RECLAMATION

Managing Water in the West

Summary Description of Accounting for Water Use in the Yuma Area Beginning with Calendar Year 2003

Bureau of Reclamation
Lower Colorado Region
Boulder Canyon Operations Office
Boulder City, Nevada

January 2006

Executive Summary

Introduction

The Bureau of Reclamation (Reclamation) prepared this report to examine the existing method and an optional method of accounting for Colorado River water use in the Yuma, Arizona, area, especially downstream from Morelos Dam.

The United States is mandated by Article V (B) of the U.S. Supreme Court Decree in *Arizona* v. *California et al.,* dated March 9, 1964, to account for, among other things, "Diversions of water from the mainstream, return flow of such water to the stream as is available for consumptive use in the United States or in satisfaction of the Mexican treaty obligation, and consumptive use of such water. These quantities shall be stated separately as to each diverter from the mainstream, each point of diversion, and each of the States of Arizona, California and Nevada."

The United States is also mandated by the Supreme Court Decree in Article II (B)(4) to consider, "Any mainstream water consumptively used within a state shall be charged to its apportionment, regardless of the purpose for which it is released" and in Article I (C) to consider, "Consumptive use from the mainstream within a state shall include all consumptive uses of water of the mainstream, including water drawn from the mainstream by underground pumping, and including but not limited to, consumptive uses made by persons, by agencies of that state, and by the United States for the benefit of Indian reservations and other federal establishments within the state."

Reclamation currently meets this mandate with an annual report entitled, "Compilation of Records in Accordance with Article V of the Decree of the Supreme Court of the United States in *Arizona* v. *California et al.,* dated March 9, 1964" (Decree Accounting Report). The accounting of water use reported in the Decree Accounting Report is referred to as Article V accounting. This report presents methods currently used to compile the records contained in the Decree Accounting Report for the Yuma area as a Current Method, with an option for consideration.

Definition of Yuma Area

This report describes Article V water accounting options for all water uses upon the Yuma Mesa and in the Yuma Valley. This report addresses the water uses by the diverters known to Reclamation as of this writing (table A). Table A also

shows the method(s) by which Reclamation understands each diverter diverts or receives delivery of Colorado River water, and the type of entitlement the diverter has to divert and consumptively use Colorado River; i.e. (1) a decreed right, (2) a contract with the United States through the Secretary of the Interior, or (3) a Secretarial Reservation of Colorado River water.

What Conditions Make Accounting for Water in the Yuma Area Unique?

The primary condition that makes accounting for water in the Yuma area unique is that this area is a river delta environment, not a river environment, as is the Colorado River generally upstream of this area. Consequently, unlike upstream of this area, much of the water diverted from the Colorado River and applied to the ground for irrigation or disposal does not naturally return to the Colorado River above NIB and become available for diversion in the United States or become available for satisfaction of the Mexican water treaty. Instead, much of the water diverted from the Colorado River and applied to the ground for irrigation or disposal flows underground across the southerly international and Limitrophe section boundaries with Mexico.

Current Method

The Current Method is the method currently used to compile the Decree Accounting Report for calendar year 2002 (the latest Decree Accounting Report available as of this writing). The Current Method compiles diversions and measured return flows from data and information reported to Reclamation's Boulder Canyon Operations Office (BCOO) by individual diverters, Reclamation's Yuma Area Office (YAO), the U.S. Geological Survey (USGS), and the International Boundary and Water Commission, United States Section. The Current Method considers reported diversions from the surface channel of the Colorado River and any reported volumes of water pumped by wells to be diversions of Colorado River water. In a few cases, where an inquiry has been received concerning the need to include pumping from a specific well in the Decree Accounting Report, Reclamation has applied the river aquifer/accounting surface techniques documented in USGS Water Resources Investigations Reports (WRIR) 94-4005[1] and 00-4085[2] to respond to the inquiry. Generally, the Current Method does not directly address the specific issues of whether a well is located within the Colorado River flood plain or the accounting surface.

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[1] Method to Identify Wells that Yield Water that will be Replaced by Colorado River Water in Arizona, California, Nevada, and Utah; USGS Water Resources Investigations Report 94-4005.
[2] Method to Identify Wells that Yield Water that will be Replaced by Water from the Colorado River Downstream from Laguna Dam in Arizona and California; USGS Water Resources Investigations Report 00-4085.

Table A.---Diverters and method(s) used to divert or receive delivery of Colorado River Water and Type of Entitlement

Diverter	Imperial Dam	Wells	River pump	Type of entitlement
North Cocopah Indian Reservation	X	X		Decree – present perfected right (PPR)
Ansel Hall (now Gary and Barbara Pasquinelli)			X	Contract
Pete Powers			X	Decree - PPR
City of Yuma	X			Contract & PPR
Yuma Area Office[1]	X			None
The Yucca Power Plant (Arizona Public Service Company)		X		Contract
Yuma County Water Users Association (YCWUA) (includes the Fort Yuma Indian Reservation Homesteads)	X			Water Right Certificates & PPR
Wells reported as part of YCWUA diversion		X		See YCWUA
Wells reported separately within (and charged to) the Yuma County Water Users Association [name (well no.) – annual acre-feet of water pumped] Glen Curtis Citrus (AEW-17) – 2 Glen Curtis Citrus (AEW-18) – 37 Glen Curtis Citrus (AEW-19) – 27 Waymon Farms (AEW-28) – 1,285 Waymon Farms (AEW-29) – 1,383		X		
Yuma Mesa Irrigation and Drainage District (YMIDD) (includes the Far West Municipal Water District)	X			Contract
Far West Municipal Water District (Water is delivered by YMIDD and included in YMIDD diversion and consumptive use by the Decree Accounting Report)	X			See YMIDD
Unit B Irrigation and Drainage District	X			Water Rights Certificates & PPR
Hillander "C" Irrigation District		X		None
University of Arizona Agricultural Test Station	X			Contract
West Cocopah Indian Reservation	X	X		Decree – PPR
East Cocopah Indian Reservation		X		Decree – PPR
Yuma Marine Corps Air Station	X	X		Contract

Table A.---Diverters and method(s) used to divert or receive delivery of Colorado River Water and Type of Entitlement

Diverter	Imperial Dam	Wells	River pump	Type of entitlement
City of Gadsden		X		None
City of Somerton		X		None
City of San Luis, Arizona		X		None
Arizona State Prison		X		None
Bureau of Land Management agricultural leases downstream from Morelos Dam [name (well no.) – annual acre-feet of water pumped] Burrell (ADW-05) – 219 Jim Cuming (AEW-32) - 588 Jim Cuming (ADW-09) – 1,219 J. Barkley (ADW-10) – 531 Roger S. Brown (ADW-11) – 813 Earl Hughs (AEW-33) – 312		X		None
Irrigated lands upon the Yuma Mesa south of YMIDD		X		None

[1] YAO uses water taken from the Main Outlet Drain Extension (MODE) and directly from the Colorado River. The water from the MODE is pumped irrigation drainage, originally diverted from the Colorado River at Imperial Dam by the Wellton-Mohawk Irrigation and Drainage District.

Reclamation's Boulder Canyon Operations Office (BCOO) compiles unmeasured return flows for diverters along the All American, Gila Gravity Main, and Yuma Main Canals using loss distribution calculations for each canal. These unmeasured return flows are reported for individual diverters. BCOO compiles additional unmeasured return flows for several diverters as a percentage (unmeasured return flow coefficient) of the reported diversion and reports them as a summation for each State and a total for the lower basin.[3] Any changes or updates to unmeasured return flow coefficients used by the Current Method would change the resultant values of consumptive use, but the concepts presented here would remain the same. The calculations used to compile diversions, measured return flows, and unmeasured return flows for the diverters are shown in Appendix II.

Arizona Preferred Option

The Arizona Preferred Option considers the "mainstream" to include (1) the surface channel of the Colorado River (2) the Colorado River flood plain upstream of NIB, and 3) the portion of the Yuma Mesa underneath which groundwater flows north or northwest toward the Colorado River above NIB. The Arizona Preferred Option effectively considers a diversion of water to be

[3] Unmeasured return flows calculated as a percentage of diversion will be reported for individual diverters in Decree Accounting Reports beginning with calendar year 2003.

Colorado River Water only if that water would otherwise reach NIB. Therefore, the Arizona Preferred Option considers a diversion of Colorado River water to consist only of water diverted from the main channel of the Colorado River and diversions from wells on the Colorado River flood plain where groundwater can be reasonably assumed to flow toward the Colorado River upstream of NIB. The Arizona Preferred Option does not consider the pumping of wells from the flood plain or underlying aquifer downstream from NIB to be diversions of Colorado River water, where the ground water can be reasonably assumed to be flowing toward Mexico from the groundwater mound beneath the Yuma Mesa and, therefore, not to be flowing toward the Colorado River upstream of NIB.

Because the Arizona Preferred Option is primarily concerned with surface water use in the Yuma area, the Arizona Preferred Option generally uses the same methods as the Current Method to calculate consumptive use for diverters. Because the Arizona Preferred Option does not consider the pumping of wells downstream from NIB where the ground water can be reasonably assumed to be flowing toward Mexico (and not toward the Colorado River upstream of NIB) to be diversions of Colorado River water, the Arizona Preferred Option does not credit diverters downstream from NIB with unmeasured return flow, except for the Yuma County Water Users Association (YCWUA), which irrigates lands both upstream of and downstream from NIB. Any changes or updates to unmeasured return flow coefficients used in the Arizona Preferred Option would change the resultant values of consumptive use, but the concepts presented here would remain the same. The calculations used by the Arizona Preferred Option to compile diversions, measured returns, and unmeasured returns for the diverters are shown in Appendix II.

Under the Arizona Preferred Option, Reclamation would need to monitor water levels to determine if the regional ground-water gradients indicate that ground-water development downstream from NIB would deplete the Colorado River upstream of NIB. Should Reclamation make a preliminary determination that ground-water development downstream from NIB is depleting the Colorado River upstream of NIB, Reclamation will need to change the methods used to account for the diversion and consumptive use of Colorado River water in the Yuma area to reflect the changed hydrologic conditions.

Hydrologic Impacts

Hydrologic impacts of the Current Method and the Arizona Preferred Option are presented by comparing calculated consumptive use in the Yuma area under the Current Method and the Arizona Preferred Option, as shown on table B. The consumptive uses identified would be charged against the 2.8 million acre-foot apportionment of Colorado River water available to Arizona annually. Therefore, the lower the sum of consumptive uses for the Yuma area, the more water within Arizona's apportionment is available for other entitlement holders in Arizona. Because the sum of the consumptive uses calculated under the Arizona Preferred

Option is 7,226 acre-feet less than the consumptive uses calculated under the Current Method for calendar year 2002; had the Arizona Preferred Option been in place for calendar year 2002, entitlement holders in Arizona (with priorities junior to the entitlement holders in the Yuma area) would have had access to 7,226 acre-feet more water annually than was available to them under the Current Method.

Table B. Consumptive use of each diverter identified in the Yuma area (annual acre-feet)

Diverter	Current Method	Arizona Preferred Option
North Cocopah Indian Reservation	1,515	1,515
Ansel Hall	325	325
Pete Powers	874	874
Curry Family LTD (formerly Armon Curtis)	183	183
Amigo Farms	224	224
Phillips Present Perfected Right area	0	0
City of Yuma	18,036	18,036
Yuma Area Office	850	850
Yucca Power Plant (Arizona Public Service Company)	602	602
Yuma County Water Users Association (YCWUA)	232,006	229,914
Wells reported as part of the YCWUA diversion	926	Not reported
Wells reported separately within (and charged to) the Yuma County Water Users Association [name (well no.) – annual acre-feet of water pumped] Glen Curtis Citrus (AEW-17) – 2 Glen Curtis Citrus (AEW-18) – 37 Glen Curtis Citrus (AEW-19) – 27 Waymon Farms (AEW-28) – 1,285 Waymon Farms (AEW-29) – 1,383	1,777	Not reported
Yuma Mesa Irrigation and Drainage District (YMIDD)	159,168	159,168
Far West Municipal Water District	Not reported, included in YMIDD	Included in YMIDD
Unit B Irrigation and Drainage District	11,802	14,314
Hillander "C" Irrigation District	Not reported	Surface delivery only = 0 in 2002
University of Arizona Agricultural Test Station	377	755
West Cocopah Indian Reservation	9,023	3,519
East Cocopah Indian Reservation	Not reported	Surface delivery only = 0 in 2002
Fort Yuma Indian Reservation homesteads (located in the Yuma Valley)	Not reported, included in YCWUA	2,092
Yuma Marine Corps Air Station	1,823	2,307
City of Gadsden	Not reported	Surface delivery only = 0 in 2002
City of Somerton	Not reported	Surface delivery only = 0 in 2002
City of San Luis, Arizona	Not reported	Surface delivery only = 0 in 2002
Arizona State Prison	Not Reported	Surface delivery only = 0 in 2002

Table B. Consumptive use of each diverter identified in the Yuma area (annual acre-feet)		
Diverter	Current Method	Arizona Preferred Option
Bureau of Land Management Agricultural Leases downstream from Morelos Dam [name (well no.) – annual acre-feet of water pumped] Burrell (ADW-05) – 219 Jim Cuming (AEW-32) - 588 Jim Cuming (ADW-09) – 1,219 J. Barkley (ADW-10) – 531 Roger S. Brown (ADW-11) – 813 Earl Hughs (AEW-33) – 312	2,393	Surface delivery only = 0 in 2002
Irrigated lands upon the Yuma Mesa south of YMIDD	Not reported	Surface delivery only = 0 in 2002
Total	441,904	434,678

Entitlement Management Impacts

This report presents entitlement management impacts by identifying and discussing the types of entitlement administrative actions that the Current Method and the Arizona Preferred Option are expected to have on Reclamation's administration of water entitlements. These actions may include the development, negotiation, and administration of new or amended water delivery contracts; and coordination among water users without entitlements, the State of Arizona, and existing water entitlement holders to the end that water users without entitlements may be included within contract service areas of existing entitlement holders. The appropriate action to resolve individual water uses currently taking place without entitlements will depend on decisions that have not yet been made, including recommendations for contracts, contract negotiations, or coordination among affected parties. Therefore, it is not possible at this time to identify the actions needed to address specific uses that do not have entitlements. However, the amount of Colorado River water potentially available for new or revised entitlements in Arizona is limited to a diversion amount of about 11,000 acre-feet. If water uses without entitlements in Arizona exceed this amount, current water uses without entitlements must be resolved through some other means.

Pros and Cons

The pros and cons of the Current Method and the Arizona Preferred Option are presented in Table C.

Table C. Pros and cons of the Current Method, and the Arizona Preferred Option

Current Method	Arizona Preferred Option
Requires no changes to the methods currently used to compile the Decree Accounting Report. Is quick to implement. Requires no additional information or data for historical users of the Decree Accounting Report. Requires minimal entitlement management changes. Double accounts for some water use, which hurts lower priority users. Has historically been inconsistent regarding wells that should, or should not, be included in the Decree Accounting Report, and regarding which diverters require entitlements. Does not provide a comprehensive accounting tool that balances ground-water pumping with ground-water recharge. Does not identify potential for future groundwater development without exceeding recharge. If the Arizona Preferred Option was in place in calendar year 2002, entitlement holders in Arizona, with priorities junior to the entitlement holders in the Yuma area, would have had access to 7,226 acre-feet more water than was available to them under the Current Method.	Eliminates "double accounting" in the Current Method. Minimal entitlement management changes required If this option was in place in calendar year 2002, entitlement holders in Arizona, with priorities junior to the entitlement holders in the Yuma area, would have had access to 7,226 acre-feet more water than was available to them under the Current Method. Requires changes to the methods currently used to compile the Decree Accounting Report. Requires some notification as to when diverters might change from pumping a well which would not require an entitlement, to surface deliveries which would require an entitlement. Additional groundwater development downstream from NIB could reduce the amount of irrigation drainage arriving at the Boundary Pumping Plant, requiring increased pumping of the Protective and Regulatory Pumping Unit, also called 242 wells. This option would allow the Cocopah Indian tribe to divert more water from the Colorado River than they currently are because wells pumped by the tribe below Morelos Dam, which are currently included in Decree Accounting, would be removed from Decree Accounting and considered to not be pumping Colorado River water. Reclamation or Arizona must create a method to determine when ground-water development exceeds the amount of Colorado River water diverted for use in the Yuma area.

Conclusion and Recommendations

Reclamation and Arizona have concluded that the Arizona Preferred Option best meets the current needs of Arizona and is consistent with Article V of the U.S Supreme Count decree in *Arizona* v. *California* of March 9, 1964. The Arizona Preferred Option will be implemented with Reclamation's Colorado River Accounting and Water Use Report Arizona, California, and Nevada Calendar Year 2003.

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Summary Description of Accounting for Water Use in the Yuma Area Beginning with Calendar Year 2003

Introduction

The Bureau of Reclamation (Reclamation) prepared this report to examine the existing method and an optional method of accounting for Colorado River water use in the Yuma, Arizona, area, especially downstream from Morelos Dam (see map).

The United States is mandated by Article V (B) of the U.S. Supreme Court Decree in *Arizona* v. *California et al.*, dated March 9, 1964, to account for, among other things, "Diversions of water from the mainstream, return flow of such water to the stream as is available for consumptive use in the United States or in satisfaction of the Mexican treaty obligation, and consumptive use of such water. These quantities shall be stated separately as to each diverter from the mainstream, each point of diversion, and each of the States of Arizona, California and Nevada."

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Definition of Yuma Area

This report describes Article V water accounting options for all water uses upon the Yuma Mesa and in the Yuma Valley. This report addresses the water uses by the diverters known to Reclamation as of this writing (Table 1). Table 1 also shows the method(s) by which Reclamation understands each diverter to divert or receive delivery of Colorado River water, and if the diverter has an entitlement to divert and consumptively use Colorado River water by (1) a decreed right, (2) a contract with the United States through the Secretary of the Interior, or (3) a Secretarial Reservation of Colorado River water. The map labeled, "Yuma Accounting Options Location Map" shows the location of each diverter addressed in this paper.

Table 1.---Diverters and method(s) used to divert or receive delivery of Colorado River water and type of entitlement

Diverter	Imperial Dam	Wells	River pump	Type of entitlement
North Cocopah Indian Reservation	X	X		Decree – present perfected right (PPR)
Ansel Hall (now Gary and Barbara Pasquinelli)			X	Contract
Pete Powers			X	Decree – PPR
Curry Family Limited			X	Contract
Amigo Farms		X	X	None
Phillips present perfected rights area				Decree – PPR
City of Yuma	X			Contract
Yuma Area Office[1]	X			None
Yucca Power Plant (Arizona Public Service Company)		X		Contract
Yuma County Water Users Association (YCWUA) (includes the Fort Yuma Indian Reservation homesteads)	X			Contract
Wells reported as part of YCWUA diversion		X		See YCWUA
Wells reported separately within (and charged to) the Yuma County Water Users Association [name (well no.) – annual acre-feet of water pumped] Glen Curtis Citrus (AEW-17) – 2 Glen Curtis Citrus (AEW-18) – 37 Glen Curtis Citrus (AEW-19) – 27 Waymon Farms (AEW-28) – 1,285 Waymon Farms (AEW-29) – 1,383		X		

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Diverter	Imperial Dam	Wells	River pump	Type of entitlement
Yuma Mesa Irrigation and Drainage District (YMIDD) (includes the Far West Municipal Water District)	X			Contract
Far West Municipal Water District (water is delivered by YMIDD and included in YMIDD diversion and consumptive use by the Decree Accounting Report)	X			See YMIDD
Unit B Irrigation and Drainage District	X			Contract
Hillander "C" Irrigation District		X		None
University of Arizona Agricultural Test Station	X			Contract
West Cocopah Indian Reservation	X	X		Decree – PPR
East Cocopah Indian Reservation		X		Decree – PPR
Yuma Marine Corps Air Station	X	X		Contract
City of Gadsden		X		None
City of Somerton		X		None
City of San Luis, Arizona		X		None
Arizona State Prison		X		None
Bureau of Land Management agricultural leases downstream from Morelos Dam [name (well no.) – annual acre-feet of water pumped] Burrell (ADW-05) – 219 Jim Cuming (AEW-32) - 588 Jim Cuming (ADW-09) – 1,219 J. Barkley (ADW-10) – 531 Roger S. Brown (ADW-11) – 813 Earl Hughs (AEW-33) – 312		X		None
Irrigated lands upon the Yuma Mesa to the south of the Yuma Mesa Irrigation and Drainage District		X		None

[1] The Yuma Area Office uses water taken from the Main Outlet Drain Extension (MODE) and directly from the Colorado River. The water from the MODE is pumped irrigation drainage, originally diverted from the Colorado River at Imperial Dam by the Wellton-Mohawk Irrigation and Drainage District.

What Makes Accounting for Water in the Yuma Area Unique?

The primary condition that makes accounting for water in the Yuma area unique is that this area is a river delta environment, not a river environment, as is the Colorado River generally upstream of this area. Consequently, unlike upstream of this area, much of the water diverted from the Colorado River and applied to the ground for irrigation or disposal does not naturally return to the Colorado River above NIB and become available for diversion in the United States or become available for satisfaction of the Mexican water treaty. Instead, much of the water diverted from the Colorado River and applied to the ground for irrigation or disposal flows underground across the southerly international and Limitrophe section boundaries with Mexico.

Hydrologic Impacts

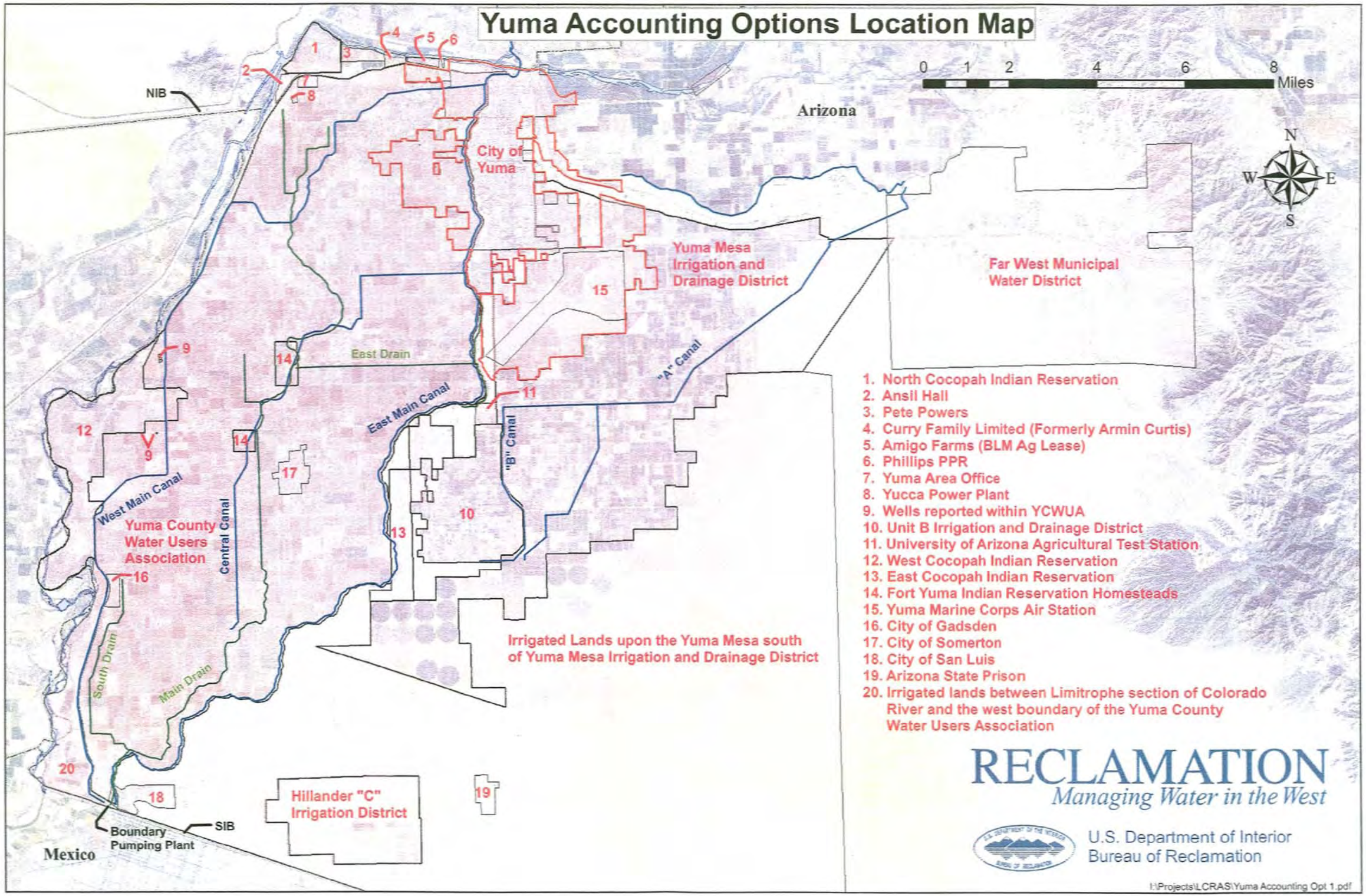
This report presents hydrologic impacts by comparing calculated consumptive use of each diverter identified in the Yuma area under the Arizona Preferred Option to consumptive use under the Current Method, which represents current Decree accounting methods. The consumptive uses identified would be charged against the 2.8 million acre-foot apportionment of Colorado River water available to Arizona annually. Therefore, the lower the sum of consumptive uses for the Yuma area, the more water within Arizona's apportionment is available for other entitlement holders in Arizona.

Entitlement Management Impacts

Entitlement management impacts are the effects that Current Method and the Arizona Preferred Option are expected to have on Reclamation's administration of water entitlements. Various entitlement administrative actions may need to be completed to establish valid entitlements for all Colorado River water use. These actions may include coordination among water users without entitlements, the State of Arizona, and existing water entitlement holders to the end that the existing entitlement holders would agree, with Reclamation's approval, to include water users without entitlements that are within their contract service areas. Possible actions include recommendations for new or amended water delivery contracts; and development, negotiation, and administration of those contracts.

Table 2 lists the preferred entitlement status of each diverter identified in the Yuma area for the Current Method and the Arizona preferred Option.

Yuma Accounting Options Location Map



1. North Cocopah Indian Reservation
2. Ansil Hall
3. Pete Powers
4. Curry Family Limited (Formerly Armin Curtis)
5. Amigo Farms (BLM Ag Lease)
6. Phillips PPR
7. Yuma Area Office
8. Yucca Power Plant
9. Wells reported within YCWUA
10. Unit B Irrigation and Drainage District
11. University of Arizona Agricultural Test Station
12. West Cocopah Indian Reservation
13. East Cocopah Indian Reservation
14. Fort Yuma Indian Reservation Homesteads
15. Yuma Marine Corps Air Station
16. City of Gadsden
17. City of Somerton
18. City of San Luis
19. Arizona State Prison
20. Irrigated lands between Limitrophe section of Colorado River and the west boundary of the Yuma County Water Users Association

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Managing Water in the West

U.S. Department of Interior
Bureau of Reclamation

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Table 2. Preferred entitlement status of each diverter identified in the Yuma area

Diverter	Entitlement status as of the date of this report, Current Method	Entitlement needed, Arizona Preferred Option
North Cocopah Indian Reservation	Yes	Yes
Ansel Hall (now Gary and Barbara Pasquinelli)	Yes	Yes
Pete Powers	Yes	Yes
Curry Family LTD (formerly Armon Curtis)	Yes	Yes
Amigo Farms (Bureau of Land Management agricultural leases)	No	Yes
Phillips present perfected right area	Yes	Yes
City of Yuma	Yes	Yes
Yuma Area Office	No	Yes
Yucca Power Plant (Arizona Public Service Company	Yes	Yes
Yuma County Water Users Association	Yes	Yes
Glen Curtis Citrus	Yes	Yes
Waymon Farms	No	Surface delivery only
Yuma Mesa Irrigation and Drainage District	Yes	Surface delivery only
Unit B Irrigation and Drainage District	Yes	Surface delivery only
Far West Municipal Water district	Included in YMIDD entitlement	Included in YMIDD entitlement
Hillander "C" Irrigation District	No	Surface delivery only
University of Arizona Agricultural Test Station	Yes	Surface delivery only
West Cocopah Indian Reservation	Yes	Surface delivery only
East Cocopah Indian Reservation	Yes	Surface delivery only
Fort Yuma Indian Reservation homesteads (located in the Yuma Valley)	Yes	Surface delivery only
Yuma Marine Corps Air Station	Yes	Surface delivery only
City of Gadsden	No	Surface delivery only
City of Somerton	No	Surface delivery only
City of San Luis, Arizona	No	Surface delivery only
Arizona State Prison	No	Surface delivery only
Bureau of Land Management agricultural leases downstream from Morelos Dam [name (well no.) – annual acre-feet of water pumped] Burrell (ADW-05) – 219 Jim Cuming (AEW-32) - 588 Jim Cuming (ADW-09) – 1,219 J. Barkley (ADW-10) – 531 Roger S. Brown (ADW-11) – 813 Earl Hughs (AEW-33) – 312	No	Surface delivery only
Irrigated lands upon the Yuma Mesa south of YMIDD	No	Surface delivery only

If entitlement is available within Arizona's apportionment of Colorado River water, Reclamation would first consult with ADWR and consider any

recommendations for contracts from that agency. Of the 2.8 million acre-feet of Colorado River water apportioned for use in Arizona, nearly all has been allocated and is available under valid water entitlements to individual water entitlement holders, including Indian tribes, water districts, projects, municipalities, water companies, and individuals under a water priority system for the State of Arizona.

Current Method

This section describes the Current Method and the consumptive use calculations for each diverter included in this option.

Description

The Current Method is the method currently used to compile the Decree Accounting Report. The Current Method compiles diversions and measured return flows from data and information reported to Reclamation's Boulder Canyon Operations Office (BCOO) by individual diverters, Reclamation's Yuma Area Office (YAO), the U.S. Geological Survey (USGS), and the International Boundary and Water Commission, United States Section. The Current Method considers reported diversions from the surface channel of the Colorado River and any reported volumes of water pumped by wells to be diversions of Colorado River water. In a few cases, where an inquiry has been received concerning the need to include pumping from a specific well in the Decree Accounting Report, Reclamation has applied the river aquifer/accounting surface techniques documented in USGS Water Resources Investigations Reports (WRIR) 94-4005[4] and 00-4085[5] to respond to the inquiry. Generally, the Current Method does not directly address the specific issues of whether a well is located within the Colorado River flood plain or the accounting surface.

BCOO compiles unmeasured return flows for diverters along the All American, Gila Gravity Main, and Yuma Main Canals using loss distribution calculations for each canal and reports these for individual diverters. BCOO compiles additional unmeasured return flows for several diverters as a percentage (unmeasured return flow coefficient) of the reported diversion and reports them as a summation for each State and a total for the lower basin.[6] Any changes or updates to unmeasured return flow coefficients used by the Current Method would change the resultant values of consumptive use, but the concepts presented here would

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[4] Method to Identify Wells that Yield Water that will be Replaced by Colorado River Water in Arizona, California, Nevada, and Utah; USGS Water Resources Investigations Report 94-4005.
[5] Method to Identify Wells that Yield Water that will be Replaced by Water from the Colorado River Downstream from Laguna Dam in Arizona and California; USGS Water Resources Investigations Report 00-4085.
[6] Unmeasured return flows calculated as a percentage of diversion will be reported for individual diverters in Decree Accounting Reports beginning with calendar year 2003.

remain the same. The calculations used to compile diversions, measured return flows, and unmeasured return flows for the following diverters are shown in Appendix II.

North Cocopah Indian Reservation

The North Cocopah Indian Reservation is at the extreme northwest end of the Yuma Valley, upstream of the northerly international boundary with Mexico (NIB). The North Cocopah Indian Reservation receives water diverted from wells (AEW-15 and AEW-16 for Doug Mellon Farms and Cocopah Bend RV). The primary uses of water are for irrigation and a recreational vehicle park. The Cocopah Indian Tribe has an entitlement to a diversion of up to 10,847 acre-feet pursuant to the Supreme Court Decree (present perfected right [PPR] Nos. 1 and 8).

BCOO does not calculate a consumptive use value for the individual areas that make up the Cocopah Indian Reservation, but calculates a consumptive use for the whole of the Cocopah Indian Reservation only. For the purpose of providing a baseline from which other options can be compared, this report calculates the consumptive use of the North Cocopah Indian Reservation as the diversion of water from wells reported in the 2002 Decree Accounting Report (2,296 acre-feet), less 34 percent of the diversion from wells as return flow.

Ansel Hall (now Gary and Barbara Pasquinelli)

Ansel Hall is listed as a river pump (ADP-05) in the Arizona supplemental tabulation section in the Decree Accounting Report. Ansel Hall is located in the northwest part of the Yuma Valley, just south of the North Cocopah Indian Reservation and upstream of NIB. Ansel Hall is an area of 80 acres according to "Pumped Diversions from the Colorado River and Adjacent Floodplain Davis Dam to International Boundary 2002" provided to Reclamation by USGS. Ansel Hall has a Colorado River water delivery contract for the annual diversion of up to 486 acre-feet.

BCOO calculates consumptive use for Ansel Hall as the diversion from ADP-05 (reported by USGS), less 35 percent of the diversion by ADP-05.

Pete Power

Pete Power is listed as two river pumps (ADP-03 and ADP-04) in the Arizona supplemental tabulation section in the Decree Accounting Report. Pete Power is an area of 215 acres, immediately east of the North Cocopah Indian Reservation and upstream of NIB, according to "Pumped Diversions from the Colorado River and Adjacent Floodplain Davis Dam to International Boundary 2002" provided to

Reclamation by USGS. Pete Power has a PPR (PPR No. 7) for the annual diversion of up to 960 acre-feet.

BCOO calculates consumptive use for Pete Power as the sum of the diversions from ADP-03 and ADP-04 (reported by USGS), less 35 percent of the sum of the diversions by ADP-03 and ADP-04.

Curry Family LTD (formerly Armon Curtis)

Curry Family LTD is listed as two river pumps (ADP-02 and AEP-04) in the Arizona supplemental tabulation section in the Decree Accounting Report. Curry Family LTD is an area of 45 acres, immediately east of Pete Power and upstream of NIB, according to "Pumped Diversions from the Colorado River and Adjacent Floodplain Davis Dam to International Boundary 2002" provided to Reclamation by USGS. Curry Family LTD has a contract in the name of Armon Curtis for the annual diversion of up to 300 acre-feet.

BCOO calculates consumptive use for Curry Family LTD as the sum of the diversions from ADP-02 and AEP-04 (reported by USGS), less 35 percent of the sum of the diversions by ADP-02 and AEP-04.

Amigo Farms (Bureau of Land Management Agricultural Lease)

Amigo Farms is listed as one well (AEW-14) and one river pump (ADP-01) in the Arizona supplemental tabulation section in the Decree Accounting Report. Amigo Farms is an area of 55 acres, immediately east of Curry Family LTD and upstream of NIB, according to "Pumped Diversions from the Colorado River and Adjacent Floodplain Davis Dam to International Boundary 2002" provided to Reclamation by USGS. Amigo Farms is a Bureau of Land Management (BLM) agricultural lease and has no entitlement to Colorado River water for irrigation purposes.

BCOO calculates consumptive use for Amigo Farms as the sum of the diversions from AEW-14 and ADP-01 (reported by USGS), less 35 percent of the sum of the diversions by AEW-14 and ADP-01.

Phillips Present Perfected Right Area

The Phillips present perfected right area (PPR #19) is a 7-acre area immediately west of the city of Yuma present perfected right area (PPR #21). The Phillips present perfected right area is not included in the 2002 Decree Accounting Report because no water use report was made to Reclamation for this area. Available maps of satellite imagery suggest that this area currently is not under development.

PPR #19 is a diversion right of 42 acre-feet in the name of Milton and Jean Phillips. Arizona has recommended Milton and Jean Phillips for an additional 18 acre-feet of fourth priority water, over and above their PPR entitlement.

City of Yuma

The City of Yuma is a large municipality and the major population center in the Yuma area. The city receives its water as diversions from Imperial Dam, through both the All American and Gila Gravity Main Canals. YAO reports diversions by the City of Yuma. Measured return flows are from a sewage treatment plant. Unmeasured return flows are from the following: (1) the difference between the delivery to the City of Yuma from the Yuma Main Canal (a branch of the All American Canal) and the delivery by the City of Yuma to municipal water storage and (2) the canal loss distribution from the All American Canal. The City of Yuma has an annual entitlement to the consumptive use of up to 50,000 acre-feet, part of which is a PPR for 2,333 acre-feet of diversion.

The Current Method calculates the consumptive use by the City of Yuma as the combined diversions from the All American and Gila Main Gravity Canals, less measured return flow from the sewage treatment plant, less unmeasured return flow from the canal loss distributions for the All American Canal, less unmeasured return flow from delivery losses to municipal storage.

Yuma Area Office

The Yuma Area Office is an office of the Bureau of Reclamation. YAO is located at the northwest end of the Yuma Valley, just south of the North Cocopah Indian Reservation, and upstream of NIB. YAO diverts water from the Main Outlet Drain Extension (MODE) (pumped irrigation drainage from the Wellton-Mohawk Irrigation and Drainage District) and treats this water for domestic use. YAO does not have an entitlement to divert and use Colorado River water.

YAO reports to BCOO the amount of water it diverts from the MODE. The 2002 Decree Accounting Report does not credit YAO any measured or unmeasured return flow; therefore, the Current Method considers the consumptive use by YAO to be equal to the diversion by YAO from the MODE.

Yucca Power Plant (Arizona Public Service Company)

The Yucca Power Plant is an electrical generating plant located at the northwest end of the Yuma Valley, south and west of YAO, and upstream of NIB. The Arizona Public Service Company has a contract for the annual diversion of up to 1,500 acre-feet of fifth and sixth priority water. Yucca Power Plant is listed as one well in the Arizona supplemental tabulation section in the Decree Accounting Report. The 2002 Decree Accounting Report does not credit the Yucca Power

Plant with any measured return flow, but does credit the plant with an unmeasured return flow equal to 35% of the diversion (amount of water pumped by their well).

Yuma County Water Users Association

The Yuma County Water Users Association (YCWUA) is a collection of landowners, organized as an association, that encompasses the majority of the Yuma Valley both upstream of and downstream from NIB. YCWUA receives water from the Yuma Main Canal and from wells that pump from the flood plain within its boundaries. YCWUA uses drainage wells to control ground-water levels within the irrigation district. Discharge from the drainage wells enters either the Colorado River upstream of NIB, or the open drainage system within the district. The flow in the open drainage system becomes the majority of the delivery to Mexico at the southerly international land boundary near San Luis, Arizona (SIB). Excess water in YCWUA's delivery system is discharged (canal spills) to the river channel in the Limitrophe section of the Colorado River downstream from NIB, and to SIB, where it is combined with drainage flows and water pumped by the Protective and Regulatory Pumping Unit (also known as 242 wells) and delivered to Mexico. YCWUA also makes deliveries to the following water users outside of its boundaries: Yuma Union High School, West Cocopah Indian Reservation, city of Yuma Main Plant and Co-generation Plant, Smucker Park, and the golf course. YCWUA has a PPR for the annual diversion of up to 254,200 acre-feet and also has unquantified water right certificates.

YAO reports diversions made by YCWUA at Imperial Dam to BCOO, drainage flows returned to the Colorado River upstream of NIB, and drainage flows that arrive at the Boundary Pumping Plant at SIB. The International Boundary and Water Commission, United States Section, Yuma, Arizona, reports canal spills delivered to the Limitrophe section. BCOO calculates consumptive use as reported diversions at Imperial Dam, less deliveries to others outside the YCWUA boundary, less return flows to the Colorado River upstream of NIB, less drainage flows that arrive at the Boundary Pumping Plant, less canal spills delivered to the Limitrophe section, less measured and unmeasured return flows from canal loss distributions (Gila Gravity and Yuma Main Canals), and additional unmeasured return flow calculated as 2.1 percent of YCWUA's diversion at Imperial Dam.

Yuma Mesa Irrigation and Drainage District

The Yuma Mesa Irrigation and Drainage District (YMIDD) occupies a substantial portion of the Yuma Mesa, just east of YCWUA. YMIDD receives water from the Gila Gravity Main Canal. YAO reports diversions made by YMIDD at Imperial Dam to BCOO. YMIDD makes deliveries outside of its boundaries to the Yuma Marine Corps Air Station (air station), city of Yuma (diversion at Imperial Dam from the Gila Gravity Main Canal), the Southern Pacific Company,

the Yuma Mesa Fruit Growers Association, Desert Lawn Memorial, the Parker-Davis Project (Gila substation), the Unit B Irrigation and Drainage District (Unit B), the University of Arizona Agricultural Test Station (University of Arizona), and Camille, Allec. Jr.; as well as deliveries to the Far West Municipal Water District (Far West) within YMIDD boundaries. YMIDD shares an annual entitlement to Colorado River water with the North Gila Valley Irrigation District and Yuma Irrigation District for a combined consumptive use not to exceed 250,000 acre-feet

BCOO calculates measured return flow as 85 percent of the water returned to the Colorado River upstream of NIB by the Yuma Mesa Outlet Drain near Yuma, plus 85 percent of the water pumped by the Pumping and Regulatory Pumping Unit and delivered to Mexico at SIB (or to diverters in the United States within 5 miles of SIB). BCOO also credits YMIDD with unmeasured return flow from the Gila Gravity Main Canal loss distribution as well as 16 percent of the diversion at Imperial Dam. The unmeasured return flow calculated as 16 percent of the diversion at Imperial Dam is effectively eliminated when the water returned to the Colorado River upstream of NIB from drainage pumping by the Drainage Pump Outlet channels is subtracted from the sum of unmeasured return flows from the whole of the Yuma Mesa Division; therefore, this unmeasured return flow is not used in the analysis of the options presented in this report.

BCOO calculates consumptive use for YMIDD as the diversions at Imperial Dam, less deliveries to others, less measured return flows from the Yuma Mesa Outlet Drain and Protective and Regulatory Pumping Unit, less unmeasured return flows from Gila Gravity Main Canal loss distribution.

Far West Municipal Water District

Far West is a municipal distributor of water. It receives water from and is located within YMIDD. Far West also pumps water from wells within its district boundaries. The 2002 Decree Accounting Report does not identify Far West as a separate diverter and includes its use of water diverted from the Colorado River at Imperial Dam in the values reported for diversion and consumptive use by YMIDD. Far West does not have a Colorado River water entitlement of its own, but operates within the YMIDD entitlement.

Unit B Irrigation and Drainage District

Unit B is a small irrigation district located on the Yuma Mesa, west of YMIDD and south of the Yuma Marine Corps Air Station. Unit B receives water from the Gila Gravity Main Canal through YMIDD facilities. Unit B has a contract for an unquantified amount of water as may be reasonably required and beneficially used for the irrigable lands within the district. Individual water right certificates

are the basis of the water right for the district. Unit B's water entitlement includes a PPR for 6,800 acre-feet per year.

YAO reports to BCOO diversions at Imperial Dam. BCOO calculates measured return flow as 15 percent of the water pumped for irrigation drainage and returned to the Colorado River upstream of NIB by the Yuma Mesa Outlet Drain near Yuma, plus 15 percent of the water pumped by the Pumping and Regulatory Pumping Unit and delivered to Mexico at SIB (or to diverters in the United States within 5 miles of SIB). BCOO also credits Unit B with unmeasured return flow from the Gila Gravity Main Canal loss distribution and 10.1 percent of the diversion at Imperial Dam.

BCOO calculates consumptive use for Unit B as the diversions at Imperial Dam, less deliveries to others, less measured return flows from the Yuma Mesa Outlet Drain and Protective and Regulatory Pumping Unit, less unmeasured return flows from Gila Gravity Main Canal loss distribution, less 10.1 percent of the diversion at Imperial Dam.

Hillander "C" Irrigation District

The Hillander "C" Irrigation District (Hillander "C") is a small district located on the Yuma Mesa south of YMIDD and just north of SIB. Hillander "C" receives water from the wells within its boundaries and has, in the past, received water from the Protective and Regulatory Pumping Unit. It has no entitlement to Colorado River water.

The 2002 Decree Accounting Report does not include the use of water by Hillander "C," but it is considered to be included in the calculation of consumptive use for YMIDD.

University of Arizona Agricultural Test Station

The University of Arizona agricultural test station is a small irrigated area immediately north of Unit B. The University of Arizona receives water diverted at Imperial Dam and delivered by Unit B. The University of Arizona has an annual entitlement for the diversion of up to 1,088 acre-feet of Colorado River water.

YAO reports to BCOO the University of Arizona's diversion at Imperial Dam. There is no measured return flow reported in the calendar year 2002 Decree Accounting Report. BCOO credits the University of Arizona with 50 percent of the diversion at Imperial Dam as unmeasured return flow.

BCOO calculates consumptive use for the University of Arizona as the diversion at Imperial Dam, less 50 percent of the diversion at Imperial Dam.

West Cocopah Indian Reservation

The West Cocopah Indian Reservation is an area of land in the Limitrophe section between the international boundary and the west boundary of YCWUA. The West Cocopah Indian Reservation receives its water from wells and deliveries of water diverted from the Colorado River at Imperial Dam from YCWUA. YCWUA reports the surface deliveries to YAO monthly, and YAO submits this information to BCOO for inclusion in Decree Accounting Reports. USGS reports the amounts of water pumped from wells.

BCOO calculates a consumptive use for the whole of the Cocopah Indian Reservation only. For the purpose of providing a baseline from which other options can be compared, this report calculates the consumptive use of the West Cocopah Indian Reservation as the diversion of water from wells reported in the 2002 Decree Accounting Report (10,191 acre-feet), plus the reported diversion of water at Imperial Dam (3,593 acre-feet), less 34 percent of the sum of diversions from wells and at Imperial Dam (0.34* [10,191+3,593]) as return flow.

East Cocopah Indian Reservation

The East Cocopah Indian Reservation is a small domestic area and a casino. The East Cocopah Indian Reservation receives water from one well (capable of pumping 110 gallons per minute) which serves 77 residences, and two wells which serve the casino. The reservation disposes wastewater through the use of septic tanks, two lined evaporation ponds, and one unlined pond. The 2002 Decree Accounting Report does not include water use from this area.

Fort Yuma Indian Reservation Homesteads

The Fort Yuma Indian Reservation homesteads are two small irrigated areas located in the Yuma Valley within the exterior boundaries of YCWUA. The homesteads receive their water from YCWUA based upon water right certificates. The 2002 Decree Accounting Report does not individually identify the water use from the homesteads, but includes this use in the calculation of diversion and consumptive use for YCWUA.

Yuma Marine Corps Air Station

The Yuma Marine Corps Air Station is a military base on the Yuma Mesa within the exterior boundaries of YMIDD near the north end of the district. The water use is domestic. The air station receives water diverted from the Colorado River at Imperial Dam, delivered by YMIDD, and from wells. The air station has an annual entitlement for the diversion of up to 3,000 acre-feet of Colorado River water.

YAO reports diversions to BCOO. The 2002 Decree Accounting Report does not credit the air station with any measured return flow. BCOO credits the air station with 21 percent of the reported diversion as unmeasured return flow.

BCOO calculates consumptive use for the air station as the diversion at Imperial Dam, less 21 percent of the diversion at Imperial Dam.

City of Gadsden

The City of Gadsden is a small municipality within the exterior boundaries of YCWUA, toward the southwest quarter of the Yuma Valley. The water use is domestic. The City of Gadsden receives its water from wells within the municipal boundaries. The city has no entitlement for the diversion and consumptive use of Colorado River water. The 2002 Decree Accounting Report does not individually identify the water use from the City of Gadsen, but it is believed to be included in the calculation of consumptive use for YCWUA.

City of Somerton

The City of Somerton is a small municipality within the exterior boundaries of YCWUA, toward the middle of the southern third of the Yuma Valley. The water use is domestic. Somerton receives its water from wells within the municipal boundaries. The city has no entitlement for the diversion and consumptive use of Colorado River water. Reclamation is currently negotiating a Colorado River water delivery contract with Somerton for 750 acre feet per year. This water will be delivered through the Yuma County Water Users Association's water delivery system.

The 2002 Decree Accounting Report does not individually identify water use from Somerton, but it is believed to be included in the calculation of consumptive use for YCWUA.

City of San Luis, Arizona

The City of San Luis, Arizona, is a small municipality on the Yuma Mesa immediately north of SIB. (It has a much larger sister city in Mexico referred to as San Luis, Sonora.) The water use is domestic. San Luis, Arizona receives its water from wells within its municipal boundaries. The city pumped 711,990,835 gallons (2,185 acre-feet) in 2002. The city has no entitlement for the diversion and consumptive use of Colorado River water.

The 2002 Decree Accounting Report does not report the water use by San Luis, Arizona, but it is believed to be included in the calculation of combined consumptive use for YMIDD and YCWUA.

Arizona State Prison

The Arizona State Prison is a small facility on the Yuma Mesa about equidistant between the southern boundary of YMIDD, at the beginning of the 5-mile zone and SIB, to the east of Hillander "C." The water use is domestic. The prison receives its water from wells within the facility boundaries. The Arizona State Prison pumped 146,521,700 gallons (450 acre-feet) in 2002. The prison has no entitlement for the diversion and consumptive use of Colorado River water.

The 2002 Decree Accounting Report does not report the water use from the prison, but it is believed to be included in the calculation of consumptive use for YMIDD.

Bureau of Land Management Agricultural Leases Downstream from Morelos Dam

These are irrigated lands in the Limitrophe section of the Colorado River between the west boundary of YCWUA and the Limitrophe and southerly international boundary with Mexico. BLM administers most, if not all, of these lands, and leases these lands to farmers. These lands receive water from wells. BLM has no entitlement for the diversion and consumptive use of Colorado River water for agricultural leases. The 2002 Decree Accounting Report reports volumes of water pumped from, some but possibly not all, wells in this area.

BLM agricultural leases downstream from Morelos Dam include the following well pumpers (name [well no.]):

1. Burrell (ADW-05)
2. Jim Cuming (AEW-32)
3. Jim Cuming (ADW-09)
4. J. Barkley (ADW-10)
5. Roger S. Brown (ADW-11)
6. Earl Hughs (AEW-33)

Irrigated Lands Upon the Yuma Mesa South of YMIDD

There are irrigated lands upon the Yuma Mesa, both within YMIDD and between the southerly and easterly boundaries of YMIDD and the 5-mile zone[7] along SIB. These lands are irrigated with wells and primarily use the center pivot method of irrigation. The 2002 Decree Accounting Report does not report water use in this

[7] The 5-mile zone is an area within which ground-water pumping by either the United States or Mexico is limited to 160,000 acre-feet annually by international treaty. The 5-mile zone parallels the southerly international boundary with Mexico and extends from the southerly international boundary a distance of 5 miles in each country.

area, but it is considered to be included in the value of consumptive use reported for YMIDD.

Hydrologic Impacts

There are no specific hydrologic impacts from the Current Method because this option forms the basis for the quantifying the hydrologic impacts for the Arizona Preferred Option. The Current Method represents the status quo. The consumptive uses identified in the Current Method represent the consumptive uses that are currently charged against the 2.8 million acre-foot apportionment available to Arizona. Table 3 presents the consumptive use values the Current Method calculated for each diverter in calendar year 2002.

Table 3 - Consumptive use values (calendar year 2002) for each diverter: Current Method (annual acre-feet)	
Diverter	Consumptive use
North Cocopah Indian Reservation	1,515
Ansel Hall (now Gary and Barbara Pasquinelli)	325
Pete Powers	874
Curry Family LTD (formerly Armon Curtis)	183
Amigo Farms	224
Phillips Present Perfected Right area	0
City of Yuma	18,036
Yuma Area Office	850
Yucca Power Plant (Arizona Public Service Company)	602
Yuma County Water Users Association (includes the Fort Yuma Indian Reservation homesteads)	232,006
Wells reported as part of the Yuma County Water Users Association diversion	926
Wells reported separately within (and charged to) the Yuma County Water Users Association [name (well no.) – annual acre-feet pumped) Glen Curtis Citrus (AEW-17) – 2 Glen Curtis Citrus (AEW-18) – 37 Glen Curtis Citrus (AEW-19) – 27 Waymon Farms (AEW-28) – 1,285 Waymon Farms (AEW-29) – 1,383	1,777
Yuma Mesa Irrigation and Drainage District (includes Far West)	159,168
Far West Municipal Water District (delivered by YMIDD, included in YMIDD diversion and consumptive use)	Included in YMIDD
Unit B Irrigation and Drainage District	11,802
Hillander "C" Irrigation District	Not reported
University of Arizona Agricultural Test Station	377
West Cocopah Indian Reservation	9,023
East Cocopah Indian Reservation	Not reported
Yuma Marine Corps Air Station	1,823
City of Gadsden	Not reported
City of Somerton	Not reported
City of San Luis, Arizona	Not reported
Arizona State Prison	Not reported
Bureau of Land Management agricultural leases downstream from Morelos Dam [name (well no.) – annual acre-feet pumped] Burrell (ADW-05) – 219 Jim Cuming (AEW-32) - 588 Jim Cuming (ADW-09) – 1,219 J. Barkley (ADW-10) – 531 Roger S. Brown (ADW-11) – 813 Earl Hughs (AEW-33) – 312	2,393
Irrigated lands upon the Yuma Mesa south of YMIDD	Not reported?
Total	441,904

Entitlement Management Impacts

Calculated consumptive use is greater under the Current Method than it would be under the Arizona Preferred Option. For example, the sum of consumptive uses in the Yuma, Arizona area downstream from Morelos Dam is 7,226 acre-feet more under the current Method than it would be if calculated under the Arizona Preferred Option (Table 4) for calendar year 2002. Accordingly, the risk is greater under the Current Method than under the Arizona Preferred Option that the remaining amount of unallocated fourth priority water would be insufficient to provide valid water entitlements to cover all current water uses without entitlements.

Using the unallocated Arizona fourth priority water to establish valid water entitlements to these diverters downstream from Morelos Dam would obligate some of this unallocated water, leaving less water available to satisfy other requests, including the request on file from the Navajo Nation for all unallocated Arizona fourth priority water. Reclamation would need to use some of the unallocated Arizona fourth priority water to offer water delivery contracts to diverters, such as BLM and Waymon Farms, who currently do not have contracts and are diverting water below Morelos Dam. If insufficient fourth priority water is available to allocate and contract with current water users without entitlements, greater emphasis on conducting discussions with existing entitlement holders would be required to try to convince them to use part of their existing entitlement to cover current water users without entitlements. Existing entitlement holders may resist assuming this responsibility if they are not offered increases in their entitlements to serve those additional water uses

Pros

The Current Method would not require changes to the methods currently used by the Decree Accounting Report, other than the refining of methods as additional data and information become available. Implementation would be very quick, and no additional information or data would be required for historical users of the report. This option would require minimal entitlement management changes, such as entering into a contract with BLM and Waymon Farms.

Cons

The Current Method accounts for the use of some portion of the water consumed in the Yuma area twice. This "double accounting" occurs where the amount of water pumped by wells---in areas where ground water is flowing into Mexico downstream from NIB without credit to the United States as deliveries according to treaty---is accounted for as a diversion. However, this diversion is not credited to the entity that recharged the ground water (from diversions from the Colorado River) with a return flow equal to the amount of water pumped by wells. Also,

the Current Method historically has been inconsistent regarding wells that should, or should not, be included in the Decree Accounting Report, as well as the requirement for wells to have entitlements to divert and use Colorado River water. This deficiency can, however, be corrected.

Arizona Preferred Option

This section describes the Arizona Preferred Option and the resultant consumptive use calculations for each diverter, shows entitlement management impacts by comparison to the Current Method, and provides pros and cons of the Arizona Preferred Option.

Description

The Arizona Preferred Option considers the "mainstream" to include (1) the surface channel of the Colorado River (2) the Colorado River flood plain upstream of NIB, and 3) the portion of the Yuma Mesa underneath which groundwater flows north or northwest toward the Colorado River above NIB. The Arizona Preferred Option effectively considers only a diversion of water that would otherwise reach NIB to be a diversion of Colorado River water. Therefore, the Arizona Preferred Option considers a diversion of Colorado River water to consist only of water diverted from the main channel of the Colorado River and diversions from wells on the Colorado River flood plain where ground water can be reasonably assumed to flow toward the Colorado River upstream of NIB.

The Arizona Preferred Option does not consider the pumping of wells from the flood plain or underlying aquifer downstream from NIB to be diversions of Colorado River water, where the groundwater can be reasonably assumed to be flowing toward Mexico from the groundwater mound beneath the Yuma Mesa and, therefore, not to be flowing toward the Colorado River upstream of NIB. The location map entitled, "Yuma Accounting, Arizona Preferred Option Location Map" shows all the diverters considered in this paper, with the diverters crosshatched within which wells were included in the accounting of water in the Current Method, but which are not included in the Arizona Preferred Option. The reader should note that, in addition to the crosshatched areas shown on the location map for the Arizona Preferred Option, new or existing wells located in the southern portion of the Yuma Mesa I&DD, Unit B I&DD, the University of Arizona Test Station, and the portion of the Yuma County Water Users Association below NIB from which groundwater flows to the south and west away from NIB would also not be included in Decree Accounting under the Arizona Preferred Option.

Because the Arizona Preferred Option is primarily concerned with surface water use in the Yuma area, the Arizona Preferred Option generally uses the same methods to calculate consumptive as the Current Method. Because the Arizona Preferred Option does not consider the pumping of wells downstream from NIB

where the groundwater can be reasonably assumed to be flowing toward Mexico to be diversions of Colorado River water, the Arizona Preferred Option does not credit diverters downstream from NIB with unmeasured return flow, with the exception of YCWUA, which irrigates lands both upstream and downstream from NIB. Any changes or updates to unmeasured return flow coefficients used by the Arizona preferred method would change the resultant values of consumptive use, but the concepts presented here would remain the same. The calculations used by the Arizona Preferred Option to compile diversions, measured returns, and unmeasured returns for the diverters, listed below, are shown in Appendix II.

Under the Arizona Preferred Option, Reclamation would need to monitor water levels to determine if the regional ground-water gradients indicate that ground-water development downstream from NIB would deplete the Colorado River upstream of NIB. Should Reclamation make a preliminary determination that ground-water development downstream from NIB is depleting the Colorado River upstream of NIB, Reclamation will change the methods used to account for the diversion and consumptive use of Colorado River water in the Yuma area to reflect the changed hydrologic conditions.

North Cocopah Indian Reservation

The calculation for diversion and consumptive use by the North Cocopah Indian Reservation is the same as for the Current Method.

Ansel Hall (now Gary and Barbara Pasquinelli)

The calculation for diversion and consumptive use by Ansel Hall is the same as for the Current Method.

Pete Power

The calculation for diversion and consumptive use by Pete Power is the same as for the Current Method.

Curry Family LTD (formerly Armon Curtis)

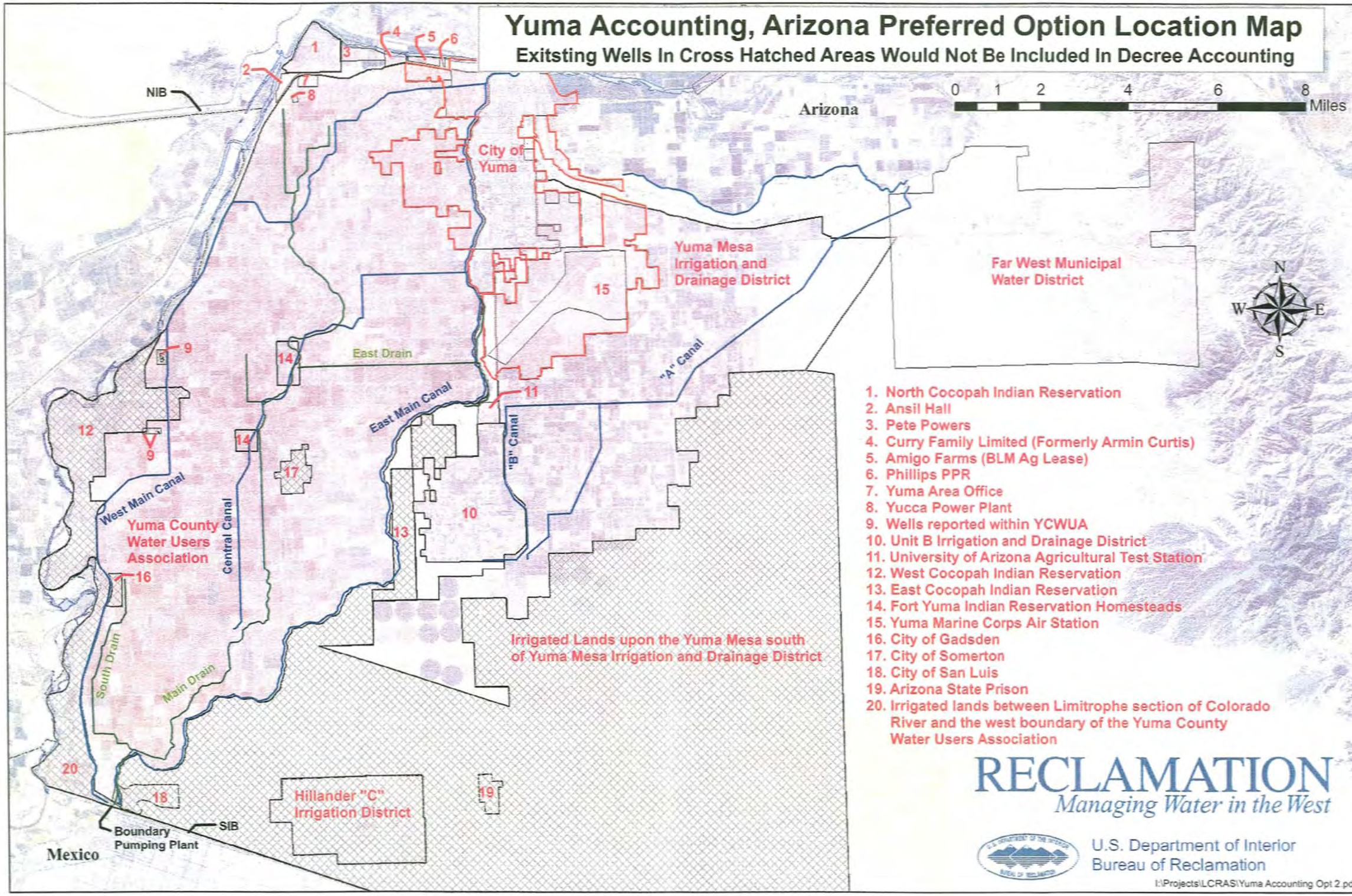
The calculation for diversion and consumptive use by Curry Family LTD is the same as for the Current Method.

Amigo Farms (BLM Agricultural Lease)

The calculation for diversion and consumptive use by Amigo Farms is the same as for the Current Method.

Yuma Accounting, Arizona Preferred Option Location Map

Exitsting Wells In Cross Hatched Areas Would Not Be Included In Decree Accounting



1. North Cocopah Indian Reservation
2. Ansil Hall
3. Pete Powers
4. Curry Family Limited (Formerly Armin Curtis)
5. Amigo Farms (BLM Ag Lease)
6. Phillips PPR
7. Yuma Area Office
8. Yucca Power Plant
9. Wells reported within YCWUA
10. Unit B Irrigation and Drainage District
11. University of Arizona Agricultural Test Station
12. West Cocopah Indian Reservation
13. East Cocopah Indian Reservation
14. Fort Yuma Indian Reservation Homesteads
15. Yuma Marine Corps Air Station
16. City of Gadsden
17. City of Somerton
18. City of San Luis
19. Arizona State Prison
20. Irrigated lands between Limitrophe section of Colorado River and the west boundary of the Yuma County Water Users Association

RECLAMATION
Managing Water in the West

U.S. Department of Interior
Bureau of Reclamation

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Phillips Present Perfected Right Area

The calculation for diversion and consumptive use by the Phillips Present Perfected Right area is the same as for the Current Method.

City of Yuma

The calculation for diversion and consumptive use by the City of Yuma is the same as for the Current Method.

Yuma Area Office

The calculation for diversion and consumptive use by YAO is the same as for the Current Method.

Yucca Power Plant (Arizona Public Service Company)

The calculation for diversion and consumptive use by the Yucca Power Plant is the same as for the Current Method.

Yuma County Water Users Association

The Arizona Preferred Option calculates YCWUA's consumptive use as the reported diversions at Imperial Dam, less deliveries to others outside the district boundaries, less return flows to the Colorado River upstream of NIB, less return flows delivered to the Boundary Pumping Plant at SIB, less canal spills delivered to the Limitrophe section, less measured and unmeasured return flows from canal loss distributions (Gila Gravity and Yuma Main Canals), and additional unmeasured return flow calculated as 2.1 percent (or other value as may be found appropriate) of YCWUA's diversion at Imperial Dam.

The Arizona Preferred Option does not consider the water withdrawn from wells within the boundaries of the district downstream from NIB where the groundwater can be reasonably assumed to be flowing toward Mexico to be diversions of Colorado River water. Therefore, the Arizona Preferred Option ignores the water pumped by wells downstream from NIB where the groundwater can be reasonably assumed to be flowing toward Mexico for accounting purposes, unlike the Current Method, which does consider some ground-water pumping within the district's boundaries to be diversions of Colorado River water.

Yuma Mesa Irrigation and Drainage District

The Arizona Preferred Option calculates diversion and consumptive use by YMIDD substantially the same as for the Current Method. The Arizona Preferred Option calculates consumptive use for YMIDD as the diversion at Imperial Dam less, 85 percent of the water returned to the Colorado River upstream of NIB by the Yuma Mesa Outlet Drain and 85 percent of the water pumped by the Protective and Regulatory Pumping Unit which is delivered to Mexico at the SIB (or to diverters in the United States within 5 miles of SIB). The Arizona Preferred Option does not credit YMIDD with unmeasured return flow calculated as a percentage of its diversion at Imperial Dam for this paper. The consumptive use calculated for the YMIDD includes the consumptive use by Far West.

Far West Municipal Water District

The consumptive use of Far West is included within the consumptive use calculated for YMIDD.

Unit B Irrigation and Drainage District

The Arizona Preferred Option calculates consumptive use by Unit B the same as for the Current Method, except that the Arizona Preferred Option does not credit Unit B with unmeasured return flow calculated as a percentage of its diversion at Imperial Dam. The Arizona Preferred Option does give Unit B return flow credit for 15 percent of the pumping from the Protective and Regulatory Pumping Unit that is delivered to Mexico at the SIB (all pumping from the Protective and Regulatory Pumping Unit was delivered to Mexico in calendar year 2002).

Hillander "C" Irrigation District

The Arizona Preferred Option does not consider the withdrawal of water from wells by Hillander "C" or the delivery of water to the district by the Protective and Regulatory Pumping Unit to be diversions of Colorado River water for accounting purposes. Only water diverted from the Colorado River upstream of NIB which might be delivered to Hillander "C" would be considered a diversion and use of Colorado River water.

University of Arizona Agricultural Test Station

The Arizona Preferred Option calculates consumptive use as the diversion for the University of Arizona Agricultural Test Station at Imperial Dam. Unlike the Current Method, the Arizona Preferred Option does not credit the University of Arizona with any measured or unmeasured returns flow.

West Cocopah Indian Reservation

The Arizona Preferred Option considers only the water diverted from the Colorado River at Imperial Dam (or elsewhere) and delivered by YCWUA (or others as may come to pass) as a diversion and use of Colorado River water. Unlike the Current Method, the Arizona Preferred Option does not credit the West Cocopah Indian Reservation with any measured or unmeasured return flow; therefore, the Arizona Preferred Option calculates consumptive use for the West Cocopah Indian Reservation as equal to the delivery to the West Cocopah Indian Reservation of water diverted at Imperial Dam (or elsewhere from the Colorado River above NIB).

East Cocopah Indian Reservation

The Arizona Preferred Option does not consider the withdrawal of water from wells by the East Cocopah Indian Reservation to be diversions of Colorado River water for accounting purposes. Only water diverted from the Colorado River upstream of NIB that might be delivered to the East Cocopah Indian Reservation would be considered a diversion and use of Colorado River water.

Fort Yuma Indian Reservation Homesteads

The Arizona Preferred Option considers only the water diverted at Imperial Dam (or elsewhere from the Colorado River above NIB) and delivered by YCWUA (or others as may come to pass) as a diversion and use of Colorado River water. The Arizona Preferred Option does not credit Fort Yuma Indian Reservation homesteads with any measured or unmeasured return flow. Therefore, unlike the Current Method, the Arizona Preferred Option calculates consumptive use for the Fort Yuma Indian Reservation homesteads as equal to their delivery of water diverted at Imperial Dam. As of this writing, Reclamation estimates 2,137 acre-feet of water was diverted at Imperial Dam and delivered by YCWUA to the Fort Yuma Indian Reservation homesteads in calendar year 2002.

Yuma Marine Corps Air Station

The Arizona Preferred Option considers only the water diverted at Imperial Dam (or elsewhere from the Colorado River above NIB) and delivered by YMIDD (or others as may come to pass) to the Yuma Marine Corps Air Station as a diversion and use of Colorado River water. The Arizona Preferred Option does not credit the air station with any measured or unmeasured return flow; therefore, the Arizona Preferred Option calculates consumptive use for the air station as equal to

its delivery of water diverted at Imperial Dam, which is the same as the Current Method.

City of Gadsden

The Arizona Preferred Option does not consider the withdrawal of water from wells by the city of Gadsden to be diversions of Colorado River water for accounting purposes. The Arizona Preferred Option considers only the water diverted from the Colorado River at Imperial Dam (or elsewhere from the Colorado River above NIB) and delivered by YCWUA (or others as may come to pass) to the city as a diversion and use of Colorado River water. Consumptive use would be calculated as the amount of Colorado River water diverted for the city of Gadsden, less the amount of water of diverted water that returned to the Colorado River and became available for use in the United States or in satisfaction of the Mexican water treaty (including diverted Colorado River water that was delivered to Mexico at SIB at the land boundary near San Luis, Arizona).

City of Somerton

The Arizona Preferred Option does not consider the withdrawal of water from wells by the city of Somerton to be diversions of Colorado River water for accounting purposes. The Arizona Preferred Option considers only the water diverted from the Colorado River at Imperial Dam (or elsewhere from the Colorado River above NIB) and delivered by YCWUA (or others as may come to pass) to the city as a diversion and use of Colorado River water. Consumptive use would be calculated as the amount of Colorado River diverted for the city, less the amount of water of diverted water that returned to the Colorado River and became available for use in the United States or in satisfaction of the Mexican water treaty (including diverted Colorado River water that was delivered to Mexico at SIB at the land boundary near San Luis, Arizona).

City of San Luis, Arizona

The Arizona Preferred Option does not consider the withdrawal of water from wells by the city of San Luis, Arizona, to be diversions of Colorado River water for accounting purposes. The Arizona Preferred Option considers only the water diverted from the Colorado River at Imperial Dam (or elsewhere from the Colorado River above NIB) and delivered by YCWUA (or others as may come to pass) to the city as a diversion and use of Colorado River water. Consumptive use would be calculated as the amount of Colorado River diverted for the city of San Luis, Arizona, less the amount of water of diverted water that returned to the Colorado River and became available for use in the United States or in

satisfaction of the Mexican water treaty (including diverted Colorado River water that was delivered to Mexico at SIB at the land boundary near San Luis, Arizona).

Arizona State Prison

The Arizona Preferred Option does not consider the withdrawal of water from wells by the Arizona State Prison to be diversions of Colorado River water for accounting purposes. The Arizona Preferred Option considers only the water diverted from the Colorado River at Imperial Dam (or elsewhere from the Colorado River above NIB) and delivered by YMIDD (or others as may come to pass) to the prison as a diversion and use of Colorado River water. Consumptive use would be calculated as the amount of Colorado River diverted for the Arizona State Prison, less the amount of water of diverted water that returned to the Colorado River and became available for use in the United States or in satisfaction of the Mexican water treaty (including diverted Colorado River water that was delivered to Mexico at SIB at the land boundary near San Luis, Arizona).

Bureau of Land Management Agricultural Leases Downstream from Morelos Dam

The Arizona Preferred Option considers only Colorado River water diverted at Imperial Dam (or elsewhere from the Colorado River above NIB) and delivered by YCWUA (or others as may come to pass) as a diversion and use of Colorado River water. Consumptive use would be calculated as the amount of Colorado River diverted for the BLM agricultural leases downstream from Morelos Dam, less the amount of water of diverted water that returned to the Colorado River and became available for use in the United States or in satisfaction of the Mexican water treaty (including diverted Colorado River water that was delivered to Mexico at SIB at the land boundary near San Luis, Arizona).

YCWUA did not deliver any Colorado River water diverted at Imperial Dam (or elsewhere) to the BLM agricultural leases downstream from Morelos Dam in calendar year 2002. Therefore, had the Arizona Preferred Option been in place for Decree accounting in calendar year 2002, the diversion and consumptive use would have been zero.

Irrigated Lands Upon the Yuma Mesa South of the Yuma Mesa Irrigation and Drainage District

The Arizona Preferred Option considers only Colorado River water diverted at Imperial Dam (or elsewhere from the Colorado River above NIB) and delivered by YMIDD (or others as may come to pass) as a diversion and use of Colorado River water. Consumptive use would be calculated as the amount of Colorado River diverted for the irrigated lands upon the Yuma Mesa south of YMIDD, less

the amount of water of diverted water that returned to the Colorado River and became available for use in the United States or in satisfaction of the Mexican water treaty (including diverted Colorado River water that was delivered to Mexico at SIB at the land boundary near San Luis, Arizona).

YMIDD did not deliver any Colorado River water diverted at Imperial Dam (or elsewhere) to irrigated lands upon the Yuma Mesa south of YMIDD in calendar year 2002. Therefore, had the Arizona Preferred Option been in place for Decree accounting in calendar year 2002, the diversion and consumptive use would have been zero.

Hydrologic Impacts

Hydrologic impacts of the Arizona Preferred Option are presented by comparing the consumptive use of each diverter, the sum of the consumptive uses of each diverter, and the differences in these values between the Arizona Preferred Option and the Current Method as shown on table 4. The consumptive uses identified would be charged against the 2.8 million acre-foot apportionment available to Arizona. Therefore, the lower the sum of consumptive uses for the Yuma area, the more water within Arizona's apportionment is available for other entitlement holders in Arizona. Because the sum of the consumptive uses calculated under the Arizona Preferred Option is 7,226 acre-feet less than the consumptive uses calculated under the Current Method for calendar year 2002; if the Arizona Preferred Option been in place for calendar year 2002, entitlement holders in Arizona (with priorities junior to the entitlement holders in the Yuma area) would have had access to 7,226 acre-feet more water annually than was available to them under the Current Method.

Table 4.---Consumptive uses for each diverter under the Arizona Preferred Option and the differences in consumptive use between the Arizona Preferred Option and the Current Method (annual acre-feet)

Diverter	Consumptive Use, Current Method	Consumptive Use, Arizona Preferred Option	Difference Consumptive use Arizona Preferred Option – Current Method
North Cocopah Indian Reservation	1,515	1,515	0
Ansel Hall (now Gary and Barbara Pasquinelli)	325	325	0
Pete Powers	874	874	0
Curry Family LTD (formerly Armon Curtis)	183	183	0
Amigo Farms (BL:M Agricultural lease)	224	224	0
Phillips Present Perfected Right area	0	0	0
City of Yuma	18,036	18,036	0
Yuma Area Office	850	850	0
Yucca Power Plant (Arizona Public Service Company)	602	602	0
Yuma County Water Users Association	232,006	229,914	-2,092
Wells reported as part of YCWUA diversion	926	0	-926
Wells reported separately within (and charged to) the Yuma County Water Users Association [name (well no.) – annual acre-feet of water pumped] Glen Curtis Citrus (AEW-17) – 2 Glen Curtis Citrus (AEW-18) – 37 Glen Curtis Citrus (AEW-19) – 27 Waymon Farms (AEW-28) – 1,285 Waymon Farms (AEW-29) – 1,383	1,777	0	-1,777
Yuma Mesa Irrigation and Drainage District	159,168	159,168	0
Far West Municipal Water District	Included in YMIDD	Included in YMIDD	Included in YMIDD
Unit B Irrigation and Drainage District	11,802	14,314	2,512
Hillander "C" Irrigation District	Not reported	0	0
University of Arizona Agricultural Test Station	377	755	378
West Cocopah Indian Reservation	9,023	3,519	-5,504
East Cocopah Indian Reservation	Not reported	0	0
Fort Yuma Indian Reservation homesteads (located in the Yuma Valley)	Included in YCWUA	2,092	2,092
Yuma Marine Corps Air Station	1,823	2,307	484
City of Gadsden	Not reported	0	0
City of Somerton	Not reported	0	0
City of San Luis, Arizona	Not reported	0	0
Arizona State Prison	Not reported	0	0
Bureau of Land Management Agricultural Leases downstream from Morelos Dam [name (well no.) – annual acre-feet of water pumped] Burrell (ADW-05) – 219 Jim Cuming (AEW-32) - 588 Jim Cuming (ADW-09) – 1,219 J. Barkley (ADW-10) – 531 Roger S. Brown (ADW-11) – 813 Earl Hughs (AEW-33) – 312	2,393	0	-2,393
Irrigated lands upon the Yuma Mesa south of YMIDD	Not reported	0	0
Total	441,904	434,678	-7,226

Entitlement Management Impacts

The sum of the consumptive uses calculated under the Arizona Preferred Option is 7,226 acre-feet less than the consumptive uses calculated under the Current Method for calendar year 2002. Therefore, had the Arizona Preferred Option been in place for calendar year 2002, entitlement holders in Arizona (with priorities junior to the entitlement holders in the Yuma area) would have had access to 7,226 acre-feet more water annually than was available to them under the Current Method. Under the Arizona Preferred Option, the diverters below Morelos Dam where the groundwater can be reasonably assumed to be flowing toward Mexico would not need a contract for pumping water from wells; however, a contract would be needed for surface deliveries. Arizona fourth priority water that is currently uncommitted would not need to be obligated to diverters downstream of Morelos Dam, leaving this 7,226 acre-feet available for the State of Arizona to recommend new or increased deliveries to non-CAP water users along the Colorado River Valley. Some of this water might also be available for commitment to the Navajo Nation or other Indian tribes as part of an Indian water rights settlement.

The Arizona Preferred Option will not require Reclamation to account for the approximately 2,400 acre-feet of groundwater pumping that occurs in the limitrophe section. Not requiring an entitlement for this groundwater pumping preserves 2,400 acre-feet of Arizona fourth priority entitlement that otherwise can be used to help meet the water demand of existing unauthorized uses in Arizona.

Under the Arizona Preferred Option, only 11 diverters would need a Colorado River water delivery contract if they receive deliveries of surface water diverted from the Colorado River. If a diverter's entire water supply is derived through pumping wells, no contract would be needed and the entity should not be listed in the Decree Accounting Report. For example, under this option, Waymon Farms and BLM agricultural leases would not be listed in the Decree Accounting Report and would not need an entitlement. BLM agricultural leases divert up to 3,000 acre-feet below Morelos Dam where the groundwater can be reasonably assumed to be flowing toward Mexico. If the Arizona Preferred Option was in effect it would free up that 3,000 acre-feet of water. However, under the Arizona Preferred Option the Cocopah Indian Tribe could divert additional water from the Colorado River, since what the tribe is diverting from wells below Morelos Dam where the groundwater can be reasonably assumed to be flowing toward Mexico would not be accounted for as Colorado River water.

The sum of consumptive uses under the Arizona Preferred Option is 7,226 acre-feet less than the consumptive use calculated under the Current Method for calendar year 2002. Under the Arizona Preferred Option, the risk would be less than under the Current Method that the remaining amount of unallocated fourth

priority water will be insufficient to provide valid water entitlements to cover all existing water uses without entitlements. Accordingly, the Arizona Preferred Option will require less emphasis on the need to convince existing entitlement holders to use part of their existing entitlements to cover current water users without entitlements.

Pros

The Arizona Preferred Option eliminates the "double accounting" that occurs in the Current Method. This "double accounting" occurs where the amount of water pumped by wells---in areas where ground water is flowing into Mexico downstream from NIB without credit to the United States as deliveries according to treaty---is accounted for as a diversion. However, this diversion is not credited to the entity that recharged the ground water (from diversions from the Colorado River) with a return flow equal to the amount of water pumped by wells. Minimum entitlement management changes would be required.

Cons

Some notification would be required when a diverter pumping from a well receives surface deliveries, because an entitlement would be required to divert and consumptively use Colorado River water. Under the Arizona Preferred Option, Reclamation or Arizona must create a method to monitor water levels to determine if the regional ground-water gradients indicate that ground-water development downstream from NIB would deplete the Colorado River upstream of NIB. Additional ground-water development downstream from NIB could reduce the amount of irrigation drainage arriving at the Boundary Pumping Plant, requiring increased pumping of the Protective and Regulatory Pumping Unit.

Summary of Impacts to Consumptive Use Values When Compared to the Current Method

Table 5 compares the consumptive use values for both options, by diverter and total for the Yuma area calculated by the Current Method and the Arizona Preferred Option. Table 6 compares the pros and cons of each option.

Table 5.---Consumptive use values for the Current Method, and the Arizona Preferred Option by Diverter for the Yuma Area
Units: Annual Acre-Feet

Diverter	Consumptive Use, Current Method	Consumptive Use, Arizona Preferred Option
North Cocopah Indian Reservation	1,515	1,515
Ansel Hall (now Gary and Barbara Pasquinelli)	325	325
Pete Powers	874	874
Curry Family LTD (formerly Armon Curtis)	183	183
Amigo Farms (BLM agricultural lease)	224	224
Phillips Present Perfected Right area	0	0
City of Yuma	18,036	18,036
Yuma Area Office	850	850
Yucca Power Plant (Arizona Public Service Company	602	602
Yuma County Water Users Association	232,006	229,914
Wells reported as part of YCWUA diversion	926	Not reported as a Colorado River water use
Wells reported separately within (and charged to) the Yuma County Water Users Association [name (well no.) – annual acre-feet of water pumped] Glen Curtis Citrus (AEW-17) – 2 Glen Curtis Citrus (AEW-18) – 37 Glen Curtis Citrus (AEW-19) – 27 Waymon Farms (AEW-28) – 1,285 Waymon Farms (AEW-29) – 1,383	1,777	Not Reported as a Colorado River water use
Yuma Mesa Irrigation and Drainage District	159,168	159,168
Far West Municipal Water District	Included in YMIDD	Included in YMIDD
Unit B Irrigation and Drainage District	11,802	14,314
Hillander "C" Irrigation District	Not reported	Consumptive use of surface water only = 0 in 2002)
University of Arizona Agricultural Test Station	377	755
West Cocopah Indian Reservation	9,023	3,519
East Cocopah Indian Reservation	Not reported	Consumptive use of surface water only = 0 in 2002)
Fort Yuma Indian Reservation homesteads (located in the Yuma Valley)	Not reported	2,092
Yuma Marine Corps Air Station	1,823	2,307
City of Gadsden	Not reported	Consumptive use of surface water only = 0 in 2002)
City of Somerton	Not reported	Consumptive use of surface water only = 0 2002)
City of San Luis, Arizona	Not reported	Consumptive use of surface water only
Arizona State Prison	Not reported	Consumptive use of surface water only

Table 5.---Consumptive use values for the Current Method, and the Arizona Preferred Option by Diverter for the Yuma Area
Units: Annual Acre-Feet

Diverter	Consumptive Use, Current Method	Consumptive Use, Arizona Preferred Option
Bureau of Land Management agricultural leases downstream from Morelos Dam [name (well no.) –annual acre-feet of water pumped] Burrell (ADW-05) – 219 Jim Cuming (AEW-32) - 588 Jim Cuming (ADW-09) – 1,219 J. Barkley (ADW-10) – 531 Roger S. Brown (ADW-11) – 813 Earl Hughs (AEW-33) – 312	2,393	Consumptive use of surface water only
Irrigated lands upon the Yuma Mesa south of YMIDD	Not reported	Consumptive use of surface water only
Total	441,904	434,678

Table 6.---Pros and cons of the Current Method, and the Arizona Preferred Option

Current Method	Arizona Preferred Option
Requires no changes to the methods currently used to compile the Decree Accounting Report.	Eliminates "double accounting" in Current Method.
Is quick to implement. Requires no additional information or data for historical users of the Decree Accounting Report. Requires minimal entitlement management changes.	Entitlement holders in Arizona, with priorities junior to the entitlement holders in the Yuma area, would have access to 7,226 acre-feet more water annually than is available to them under the Current Method.
Double accounts for some water use. Has historically been inconsistent regarding wells that should, or should not, be included in the Decree Accounting Report and regarding which diverters require entitlements.	Requires some notification as to when diverters might change from pumping a well which would not require an entitlement, to surface deliveries which would require an entitlement.

Entitlement holders in Arizona, with priorities junior to the entitlement holders in the Yuma area, would have access to 7,226 acre-feet less water annually than is available to them under the Arizona Preferred Option.	This option would allow the Cocopah Indian Tribe to divert additional water from the river, since what the tribe is diverting from wells below Morelos Dam would not be accounted for as Colorado River water. Reclamation or Arizona must create a method to determine when ground-water development exceeds the amount of Colorado River water diverted for use in the Yuma area. Additional groundwater development downstream from NIB could reduce the amount of irrigation drainage arriving at the Boundary Pumping Plant, requiring increased pumping of the Protective and Regulatory pumping Unit, also called 242 wells.

Conclusion and Recommendations

Reclamation and Arizona have concluded that the Arizona Preferred Option best meets the current needs of Arizona and is consistent with Article V of the U.S Supreme Count Decree in *Arizona* v. *California* of March 9, 1964. The Arizona Preferred Option will be implemented with Reclamation's Colorado River Accounting and Water Use Report Arizona, California, and Nevada Calendar Year 2003.

Appendix I

Example Calculation for Both Options, State of Arizona Agricultural Test Station and West Cocopah Indian Reservation

These example calculations provide side-by-side comparisons of consumptive use calculations for the Current Method and the Arizona Preferred Option discussed in this report. The first example water user is the University of Arizona Agricultural Test Station. The test station is an agricultural water user that receives water diverted at Imperial Dam, which recharges the underlying aquifer at a location where ground-water gradients are toward Mexico and not toward the Colorado River at NIB.

Example Calculation: University of Arizona Agricultural Test Station (annual acre-feet)

Factor	Current Method	Arizona Preferred Option
Diversion at Imperial Dam	755	755
Reported return flow[1]	0	0
Unmeasured return flow[2]	378	0
Return flow from down-gradient pumping	Not considered	Not considered
Consumptive use	755- 0 - 378 = 377	755 – 0 - 0 =755

The second example water user is the West Cocopah Indian Reservation. The West Cocopah Indian Reservation is an agricultural water user, with some domestic use, that receives Colorado River water diverted at Imperial Dam and which pumps water from wells in the Yuma Valley downstream from NIB where the groundwater can be reasonably assumed to be flowing toward Mexico.

Example Calculation – West Cocopah Indian Reservation (annual acre-feet)

	Current Method	Arizona Preferred Option
Diversion at Imperial Dam	3,593	3,593
Diversion from wells in the Yuma Valley	10,191	Not considered
Reported return flow[1]	74	74
Unmeasured return flow[2]	4,687	[4] 0
Return flow from down-gradient pumping	Not considered	Not considered
Consumptive use	3,593 + 10,19 - 74 -4,687 = 9,023	3,593 - 74 - 0 = 3,519

Appendix II
Spreadsheet Used to Compile Consumptive Use and Other Values

Introduction

This appendix contains the spreadsheet used to compile the consumptive uses and other values in this report. The spreadsheet is three layers, with the Current Method occupying layer 1, the Arizona Preferred Option occupying layer 2, and a table displaying the consumptive use for all diverters and the total consumptive use for both options occupying layer 3. The following describes the calculations used in the spreadsheet for each option.

Current Method (Layer 1)

The Current Method reflects the methods of calculating consumptive use currently used to compile the 2002 Decree Accounting Report. The spreadsheet contains columns A through E and records 1 through 29. These columns and records are described in the following paragraphs.

Columns A through E

Column A – Labeled Diverter Name, lists the diverters included in this report.

Column B – Labeled Diversion, contains the diversions for each diverter reported by the Decree Accounting Report.

Column C – Labeled Reported Return, contains the returns for each diverter reported by the Decree Accounting Report.

Column D – Labeled Unmeasured Return, contains the unmeasured returns for each diverter (calculated as the product of the diversion [Column 2] and an unmeasured return flow coefficient).

Column E – Labeled Consumptive Use, contains the consumptive use for each diverter calculated as diversion (column 2) less reported return (column 3), less unmeasured return (column 4).

Lines 1 through 29

Lines 1 through 3 are headings.

Lines 4 through 27 are the names/identifiers of the diverters considered in this report.

Line 28 is blank to set off the totals.

Line 29 is the total consumptive use in the Yuma area yielded by each option (calculated as the sum of lines 4 though 27).

If the diverter listed in column 1 is not reported in the Decree Accounting Report, text appears in columns B through E stating that the diverter is not reported and the name of the reported diverter the consumptive use is assumed to be included within. The unmeasured return flow calculated for YMIDD is effectively eliminated when the water returned to the Colorado River upstream of NIB from drainage pumping by the Drainage Pump Outlet channels is subtracted from the sum of unmeasured return flows from the whole of the Yuma Mesa Division; therefore, this unmeasured return flow is not used in the analysis of any of the options addressed by this report.

Arizona Preferred Option (Layer 2)

The Arizona Preferred Option considers a diversion of Colorado River water to consist only of water diverted from the main channel of the Colorado River, and diversions from wells on the Colorado River flood plain where ground water can be reasonably assumed to flow toward the Colorado River upstream of NIB. The Arizona Preferred Option does not consider the pumping of wells from the flood plain or underlying aquifer downstream from NIB, where water can be reasonably assumed to not be flowing toward the Colorado River upstream of NIB, to be diversions of Colorado River. The Arizona Preferred Option generally uses the same methods to calculate consumptive use, for diverters addressed by the Arizona Preferred Option, that are used by the Current Method. Because the Arizona Preferred Option does not consider the pumping of wells downstream from NIB where the groundwater can be reasonably assumed to be flowing toward Mexico to be diversions of Colorado River water, the Arizona Preferred Option does not credit diverters downstream from NIB with unmeasured return flow, except for YCWUA, which irrigates lands both upstream of and downstream from NIB.

The spreadsheet contains columns A through E and records 1 through 29. These columns and records are described in the following paragraphs.

Columns A through E

Column A – Labeled Diverter Name, lists the diverters included in this report.

Column B – Labeled Diversion, contains the diversions for each diverter reported by the Decree Accounting Report, reported by YAO, or estimated as evapotranspiration divided by an irrigation efficiency.

Column C – Labeled Reported Return, contains the returns for each diverter reported by the Decree Accounting Report.

Column D – Labeled Unmeasured Return, contains the unmeasured returns for each diverter (calculated as the product of the diversion [column 2] and an unmeasured return flow coefficient).

Column E – Labeled Consumptive Use, contains the consumptive use for each diverter calculated as diversion (column B) less reported return (column C), less unmeasured return (column D).

If the Arizona Preferred Option does not consider a diverter to be diverting Colorado River water for accounting purposes, text appears in columns B through E stating that the diversion by the diverter is not considered a Colorado River diversion.

Comparison of Consumptive Use Values Both Options (Layer 3)

This layer of the spreadsheet presents the consumptive use results for each diverter and a total consumptive use for all diverters for each option.

The spreadsheet contains the following columns:

Column A – Labeled Diverter Name, lists the diverters included in this report.

Column B – Labeled Current Method, contains the consumptive use values for each diverter as calculated by the Current Method.

Column C – Labeled Arizona Preferred Option, contains the consumptive use values for each diverter as calculated by the Arizona Preferred Option.

Lines 1 through 29

Lines 1 through 3 are headings.

Lines 4 through 27 are the names/identifiers of the diverters considered in this report.

Line 28 is blank to set off the totals.

Line 29 is the total consumptive use in the Yuma area yielded by each option (calculated as the sum of lines 4 through 27).

Accounting Options for Water Users Downstream of Morelos Dam — Units=Annual Acre-Feet — 19 April 2005
Current Method, 2002 Decree Accounting Report

Diverter Name	Diversion	Reported Return	Unmeasured Return	Consumptive Use
North Cocopah Indian Reservation	2,296	0	781	1,515
Ansil Hall	500	0	175	325
Pete Powers	1,344	0	470	874
Curry Family Limited (Formerly Armin Curtis)	281	0	98	183
Amigo Farms (BLM Ag Lease)	344	0	120	224
The Phillips Present Perfected Right Area	0	0	0	0
City of Yuma	28,675	10,639		18,036
Yuma Area office	850	0	0	850
Yucca Power Plant	926	0	324	602
Yuma County Water Users Association	371,246	131,444	7,796	232,006
Wells reported separately within (and charged to) the Yuma County Water Users Association	1,425	0	499	926
Wells reported within the Yuma County Water Users Association, but not reported as part of the YCWUA diversion	2,734	0	957	1,777
Yuma Mesa Irrigation and Drainage District	225,532	66,364	0	159,168
Far West Minicipal Water District	Included in Yuma Mesa Irrigation and Drainage District			
Unit B Irrigation and Drainage District	24,873	10,559	2,512	11,802
Hillander "C" Irrigation District	Not Reported, assumed included in CU of YMIDD			
The University of Arizona Agricultural Test Station	755	0	378	377
The West Cocopah Indian Reservation	13,784	74	4,687	9,023
The East Cocopah Indian Reservation	Not Reported, assumed included in CU of YMIDD			
The Fort Yuma Indian Reservation Homesteads (located in the Yuma Valley)	Not Reported, assumed included in CU of YCWUA			
The Yuma Marine Corps Air Station	2,307	0	484	1,823
The City of Gadsden	Not Reported, assumed included in CU of YCWUA			
The City of Somerton	Not Reported, assumed included in CU of YCWUA			
The City of San Luis, Arizona	Not Reported, assumed included in CU of YCWUA			
The Arizona State Prison	Not Reported, assumed included in CU of YMIDD			
Irrigated lands between the Limitrophe section of the Colorado River and the west boundary of the Yuma County Water Users Association	3,682	0	1,289	2,393
Irrigated lands upon the Yuma Mesa to the south of the Yuma Mesa Irrigation and Drainage District	Not Reported, assumed included in CU of YMIDD			
Totals	681,554	219,080	20,570	441,904

Accounting Options for Water Users Downstream of Morelos Dam — Units = Annual Acre-Feet — 19 April 2005

Arizona Preferred Option (Groundwater that would otherwise flow to Mexico is not accounted for as Colorado River water)

Diverter Name	Diversion	Reported Return	Unmeasured Return	Consumptive Use
North Cocopah Indian Reservation	2,296	0	781	1,515
Ansil Hall	500	0	175	325
Pete Powers	1,344	0	470	874
Curry Family Limited (Formerly Armin Curtis)	281	0	98	183
Amigo Farms (BLM Ag Lease)	344	0	120	224
The Phillips Present Perfected Right Area	0	0	0	0
City of Yuma	28,675	10,639	0	18,036
Yuma Area Office	850	0	0	850
Yucca Power Plant	926	0	324	602
Yuma County Water Users Association	369,109	131,444	7,751	229,914
Wells reported separately within (and charged to) the Yuma County Water Users Association	Not considered a Colorado River Diversion			
Wells reported within the Yuma County Water Users Association, but not reported as part of the YCWUA diversion	Not considered a Colorado River Diversion			
Yuma Mesa Irrigation and Drainage District (includes Far West Municipal Water District)	225,532	66,364	0	159,168
Far West Water District	Included in Yuma Mesa Irrigation and Drainage District			
Unit B Irrigation and Drainage District	24,873	10,559	0	14,314
Hillander "C" Irrigation District	Not considered a Colorado River Diversion			
The University of Arizona Agricultural Test Station	755	0	0	755
The West Cocopah Indian Reservation (surface water use only)	3,593	74	0	3,519
The East Cocopah Indian Reservation	Not considered a Colorado River Diversion			
The Fort Yuma Indian Reservation Homesteads	2,137	0	45	2,092
The Yuma Marine Corps Air Station	2,307	0	0	2,307
The City of Gadsden	Not considered a Colorado River Diversion			
The City of Somerton	Not considered a Colorado River Diversion			
The City of San Luis, Arizona	Not considered a Colorado River Diversion			
The Arizona State Prison	Not considered a Colorado River Diversion			
Irrigated lands between the Limitrophe section of the Colorado River and the west boundary of the Yuma County Water Users Association (well water use only)	Not considered a Colorado River Diversion			
Irrigated lands upon the Yuma Mesa to the south of the Yuma Mesa Irrigation and Drainage District (well water use only)	Not considered a Colorado River Diversion			
Totals	663,522	219,080	9,764	434,678

Accounting Options for Water Users Downstream of Morelos Dam | Units=Annual Acre-Feet | 19 April 2005

Comparison of Consumptive Use Values for All Options

Diverter Name	Current Method	Arizona Preferred Option
North Cocopah Indian Reservation	1,515	1,515
Ansil Hall	325	325
Pete Powers	874	874
Curry Family Limited (Formerly Armin Curtis)	183	183
Amigo Farms (BLM Ag Lease)	224	224
The Phillips Present Perfected Right Area	0	0
City of Yuma	18,036	18,036
Yuma Area office	850	850
Yucca Power Plant	602	602
Yuma County Water Users Association	232,006	229,914
Wells reported separately within (and charged to) the Yuma County Water Users	926	Not considered a Colorado River Diversion
Wells reported within the Yuma County Water Users Association, but not reported as part of the YCWUA diversion	1,777	Not considered a Colorado River Diversion
Yuma Mesa Irrigation and Drainage District	159,168	159,168
Far West Municipal Water District	Included in Yuma Mesa Irrigation and Drainage District	Included in Yuma Mesa Irrigation and Drainage District
Unit B Irrigation and Drainage District	11,802	14,314
Hillander "C" Irrigation District	Not Reported, assumed included in CU of YMIDD	Not considered a Colorado River Diversion
The University of Arizona Agricultural Test Station	377	755
The West Cocopah Indian Reservation	9,023	3,519
The East Cocopah Indian Reservation	Not Reported, assumed included in CU of YMIDD	Not considered a Colorado River Diversion
The Fort Yuma Indian Reservation Homesteads (located in the Yuma Valley)	Not Reported, assumed included in CU of YCWUA	2,092
The Yuma Marine Corps Air Station	1,823	2,307
The City of Gadsden	Not Reported, assumed included in CU of YCWUA	Not considered a Colorado River Diversion
The City of Somerton	Not Reported, assumed included in CU of YCWUA	Not considered a Colorado River Diversion
The City of San Luis, Arizona	Not Reported, assumed included in CU of YCWUA	Not considered a Colorado River Diversion
The Arizona State Prison	Not Reported, assumed included in CU of YMIDD	Not considered a Colorado River Diversion
Irrigated lands between the Limitrophe section of the Colorado River and the west boundary of the Yuma County Water Users Association	2,393	Not considered a Colorado River Diversion
Irrigated lands upon the Yuma Mesa to the south of the Yuma Mesa Irrigation and Drainage District	Not Reported, assumed included in CU of YMIDD	Not considered a Colorado River Diversion
Totals	441,904	434,678