RECLANATION Managing Water in the West

Calendar Year 2012 Lower Colorado River Annual Summary of Evapotranspiration and Evaporation







U.S. Department of the Interior Bureau of Reclamation Lower Colorado Region Boulder Canyon Operations Office This page intentionally left blank.

Lower Colorado River Annual Summary of Evapotranspiration and Evaporation

Calendar Year 2012

Mission Statements

The Department of the Interior protects and manages the Nation's natural resources and cultural heritage; provides scientific and other information about those resources; and honors its trust responsibilities or special commitments to American Indians, Alaska Natives, and affiliated island communities.

The mission of the Bureau of Reclamation is to manage, develop, and protect water and related resources in an environmentally and economically sound manner in the interest of the American public.

Report Corrections

The 2012 Lower Colorado River Annual Summary of Evapotranspiration and Evaporation report, as herein revised, incorporates the following changes:

• Additional acreage was added to the Bermuda/Grass crop category for several diverters which increased the total estimated agricultural ET from 2,955,137 AF to 2,990,807 AF.

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Acronyms

AF	Acre-Feet
AZ	Arizona
AZMET	Arizona Meteorological Network
CA	California
CIMIS	California Irrigation Management Information System
CVWD	Coachella Valley Water District
ET	Evapotranspiration
ETo	Reference Evapotranspiration
GIS	Geographic Information System
IID	Imperial Irrigation District
LCRAS	Lower Colorado River Annual Summary (previously known as Lower Colorado River Accounting System)
NAIP	National Agriculture Imagery Program
NCR	Non-Colorado River
NV	Nevada
NWR	National Wildlife Refuge
NWS	National Weather Service
RS	Remote Sensing
SIB	Southerly International Boundary
ТМ	Thematic Mapper
USDA	United States Department of Agriculture
USGS	United States Geological Survey
WMIDD	Wellton-Mohawk Irrigation and Drainage District
YMIDD	Yuma Mesa Irrigation and Drainage District
YPG	Yuma Proving Ground

Glossary

AZMET: A network of automated weather stations within the state of Arizona that provide reference evapotranspiration estimates.

CIMIS: A network of automated weather stations within the state of California that provide reference evapotranspiration estimates.

Crop Group: Crops with similar water use rates, grouped for the purpose of calculating evapotranspiration.

Crop Coefficient: The ratio of evapotranspiration observed for the crop studied over that observed for the reference crop under the same conditions.

Evapotranspiration: The combined effect of evaporation from the soil surface and transpiration from the plant canopy.

Fallowed/Idle Acres: The total number of acres that were left fallow or idle for the entire calendar year.

Geographic Information System: An information system that integrates, stores, edits, analyzes, shares, and displays geographic information.

Gross Cropped Acres: The total acres of crops grown, which includes multiple cropping on individual fields. Because permanent crops (i.e. alfalfa, bermuda grass, orchards and dates) may be pulled or replanted during the calendar year, the gross cropped acreage reported for permanent crops represents an average of the quarterly acreage values for a given water user. Gross cropped acres for a particular water user may be less than or greater than net cropped acres based on the following scenarios:

- When gross cropped acres are less than net cropped acres, it reflects a year in which permanent crops were pulled or replanted during the calendar year. Example: A given water user had 200 net acres of land. Of those, all 200 acres were planted in alfalfa in quarter 1. Beginning in quarter 2, 50 acres of alfalfa were pulled, leaving 150 acres of alfalfa in quarters 2, 3 and 4. In this scenario, the gross cropped acreage would be 162.5 acres (i.e. 200 + 150 + 150 + 150)/4 = 162.5 acres). The net cropped acreage would be 200 acres.
- When gross cropped acres are greater than net cropped acres, it reflects a year in which multiple crops were grown on a single field. Example: A given water user had 200 net acres of land. Of those, 200 acres of wheat were planted in the spring and 200 acres of lettuce were planted on the same fields in the fall. In this scenario, the gross cropped acreage would be reported as 200+200 = 400 acres. The net cropped acreage would be 200 acres.

Irrigable Acres: The total acres that can be irrigated and for which there exists adequate infrastructure to irrigate.

Moist Soil Unit: An area gradually flooded in winter to develop migratory waterfowl forage and not irrigated in summer.

Non-Colorado River (NCR): For water users designated as NCR, the origin of water used for agricultural irrigation and by riparian vegetation and open water is considered to come from sources other than the Colorado River.

Net Cropped Acres: The total acres on which one or more crops were grown, which does not include multiple cropping on individual fields. Does not include fallowed/idle acres. Because Reclamation's method uses the average annual acreage for permanent crops (i.e. alfalfa, bermuda, orchards and dates), gross cropped acres may be less than net cropped acres.

Program Area: The area in which Reclamation routinely monitors agricultural and riparian vegetation evapotranspiration and open water evaporation. Includes the lower Colorado River valley from Hoover Dam to the Southerly International Boundary with Mexico; the Wellton-Mohawk Irrigation and Drainage District on the Gila River in Arizona, and the Imperial Irrigation District and the Coachella Valley Water District in California.

Remote Sensing: A technique for obtaining information from a surface without coming into physical contact with it, using sensors and imagers that are sensing the electromagnetic radiation coming from the surface at specific wavelengths.

Reference Evapotranspiration: The evapotranspiration rate from a reference surface. The reference surface is a hypothetical reference crop with specific characteristics.

Riparian Vegetation: Riparian vegetation refers to the vegetation that grows along the shores of freshwater rivers and lakes, or along some canals. As used in this report, riparian vegetation classes also include wetland types and natural vegetation within the lower Colorado River floodplain.

Spectral Characteristics: The amount of spectral reflectance from the Earth's surface recorded by the satellite sensors in different portions of the electromagnetic spectrum for different land cover types.

PROGRAM AREA

0 5 10 20 30 40 Miles Ν





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Executive Summary

The Secretary of the Interior, as the "Watermaster" for the lower Colorado River, acts through the Bureau of Reclamation (Reclamation) to manage the waters of the Colorado River for the benefit of water users in the Southwestern United States and Mexico. A significant component of the Watermaster role, a component mandated by Article V of the Consolidated Decree of the United States Supreme Court in *Arizona* v. *California* (547 U.S. 150 (2006)), is to account for water use by each state and individual water user. In this capacity, Reclamation administers a number of programs, some of which utilize remote sensing technology to monitor and estimate annual agricultural and riparian vegetation water use, and open water evaporation along the lower Colorado River from Hoover Dam to the Southerly International Border with Mexico. Reclamation provides an annual summary of this information through publication of this report.¹

Specifically, Reclamation calculates estimates of:

- Evapotranspiration (ET) from irrigated agricultural areas.
- ET from riparian vegetation.
- Evaporation from the mainstream channel and reservoirs of the lower Colorado River.
- Evaporation from major delivery canals, lakes, lagoons, and other open water areas along the river.
- Agricultural data, by water user, including the types of crops grown and acreages.

More than 3.5 million acres are monitored within the program area. This acreage includes:

- Irrigation districts, Indian reservations, Federal recreation areas, and wildlife refuges located along the mainstream of the lower Colorado River.
- The Bill Williams River below Alamo Dam.
- The Wellton-Mohawk Irrigation and Drainage District on the Gila River in Arizona.
- The Imperial Irrigation District and the Coachella Valley Water District in California.

The total estimated agricultural ET in 2012 is 2,990,807 acre-feet² (AF), representing a 2.0% increase from the 2011 total of 2,929,668 AF.

Table ES-1 provides a summary of the predominant crops grown within the program area during calendar year 2012 and the acreages associated with each crop. More detailed information

¹ Copies of this and previous years' reports may be found on Reclamation's website at: <u>www.usbr.gov/lc/region/g4000/wtracct.html.</u>

² See Tables 4 and 5 for additional information. Note: In previous years' reports, this value included estimated ET from lands irrigated with non-Colorado River water (NCR). Beginning with this 2012 report, ET from NCRs is not included in the calculation of total ET. Table 6 separately tabulates the estimated ET for NCRs.

including water users' agricultural acreage (irrigable, gross cropped, net cropped, and fallowed/idle acres), crop types and acreages, agricultural ET by crop type, riparian vegetation acreage and ET, and open water acreage and evaporation has been included in Appendix 1. For select water users, the appendix also provides the historical 5-year trend (calendar years 2008-2012) of the user's total diversions, consumptive use (diversions less measured and unmeasured return flows, as reported in Reclamation's annual *Colorado River Accounting and Water Use Report: Arizona, California, and Nevada* reports), and agricultural ET (crop ET minus effective precipitation).

Table ES-1. Major Crops Grown in the Program Area in Calendar Year 2012.

Gran	Gross	
	Cropped Acres	
Alfalfa	257,363	
Lettuce (Head, Leaf Red, Leaf Green, Spinach)	185,699	
Small Grains (Wheat, Oats, Rye, Barley, Millet)	152,013	
Sudan (Includes Sesbania and Clover)	105,183	
Bermuda/Grass (Bermuda Overseeded with Rye, Klein, Timothy)	71,524	
Cotton	55,456	
Other (e.g. Small Vegetables, Sugar Beets, Citrus, Crucifers, Dates, Field grains, Grapes, Melons, etc.)	250,085	
Total	1,077,323	



Figure ES-1. Major Crops Grown in the Program Area in Calendar Year 2012. (Based on Gross Cropped Acres.)

1.0 Introduction

The Colorado River has often been termed the "Lifeblood of the Southwest." Beginning in the Rocky Mountains of north central Colorado, the river travels more than 1,400 miles before it empties into the Gulf of California, commonly referred to the Sea of Cortez. Together with its tributaries, the Colorado River drains approximately 242,000 square miles in the United States, one-twelfth of the country's continental land area, and 2,000 square miles in Mexico.

The Colorado River and its tributaries provide water to nearly 40 million people for municipal

use, supply water to irrigate nearly 5.5 million acres of land, and are the lifeblood for at least 22 federally recognized tribes, 7 National Wildlife Refuges, 4 National Recreation Areas, and 11 National Parks. In the Lower Division States of Arizona. California, and Nevada, the river serves major cities such as Phoenix, Los Angeles, and Las Vegas. The dry, arid climate of the lower Colorado River Basin (Lower Basin) lends itself to being one of the most productive agricultural regions in the nation. Agriculture use accounts for the largest component of the river's consumptive use in the Lower Basin, supporting an agricultural economy worth billions of dollars.

As the Watermaster for the lower Colorado River, the Bureau of Reclamation must understand the



Figure 1. Map of the Colorado River hydrologic basin and areas adjacent to the hydrologic basin that receive Colorado River water.

disposition of water once it is released from Hoover Dam in order to effectively manage resources of the lower Colorado River. Because the agricultural sector comprises such a large component of the river's use in this region, it is important to have a comprehensive understanding of current agricultural practices and their associated water use. As competition for the Colorado River resource continues to escalate, water managers will increasingly rely on accurate and reliable sources of data upon which to make sound decisions regarding future water management policies to ensure a sustainable water supply is available to meet future demands. This is particularly true for the Lower Division States, as each of these states has the ability to fully utilize its Colorado River apportionment.

2.0 Lower Colorado River Acreage and Water Use Estimates

This report provides estimates of agricultural, riparian vegetation, and open water acreages and water uses along the lower Colorado River from Hoover Dam to the Southerly International Border (SIB) with Mexico. Reclamation has reported these data since 1995, in reports previously entitled, *Lower Colorado River Accounting System Evapotranspiration and Evaporation Calculations* (LCRAS). A detailed history of the LCRAS program and the work that was performed related to its development is presented in the United States Geological Survey (USGS) Water Supply Paper 2407 (Owen-Joyce and Raymond, 1996). Beginning with the 2009 report, Reclamation reformatted the way in which the data are presented in an effort to provide a more user-friendly product that better serves the end-user. Beginning with the 2012 report this report has been entitled *Lower Colorado River Annual Summary of Evapotranspiration and Evaporation (LCRAS)*.

This section provides a general overview of Reclamation's acreage and water use monitoring program, including a description of the program area and program elements. Section 3 provides a description of the procedures and methods; Section 4 provides the results of the 2012 monitoring program; and Section 5 discusses program improvements and/or changes that occurred in 2012.

2.1 Program Area

The area monitored by Reclamation includes the lower Colorado River valley from Hoover Dam to the SIB. Reclamation has routinely monitored agricultural and riparian vegetation ET and open water evaporation along the mainstream since 1994, and along the mainstream and Bill Williams River below Alamo Dam since 2001. Beginning in 2004, the program area was expanded to include the Wellton-Mohawk Irrigation and Drainage District (WMIDD) on the Gila River in Arizona, and the Imperial Irrigation District (IID) and the Coachella Valley Water District (CVWD) in California. With this expansion, the extent of the area analyzed more than doubled from approximately 1.2 million acres to nearly 3.5 million acres (Figure 2). Correspondingly, the number of fields analyzed also increased from approximately 50,000 fields to over 125,000 fields. Figure 2 illustrates the program area before and after the expansion.



Figure 2. Program Area Extent: (1) 1994-2003 (original) and (2) 2004-Present (with the addition of WMIDD, IID, and CVWD). Program area includes riparian and open water areas, which are not shown here.

2.2 Program Elements

Reclamation's remotely-sensed data collection and monitoring program provides the following types of data:

- 1. Estimates of ET from irrigated agricultural areas.
- 2. Estimates of ET from riparian vegetation.
- 3. Estimates of evaporation from the mainstream channel and reservoirs of the lower Colorado River.
- 4. Estimates of evaporation from major delivery canals, lakes, lagoons, and other open water areas along the river.
- 5. Estimates of agricultural data, by water user, including the types of crops grown and acreages.

Reclamation uses this information to support a variety of program-related administrative requirements, including to monitor the current state of the river system, to assess potential impacts of changes to the river system, and as inputs to management decisions involving the administration of the federal laws, compacts, court decisions and decrees, contracts, and regulatory guidelines, collectively known as "The Law of the River," which govern the diversion and use of Colorado River water. Examples of how Reclamation uses this data include:

- 1. To assist in verifying Colorado River water users' success in meeting conservation targets under the Inadvertent Overrun and Payback Policy, Intentionally Created Surplus, and/or System Conservation programs.
- 2. To develop spatial databases representing locations of crops, riparian vegetation, and open water surfaces of the Colorado River, lakes, and canal systems.
- 3. To statistically quantify the types and acres of crops, riparian vegetation groups, and open water surface areas.
- 4. To perform economic analyses for land use conversions.
- 5. To refine and improve upon unmeasured return flow estimates.
- 6. To assist in making water entitlement and beneficial use determinations.
- 7. To assist in making determinations of unauthorized use.

Reclamation provides an annual summary of the land cover types, acreages, and associated evapotranspiration and evaporation for agricultural, riparian vegetation, and open water areas within the program area through publication of this report. Copies of this and previous years' reports can be found on Reclamation's website at: www.usbr.gov/lc/region/g4000/wtracct.html.

3.0 Procedures and Methods

Reclamation uses Remote Sensing (RS) and Geographic Information Systems (GIS) technologies to identify the location and quantify the acreages of crop groups, riparian vegetation groups, and open water areas in the program area. Riparian vegetation is monitored only in the Colorado River floodplain and along the Bill Williams River below Alamo Dam; it is not monitored in the IID, CVWD, or WMIDD areas. The spatial extent (location and area of coverage) of the crop groups, riparian vegetation groups, and open water areas is stored in digital spatial databases collectively referred to as a GIS database. Reclamation uses the data generated from the RS and GIS processes to calculate ET from crops and riparian vegetation, and evaporation from open water areas.

When RS processes alone are insufficient to map crop and riparian vegetation groups or open water areas, data collected on the ground (ground reference surveys) are also used. For example, orchards are mapped using data collected from ground reference surveys due to the difficulty of correctly identifying features related to this type of crop using RS processes alone. Once the data are entered into a GIS database, programs are used to calculate the number of acres of each crop group and riparian vegetation group for each water user, as well as the number of acres of open water areas. Acreage calculations are completed for areas located within the program area.



Figure 3. Reclamation uses RS and GIS processes to map crop and riparian vegetation groups and to estimate the evapotranspiration associated with these groups.

Once Reclamation maps the crop and riparian vegetation groups and open water areas (as discussed in the following sections), Reclamation calculates the ET from crops and riparian vegetation for each water user, and evaporation from open water areas. Currently, this analysis does not include estimates of ET or evaporation within the boundaries of domestic water users. Areas with identified crops and/or riparian vegetation located outside of a known water user boundary are mapped and labeled with the name of the state and river reach in which they are located (e.g. State of Arizona, Other Users, Davis Dam to Parker Dam).

The key components of ET and evaporation calculations include:

- 1. Identifying crop and riparian vegetation groups, and open water areas.
- 2. Calculating ET for crop groups and riparian vegetation groups.
- 3. Calculating evaporation from open water areas (i.e. the mainstream channel and reservoirs of the lower Colorado River, major delivery canals, lakes, lagoons, and other open water areas).

Sections 3.1 through 3.3 present a brief description of each of these components.

3.1 Identifying Crop Groups, Riparian Vegetation Groups, and Open Water Areas

This section provides an overview of the image classification processes and GIS technologies Reclamation uses to identify and map crop and riparian vegetation groups, and open water areas within the program area.

3.1.1 Collecting and Analyzing Remotely-Sensed Data

Satellite imagery is acquired from Landsat Thematic Mapper (TM) sensors and other satellite or airborne imaging systems as needed. For its analysis, Reclamation selects satellite images that adequately cover the program area, are cloud-free, and capture the variation in crop planting practices during the year.

3.1.2 Collecting Ground Reference Data

Correctly identifying and mapping crop and riparian vegetation groups using remotely-sensed data requires a thorough understanding of the spectral characteristics of vegetation types for representative (ground reference survey) sites throughout the program area. TM satellite image data contain digital values that represent the spectral characteristics of these crop and riparian vegetation groups. Reclamation analyzes these digital values within ground reference survey sites to generate spectral statistics for specific crop and riparian vegetation groups.

Reclamation collects ground reference survey data for approximately 12 percent of the irrigated fields in the program area. Reclamation uses 60 to 65 percent of the ground reference survey data for image classification processing (to identify crop groups) and the remaining 35 to 40 percent to assess the accuracy of the image classifications. Reclamation selects ground reference survey sites in each major irrigated area involved in this analysis. To provide a statistically valid data set, Reclamation selects irrigated fields from a GIS database using a stratified random sample and adds additional fields to the random sample, where necessary, to ensure representation of all major crop groups.

Table 1 provides a listing and description of the common crop groups identified within the program area. Although cropping patterns may vary yearly depending on market conditions, the types of crops grown within the program area generally remain consistent over the long-term.

Crop Group	Description
Alfalfa	Alfalfa
Aloe	Aloe
Bermuda/Grass	Bermuda, Bermuda Overseeded with Rye, Klein grass, Timothy grass
Cane/Bamboo	Cane/Bamboo
Citrus	Young (1-2 meters tall) Mature (2+ meters tall) Declining
Cotton	Cotton
Crucifers	Broccoli, Cauliflower, Cabbage, Bok-Choy, Mustard, Kale, Okra
Dates	Dates
Deciduous Orchards	Pecans, Peaches, Almonds
Fallow/Idle	Fields currently not in production; includes bare cultivated soil
Field grains	Field Corn, Sorghum, Milo
Grapes	Grapes
Jojoba	Jojoba
Legumes/Solanum Vegetables	Green, Dry and Garbanzo Beans; Peas, Peanuts, Fresh Peppers, Potatoes
Lettuce	Spring and Fall (Head, Leaf [Red], Leaf [Green], Spinach, Other Lettuce)
Maintained Marsh	Maintained Marsh
Melons	Spring and Fall (Watermelon, Honeydew, Cantaloupe, Squash, Cucumbers)
Miscellaneous Herbs	Anise, Mint, other
Moist Soil Unit	An area gradually flooded in winter to develop migratory waterfowl forage and not irrigated in summer
Nursery or Greenhouse	Citrus Nursery, Native Nursery, Greenhouse, Other Nursery
Oil Crops	Safflower, Canola, Sunflower, Sesame
Perennial Vegetables	Artichoke, Asparagus, Guayule
Restoration Areas	Irrigated lands where natural vegetation has been planted for purposes of increasing wildlife habitat along the lower Colorado River
Root Vegetables	Table Beets, Parsnip, Turnip, Rutabaga
Small Grains	Oats, Rye, Barley, Millet, Wheat
Small Vegetables	Carrots, Cilantro, Celery, Garlic, Dry Onions, Onions, Parsley, Radishes, Flowers
Sudan	Includes Sesbania and Clover
Sugar Beets	Summer and Winter
Tomatoes	Tomatoes
Wildlife Forage Maintained	Wildlife Forage Maintained

Table 1. Crop Groups Identified within the Program Area.

Table 2 provides a list and description of the riparian vegetation groups identified within the program area.

Riparian Group	Description
Barren	Less than 10% vegetation
Cottonwood/Willow	61% to 100% cottonwood and willow
Marsh	40% cattail, bulrush, and phragmites
Mixed Veg Low	Mixed vegetation types that may include salt cedar, mesquite, or arrowweed with crown closure greater than or equal to 10% and less than 40%
Mixed Veg Medium	Mixed vegetation types that may include salt cedar, mesquite, or arrowweed with crown closure greater than or equal to 40% and less than or equal to 80%
Salt Cedar Dense	Predominant salt cedar with crown closure greater than 80%

Table 2. Riparian Vegetation Groups Identified within the Program Area.

3.1.3 Delineating Cropped Areas

Reclamation has developed a spatial relational database that delineates field borders for all irrigated areas included in this analysis (field-border database). Reclamation has linked all ground reference survey data collected for image classification to this field-border database.

Reclamation routinely updates the field border database to reflect actual conditions observed in the field during collection of the ground reference sample data. Reclamation also uses 30 meter TM imagery, and 1- and 2-meter United States Department of Agriculture National Agricultural Imaging Program (NAIP) digital photography to update and create new field-border databases.

Delineated cropped areas include all areas known by Reclamation to divert or pump water along the mainstream of the lower Colorado River from Davis Dam to Mexico, WMIDD, IID, CVWD, and irrigated areas along the Bill Williams River from below Alamo Dam to Lake Havasu. (See Appendix 3, Exhibit 1 for an index of water user boundaries, and Exhibits 1 through 7 for illustrations of these areas.)

Using the RS technology with the GIS field border database, Reclamation identifies the crop(s) grown in each agricultural field throughout the calendar year. Post-classification accuracy assessments show that, overall, Reclamation routinely achieves an average accuracy of 90 percent or greater when mapping crop groups in the program area.

Reclamation completed a study with an independent statistician to quantify the effects of remote sensing-based crop classification error on accuracies of ET estimates. To review the results of this study, see Stehman, S.V. and Milliken, J.A. (2007), "Estimating the effect of crop classification error on evapotranspiration derived from remote sensing in the lower Colorado River basin, USA." *Remote Sensing of Environment*, 106, pp. 217 – 227.

3.1.4 Delineating Riparian Vegetation Areas

Reclamation updates riparian vegetation areas along the Colorado River floodplain by comparing the current year Landsat TM summer satellite images to the previous year's images (change detection methods³). Reclamation field checks areas of spectral change to confirm that the change is actually due to a change in land cover. Reclamation then remaps areas of land cover change and



Figure 4. Landsat satellite image showing agricultural fields in the Imperial Irrigation District with digitized field borders.

uses these maps to update the riparian vegetation database.

3.1.5 Delineating Open Water Areas

Reclamation maintains an open water GIS database which contains the spatial boundaries of open water surfaces within the program area including: the mainstream of the Colorado River, reservoirs, major delivery canals, lakes, lagoons, and other backwater areas. Reclamation annually compares current-year satellite imagery to previous year imagery and updates the open water surface area as necessary.

Reclamation calculates evaporation from major delivery canals that serve water users within the Yuma area. Reclamation identifies bank-to-bank area (in acres) in these canals by digitizing canal banks from satellite and airborne imagery.

³See, Lower Colorado River Accounting System, Calendar Year 2001, Demonstration of Technology Report, Chapter 6, 6.23 - 6.26.

3.2 Calculating Crop and Riparian Vegetation ET

Reclamation calculates ET from crop groups and riparian vegetation groups using the following data:

- 1. Reference ET.
- 2. ET coefficients for each crop and riparian vegetation group.
- 3. Number of acres and location of each crop and riparian vegetation group.
- 4. Effective precipitation (used to calculate crop ET only).

The following sections describe the methods utilized by Reclamation to calculate these data.

3.2.1 Calculating Reference ET

Reference ET represents a fundamental measure of the rate of water use by vegetation (in linear units, such as inches) to which the rate of water use of all types of vegetation (as well as the rate of evaporation from a water body) can be related.

Reclamation calculates reference ET values using the standardized Penman-Monteith equation developed by the American Society of Civil Engineers (standardized equation), and climatological data provided by California Irrigation Management Information System (CIMIS) and Arizona Meteorological Network (AZMET) automated weather stations located in irrigated areas along the Colorado River from Davis Dam to Mexico. The standardized equation is widely accepted by science/engineering communities, and is considered the most accurate method currently available. The AZMET and CIMIS stations continuously collect maximum, minimum, and average air temperature and relative humidity; average soil temperature at depths of 2- and 4-inches, wind speed, and precipitation data; and calculate net solar radiation. These parameters, with the exception of precipitation, are used to calculate hourly and daily reference ET values.

Table 3 provides a list of the stations used to collect the reference ET data used in Reclamation's calculations and the corresponding geographical areas for which each station's data are applied. Appendix 2 contains the following additional information (averaged for each geographical area referenced in Table 3): monthly reference ET, monthly precipitation, and monthly ET rates for crop and riparian groups.

Geographical Area	Weather Stations			
	AZMET	CIMIS	NWS*	
Mohave Valley area Mohave II Mohave ETo			Bullhead City Laughlin	
Parker/Palo Verde Parker valleys Parker II		Blythe NE Ripley Palo Verde II	Blythe-Airport Ehrenberg 2E Parker Blythe	
Wellton-Mohawk area	Roll Roll ETo		Tacna 3 NE	
Imperial/Coachella valleys		Calipatria/Mulberry Seeley Meloland La Quinta II Indio 2 Oasis Westmorland North	El Centro 2 SSW El Centro NAF, CA Imperial Indio FS Mecca FS Niland Desert Resorts Airport	
Yuma area	Yuma North Gila Yuma South Yuma Valley Yuma Valley ETo		Somerton, AZ Yuma Proving Ground Yuma Quartermaster Yuma 9.7 ESE Yuma 13.8 ESE Yuma MCAS	

Table 2	Area Maathar	Ctationa II	and for the	Coloulation	of Average	Doforonoo CT	ond Dradi	aitatian
rable 5.	Alea wealler	SIALIONS US	sed for the	Calculation	OF AVERAGE	Releience EI	and Precil	manon.
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*National Weather Station (NWS) stations collect precipitation data only.

Although the AZMET and CIMIS networks perform calculations of reference ET, it was discovered that there was a disparity in the values reported by each network for the lower Colorado River. Upon investigation, it was determined that the reason for the disparity was because the AZMET and CIMIS networks each use slightly different equations to calculate reference ET. Within the Parker and Palo Verde valleys, both CIMIS and AZMET stations are used to derive average reference ET values. By calculating reference ET using the standardized equation with the climatological data provided by the AZMET and CIMIS networks, this disparity is eliminated, and leaves only site conditions, equipment calibration, and micro-climatic differences between sites as sources of site to site variations in reference-ET values. Reclamation currently uses the reference ET values provided by the CIMIS network for the Imperial and Coachella valleys, and reference ET values from the AZMET network for the Mohave Valley and Wellton-Mohawk areas.

Reclamation develops area-specific reference ET values for the Mohave Valley, the Parker/ Palo Verde Valleys, the Imperial/Coachella valleys, the Wellton-Mohawk area (when more than one station is available), and the Yuma Area by averaging reference ET values from multiple sites within these areas. Figure 5 shows the reference ET and precipitation values used to develop the 2012 ET rates, which are then used to calculate ET from crop and riparian vegetation groups.



Figure 5. Reference ET and precipitation. Units: Inches.

3.2.2 ET Coefficients for Crop and Riparian Vegetation Groups

ET coefficients are the values that relate reference ET to the ET rate of a specific crop or riparian vegetation group, as well as to the evaporation rate from a water body. Jensen, Marvin E. (1998), *Coefficients for Vegetative Evapotranspiration and Open Water Evaporation for the Lower Colorado River Accounting System*, presents the rationale used to develop the original crop and riparian vegetation groups along the lower Colorado River and the Bill Williams River, their respective ET coefficients, and open water evaporation coefficients. Jensen, Marvin E. (2003), *Vegetative and Open Water Coefficients for the Lower Colorado River Accounting System (LCRAS), Addendum to the 1998 Report*, presents the adjustments made to the crop and riparian vegetation groups and the ET and evaporation coefficients, which are used in this report. The ET coefficients developed for the Yuma area are used to calculate crop ET for WMIDD.

The ET coefficients used for crops grown in IID and CVWD are derived from coefficients reported in Jensen, Marvin E. and Walter, Ivan A. (1997), *Assessment of 1987-1996 Water Use by the Imperial Irrigation District using Water Balance and Cropping Data Special Report, June 1997.* These ET coefficients were compared with crop ET coefficients for CVWD developed by

Lord, J.M. (1994), reported in *Water Use Assessment, Coachella Valley Water District and Imperial Irrigation District, Phase I Report*, and found to be similar; therefore the same ET coefficients are used for IID and CVWD. For a more in-depth description of the ET coefficients used for IID and CVWD, see *Lower Colorado River Accounting System Evapotranspiration and Evaporation Calculations, Calendar Year 2004.*

3.2.3 Calculating Effective Precipitation

Effective precipitation is that portion of precipitation which infiltrates and remains in the soil so as to be available for crop consumptive use. A correction to the ET rate for crop groups is required to remove the impact of precipitation so the ET calculated reflects only the consumptive use of Colorado River water. Reclamation calculates effective precipitation as the product of recorded precipitation and an effective precipitation coefficient. Precipitation is recorded by rain gauges located at CIMIS and AZMET stations, and at stations operated by the NWS along the lower Colorado River. Table 3 provides a list of the stations used to collect the precipitation data used in Reclamation's calculations and the corresponding geographical areas for which each station's data are applied.

Reclamation developed a single daily, area-specific precipitation value for the Mohave Valley, the Parker/Palo Verde valleys, the Wellton-Mohawk area, the Imperial and Coachella valleys, and the Yuma area by averaging precipitation measured at the CIMIS, AZMET, and NWS stations in each area. Jensen, Marvin E. (1993), *Evaluating Effective Rainfall in CVWD*, contains the documentation for the effective precipitation coefficients used in this report. Reclamation uses the following equation to calculate effective precipitation:

Effective Precipitation = Daily Precipitation × Monthly Effective Precipitation Coefficient

Because the amount of precipitation in the Lower Basin is typically very small, the correction to the ET rate for precipitation is also typically very small.

3.2.4 Calculating Crop ET

To calculate ET from crops in the program area, Reclamation calculates an ET rate (in inches) for each crop group by multiplying the average daily reference ET values (inches) by each group's unique daily ET coefficient (dimensionless). (See Appendix, Part 2 of the *Lower Colorado River Accounting System Evapotranspiration and Evaporation Calculations, Calendar Year 2008* report for daily Kc values.) Reclamation considers the effect of rainfall on crop water use by subtracting effective precipitation (inches) from the ET rate for each crop group to yield a net ET rate (inches). Reclamation sums the daily ET rates to produce a monthly ET rate (inches) for each crop group.

Reclamation determines the acreage of each crop group within each water user's boundary using GIS technologies, RS, and field survey data as previously described. For multi-year crops that are present during only part of the year, such as alfalfa and orchards, Reclamation uses quarterly acreage estimates for the ET calculation.

Reclamation calculates the ET (in acre-feet) within each water user's boundary by multiplying the ET rate for each crop group by the acreage of each crop group. These calculations are performed on a monthly time-step and the results summed to produce annual agricultural ET values within each water user's boundary. The following equation is used to calculate ET for a specific crop group:

Annual ET =
$$\sum_{t=0}^{n} \frac{[(ET_o \times K_c) - Effective PPT] AC}{12 \text{ inches/foot}}$$



Figure 6. AZMET weather station, Mohave 2, located in the Mohave Valley, AZ.

Where:

ET	=	Annual ET by crop group (acre-feet)
n	=	Time-step (monthly)
ETo	=	Daily reference ET (inches)
Kc	=	Daily ET coefficient for a specific crop (dimensionless)
AC	=	Acres of crop
Effective PPT	`=	Effective precipitation (inches)

3.2.5 Calculating ET from Riparian Vegetation

Reclamation calculates ET from riparian vegetation for this report the same way it calculates agricultural ET, except that no correction is made to the ET rates of riparian vegetation for effective precipitation. The sum of the ET from all riparian vegetation groups within a water user's boundary yields the riparian vegetation ET for that individual water user. Riparian vegetation is monitored only in the Colorado River floodplain and along the Bill Williams River below Alamo Dam; it is not monitored in the IID, CVWD, or WMIDD areas.

3.3 Calculating Evaporation from Open Water Areas

Reclamation calculates evaporation from open water areas within the program area using the following data:

- 1. Reference ET.
- 2. Monthly evaporation coefficients.
- 3. Number of acres and location of the open water area.
- 4. Precipitation.

The following sections describe the methods utilized by Reclamation to calculate open water evaporation from the mainstream and from major delivery canals.

3.3.1 Mainstream

Reclamation calculates evaporation from Lakes Mohave and Havasu, and the open water areas of the mainstream Colorado River channel and its adjacent backwaters (such as Topock Marsh and Mittry Lake) from below Hoover Dam to Mexico. The following equation is used to calculate evaporation from open water areas:

Annual EVAP =
$$\sum_{t=0}^{n} \frac{[(ET_o \times K_c) - PPT] AC}{12 \text{ inches/foot}}$$

Where:

EVAP	=	Annual Evaporation by open water (acre-feet)
n	=	Time-step (monthly)
ETo	=	Daily reference ET (inches)
Kc	=	Monthly Evaporation coefficient for water (dimensionless)
AC	=	Acres of water
PPT	=	Precipitation (inches)

Reclamation verified the open water area for this report using the method described in Section 3.1.5, "Delineating Open Water Areas."

3.3.2 Calculating Evaporation from Major Delivery Canals

Reclamation calculates evaporation from the All-American Canal, Gila Gravity Main Canal and other major delivery canals in the Yuma area using the same equation used to calculate evaporation from the mainstream. Reclamation categorized major delivery canals into two groups: (1) those that deliver water to a single water user (single-user canals) and, (2) those that deliver water to two or more water users (shared canals).

Evaporation from a shared canal is proportioned among the water users which receive water from the canal. Reclamation calculates each water user's proportionate share of evaporation using the following process:

- Calculate the distance from the canal headworks to the user's point(s) of delivery. In cases where a user has more than one delivery point, Reclamation calculates a single point of delivery using a weighted average based on the user's diversion amounts at each point of delivery. These values have units of miles.
- 2. Multiply the mileage value from (1) by the user's total diversion to derive what is referred to as the pro-rata factor. These values have units of acre-foot miles.
- Divide the pro-rata factor for each water user (derived in (2)) by the sum of the pro-rata factors for all water users that receive water from the canal. This value, which can be



Figure 7. Digital image showing the All-American Canal, one of the canals from which Reclamation estimates evaporation.

expressed as a fraction or percentage, represents each user's percentage use of the canal.

4. Multiply each user's percentage use of the canal by the total volume of evaporation from the canal to determine each user's share of evaporation from the canal.

4.0 Results

For each specified water user, Table 4 shows the ET from agriculture and riparian vegetation; and evaporation from the open water surfaces within that water user's boundary. As previously mentioned, areas with identified crops and/or riparian vegetation not located within a known water user boundary are mapped and labeled with the name of the state and river reach in which they are located. Table 4 includes water users which are not located on the river but are irrigated with water diverted from the Colorado River; specifically WMIDD in Arizona, and IID and CVWD in California.

The raw data used to develop the results presented in Tables 4 through 6 can be found on Reclamation's website at http://www.usbr.gov/lc/region/g4000/wtracct.html.

Table 4. Agricultural ET, Riparian Vegetation ET, and Open Water Evaporation by Water User, Lower Colorado River, Hoover Dam to Mexico. Units: Annual Acre-Feet.

Water User	Agricultural ET	Riparian Vegetation ET ⁴	Open Water Evaporation		
Nevada (below Hoover Dam)					
Fort Mojave Indian Reservation	1,887	5,315	54		
Lake Mead National Recreation Area (Hoover Dam to Davis Dam)	0	2,057	24		
Lake Mead National Recreation Area (Davis Dam to Parker Dam)	0	0	0		
State of Nevada (Davis Dam to Parker Dam)	0	9,347	288		
Nevada Totals*	1,887	16,719	366		
California					
Arizona State Trust Lands, CA	5,537	1,689	102		
Chemehuevi Indian Reservation	0	2,195	0		
Cibola National Wildlife Refuge	0	12,880	614		
Coachella Valley Water District	159,131	0	5,458		
Colorado River Indian Reservation	3,549	32,237	658		
Fort Mojave Indian Reservation	10,505	2,680	0		
Fort Yuma Indian Reservation	259	10,729	335		
Fort Yuma Indian Reservation Ranch 1	383	0	0		
Fort Yuma Indian Reservation Ranch 2 Parcel 3	207	0	0		
Fort Yuma Indian Reservation Ranch 3	9	14	0		
Fort Yuma Indian Reservation Ranch 4	780	1	0		
Fort Yuma Indian Reservation Ranch 5	649	0	0		
Fort Yuma Indian Reservation Ranch 7	57	0	0		
Fort Yuma Indian Reservation Ranch 15	506	11	0		
Fort Yuma Indian Reservation Ranch 17	0	0	0		
Havasu National Wildlife Refuge	0	3,726	392		
Imperial Irrigation District	1,618,502	0	13,179		

⁴ Riparian Vegetation ET is monitored only in the Colorado River floodplain.

Water User	Agricultural ET	Riparian Vegetation ET ⁴	Open Water Evaporation
Imperial National Wildlife Refuge (Parker Dam to Imperial Dam)	0	10,115	1,024
Lake Enterprises of California, LLC	0	638	34
Palo Verde Irrigation District	291,080	8,573	1,272
State of California, Other Users (Davis Dam to Parker Dam)	0	9,393	425
State of California, Other Users (Parker Dam to Imperial Dam)	1,620	18,314	5,434
State of California, Other Users (Imperial Dam to Mexico)	0	7,852	369
Yuma Project Reservation Division, Bard Unit	21,267	815	169
Yuma Project Reservation Division, Indian Unit	15,054	661	118
California Totals*	2,129,095	122,523	29,584
Arizona			
Arizona Game and Fish Commission/Mohave County Water Authority	4,199	468	0
Arizona State Land Department (Parker Dam To Imperial Dam)	1,020	1,907	0
Arizona State Land Department (Imperial Dam To Mexico)	3,184	565	65
Beattie Farms Southwest	770	243	0
Bill Williams National Wildlife Refuge	0	7,615	210
BLM	208	132	0
BLM (Monty Lee)	177	0	0
BLM (Pratt)	247	0	0
Cha Cha, LLC	1,254	329	21
Cibola National Wildlife Refuge	9,272	27,998	2,741
Cibola Valley Irrigation and Drainage District	4,328	3,104	0
City of Yuma (Yuma East Wetlands)	0	395	99
Cocopah Indian Tribe, Fee Lands	494	52	0
Colorado River Indian Reservation	313,557	88,834	940
Curtis, Armon	130	19	0
East Cocopah Indian Reservation	0	0	0

Water User	Agricultural ET	Riparian Vegetation ET ⁴	Open Water Evaporation
Fort Mojave Indian Reservation	39,418	20,955	158
Fort Yuma Indian Reservation	0	4,619	145
Fort Yuma Indian Reservation, Ranch 5	226	2	0
Fort Yuma Indian Reservation, Yuma East Wetlands	0	627	2
Gila Monster Farms	4,021	161	49
Griffin, R.	54	0	0
Griffin Ranches	161	2	0
GSC Farm, LLC	1,432	0	0
Havasu National Wildlife Refuge	472	43,536	15,445
Hopi Tribe	3,003	1,063	0
Imperial National Wildlife Refuge	219	20,441	3,129
JRJ Partners, LLC	885	12	0
Lake Havasu State Park	0	1,320	6
Lake Mead National Recreation Area (Hoover Dam to Davis Dam)	0	2,092	33
Lake Mead National Recreation Area (Davis Dam to Parker Dam)	0	102	5
Mittry Lake Management Area	0	12,581	2,571
Mohave Valley Irrigation and Drainage District	15,387	15,487	504
North Baja Pipeline, LLC	155	2	0
North Cocopah Indian Reservation	1,371	94	49
North Gila Valley Irrigation District	19,441	2,643	66
Ogram Boys Enterprises, Inc.	491	12	0
Ogram, George	170	0	0
Pasquinelli, Gary & Barbara	406	0	0
Peach, John	247	0	0
Phillips, Milton	0	0	0
Power	184	0	0
Power, Victor	34	2	0

Water User	Agricultural ET	Riparian Vegetation ET ^₄	Open Water Evaporation
Rayner Ranches	2,436	3	0
State of Arizona, Other Users (Davis Dam to Parker Dam)	0	2,157	259
State of Arizona, Other Users (Parker Dam to Imperial Dam)	351	21,225	3,654
State of Arizona, Other Users (Imperial Dam to Mexico)	3,287	8,237	472
State of Arizona, Other Users (Down Gradient of YMIDD)	31,157	0	0
State of Arizona, Other Users (Limitrophe)	2,191	4,067	0
Unit B Irrigation and Drainage District	6,702	0	118
University of Arizona	224	0	0
Wellton-Mohawk Irrigation and Drainage District	185,865	0	722
West Cocopah Indian Reservation	4,321	4,767	0
Yuma County Water Users Association	103,878	3	1,853
Yuma Irrigation District	28,541	660	365
Yuma Mesa Irrigation and Drainage District	64,255	0	1,029
Yuma Proving Ground	0	262	90
Arizona Totals*	859,825	298,796	34,800
Hoover Dam to Mexico Totals*	2,990,807	438,038	64,750

*Due to rounding, totals shown may differ from the sum of the individual values.
Table 5 provides a summary, by river reach, of ET and evaporation results along the lower Colorado River from Hoover Dam to Mexico. (Note: Bill Williams River National Wildlife Refuge (NWR) is included in the Davis Dam to Parker Dam reach; WMIDD, IID, and CVWD are included in the Imperial Dam to Mexico reach.)

Table 5.	Summary of ET	and Evaporation	along the low	er Colorado	River from	Hoover	Dam to M	Aexico.
Units: A	nnual Acre-Feet.							

					Total:
	Hoover Dam	Davis Dam	Parker Dam	Imperial Dam	Hoover Dam
	to	to	to	То	То
ET Category/Evaporation	Davis Dam	Parker Dam	Imperial Dam	Mexico	Mexico*
Agricultural ET	0	67,670	636,221	2,286,916	2,990,807
Riparian Vegetation ⁴	4,149	123,827	247,804	62,259	438,039
Evaporation – Open Water	57	17,747	19,500	27,446	64,750
Evaporation – Mainstream	133,823	99,146	47,031	4,264	284,264

**Due to rounding, totals shown may differ from the totals shown in Table 4.

Table 6 shows the ET from agriculture and riparian vegetation and evaporation from open water areas along the Bill Williams River⁵, the Bill Williams River NWR⁶, the Gila River Valley⁷, and Hillander C Irrigation District⁸. The origin of the water used for agricultural irrigation and by riparian vegetation in these areas is considered to come from sources other than the Colorado River.

Table 6. Agricultural ET, Riparian Vegetation ET, and Open Water Evaporation by Water User: Bill Williams River, Gila River Valley, and South Yuma Mesa. Units: Annual Acre-Feet.

Water User Name	Agricultural ET	Riparian Vegetation ET ⁴	Open Water Evaporation
State of Arizona (Alamo Dam to Bill Williams NWR)	904	15,631	540
Bill Williams River NWR	0	1,618	50
State of Arizona (Gila River Valley)	3,879	0	0
Hillander C Irrigation District	3,224	0	0
Totals	8,007	17,249	590

*Due to rounding, totals shown may differ from the sum of the individual values.

⁵ Bill Williams River, from Alamo Dam to the eastern boundary of the Bill Williams River NWR.

⁶ Bill Williams River NWR, from the eastern extent of the Colorado River aquifer to the eastern extent of the refuge boundary.

⁷ Agricultural land outside of WMIDD that is irrigated with wells pumping Gila River Valley groundwater.

⁸ Hillander C Irrigation District is located on the South Yuma Mesa and is irrigated with groundwater not available for other users in the United States or to meet the 1944 Mexican Treaty obligation.

5.0 Data Comparisons in Appendix 1

Additional information on the water users identified in Tables 4 through 6, including agricultural acreage (irrigable, gross cropped, net cropped, and fallowed/idle acres), crop types and acreages, agricultural ET by crop type, riparian vegetation acreage and open water acreage has been included in Appendix 1. For select water users, the appendix also provides the historical 5-year trend (calendar years 2008-2012) of the user's total diversions and consumptive use (as reported in Reclamation's *Colorado River Accounting and Water Use Report: Arizona, California, and Nevada (Water Accounting Report)*), and agricultural ET (crop ET minus effective precipitation).

5.1 Differences between LCRAS Report and Water Accounting Report Values

Estimates of ET from irrigated agricultural areas presented in the LCRAS report may differ from the consumptive use values contained in the Water Accounting Report. In the LCRAS report, the terms "consumptive use" and "ET" are used interchangeably and represent the estimates of consumptive use of Colorado River water from agriculture, riparian vegetation, and permanent open water. These estimates are based on computations of ET and evaporation using weather data, crop acreage, crop type, regionally estimated planting and harvest dates, and crop-specific ET coefficients.

In the Water Accounting Report, tabulated consumptive use values are computed as diversions minus the sum of measured and unmeasured return flows, and incorporate the following types of consumptive use that are not included in the LCRAS report:

- 1. The total volume of water exported from the mainstream (e.g. Imperial Irrigation District and Coachella Valley Water District).
- 2. Municipal and industrial diversions.
- 3. Delivery system losses within and along irrigation canals from the point of diversion to the agricultural fields.
- 4. Irrigations performed outside of a standard crop cycle (e.g. irrigations to remove salt from the soil column and dust control irrigations during times of fallowing).

6.0 Program Improvements for Calendar Year 2012

Reclamation annually reviews each application of the methodology and incorporates "lessons learned" into subsequent reports. Reclamation also modifies each application of the methodology in response to information provided by water users and as modified processes become available after analysis of long-term questions and issues. The following paragraphs describe the program improvements implemented beginning with this calendar year 2012 report.

6.1 Reporting of Habitat Restoration Areas

Reclamation changed the way in which habitat restoration areas are categorized. Fields that were historically used for agricultural production and are now planted with natural vegetation are no longer included in the riparian vegetation data and are, instead, categorized within the agricultural data. This change affects fields on which cottonwood-willow, mesquite and other native vegetative species have been planted and irrigated for the purpose of creating wildlife habitat along the lower Colorado River. All irrigated native vegetation is now reported under the crop group "Restoration Areas".

This change was adopted to more closely align a water user's consumptive use as reported in the Water Accounting Report with the ET reported for the same water user in this report. Within the Water Accounting Report, a water user's consumptive use is calculated as the sum of diversion(s) less the sum of return(s) back to the Colorado River. Since restoration areas are irrigated with Colorado River water diverted by the water user and delivered through the user's irrigation network, consumptive use within the Water Accounting Report includes consumptive use within these restoration areas. In order to accurately compare a water user's ET (consumptive use) reported in this report, with the consumptive use reported in the Water Accounting Report, the restoration areas' acreage and associated ET must be categorized as an agricultural water use.

6.2 Adjustments to Water User Names and Boundaries

Several water user names and boundaries were updated to reflect current conditions and to maintain consistency with the water user names and boundaries used in Reclamation's 2012 Water Accounting Report. For reference, a summary of the updates that were made to water user names is provided in Table 7.

Water User	Description of Update
California	·
AZ State Trust Lands, CA	Added as a user. Formerly included in "State of California (Imperial Dam to Mexico)"
Fort Yuma Indian Reservation, CA	Portions of the Fort Yuma Indian Reservation, CA were split into Fort Yuma Indian Reservation, CA Ranches 1, 2 Parcel 3, 3, 4, 5, 7, 15, and 17.
Arizona	
Arizona Game and Fish Commission/Mohave County Water Authority	Added as a user. Formerly included in "Cibola Valley Irrigation and Drainage District, AZ (Davis Dam to Parker Dam)"
BLM	Added as a user. Formerly included in "State of Arizona (Imperial Dam to Mexico)"
BLM (Monty Lee)	Added as a user. Formerly included in "State of Arizona (Imperial Dam to Mexico)"
BLM (Pratt)	Added as a user. Formerly included in "State of Arizona (Imperial Dam to Mexico)"
Cocopah Indian Tribe, Fee Lands	Added as a user. Formerly included in "Powers (Power, R.E. & P.) (Imperial Dam to Mexico)
Fort Yuma Indian Reservation, Ranch 5	Added as a user. Formerly included in "Fort Yuma Indian Reservation (Imperial Dam to Mexico)"
Griffin, R.	Added as a user. Formerly included in "State of Arizona (Imperial Dam to Mexico)"
Griffin Ranches	Added as a user. Formerly included in "Powers (Power, R.E. & P.), AZ (Imperial Dam to Mexico)"
GSC Farm, LLC	Added as a user. Formerly included in "Cibola Valley Irrigation and Drainage District, AZ (Parker Dam to Imperial Dam)"
Hopi Tribe	Added as a user. Formerly included in "Cibola Valley Irrigation and Drainage District, AZ (Parker Dam to Imperial Dam)"
Peach, John	Added as a user. Formerly included in "State of Arizona (Imperial Dam to Mexico)"
Phillips, Milton	Added as a user. Formerly included in "Powers (Power, R.E. & P.), AZ (Imperial Dam to Mexico)"
Power	Added as a user. Formerly included in "State of Arizona (Imperial Dam to Mexico)"
Power, Victor	Added as a user. Formerly included in "Powers (Power, R.E. & P.), AZ (Imperial Dam to Mexico)"

Table 7. Summary of Updates Made to Water User Names.

6.3 Refinement of Open Water Areas

In 2012, changes in open water acreage were identified by inspecting the most recent imagery available, including NAIP and SPOT5 collected in 2012, aerial imagery from project contractors, Google Earth, and ESRI imagery. The 2011 open water data set was compared to these image sources and updated by adding or removing open water areas where differences occurred.

Evaporation calculations for open water surfaces along the main stem of the Lower Colorado River use unique evaporation coefficients for each geographical area (Jensen, 2003, Appendix 2).

7.0 References

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Appendix 1: Water User Fact Sheets

This appendix is intended to supplement the information contained in Table 4, and includes the following information for each water user: agricultural acreage (irrigable acres, gross cropped acres, net cropped acres and fallowed/idle acres); crop types and acreages; agricultural ET by crop type; riparian vegetation acreage and ET; and open water acreage and evaporation. For select users, the appendix also provides a historical 5-year trend (calendar years 2008-2012) of the user's total Colorado River diversions and consumptive use (diversions less measured and unmeasured return flows) – as reported in Reclamation's annual *Colorado River Accounting and Water Use Report: Arizona, California, and Nevada* reports– and agricultural ET (crop ET minus effective precipitation – as reported in Reclamation's annual *Lower Colorado River Annual Summary of Evapotranspiration and Evaporation* (LCRAS) reports. Copies of these reports may be found on Reclamation's website at: www.usbr.gov/lc/region/g4000/wtracct.html.

Executive Summary

		the the second s
River Reach:	Hoover Dam to Mexico	NEVADA
Agriculture		HOOVER DAM
Irrigable Acres:	846,376	N
Gross Cropped Acres:	1,077,323	1 22
Net Cropped Acres:	793,974	DAVIS DAM
Fallowed/Idle Acres:	52,402	- Contraction of the Property
Agricultural Evapotranspiration (acre-feet):	2,990,807	ARIZONA
Riparian		CALIFORNIA
Riparian Vegetation - Acres:	138,686	The second secon
Riparian Evapotranspiration (acre-feet):	438,039	
Open Water		
Open Water - Acres:	11,987	
Open Water - Evaporation (acre-feet):	64,750	
Mainstream (Lake and River)		MPERIAL DAM
Acres:	57,676	Gilan
Evaporation (acre-feet):	284,264	MEXICO





Annual Agricultural ET



Evapotranspiration and Evaporation, 2008-2012



Executive Summary

Crop Type	Gross Cropped Acres	Acres % Total	Annual ET (acre-feet)	Annual ET % Total
Alfalfa	257 363	24	1 337 168	45
Aloe	45	<1	91	<1
Bermuda/Grass	71.524	7	292.268	10
Cane/Bamboo	38	<1	175	<1
Citrus	25.059	2	85.583	3
Cotton	55,456	5	158,673	5
Crucifers	48,787	5	33,116	1
Dates	14,106	1	81,467	3
Deciduous Orchards	1,358	<1	5,707	<1
Field Grain	16,302	2	47,011	2
Grapes	7,897	1	24,096	1
Jojoba Beans	17	<1	16	<1
Legume/Solanum Veg.	10,331	<1	16,493	<1
Lettuce	185,699	17	89,882	3
Marsh Maintained	303	<1	1,753	<1
Melons	8,425	1	14,327	<1
Miscellaneous herbs	1,138	<1	2,766	<1
Moist Soil Unit	1,567	<1	7,902	<1
Nursery/Greenhouse	2,587	<1	5,627	<1
Oil Crops	213	<1	518	<1
Perennial Vegetables	1,212	<1	5,574	<1
Root Vegetables	537	<1	386	<1
Small Grains	152,013	14	290,562	10
Small Vegetables	57,127	5	64,196	2
Sudan	105,183	10	339,566	11
Sugar Beets	50,175	5	77,379	3
Tomatoes	336	<1	745	<1
Wildlife Forage Maintained	1,035	<1	2,217	<1
Restoration Area	1,491	<1	5,545	<1
Total*	1,077,323	100%	2,990,807	100%

*Due to rounding, totals may differ from the sum of the individual values.

Hoover Dam to Davis Dam 2012

Agriculture NEVADA HOOVER There is no agricultural use in this reach. N ARIZONA Riparian 1,356 **Riparian Vegetation Acres:** CALIFORNIA PARKER DAM Riparian Evapotranspiration (acre-feet): 4,149 **Open Water Open Water Acres:** 12 Open Water Evaporation (acre-feet): 57 Gila River Mainstream (Lake and River) IMPERIAL DAM 27,371 Acres: MEXICO 133,823 Evaporation (acre-feet): **Crop Types Annual ET** within Reach Water Users within Reach **Acres** (acre-feet) Lake Mead National Recreation Area - AZ & NV Note: There were no crops grown in this reach.

Evapotranspiration and Evaporation, 2008-2012



Davis Dam to Parker Dam 2012

Agriculture	
Irrigable Acres:	18,197
Gross Cropped Acres:	17,939
Net Cropped Acres:	16,867
Fallowed/Idle Acres:	1,330
Agricultural Evapotranspiration (acre-feet):	67,670
Riparian	
Riparian Vegetation Acres:	38,377
Riparian Evapotranspiration (acre-feet):	123,827
Open Water	
Open Water Acres:	3,630
Open Water Evaporation (acre-feet):	17,747
Mainstream (Lake and River)	
Acres:	20,279
Evaporation (acre-feet):	99,146



Weter Heere with in Decel	Crop Types within Reach	Acres	Annual ET
water Users within Reach	Reach	Acies	
Bill Williams River National Wildlife Refuge - AZ	Alfalfa	7,991	42,951
Chemehuevi Indian Reservation - CA	Bermuda/Grass	1,344	4,225
Fort Mojave Indian Reservation - AZ, CA, & NV	Cotton	5,564	14,848
Havasu National Wildlife Refuge - AZ & CA	Crucifers	163	80
Lake Havasu State Park - AZ	Field Grain	100	255
Lake Mead National Recreation Area - AZ & NV	Small Grains	2,347	3,816
Mohave Valley Irrigation & Drainage District - AZ	Sudan	429	1,495
State of Arizona (Other Users)			
State of California (Other Users)			
State of Nevada (Other Users)			
	Total	17,939	67,670



Parker Dam to Imperial Dam 2012

Agriculture	
Irrigable Acres:	173,983
Gross Cropped Acres:	151,513
Net Cropped Acres:	154,499
Fallowed/Idle Acres:	19,484
Agricultural Evapotranspiration (acre-feet):	636,221
Riparian	
Riparian Vegetation Acres:	79,960
Riparian Evapotranspiration (acre-feet):	247,804
Open Water	
Open Water Acres:	3,866
Open Water Evaporation (acre-feet):	19,500
Mainstream (Lake and River)	
Acres:	9,307
Evaporation (acre-feet):	47 031



	Crop Types		Annual ET
Water Users within Reach	within Reach	Acres	(acre-feet)
Arizona Game and Fish Commission/Mohave County Water	Alfalfa	91,297	477,871
Authority - AZ	Bermuda/Grass	5,374	16,487
Arizona State Land Department - AZ	Citrus	1,998	6,797
Cibola National Wildlife Refuge - AZ & CA	Cotton	31,286	83,686
Cibola Valley Irrigation & Drainage District - AZ	Crucifers	835	573
Colorado River Indian Reservation - AZ & CA	Dates	462	2,611
GSC Farm, LLC - AZ	Deciduous Orchards	152	372
Hopi Tribe - AZ	Field Grain	844	2,117
Imperial National Wildlife Refuge - AZ	Grapes	42	123
Lake Enterprises of California, LLC - CA	Lettuce	415	303
North Baja Pipeline, LLC - AZ	Melons	1,733	3,405
Palo Verde Irrigation District - CA	Moist Soil Unit	312	1,535
Rayner Ranches - AZ	Nursery/Greenhouse	9	18
State of Arizona (Other Users)	Perennial Vegetables	185	823
State of California (Other Users)	Small Grains	10,447	20,387
	Small Vegetables	829	498
	Sudan	3,830	13,211
	Restoration Area	1,463	5,405



Imperial Dam to Mexico 2012

Agriculture	
Irrigable Acres:	654,196
Gross Cropped Acres:	907,872
Net Cropped Acres:	622,608
Fallowed/Idle Acres:	31,588
Agricultural Evapotranspiration (acre-feet):	2,286,916
Riparian	
Riparian Vegetation Acres:	18,993
Riparian Evapotranspiration (acre-feet):	62,259
Open Water	
Open Water Acres:	4,479
Open Water Evaporation (acre-feet):	27,446
Mainstream (Lake and River)	
Acres:	719
Evaporation (acre-feet):	4,264



	Crop Types		Annual ET
Water Users within Reach	within Reach	Acres	(acre-feet)
Arizona State Land Department - AZ	Alfalfa	158,075	816,345
AZ State Trust Lands, CA	Aloe	45	91
Beattie Farms Southwest - AZ	Bermuda/Grass	64,806	271,556
BLM, BLM (Monte Lee) & BLM (Pratt) - AZ	Cane/Bamboo	38	175
Cha Cha, LLC - AZ	Citrus	23,061	78,786
City of Yuma (Yuma East Wetlands), AZ	Cotton	18,605	60,139
Coachella Valley Water District - CA	Crucifers	47,788	32,463
Cocopah Indian Reservation (incl. East, North & West Reservations) - AZ	Dates	13,644	78,856
Curtis, Armon - AZ	Deciduous Orchards	1,207	5,335
Fort Yuma Indian Reservation (inc. Ranches & Yuma East Wetlands) - AZ & CA	Field Grain	15,359	44,638
Gila Monster Farms, AZ	Grapes	7,856	23,974
Griffin Ranches & Griffin, R AZ	Jojoba Beans	17	16
Imperial Irrigation District - CA	Legume/Solanum Veg.	10,331	16,493
JRJ Partners, LLC - AZ	Lettuce	185,284	89,579
Mittry Lake Management Area - AZ	Marsh Maintained	303	1,753
North Gila Valley Irrigation District - AZ	Melons	6,692	10,922
Ogram Boys Enterprises, Inc. & Ogram, George - AZ	Miscellaneous herbs	1,138	2,766
Pasquinelli, Gary & Barbara - AZ	Moist Soil Unit	1,256	6,367
Peach, John - AZ	Nursery/Greenhouse	2,578	5,609
Phillips, Milton - AZ	Oil Crops	213	518
Power & Power, Victor - AZ	Perennial Vegetables	1,027	4,751
State of Arizona (Downgradient of YMIDD, Limitrophe, Other Users)	Root Vegetables	537	386
State of California (Other Users)	Small Grains	139,218	266,359
Unit B Irrigation and Drainage District - AZ	Small Vegetables	56,298	63,697
University of Arizona - AZ	Sudan	100,924	324,860
Wellton Mohawk Irrigation and Drainage District - AZ	Sugar Beets	50,175	77,379
Yuma County Water Users' Association - AZ	Tomatoes	336	745
Yuma Irrigation District - AZ	Wildlife Forage Maintained	1,035	2,217
Yuma Mesa Irrigation and Drainage District - AZ	Restoration Area	28	140
Yuma Project Reservation Division, Bard Unit & Indian Unit - CA			
Yuma Proving Ground - AZ	Total	907.872	2,286,916



*The Imperial to Mexico reach includes water diverted from the Colorado River to the Wellton-Mowhawk Irrigation and Drainage District in Arizona, and Imperial Irrigation District and Coachella Valley Water District in California.

Arizona Game and Fish Commission/Mohave County Water Authority 2012

River Reach:	Parker Dam to Imperial Dam	
Agriculture		A. A.
Irrigable Acres:	1,178	17
Gross Cropped Acres:	1,187	
Net Cropped Acres:	1,097	1
Fallowed/Idle Acres:	81	the second se
Agricultural Evapotranspiration (acre-f	eet): 4,199	E.
Riparian		(The se
Riparian Vegetation Acres:	161	物化
Riparian Evapotranspiration (acre-feet	t): 468	and the
Open Water		
Open Water Acres:	0	N.S.
Open Water Evaporation (acre-feet):	0	De la





Annual Agricultural ET

Arizona Game and Fish Commission/Mohave County Water Authority 2012

Сгор Туре	Acres	Acres % Total	Annual ET (acre-feet)	Annual ET % Total
Alfalfa	245	21	1,295	31
Cotton	221	19	590	14
Deciduous Orchards	91	8	207	5
Restoration Area	561	47	1,967	47
Small Grains	71	6	139	3

Total*	1,187	100%	4,199	100%
*Due to displaying values t	o the nearest whole numbe	er, totals may differ	from the sum of the	individual values.

Arizona State Land Department - AZ

River Reach:	Parker Dam to Mexico	
Agriculture		No. No.
Irrigable Acres:	1,452	PANA P
Gross Cropped Acres:	1,494	0.11
Net Cropped Acres:	1,385	1
Fallowed/Idle Acres:	67	N. N. N
Agricultural Evapotranspiration (acre-feet):	3,184	Take -
Riparian		0.1440
Riparian Vegetation Acres:	163	10.00
Riparian Evapotranspiration (acre-feet):	565	A.A.A.A.
Open Water		at and
Open Water Acres:	11	
Open Water Evaporation (acre-feet):	65	





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Arizona State Land Department - AZ

				2012
Сгор Туре	Acres	Acres % Total	Annual ET (acre-feet)	Annual ET % Total
Alfalfa	25	2	125	4
Citrus	535	36	1,920	60
Cotton	4	<1	15	<1
Crucifers	26	2	14	<1
Dates	13	1	78	2
Legume/Solanum Veg.	53	4	58	2
Lettuce	539	36	185	6
Melons	84	6	152	5
Small Grains	23	2	41	1
Small Vegetables	47	3	80	3
Sudan	146	10	517	16

Total*	1,494	100%	3,184	100%
*Due to displaying values t values.	to the nearest whole num	iber, totals may di	ffer from the sum of	the individual

Cibola National Wildlife Refuge - AZ 2012

River Reach:	Parker Dam to Imperial Dam	1
Agriculture		2 m
Irrigable Acres:	2,485	N
Gross Cropped Acres:	2,177	1
Net Cropped Acres:	2,402	I
Fallowed/Idle Acres:	83	
Agricultural Evapotranspiration (acre-	feet): 9,272	1000
Riparian		CA
Riparian Vegetation Acres:	9,288	
Riparian Evapotranspiration (acre-fee	t): 27,998	
Open Water		a da anti-
Open Water Acres:	550	-10-5-21"
Open Water Evaporation (acre-feet):	2,741	





Major Crop Types

Cibola National Wildlife Refuge - AZ

				2012
Сгор Туре	Acres	Acres % Total	Annual ET (acre-feet)	Annual ET % Total
Alfalfa	1,156	53	5,978	64
Bermuda/Grass	44	2	139	1
Deciduous Orchards	28	1	15	<1
Field Grain	181	8	453	5
Moist Soil Unit	239	11	1,178	13
Restoration Area	299	14	1,057	11
Small Grains	229	11	452	5

Total*	2,177	100%	9,272	100%
*Due to displaying values t values.	o the nearest whole num	nber, totals may di	ffer from the sum of	the individual

Cibola Valley Irrigation and Drainage District - AZ 2012

River Reach:	Parker Dam to Imperial Dam	CATE AND THE THE
Agriculture		NEVADA
Irrigable Acres:	1,209	N HOOVER DAM
Gross Cropped Acres:	1,098	1
Net Cropped Acres:	1,145	DAVIS DAM
Fallowed/Idle Acres:	64	2
Agricultural Evapotranspiration (acre-	feet): 4,328	
Riparian		CALIFORNIA
Riparian Vegetation Acres:	1,101	
Riparian Evapotranspiration (acre-fee	t): 3,104	Salion
Open Water		IMPERIAL DAM River
Open Water Acres:	0	MEXICO
Open Water Evaporation (acre-feet):	0	



Cibola Valley Irrigation and Drainage District - AZ

2012

	• • • • •	Acres	Annual ET	Annual ET
Crop Type	Acres	70 TOLAI	(acre-reet)	70 TOLAI
Alfalfa	500	45	2,624	61
Bermuda/Grass	68	6	214	5
Cotton	499	45	1,334	31
Moist Soil Unit	32	3	156	4

Total*	1,098	100%	4,328	100%
*Due to displaying values to	the nearest whole numb	per, totals may differ	from the sum of the i	ndividual values.

Cocopah Indian Reservation - AZ (Includes East, North and West Reservations) 2012

River Reach:	Imperial Dam to Mexico	CARE AND
Agriculture		NEVADA
Irrigable Acres:	2,038	N
Gross Cropped Acres:	0	
Net Cropped Acres:	1,655	DAVIS DAM
Fallowed/Idle Acres:	383	2
Agricultural Evapotranspiration (acre-feet):	0	
Riparian		CALIFORNIA
Riparian Vegetation Acres:	0	
Riparian Evapotranspiration (acre-feet):	0	Sulton
Open Water		IMPERIAL DAM RIVET
Open Water Acres:	0	MEXICO
Open Water Evaporation (acre-feet):	0	



Cocopah Indian Reservation - AZ (Includes East, North and West Reservations)

				2012	
Сгор Туре	Acres	Acres % Total	Annual ET (acre-feet)	Annual ET % Total	
Alfalfa	579	28	2,916	51	
Bermuda/Grass	115	6	343	6	
Cotton	122	6	406	7	
Crucifers	7	<1	5	<1	
Lettuce	542	26	195	3	
Melons	58	3	106	2	
Small Grains	272	13	487	9	
Small Vegetables	6	<1	3	<1	
Sudan	348	17	1,230	22	

Total*	2,051	100%	5,692	100%
*Due to displaying values to	the nearest whole num	ber, totals may differ	from the sum of the i	ndividual values.

Colorado River Indian Reservation - AZ

River Reach:	Parker Dam to Imperial Dam	X 19/31
Agriculture		NE
Irrigable Acres:	74,986	N
Gross Cropped Acres:	71,280	1
Net Cropped Acres:	71,327	
Fallowed/Idle Acres:	3,659	the second of
Agricultural Evapotranspiration (acre-f	eet): 313,557	CALIFORNI
Riparian		CALIFORNI
Riparian Vegetation Acres:	31,912	A Carl
Riparian Evapotranspiration (acre-feet	t): 88,834	Salton
Open Water		and the a
Open Water Acres:	186	MEXICO
Open Water Evaporation (acre-feet):	940	





Colorado River Indian Reservation - AZ

				2012
Сгор Туре	Acres	Acres % Total	Annual ET (acre-feet)	Annual ET % Total
Alfalfa	48,106	67	255,272	81
Bermuda/Grass	2,307	3	7,064	2
Cotton	11,285	16	30,186	10
Crucifers	93	<1	33	<1
Deciduous Orchards	6	<1	27	<1
Grapes	5	<1	14	<1
Lettuce	41	<1	30	<1
Melons	33	<1	70	<1
Perennial Vegetables	185	<1	823	<1
Restoration Area	139	<1	651	<1
Small Grains	6,474	9	12,759	4
Small Vegetables	829	1	498	<1
Sudan	1,777	2	6,131	2

Total*	71,280	100%	313,557	100%
*Due to displaying values values.	to the nearest whole nur	nber, totals may di	iffer from the sum c	f the individual

Hopi Tribe

River Reach:	Parker Dam to Imperial Dam
Agriculture	
Irrigable Acres:	986
Gross Cropped Acres:	946
Net Cropped Acres:	946
Fallowed/Idle Acres:	40
Agricultural Evapotranspiration (acre-f	eet): 3,003
Riparian	
Riparian Vegetation Acres:	393
Riparian Evapotranspiration (acre-feet	t): 1,063
Open Water	
Open Water Acres:	0
Open Water Evaporation (acre-feet):	0



Major Crop Types

Annual Agricultural ET



Hopi Tribe 2012

Сгор Туре	Acres	Acres % Total	Annual ET (acre-feet)	Annual ET % Total
Alfalfa	181	19	956	32
Cotton	765	81	2,047	68

Total*	946	100%	3,003	100%
*Due to displaying values to	o the nearest whole numbe	er, totals may differ	r from the sum of the i	ndividual values.

Fort Mojave Indian Reservation - AZ

River Reach:	Davis Dam to Parker Dam	/
Agriculture		a Mi
Irrigable Acres:	10,009	Words.
Gross Cropped Acres:	10,617	-1
Net Cropped Acres:	9,883	- 21
Fallowed/Idle Acres:	126	100
Agricultural Evapotranspiration (acre-fee	et): 39,418	N. K.
Riparian		AV.
Riparian Vegetation Acres:	7,511	9
Riparian Evapotranspiration (acre-feet):	20,955	10
Open Water		14.00
Open Water Acres:	32	100
Open Water Evaporation (acre-feet):	158	





Fort Mojave Indian Reservation - AZ

2012

		Acres	Annual ET	Annual ET
Сгор Туре	Acres	% Total	(acre-feet)	% Total
Alfalfa	4,321	41	23,288	59
Bermuda/Grass	3	<1	11	<1
Cotton	5,090	48	13,583	34
Crucifers	107	1	52	<1
Field Grain	100	1	255	1
Small Grains	875	8	1,808	5
Sudan	121	1	420	1

Total*	10,617	100%	39,418	100%
*Due to displaying values t	o the nearest whole numb	er, totals may differ	from the sum of the	individual values.

Gila Monster Farms - AZ

River Reach:	Imperial Dam to Mexico	1
Agriculture		a late
Irrigable Acres:	1,377	N
Gross Cropped Acres:	2,885	1
Net Cropped Acres:	1,347	
Fallowed/Idle Acres:	30	14
Agricultural Evapotranspiration (acre-feet):	4,021	199
Riparian		CA
Riparian Vegetation Acres:	39	-13
Riparian Evapotranspiration (acre-feet):	161	
Open Water		Lit
Open Water Acres:	8	11/2
Open Water Evaporation (acre-feet):	49	





Major Crop Types

Annual Agricultural ET

Gila Monster Farms - AZ

2012

		Acres	Annual ET	Annual ET
Сгор Туре	Acres	% Total	(acre-feet)	% Total
Alfalfa	41	1	177	4
Bermuda/Grass	31	1	101	3
Citrus	97	3	305	8
Cotton	145	5	481	12
Crucifers	143	5	58	1
Lettuce	1,436	50	510	13
Perennial Vegetables	18	1	83	2
Small Grains	558	19	1,000	25
Small Vegetables	59	2	45	1
Sudan	357	12	1,260	31

Total*	2,885	100%	4,021	100%
*Due to displaying value	es to the nearest whole numbe	er, totals may diffe	r from the sum of the i	ndividual values.

Mohave Valley Irrigation and Drainage District - AZ 2012

River Reach:	Davis Dam to Parker Dam
Agriculture	
Irrigable Acres:	4,137
Gross Cropped Acres:	3,478
Net Cropped Acres:	3,541
Fallowed/Idle Acres:	596
Agricultural Evapotranspiration (acre-fee	et): 15,387
Riparian	
Riparian Vegetation Acres:	5,421
Riparian Evapotranspiration (acre-feet):	15,487
Open Water	
Open Water Acres:	103
Open Water Evaporation (acre-feet):	504





Mohave Valley Irrigation and Drainage District - AZ

-	-	
60)	n	
	9	

Сгор Туре	Acres	Acres % Total	Annual ET (acre-feet)	Annual ET % Total
Alfalfa	2,329	67	12,592	82
Bermuda/Grass	123	4	339	2
Cotton	340	10	906	6
Small Grains	594	17	1,227	8
Sudan	93	3	323	2

Total*	3,478	100%	15,387	100%
*Due to displaying values to	o the nearest whole numb	per, totals may differ	from the sum of the	individual values.

North Gila Valley Irrigation District - AZ

River Reach:	Imperial Dam to Mexico	1199
Agriculture		
Irrigable Acres:	5,836	N
Gross Cropped Acres:	13,245	Į
Net Cropped Acres:	5,728	
Fallowed/Idle Acres:	108	the Care
Agricultural Evapotranspiration (acre-feet):	19,441	CA
Riparian		
Riparian Vegetation Acres:	784	- A 16
Riparian Evapotranspiration (acre-feet):	2,643	
Open Water		- finite
Open Water Acres:	11	and the second second
Open Water Evaporation (acre-feet):	66	Contraction of the





North Gila Valley Irrigation District - AZ

				2012
		Acres	Annual ET	Annual ET
Сгор Туре	Acres	% Total	(acre-feet)	% Total
Alfalfa	114	1	538	3
Bermuda/Grass	28	<1	90	<1
Citrus	13	<1	44	<1
Cotton	1,853	14	6,153	32
Crucifers	911	7	423	2
Dates	15	<1	87	<1
Field Grain	100	1	237	1
Legume/Solanum Veg.	51	<1	127	1
Lettuce	6,571	50	2,640	14
Melons	27	<1	44	<1
Perennial Vegetables	30	<1	138	1
Root Vegetables	13	<1	13	<1
Small Grains	1,581	12	2,831	15
Small Vegetables	272	2	183	1
Sudan	1,667	13	5,892	30

Total*13,245100%19,441100%*Due to displaying values to the nearest whole number, totals may differ from the sum of the individual values.

Unit B Irrigation and Drainage District - AZ 2012

River Reach:	Imperial Dam to Mexico	CATES AND PARTY
Agriculture		NEVADA
Irrigable Acres:	1,885	N HOOVER DAM
Gross Cropped Acres:	1,579	
Net Cropped Acres:	1,637	DAVIS DAM
Fallowed/Idle Acres:	248	
Agricultural Evapotranspiration (acre-feet):	6,702	
Riparian		CALIFORNIA
Riparian Vegetation Acres:	0	
Riparian Evapotranspiration (acre-feet):	0	Sulton
Open Water		IMPERIAL DAM RIVE
Open Water Acres:	20	MEXICO
Open Water Evaporation (acre-feet):	118	

ONA


Unit B Irrigation and Drainage District - AZ

Сгор Туре	Acres	Acres % Total	Annual ET (acre-feet)	Annual ET % Total
Alfalfa	737	47	3,920	58
Bermuda/Grass	177	11	570	9
Citrus	351	22	1,219	18
Cotton	15	1	48	1
Crucifers	19	1	7	<1
Dates	84	5	484	7
Deciduous Orchards	5	<1	22	<1
Lettuce	61	4	29	<1
Nursery/Greenhouse	15	1	32	<1
Small Grains	13	1	23	<1
Small Vegetables	8	1	14	<1
Sudan	94	6	333	5

Wellton-Mohawk Irrigation and **Drainage District - AZ** 2012

River Reach:	Imperial Dam to Mexico	44013131 1 4 All 2 5-151
Agriculture		NEVADA
Irrigable Acres:	58,561	N
Gross Cropped Acres:	85,794	
Net Cropped Acres:	56,310	DAVIS DAM
Fallowed/Idle Acres:	2,251	ARIZONA
Agricultural Evapotranspiration (acre-feet):	185,865	
Riparian		
Riparian Vegetation Acres:	0	River
Riparian Evapotranspiration (acre-feet):	0	Sulton Sva
Open Water		IMPERIAL DAM
Open Water Acres:	130	MEXICO
Open Water Evaporation (acre-feet):	722	



Major Crop Types

Wellton-Mohawk Irrigation and Drainage District - AZ

	Acres	Annual ET	Annual ET
Acres	% Total	(acre-feet)	% Total
15,111	18	74,000	40
2,236	3	6,883	4
387	<1	1,203	1
9,312	11	29,282	16
2,542	3	1,243	1
7	<1	37	<1
68	<1	294	<1
60	<1	142	<1
557	1	1,285	1
27,744	32	8,588	5
1,603	2	2,093	1
23	<1	100	<1
13,527	16	22,597	12
1,951	2	2,023	1
10,416	12	35,625	19
251	<1	472	<1
	Acres 15,111 2,236 387 9,312 2,542 7 68 60 557 27,744 1,603 23 13,527 1,951 10,416 251	Acres% Total15,111182,2363387<1	AcresAcresAnnual ET (acre-feet)15,1111874,0002,23636,883387<1

Total*	85,794	100%	185,865	100%
*Due to displaying values values	s to the nearest whole num	ıber, totals may diff	fer from the sum of the	e individual

Yuma County Water Users' Association - AZ

2012

River Reach:	Imperial Dam to Mexico	Citeran Citeration
Agriculture		NEVADA
Irrigable Acres:	41,167	N HOOVER DAM
Gross Cropped Acres:	84,373	
Net Cropped Acres:	40,693	DAVIS DAM
Fallowed/Idle Acres:	474	a state of the sta
Agricultural Evapotranspiration (acre-feet):	103,878	ARIZONA
Riparian		CALIFORNIA
Riparian Vegetation Acres:	2	
Riparian Evapotranspiration (acre-feet):	3	Sulton
Open Water		IMPERIAL DAM
Open Water Acres:	313	MEXICO Gila R
Open Water Evaporation (acre-feet):	1,853	



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Yuma County Water Users' **Association - AZ** 2012

				2012
Cron Tuno	Aoroo	Acres % Total	Annual ET	Annual ET % Total
стор туре	Acres	70 10001		70 TOtal
Alfalfa	758	1	4,024	4
Bermuda/Grass	333	<1	1,212	1
Citrus	288	<1	1,031	1
Cotton	3,511	4	11,659	11
Crucifers	7,023	8	3,373	3
Dates	295	<1	1,717	2
Deciduous Orchards	147	<1	677	1
Field Grain	60	<1	142	<1
Grapes	1	<1	1	<1
Legume/Solanum Veg.	439	1	1,098	1
Lettuce	45,240	54	16,854	16
Melons	311	<1	546	1
Miscellaneous herbs	222	<1	662	1
Nursery/Greenhouse	269	<1	592	1
Perennial Vegetables	15	<1	67	<1
Small Grains	15,415	18	27,601	27
Small Vegetables	997	1	756	1
Sudan	9,012	11	31,844	31
Sugar Beets	38	<1	22	<1

Total* 84,373 100% 103,878 100% *Due to displaying values to the nearest whole number, totals may differ from the sum of the individual values.

Yuma Irrigation District - AZ

River Reach:	Imperial Dam to Mexico	Cathering and a fair in the
Agriculture		NEVADA
Irrigable Acres:	10,047	N HOOVER DAM
Gross Cropped Acres:	20,033	
Net Cropped Acres:	9,940	DAVIS DAM
Fallowed/Idle Acres:	107	
Agricultural Evapotranspiration (acre-feet):	28,541	ARIZONA
Riparian		CALIFORNIA
Riparian Vegetation Acres:	224	
Riparian Evapotranspiration (acre-feet):	660	Salton
Open Water		IMPERIAL DAM
Open Water Acres:	62	MEXICO
Open Water Evaporation (acre-feet):	365	Contract Multiple



Yuma Irrigation District - AZ

0	0	2	0
Ζ	U		7

Cron Type	Acres	Acres % Total	Annual ET (acre-feet)	Annual ET % Total
	600	2	2.050	4.4
Alfalfa	620	3	3,250	11
Bermuda/Grass	80	<1	260	1
Citrus	3	<1	12	<1
Cotton	1,175	6	3,902	14
Crucifers	1,603	8	845	3
Dates	66	<1	381	1
Field Grain	36	<1	85	<1
Legume/Solanum Veg.	642	3	1,607	6
Lettuce	9,582	48	3,377	12
Melons	314	2	570	2
Miscellaneous herbs	27	<1	81	<1
Nursery/Greenhouse	28	<1	62	<1
Small Grains	3,293	16	5,895	21
Small Vegetables	352	2	395	1
Sudan	2,213	11	7,819	27

Total*	20,033	100%	28,541	100%
*Due to displaying val	ues to the nearest whole numb	er, totals may diffe	er from the sum of the	individual values.

Yuma Mesa Irrigation and **Drainage District - AZ** 2012

River Reach:	Imperial Dam to Mexico	AND AND AND AND
Agriculture		NEVADA
Irrigable Acres:	16,409	N HOOVER DAM
Gross Cropped Acres:	16,003	
Net Cropped Acres:	15,234	C DAVIS DAM
Fallowed/Idle Acres:	1,175	a second and a second second
Agricultural Evapotranspiration (acre-feet):	64,255	ARIZONA
Riparian		CALIFORNIA
Riparian Vegetation Acres:	0	
Riparian Evapotranspiration (acre-feet):	0	Sulton
Open Water		IMPERIAL DAM DIVET
Open Water Acres:	174	MEXICO Gila N
Open Water Evaporation (acre-feet):	1,029	



Major Crop Types

Yuma Mesa Irrigation and Drainage District - AZ

Acres	Acres % Total	Annual ET (acre-feet)	Annual ET % Total
5,592	35	29,298	46
269	2	879	1
6,238	39	21,851	34
76	<1	252	<1
9	<1	3	<1
747	5	4,343	7
74	<1	341	1
198	1	106	<1
50	<1	90	<1
79	<1	175	<1
1,018	6	1,087	2
5	<1	7	<1
1,648	10	5,825	9
	Acres 5,592 269 6,238 76 9 747 74 198 50 79 1,018 5 1,648	Acres% Total5,5923526926,2383976<1	AcresAcresAnnual ET (acre-feet)5,5923529,29826928796,2383921,85176<1

Total*	16,003	100%	64,255	100%
*Due to displaying values to values.	the nearest whole num	nber, totals may diffe	er from the sum of the	individual

Arizona State Trust Lands, CA 2012

River Reach: Imperial Dam to M	
Agriculture	
Irrigable Acres:	1,970
Gross Cropped Acres:	2,820
Net Cropped Acres:	1,797
Fallowed/Idle Acres:	173
Agricultural Evapotranspiration (acre-feet):	5,537
Riparian	
Riparian Vegetation Acres:	511
Riparian Evapotranspiration (acre-feet):	1,689
Open Water	
Open Water Acres:	17
Open Water Evaporation (acre-feet):	102





Major Crop Types

Arizona State Trust Lands, CA

2012

Сгор Туре	Acres	Acres % Total	Annual ET (acre-feet)	Annual ET % Total
Alfalfa	342	12	1,682	30
Bermuda/Grass	37	1	68	1
Citrus	27	1	98	2
Cotton	33	1	111	2
Crucifers	76	3	36	1
Legume/Solanum Veg.	23	1	57	1
Lettuce	923	33	327	6
Melons	16	1	30	1
Oil Crops	22	1	67	1
Small Vegetables	599	21	514	9
Sudan	721	26	2,546	46

Total*	2,820	100%	5,537	100%
*Due to displaying values to	the nearest whole num	ber, totals may differ	from the sum of the i	ndividual values.

Coachella Valley Water District - CA

River Reach:	Imperial Dam to Mexico	CARLON APPENDING
Agriculture		NEVADA
Irrigable Acres:	57,847	N
Gross Cropped Acres:	63,232	
Net Cropped Acres:	51,413	DAVIS DAM
Fallowed/Idle Acres:	6,434	and the second se
Agricultural Evapotranspiration (acre-feet)	: 159,131	
Riparian		CALIFORNIA
Riparian Vegetation Acres:	0	
Riparian Evapotranspiration (acre-feet):	0	Salton
Open Water		MPERIAL DAM
Open Water Acres:	868	Gila R
Open Water Evaporation (acre-feet):	5,458	



Coachella Valley Water District - CA

Сгор Туре	Acres	Acres % Total	Annual ET (acre-feet)	Annual ET % Total		
Alfalfa	414	1	2,122	1		
Aloe	1	<1	2	<1		
Bermuda/Grass	1,920	3	8,401	5		
Citrus	7,573	12	26,432	17		
Crucifers	5,623	9	4,125	3		
Dates	8,425	13	48,561	31		
Deciduous Orchards	402	1	1,802	1		
Field Grain	4,115	7	11,998	8		
Grapes	7,855	12	23,972	15		
Legume/Solanum Veg.	5,194	8	8,346	5		
Lettuce	9,837	16	3,896	2		
Melons	1,758	3	2,940	2		
Miscellaneous herbs	823	1	1,824	1		
Moist Soil Unit	87	<1	443	<1		
Nursery/Greenhouse	1,507	2	3,267	2		
Oil Crops	22	<1	53	<1		
Perennial Vegetables	539	1	2,499	2		
Root Vegetables	409	1	291	<1		
Small Grains	600	1	630	<1		
Small Vegetables	5,538	9	5,988	4		
Sudan	262	<1	811	1		
Tomatoes	328	1	727	<1		
Total*	63,232	100%	159,131	100%		
*Due to displaying values to	o the nearest whole	number, totals may	differ from the sum of	of the individual		
values.	values.					

Fort Mojave Indian Reservation - CA 2012

River Reach:	Davis Dam to Parker Dam
Agriculture	
Irrigable Acres:	3,219
Gross Cropped Acres:	3,276
Net Cropped Acres:	3,031
Fallowed/Idle Acres:	188
Agricultural Evapotranspiration (acre-fee	et): 10,505
Riparian	
Riparian Vegetation Acres:	919
Riparian Evapotranspiration (acre-feet):	2,680
Open Water	
Open Water Acres:	0
Open Water Evaporation (acre-feet):	0





Fort Mojave Indian Reservation - CA

				2012	
Сгор Туре	Acres	Acres % Total	Annual ET (acre-feet)	Annual ET % Total	
Alfalfa	1,015	31	5,313	51	
Bermuda/Grass	1,158	35	3,599	34	
Cotton	129	4	344	3	
Small Grains	783	24	586	6	
Sudan	190	6	663	6	

Total*	3,276	100%	10,505	100%
*Due to displaying values t	to the nearest whole numb	er, totals may differ	from the sum of the i	ndividual values.

Yuma Project Reservation Division, Bard Unit - CA

2012

River Reach:	Imperial Dam to Mexico	Citeralan Property in M
Agriculture		NEVADA
Irrigable Acres:	6,371	N
Gross Cropped Acres:	14,071	
Net Cropped Acres:	6,370	DAVIS DAM
Fallowed/Idle Acres:	1	a share from the second se
Agricultural Evapotranspiration (acre-feet):	21,267	
Riparian		CALIFORNIA
Riparian Vegetation Acres:	250	Contraction of the second s
Riparian Evapotranspiration (acre-feet):	815	Salton
Open Water		IMPERIAL DAM DIVET
Open Water Acres:	28	MEXICO Gila h
Open Water Evaporation (acre-feet):	169	



Major Crop Types

Annual Agricultural ET

Yuma Project Reservation Division, Bard Unit - CA

2012

		Acres	Annual ET	Annual ET
Сгор Туре	Acres	% Total	(acre-feet)	% Total
Alfalfa	114	1	622	3
Bermuda/Grass	6	<1	21	<1
Citrus	115	1	421	2
Cotton	555	4	1,843	9
Crucifers	974	7	447	2
Dates	853	6	4,960	23
Deciduous Orchards	7	<1	30	<1
Field Grain	8	<1	19	<1
Legume/Solanum Veg.	18	<1	46	<1
Lettuce	6,734	48	2,524	12
Melons	187	1	339	2
Small Grains	2,762	20	4,945	23
Small Vegetables	447	3	486	2
Sudan	1,292	9	4,564	21

Total*	14,071	100%	21,267	100%
*Due to displaying values to	o the nearest whole numb	oer, totals may differ	from the sum of the	individual values.

Yuma Project Reservation Division **Indian Unit - CA** 2012

River Reach:	Imperial Dam to Mexico	Carter as as a the true of the
Agriculture		NEVADA
Irrigable Acres:	6,072	N HOOVER DAM
Gross Cropped Acres:	12,846	
Net Cropped Acres:	5,777	DAVIS DAM
Fallowed/Idle Acres:	295	
Agricultural Evapotranspiration (acre-feet):	15,054	ARIZONA
Riparian		CALIFORNIA
Riparian Vegetation Acres:	239	and the second second
Riparian Evapotranspiration (acre-feet):	661	Salion
Open Water		Me mperial Dam piver
Open Water Acres:	20	MEXICO Gila N.
Open Water Evaporation (acre-feet):	118	



Annual Agricultural ET

Yuma Project Reservation Division Indian Unit - CA

	6	
		- 2
-		

		Acres	Annual ET	Annual ET
Сгор Туре	Acres	% Total	(acre-feet)	% Total
Alfalfa	46	<1	261	2
Bermuda/Grass	107	1	349	2
Cotton	500	4	1,661	11
Crucifers	1,141	9	455	3
Dates	9	<1	55	<1
Legume/Solanum Veg.	14	<1	36	<1
Lettuce	6,430	50	2,354	16
Melons	58	<1	101	1
Miscellaneous herbs	58	<1	173	1
Small Grains	3,181	25	5,696	38
Small Vegetables	233	2	146	1
Sudan	1,061	8	3,748	25
Tomatoes	8	<1	18	<1

Total*	12,846	100%	15,054	100%
*Due to displaying values t	o the nearest whole num	ber, totals may diffe	r from the sum of the	e individual values.

Imperial Irrigation District - CA 2012

River Reach:	Imperial Dam to Mexico	Carly!
Agriculture		and and
Irrigable Acres:	430,801	N
Gross Cropped Acres:	573,365	1
Net Cropped Acres:	412,482	
Fallowed/Idle Acres:	18,319	and the second
Agricultural Evapotranspiration (acre-feet):	1,618,502	CALIE
Riparian		CALIFU
Riparian Vegetation Acres:	0	- An Sall
Riparian Evapotranspiration (acre-feet):	0	Se
Open Water		a fatter
Open Water Acres:	2,116	ME
Open Water Evaporation (acre-feet):	13,179	L





Major Crop Types

Annual Agricultural ET

Imperial Irrigation District - CA

	-	
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		Acres	Annual ET	Annual ET
Сгор Туре	Acres	% Total	(acre-feet)	% Total
Alfalfa	131,378	23	682,001	42
Aloe	44	<1	90	<1
Bermuda/Grass	59,013	10	250,897	16
Cane/Bamboo	38	<1	175	<1
Citrus	6,485	1	20,826	1
Crucifers	27,370	5	21,251	1
Dates	804	<1	4,642	<1
Deciduous Orchards	461	<1	1,970	<1
Field Grain	10,981	2	32,015	2
Jojoba Beans	17	<1	16	<1
Legume/Solanum Veg.	3,340	1	3,834	<1
Lettuce	67,044	12	46,937	3
Marsh Maintained	303	<1	1,753	<1
Melons	2,136	<1	3,751	<1
Moist Soil Unit	1,169	<1	5,924	<1
Nursery/Greenhouse	678	<1	1,477	<1
Oil Crops	168	<1	398	<1
Perennial Vegetables	402	<1	1,864	<1
Root Vegetables	115	<1	82	<1
Small Grains	95,307	17	190,752	12
Small Vegetables	45,432	8	52,712	3
Sudan	69,761	12	216,034	13
Sugar Beets	49,886	9	76,885	5
Wildlife Forage Maintained	1,035	<1	2,217	<1

Total*	573,365	100%	1,618,502	100%
*Due to displaying values	to the nearest whole number,	totals may differ	from the sum of the i	ndividual values.

Palo Verde Irrigation District - CA

River Reach:	Parker Dam to Imperial Dam	A PART AND
Agriculture		NEVADA
Irrigable Acres:	89,306	N
Gross Cropped Acres:	72,148	1 2
Net Cropped Acres:	75,020	DAVIS DAM
Fallowed/Idle Acres:	14,286	a la
Agricultural Evapotranspiration (acre-f	eet): 291,080	
Riparian		CALIFORNIA
Riparian Vegetation Acres:	3,045	Setter
Riparian Evapotranspiration (acre-feet	t): 8,573	Sea
Open Water		IMPERIAL DAM DIVET
Open Water Acres:	252	MEXICO Gila h
Open Water Evaporation (acre-feet):	1,272	



Palo Verde Irrigation District - CA

				2012
Сгор Туре	Acres	Acres % Total	Annual ET (acre-feet)	Annual ET % Total
Alfalfa	39,931	55	205,677	71
Bermuda/Grass	2,884	4	8,850	3
Citrus	1,853	3	6,352	2
Cotton	17,442	24	46,656	16
Crucifers	743	1	540	<1
Dates	254	<1	1,436	<1
Deciduous Orchards	27	<1	123	<1
Field Grain	663	1	1,664	1
Grapes	37	<1	109	<1
Lettuce	374	1	273	<1
Melons	1,699	2	3,335	1
Moist Soil Unit	41	<1	200	<1
Nursery/Greenhouse	9	<1	18	<1
Restoration Area	464	1	1,729	1
Small Grains	3,674	5	7,036	2
Sudan	2,053	3	7,080	2

Total*	72,148	100%	291,080	100%
*Due to displaying values	to the nearest whole number,	totals may differ	from the sum of the in	dividual values.

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Other Water Users Not Reported on Individual Fact Sheets 2012

		Agricultural Acreage				Agriculture			Riparian Vegetation		Open Water	
Water User	River Reach	Irrigable Acres	Gross Cropped Acres	Net Cropped Acres	Fallowed/Idle Acres	Сгор Туре	Acres	Annual ET (acre-feet)	Acres	Annual ET (acre-feet)	Acres	Annual Evaporation (acre-feet)
Arizona	otals may differ from the sum of the indi-											
Beattie Farms Southwest	Imperial Dam To Mexico	214	303	214	0	Alfalfa Lettuce Small Grains Small Vegetables Sudan Total	84 21 47 102 49 303	403 17 84 93 174 770	89	243	0	0
Bill Williams National Wildlife Refuge	Davis Dam To Parker Dam	0	0	0	0	Total	0	0	2,140	7,615	43	210
Bill Williams National Wildlife Refuge (NCR)	Bill Williams River, NCR	0	0	0	0	Total	0	0	457	1,618	10	50
BLM	Imperial Dam To Mexico	55	55	55	0	Bermuda/Grass Restoration Area Total	40 15 55	132 76 208	23	132	0	0
BLM (Monty Lee)	Imperial Dam To Mexico	50	149	50	0	Crucifers Lettuce Small Grains Sudan Total	20 79 29 20 149	10 43 53 71 177	0	0	0	0
BLM (Pratt)	Imperial Dam To Mexico	61	81	61	0	Cotton Crucifers Lettuce Restoration Area Small Vegetables Sudan Total	29 2 13 13 6 19 81	96 1 10 64 9 67 247	0	0	0	0
Cha Cha, LLC	Imperial Dam To Mexico	337	337	337	0	Citrus Dates Total	325 13 337	1,181 73 1,254	119	329	4	21
City of Yuma (Yuma East Wetlands)	Imperial Dam to Mexico	0	0	0	0	Total	0	0	97	395	17	99
Cocopah Indian Tribe, Fee Lands	Imperial Dam To Mexico	108	324	108	0	Cotton Lettuce Small Vegetables Sudan Total	55 179 37 53 324	184 71 53 186 494	18	53	0	0
Curtis, Armon	Imperial Dam To Mexico	43	85	43	0	Alfalfa Crucifers Lettuce Total	43 28 14 85	114 14 2 130	5	19	0	0
Fort Yuma Indian Reservation	Imperial Dam To Mexico	31	0	0	31	Total	0	0	1,480	4,619	24	145
Fort Yuma Indian Reservation, Ranch 5	Imperial Dam To Mexico	181	91	66	115	Cotton Lettuce Total	66 25 91	220 6 226	1	2	0	0
Fort Yuma Indian Reservation, Yuma East Wetlands	Imperial Dam To Mexico	0	0	0	0	Total	0	0	189	627	4	2
Griffin, R.	Imperial Dam To Mexico	13	39	13	0	Cotton Crucifers Lettuce Total	13 13 13 39	43 10 2 54	0	0	0	0

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Other Water Users Not Reported on Individual Fact Sheets 2012

		Agricultural Acreage			Agriculture			Riparian Vegetation		Open W	ater	
		Irrigable	Gross Cropped	Net Cropped	Fallowed/Idle			Annual ET		Annual ET		Annual Evaporation
Note: Due to displaying values to the nearest whole number, tota	s may differ from the sum of the indiv	vidual values.	Acres	Acres	Acres	Crop Type	Acres	(acre-teet)	Acres	(acre-teet)	Acres	(acre-teet)
Arizona (continued)												
Griffin Ranches	Imperial Dam To Mexico	38	113	38	0	Cotton Crucifers Lettuce Sudan Total	20 38 38 18	66 28 5 63				
GSC Farm, LLC	Parker Dam To Imperial Dam	389	376	376	13	Alfalfa Cotton Total	163 214 376	860 571 1 432	0	2	0	0
Havasu National Wildlife Refuge	Davis Dam To Parker Dam	155	155	155	0	Bermuda/Grass Small Grains Total	60 95 155	277 195 472	10,933	43,536	3,159	15,445
Hillander C (NCR)	Imperial Dam To Mexico NCR	2,334	810	811	1,523	Alfalfa Lettuce Small Grains Total	538 102 171 810	2,876 43 306 3,224	0	0	0	0
Imperial National Wildlife Refuge	Parker Dam To Imperial Dam	70	70	70	0	Bermuda/Grass Total	70 70	219 219	4,814	20,441	619	3,129
JRJ Partners, LLC	Imperial Dam To Mexico	200	365	181	19	Dates Lettuce Small Vegetables Sudan Total	74 124 70 97 365	433 78 31 343 885	4	12	0	0
Lake Havasu State Park	Davis Dam To Parker Dam	0	0	0	0	Total	0	0	405	1,320	1	6
Lake Mead National Recreation Area (Davis Dam to Parker Dam)	Davis Dam To Parker Dam	0	0	0	0	Total	0	0	27	102	1	5
Lake Mead National Recreation Area (Hoover Dam to Davis Dam)	Hoover dam to Davis Dam	0	0	0	0	Total	0	0	666	2.092	7	33
Mittry Lake Management Area	Imperial Dam To Mexico	0	0	0	0	Total	0	0	3.234	12.581	434	2.571
North Baja Pipeline, LLC	Parker Dam To Imperial Dam	46	81	46	0	Alfalfa Cotton Total	35 46 81	32 123 155	1	2	0	0
Ogram Boys Enterprises Inc.	Imperial Dam To Mexico	169	312	169	0	Alfalfa Lettuce Small Grains Sudan Total	41 182 74 15 312	211 97 132 53 491	2	12	0	0
Ogram, George	Imperial Dam To Mexico	73	115	73	0	Alfalfa Crucifers Lettuce Small Grains Sudan Total	14 20 43 29 10 115	66 7 11 51 34 170	0	0	0	0
Pasquinelli, Gary and Barbara	Imperial Dam To Mexico	76	265	76	0	Crucifers Lettuce Small Vegetables Sudan Total	68 85 36 76 265	41 41 54 270 406	0	0	0	0
Peach, John	Imperial Dam To Mexico	74	74	74	0	Cotton Total	74 74	247 247	0	0	0	0

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Other Water Users Not Reported on Individual Fact Sheets 2012

		Agricultural Acreage				Agriculture		Riparian Vegetation		Open Water		
Water Hore	Diver Deech	Irrigable	Gross Cropped	Net Cropped	Fallowed/Idle	Curren Turren	A	Annual ET	A	Annual ET	A	Annual Evaporation
Note: Due to displaying values to the nearest whole number, tota	als may differ from the sum of the indiv	/idual values.	Acres	Acres	Acres	стор туре	Acres	(acre-ieer)	Acres	(acre-leet)	Acres	(acre-ieet)
Arizona (continued)												
Phillips, Milton	Imperial Dam To Mexico	19	0	0	19							
						Total	0	0	0	0	0	0
Power	Imperial Dam To Mexico	43	104	43	0	Cotton	19	62				
						Lettuce Sudan	62 24	37 85				
						Total	104	184	0	0	0	0
Power, Victor	Imperial Dam To Mexico	8	23	8	0	Crucifers	8	6				
						Lettuce	8	1				
						Sudan	8	27				
						Total	23	34	1	2	0	0
Rayner Ranches	Parker Dam To Imperial Dam	679	679	679	0	Alfalfa	236	1,251				
						Total	443 679	1,185 2 436	3	з	0	0
State of Arizona (Davis Dam to Parker Dam)	Davis Dam To Parker Dam	0	0	0	0			2,430	y		U	•
		0	0	0	0	Total	0	0	895	2,157	53	259
State of Arizona (Imperial Dam to Mexico)	Imperial Dam To Mexico	902	1,247	777	125	Alfalfa	31	136				
						Bermuda/Grass	18	58				
						Citrus	2	6				
						Cotton	40	131				
						Crucifers	23	17				
						Dates	232	1,346				
						Lettuce	423	135				
						Small Grains	0 107	9 192				
						Small Vegetables	16	23				
						Sudan	349	1,233				
						Total	1,247	3,287	2,373	8,237	80	472
State of Arizona (Parker Dam to Imperial Dam)	Parker Dam To Imperial Dam	131	131	131	0	Cotton	131	351				
		110	220	264		lotal	131	351	6,226	21,225	723	3,654
State of Arizona, Alamo Dam to Bill Williams River NWR (NCR)	Bill Williams River, NCR	410	228	261	149	Alfalfa	103	645				
						Total	228	259 904	6 357	15 631	110	540
State of Arizona, Down Gradient of YMIDD	Imperial Dam To Mexico	7 536	7 178	6 763	773	Alfalfa	1 987	10 455	0,007	13,031	110	540
		7,550	,,1,0	0,700	775	Bermuda/Grass	126	411				
						Citrus	579	2,088				
						Cotton	495	1,643				
						Dates	1,996	11,604				
						Deciduous Orchard	s 38	176				
						Small Grains	1,103	1,762				
						Sudan	854	3,017	•			•
State of Arizona, Cila Diver Valley (NCD)		2.966	1 0 2 2	1 0 2 2	1.042	Cotton	129	31,157	U	U	0	0
State of Alizona, Gila River Valley (NCR)	Glia River valley, NCR	2,866	1,023	1,023	1,843	Dates	128	402 1 8/9				
						Joioba Beans	234	1,849				
						Small Grains	240	402				
						Small Vegetables	81	107				
						Total	1,023	3,879	0	0	0	0
State of Arizona, Limitrophe	Imperial Dam To Mexico	793	830	764	29	Bermuda/Grass	270	881				
						Cotton	165	549				
						Dates	_7	39				
						Lettuce	74	49				
						Small Grains	251	449				
						Total	830	224 2,191	1,447	4,067	0	0

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Other Water Users Not Reported on Individual Fact Sheets 2012

		Agricultural Acreage			Agriculture		Riparian Vegetation		Open Water			
Water User	River Reach	Irrigable Acres	Gross Cropped Acres	Net Cropped Acres	Fallowed/Idle Acres	Сгор Туре	Acres	Annual ET (acre-feet)	Acres	Annual ET (acre-feet)	Acres	Annual Evaporation (acre-feet)
Arizona (continued)												
University of Arizona	Imperial Dam To Mexico	84	66	64	20	Alfalfa Citrus Crucifers Dates Deciduous Orchards Nursery/Greenhouse Sudan Total	5 45 5 2 5 1 4 66	25 149 3 9 23 3 13 224	0	0	0	0
Yuma Proving Ground	Imperial Dam to Mexico	0	0	0	0	Total	0	0	84	262	15	90
California	"											
Chemehuevi Indian Reservation	Davis Dam To Parker Dam	58	0	0	58	Total	0	0	560	2,195	0	0
Cibola National Wildlife Refuge	Davis Dam To Parker Dam	0	0	0	0	Total	0	0	3,945	12,880	121	614
Colorado River Indian Reservation	Parker Dam To Imperial Dam	949	671	671	278	Alfalfa Bermuda/Grass Total	670 1 671	3,547 2 3,549	11,120	32,237	130	658
Fort Yuma Indian Reservation	Imperial Dam To Mexico	134	188	96	38	Lettuce Small Grains Sudan Total	107 29 52 188	22 52 185 259	3,518	10,729	56	335
Fort Yuma Indian Reservation, Ranch 1	Imperial Dam To Mexico	92	271	92	0	Cotton Lettuce Sudan Total	82 180 10 271	271 77 35 383	0	0	0	0
Fort Yuma Indian Reservation, Ranch 2, Parcel 3	Imperial Dam To Mexico	55	164	55	0	Cotton Crucifers Lettuce Total	55 55 55 164	181 19 7 207	0	0	0	0
Fort Yuma Indian Reservation, Ranch 3	Imperial Dam To Mexico	80	2	2	78	Dates Total	2 2	9 9	5	14	0	0
Fort Yuma Indian Reservation, Ranch 4	Imperial Dam To Mexico	329	494	293	36	Crucifers Lettuce Melons Miscellaneous herbs Small Vegetables Sudan Total	9 198 84 9 79 115 494	7 120 153 26 68 407 780	<1	1	0	0
Fort Yuma Indian Reservation, Ranch 5	Imperial Dam To Mexico	311	403	170	141	Cotton Crucifers Lettuce Sudan Total	63 32 215 92 403	210 14 100 326 649	0	0	0	0
Fort Yuma Indian Reservation, Ranch 7	Imperial Dam To Mexico	120	104	74	46	Lettuce Small Vegetables Total	96 8 104	43 14 57	Π	0	Ο	Ω
Fort Yuma Indian Reservation, Ranch 15	Imperial Dam To Mexico	127	298	127	0	Cotton Lettuce Total	127 171 298	422 84 506	2	11	n	
Fort Yuma Indian Reservation, Ranch 17	Imperial Dam To Mexico	58	0	58	0	Total	0	0	0	0	0	0

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Other Water Users Not Reported on Individual Fact Sheets 2012

		Agricultural Acreage			Agriculture		Riparian Ve	getation	Open Water			
Water User	River Reach	Irrigable Acres	Gross Cropped Acres	Net Cropped Acres	Fallowed/Idle Acres	Сгор Туре	Acres	Annual ET (acre-feet)	Acres	Annual ET (acre-feet)	Acres	Annual Evaporation (acre-feet)
Colifornia (continued)	s may differ from the sum of the indic	ndual values.										
Havasu National Wildlife Refuge	Davis Dam To Parker Dam	0	0	0	0	Total	0	0	755	3.726	80	392
Imperial National Wildlife Refuge	Parker Dam To Imperial Dam	0	0	0	0	Total	0	0	2,536	10,115	203	1,024
Lake Enterprises of California, LLC	Parker Dam To Imperial Dam	0	0	0	0	Total	0	0	131	638	7	34
State of California (Davis Dam to Parker Dam)	Davis Dam To Parker Dam	0	0	0	0	Total	0	0	3,268	9,393	87	425
State of California (Parker Dam to Imperial Dam)	Parker Dam To Imperial Dam	1,332	353	353	979	Citrus Dates Total	145 208 353	444 1,175 1,620	4,536	18,314	1,075	5,434
State of California (Imperial Dam to Mexico)	Imperial Dam to Mexico	0	0	0	0	Total	0	0	2,386	7,852	62	369
Nevada												
Fort Mojave Indian Reservation	Davis Dam To Parker Dam	412	412	412	0	Alfalfa Cotton Crucifers Sudan Total	325 6 57 25 412	1,757 15 28 87 1,887	2,256	5,315	11	54
Lake Mead National Recreation Area (Hoover Dam to Davis Dam)	Hoover Dam to Davis Dam	0	0	0	0	Total	0	0	690	2,057	5	24
State of Nevada (Davis Dam to Parker Dam)	Davis Dam To Parker Dam	0	0	0	0	Total	0	0	3,287	9,347	59	288

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Appendix 2: Monthly Reference Values for Reference ET, Precipitation, and Crop/Riparian Vegetation ET Rates

This appendix contains area-specific data used by Reclamation to calculate the ET and evaporation estimates provided in this report. Each table displays monthly reference ET and precipitation values, monthly ET rates for crop and riparian groups, and monthly evaporation rates for open water areas.

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Mohave Area ET Rate Table (Inches) 2012

					201	2							
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Reference ET	3.51	4.23	5.88	6.93	9.50	9.62	8.02	7.89	6.28	4.78	3.30	2.14	72.08
									•				
Precipitation	0.02	0.08	0.18	0.90	0.00	0.01	1.69	0.92	0.73	1.22	0.00	1.03	6.77
Сгор	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Alfalfa	2.77	4.24	4.88	6.38	8.89	8.38	7.13	7.44	6.69	3.72	2.58	2.24	65.35
Bermuda	0.00	0.00	0.11	2.98	7.83	8.19	6.82	6.60	5.10	0.18	0.00	0.00	37.80
Bermuda Overseeded with Rve in Winter	3.13	3.60	4.41	2.98	7.83	8.19	6.82	6.60	5.10	2.28	2.91	1.84	55.68
Citrus - Declining	1 71	1 98	2 64	2 97	3.89	3 84	3 20	3 15	2.56	2 09	1 54	1 02	30.59
Citrus - Mature	2 44	2.83	3.77	4 25	5.56	5.48	4 57	4 50	3.66	2.00	2 20	1.02	43 70
Citrus - Young	1.46	1 70	2.26	2 55	3 34	3 20	2 74	2 70	2 20	1 70	1 32	0.88	26.22
Cotton	0.00	0.00	0.00	0.99	2.46	5.60	7 45	8.83	6 14	0.56	0.00	0.00	32.02
Crucifers Fall Farly	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.14	2.16	1 94	1 91	6 11
Crucifers Fall Late	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.10	0.17	1.34	1.51	2.01
Crucifers Spring Early	3.52	4.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.17	0.00	0.00	8 10
Crucifers Spring Late	3.32	4.03	5 36	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	12.03
Deteo	2.04	4.24	5.00	6.07	0.00	0.00	7.94	7.62	0.00	4.50	2.00	1.00	60.67
Dates	1.59	1.04	2.01	5.11	9.50	9.01	6.05	6.92	5.44	4.52	2.00	1.90	55.96
	1.50	0.00	0.04	0.00	0.17	0.33	0.95	0.03	2.44	4.14	2.11	1.20	14.26
Fail Meions	0.00	0.00	0.00	0.00	0.00	0.00	0.00	5.00	3.60	4.70	3.29	1.10	14.30
Falli Pollu Field Croin	3.12	3.04	5.14	0.00	0.01	0.17	0.49	5.99	4.60	3.74	2.90	1.07	00.03
	0.00	0.04	2.00	0.37	11.39	9.92	1.03	0.00	0.00	0.00	0.00	0.00	30.01
Grapes	0.00	0.20	1.73	4.52	0.03	0.17	0.47	4.93	1.04	0.00	0.00	0.00	30.70
Irrigated Restoration - Cottonwood/Willow	1.10	1.40	2.81	5.20	9.41	9.78	8.10	8.02	0.39	4.29	1.81	0.49	58.98
Imigated Restoration - Mixed Veg Low	0.72	0.90	1.90	3.23	5.30	5.39	4.49	4.31	2.84	1.62	0.77	0.42	31.89
Imgaled Restoration - Mixed Veg Medium	1.05	1.29	2.20	3.23	5.05	5.14	4.20	3.73	2.51	1.55	0.99	0.62	31.02
Legume/Solanum Vegetables Fall	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.74	2.36	2.05	6.15
Legume/Solanum Vegetables Spring	3.69	4.38	2.24	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	10.31
Lettuce Fall Early	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.13	2.94	2.90	0.00	5.97
Lettuce Spring Late	3.19	4.24	2.40	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	9.83
Miscellaneous herbs	0.00	1.64	4.48	8.18	11.75	10.52	1.38	0.00	0.00	0.00	0.00	0.00	37.95
Moist Soil Unit	3.51	4.23	5.78	6.83	5.31	3.32	8.67	8.91	4.32	4.78	3.30	2.06	61.01
Nursery/Greenhouse	1.46	1.70	2.26	2.55	3.34	3.29	2.74	2.70	2.20	1.79	1.32	0.88	26.22
Oil Crops	0.00	1.64	4.48	8.18	11.75	10.52	1.38	0.00	0.00	0.00	0.00	0.00	37.95
Perennial Vegetables	1.53	1.84	2.74	5.15	8.85	8.98	7.48	7.34	5.13	3.03	1.48	0.90	54.46
Root Vegetables	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.08	2.22	3.68	3.46	1.97	11.41
Small Grains Fall	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.33	0.75	1.08
Small Grains Spring	2.95	4.77	6.63	7.51	2.99	0.00	0.00	0.00	0.00	0.00	0.00	0.00	24.86
Small Vegetables Fall	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.08	1.95	2.51	2.05	7.60
Small Vegetables Spring	3.50	4.21	4.72	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	12.43
Spring Melons	0.00	0.43	3.91	6.86	9.48	5.16	0.00	0.00	0.00	0.00	0.00	0.00	25.83
Sudan	0.00	0.06	3.06	7.10	10.83	10.97	8.85	0.96	0.00	0.00	0.00	0.00	41.83
Sugar Beets (Summer)	3.76	4.53	6.30	7.13	6.96	0.00	0.00	0.00	0.00	0.00	0.00	0.00	28.69
Sugar Beets Fall	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.73	1.73	2.12	2.00	6.58
Tomatoes	0.00	2.61	5.06	8.15	10.61	3.72	0.00	0.00	0.00	0.00	0.00	0.00	30.14
Wildlife Forage Maintained	3.40	5.01	6.97	7.11	3.80	0.29	0.00	0.00	0.00	0.00	0.07	0.94	27.60
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Open Water	3.09	3.64	5.14	6.58	8.81	8.17	6.49	5.99	4.60	3.74	2.90	1.67	60.80
Riparian Types	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Barren	0.70	0.75	0.83	0.94	1.29	1.31	1.09	1.07	0.85	0.69	0.59	0.41	10.53
Cottonwood/Willow	1.16	1.40	2.81	5.26	9.41	9.78	8.16	8.02	6.39	4.29	1.81	0.49	58.98
Marsh	0.91	1.10	4.62	8.24	11.30	11.44	9.54	9.38	7.38	2.67	0.82	0.52	67.91
Mixed Veg Low	0.72	0.90	1.90	3.23	5.30	5.39	4.49	4.31	2.84	1.62	0.77	0.42	31.89
Mixed Veg Medium	1.05	1.29	2.20	3.23	5.05	5.14	4.26	3.73	2.51	1.55	0.99	0.62	31.62
Salt Cedar Dense	0.79	0.95	1.69	3.55	6.84	7.28	6.07	5.97	4.72	2.80	1.14	0.46	42.26

Parker Area ET Rate Table (Inches) 2012

	lan	Ech	Mar	Apr	May	lun	lul l	Aug	Son	Oct	Nov	Dec	Total
Poforonoo ET	3 0 4	2 74	F 72	7.05	May 0.12	0.20	9 09	7 05	6 20	4 97	2.02	2 12	70.41
	3.04	3.74	5.73	7.05	9.12	9.39	0.00	7.95	0.30	4.07	2.93	2.13	70.41
Provinitation	0.07	0.00	0.25	0.00	0.00	0.00	1 11	0.09	0.22	0.24	0.00	0.72	2.60
Freepitation	0.07	0.00	0.25	0.09	0.00	0.00	1.11	0.90	0.25	0.24	0.00	0.72	5.09
Crop	lan	Ech	Mar	Apr	May	lun	lul.	Δυσ	Son	Oct	Nov	Dec	Total
Alfolfo	Jan 1 70	2.44	Mai 4 27	Api 5.07	111ay	9 26	Jui 7 62	7 20	5ep 5 12	4.04	2.21	2.25	FOTAL 60.20
Alialia	0.00	0.00	4.57	3.27	7.55	0.50	7.02	6.94	5.12	4.54	2.21	2.55	27.71
Bermuda Overseeded with Bus in Winter	0.00	0.00	0.06	2.00	7.23	0.07	7.32	0.04	5.15	0.15	0.00	0.00	57.71
Citrue Declining	2.09	2.90	3.77	2.00	7.23	0.07	7.32	0.04	5.15	2.13	2.30	1.90	32.00
Citrus - Deciming	1.14	1.59	2.24	2.00	3.01	3.01	3.45	3.20	2.59	2.02	1.20	1.09	20.92
Citrus - Mature	1.63	2.27	3.20	4.08	5.16	5.44	4.93	4.68	3.69	2.89	1.79	1.56	41.32
Citrus - Young	0.98	1.36	1.92	2.45	3.09	3.26	2.96	2.81	2.22	1.73	1.07	0.94	24.79
Cotton	0.00	0.00	0.77	1.74	3.53	6.56	8.44	9.21	6.10	1.43	0.00	0.00	37.78
Crucifers Fall Early	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.32	1.63	1.52	2.07	5.54
Cruciters Fall Late	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.04	0.94	1.16	2.14
Crucifers Spring Early	2.34	0.85	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3.18
Crucifers Spring Late	2.13	3.40	2.21	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	7.73
Dates	1.93	2.94	4.80	6.55	8.66	9.32	8.41	7.94	6.09	4.43	2.55	2.09	65.70
Deciduous Orchards	0.90	1.32	2.58	4.71	7.44	8.11	7.35	6.98	5.38	3.94	2.20	1.36	52.28
Fall Melons	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.12	3.17	4.10	2.67	2.00	12.06
Farm Pond	2.09	2.93	4.36	6.32	8.17	8.10	7.00	6.23	4.63	3.62	2.35	1.78	57.58
Field Grain	0.00	0.63	2.94	7.52	10.46	6.98	0.00	0.00	0.00	0.00	0.00	0.00	28.53
Grapes	0.00	0.23	1.49	4.37	7.46	8.10	6.97	5.16	1.58	0.00	0.00	0.00	35.36
Irrigated Restoration - Cottonwood/Willow	0.78	1.13	2.41	5.07	8.75	9.70	8.80	8.35	6.44	4.18	1.45	0.51	57.56
Irrigated Restoration - Mixed Veg Low	0.48	0.72	1.62	3.11	4.92	5.34	4.84	4.49	2.85	1.58	0.63	0.45	31.04
Irrigated Restoration - Mixed Veg Medium	0.71	1.03	1.87	3.11	4.69	5.09	4.59	3.89	2.52	1.51	0.80	0.66	30.48
Joioba Beans	2.58	3.57	2.89	0.26	4.26	8.10	9.51	9.03	6.96	5.09	2.95	2.42	57.63
Legume/Solanum Vegetables	0.00	0.00	0.00	1.98	5 59	9.39	8.98	3 24	0.00	0.00	0.00	0.00	29.17
Legume/Solanum Vegetables Fall	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1 28	1.69	2 17	5 15
Legume/Solanum Vegetables Fail	2 47	3 52	1.82	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	7.80
Lettuce Fall Farly	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00	1.86	3.46	2.40	0.00	7.00
Lettuce Fall Late	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.58	1.72
Lettuce Spring Early	2.25	1.81	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00
Lettuce Spring Laty	2.25	2.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	4.00
	0.95	3.00	4.00	0.00	10.00	10.00	0.00	0.00	0.00	0.00	0.00	0.00	0.03
Miscellarieous nerbs	0.00	1.20	3.70	1.03	10.03	10.34	0.20	0.00	0.00	0.00	0.00	0.00	53.46
Moist Soli Unit	2.30	3.40	4.69	0.00	4.76	3.33	9.36	9.20	4.25	4.03	2.00	2.20	57.69
Nursery/Greennouse	0.98	1.36	1.92	2.45	3.09	3.26	2.96	2.81	2.22	1.73	1.07	0.94	24.79
Oil Crops	0.00	1.26	3.76	7.83	10.83	10.34	1.46	0.00	0.00	0.00	0.00	0.00	35.48
Perennial Vegetables	0.96	1.39	2.20	4.86	8.12	8.80	7.98	7.55	5.12	2.97	1.23	0.90	52.06
Root Vegetables	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.09	2.37	3.56	2.81	2.08	10.91
Small Grains Fall	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.73	0.75
Small Grains Spring	2.15	3.79	5.57	6.22	2.36	0.00	0.00	0.00	0.00	0.00	0.00	0.00	20.10
Small Vegetables Fall	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.39	1.63	1.87	4.90
Small Vegetables Spring	2.34	3.39	4.91	5.27	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	15.92
Small Vegetables Spring Late	1.70	2.00	4.03	5.62	3.02	0.87	0.00	0.00	0.00	0.00	0.00	0.00	19.53
	0.00	2.49	4.46	6.72	7.96	0.00	0.00	0.00	0.00	0.00	0.00	0.00	21.63
	0.00	0.00	0.08	2.88	8.83	10.79	9.78	8.68	0.00	0.00	0.00	0.00	41.04
Sugar Beets (Summer)	2.50	3.61	5.30	6.79	6.35	0.00	0.00	0.00	0.00	0.00	0.00	0.00	24.54
Sugar Beets Fall	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.83	1.71	1.73	2.14	6.40
Tomatoes	0.00	2.10	4.32	7.81	9.80	3.62	0.00	0.00	0.00	0.00	0.00	0.00	27.65
Wildlife Forage Maintained	2.31	4.03	5.91	6.82	3.43	0.29	0.00	0.00	0.00	0.00	0.07	1.02	23.88
												_	
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Open water	2.00	3.27	5.14	6.92	9.08	9.83	9.00	8.53	6.45	4.57	2.32	1.65	68.77
												_	
Riparian Types	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Barren	0.47	0.60	0.70	0.91	1.20	1.30	1.18	1.12	0.86	0.67	0.48	0.44	9.91
Cottonwood/Willow	0.78	1.13	2.41	5.07	8.75	9.70	8.80	8.35	6.44	4.18	1.45	0.51	57.56
Marsh	0.61	0.89	3.99	7.92	10.49	11.34	10.28	9.76	7.44	2.65	0.67	0.55	66.59
Mixed Veg Low	0.48	0.72	1.62	3.11	4.92	5.34	4.84	4.49	2.85	1.58	0.63	0.45	31.04
Mixed Veg Medium	0.71	1.03	1.87	3.11	4.69	5.09	4.59	3.89	2.52	1.51	0.80	0.66	30.48
Salt Cedar Dense	0.53	0.76	1.45	3.43	6.37	7.22	6.55	6.21	4.76	2.72	0.92	0.49	41.41

Wellton-Mohawk Area ET Rate Table (Inches) 2012

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Reference ET	2.35	3.40	4.99	0.00	8.82	9.54	C0.6	8.21	0.33	4.03	2.08	2.21	08.03
Precipitation	0.00	0.08	0.10	0.00	0.00	0.00	0.66	0.26	1.29	0.07	0.00	0.53	2.98
Crear	Inn	Eale	Men	Ame	Meu	lue	Ind	A	Com	0	Marri	Dee	Total
Crop	Jan 1 79	Feb 2.44	Mar	Apr 5.07	May 7 25	Jun	Jui	Aug 7 20	Sep 5 10	UCT 4.04	NOV 2.21	Dec	
Alialia	1.78	3.44	4.37	0.27	7.30	8.30	7.02	7.39	5.1Z	4.94	2.21	2.30	27.71
Bermuda Overeaged with Byg in Winter	2.00	2.0	0.06	2.00	7.23	8.07	7.32	0.04	5.15 E 1E	0.13	2.25	1.06	57.71
Citrue Declining	2.09	2.9	3.77	2.80	7.20	8.07	7.32	0.84	5.15	2.13	2.35	1.90	52.08
Citrus - Declining	1.14	1.59	2.24	2.80	3.01	3.81	3.45	3.28	2.59	2.02	1.25	1.09	28.92
Citrus - Mature	1.63	2.27	3.2	4.08	5.16	5.44	4.93	4.68	3.69	2.89	1.79	1.56	41.32
Citrus - Young	0.98	1.36	1.92	2.45	3.09	3.26	2.96	2.81	2.22	1.73	1.07	0.94	24.79
Cotton	0	0	0.77	1.74	3.53	6.56	8.44	9.21	6.1	1.43	0	0	37.78
Crucifers Fall Early	0	0	0	0	0	0	0	0	0.32	1.63	1.52	2.07	5.54
	0	0	0	0	0	0	0	0	0	0.04	0.94	1.16	2.14
Crucifers Spring Early	2.34	0.85	0	0	0	0	0	0	0	0	0	0	3.18
Crucifers Spring Late	2.13	3.4	2.21	0	0	0	0	0	0	0	0	0	7.73
Dates	1.93	2.94	4.8	6.55	8.66	9.32	8.41	7.94	6.09	4.43	2.55	2.09	65.7
Deciduous Orchards	0.9	1.32	2.58	4.71	7.44	8.11	7.35	6.98	5.38	3.94	2.2	1.36	52.28
Fall Melons	0	0	0	0	0	0	0	0.12	3.17	4.1	2.67	2	12.06
Farm Pond	2.09	2.93	4.36	6.32	8.17	8.1	7	6.23	4.63	3.62	2.35	1.78	57.58
Field Grain	0	0.63	2.94	7.52	10.46	6.98	0	0	0	0	0	0	28.53
Grapes	0	0.23	1.49	4.37	7.46	8.1	6.97	5.16	1.58	0	0	0	35.36
Irrigated Restoration - Cottonwood/Willow	0.78	1.13	2.41	5.07	8.75	9.7	8.8	8.35	6.44	4.18	1.45	0.51	57.56
Irrigated Restoration - Mixed Veg Low	0.48	0.72	1.62	3.11	4.92	5.34	4.84	4.49	2.85	1.58	0.63	0.45	31.04
Irrigated Restoration - Mixed Veg Medium	0.71	1.03	1.87	3.11	4.69	5.09	4.59	3.89	2.52	1.51	0.8	0.66	30.48
Jojoba Beans	2.58	3.57	2.89	0.26	4.26	8.1	9.51	9.03	6.96	5.09	2.95	2.42	57.63
Legume/Solanum Vegetables	0	0	0	1.98	5.59	9.39	8.98	3.24	0	0	0	0	29.17
Legume/Solanum Vegetables Fall	0	0	0	0	0	0	0	0	0	1.28	1.69	2.17	5.15
Legume/Solanum Vegetables Spring	2.47	3.52	1.82	0	0	0	0	0	0	0	0	0	7.8
Lettuce Fall Early	0	0	0	0	0	0	0	0	1.86	3.46	2.4	0	7.72
Lettuce Fall Late	0	0	0	0	0	0	0	0	0	0	0	1.58	1.58
Lettuce Spring Early	2.25	1.81	0	0	0	0	0	0	0	0	0	0	4.06
Lettuce Spring Late	0.95	3	4.88	0	0	0	0	0	0	0	0	0	8.83
Miscellaneous herbs	0	1.26	3.76	7.83	10.83	10.34	1.46	0	0	0	0	0	35.48
Mixed Veg Low	0.48	0.72	1.62	3.11	4.92	5.34	4.84	4.49	2.85	1.58	0.63	0.45	31.04
Mixed Veg Medium	0.71	1.03	1.87	3.11	4.69	5.09	4.59	3.89	2.52	1.51	0.8	0.66	30.48
Moist Soil Unit	2.35	3.4	4.89	6.55	4.78	3.33	9.38	9.26	4.25	4.63	2.68	2.2	57.69
Nursery/Greenhouse	0.98	1.36	1.92	2.45	3.09	3.26	2.96	2.81	2.22	1.73	1.07	0.94	24.79
Oil Crops	0	1.26	3.76	7.83	10.83	10.34	1.46	0	0	0	0	0	35.48
Perennial Vegetables	0.96	1.39	2.2	4.86	8.12	8.8	7.98	7.55	5.12	2.97	1.23	0.9	52.06
River	2	3.27	5.14	6.92	9.08	9.83	9	8.53	6.45	4.57	2.32	1.65	68.77
Root Vegetables	0	0	0	0	0	0	0	0.09	2.37	3.56	2.81	2.08	10.91
Small Grains Fall	0	0	0	0	0	0	0	0	0	0	0.02	0.73	0.75
Small Grains Spring	2.15	3.79	5.57	6.22	2.36	0	0	0	0	0	0	0	20.1
Small Vegetables Fall	0	0	0	0	0	0	0	0	0	1.39	1.63	1.87	4.9
Small Vegetables Spring	2.34	3.39	4.91	5.27	0	0	0	0	0	0	0	0	15.92
Small Vegetables Spring Late	1.76	2.65	4.63	5.82	3.82	0.87	0	0	0	0	0	0	19.53
Spring Melons	0	2.49	4.46	6.72	7.96	0	0	0	0	0	0	0	21.63
Sudan	0	0	0.08	2.88	8.83	10.79	9.78	8.68	0	0	0	0	41.04
Sugar Beets (Summer)	2.5	3.61	5.3	6.79	6.35	0	0	0	0	0	0	0	24.54
Sugar Beets Fall	0	0	0	0	0	0	0	0	0.83	1.71	1.73	2.14	6.4
Tomatoes	0	2.1	4.32	7.81	9.8	3.62	0	0	0	0	0	0	27.65
Wildlife Forage Maintained	2.31	4.03	5.91	6.82	3.43	0.29	0	0	0	0	0.07	1.02	23.88
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct _	Nov	Dec	Total
Open Water	2	3.27	5.14	6.92	9.08	9.83	9	8.53	6.45	4.57	2.32	1.65	68.77
Riparian Types	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Barren	0.47	0.6	0.7	0.91	1.2	1.3	1.18	1.12	0.86	0.67	0.48	0.44	9.91
	0.78	1.13	2.41	5.07	8.75	9.7	8.8	8.35	6.44	4.18	1.45	0.51	57.56
Marsh	0.61	0.89	3.99	7.92	10.49	11.34	10.28	9.76	7.44	2.65	0.67	0.55	66.59
	0.48	0.72	1.62	3.11	4.92	5.34	4.84	4.49	2.85	1.58	0.63	0.45	31.04
iviixea veg Mealum Salt Cedar Dense	0.71	1.03	1.87	3.11	4.69	5.09	4.59	3.89	2.52	1.51	0.8	0.06	30.48

Yuma Area ET Rate Table (Inches) 2012

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Reference ET	3.35	3.60	5.32	6.67	8.53	9.93	9.07	8.87	6.85	5.40	3.21	2.37	73.17
Precipitation	0.03	0.05	0.06	0.05	0.00	0.00	1.26	0.31	0.89	0.08	0.00	0.57	3.31
-													
Сгор	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Alfalfa	2.59	3.64	4.69	5.38	7.11	8.65	7.99	7.95	5.58	5.76	2.64	2.47	64.46
Bermuda	0	0	0.09	2.85	7.01	8.4	7.67	7.39	5.57	0.2	0	0	39.19
Bermuda Overseeded with Rye in Winter	2.98	3.07	4.03	2.85	7.01	8.4	7.67	7.39	5.57	2.5	2.82	2.06	56.36
Citrus - Declining	1.63	1.68	2.39	2.86	3.49	3.96	3.62	3.54	2.8	2.36	1.5	1.15	30.98
Citrus - Mature	2.33	2.4	3.41	4.09	4.99	5.66	5.17	5.06	3.99	3.37	2.14	1.64	44.25
Citrus - Young	1.4	1.44	2.05	2.45	2.99	3.4	3.1	3.03	2.4	2.02	1.28	0.98	26.55
Cotton	0	0	0.8	1.74	3.42	6.85	8.84	9.95	6.61	1.68	0	0	39.89
Crucifers Fall Early	0	0	0	0	0	0	0	0	0.35	1.9	1.82	2.17	6.24
Crucifers Fall Late	0	0	0	0	0	0	0	0	0	0.04	1.13	1.22	2.39
Crucifers Spring Early	3.33	0.9	0	0	0	0	0	0	0	0	0	0	4.24
Crucifers Spring Late	3.02	3.6	2.42	0	0	0	0	0	0	0	0	0	9.04
Dates	2.75	3.11	5.12	6.56	8.37	9.7	8.81	8.58	6.59	5.17	3.06	2.19	70
Deciduous Orchards	1.29	1.39	2.74	4.71	7.2	8.44	7.71	7.54	5.82	4.59	2.64	1.43	55.5
Fall Melons	0	0	0	0	0	0	0	0.12	3.42	4.78	3.2	2.09	13.62
Farm Pond	2.98	3.1	4.65	6.33	7.91	8.43	7.34	6.73	5.01	4.22	2.82	1.87	61.39
Field Grain	0	0.67	3.1	7.51	10.12	7.2	0	0	0	0	0	0	28.6
Grapes	0	0.25	1.57	4.35	7.22	8.43	7.31	5.58	1.74	0	0	0	36.45
Irrigated Restoration - Cottonwood/Willow	1.11	1.19	2.55	5.06	8.47	10.1	9.22	9.02	6.97	4.87	1.74	0.54	60.83
Irrigated Restoration - Mixed Veg Low	0.69	0.77	1.72	3.11	4.76	5.56	5.08	4.85	3.09	1.84	0.75	0.47	32.68
Irrigated Restoration - Mixed Veg Medium	1.01	1 1	1.99	3 11	4 53	5.3	4 82	4 2	2 73	1.01	0.96	0.69	32.2
Legume/Solanum Vegetables	0	0	0	1.89	5.42	9.79	9.42	3 53	0	0	0.00	0.00	30.04
Legume/Solanum Vegetables Fall	0	0	0	0	0.12	0.10	0.12	0.00	0	1 49	2 02	2 28	5 79
Legume/Solanum Vegetables Spring	3 52	3 72	2 04	0	0	0	0	0	0	0	0	0	9.28
Lettuce Fall Farly	0.02	0.72	2.04	0	0	0	0	0	1 98	4 04	2 92	0	8.93
Lettuce Fall Late	0	0	0	0	0	0	0	0	1.00	+.0+ 0	2.02	1.66	1.66
Lettuce Spring Early	32	1.86	0	0	0	0	0	0	0	0	0	1.00	5.06
Lettuce Spring Late	13	3.18	5.2	0	0	0	0	0	0	0	0	0	9.68
Miscellanoous horbs	1.5	1 22	3.02	7 92	10.47	10.73	1 55	0	0	0	0	0	35.99
Miscellaneous nerbs	3 35	1.55	5.30	6.57	10.47	3.40	1.55	0 00	4.64	5.4	3 21	2 21	62.22
Nursen/Greenhouse	1.0	1.44	2.05	2.45	2.01	3.49	3.03	3.03	4.04	2.02	1.28	0.98	26.55
Oil Crops	1.4	1.44	2.05	7.92	10.47	10.73	1.55	5.05	2.4	2.02	1.20	0.30	20.00
Beronnial Vagetables	1 37	1.55	2.34	1.02	7.96	0.16	9.36	9.16	5 55	3.46	1 49	0.04	54.09
Pivor	2.95	3.46	5.49	6.03	9.70	9.10	0.30	0.10	5.55	5.33	2.79	1 73	73 22
Rivel Boot Vegetables	2.03	3.40	3.40	0.93	0.79	10.23	9.43	9.22	0.90	J.JJ	2.70	2.10	10.22
Small Grains Fall	0	0	0	0	0	0	0	0.09	2.00	4.15	3.30	2.10	0.70
Small Grains Fail	2.02	4.02	5.04	6.29	2.27	0	0	0	0	0	0.02	0.77	0.75
Small Vegetables Fall	3.03	4.02	5.94	0.20	2.27	0	0	0	0	1.61	1.05	1.06	21.00
Small Vegetables Fall	0	2.50	E 22		0	0	0	0	0	1.01	1.95	1.90	0.03 47 47
Small Vegetables Spring Late	3.34	3.59	J.∠3	5.3 E 00	0	0	0	0	0	0	0	0	17.47
Smail Vegetables Spring Late	2.48	2.8	4.92	5.60	3.08	0.88	0	0	0	0	0	0	20.03
Spring Meions	0	2.04	4.74	0.73	1.09	11.00	10.00	0 44	0	0	0	0	∠1.8
Sugar Booto (Summar)	0	0	0.09	2.0/	0.04	11.23	10.26	9.41	0	0	0	0	42.4
Sugar Beets (Summer)	3.56	3.82	5.05	6.81	6.13	0	0	0	0	0	0	0	25.97
Sugar Beets Fall	0	0	0	0	0	0	0	0	0.86	1.99	2.07	2.24	7.16
Tomatoes Wildlife Forage Maintained	3.06	2.22	4.58	1.82	9.47	3.67	0	0	0	0	0	1 07	21.76
Windine I Drage Maindilleu	3.20	4.27	0.3	0.07	3.31	0.29	0	0	0	U	0.08	1.07	20.44
	lan -	Ech -	Mar	Apr	May	lun	- Iul	Aug	Son		Nov	Dec	Total
Open Water	2 85	3.46	5 <u>4</u> 8	Apr 6.03	8 70	- Jun 10 23	9.43	Aug 9 22	6 08	5 33	2 78	1 73	73 22
	2.00	0.40	0.40	0.00	0.10	10.20	0.40	0.22	0.00	0.00	2.70	1.75	10.22
Riparian Types	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Barren	0.67	0.64	0.75	0.91	1.16	1.35	1.23	1.21	0.93	0.78	0.58	0.46	10.66
Cottonwood/Willow	1.11	1.19	2.55	5.06	8.47	10.1	9.22	9.02	6.97	4.87	1.74	0.54	60.83
Marsh	0.87	0.94	4,19	7,93	10.14	11,81	10.78	10.55	8.05	3,09	0.8	0.58	69,73
Mixed Veg Low	PA 0	0.77	1 72	3 11	4 76	5.56	5.08	4 85	3.09	1 84	0.75	0.47	32.68
Mixed Veg Medium	1.01	11	1.99	3.11	4.53	5.3	4.82	4.2	2.73	1.76	0.96	0.69	32.2
Salt Cedar Dense	0.75	0.81	1.53	3.41	6.16	7.52	6.87	6.71	5.15	3.18	1.1	0.52	43.71

IID and Coachella Area ET Rate Table (Inches) 2012

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	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Reference ET	2.90	3.77	5.74	7.10	8.74	9.79	8.97	8.02	6.83	5.31	3.13	2.27	72.57
Precipitation	0.01	0.38	0.04	0.10	0.09	0.04	0.65	0.11	0.49	0.01	0.01	0.32	2.25
	•												
Crop	Jan	Feb	Mar	Apr	Mav	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Alfalfa	2.32	4 39	4 73	57	7 02	7.8	7 17	6 75	54	6 18	2 67	2.56	62 69
Aloe	1.02	1.51	2 21	2 61	3.07	3 35	3.07	2 74	2.39	1.99	1 25	0.94	26.33
Bermuda	0	0.15	5.09	6.82	8 30	9.00	8.61	77	5.93	0.61	1.20	0.04	52.60
Bermuda Overseeded with Rve in Winter	2 55	3.62	5.03	6.82	8 30	0.4	8.61	7.7	5.03	0.01	0	0.11	50.25
Cons/Romboo	0.75	0.02	4.50	0.02	10.33	11.64	10.67	0.54	0.00	2.09	0.79	0.55	60.44
Carle/Daribboo	0.75	0.90	4.55	2.05	2.59	2.01	2.59	3.34	2.70	3.00	1.46	1.00	20.72
Citrus - Deciming	1.41	1.70	2.57	3.03	5.00	5.91	5.00	3.2	2.79	2.32	1.40	1.09	30.72
Citrus - Malure	2.01	2.52	3.00	4.35	0.11	0.05	5.11	4.57	3.99	3.31	2.09	1.50	43.00
Citrus - Young	1.21	1.51	2.21	2.01	3.07	3.35	3.07	2.74	2.39	1.99	1.23	0.94	20.33
Cotton	0	0.12	1.69	1.99	4.35	8.13	10.14	7.91	3.66	0.55	0	0	38.55
Cottonwood/Willow	0.96	1.25	2.77	5.39	8.67	9.96	9.12	8.16	6.95	4.81	1.71	0.52	60.25
Cruciters Fall Early	0	0	0	0	0	0	0	3.43	2.99	5.29	3.75	2.12	17.59
Crucifers Fall Late	0	0	0	0	0	0	0	0	2.58	1.91	2.86	2.64	9.99
Crucifers Spring Early	0.82	0.03	0	0	0	0	0	0	0	0	0	0	0.85
Crucifers Spring Late	2.96	1.37	0.16	0	0	0	0	0	0	0	0	0	4.49
Dates	2.38	3.26	5.53	6.99	8.58	9.56	8.72	7.75	6.57	5.08	2.98	2.09	69.48
Deciduous Orchards	1.11	1.46	2.97	5.01	7.37	8.32	7.62	6.82	5.81	4.51	2.58	1.36	54.95
Fall Melons	0	0	0	0	0	0	0.6	3.89	4.12	5.57	3.21	1.51	18.91
Farm Pond	3.1	4.03	6.14	7.6	9.35	10.48	9.6	8.58	7.31	5.68	3.35	2.35	77.58
Field Grain	0	1	2.77	7.13	10.45	10.08	3.38	0.26	0	0	0	0	35.07
Grapes	0	0.26	1.72	4.64	7.39	8.31	7.23	5.07	1.64	0	0	0	36.26
Irrigated Restoration - Cottonwood/Willow	0.96	1.25	2.77	5.39	8.67	9.96	9.12	8,16	6.95	4.81	1.71	0.52	60.25
Irrigated Restoration - Mixed Veg Low	0.59	0.81	1.86	3.31	4.88	5.48	5.02	4.39	3.06	1.82	0.74	0.45	32.41
Irrigated Restoration - Mixed Veg Medium	0.87	1 15	2 15	3.31	4 65	5 23	4 76	3.8	2 72	1 74	0.94	0.66	31.97
Joioba Beans	3 19	3 95	3 32	0.01	4 25	8.33	9.86	8.82	7.51	5.84	3 44	2 42	61.01
Lake or Reservoir	3.1	4.03	6.14	7.6	9.20	10.48	0.00	8.58	7.01	5.68	3 35	2.42	77.58
Legume/Solanum Vegetables	0.1	4.00	2.5	1.0	10 31	9.08	3.72	0.00	7.51	0.00	0.00	2.55	30.44
Legume/Solanum Vegetables	0	0	2.5	4.73	10.51	9.00	3.72	0.09	0	1.26	1 5 1	2.2	4.07
	2.17	2.60		1.04	0	0	0	0	0	1.20	1.51	2.2	4.97
Legume/Solanum vegetables Spring	3.17	3.00	5.45	1.04	0	0	0	0	0	0	0	0.05	14.14
Lettuce Fail Early	0	0	0	0	0	0	0	0	0	4.08	3.34	2.35	9.78
	0	0	0	0	0	0	0	0	0	0.34	2.69	2.35	5.39
Lettuce Spring Early	3.1	1.22	0.01	0	0	0	0	0	0	0	0	0	4.33
Lettuce Spring Late	3.1	4.03	5.64	0.73	0	0	0	0	0	0	0	0	13.5
Miscellaneous herbs	0.21	1.76	4.06	8.4	8	4.04	0.3	0	0	0	0	0	26.76
Moist Soil Unit	2.9	3.77	5.63	1	4.75	3.43	9.7	9.07	4.51	5.31	3.13	2.2	61.4
Nursery/Greenhouse	1.21	1.51	2.21	2.61	3.07	3.35	3.07	2.74	2.39	1.99	1.25	0.94	26.33
Oil Crops	0.21	1.76	4.06	8.4	8	4.23	1.92	0	0	0	0	0	28.57
Perennial Vegetables	0.56	0.01	1.63	3.64	8.11	9.3	8.52	7.62	6.49	5.04	2.97	1.84	55.73
Root Vegetables	0.57	0.01	0	0	0	0	0	0	0.86	1.96	2.91	2.32	8.63
Small Grains Fall	0	0	0	0	0	0	0	0	0	0	0.08	1.02	1.1
Small Grains Spring	2.87	4.47	6.8	7.31	3.4	0.29	0	0	0	0	0	0	25.13
Small Vegetables Fall	0	0	0	0	0	0	0	0	0.16	2	2.04	2.15	6.35
Small Vegetables Spring	3.07	3.83	5.21	5.38	0.81	0	0	0	0	0	0	0	18.29
Small Vegetables Spring Late	2.18	2.94	5.32	6.23	3.78	0.88	0	0	0	0	0	0	21.33
Spring Melons	0.13	1.81	5.82	7.07	5.54	0.92	0	0	0	0	0	0	21.3
Sudan	0	0	0.36	3.04	8.94	11.65	9.03	3.94	0.21	0	0	0	37.16
Sugar Beets (Summer)	3.3	4.3	6.22	6.85	5.59	2.48	0.27	0	0	0	0	0	29.01
Sugar Beets Fall	0	0	0	0	0	0	0	0	0.28	2 02	1 83	2 16	6 29
Tomatoes	0.21	1 76	4.06	8.4	8	4 04	0.3	0	0.20	0	0	0	26.26
Wildlife Forage Maintained	2.21	4 47	6.8	7.31	34	0.29	0.5	0	0	0	0.08	1 02	26.23
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Open Water	3.1	1 03	6 14	76	0.35	10 / 9	9.0	8 59	7 31	5.68	3 35	2 35	77 59
All American Canal*	2 47	3.63	5.91	7.38	9.35 Q	10.40	9.33	8.34	6.96	5 24	2 71	1 65	72 71
*Imperial to Morelos Ko data and Yuma area	weather data	ised for these	calculations	7.50	5	10.00	0.00	0.04	0.00	0.2-1	2.7 1	1.00	12.11
Rinarian Types	.lan	Feb	Mar	Apr	May	Jun	.lul	Aug	Sen	Oct -	Nov	Dec	Total
Marsh	0.75	0.05	/ 50	8 11	10 30	11 64	10.67	Q 54	8 02	3 08	0.78	0.55	60 //
Mixed Veg Low	0.75	0.90	1.55	2 21	10.55	5 / 9	5.02	/ 30	3.02	1 82	0.70	0.00	32 /1
Mixed Veg Medium	0.39	1.15	2.15	3.31	4.65	5.23	4.76	3.8	2.72	1.74	0.94	0.66	31.97

Appendix 3: Exhibits 1 through 5

This appendix contains the following Exhibits:

- 1. Exhibit 1. Program area, reach boundaries.
- 2. Exhibit 2. Program area, Hoover Dam to Davis Dam.
- 3. Exhibit 3. Program area, Davis Dam to Parker Dam.
- 4. Exhibit 4. Program area, Parker Dam to Imperial Dam.
- 5. Exhibit 5. Program area, Imperial Dam to Mexico.





PROGRAM AREA ALONG THE COLORADO RIVER Hoover Dam to Davis Dam





PROGRAM AREA ALONG THE COLORADO RIVER Davis Dam to Parker Dam

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<u>95</u> 16) Imperial National Wildlife Refuge, AZ 17) Lake Enterprises of California, LLC, CA 18) Yuma Proving Ground, AZ 15 19) Bill Williams River National Wildlife Refuge, CA AZ (NCR) OUNTAIN 20) State of Arizona, Alamo Dam to Bill Williams **River NWR (NCR)** Ν IMPERIAL * NCR (Non-Colorado River) - The origin of water **DIVERSION DAM** used for agricultural irrigation and by riparian vegetation and open water areas is considered to A3-4 be from sources other than the Colorado River.

PROGRAM AREA ALONG THE COLORADO RIVER Imperial Dam to Mexico

