

# [***COMMENTARY:NEW WATER FOR THE COLORADO RIVER: ECONOMIC AND ENVIRONMENTAL CONSIDERATIONS FOR REPLACING THE BYPASS FLOW***](https://advance.lexis.com/api/document?collection=analytical-materials&id=urn:contentItem:4828-VRB0-00SW-50D5-00000-00&context=1516831)

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**Text**

**[\*69]**

[*I*](https://advance.lexis.com/api/document?collection=statutes-legislation&id=urn:contentItem:8T9R-T2X2-D6RV-H374-00000-00&context=1516831). INTRODUCTION

In the future, the United States government may be obligated to replace water that is currently removed from the ***Colorado*** ***River*** via the Main Outlet Drain Extension, otherwise known as the bypass flow, and diverted into the Cienega de Santa Clara ("Cienega"), a large, open-water wetland in Mexico. [[1]](#footnote-2)1 The ***Colorado*** ***River*** Basin Salinity Control Act establishes replacement of the bypass flow as a federal obligation. [[2]](#footnote-3)2 Originally diverted to ensure that ***Colorado*** ***River*** water deliveries to Mexico satisfied 1972 salinity standards [[3]](#footnote-4)3 amending the 1944 ***Rivers*** Treaty, the bypass flow now sustains an important habitat in the ***Colorado*** ***River*** delta. [[4]](#footnote-5)4 The Cienega is home to thousands of migratory and resident waterfowl, as well as the Yuma clapper rail and the desert pupfish, both endangered species. [[5]](#footnote-6)5

At present, the bypass flow is replaced by water conserved through **[\*70]** lining the Coachella Canal. [[6]](#footnote-7)6 At such time the federal government can no longer take credit for this conserved water, it must secure a new source. Finding "new" water in the ***Colorado*** ***River*** poses significant problems, because the ***river*** is already over allocated and its ecosystems are already under stress. This paper examines several alternatives, and identifies water leasing from the Wellton-Mohawk Irrigation and Drainage District ("Wellton-Mohawk District"), as the least ecologically damaging way for the federal government to fulfill its obligation to replace the bypass flow. Not only would this solution minimize harm to the Cienega and the ***Colorado*** ***River*** delta, but it is less expensive than other alternatives currently under consideration by the Bureau of Reclamation ("Reclamation").

[*II*](https://advance.lexis.com/api/document?collection=statutes-legislation&id=urn:contentItem:8T9R-T352-D6RV-H379-00000-00&context=1516831). BACKGROUND

A. Salt in the ***Colorado*** ***River***

From its headwaters in the Rocky Mountains to the Gulf of California, the ***Colorado*** ***River*** accumulates nine million tons of salt annually. [[7]](#footnote-8)7 Natural sources contribute about half of the salt in the ***river***, but another thirty seven percent results from irrigated agriculture, which returns salt to the ***river*** via agricultural return flow. [[8]](#footnote-9)8 The 1972 amendment of the U.S.-Mexico ***Rivers*** Treaty [[9]](#footnote-10)9 through the adoption of Minute 242 [[10]](#footnote-11)10 of the International Boundary and Water Commission ("IBWC"), and the subsequent passage of the ***Colorado*** ***River*** Basin Salinity Control Act of 1974 [[11]](#footnote-12)11 ("CRBSCA") were intended to address Mexico's concerns over rising salinity levels in the ***Colorado***.

Mexico's complaints about salinity in the ***Colorado*** ***River*** began when agriculture within the Wellton-Mohawk District introduced extraordinarily high volumes of salt to the ***river***. [[12]](#footnote-13)12 The Wellton-Mohawk District is located in Yuma County, Arizona along the Gila ***River*** valley (see Figure 1). A division of the Gila Project, Wellton-Mohawk is located twelve miles east of the city of Yuma and extends forty-five miles into the Gila ***River*** valley. In this region, irrigators began pumping groundwater in 1906, and by 1934 many Wellton- **[\*71]** Mohawk wells exhibited excessive levels of salt and the water table had dropped dramatically. [[13]](#footnote-14)13 Many farms were abandoned until 1952, when Reclamation brought ***Colorado*** ***River*** water to the area through the Gila Project. [[14]](#footnote-15)14 Unfortunately, poor drainage throughout the Wellton-Mohawk District resulted in the mixing of irrigation wastewater with highly saline aquifer water. [[15]](#footnote-16)15 The brackish groundwater eventually rose to the surface of the agricultural fields, damaging acres of crops. [[16]](#footnote-17)16 In the early 1960s, Reclamation tried to mitigate these problems by installing a drainage system at a cost of fourteen million dollars. [[17]](#footnote-18)17

The drainage system pumped saline drain water, at approximately 6,000 parts per million ("ppm"), into the Gila ***River*** near its confluence with the ***Colorado*** ***River***, causing the ***Colorado*** ***River*** water salinity level at the border to nearly double, from 800 ppm to 1,500 ppm. [[18]](#footnote-19)18 Delivery of the drain water to the ***Colorado*** ***River*** resulted in overall increased salinity in the ***River*** and extensive damage to agricultural fields downstream in the Mexicali Valley. [[19]](#footnote-20)19 In 1965, the United States and Mexico adopted IBWC Minute 218 to reroute Wellton-Mohawk drain water away from the main stem of the ***Colorado*** ***River*** to Mexico's Gulf of California via a newly constructed canal. [[20]](#footnote-21)20 An extension to this new canal, known as the Main Outlet Drain Extension ("MODE"), [[21]](#footnote-22)21 terminated in a below sea-level depression that was formerly part of the ***Colorado*** ***River*** delta. Now that the bypass flow has flowed there for several decades, it has revived some of the delta's former ecosystem and currently sustains the Cienega. [[22]](#footnote-23)22 Presently, the MODE delivers an annual average of 108,000 acre-feet of water to the Cienega. [[23]](#footnote-24)23

**[\*72]**

B. The Cienega de Santa Clara

The introduction of Wellton-Mohawk's saline drain water into the Cienega de Santa Clara reclaimed some of the ***Colorado*** ***River*** delta. [[24]](#footnote-25)24 Before development upstream diminished ***Colorado*** ***River*** flows in its southernmost reaches, the ***Colorado*** ***River*** delta was a vast, productive riverine and freshwater ecosystem in the midst of the Sonoran desert. [[25]](#footnote-26)25 The eastern delta, the site of today's Cienega, was an active arm of the ***Colorado*** ***River*** lined by native cottonwood and willow trees. [[26]](#footnote-27)26 ***Colorado*** ***River*** development through the middle of the twentieth century, most notably the filling of Lake Powell behind the Glen Canyon Dam in the 1950-60s, deprived the delta of nearly all flows and desiccated its ecosystems. [[27]](#footnote-28)27 While small flows have returned on the ***river***'s main stem, much of the former delta remains dry. [[28]](#footnote-29)28

The significance of the Cienega de Santa Clara cannot be overstated. The 108,000 acre-feet of saline water, 2,800 ppm, [[29]](#footnote-30)29 that flows from MODE into the Cienega has not restored the pre-development ecosystem, but it has brought significant life back to the landscape. [[30]](#footnote-31)30 A 50,000-acre open-water wetland dominated by cattails and phragmites, the Cienega provides habitat for tens of thousands of resident and migratory waterfowl, and harbors two endangered species, the Yuma clapper rail and the desert pupfish. [[31]](#footnote-32)31 The Mexican government established protection for the Cienega in 1993 when it was included in the core area designation of the Biosphere Reserve of the ***Colorado*** ***River*** delta and Upper Gulf of California. [[32]](#footnote-33)32 The local community has developed a modest ecotourism enterprise, guiding visitors on boats through the Cienega's open waters. [[33]](#footnote-34)33

The Cienega de Santa Clara is an inadvertent creation of efforts to control salinity on the ***Colorado*** ***River***. Its renewed ecological value is important because it is also the former site of one of the world's great **[\*73]** desert ***river*** deltas, which has been destroyed as the ***Colorado*** ***River*** was developed for consumptive use in the United States. [[34]](#footnote-35)34 The United States may be authorized to protect the Cienega by amendments to the CRBSCA, [[35]](#footnote-36)35 which sanction funding for measures to replace incidental fish and wildlife values foregone as salinity control programs are implemented. [[36]](#footnote-37)36 Furthermore, the United States may be obligated, by several treaties, laws, and agreements, [[37]](#footnote-38)37 and as a good neighbor, to do it no harm.

[*III*](https://advance.lexis.com/api/document?collection=statutes-legislation&id=urn:contentItem:8T9R-T372-8T6X-731R-00000-00&context=1516831). FEDERAL OBLIGATION TO REPLACE BYPASSED WATER

By 1973, Mexico and the United States agreed to amend the 1944 ***Rivers*** Treaty with Minute 242, [[38]](#footnote-39)38 which set a salinity standard for ***Colorado*** ***River*** water delivered to Mexico. [[39]](#footnote-40)39 The CRBSCA followed in 1974, authorizing the work required to meet the provisions of Minute 242. The CRBSCA established replacement of bypassed water as a federal obligation [[40]](#footnote-41)40 and authorized a variety of projects including:

. Irrigation-efficiency improvements for the Wellton-Mohawk District; [[41]](#footnote-42)41

. Lining forty-nine miles of the Coachella Canal; [[42]](#footnote-43)42

. Buyout and retirement of 10,000 acres of Wellton-Mohawk land; [[43]](#footnote-44)43

. A protective and regulatory pumping unit (pumping of up to 160,000 acre-feet of groundwater north of the border to augment flows and for dilution); [[44]](#footnote-45)44

**[\*74]** . Constructing the Yuma Desalting Plant to process the bypass flow and return it to the ***Colorado*** ***River***; [[45]](#footnote-46)45 and

. Funding construction of a bypass drain to the Cienega de Santa Clara. [[46]](#footnote-47)46

Reclamation implemented all of these authorized projects except the Yuma Desalting Plant ("YDP"). Reclamation constructed the plant, however, it has never operated at full capacity. [[47]](#footnote-48)47 Nevertheless, to date, the United States has ably met the Minute 242 salinity standard. [[48]](#footnote-49)48

The United States completed lining the Coachella Canal in 1980. The 130,000 acre-feet of water conserved annually from lining the canal effectively became the replacement water that the United States had previously removed from the ***Colorado*** ***River*** to meet the terms of Minute 242. At some point in the future, the interim period during which the federal government receives credit for water conserved by the lining of the Coachella canal may come to an end. [[49]](#footnote-50)49 However, environmental organizations, [[50]](#footnote-51)50 the ***Colorado*** ***River*** Board of California, [[51]](#footnote-52)51 and the ***Colorado*** Water Conservation Board [[52]](#footnote-53)52 have **[\*75]** argued that a close reading of the CRBSCA indicates this interim period is not yet over. It is likely that at some point in the future, the United States will be obligated to find a new way to replace the bypass flow.

In addition to authorizing a number of projects that might be developed to replace bypass flows, the CRBSCA authorizes Reclamation to explore alternatives that demonstrate an economic advantage. [[53]](#footnote-54)53 A 1984 amendment to the CRBSCA obligates Reclamation to use cost-effectiveness as the underlying criterion in determining which salinity control units should be operated. [[54]](#footnote-55)54

The remainder of this paper analyzes three alternatives for replacing the bypass flow, including two under consideration by Reclamation: (1) operation of the YDP; and (2) offstream storage of ***Colorado*** ***River*** water. [[55]](#footnote-56)55 The third alternative the paper considers combines the lease of water from Wellton-Mohawk District and groundwater pumped from the Yuma Mesa Area.

[*IV*](https://advance.lexis.com/api/document?collection=statutes-legislation&id=urn:contentItem:8T9R-T3H2-D6RV-H37G-00000-00&context=1516831). BYPASS FLOW REPLACEMENT ALTERNATIVES

A. Lease of Wellton-Mohawk Water and Securing of Federal Rights to Yuma Mesa Groundwater

One way for the United States government to replace the bypass flow is to transfer water, either by lease or purchase, from farmers who use the ***Colorado*** ***River*** to irrigate crops. This paper examines leasing as one form of water transfer, but given the federal government's need for a permanent source of water, it may also be important to consider a permanent acquisition of water rights, such as through the purchase and fallowing of land currently under irrigation and cultivation.

Water used by farmers in the Wellton-Mohawk District to grow cereals and grains has relatively low economic productivity, suggesting that some water users are likely to respond positively to an attractive lease offer. [[56]](#footnote-57)56 It is important to note that a reduction of irrigation water use in Wellton-Mohawk District would reduce the quantity of water draining into the MODE. Protection of the Cienega ecosystem could be accomplished by complementing a lease program with the addition to the MODE of brackish groundwater pumped from the Yuma Mesa groundwater mound (see Figure 1).

**[\*76]**

Figure 1: Map of the ***Colorado*** ***River*** in southern Arizona and northern Mexico depicting various irrigation districts and infrastructure.

[SEE FIGURE IN ORIGINAL]

i. Leasing Water from The Wellton-Mohawk District

Reclamation might obtain bypass flow replacement water by leasing water from agricultural ***Colorado*** ***River*** water users, known in government parlance as "extraordinary conservation." [[57]](#footnote-58)57 Of the many irrigation districts in the ***Colorado*** ***River*** basin, this paper proposes a lease from the Wellton-Mohawk District, because of the low productivity of this water and the ecological benefit it would provide.

The Wellton-Mohawk District has had rights on the ***Colorado*** ***River*** **[\*77]** to approximately 300,000 acre-feet, [[58]](#footnote-59)58 requiring a diversion of over 400,000 acre-feet of water, [[59]](#footnote-60)59 dating back to 1952. [[60]](#footnote-61)60 Having subsidized the infrastructure that delivers and removes water, the federal government charges the Wellton-Mohawk District a mere three dollars per acre-foot of water delivered. [[61]](#footnote-62)61 Without a true price signal for the cost of water, farmers have little incentive to conserve and continue to grow water-intensive crops of extremely low value.

While the Wellton-Mohawk District has publicly stated it is not willing to sell or lease water, [[62]](#footnote-63)62 and in Arizona, no water transfers may take place without approval of the governing irrigation district, [[63]](#footnote-64)63 it is likely that an attractive offer would nevertheless stimulate a market response. Figure 2 [[64]](#footnote-65)64 illustrates that the average annual net return [[65]](#footnote-66)65 per acre-foot of water for the least economically productive 108,000 acre-feet of water in Wellton-Mohawk District per year peaks at fifty-three dollars. [[66]](#footnote-67)66 Significantly, fifty-three dollars overestimates the economic productivity of water because it is calculated for all water applied to an **[\*78]** acre of a given crop, rather than the marginal return per acre-foot of water used. However, terms of a water lease may specify that land must be fallowed, in which case fifty-three dollars per acre-foot is the appropriate value.

Figure 2

[SEE FIGURE IN ORIGINAL] **[\*79]** The price for a water lease can be determined in a number of ways including; (1) a standing offer; (2) individually negotiated contracts; or (3) by a market-based procedure such as auctioning. [[67]](#footnote-68)67 Recently the Wellton-Mohawk District objected to the sale of its ***Colorado*** ***River*** water, which suggests that only the first of these three options is feasible. [[68]](#footnote-69)68 Reclamation could test the willingness of Wellton-Mohawk District farmers to sell their water by making a standing offer at a price that reflects their net returns on ***Colorado*** ***River*** water increased by a sufficient incentive. [[69]](#footnote-70)69 Over time, the economic benefit of a ***Colorado*** ***River*** water lease may prove sufficiently attractive to Wellton-Mohawk District farmers to overcome any objections.

Additional cost savings of a water lease to the Wellton-Mohawk District would include reduced operation and maintenance costs associated with retirement of Wellton-Mohawk District lands, which could total millions of dollars annually. The energy required for pump lift stations and maintenance on the 108 miles of conveyance canals and tunnels is significant: the six pumping plants in the Wellton-Mohawk Division require a total horsepower greater than 35,000 units. [[70]](#footnote-71)70 The energy cost to convey irrigation water uphill and across the entire district for the year 2000 was approximately one million dollars. [[71]](#footnote-72)71 One would reasonably expect a twenty five percent reduction in Wellton-Mohawk District water use would also decrease its power costs by $ 250,000 annually.

One significant consequence of reducing consumptive use of ***Colorado*** ***River*** water at the Wellton-Mohawk District will be the reduction of drain water flowing into the MODE. [[72]](#footnote-73)72 If water use at the Wellton-Mohawk District decreases by twenty five percent, the bypass flow volume will be reduced by the same percentage, approximately 30,000 acre-feet of water annually. [[73]](#footnote-74)73 As discussed above, MODE water sustains an important ecosystem in the Cienega, and its reduction or elimination would cause unacceptable harm. [[74]](#footnote-75)74 One way to address this **[\*80]** impact to MODE flows is to supplement them with 25,000 acre-feet of water pumped from the Yuma Mesa groundwater mound.

ii. Securing Federal Credit for Pumped Yuma Mesa Groundwater

To sustain the Cienega de Santa Clara ecosystem, the present-day quantity and quality of flows in the MODE must be maintained. [[75]](#footnote-76)75 It may be acceptable to replace MODE flows diminished by the lease of water from the Wellton-Mohawk District with 25,000 acre-feet per year of groundwater pumped from the Yuma Mesa area.

Extraordinarily high rates of irrigation in the Yuma area irrigation districts have created a mound of groundwater below the Yuma Mesa. [[76]](#footnote-77)76 Under approximately 8,700 acres of land, the depth to groundwater is less than six feet despite extensive pumping in the region. [[77]](#footnote-78)77 Groundwater salinity in the Yuma area averages 1,400 ppm. [[78]](#footnote-79)78 The Yuma Area Water Resources Management Group [[79]](#footnote-80)79 ("Water Resources Group") proposed a 2.2 million dollar upgrade to the region's groundwater pumping infrastructure in order to reduce groundwater levels beneath 6,200 acres of the Yuma Valley. [[80]](#footnote-81)80 The Water Resources Group proposed to divert pumped groundwater north through the Yuma Mesa Conduit towards the ***Colorado*** ***River***. [[81]](#footnote-82)81 Their proposal would increase groundwater pumping over the most recent ten-year average by 50,000 acre-feet per year for five years and 30,000 acre-feet per year thereafter. [[82]](#footnote-83)82 The Water Resources Group recommended that Arizona trade 25,000 acre-feet per year of pumped groundwater for a period of ten years, subject to renewal, in exchange for financial **[\*81]** support from Reclamation. [[83]](#footnote-84)83 For a modest $ 8.80 per acre-foot, Reclamation can secure water to replace MODE flows diminished by the lease of water from the Wellton-Mohawk District. Calculated alternatively, it adds two dollars to the cost of an acre-foot of water leased from the Wellton-Mohawk District.

However, before any changes are made to the Yuma area groundwater pumping regime, Reclamation must evaluate the environmental impacts with a full review as required by the National Environmental Policy Act. [[84]](#footnote-85)84 Expected impacts include: (1) loss of groundwater flows to the Gila ***River*** and the ***Colorado*** ***River*** main stem in its limitrophe reach; (2) loss of groundwater flows to Mexico; and (3) lowering of water tables in adjacent aquifers and surface waters. [[85]](#footnote-86)85 Further impacts include increased salinity in the ***Colorado*** ***River*** main stem from the balance of groundwater pumped from the Yuma Mesa area that Yuma Area irrigation districts will claim as return flows. [[86]](#footnote-87)86 Under this proposal, the salinity of Yuma Mesa groundwater is expected to increase over time. The increased salinity of pumped water will lead to increased water irrigation rates and increased need for groundwater pumping. [[87]](#footnote-88)87 Furthermore, increased groundwater pumping will reinforce the extraordinarily high rates of water use for irrigation in the Yuma area irrigation districts. If Reclamation were to give Yuma Area irrigators incentives to conserve water, the reductions in use might solve groundwater problems and reduce depletion of the ***Colorado*** ***River*** main stem. Therefore, Reclamation must evaluate these impacts and weigh them against the potential benefits of Yuma area groundwater pumping.

The term of the arrangement in the Water Resources Group proposal is also uncertain. Arizona's recent population growth is likely to continue, [[88]](#footnote-89)88 and with it, Arizona's urban water demand. After the ten-year term of the Water Resources Group's proposal, Arizona has the option to refuse contract renewal with Reclamation. [[89]](#footnote-90)89 Thus, it is important that Reclamation evaluate the Water Resources Group **[\*82]** proposal as a temporary source of water. Finally, the Water Resources Group's proposal would facilitate the routing of pumped Yuma Mesa groundwater to the YDP, which is problematic for reasons outlined in the section below titled Yuma Desalting Plant.

Because the Water Resources Group has indicated some urgency for increasing groundwater pumping in the Yuma Mesa area, it is likely pumping may begin before the end of the interim period for which the federal government receives credit for water conserved by lining the Coachella Canal. Under these circumstances, Reclamation will receive 25,000 acre-feet of water for which it has no obligation. Reclamation would then be free to use this "new" water to augment flows to the ***Colorado*** ***River*** delta in Mexico, as long as the addition of this water to the main stem does not violate the Minute 242 salinity standard. [[90]](#footnote-91)90

iii. Ecological Advantages of Leasing Wellton-Mohawk Water and Securing Federal Credit for Yuma Mesa Groundwater

There are two important ecological advantages to the leasing alternative: (1) bypass flows will be replaced without creating new storage for ***Colorado*** ***River*** water and the ecological damage created by reduced flood flows to the ***Colorado*** ***River*** delta would be avoided; and (2) salinity of flows to the Cienega will be reduced.

Flood flows have restored considerable native habitat in the ***Colorado*** ***River*** delta, [[91]](#footnote-92)91 and must be protected. The IBWC Minute 306 [[92]](#footnote-93)92 commits the United States and Mexico to a collaborative process to identify mechanisms to supply the delta with water to sustain its ecosystems. [[93]](#footnote-94)93 The United States will violate the spirit of Minute 306 if it takes actions to further reduce the probability of flood flows to the delta. [[94]](#footnote-95)94 In addition, the Endangered Species Act may prohibit the United States from diminishing flood flows to the delta. [[95]](#footnote-96)95

Additionally, the groundwater pumped from the Yuma Mesa area is slightly brackish at approximately 1,400 ppm. [[96]](#footnote-97)96 Reclamation analysis indicates that addition of pumped Yuma Mesa groundwater to the **[\*83]** ***Colorado*** ***River*** main stem is likely to cause violations of the Minute 242 salinity standard during dry winter months. [[97]](#footnote-98)97 If the U.S. would divert some groundwater pumped from the Yuma Mesa area, such a diversion might reduce the probability of these violations and might also reduce the salinity of flows to the Cienega. Water in the MODE averages salinity levels of approximately 2,400 ppm; [[98]](#footnote-99)98 therefore, calculations estimate that the annual addition of 25,000 acre-feet of 1,400 ppm water would reduce the salinity of MODE water to 2,200 ppm.

B. Operation of the Yuma Desalting Plant

Reclamation has proposed that it could replace bypass flows by treating the bypass flow itself, or another source of brackish water, at the Yuma Desalting Plant. [[99]](#footnote-100)99 The U.S. government completed the YDP in 1992, with the capacity to produce 68,000 acre-feet of treated water annually at a total cost of $ 258 million. Today the plant sits idle on "ready reserve" status, costing approximately $ 5.1 million per year to maintain. [[100]](#footnote-101)100 Reclamation estimates YDP operational costs at approximately $ 26 to $ 34 million annually, resulting in a cost of between $ 305 and $ 480 per acre-foot for treated water. [[101]](#footnote-102)101

At an average cost of $ 390 per acre-foot to desalt irrigation water, the YDP is not a cost-effective salinity control measure by any standard. If Reclamation is to comply with 1984 and 1995 amendments to the CRBSCA, then operation of the YDP as a potential alternative must be eliminated. Additionally, with annual costs of approximately $ 5.1 million to maintain on "ready reserve" status, [[102]](#footnote-103)102 Reclamation should strongly consider permanent decommissioning of the plant. Decommissioning the YDP would cut the project's future losses and may allow other, more cost-effective, salinity control measures to be implemented.

i. Environmental Impacts of Yuma Desalting Plant Operation

Were the YDP to function at full capacity treating Wellton-Mohawk District drain water, the Cienega de Santa Clara would be destroyed due to the reduced volume and increased salinity of the bypass flow in the MODE. At full operating capacity, the YDP is designed to process 97,300 acre-feet of Wellton-Mohawk drain water, which has a salinity level of 2,900 ppm, producing 68,500 acre-feet of plant product water, at a salinity level of 295 ppm, and 28,800 acre-feet of reject water at a **[\*84]** salinity level of 9,400 ppm. [[103]](#footnote-104)103 Reclamation estimates return flow to the ***Colorado*** ***River*** at 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. [[104]](#footnote-105)104 YDP reject water would be disposed into the MODE, and the salinity of water flowing to the Cienega would increase more than threefold, compounded by an approximate seventy percent decrease in flow quantity.

The cumulative effect of increased salinity and decreased flows would have irreparably devastating effects on the Cienega. The ecosystem will be destroyed as its water source is reduced and salinity increases dramatically. As previously discussed, the Cienega provides important habitat to significant bird populations, and harbors two endangered species, the Yuma clapper rail, and the desert pupfish. [[105]](#footnote-106)105 Harm to the Cienega's ecosystem will also impact local residents who hunt, fish, and generate income by leading tours through the wetland.

C. Offstream Storage of ***Colorado*** ***River*** Flood Flows

Reclamation has identified offstream storage of ***Colorado*** ***River*** water as an alternative for replacing the bypass flow, and has discussed the idea with the Arizona Water Banking Authority ("AWBA"). [[106]](#footnote-107)106 Reclamation claims authority to store water under the existing U.S. - Central Arizona Water Conservation District ("CAWCD") settlement. [[107]](#footnote-108)107 Arizona has agreed to let Reclamation pay to store unused Central Arizona Project ("CAP") water in exchange for the right to use this water to replace the bypass flow. [[108]](#footnote-109)108 At present, Arizona chooses not to store all unused CAP water offstream because costs outweigh the benefits. [[109]](#footnote-110)109 Because the terms of such an agreement between Reclamation and AWBA/CAWCD are under negotiation, the economics of offstream storage are unknown. However, a recent deal between Nevada and Arizona established a storage price of $ 200 per acre-foot plus an additional fee to recover the water. [[110]](#footnote-111)110

i. Environmental Impacts of Offstream Storage

Any increase in storage on the ***Colorado*** ***River*** will diminish the probability of flood control releases from Hoover Dam, and will consequently diminish flows to the ***Colorado*** ***River*** delta. **[\*85]** Reclamation's Record of Decision on the Interim Surplus Guidelines, [[111]](#footnote-112)111 signed January 16, 2001, will result in considerable reduction of flows to the delta in order to supply California with "surplus" water. [[112]](#footnote-113)112 The Environmental Impact Statement for the Interim Surplus Guidelines was flawed in its failure to analyze the impacts of reduced flows to the delta in Mexico. [[113]](#footnote-114)113 Six environmental organizations and more than 7,500 individuals submitted comments to Reclamation objecting to the environmental damage to the ***Colorado*** ***River*** delta expected upon implementation of the Interim Surplus Guidelines. [[114]](#footnote-115)114

Offstream storage of ***Colorado*** ***River*** water will decrease the probability of flows to the ***Colorado*** ***River*** delta, and will result in harm to the native riparian ecosystem on the ***River***'s main stem. [[115]](#footnote-116)115 The forests that line the banks of the ***Colorado*** ***River*** below Morelos Dam are comprised of native cottonwood and willow trees that require periodic flooding. [[116]](#footnote-117)116 These forests are a critical link for migrating songbirds in the Pacific flyway, including the Southwestern willow flycatcher, an endangered species. [[117]](#footnote-118)117 Reduced flooding in the ***Colorado*** ***River*** delta will also impose harm on the ***River***'s estuary and the near-shore marine habitats that provide critical breeding area for the totoaba, and the vaquita porpoise, both of which are also endangered species. [[118]](#footnote-119)118 Furthermore, depletion of flows to the ***Colorado*** ***River*** delta will further reduce the ability of local communities, including the native Cucapa, to continue their traditional, ***river***-based practices such as fishing. [[119]](#footnote-120)119

**[\*86]**

[*V*](https://advance.lexis.com/api/document?collection=statutes-legislation&id=urn:contentItem:8T9R-T3X2-8T6X-731X-00000-00&context=1516831). CONCLUSION

At some time in the future, Reclamation may no longer be able to take credit for water conserved by lining the Coachella Canal and will be obligated to find a new way to replace the bypass flow. At that time, it must look carefully at economic and environmental costs of any bypass flow replacement options. This paper demonstrates that by leasing water from the Wellton-Mohawk District and securing temporary rights from Arizona to pumped groundwater in the Yuma area, Reclamation can replace the bypass flow with minimum economic costs:

Source of Bypass Flow ReplacementCost per acre-foot

Leased Water$ 55 plus incentive

YDP Operation$ 305-480

Offstream Storage$ 200 plus recovery costs

The leased water alternative also provides some environmental benefit in the improvement of water quality in the Cienega. YDP operation and offstream storage both will result in unacceptable harm to ***Colorado*** ***River*** delta ecosystems.

The lower ***Colorado*** ***River***, renowned for its diminished ecosystems, and dubbed in the popular press as "A ***River*** No More," [[120]](#footnote-121)120 has experienced an unanticipated revival in its delta. As the importance of protecting the ***Colorado*** ***River*** delta gains wider recognition, it becomes more likely that the water necessary will be dedicated to sustain it. The question remains whether the requisite changes can be made before the inevitable pressure for development upstream deprives the delta's ecosystems of every last drop. [[121]](#footnote-122)121 By choosing a less costly solution, the United States can replace the bypass flow without harming these ecosystems, demonstrate good will towards Mexico, and preserve important species and habitat until the two nations are ready to broker an agreement that protects them permanently.

University of Denver Water Law Review

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**End of Document**

1. 1 Report from the Secretary of Interior, to select members of the U.S. Senate Energy, Resource, & Appropriations Committee, Modifications to Projects of Title I of the ***Colorado*** ***River*** Basin Salinity Control Act 11-12 (October 22, 2002) (Draft on file with author) [hereinafter Draft Interior Report]. [↑](#footnote-ref-2)
2. 2 [*43 U.S.C. 1571*](https://advance.lexis.com/api/document?collection=statutes-legislation&id=urn:contentItem:8SDD-0HD2-8T6X-74F4-00000-00&context=1516831)(c) (2000). [↑](#footnote-ref-3)
3. 3 Minute 242 set the 1972 Salinity Standards, see infra note 10. [↑](#footnote-ref-4)
4. 4 Taylor O. Miller et al., The Salty ***Colorado*** 24-25 (1986); Edward P. Glenn et al., Status of Wetlands Supported by Agricultural Drainage Water in the ***Colorado*** ***River*** Delta, Mexico, 34 Hortscience 39, 41 (1999). [↑](#footnote-ref-5)
5. 5 Daniel F. Luecke et al., A Delta Once More: Restoring Riparian and Wetland Habitat in the ***Colorado*** ***River*** Delta 17 (1999); see also National Marine Fisheries Service, Southwest Regional Office, Federally Listed Threatened and Endangered Species-California, Appendix E, at [*http://swr.ucsd.edu/limit10/AppendixE.pdf*](http://swr.ucsd.edu/limit10/AppendixE.pdf). [↑](#footnote-ref-6)
6. 6 1 Bureau of Reclamation, U.S. Dep't of Interior, Coachella Canal Lining Project, Final Environmental Impact Statement 1-7 (2001) [hereinafter Coachella EIS]. [↑](#footnote-ref-7)
7. 7 Miller et al., supra note 4, at xiii. [↑](#footnote-ref-8)
8. 8 See id. at 5 & fig.1. [↑](#footnote-ref-9)
9. 9 Treaty Between the United States & Mexico Respecting the Utilization of Waters of the ***Colorado*** and Tijuana ***Rivers*** and of the Rio Grande, Feb. 3, 1944, U.S.-Mex., [*59 Stat. 1219, 1265.*](https://advance.lexis.com/api/document?collection=statutes-legislation&id=urn:contentItem:5CBP-FY70-01XN-S099-00000-00&context=1516831) [↑](#footnote-ref-10)
10. 10 Resolution on the Permanent and Definitive Solution to the International Problem on the Salinity of the ***Colorado*** ***River***, Aug. 30, 1973, U.S.-Mex., 24 U.S.T. 1971, reprinted in Milton N. Nathanson, Bureau of Reclamation, U.S. Dep't of Interior, Updating the Hoover Dam Documents, at XIII-10 through -12 (1978) [hereinafter Minute 242]. [↑](#footnote-ref-11)
11. 11 [*43 U.S.C. 1571*](https://advance.lexis.com/api/document?collection=statutes-legislation&id=urn:contentItem:8SDD-0HD2-8T6X-74F4-00000-00&context=1516831)-99 (2000). [↑](#footnote-ref-12)
12. 12 Miller et al., supra note 4, at 24. [↑](#footnote-ref-13)
13. 13 Id. [↑](#footnote-ref-14)
14. 14 Bureau of Reclamation, U.S. Dep't of Interior, Dataweb, Gila Project, Arizona, General Description, at [*http://dataweb.usbr.gov/html/gila.html*](http://dataweb.usbr.gov/html/gila.html). ***Colorado*** ***River*** water was first delivered to Wellton-Mohawk fields in 1952. Nathanson, supra note 10, at 38. The Gila Project was later completed in 1957. Id. [↑](#footnote-ref-15)
15. 15 Miller et al., supra note 4, at 24. [↑](#footnote-ref-16)
16. 16 Norris Hundley, Jr., The West Against Itself: The ***Colorado*** ***River***-An Institutional History, in New Courses for the ***Colorado*** ***River*** 9, 38 (Gary D. Weatherford & F. Lee Brown eds., 1986). [↑](#footnote-ref-17)
17. 17 Bureau of Reclamation, U.S. Dep't of Interior, ***Colorado*** ***River*** Basin Salinity Control Project, Title I Division, Desalting Complex Unit, Arizona, Status Report 146 (1977) [hereinafter Salinity Control Project]. [↑](#footnote-ref-18)
18. 18 Id. at 2. [↑](#footnote-ref-19)
19. 19 Miller et al., supra note 4, at 24. [↑](#footnote-ref-20)
20. 20 Recommendations on the ***Colorado*** ***River*** Salinity Problem, Mar. 22, 1965, U.S.-Mex., [*24 U.S.T. 1965,*](https://advance.lexis.com/api/document?collection=statutes-legislation&id=urn:contentItem:403V-CCG0-00V4-M3TD-00000-00&context=1516831) reprinted in Nathanson, supra note 10, at XIII-3 through -4 (1978) [hereinafter Minute 218]. [↑](#footnote-ref-21)
21. 21 See Salinity Control Project, supra note 17, at 5. The MODE is in fact a sequence of canals known (from upstream down) as the Main Outlet Drain, the Main Outlet Drain Extension, and the Bypass Extension. Id. at 5, 53. [↑](#footnote-ref-22)
22. 22 Luecke et al., supra note 5, at 16. [↑](#footnote-ref-23)
23. 23 Draft Interior Report, supra note 1, at 10. [↑](#footnote-ref-24)
24. 24 Luecke et al., supra note 5, at 16. [↑](#footnote-ref-25)
25. 25 See generally id. at 1. [↑](#footnote-ref-26)
26. 26 Edward P. Glenn et al., Effects of Water Management on the Wetlands of the ***Colorado*** ***River*** Delta, Mexico, 10 Conservation Biology 1175, 1178 (1996) [hereinafter Conservation Biology]. [↑](#footnote-ref-27)
27. 27 See generally Jennifer Pitt et al., Two Nations, One ***River***: Managing Ecosystem Conservation in the ***Colorado*** ***River*** Delta, 40 Nat. Resources J. 819, 820-29 (2000) [hereinafter Two Nations]. [↑](#footnote-ref-28)
28. 28 Luecke et al., supra note 5, at 4. [↑](#footnote-ref-29)
29. 29 Draft Interior Report, supra note 1, at 8. [↑](#footnote-ref-30)
30. 30 Luecke et al., supra note 5, at 16. [↑](#footnote-ref-31)
31. 31 See generally id. (describing in further detail the ecology of the Cienega de Santa Clara); see also Conservation Biology, supra note 26, at 1176-83. [↑](#footnote-ref-32)
32. 32 Wesley Marx, Border Waters, The Surprise Return of the ***Colorado*** ***River*** Delta, 17 Cal. Coast & Ocean Winter (2001-02), at [*www.coastalconservancy.ca.gov/coast&ocean/*](http://www.coastalconservancy.ca.gov/coast&ocean/) winter2002/pages/six.htm. [↑](#footnote-ref-33)
33. 33 See Carlos Valdes-Caillas et al., Information Database and Local Outreach Program for the Restoration of the Hardy ***River*** Wetlands, Lower ***Colorado*** ***River*** Delta, Baja California And Sonora, Mexico, at vii (1998) (discussing tourism in the ***Colorado*** ***River*** delta). [↑](#footnote-ref-34)
34. 34 Luecke et al., supra note 5, at 2, 4. [↑](#footnote-ref-35)
35. 35 Act of July 28, 1995, Pub. L. No. 104-20, 1, ***109 Stat 255 (1995)*** (codified as amended at [*43 U.S.C. 1592*](https://advance.lexis.com/api/document?collection=statutes-legislation&id=urn:contentItem:8TR7-YC52-8T6X-74BV-00000-00&context=1516831)(a)(6) (2000)); Act of Oct. 30, 1984, Pub. L. No. 98-569, 4, [*98 Stat. 2933, 2933-44 (1984)*](https://advance.lexis.com/api/document?collection=statutes-legislation&id=urn:contentItem:5CD7-HSP0-01XN-S4N1-00000-00&context=1516831) (codified as amended at [*43 U.S.C. 1595*](https://advance.lexis.com/api/document?collection=statutes-legislation&id=urn:contentItem:8SDD-0HD2-8T6X-74FP-00000-00&context=1516831)(a)). [↑](#footnote-ref-36)
36. 36 [*7 C.F.R. 702.2(a)(13) (2002)*](https://advance.lexis.com/api/document?collection=administrative-codes&id=urn:contentItem:604H-BF41-DYB7-W0TB-00000-00&context=1516831). Neither the amendments nor the rules and regulations discuss the applicability of this authorization to transboundary resources. But see id. 702.4(b) (listing lands to which the ***Colorado*** ***River*** Basin Salinity Control Program is applicable, however, the statute fails to list transboundary lands). [↑](#footnote-ref-37)
37. 37 See, e.g., Endangered Species Act, [*16 U.S.C. 1536*](https://advance.lexis.com/api/document?collection=statutes-legislation&id=urn:contentItem:8S8T-0KG2-8T6X-7084-00000-00&context=1516831)(a)(2) (2000) (prohibiting federal agencies from "jeopardizing" endangered or threatened species); Agreement on Cooperation for the Protection and Improvement of the Environment in the Border Area, Aug. 14, 1983, U.S.-Mex., art. 1, 35 U.S.T. 2917, 2918 (obliging the United States and Mexico to "cooperate in the field of environmental protection in the border area"); Convention on Wetlands of International Importance Especially as Waterfowl Habitat, Feb. 2, 1971, art. 3, T.I.A.S. No. 11084 (requiring the U.S. and Mexico to "formulate and implement their planning so as to promote the conservation of the wetlands" such as the Cienega de Santa Clara). Transboundary application of the Endangered Species Act is uncertain. See Two Nations, supra note 27, at 849-50. [↑](#footnote-ref-38)
38. 38 Minute 242, supra note 10. [↑](#footnote-ref-39)
39. 39 See id. 1(a) at 1972 ("The United States shall adopt measures to assure that … [water] delivered to Mexico upstream of Morelos Dam, have an annual average salinity of no more than 115 ppm +/-30 ppm … over the annual average salinity of ***Colorado*** ***River*** waters which arrive at Imperial Dam … ."). [↑](#footnote-ref-40)
40. 40 [*43 U.S.C. 1571*](https://advance.lexis.com/api/document?collection=statutes-legislation&id=urn:contentItem:8SDD-0HD2-8T6X-74F4-00000-00&context=1516831)(c) (2000). [↑](#footnote-ref-41)
41. 41 Id. 1571(f)(1). [↑](#footnote-ref-42)
42. 42 Id. 1572(a). [↑](#footnote-ref-43)
43. 43 Id. 1571(f)(2). [↑](#footnote-ref-44)
44. 44 Id. 1573(a)(1). [↑](#footnote-ref-45)
45. 45 [*43 U.S.C. 1571*](https://advance.lexis.com/api/document?collection=statutes-legislation&id=urn:contentItem:8SDD-0HD2-8T6X-74F4-00000-00&context=1516831)(b). [↑](#footnote-ref-46)
46. 46 Id. 1571(d). [↑](#footnote-ref-47)
47. 47 The YDP was operated briefly at one-third capacity in 1992 for testing. Martin Van Der Werf, Draining the Budget to Desalt the ***Colorado***, High Country News, February 21, 1994, available at [*http://www.hcn.org/servlets/hcn.Printable.Article?article*](http://www.hcn.org/servlets/hcn.Printable.Article?article) id=97. [↑](#footnote-ref-48)
48. 48 Dale Pontius, ***Colorado*** ***River*** Basin Study, Final Report to the Western Water Review Advisory Commission 66 (1997). [↑](#footnote-ref-49)
49. 49 [*43 U.S.C. 1572*](https://advance.lexis.com/api/document?collection=statutes-legislation&id=urn:contentItem:8SDD-0HD2-8T6X-74F5-00000-00&context=1516831)(a) (2000) provides:

    The Secretary is authorized to construct a new concrete-lined canal or, to line the presently unlined portion of the Coachella Canal of the Boulder Canyon project, California, from station 2 plus 26 to the beginning of siphon numbered 7, a length of approximately forty-nine miles. The United States shall be entitled to a temporary use of a quantity of water, for the purpose of meeting the salinity control objectives of Minute 242, during an interim period, equal to the quantity of water conserved by constructing or lining the said canal. The interim period shall commence on the completion of construction or lining said canal and shall end the first year that the Secretary delivers main stream ***Colorado*** ***River*** water to California in an amount less than the sum of the quantities requested by (1) the California agencies under contracts made pursuant to section 617d of this title, and (2) Federal establishments to meet their water rights acquired in California in accordance with the Supreme Court decree in Arizona against California.

    (citation omitted) (emphasis added). [↑](#footnote-ref-50)
50. 50 Letter from Jennifer Pitt et al., to Robert Johnson, Director, Lower ***Colorado*** Regional Office, Bureau of Reclamation, U.S. Dep't of Interior 2 (July 6, 2001) (stating that ten environmental organizations believe that the interim period during which the federal government can take credit for water conserved by the Coachella Canal Lining continues, as California has not yet requested delivery of ***Colorado*** ***River*** water in excess of the quantity delivered by the Bureau of Reclamation) (on file with author). [↑](#footnote-ref-51)
51. 51 Letter from Gerald R. Zimmerman, Executive Director, ***Colorado*** ***River*** Board of California, to Robert W. Johnson, Regional Director, Lower ***Colorado*** Regional Office, Bureau of Reclamation, U.S. Dep't of Interior (Aug. 1, 2001) (on file with author). [↑](#footnote-ref-52)
52. 52 Memorandum from Randy Seaholm, Chief, Water Supply Protection, ***Colorado*** Water Conservation Board, to the ***Colorado*** Water Conservation Board Members (July 17, 2001) (on file with author). [↑](#footnote-ref-53)
53. 53 See [*43 U.S.C. 1574.*](https://advance.lexis.com/api/document?collection=statutes-legislation&id=urn:contentItem:8SDD-0HD2-8T6X-74F7-00000-00&context=1516831) [↑](#footnote-ref-54)
54. 54 ***Colorado*** ***River*** Basin Salinity Control Act, Amendments of 1984, Pub. L. No. 98-569, [*98 Stat. 2933.*](https://advance.lexis.com/api/document?collection=statutes-legislation&id=urn:contentItem:5CD7-HSP0-01XN-S4N1-00000-00&context=1516831) [↑](#footnote-ref-55)
55. 55 Draft Interior Report, supra note 1, at 12-15. [↑](#footnote-ref-56)
56. 56 See generally B. Delworth Gardner, The Untried Market Approach to Water Allocation, in New Courses for the ***Colorado*** ***River*** 155 (Gary D. Weatherford & F. Lee Brown eds., 1986) (discussing prospective water markets on the ***Colorado*** ***River***). [↑](#footnote-ref-57)
57. 57 Bureau of Reclamation, U.S. Dep't of Interior, YDP & Alternatives Meeting Materials, Agenda (May 8, 2001, Las Vegas, Nev.) (on file with author) [hereinafter Las Vegas Conference]. [↑](#footnote-ref-58)
58. 58 Act of July 30, 1947, Pub L. No. 80-272, [*61 Stat. 628.*](https://advance.lexis.com/api/document?collection=statutes-legislation&id=urn:contentItem:5CCB-R1K0-01XN-S364-00000-00&context=1516831) [↑](#footnote-ref-59)
59. 59 Bureau of Reclamation, U.S. Dep't of Interior, Lower ***Colorado*** ***River*** Accounting System, appendix I, Imperial Dam to Mexico, Annual Water Balance 1 (2000). Diversion quantities are greater than consumptive use quantities, and because Wellton-Mohawk's drain water does not return to the ***Colorado***, the entire diversion is removed from the ***river***. [↑](#footnote-ref-60)
60. 60 Nathanson, supra note 10, at 38. [↑](#footnote-ref-61)
61. 61 Bureau of Reclamation, U.S. Dep't of Interior, Amendatory and Consolidated Contract with Wellton-Mohawk Irrigation and Drainage District for Delivery of Water, Construction of Works, Repayment, and Project Power Supply 23 (Wellton-Mohawk District may collect an additional fee for power costs incurred). See also Arizona Cooperative Extension Service, Arizona Field Crop Budgets 1999-2000, available at [*http://ag.arizona.edu/arec/ext/exthome.html*](http://ag.arizona.edu/arec/ext/exthome.html) [hereinafter Arizona Extension]. Reclamation collected fees for water delivered until construction costs were repaid. [↑](#footnote-ref-62)
62. 62 Interview with Don Pope, Staff, Yuma Area Irrigators Association, in Las Vegas, Nev. (May 8, 2001). [↑](#footnote-ref-63)
63. 63 National Research Council, Water Transfers in the West, Efficiency, Equity, and the Environment 98 (1992). [↑](#footnote-ref-64)
64. 64 Figure 2, created by Environmental Defense, illustrates the net dollar return by acre-feet of water used for irrigation of specific crops in the Wellton-Mohawk District. Net return is defined by the Arizona Extension Service. See Arizona Extension, supra note 61. Acre-feet of water used for each crop is calculated by multiplying the acre-feet per acre used for a crop, id., by the acres of that crop irrigated in the Wellton-Mohawk District. Bureau of Reclamation, Dep't of Interior, Crop & Water Data, Wellton-Mohawk Irrigation & Drainage District Data (1996-1998) (on file with author). [↑](#footnote-ref-65)
65. 65 Arizona Extension, supra note 61. Net return is defined as returns over cash operating expenses. Id. Returns are the sum of the contributions toward projected income of all products produced by the cropping system, including possible subsidies. Id. Income estimates are based on 5-year county averages for yields for most crops and 5-year state averages for commodity prices. Id. Operating costs include total cash land preparation expenses (labor, chemical and custom application, farm machinery and vehicles, irrigation water, and other purchased inputs and services), total harvest and post harvest expenses (labor, chemical and custom application, farm machinery and vehicles, custom harvest/post harvest, cotton ginning if appropriate, crop assessments, and other materials), and pickup use. Id. Net return does not include costs for overhead, land ownership, management, or risk. Id. [↑](#footnote-ref-66)
66. 66 Id. see also text within footnotes 64 & 65. [↑](#footnote-ref-67)
67. 67 See Zach Willey & Adam Diamant, Restoring the Yakima ***River***'s Environment: Water Marketing and Instream Flow Enhancement in Washington's Yakima ***River*** Basin 27 (1994). [↑](#footnote-ref-68)
68. 68 Telephone Interview with William Swan, Attorney, June 21, 2001. Mr. Swan worked at the Dep't of Interior for approximately eighteen years, including three years as the Field Solicitor in Phoenix, Ariz. [↑](#footnote-ref-69)
69. 69 There are various methods of determining this price incentive. This paper refrains from discussing alternatives to avoid any premature biasing of the pricing process. See generally Gardner, supra note 56. [↑](#footnote-ref-70)
70. 70 See Bureau of Reclamation, U.S. Dep't of Interior, Dataweb, Gila Project, Arizona, Engineering Data, Pumping Plants, at [*http://dataweb.usbr.gov/html/lcgilengdata.html*](http://dataweb.usbr.gov/html/lcgilengdata.html). [↑](#footnote-ref-71)
71. 71 Bureau of Reclamation, U.S. Dep't of Interior, Summary of Revenue and Program Expense, Parker Davis Project (Sept. 30, 2000). [↑](#footnote-ref-72)
72. 72 Water flowing in the MODE is Wellton-Mohawk District drain water. See Luecke et al., supra note 5, at 16. [↑](#footnote-ref-73)
73. 73 Note that this assumes a linear relationship between Wellton-Mohawk District diversions and MODE flows. [↑](#footnote-ref-74)
74. 74 See Luecke et al., supra note 5, at 4. [↑](#footnote-ref-75)
75. 75 See generally Miller et al., supra note 4. [↑](#footnote-ref-76)
76. 76 Interview with John Redlinger, Deputy Area Manager, Boulder Canyon Operations Office, Bureau of Reclamation, in Las Vegas, Nev. (Aug. 28, 2001). [↑](#footnote-ref-77)
77. 77 Yuma Area Water Resources Management Group, Project Proposal: Improvement of Drainage Operations in the Yuma Valley 1 (May 2, 2001) (Final Draft Prepared for YAWRMG Approval) [hereinafter Final Draft]. [↑](#footnote-ref-78)
78. 78 Edward Kandl & Fred Coxen III, Bureau of Reclamation, U.S. Dep't of Interior, Ground Water Status Report, 1994, Yuma Area, Arizona California, at A30 (1996) [hereinafter Status Report]. [↑](#footnote-ref-79)
79. 79 The Water Resources Group agencies include the Yuma County Water Users' Association, Unit B Irrigation and Drainage District, North Gila Irrigation and Drainage District, Cocopah Tribe, City of Yuma, Arizona Department of Water Resources, Yuma Mesa Irrigation and Drainage District, Wellton-Mohawk Irrigation and Drainage District, Yuma Irrigation District, Yuma County, U.S. Bureau of Reclamation, and the International Boundary and Water Commission. Final Draft, supra note 77, at 5. [↑](#footnote-ref-80)
80. 80 Final Draft, supra note 77, at 1-3. The Water Resources Group proposal to Reclamation is a lease of 25,000 acre-feet for ten years in exchange for a federal investment of two million dollars. Id. at 1. Reclamation's operations and maintenance costs would be $ 200,000 per year and the deal would be good for ten years. Interview with John Redlinger, Deputy Area Manager, Bureau of Reclamation, supra note 76. [↑](#footnote-ref-81)
81. 81 The Water Resources Group proposal includes the construction of a trifurcation structure at the terminus of the Yuma Mesa Conduit, allowing pumped groundwater to be diverted to the ***Colorado*** ***River***, the MODE, or the YDP. For reasons discussed in Part IV, treatment of pumped groundwater at the YDP may not be feasible. Final Draft, supra note 77, at 2. [↑](#footnote-ref-82)
82. 82 Id. [↑](#footnote-ref-83)
83. 83 Id. at 1, 3. [↑](#footnote-ref-84)
84. 84 [*42 U.S.C. 4331,*](https://advance.lexis.com/api/document?collection=statutes-legislation&id=urn:contentItem:8SHT-0722-D6RV-H24H-00000-00&context=1516831) 4332 (2000). [↑](#footnote-ref-85)
85. 85 Reclamation considers the Yuma Mesa groundwater mound to be Arizona groundwater rather than hydrologically connected to the ***Colorado*** ***River***. Furthermore, the United States and Mexico do not have agreements that govern the management of transboundary groundwater resources. For a general discussion of groundwater and the ***Colorado*** ***River***, see David Getches & Charles Meyers, The ***River*** of Controversy: Persistent Issues, in New Courses for the ***Colorado*** ***River*** 51, 60 (Gary D. Weatherford & F. Lee Brown eds., 1986). [↑](#footnote-ref-86)
86. 86 Bureau Of Reclamation, U.S. Dep't of Interior, Application to Arizona Department of Water Resources, Application For Permit to Transport Water out of State, Narrative 3 (July 14, 2001). [↑](#footnote-ref-87)
87. 87 John Redlinger, Deputy Area Manager, Boulder Canyon Operations Office, Bureau of Reclamation, Presentation in Las Vegas, Nev. (May 8, 2001). [↑](#footnote-ref-88)
88. 88 The U.S. Census Bureau projects Arizona's 2025 population at 6.412 million, an increase of 1.614 million from the 2000 population of 4.798 million. See U.S. Bureau of the Census, Projections of the Total Population of States: 1995 to 2025, [*http://www.census.gov/population/projections/state/stpjpop.txt*](http://www.census.gov/population/projections/state/stpjpop.txt). [↑](#footnote-ref-89)
89. 89 Final Draft, supra note 77, at 3. [↑](#footnote-ref-90)
90. 90 At such time that addition to the ***Colorado*** ***River*** main stem of pumped Yuma Mesa groundwater would violate the salinity standard, it could be diverted to the MODE to temporarily increase flows to the Cienega de Santa Clara. See also Minute 242, supra note 10. [↑](#footnote-ref-91)
91. 91 Luecke et al., supra note 5, at 6-7. [↑](#footnote-ref-92)
92. 92 Int'l Boundary & Water Comm'n, Minute 306: Conceptual Framework for U.S.-Mex. Studies for Future Recommendations Concerning the Riparian and Estuarine Ecology of the Limitrophe Section of the ***Colorado*** ***River*** and its Associated Delta (Dec. 12, 2000), [*http://www.ibwc.state.gov//Files/Minutes/Min306.pdf*](http://www.ibwc.state.gov//Files/Minutes/Min306.pdf). [↑](#footnote-ref-93)
93. 93 Id. at 2-3. [↑](#footnote-ref-94)
94. 94 Minute 306 requires the United States to work with Mexico on the restoration of ***Colorado*** ***River*** delta ecosystems. See id. at 2. Flood flows sustain important native ecosystems in the ***Colorado*** ***River*** delta riparian corridor, and depleting these flows threatens the ecosystems. See also Two Nations, supra note 27, at 832. Thus increasing U.S. depletions will create greater obstacles to the objectives set forth in Minute 306. [↑](#footnote-ref-95)
95. 95 See [*16 U.S.C. 1536*](https://advance.lexis.com/api/document?collection=statutes-legislation&id=urn:contentItem:8S8T-0KG2-8T6X-7084-00000-00&context=1516831)(a)(2) (2000). [↑](#footnote-ref-96)
96. 96 Status Report, supra note 78. [↑](#footnote-ref-97)
97. 97 Bureau of Reclamation, U.S. Dep't of Interior, YDP & Alternatives Meeting Materials, 1996 + 30,000 AF New Valley Drainage Graph (1996). [↑](#footnote-ref-98)
98. 98 Draft Interior Report, supra note 1, at 8. [↑](#footnote-ref-99)
99. 99 Id. at 16-17. [↑](#footnote-ref-100)
100. 100 Id. at 12. [↑](#footnote-ref-101)
101. 101 Note that this figure includes amortized start-up costs of $ 26.1 million. Id. at 13. [↑](#footnote-ref-102)
102. 102 Id. [↑](#footnote-ref-103)
103. 103 See Bureau of Reclamation, U.S. Dep't of Interior, Dataweb, ***Colorado*** ***River*** Basin Salinity Control Act, Yuma Desalting Complex Unit, Engineering Data, Facilities in Operation, at [*http://dataweb.usbr.gov/html/lcydsengdata.html*](http://dataweb.usbr.gov/html/lcydsengdata.html). [↑](#footnote-ref-104)
104. 104 Id. [↑](#footnote-ref-105)
105. 105 Luecke et. al., supra note 5, at 6. [↑](#footnote-ref-106)
106. 106 Las Vegas Conference, supra note 57. [↑](#footnote-ref-107)
107. 107 Id. [↑](#footnote-ref-108)
108. 108 Telephone Interview with John Redlinger, Deputy Area Manager, Boulder Canyon Operations Office, Bureau of Reclamation (Aug. 1, 2001). [↑](#footnote-ref-109)
109. 109 See Central Arizona Project, Annual Report 11-12 (2000). [↑](#footnote-ref-110)
110. 110 Telephone Interview with John Redlinger, Deputy Area Manager, Bureau of Reclamation, supra note 108. [↑](#footnote-ref-111)
111. 111 See Bureau of Reclamation, U.S. Dep't of Interior, Record of Decision, ***Colorado*** ***River*** Interim Surplus Guidelines, Final Environmental Impact Statement (2001) [hereinafter Interim Guidelines]. [↑](#footnote-ref-112)
112. 112 See 1 Bureau of Reclamation, U.S. Dep't of Interior, ***Colorado*** ***River*** Interim Surplus Criteria, Final Environmental Impact Statement 1-3 (2000) [hereinafter Surplus Criteria]. [↑](#footnote-ref-113)
113. 113 Id. at 3.16-1 through -41 atmt.T. [↑](#footnote-ref-114)
114. 114 Interim Guidelines, supra note 111, at 7-8. The environmental organizations submitting comments included Environmental Defense, Southwest ***Rivers***, the Pacific Institute for Studies in Development, Environment, and Security, the Center for Biological Diversity, Friends of Arizona ***Rivers***, the Glen Canyon Institute, Defenders of Wildlife, the Sierra Club, and the Glen Canyon Action Network. 3 Surplus Criteria, supra note 112, at B-16 through -20. [↑](#footnote-ref-115)
115. 115 For more information about the ***Colorado*** ***River*** delta ecosystems, see Luecke et al., supra note 5. [↑](#footnote-ref-116)
116. 116 Id. at 13-14. [↑](#footnote-ref-117)
117. 117 Jacqueline Garcia-Hernandez et al., Willow Flycatcher Surveys in the ***Colorado*** ***River*** delta: Implications for Management, 49 J. Arid Env'ts 161, 162 (2001). [↑](#footnote-ref-118)
118. 118 Luecke et al., supra note 5, at 17. [↑](#footnote-ref-119)
119. 119 Id. at 7-8. [↑](#footnote-ref-120)
120. 120 Philip Fradkin, A ***River*** No More, The ***Colorado*** ***River*** and the West (1981). [↑](#footnote-ref-121)
121. 121 See generally Two Nations, supra note 27. See also Jennifer Pitt, Can We Restore the ***Colorado*** ***River*** delta?, 49 J. Arid Env'ts 211 (2001). [↑](#footnote-ref-122)