Integrating Agriculture & Conservation: The IID Case Study

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Colorado River Geography & Overview

- Named after its muddy, red color
- 1,450 miles long from Colorado to the Mexican border; encompassing seven states, two countries and 246,000 square mile watershed basin
- Lee's Ferry divides system into 2 basins (Upper and Lower)
  - *Upper Basin = Colorado, New Mexico, Utah, and Wyoming*
  - *Lower Basin = Arizona, California, and Nevada*
  - *Republic of Mexico*

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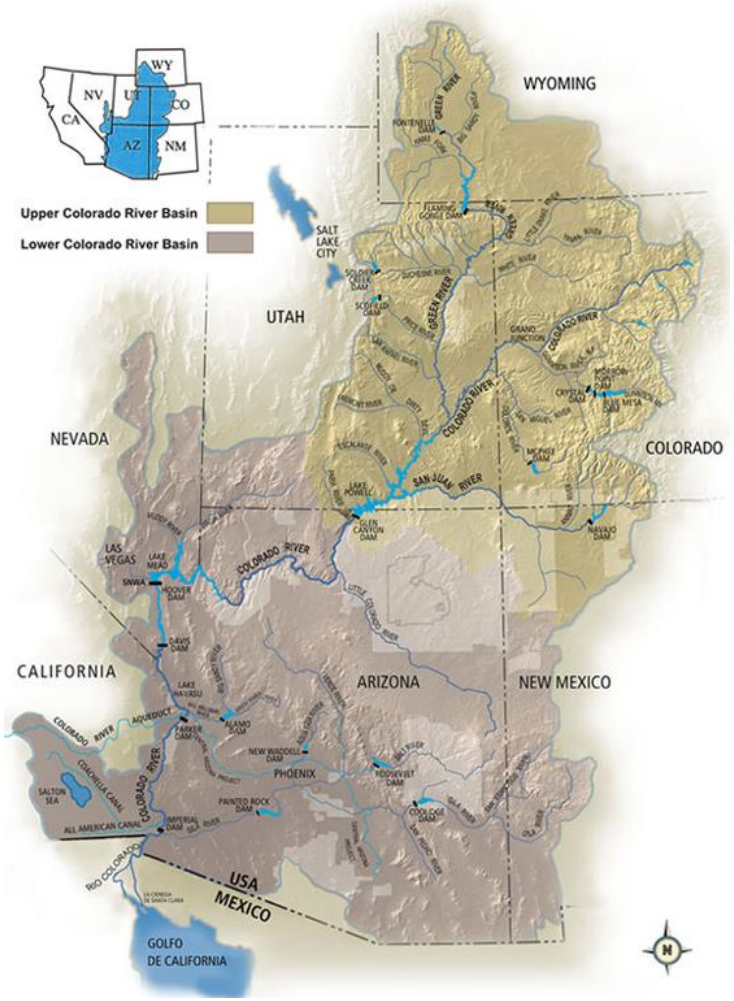
Colorado River Water Users and Uses

- 4 million acres of farmland
- Serves nearly 30 million people
- 10 American Indian Tribes
- Environmental uses (including 4 endangered fish species)
- Hydropower facilities generate more than 12 billion kWh of low-cost power for 3 million people



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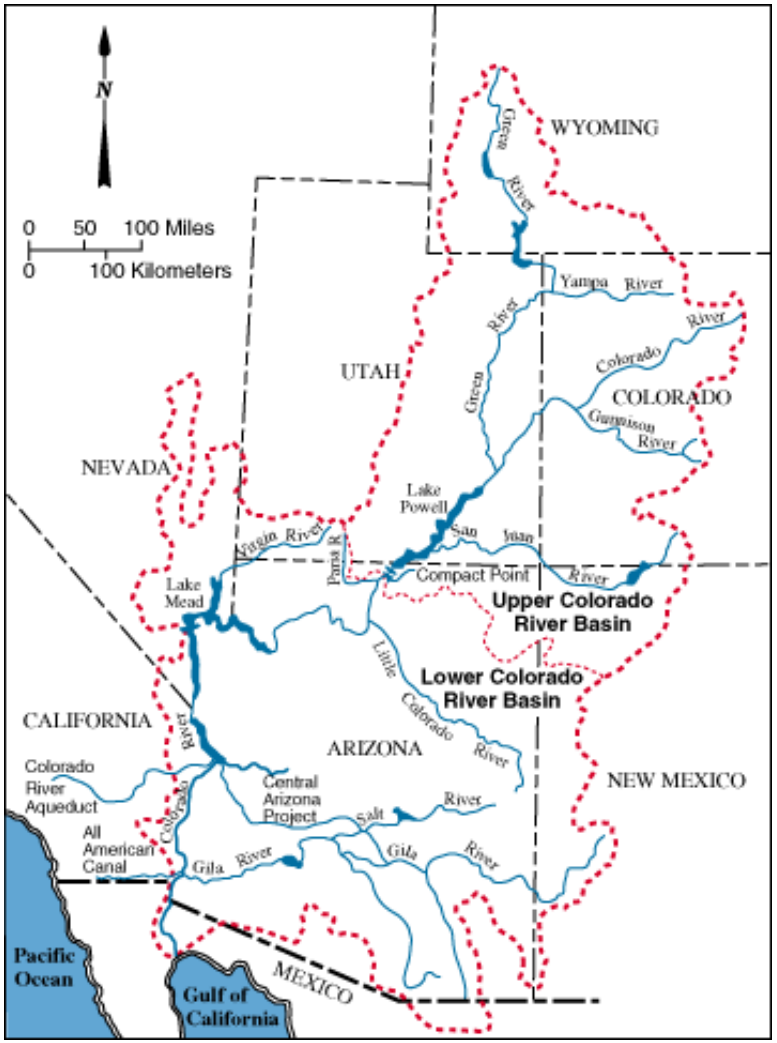
Colorado River System Storage

- Lake Powell = 27 MAF
- Lake Mead = 28.5 MAF (4 years of storage)
- Total reservoir storage = 60 MAF

Annual yield was originally estimated at 17.5 MAF, then 15 MAF and is now thought to be closer to 12-14 MAF. The Colorado River has reached its delta only five times since 1983 and is considered one of the most regulated, and litigated, rivers.

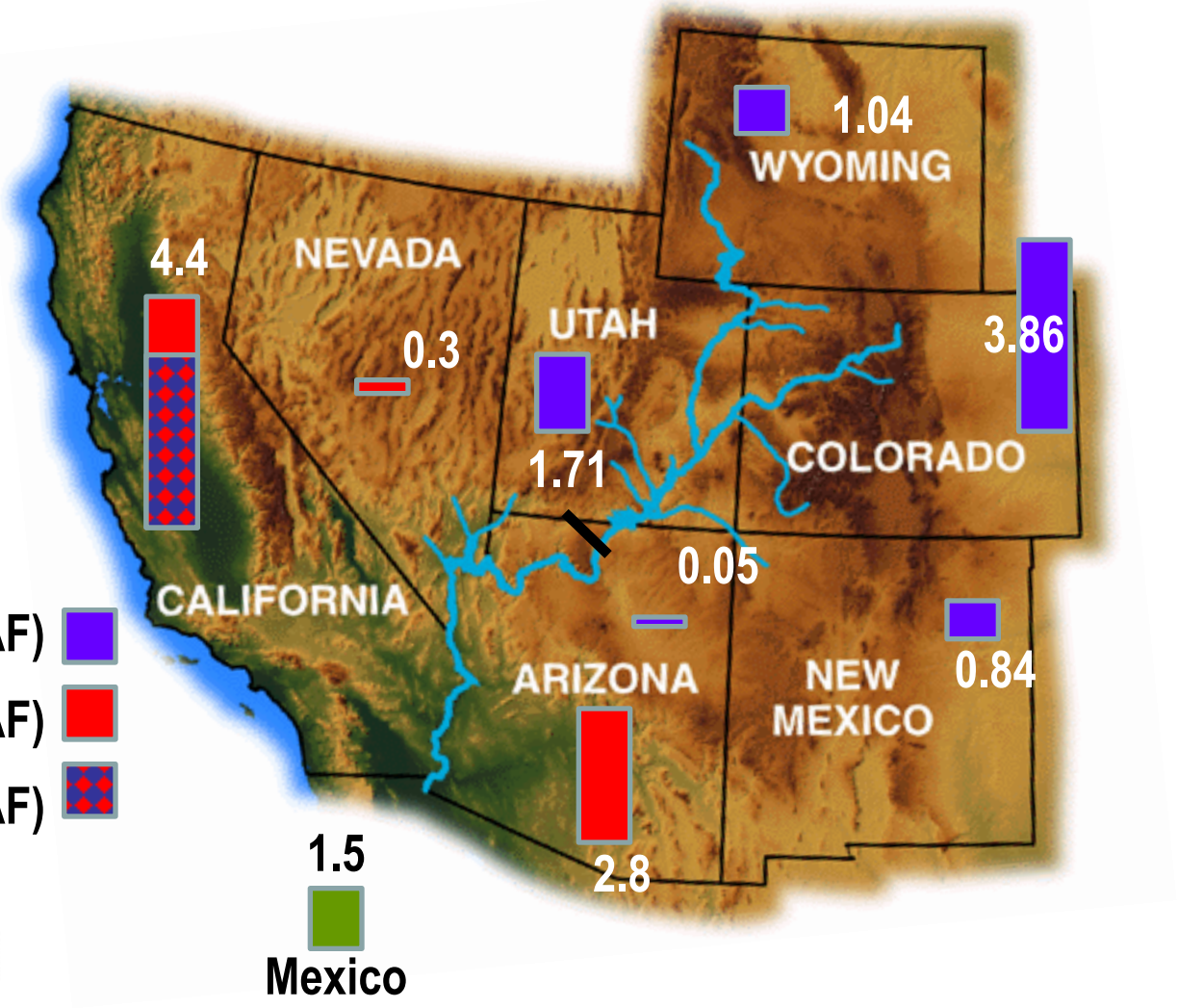


Law of the River

The Colorado River is managed and operated under numerous compacts, federal laws, court decisions and decrees, contracts, and regulatory guidelines collectively known as the "Law of the River." This collection of documents apportions the water and regulates the use and management of the Colorado River among the seven basin states and Mexico.

- Colorado River Compact of 1922
- Boulder Canyon Project Act of 1928
- Seven-Party Agreement of 1931
- Mexican Water Treaty of 1944
- Upper Colorado River Basin Compact of 1948
- Colorado River Storage Project Act of 1956
- Arizona v. California US Supreme court Decree (1964)
- Colorado River Basin Project Act (1968-CAP)
- Minute 242, IBWC
- Colorado River Basin Salinity Control Forum

Colorado River Basin State Entitlements



Upper Basin (7.5 MAF)

Lower Basin (7.5 MAF)

IID (3.1 MAF)

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California Service Areas
NV
LAKE MEAD
HOOVER DAM
CA
LAKE MOHAVE
DAVIS DAM
AZ
COLORADO RIVER
CALIFORNIA AQUEDUCT
LAKE HAVASU
PARKER DAM
COACHELLA VALLEY W.D.
COLORADO R. AQUEDUCT
MWD
COACHELLA CANAL
PALO VERDE I.D.
SALTON SEA
IMPERIAL DAM
IMPERIAL I.D.
USA
MEXICO
ALL AMERICAN CANAL
YUMA PROJECT

Priorities for California's 4.4 MAF Apportionments

1. PVID
2. Yuma Project
3. IID and CVWD

} 3,850,000 AF

4. MWD.....550,000 AF

= 4.4 MAF (California's apportionment)

5a. MWD.....550,000 AF

5b. San Diego city, county (given to MWD).....112,000 AF

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Water Fact

1 acre-foot (AF) of water is the amount necessary to supply 1-2 households for one year

Equivalent to 326,000 gallons or a football field covered with one foot of water

"Get your facts first, and then you can distort them as much as you please."

-Mark Twain

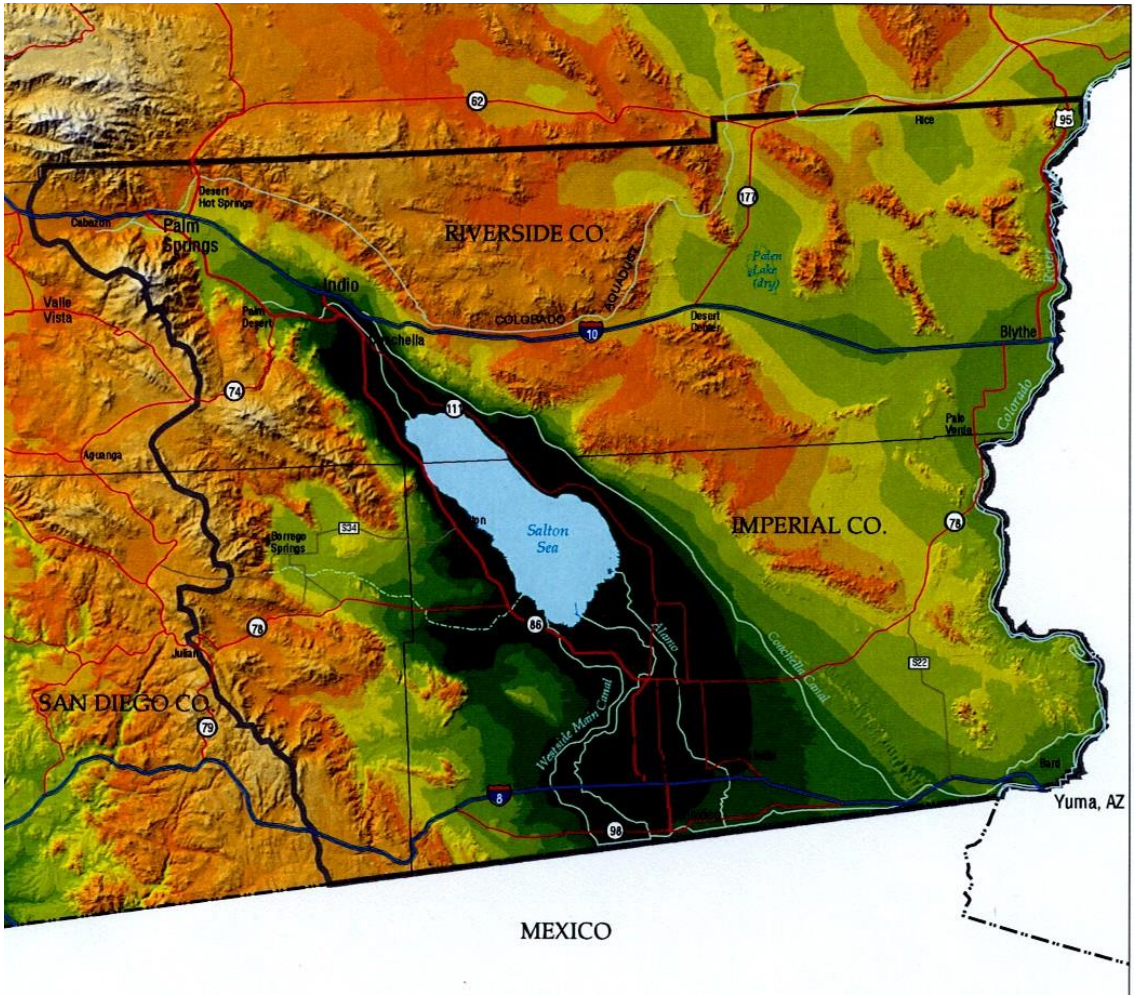
IID's Colorado River History

- ***1901*** – California Development Company diverts water to irrigate 100,000 acres in Imperial Valley
- ***1905-07*** – Gila River floods causing Colorado River to break and flow through Imperial Valley creating the Salton Sea
- ***1911-1922*** – IID formed to acquire properties of the bankrupt CDC and its Mexican subsidiary; expanded to include 13 mutual water companies that had developed and operated the distribution canals irrigation nearly 500,000 acres
- ***1922*** – Colorado River Compact signed; each Basin apportioned 7.5 MAF
- ***1925*** – MWD created

IID's Colorado River History

- ***1928*** – Boulder Canyon Project Act passed authorizing Hoover Dam and All-American Canal construction
- ***1929*** – California Limitation Act passes limiting California to 4.4 MAF
- ***1931*** – California Seven-Party Agreement signed; IID federal water delivery contract executed/Hoover Dam construction begins
- ***1942*** – All-American Canal completed, water diverted
- ***1941*** – MWD completes 242-mile long CR Aqueduct
- ***1944*** – US and Mexico sign treaty giving Mexico 1.5 MAF
- ***1964*** –Arizona v. California Supreme Court decree establishes IID's 2.6 MAF of present-perfected rights (PPR)

Imperial Valley, California



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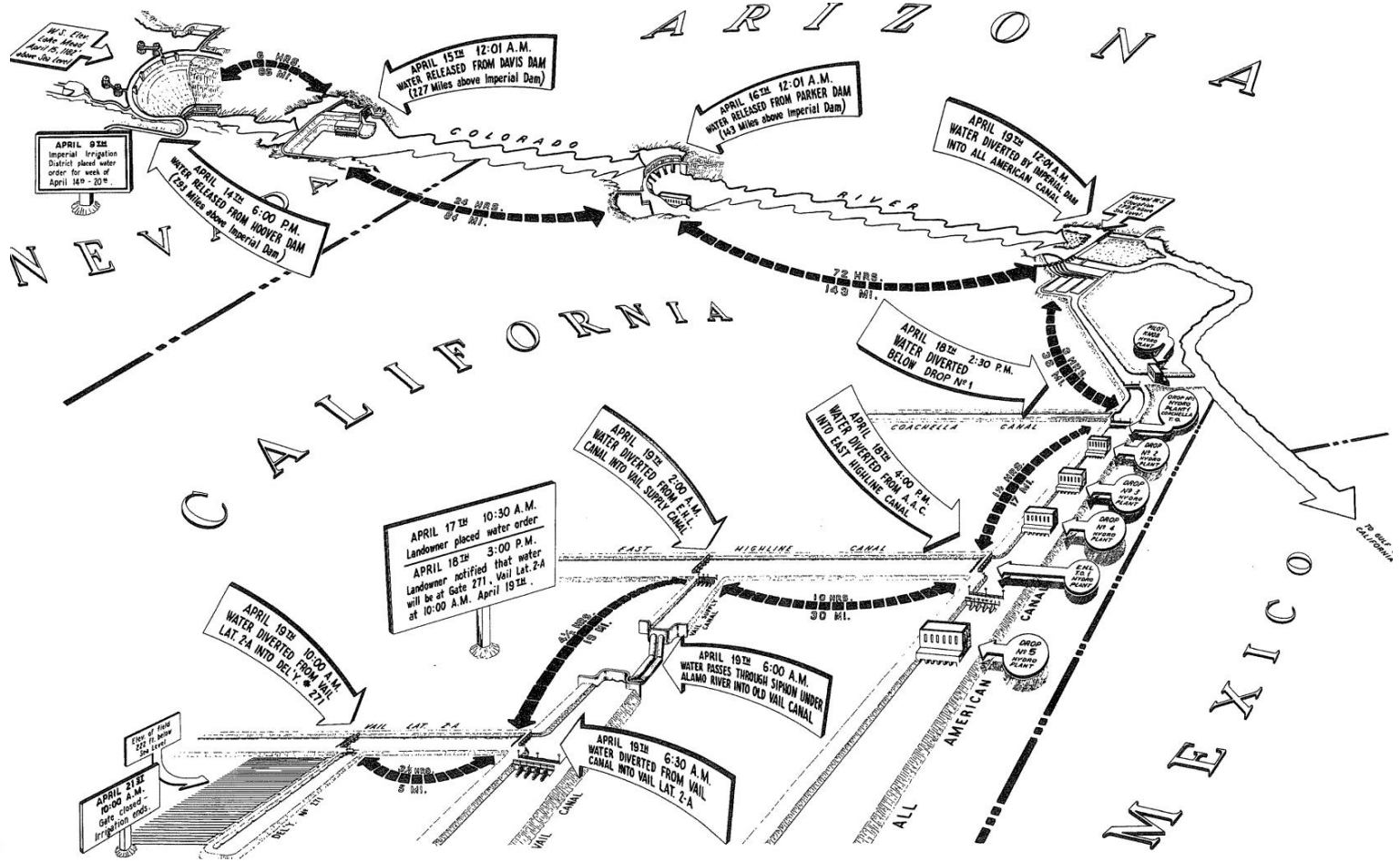
Water Transportation - Hoover Dam to IID



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IID Colorado River Operations

- Imperial Dam facility operation
- AAC and Gila Canal Headings
- Senator Wash Reservoir
- 3 Desilting Basins (4,000 cfs)
- California Sluiceway
- Mexico diversions

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All-American Canal

- Connects Imperial Valley to the Colorado River
- 82-miles long, 175’ elevation drop
- 15,500 - 6,500 cfs capacity
- Delivers water to CVWD via Coachella Main Canal
- 23-mile AAC Lining Project completed in 2010; conserves 67,700 AFY

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SWRCB Water Appropriation Permit Locations

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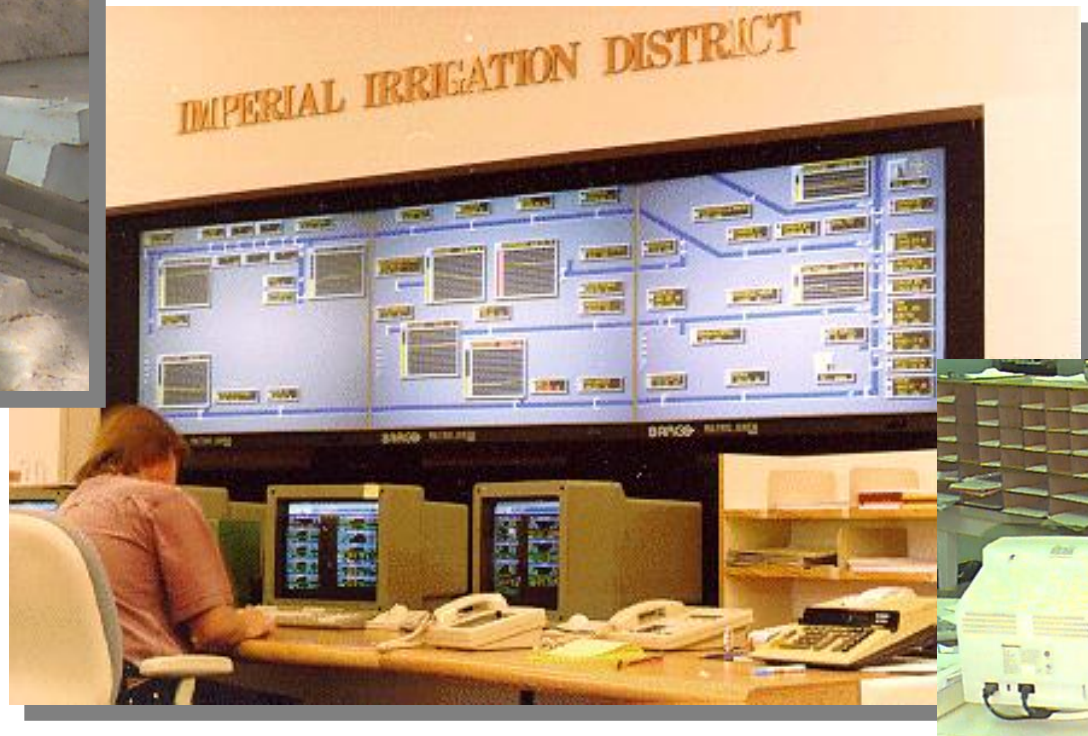
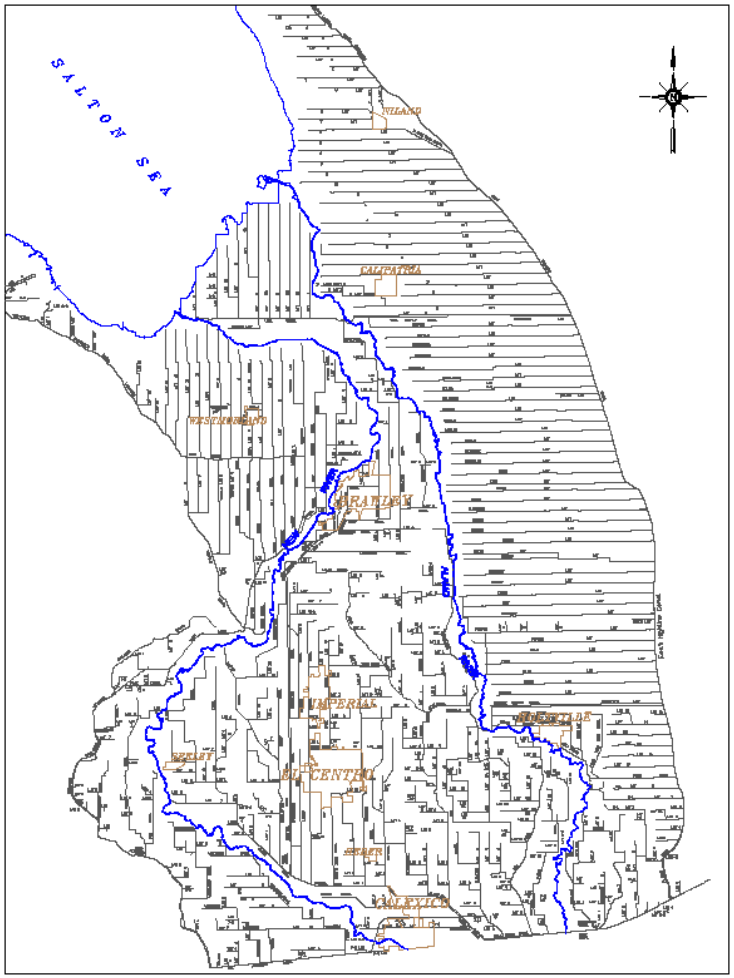
IID Main Canal Operations

- Water Control Center coordinates River operations with Imperial Valley operations
- Operates AAC and main canal systems
- Distributes water to laterals via Division offices



Irrigation and Drainage System

- 148 miles of main canals
- 1,442 miles of laterals
- 1,457 miles of surface drains
- >97% of water is delivered for agriculture uses



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IID Service Area (2013)

- 1,061,637 gross acres within boundaries
- 520,307 total acreage receiving water
- 473,782 total farmable acreage
- 457,695 total acreage in crop[1]

[1] *Includes multiple cropped area/excludes land enrolled in IID fallowing conservation programs*

Economic Impact of Imperial Valley Agriculture (2013)

• Vegetable and Melon Crops	$865,401,000
• Field Crops	$470,461,000
• Livestock	$617,371,000
• Fruit and Nut Crops	$100,019,000
• Seed and Nursery Crops	$100,557,000
• Apiary (Honey, Wax, Pollination)	$4,708,000
Imperial Valley Commodity Total 2013	**$2,158,157,000**
Imperial Valley Commodity Total 2013	**$1,945,759,000**

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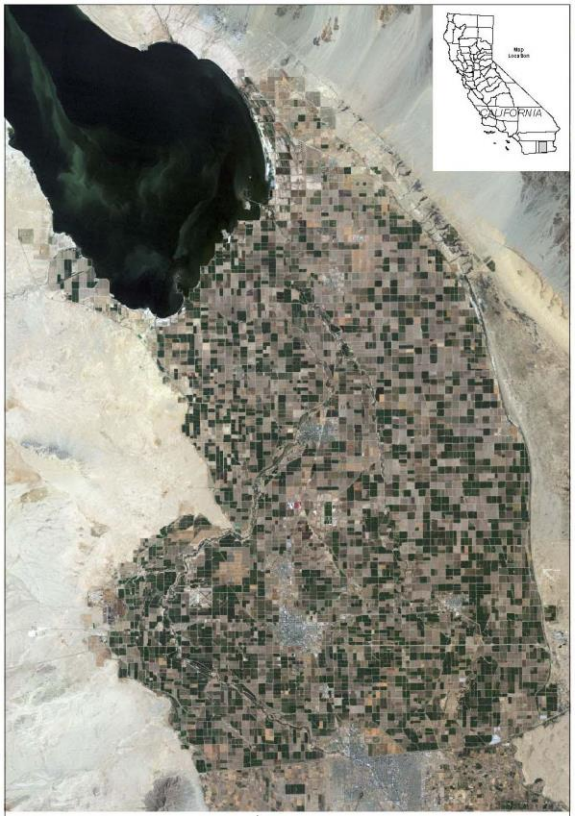
2013 Top 13 Crops (Acres)



Alfalfa	136,891	29.9%
Bermuda Grass	51,182	11.2%
Sudangrass	50,044	10.9%
Wheat	41,652	9.1%
Lettuce	28,061	6.1%
Sugar Beets	25,400	5.5%
Kleingrass	16,790	3.7%
Carrots	13,698	3.0%
Broccoli	12,688	2.8%
Duck Ponds	10,237	2.2%
Onions	9,879	2.2%
Sweet Corn	8,571	1.9%
Citrus	7,443	1.6%
Top 13 Crops Total Acres	**412,536**	**90.1%**
Total Acreage of Crops at IID	**457,695**	**100.0%**

http://www.iid.com/index.aspx?page=119

Permanent Crops

- Permanent crops make up less than 4% of the total acreage.
- Feedlots, Sheep, Asparagus, Citrus, Aviary (Bees), Duck Ponds

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Garden Crops

- Garden Crops account for nearly 19% of total acreage.
- Carrots, Lettuce, Melons, Cauliflower, Onions, Flowers






Field Crops

- Field Crops account for over 77% of total acreage.
- Alfalfa, Bermuda Grass, Sudan Grass, Sugar Beets, Wheat. Oilseed (Canola), Sugar Cane






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Field Crops

- Field Crops account for nearly 77% of total acreage.
- Wheat, Oilseed (Canola), Sugar Cane

Priorities for California's 4.4 MAF Apportionment with the QSA

1. PVID
2. Yuma Project } *(420,000 AF*)* } 3,850,000 AF
3. IID *(3,100,000 AF*)* and CVWD *(330,000 AF*)*
4. MWD.....550,000 AF

= 4.4 MAF (California's apportionment)

5a. MWD.....550,000 AF

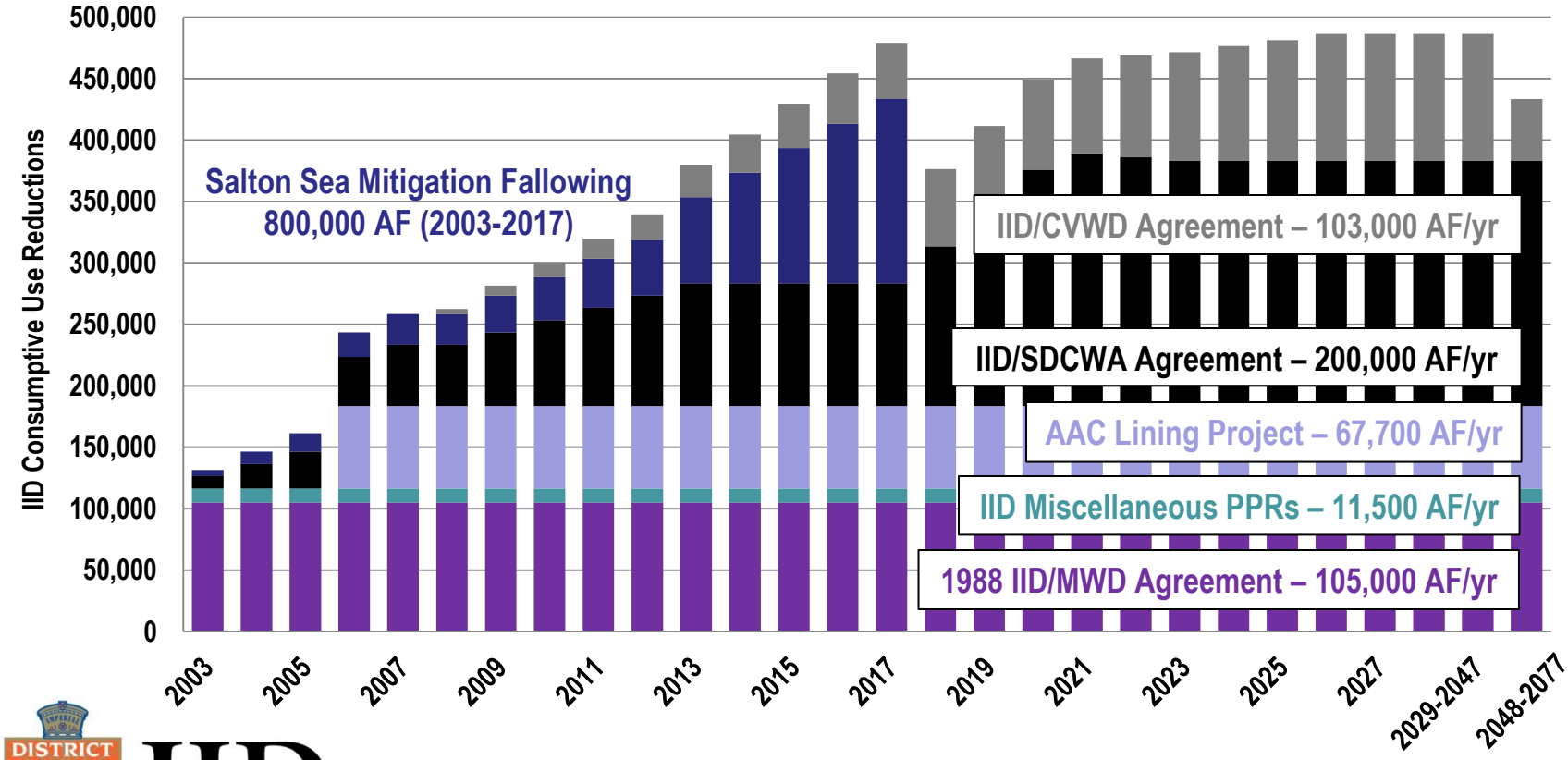
5b. San Diego city, county (given to MWD).....112,000 AF

* *Agricultural water agency entitlements under the QSA; MWD is responsible for the PVID/Yuma Project over/under as PVID/YPRD are not a party to the QSA.*

The California Problem
(pre-Quantification Settlement Agreement)

- California's basic annual apportionment is 4.4 maf, but it had been using 5.2 maf.
- The excess water used by California was legally diverted by MWD from Arizona and Nevada's unused apportionments, but there were concerns about California's dependence on these unused flows and how it might affect other states' future growth.
- In 1996 Arizona created the Arizona Water Banking Authority to fully use its apportionment. In 2001 Nevada signed an intra-state water storage agreement with Arizona.

The California Solution: QSA Water Conservation & Transfer Programs



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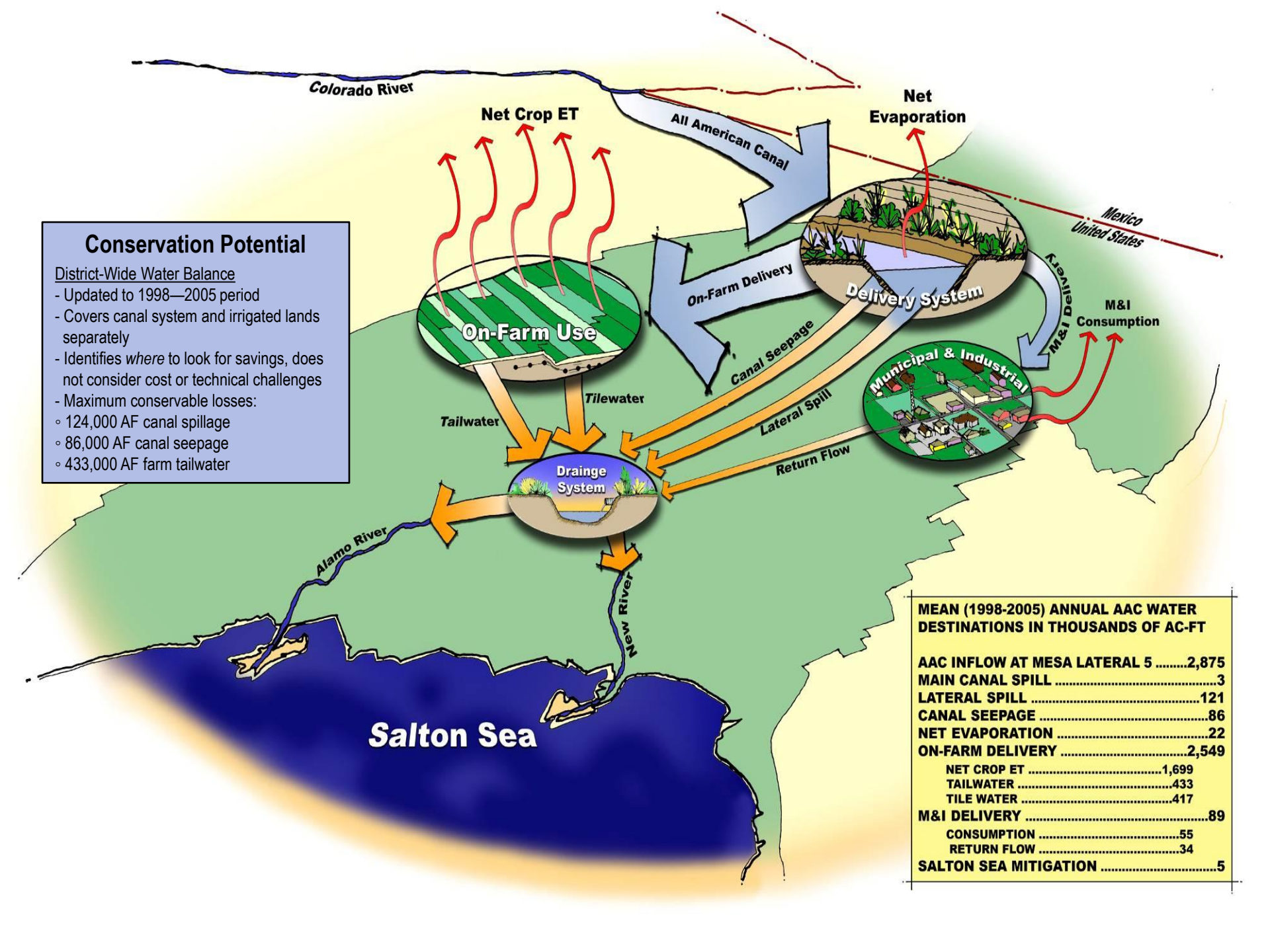
QSA/Water Transfer

- Resolution of issues regarding the reasonable and beneficial use of Colorado River water
- Quantification of IID's annual consumptive use at 3,100,000 af
- Authorize water conservation and transfer programs (200 kaf for SDCWA/103 kaf for CVWD) and All-American Canal Lining Project (67.7 kaf)
- Funding of environmental mitigation requirements, including a cap on IID costs and long-term environmental liability/risk associated with Salton Sea restoration
- Enactment of federal policies including the Interim Surplus Guidelines (ISG) and Inadvertent Overrun & Payback Policy (IOPP) and eventually Intentionally Created Surplus (ICS) and Interim Shortage and Coordinated Operations Guidelines

QSA Litigation

- Since 2003, eleven separate cases and a number of related cross-actions filed in various superior courts coordinated before a single judge in the Sacramento Superior Court
- In early 2010 the Court ruled the QSA JPA agreement, and 11 other QSA Agreements, were invalid due to one issue - the State's commitment to fund excess environmental mitigation costs was inconsistent with an appropriation under the California Constitution.
- In December, 2011, after a stay of the judgment was granted by the Court of Appeal, the Appellate Court reversed the judgment of invalidation and found the trial court erred in finding the QSA JPA Agreement unconstitutional and rejected all other grounds argued by the parties to affirm the trial court's judgment. The California Supreme Court denied review. The cases were sent back to trial court on remand and all arguments were heard in 2012.
- In June 2013 the Sacramento Superior Court validated the 12 QSA Agreements and rejected all other contested matters including allegations of CEQA inadequacy. The matter was promptly appealed by Imperial County, IC Air Pollution Control District and other parties.
    - In January 2015 IID reached a settlement agreement with Imperial County, concluding all pending QSA litigation and enhancing a 2014 MOU to work together to resolve Salton Sea restoration uncertainty in support of the QSA.



Conservation Potential

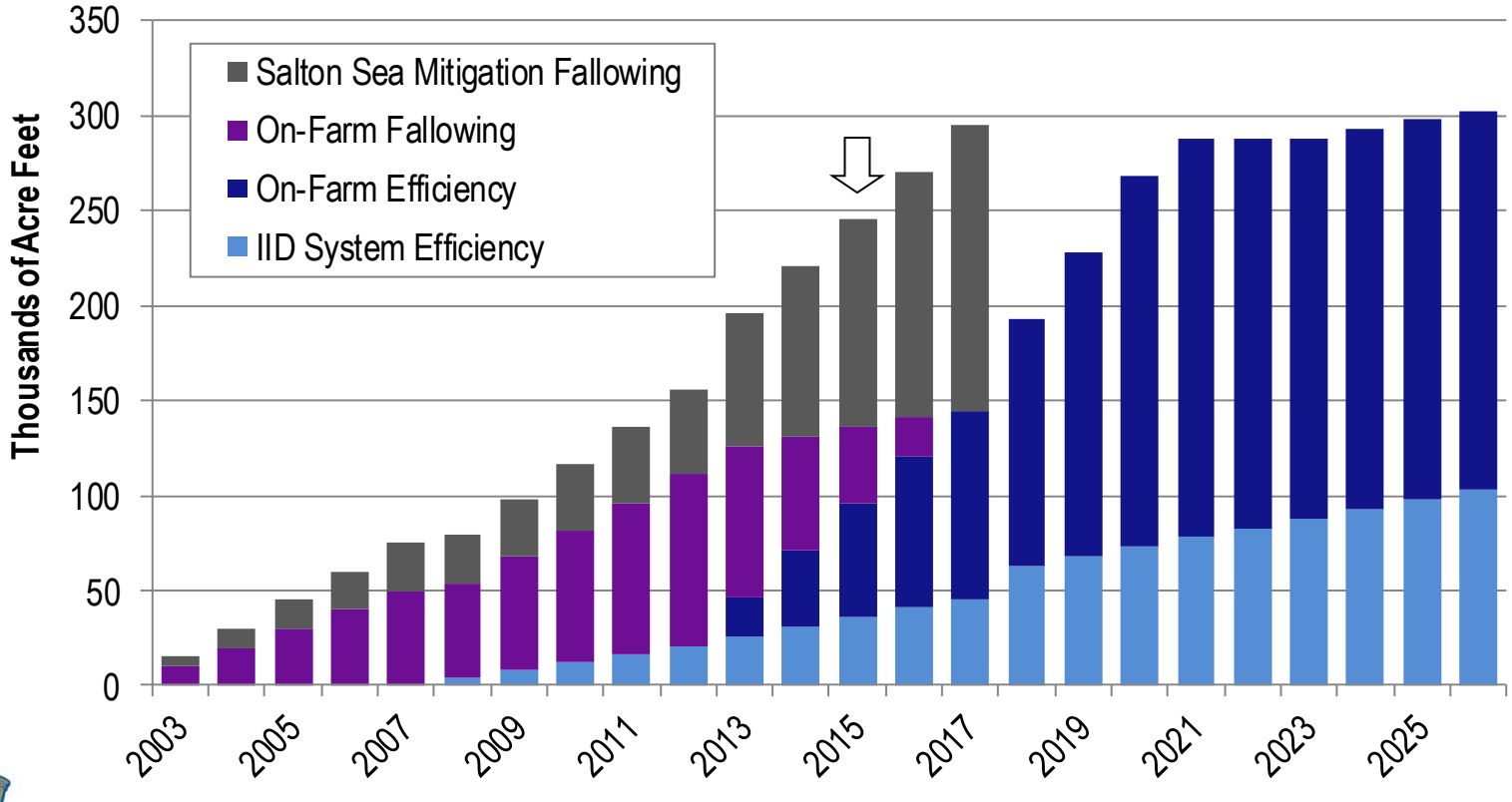
District-Wide Water Balance

- Updated to 1998—2005 period
- Covers canal system and irrigated lands separately
- Identifies *where* to look for savings, does not consider cost or technical challenges
- Maximum conservable losses:
  - 124,000 AF canal spillage
  - 86,000 AF canal seepage
  - 433,000 AF farm tailwater

MEAN (1998-2005) ANNUAL AAC WATER DESTINATIONS IN THOUSANDS OF AC-FT

AAC INFLOW AT MESA LATERAL 5	2,875
MAIN CANAL SPILL	3
LATERAL SPILL	121
CANAL SEEPAGE	86
NET EVAPORATION	22
ON-FARM DELIVERY	2,549
NET CROP ET	1,699
TAILWATER	433
TILE WATER	417
M&I DELIVERY	89
CONSUMPTION	55
RETURN FLOW	34
SALTON SEA MITIGATION	5

Conservation Methodology & Schedule



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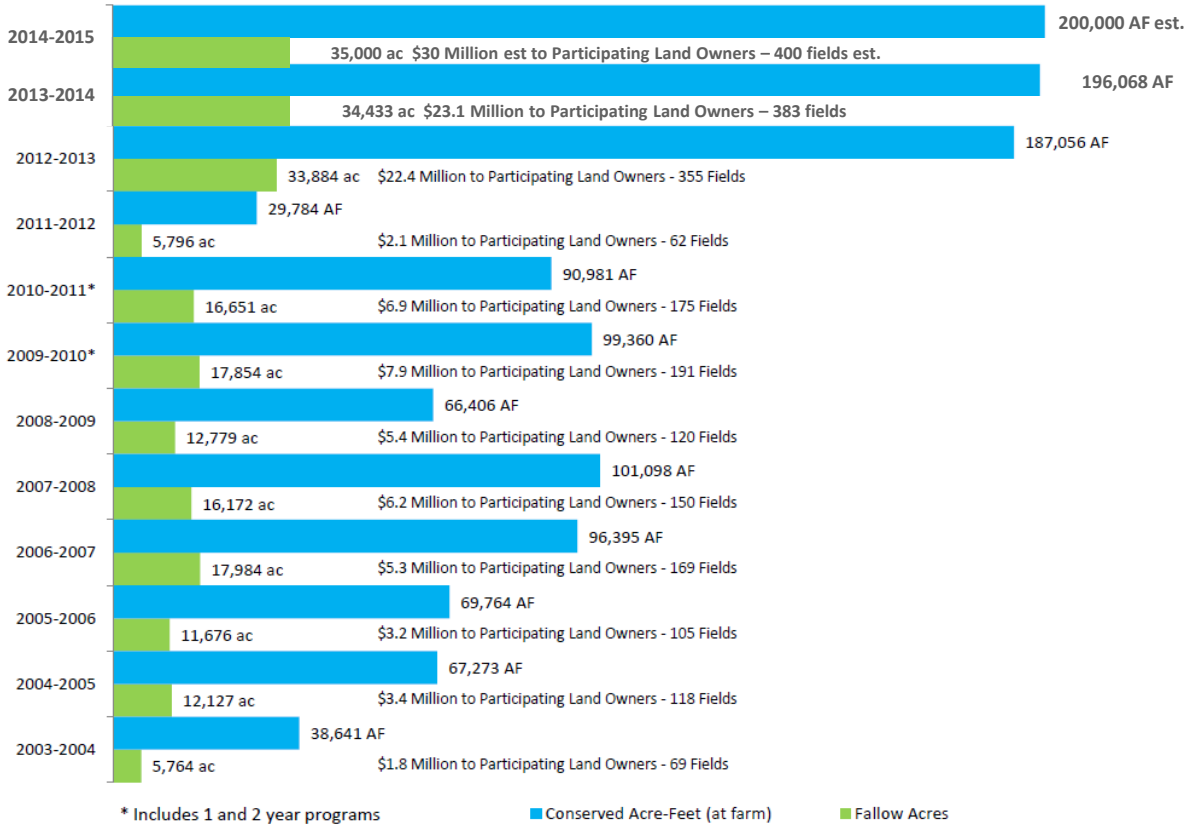
IID Fallowing Program Summary

(provisional data, subject to change and true-up)



20 Fallowing Programs (12/1/03 – 6/30/15)

- *$124.6 million paid*
- *248,046 fallowed acres*
- *1,364,508 AF water conservation yield (at-farm)*
- *1,479,311 AF water conservation yield (at-river)*

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http://www.iid.com/index.aspx?page=190

Land Conversion and Fallowing

Water Code Section § 1013 is QSA legislation that provides for a specific definition of fallowing for the duration of the QSA

"[L]and fallowing conservation measures "means the generation of water to be made available for transfer or for environmental mitigation purposes by fallowing land or *removing land from agricultural production* regardless of whether the fallowing or removal from agricultural production is temporary or *long-term*, and *regardless* of whether it occurs in the course of normal and customary agricultural production . . . ."

IID's Temporary Land Conversion (aka "Solar") Fallowing Policy

- Adopted in May 2012, the TLCFP requires the participation of certain non-agricultural projects with lower water demands as deemed appropriate by IID as a condition of an IID water supply agreement.
- The conserved water use is legislatively limited to transfer and environmental purposes, however IID can offset this new source of conserved water with reduced agricultural fallowing in a like amount.
- No payment, however participation will preserve the landowner's future right to agricultural water service when the land is put back into crop production.

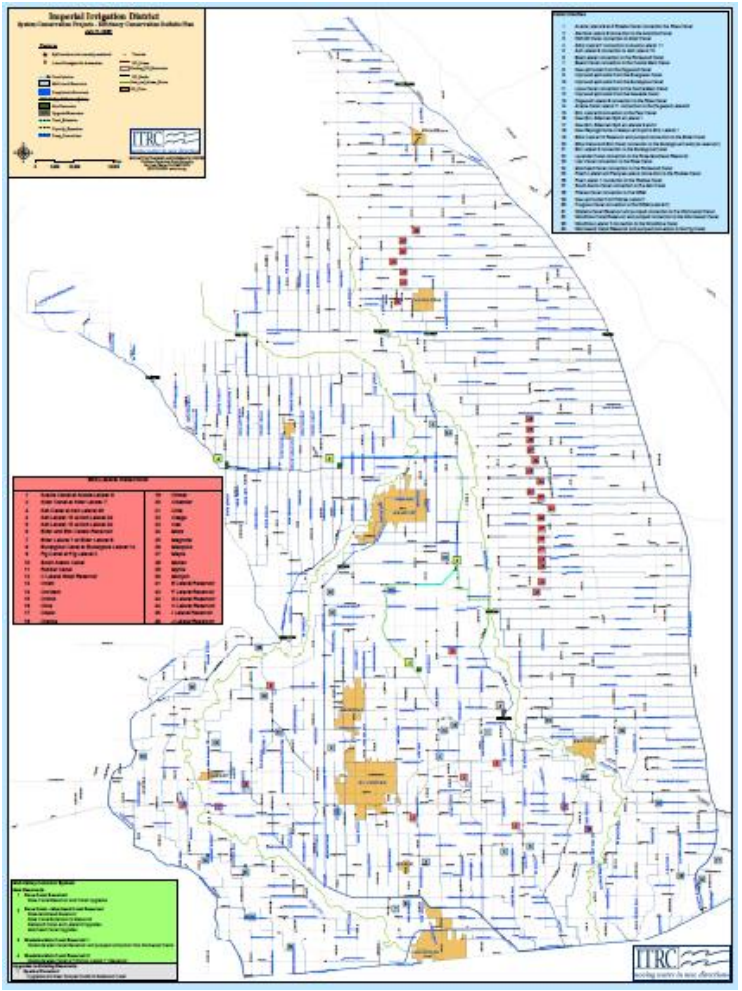
System Efficiency Conservation Program

Delivery system improvements

- *Main canal seepage interception*
- *Spill structure upgrades*
- *Main canal reservoirs (new and upgrades)*
- *Main canal lining*
- *Mid-lateral operational reservoirs*
- *Lateral interties*
- *Non-leak gates*

Integrated Information Management

- *Automated lateral headings, spill measurement, SCADA upgrades*
- *5,500+ farm turn-out measurement upgrades*
- *Computers in zanjero vehicles with real-time information and decision support features*



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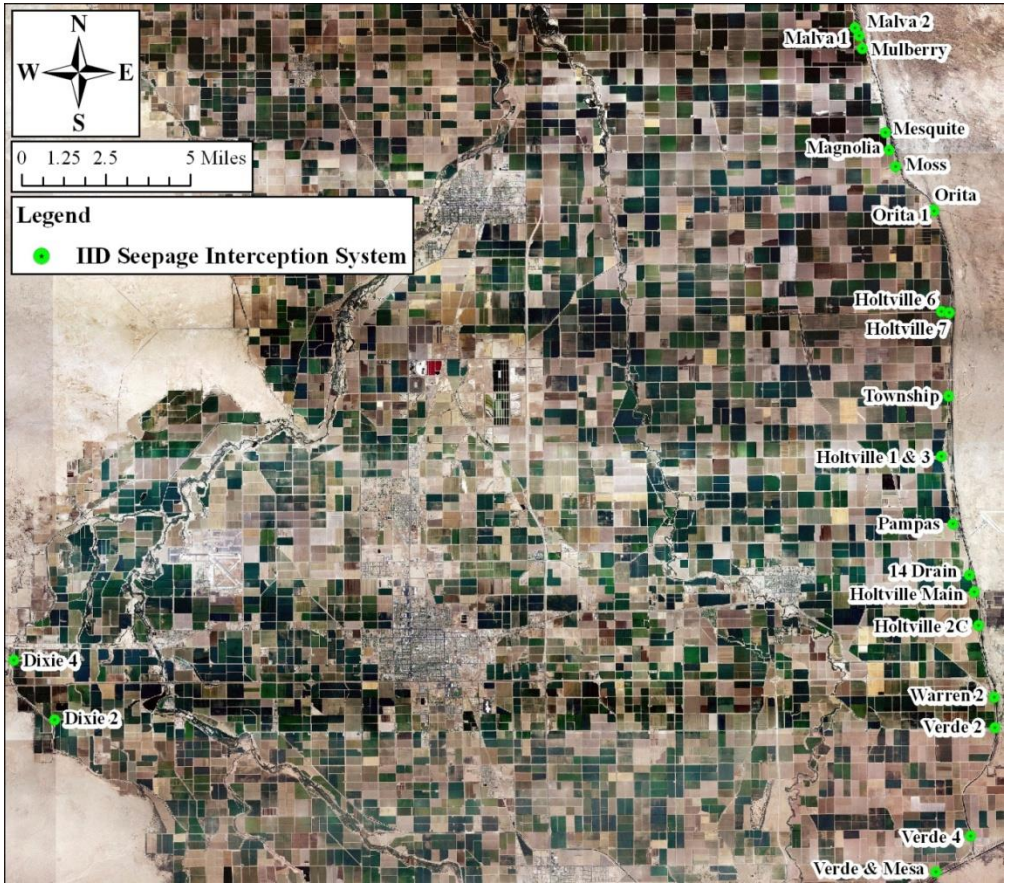
Main Canals Seepage Interception Program

- First component of IID's System Efficiency Conservation Program
- Estimated to conserve nearly 40,000 AF/yr when fully implemented
- Decades ago, surface drains were constructed parallel to IID's main canals to intercept seepage flow.
- The Main Canals Seepage Interception Project captures seepage water from the East Highline canal in the parallel surface drain and pumps it back to main canals.

Seepage water pumped from the EHL 14 Drain flows into the East Highline Canal

Project Overview

- IID budgeted $7.7 million for the main canals seepage interceptor project
- Construction of 22 interception systems along three main canals completed in 2009.
- 2014 conservation yield = 32,231 AF (provisional)



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On-Farm Conservation Program

- Program is designed for maximum flexibility to allow for broad farmer participation and a wide variety of crops and growing seasons.
- Incentivizes landowners and tenants to reduce water deliveries by improving on-farm water use efficiencies
- Conservation is measured relative to a ten-year historical baseline specific to each field and crop
- Payment of $285 per acre-foot; 4 acre-feet per acre payment cap
- Tenants can execute contracts with owners' consent
- 2013-2014 pilot program; in 2014 the IID board authorized an extended program to allow for longer-term contracts and expanded participation.
- 2013 conservation yield = 17,276 AF
- 2014 conservation yield = 42,679 AF (provisional)

QSA Environmental Permits/Authorizations

- 2081 (CESA Incidental Take Permit)
- State Water Resources Control Board (SWRCB)
- Draft Habitat Conservation Plan (HCP)
- EIR/EIS – Mitigation Monitoring and Reporting Program (MMRP)
- Biological Opinion (BO)
- Natural Community Conservation Plan (NCCP) in progress

QSA Water Transfer Mitigation Activities

Completed Projects

- *Drain and riparian vegetation analysis*
- *Desert vegetation analysis*
- *Baseline survey protocols*
- *Pupfish sampling protocols*
- *Selenium study protocols*
- *Burrowing owl pilot and population/distribution field study*
- *Phase I managed marsh*
- *Installed six Salton Sea air quality monitoring stations*

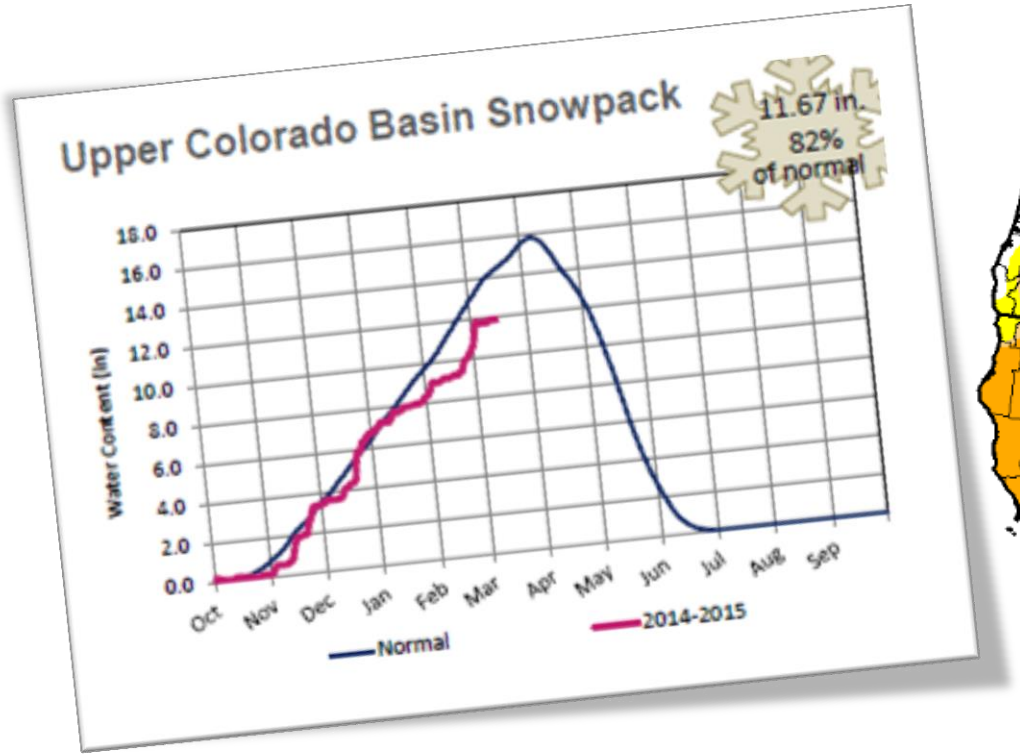
In Progress/On-Going

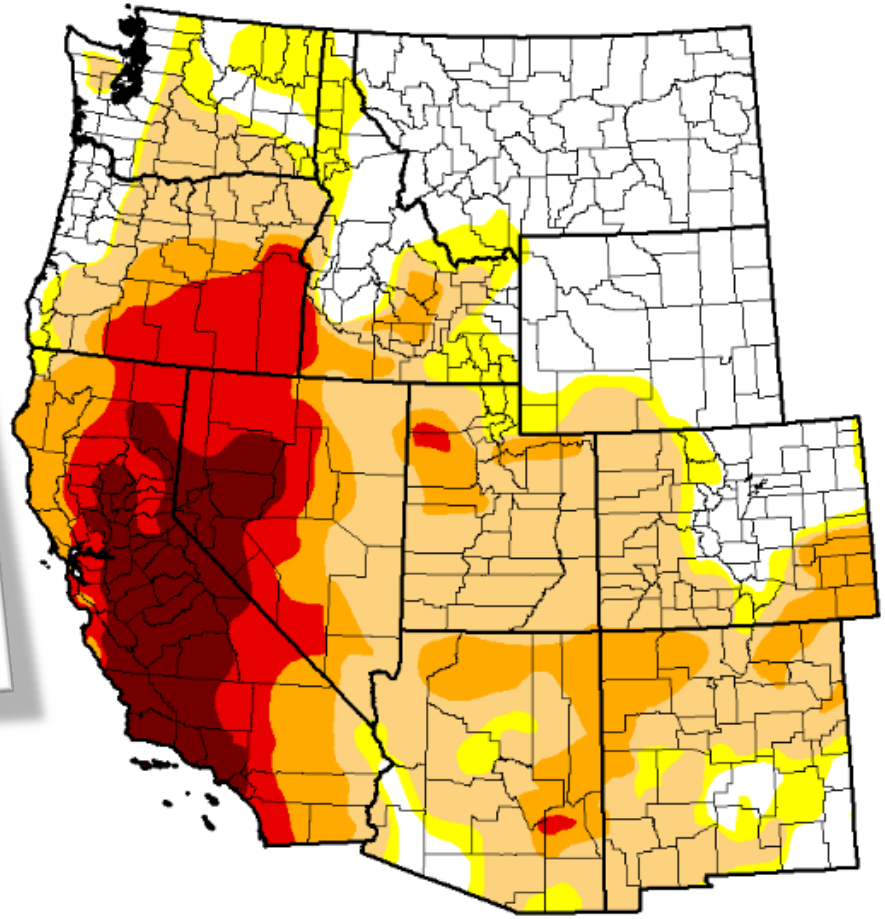
- Salton Sea mitigation flows (2003-2017)
- Phase II managed marsh
- Water quality studies
- Pupfish refugium
- Selenium transport evaluation and toxicity study
- Salton Sea air quality pilot projects
- Covered species baseline surveys

Managed Marsh Complex

- Constructed and managed aquatic habitat intended to mitigate IID Drain O&M impacts to HCP-covered species.
- Primary benefit of the managed marsh is a secure long-term assurance in a changing regulatory environment.
- Intended to benefit many of 96 proposed covered species.
- HCP, EIR/EIS, State Board Order, CDFG 2081 permit.
- Mitigation commitment is three phases up to 959 acres: Phase I completed in 2009
  - ~ *618 ac open-water/fresh emergent marsh*
  - ~ *341 ac riparian woodland/scrub*

Colorado River Drought Monitor & Snowpack Conditions





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3-17-15 http://droughtmonitor.unl.edu/Home/RegionalDroughtMonitor.aspx?west

3-15-15 http://www.mwdh2o.com/mwdh2o/pages/yourwater/supply/res_storage/res_storage.pdf

Colorado River Basin Storage & Hydrology
(as of March 9, 2015)

Current Storage	Percent Full	MAF	Elevation
Lake Powell	45%	11.013	3,592.11
Lake Mead	41%	10.693	1,087.98
Total System Storage*	49%	29.197	N/A

*Total system storage was 29,201 maf or 48% this time last year.

	Upper Colorado Basin
Water Year 2015 Precipitation to Date	83% (12.8”)
Current Basin Snowpack	87% (11.8”)

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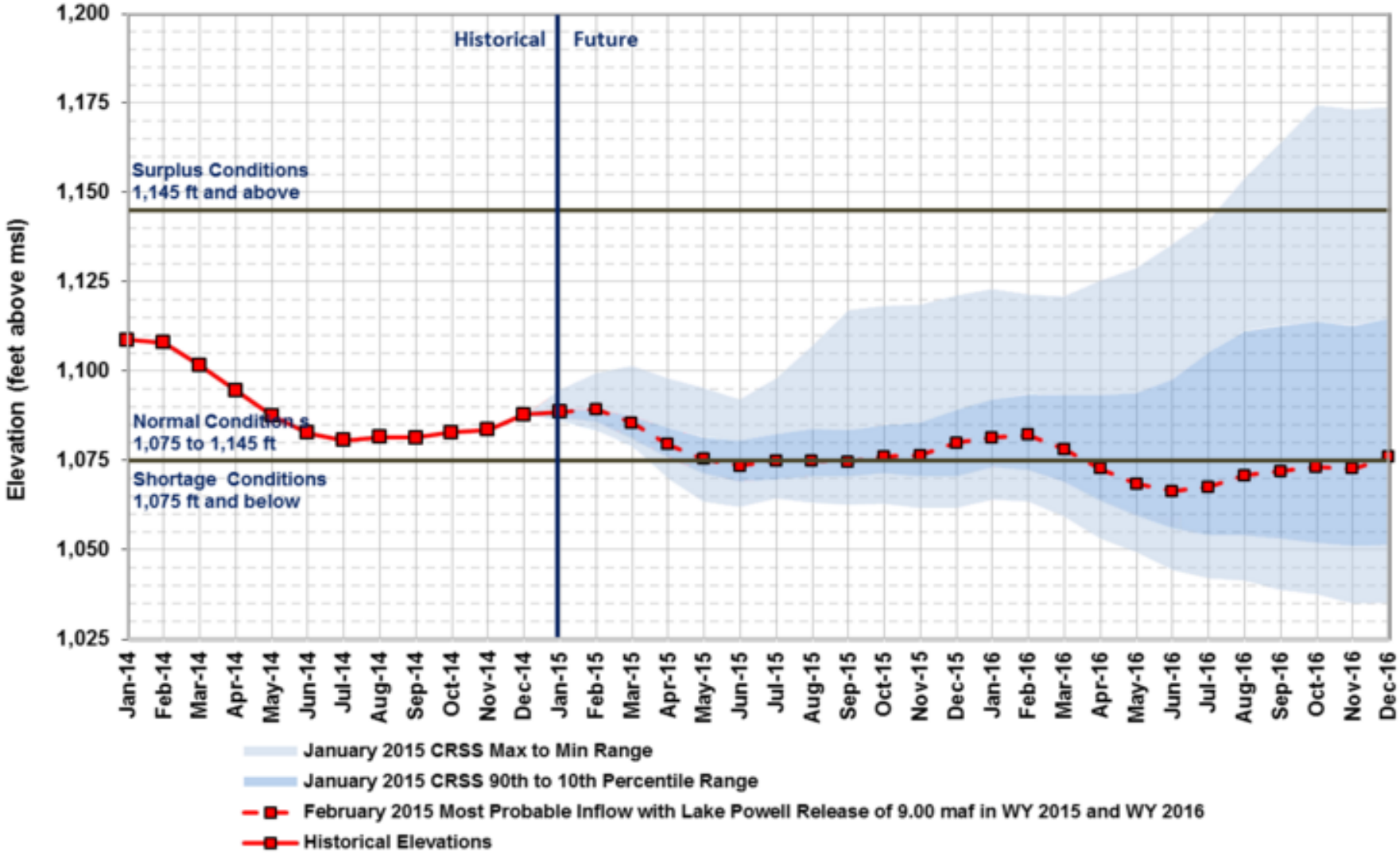
http://www.usbr.gov/lc/region/g4000/weekly.pdf

Lake Mead Elevation (1936-2015)

Lake Mead End of Month Projected Elevations

Projections from February 2015 24-Month Study Most Probable Inflow Scenario



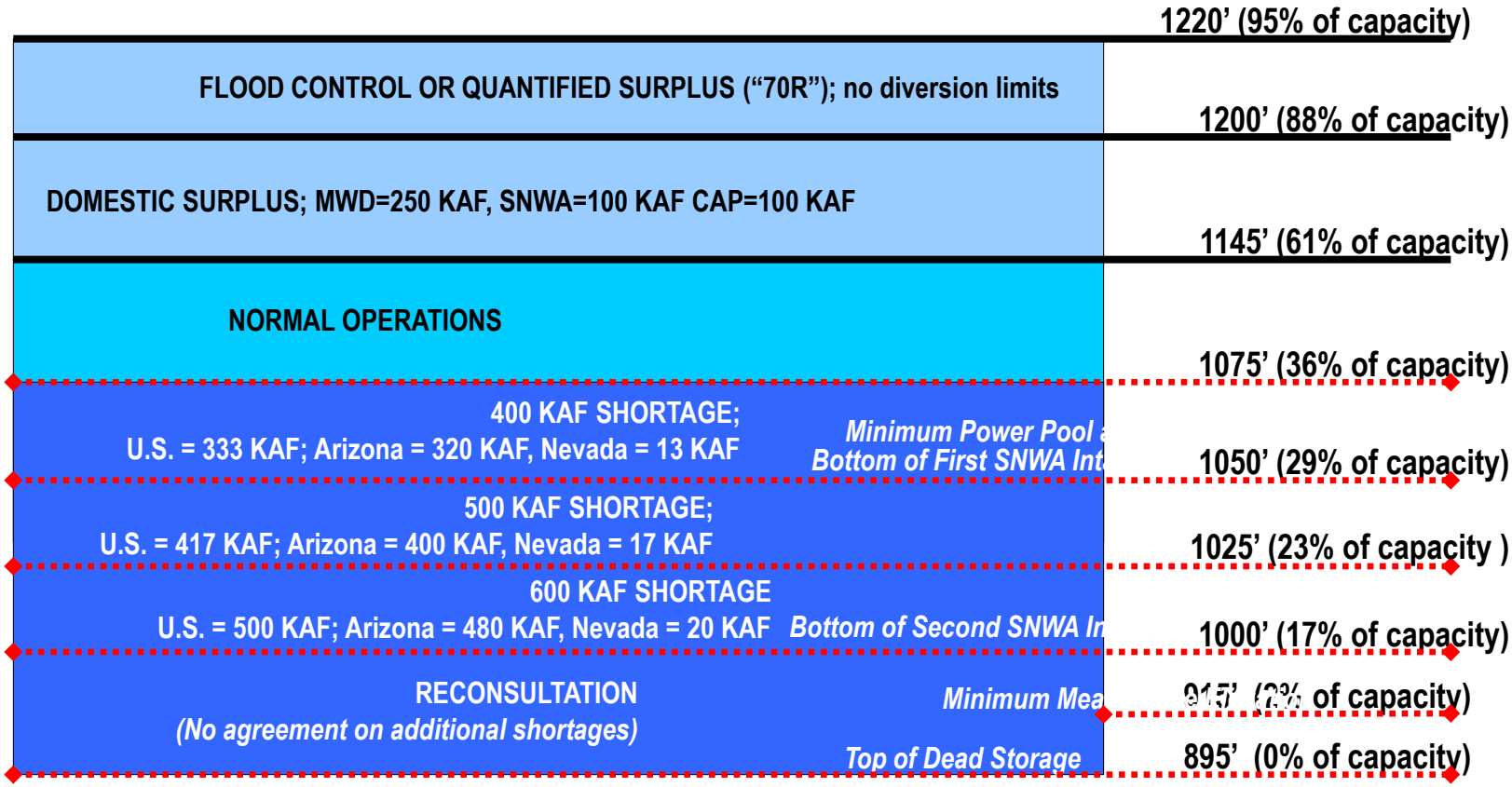
RECLAMATION

Lower Basin & Mexico Shortage Triggers

Lower Division States & Mexico Shortage Triggers and Apportionment Volume Reductions (in acre-feet)				
Lake Mead Elevation	**CA**	**AZ**	**NV**	**Mexico***
1075'-1050'	0	320,000	13,000	50,000
1050'-1025'	0	400,000	17,000	70,000
Below 1025'	0	480,000	20,000	125,000

* Mexico reductions are a result of Minute 319 and in effect for 2013-2017

2007 Interim Guidelines
Lake Mead Key Operational Elevations



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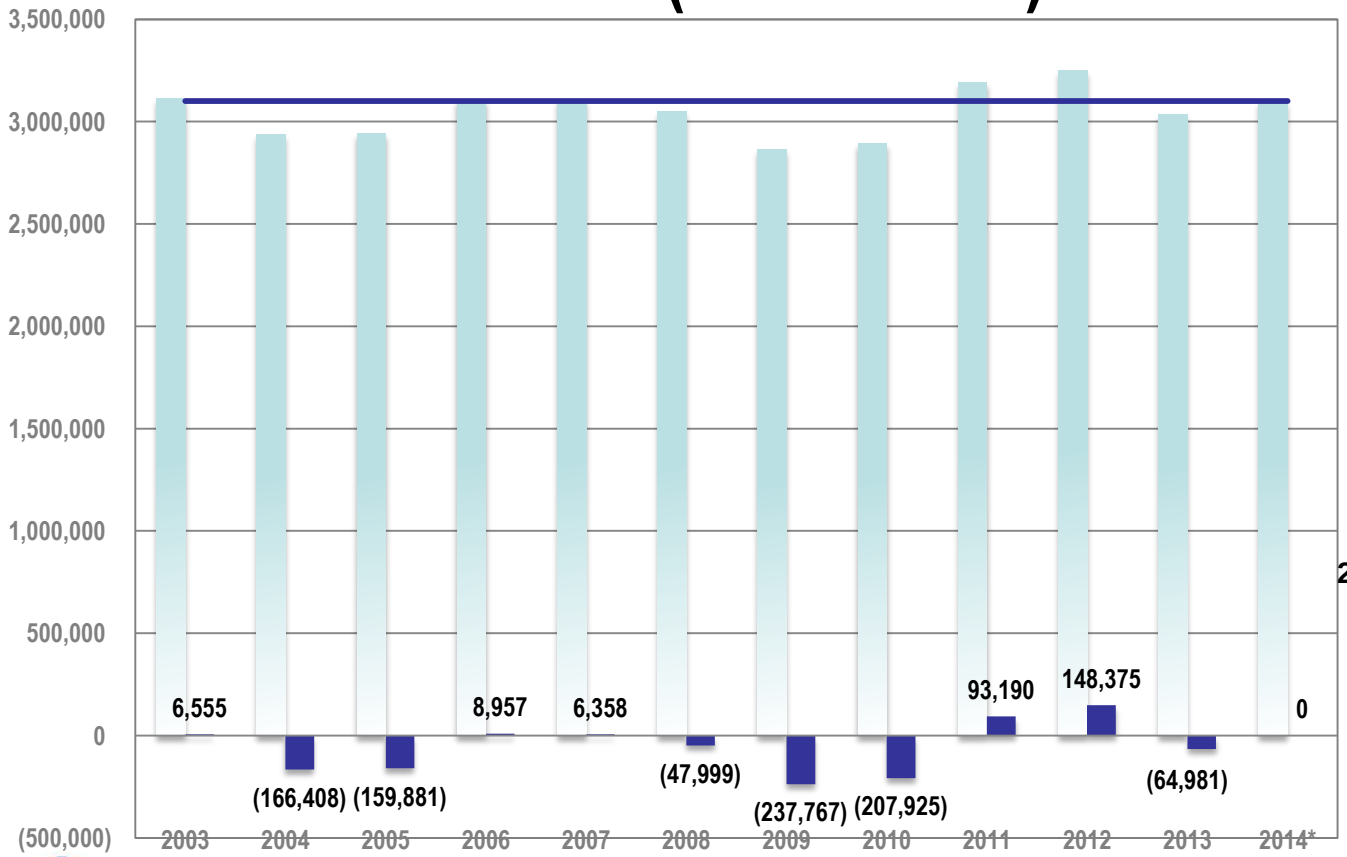
IID Shortage Impacts

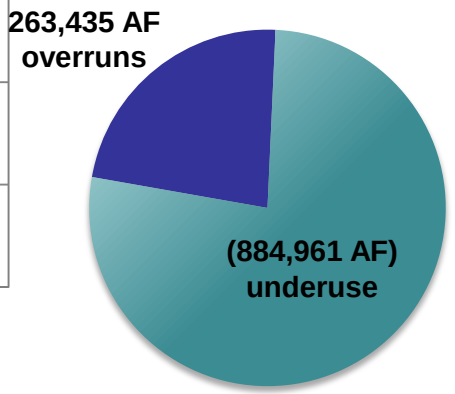
- Existing operational guidelines do not provide for any shortage reductions to California or IID.
- The 1968 Colorado River Basin Project Act limits the amount of water Arizona can divert for CAP during a drought. In the even of a reduction of Colorado River supplies, California cannot be reduced before CAP as the most junior priority user.
- IID has senior water rights within California as well as 2.6 maf of present perfected rights (PPR).
- Suspension of inadvertent overrun policy (IOPP).

IID Annual Water Use and Overruns/Underuse (2002-2014*)



2003-2014*

Overruns/(Underuse)



*provisional

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IID Provisional Estimated Consumptive Uses

(Acre-Feet)

	2013	2014	2015
Priority 3 QSA Cap	3,100,000	3,100,000	3,100,000
Miscellaneous PPR's	(11,500)	(11,500)	(11,500)
1988 IID/MWD Efficiency Conservation Transfer	(105,000)	(105,000)	(105,000)
IID/SDCWA Conservation Transfer	(100,000)	(100,000)	(100,000)
Salton Sea Mitigation	(70,000)	(90,000)	(110,000)
All-American Canal Lining	(67,700)	(67,700)	(67,700)
IID/CVWD Efficiency Conservation Transfer	(26,000)	(31,000)	(36,000)
IOPP Payback	(62,000)	(170,000)	0
Total IID Provisional Consumptive Use Estimates	*2,657,800*	*2,524,800*	*2,669,800*

Water Distribution Management Policy

Originally adopted in 2007, IID's Equitable Distribution Plan apportions water to various categories of use within IID including municipal, industrial, environmental, and agriculture. The EDP is designed as a water management policy to ensure IID does not exceed its annual consumptive use cap, but it also provides a planning tool for growers to maximize the agricultural potential associated with their annual apportionments.

- *In 2013, IID implemented a straight-line agricultural apportionment of 5.45 af/acre, prorated to 3.7 af/ac with a May 1st mid-year start date.*
- *Since 2014, IID has implemented a hybrid agricultural apportionment ranging from 2.86 to 7.86 af/acre, calculated from a combination of historical use and straight-line methodologies.*

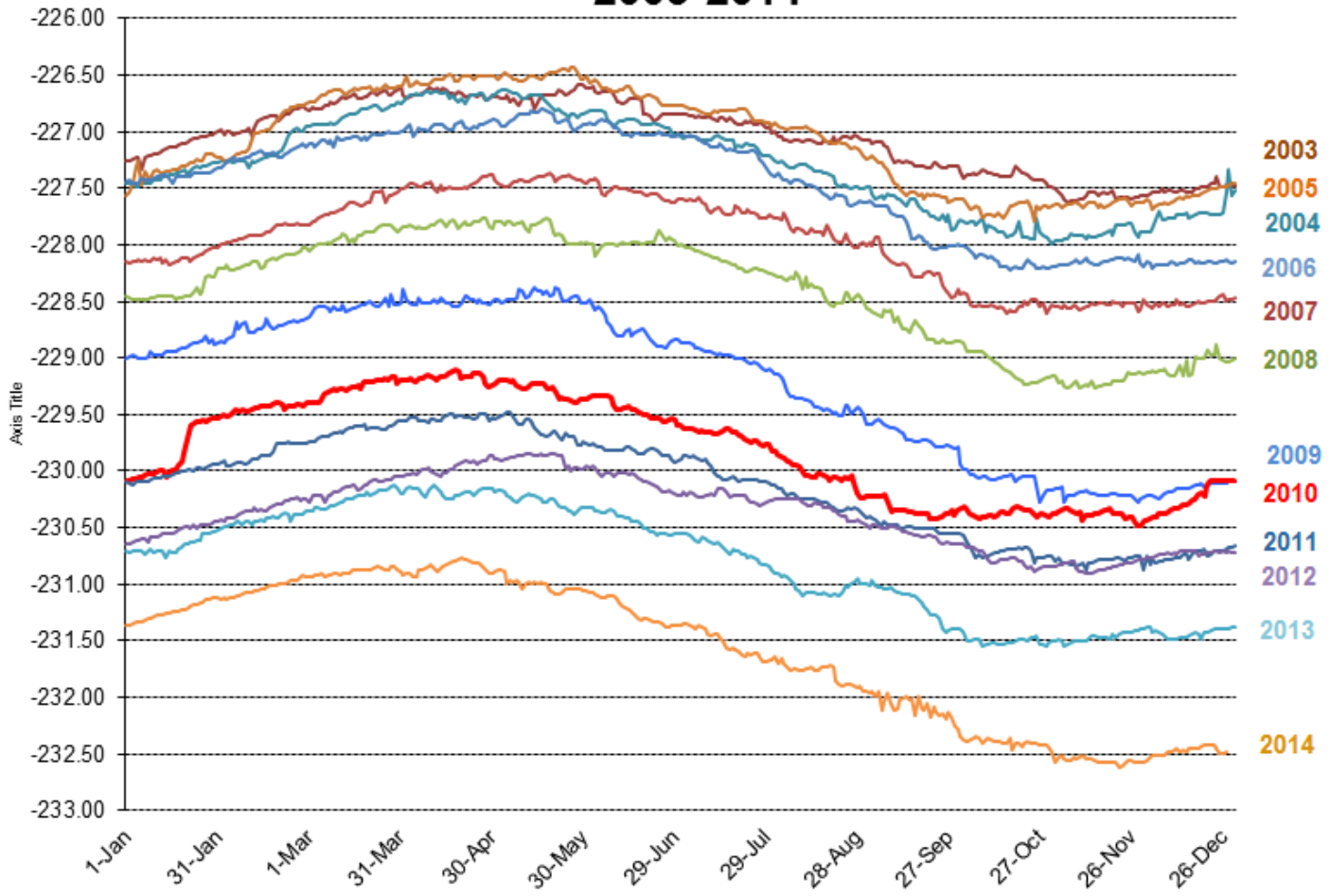
Farm Unit Water Management Focus

- In 2013, IID implemented a new water management tool by apportioning its annual water supply through an Equitable Distribution Plan (EDP).
  - *The largest category of use, agriculture, was assigned water on a per acre basis to allow these apportionments to be managed at the farm unit level.*
  - *An Agricultural Water Clearinghouse was created to provide a mechanism to move water outside of farm units from low water use fields to higher demand areas.*
  - *IID is developing internal procedures for farm units to 'pay back' any water use that exceeds its annual apportionment.*
- In 2014 IID modified its fallowing program based on a similar farm unit concept in order to integrate it with the EDP.
- The integration of the EDP, fallowing and on-farm programs provides critical new planning tools/water management opportunities for its growers.

The Salton Sea

- 375 square miles, up to 52’ deep
- Volume of 7.5 MAF with annual inflow of 1.3 MAF, no outflow
- 50% saltier than the ocean
- Repository for agricultural drainage
- Heavily used by migratory waterfowl including endangered species
- >6’ elevation decline since 2003; despite the replacement of conserved water reductions through the delivery of mitigation water
- Without transfers, Sea is estimated to turn hypersaline between 2010 and 2025
- With transfers, Sea is estimated to turn hypersaline 1-9 years earlier

SALTON SEA ELEVATION @ FIG TREE JOHN
2003-2014



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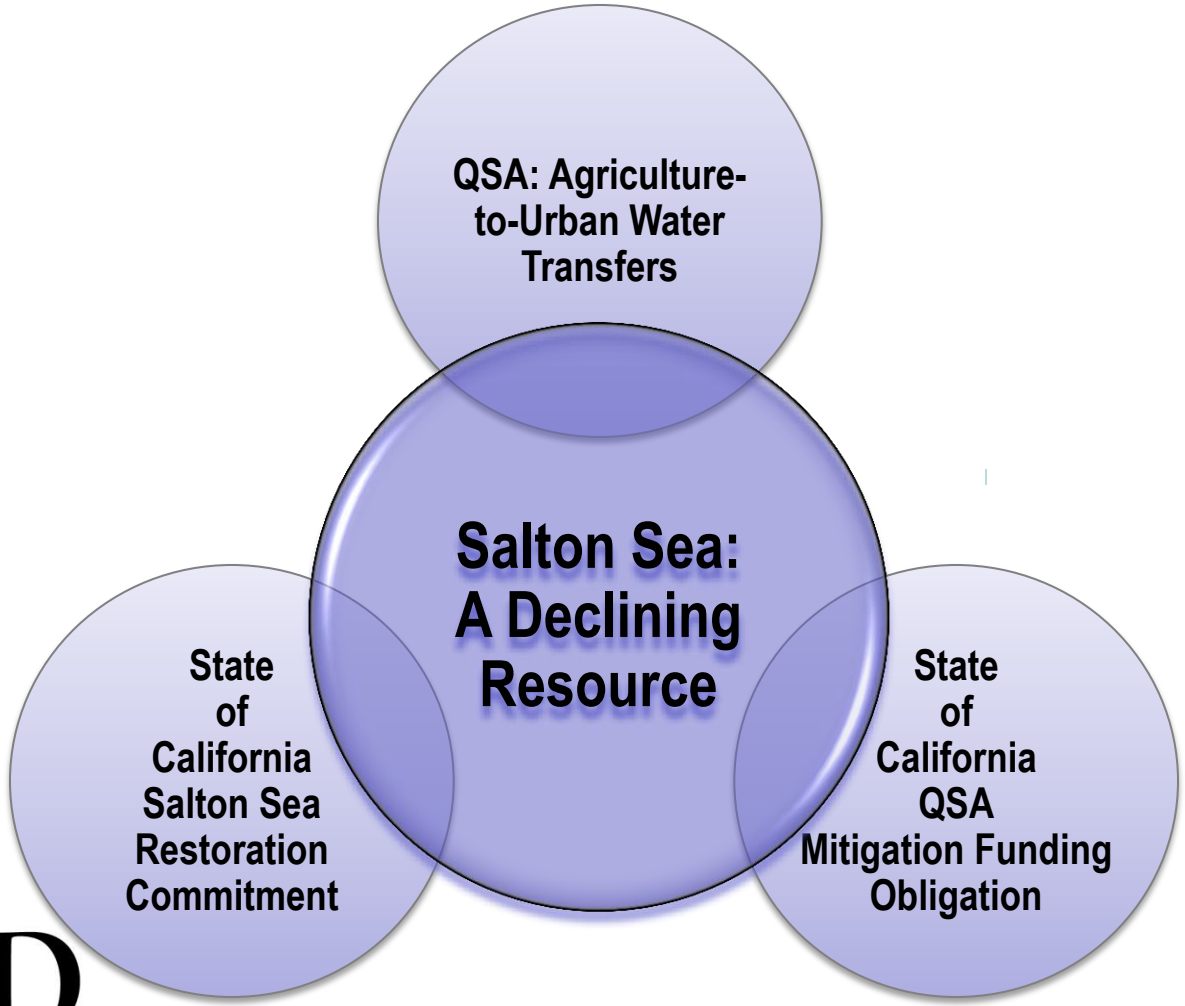
The Salton Sea Dilemma



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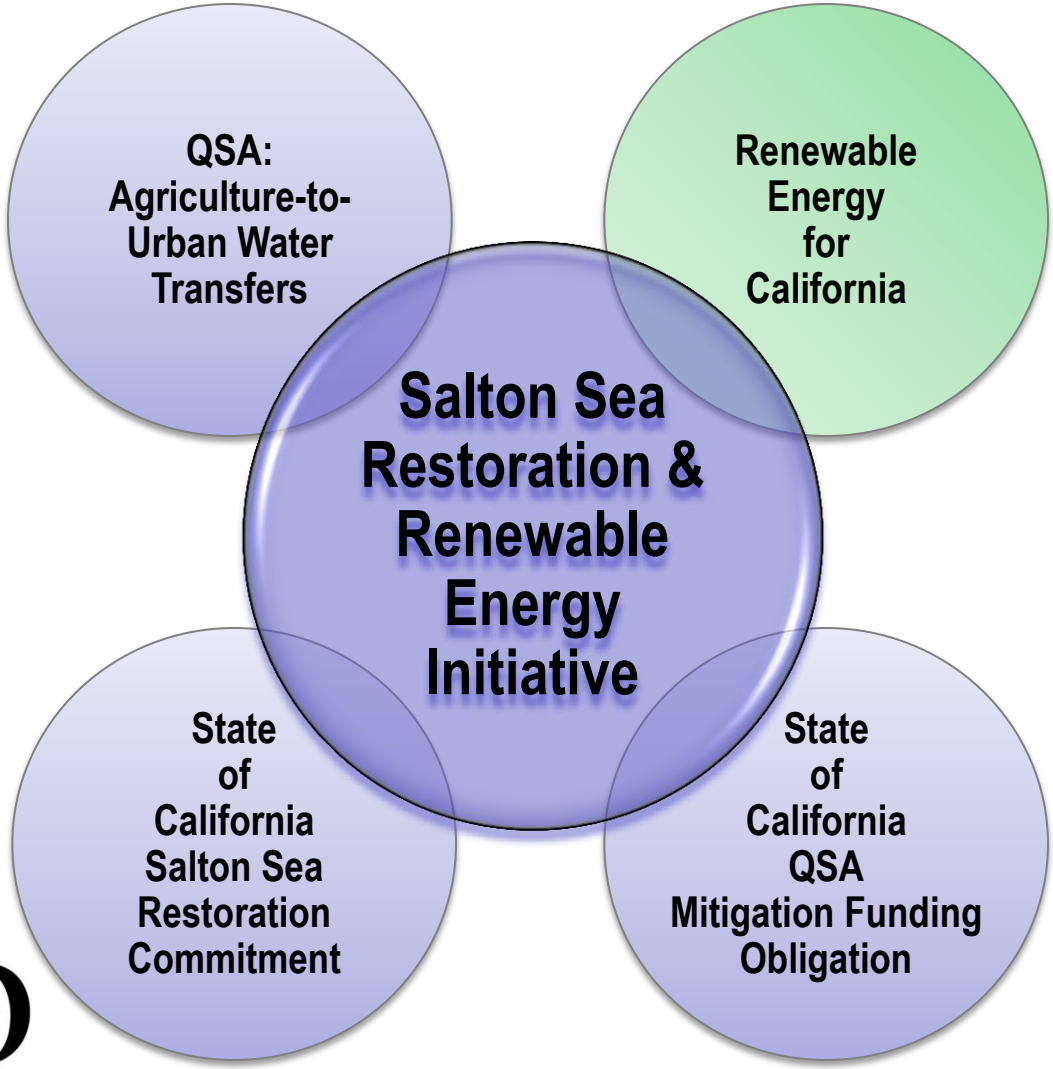
The Solution to the Salton Sea Lies within Itself



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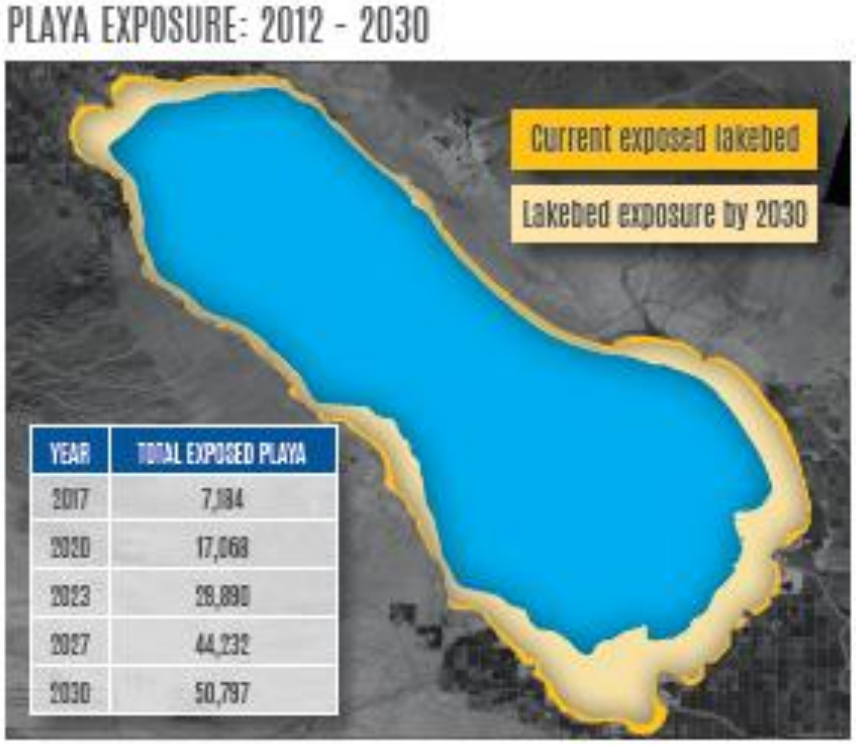
Salton Sea Restoration & Renewable Energy Initiative

As the shoreline recedes due to the implementation of water conservation measures, the Initiative proposes:

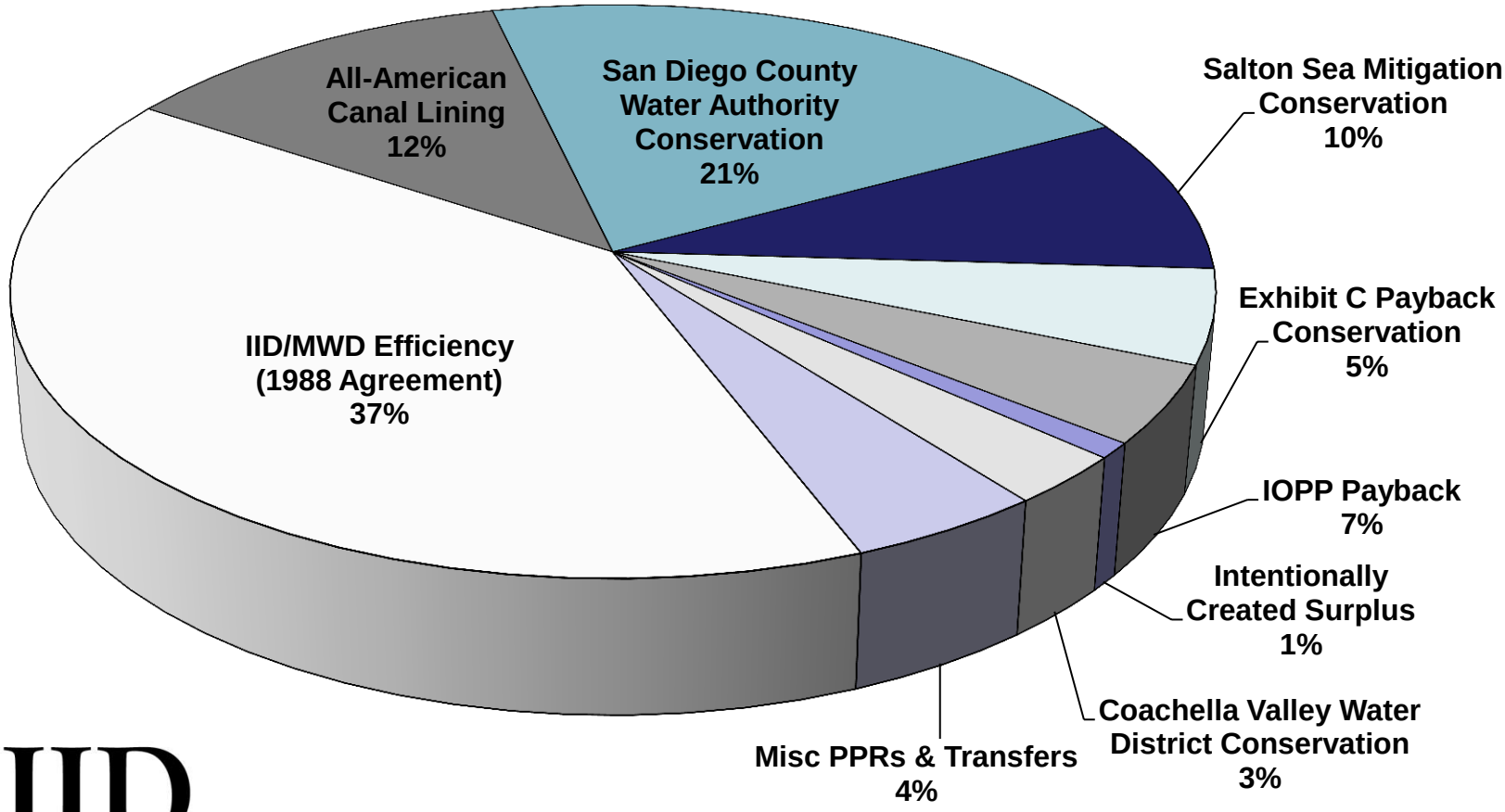
- *Developing up to 1,700 megawatts of new geothermal baseload energy in the KGRA*
- *Leveraging IID and federal land assets at the Sea to develop other renewable energy and emerging resources (solar, wind, algae, solar gradient, subsurface mining, etc.)*
- *Working with state and regulatory agencies to construct new transmission lines into Imperial Valley and execute power purchase agreements*

Salton Sea Restoration & Renewable Energy Initiative



- The Initiative will assist California utilities in meeting their green energy portfolio requirements, while providing a funding source to jump-start the restoration of a smaller but sustainable Salton Sea.
- Renewable energy projects will provide a secondary mitigation benefit as ground cover to reduce playa exposure and prevent potential air quality problems.
- Phased mitigation and restoration activities will assist California in ensuring the long-term viability of the QSA water transfers.

IID's QSA Water Conservation & Transfer Summary
(2003-2014; Total Conservation = 3,390,996 AF)*



*2014 estimated values

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