

Yuma Desalinization Plant and the Ciénega de Santa Clara

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The Ciénega de Santa Clara, located at the eastern edge of the Colorado River Delta in Mexico, is a massive open water wetland that covers more than 40,000 acres. The Ciénega is now by far the largest remaining wetland in the Delta, and functions as an essential component of the Delta ecosystem. Yet despite its central importance, the Ciénega is all but guaranteed to disappear if the Yuma Desalting Plant (YDP) is operated. In November 2003, the United States Congress passed report language in the Energy and Water Appropriations bill for 2004 instructing the Bureau of Reclamation (BOR) to ready the YDP for operation. This Congressional action preempts BOR's own analysis—already in progress—which has identified an alternative to operation of the YDP that would provide needed water to replace bypass flows at far lower cost, and avoid harm to the Ciénega.

The YDP issue is politically charged and is closely connected to important issues facing the State of Arizona related to its Colorado River water entitlement and the allocation of potential shortages on the Lower Colorado. However, these interests need not be satisfied at the expense of a critical environmental resource and millions upon millions of wasted tax dollars.

The Ciénega de Santa Clara and the Colorado River Delta

The massive wetlands that the Colorado River Delta once comprised were nearly destroyed by a century of dam construction, urban water development, and agricultural water use that all but eliminated water flows to the Delta region. Yet for more than 30 years, brackish drain water from the Wellton Mohawk Irrigation and Drainage District has flowed in a concrete-lined canal that terminates in Mexico, just east of the main stem of the Colorado River. Historically, the land at the terminus of the canal was part of the vast Delta wetlands, but the dams and diversions that were built during the early and mid-twentieth century choked off flows to this area. By the 1960's, the area where the Ciénega is today was a dry mudflat. Remarkably, however, the delivery of drain water to this area resulted in the restoration of a highly productive wetland at this site—even as the remainder of the Delta ecosystem largely disappeared around it.

Today, the Ciénega de Santa Clara is home to thousands of migratory and resident birds, is a critical link in the Pacific Flyway, and harbors several endangered species, including at least 70% of the world's population of the endangered Yuma Clapper Rail. In recognition of the Ciénega's central importance, Mexico has protected the wetland by including it within the borders of the Biosphere Reserve of the Upper Gulf of California and Colorado River Delta. The Ciénega is also included in the RAMSAR convention, and is internationally recognized as a wetland of great ecological significance. The Ciénega represents an important economic and cultural resource for local communities in Mexico. Residents of the nearby community operate birding tours by canoe in the Ciénega, supplementing their income from an economy that would otherwise be based entirely on subsistence farming. La Ruta de Sonora, a tour operator based in Tucson, also regularly sends commercial tours to the Ciénega.

As the largest remaining wetland in the Colorado River Delta, the Ciénega also functions as a critical component of the larger Delta ecosystems. Recent research has demonstrated that the Delta plays a critical ecological role in the Colorado River Basin, the Gulf of California, and throughout North America, providing crucial support to fisheries and the Gulf of California marine ecosystem, serving as an enormous species reservoir for the Colorado basin, and functioning as the cornerstone of a bird migration corridor that serves more than 75% of North American birds.

Numerous environmental NGO's and academic research groups have been working for as long as a decade to protect and begin to restore the Colorado River Delta ecosystems. As a border environmental resource, the Delta has been neglected for more than a century. However, the United States and Mexico have begun to show real interest in protecting and restoring these ecosystems, most recently in a new addition to the 1944 Treaty, known as Minute 306. Minute 306 commits the two countries to studying the Delta ecosystems, defining their water needs, and identifying ways to protect them.

Bypass Flow Replacement

The Colorado River Basin Salinity Control Act of 1974 requires the U.S. Bureau of Reclamation to replace the brackish water that drains from the Wellton Mohawk Irrigation and Drainage District via a concrete canal into the Ciénega. The story of Wellton-Mohawk's drain water and U.S. negotiations with Mexico over salinity in the Colorado is complex, but the bottom line is that Wellton-Mohawk's brackish drain water was diverted from the main stem of the Colorado into what has today become the Ciénega, and the U.S. federal government took on the obligation to replace this diverted water (the "bypass flow") while Arizona continued to receive return flow credits for it. Until recently, the U.S. replaced this bypass flow with water conserved from lining the Coachella Canal in California, but as California's deliveries were cut in 2003, the federal government no longer has rights to this conserved water and must seek another source.

The Salinity Control Act identifies a broad range of possible water sources, including canal lining, the conservation, leasing, and purchase of agricultural irrigation water, and operation of the YDP. In 1974, lawmakers expected the YDP to be the long-term solution to replace the bypass flow. However, the emergence of the Ciénega de Santa Clara in the interim as a significant feature of ecological value in the Colorado River Delta both informs and changes the context in which decision-makers in 2003 must determine the best way to secure bypass flow replacement.

The Yuma Desalting Plant

The YDP would require significant amounts of power to operate (170 million kWh at full capacity), and is a very expensive way to produce water. It would replace the bypass flow by treating it to concentrate salt, returning high quality, low-salinity water to the Colorado River main stem, and discharging the resulting waste brine into the canal that runs to the Ciénega. With the capacity to produce 68,000 acre-feet of treated water each year, the YDP was finally completed in 1992 at a total cost of \$258 million. Since that time the YDP has sat idle in "ready reserve" status, costing approximately \$2.2 million per year to maintain. Reclamation estimates the YDP's operational costs at approximately \$33 to \$42 million annually, assuming a range of costs of between \$305 and \$480 per acre-foot for treated water, plus additional costs of leasing water to make up the full 108,000 acre-feet. At these prices, the YDP is not a cost-effective salinity control measure or bypass flow replacement measure by any standard.

A careful analysis of the BOR's figures demonstrates that even these high figures are overly optimistic, using low-end estimates for power costs, amortizing startup expenses, and ignoring the fact that the plant will only be able to operate at limited capacity for at least the first four years of operation, which substantially understates the unit cost of water in the early years of operation. Most significantly, however, the BOR's estimates do not account for the environmental mitigation costs that will be associated with the operation of the YDP. As discussed further below, operation of the YDP would have disastrous effects on the Ciénega de Santa Clara; the costs of mitigating these impacts could easily reach into the tens of millions of dollars annually. The Bureau's cost estimates also ignore the substantial costs of environmental permitting for the plant.

Were the Yuma Desalting Plant to function at full capacity, the Ciénega de Santa Clara would, very simply, be destroyed. The YDP is currently designed to process 97,300 acre-feet of Wellton-Mohawk

drain water (2,900 ppm), producing 68,500 acre-feet of plant product water (295 ppm) and 28,800 acre-feet of highly saline reject water (9,400 ppm). Return flow to the Colorado River is estimated to be 78,600 acre-feet of blended water (68,500 acre-feet of plant product water mixed with 10,100 acre-feet of Wellton-Mohawk drain water); the reject water would be disposed into the canal to flow into the Ciénega de Santa Clara. The desalting operation would thus drastically cut water deliveries to the Ciénega (by more than 70%), while driving salinity levels in the remaining effluent more than 3 times higher than the levels in the drain water that currently reaches the Ciénega; this concentration is also expected to drastically increase selenium loading in the waste stream, creating the risk of additional environmental and public health consequences in Mexico that have not adequately been explored.

This combination of increased salinity and decreased flows would have irreparable and devastating effects on the Ciénega, starving the marshlands of their water even as salinity increases beyond the salt-tolerance of the dominant vegetation. These effects are neither speculative nor even uncertain, as the effects of the deprivation of water on the Ciénega have been well documented in the scientific literature. For example, two studies published in 1995¹ documented significant degradation to the Ciénega as a result of a temporary interruption in flows due to flood damage and subsequent repairs to the bypass canal in 1993. Although the interruption was only temporary in nature, the Ciénega rapidly lost between 60 and 70 percent of its wetland habitat. Finally, with a power demand of 170 million kilowatt-hours, operation of the YDP would have significant air quality and climate change impacts.

The Best Alternative: Leasing Water From Willing Sellers

The primary justification that has been advanced for the operation of the YDP is that it will help to alleviate the risk of shortages in the Lower Basin by replacing the bypass flow, which would arguably benefit Arizona with its low-priority CAP allocation. Thankfully, however, operation of the Yuma Desalting Plant is not the only way for the federal government to replace the bypass flow and to achieve these benefits. The BOR has already developed an alternative that would cost far less and avoid harm to the Ciénega.

The BOR proposes to lease water from willing sellers, which they estimate would cost from \$60 to at most \$250 per acre-foot. The BOR has suggested that by issuing a request for proposals for voluntary and temporary leases, the agency could develop a legitimate market for this water, soliciting bids from throughout the Colorado River Basin for annual or partial-year leases of water. This would ensure that only willing sellers would engage in these transactions, and because the leases would be short-term in nature, would minimize any impacts on farming communities. Indeed, the opportunity for part-year leasing could benefit farmers by providing a voluntary, flexible tool that would allow them to profit from water rights that might otherwise be used on low-value crops or for production at unfavorable times of the year. Finally, by developing a replacement for the bypass flow without operation of the YDP, this alternative would save tens of millions of dollars annually and avoid critical environmental harm to the Ciénega de Santa Clara.

The leasing option is superior for Arizona for the following reasons:

- leasing imposes less of a financial burden on the American taxpayer;
- leasing avoids any need for new energy production;
- leasing avoids air quality and climate impacts;

¹ E.g., Zengel, S, et. al. 1995. Cienega de Santa Clara, a remnant wetland in the Rio Colorado delta (Mexico): vegetation distribution and the effects of water flow reduction. *Ecological Engineering* 4: 19-36; Glenn, E., et. al. 1995. Effects of Water Management on the Wetlands of the Colorado River Delta, Mexico. *Conservation Biology* 10(4):1175-1186.

- with respect to shortage conditions on the Colorado, leasing is no different from YDP operation and does not increase the risk of shortage to Arizona;
- leasing could provide farmers from Arizona or other Colorado River basin states with a flexible, voluntary tool to augment farm income;
- leasing, if implemented in Upper Basin states where salinity inputs are high, could improve the quality of Arizona's share of Colorado River water;
- leasing implemented in the Yuma region could help the United States meet the salinity differential requirement in the U.S.–Mexico Treaty;
- leasing does no harm to the Ciénega, preserving a vital ecological resource for the benefit of the people of Arizona, the United States, and Mexico.