleistocene bison, mammoth and camels, for example — could be found grazing in the grasslands and drinking from the rivers and streams. Evidence of this history was found at the KERP site during its construction in 2001 when a worker uncovered a tusk and leg bone of a Pleistocene mammoth buried in the stream channel.

The reasons for the transition from lush aquatic areas to the dry arroyos we see today are numerous, but the rapid increase in the human population beginning in the 1880s and the subsequent urban expansion and groundwater pumping are the main culprits. By the year of Arizona's statehood (1912), the Santa Cruz River near downtown was no longer flowing year-round.

But heavy desert rains — especially the summer rains — could still cause flooding and turn the Santa Cruz and other area waterways and washes into raging rivers.

Summer rains come fast and hard, and desert soils are incapable of absorbing more than a small percentage of any heavy rainfall. Rain that's not absorbed into the soil very quickly begins to run laterally across the ground surface, gathering speed and force as it flows downhill.

The Santa Cruz River at the base of "A" Mountain near downtown Tucson in 1904.

Picture of the old arroyo just downstream from present-day KERP, 1961.

Urban development — pavement in particular — aggravated the situation.

Less than 100 years ago, the area south of downtown Tucson was a mesquite-lined wash surrounded by creosote desert that stretched largely unbroken to the south, east, and west of the city.

As Davis-Monthan Air Force Base grew and the city expanded to the east, more of the desert floor was inevitably paved. Paved streets and runways offered less resistance to the rainwater that fell in the east and began flowing downhill more rapidly.

For example, the National Weather Service ranks an Aug. 9, 1945, storm as one of the top 10 weather/water/climate stories to impact Tucson in the last century:

Thunderstorms with heavy rain filled to overflowing the banks of an ordinarily dry wash on Tucson's southside. Floodwaters washing down this normally dry wash tore a 15-foot gap in the bridge on the Benson Highway. Four automobiles plunged into the raging torrents where 10 people were drowned while four others struggled out of the floodwaters.

US Army Corps of Engineers ®

Flood control became a priority, and in 1948 the area's first major flood control project, the Tucson Diversion Channel, was authorized. The long concrete and earth channel collects rainwater beginning near the northwest edge of Davis-Monthan, northwest of Alvernon Way and Golf Links Road, and along its length across Tucson's South Side, dumping it into the Santa Cruz River southwest of the Interstate 10/Interstate 19 interchange.

The channel did an effective job of collecting and directing water from the Air Force base, but significant flooding downstream from the base led to the next major project in the area. The U.S. Army Corps of Engineers constructed the Ajo Detention Basin in 1966 in the present-day site of KERP to collect water from the diversion channel northwest of Country Club Road and Ajo Way. The $6 million project resulted in a bare, flat-bottomed pit about 90 acres in size – essentially a mud flat with scrub trees and grasses growing along the edges.

In 1999, Congress authorized construction of the Tucson (Ajo) Detention Basin Environmental Restoration Project to 1) continue flood control, 2) harvest and store for irrigation use storm water that would have previously seeped or evaporated from the unlined basin, and 3) establish or re-establish natural habitat representing Arizona's southwest riparian environment throughout the detention basin.

Construction of KERP began in 2000 and was completed in 2001 at a total cost of approximately $11 million. The project was funded by the Corps of Engineers ($5 million federal share) and Pima County.

The final footprint of the new KERP covers 141 acres that contains 28 acres of riparian and open water including a 5.6 acre, 50-foot deep pond; 21 acres of grassland, mesquite bosque, marsh and upland vegetation; and another 92 acres that includes flood control structures, a basin earthen berm, and a recreational path that surrounds the basin.

Kino Sports Complex/Stadium District maintains the basin and works closely with other Pima County departments such as the Health Department, Regional Flood Control District, Department of Transportation, and the Regional Wastewater Reclamation Department in addition to a number of state agencies to ensure KERP meets the state and federal guidelines set forth for the re-establishment and restoration of natural habitat.

Aerial photograph of KERP looking south.

THE BENEFITS

Flood Control Benefits

On Sept. 15, 2011, 2.64 inches of rain was recorded at Davis-Monthan.

More than 16,000 gallons of storm water were flowing from the Tucson Diversion Channel into KERP per second. KERP was filled to the highest level on record. But because KERP is able to detain more than 612 million gallons of water, the flow south and west out of KERP and into the diversion channel was reduced by almost a third to less than 11,000 gallons per second.

KERP is designed to reduce the peak flow rate of a 100-year storm from nearly 115,000 gallons per second to less than 70,000 gallons per second.

Had KERP and a series of other detention basins constructed over the years, including the Rodeo, Kolb Road, Arroyo Chico and Cherry Field detention basins, not been in place on Sept. 15, 2011, "there would have been significant flood damage in developed Tucson, including the downtown area," Pima County Administrator C.H. Huckelberry said in a Sept. 22 memo to the Board of Supervisors.

Water Harvesting Benefits

Water harvesting involves collecting runoff for productive purposes. It is an ancient practice: native people used water harvesting techniques to capture runoff for farming in southern Arizona at least a thousand years ago.

Today, most urban water harvesting systems are small scale; they collect runoff from rooftops and roadways, primarily to irrigate vegetation. Small amounts of water storage may be provided by cisterns either above or below ground level, but many systems pass water directly onto the soil to irrigate plants. As many Tucsonans have learned, when droughts occur, small cisterns are rapidly exhausted.

HARVESTED STORM WATER

Year	Gallons
2002	39,099,480
2003	28,347,143
2004	5,947,234
2005	15,603,666
2006	0
2007	21,312,471
2008	63,312,471
2009	0
2010	28,844,897
2011	72,393,223
2012	11,986,857

KERP may be the largest water harvesting facility in southern Arizona. It differs from most other water harvesting projects by capturing runoff from a stream channel, rather than directly from rooftops or paved areas.

KERP was designed to capture and direct runoff from a 17.7 square mile watershed into a large system of lined basins.

Economic Benefits

One of KERP'S key objectives was to reduce the cost of irrigating Kino Sports Complex ball fields and turf and landscaping at University Medical Center South, Herbert Abrams Public Health Center, and the Public Defenders, Juvenile Court, and Adult Probation buildings along Ajo Way. Using a combination of harvested rainwater and reclaimed water, KERP has saved Pima County taxpayers more than $1.3 million since 2004. Based on these savings, the cost of constructing KERP will be paid for by the year 2035.

Public Recreation Benefits

Proposals to add recreational features to the Ajo Detention Basin came within a decade of its existence. A proposal to retrofit the basin for a 70-acre lake was made in 1976. The vision for that project, known as the Ajo Way Detention Basin Wet Park, was to provide recreational opportunities such as boating and fishing, but the project was never realized.

In 1981, recreation was once again the theme of a master plan prepared by Pima County and the U.S. Army Corps of Engineers. Sam Lena Park was the only element of this plan that was realized through its completion in 1986.

Sam Lena Park has two lighted softball fields; nine ramadas with grills; and public restrooms and drinking fountains.

In 1995, the master plan was updated once again to include trails from Sam Lena Park to Interstate 19 and additional recreational facilities around the Ajo Detention Basin. A 2.2 mile multi-use, paved path around the KERP basin is available to the general public for walking, jogging, bicycling, and wildlife viewing including bird watching.

In 1997, Kino Sports Complex, the largest professional sports and entertainment venue of its kind in Pima County, was constructed around the basin. It includes the 11,000-seat Kino Veterans Memorial Stadium. Kino Sports Complex facilities are available for youth, high school and collegiate sports; and social gatherings, concerts, and community events.

The Loop

KERP and Kino Sports Complex are also on the The Loop, more than 100 miles of car-free paths being developed around metropolitan Tucson, with links to Marana and Oro Valley, for Pima County residents and visitors on foot, bikes, skates and horses. The Loop will connect the Rillito River Park, the Santa Cruz River Park, the Julian Wash Greenway, the Harrison Greenway and the Pantano River Park.

SAM LENA PARK

HERBALIFE
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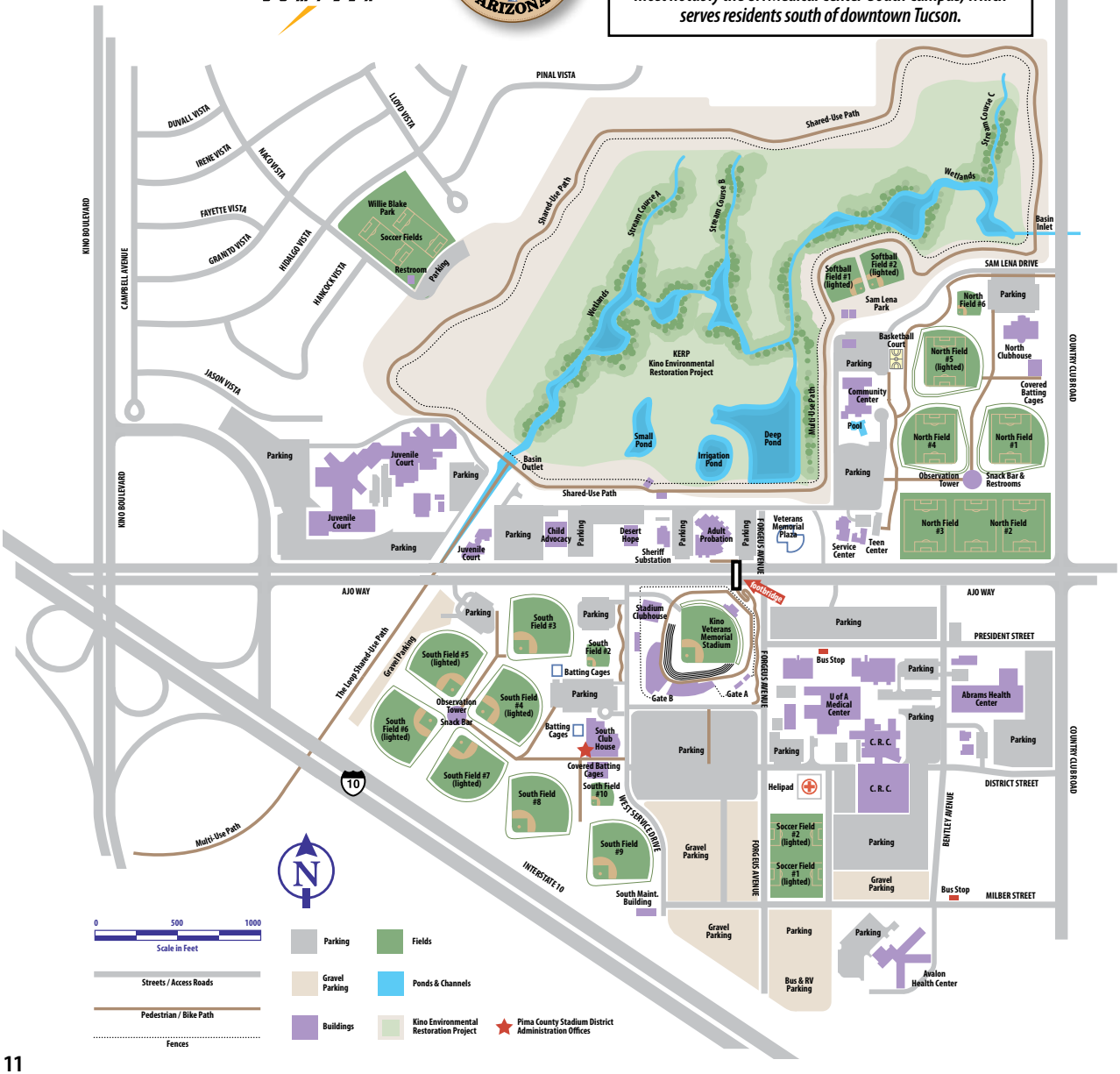
KINO SPORTS COMPLEX AREA MAP

KERP is embedded within a complex of sports facilities, municipal service buildings, and health services facilities, most notably the UA Medical Center-South Campus, which serves residents south of downtown Tucson.



Environmental Benefits

This terrain, visible from a paved walkway around the perimeter, has five different environments:

Arizona Uplands

Tucson is located in the Arizona Upland Subdivision of the Sonoran Desert where Palo Verde trees, saguaro, cholla and prickly pear cacti are common. Desert birds nest and forage within the protection of these thorny plants, and other animals like javelina, jackrabbits and desert tortoises feed on the cactus pads and fruit. Arizona Upland birds to look for are the Red-tailed Hawk, Gambel's Quail, Curve-billed Thrasher, Cactus Wren, and the Greater Roadrunner.

Open Water

In ponds and lakes, open water is the habitat found beyond the shallow water and plants of the shore. Diving ducks feed in open water, seeking out water insects, snails, and aquatic plants. Open water birds to look for are Mallard, Northern Shoveler, Ringnecked Duck, and the Belted Kingfisher.

Riparian Communities

A riparian community is made up of the plants and animals living along streams and rivers. In the desert these areas are important to many wildlife species. Riparian trees like cottonwoods and desert willow depend on the water available in the river bottoms and banks. Eighty percent of Arizona's wildlife species utilize or depend upon the resources of riparian areas. Riparian birds to look for are the Wilson's Warbler, Black Phoebe, Song Sparrow, and the White-winged Dove.

Wetlands

A wetland is the place where land meets water, at the edge of a pond, lake or river. Wildlife thrives in wetland habitat because of the abundant water and the cover provided by wetland plants like reeds and cattails. Migratory waterbirds rely on wetlands as stopover points during their long journeys in the spring and fall. Wetland birds to look for are the American Coot, Red-winged Blackbird, Great Blue Heron, and the Black-necked Stilt.

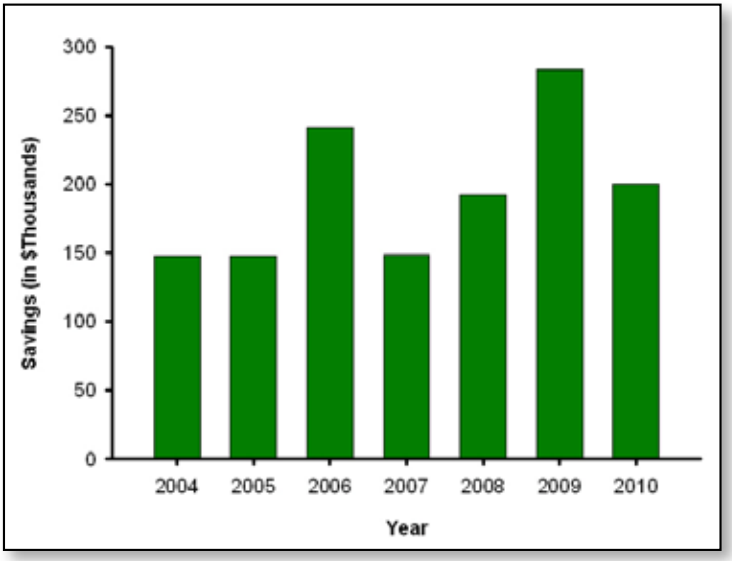
Mesquite Bosque

A dense stand or "forest" of Mesquite trees is called a bosque. Mesquite trees are especially adapted to our dry climate, sending taproots down as deep as 150 feet to reach water during times of drought. Mesquite bosques provide shade and shelter for wildlife and other plants. Mesquite seeds are rich in protein and are an important food source for many animals. Mesquite Bosque birds to look for are the Gila Woodpecker, Ladder-backed Woodpecker, Vermilion Flycatcher, and the White-crowned Sparrow.

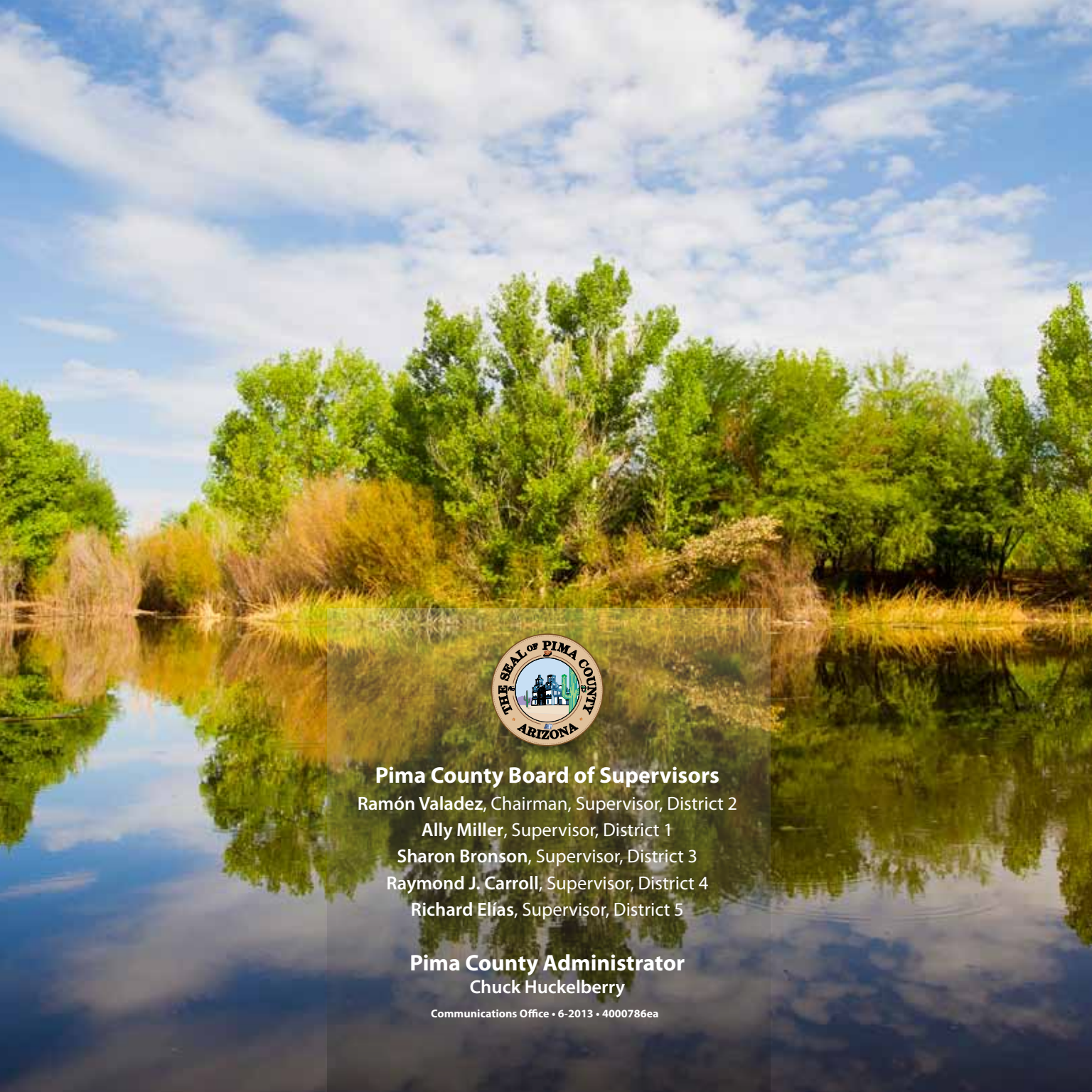
CONCLUSION

After its completion in 2005, the Ed Pastor Kino Environmental Restoration Project had effectively modified the existing Ajo Detention Basin by adding a reclaimed water storage component. The water made it possible to reestablish a historic wildlife habitat and natural ecological system whose characteristics and functions were integrated with the existing storm water control facility. So successful were KERP's water harvesting and restoration features that they served as a model for five subsequent Pima County projects (Tres Rios Del Norte, Paseo de las Iglesias, El Rio Antiguo, Swan Wetlands, and Agua Caliente) all areas located adjacent to the Rillito or Santa Cruz River.

In many ways, KERP reflects the changing needs, vision, and sophistication of the citizens of eastern Pima County and planners who brought together the multiple goals of flood control, wildlife habitat, recreation, sports, cost savings, and environmental stewardship. Realizing these multiple objectives was an important departure from earlier visions such as the Ajo Detention Basin with its single purpose (flood control). Like The Loop trail that is connecting multiple sections of recreation paths throughout the greater Tucson area into a single path, KERP, too, has proven that integration and connection can create something that is much larger than the sum of its parts. Given limited space within an increasingly urbanizing environment, projects that meet multiple needs such as KERP will become increasingly needed and successful, greatly benefiting our community and our environment.



Using a combination of stormwater and reclaimed water at the Kino Sports Complex has saved an average of $195,000 per year since 2004.



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