Irrigated Agriculture in Arizona: A Fresh Perspective

~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~

Water Resources Research Center
2017 Annual Conference
Tuesday, March 28

Planning for Central Arizona's Looming Agricultural Water Shortage

Brian M. Betcher
General Manager
Maricopa-Stanfield Irrigation & Drainage District
~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~


CENTRAL ARIZONA PROJECT SYSTEM MAP
LAKE HAVASU
MARK WILMER
SANTA MARIA RIVER
ALAMO LAKE
BOUSE HILLS
COLORADO RIVER
LITTLE HARQUAHALA
TONOPAH DESERT
HASSAYAMPA RIVER
HASSAYAMPA
HIEROGLYPHIC MOUNTAINS
LAKE PLEASANT
AGUA FRIA RIVER
WADDELL
AGUA FRIA
PHOENIX
SALT RIVER
VERDE RIVER
HORSESHOE RESERVOIR
BARTLETT RESERVOIR
SALT RIVER
ROOSEVELT LAKE
SAGUARO LAKE
CANYON LAKE
APACHE LAKE
SALT GILA
SUPERSTITION MOUNTAINS
GILA RIVER
SAN CARLOS RESERVOIR
CASA GRANDE
BRADY
PICACHO
RED ROCK
SAN PEDRO RIVER
MARICOPA COUNTY
PINAL COUNTY
LOWER SANTA CRUZ
TWIN PEAKS
SANDARIO
BRAWLEY
SAN XAVIER
TUCSON
SNYDER HILL
BLACK MOUNTAIN
PIMA MINE ROAD
PIMA COUNTY
SANTA CRUZ RIVER
ARIZONA
MEXICO
Colorado River
KINGMAN
FLAGSTAFF
PRESCOTT
PARKER
Central Arizona Project
PHOENIX
YUMA
TUCSON
CAP
3 COUNTY SERVICE TERRITORY
Recharge Project
Pumping Plant
Santa Rosa Canal
Central Arizona Project Canal
Maricopa-Stanfield Irrigation & Drainage District

District Project

480 Square Miles - West of Casa Grande

Between Gila River and Tohono O'Odham Nations

87,000 Gross Acres (80,000 Farmable in 1989)
Canal System Completed in 1989
District Acquired Over 400 Operable Irrigation Wells in 1989 (1,000 cfs)
40-year Lease Agreements with Landowners

- Canal System :
  - Santa Rosa Canal: 56 Miles
    - Serves Ak-Chin Community & CAIDD
  - East Main Canal: 17 Miles
  - Lateral Canals: 130 Miles
  - 193 Delivery Turnouts (95% Gravity)
  - **Entire Service Area Has Equal Access to CAP Water**
  - SCADA/ No Regulatory Storage

- Groundwater System:
  - Current Capacity: Over 440 cfs (150 Wells)
    - Capacity Lost to Development: 150 cfs (70 Wells)
  - Current Production Capability: 180,000 AFA*
    - 73% of Wells Connected to Canal System
  - **Uneven Access - "GW Poor/Dry" Areas**
  - Capital Improvement Program 2016-2017
    - Increase Capability to 190,000-200,000 AFA*
    - 75% of Wells Connected to Canal System

* Depends on Annual Demand and Well Location

The Shortage Challenge

	Recent Supplies	Current Supplies		Supplies During Shortage
CAP:	140,000	115,000**		40,000
GW:	130,000*	150,000	>>??	200,000
	270,000	265,000		240,000

Can MSIDD Increase Groundwater Production to 200,000 AFA?

* 2016 District Capability 165,000 – 175,000 AFA
** Influenced by Efforts to Protect Lake Mead Levels

Shortage Strategies

Forbearance: Protect Lake Mead Water Levels

Delayed Onset of Level 1 Shortage Until 2018 or Later

- CAP Ag Contribution – 200,000 AF = 2' in Lake Mead

Drought Contingency Plan Among AZ, CA & NV

Protections/Risks Potentially Greater

DCP+ for Arizona

Increase Groundwater Pumping

How Much / How Long – Concern Over Preserving Resource

Growers May be Forced to Increase Fallowing

Growers Continue Shift to Efficient Low-Head Irrigation Systems

Make GW Supplies More Effective

Growers Change to Alternative Crops

Must Prove Profitability – Long Term

Requires Investment in Infrastructure

EDF Study

Preparing for Reduced CAP Supplies
Investments in GW Infrastructure

- Rehabilitation of Existing Wells
  - Preservation & Augmentation
- Pipeline Infrastructure

- 2009 – 2012: $1.5 Million Revenue Bond
  Prepare for 2017 Ag Pool Reductions – Target: 170,000 AFA
- 2013: 3-Year Plan- $1.2 Million in Reserves
- 2014: Construction Improvement Program Study
- 2015 – 2017: CIP Implementation
  Increase Use of Reserves to $2.0 Million
  Target →190,000 – 200,000 AFA

Water Policy Ramifications

- **District Level** (Board Decisions)
  - How Much to Actually Pump
    - Cost vs. Resource Management vs. Subsidence
  - Limits on Flow Rate and / or Daily Use
  - Strict / Reduced Annual Allotments
- **State Level** (ADWR and CAP)
  - Increased Pumping vs. AMA Management Goals
  - Pricing Strategies for Remaining Colorado River Water
- **Basin Level** (Federal)
  - Does AZ Continue to Bear "Cost" of Lowest Priority?
    - Structural Deficit: Share with CA & NV - DCP
    - Colorado River Management
      - Augmentation (Federal Funding)
      - Upper Basin vs. Lower Basin Transfers

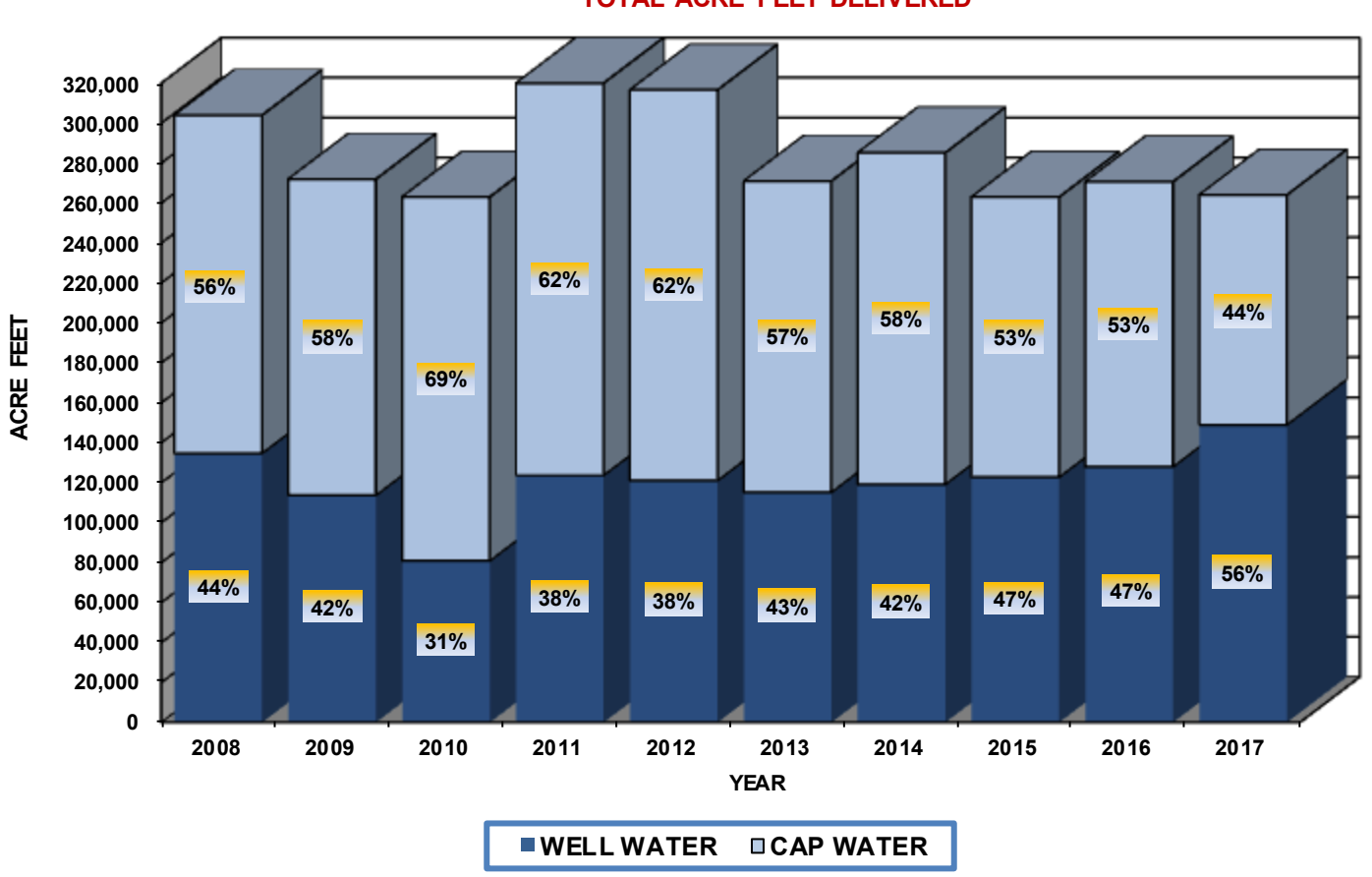
CAP SUPPLIES

	Recent	Current	During Shortage
Ag Pool Allotment:	89,000*	82,000	41,000
Ag Pool Remarket:	17,000	10,000	??
In Lieu Storage:			
AWBA:	5,000	4,000	??
GRIC:	31,000	22,000	??
Other:	4,000	2,000	1,000
	146,000	120,000	42,000
Losses:	(6,000)	(5,000)	(2,000)
Delivered to Growers:	140,000	115,000	40,000

* Net of 20,000 AF to Benefit Lake Mead Water Levels

M.S.I.D.D.

LAST TEN YEARS



YEAR	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017 Budget
CAP	169,202	158,230	182,088	204,289	195,491	155,720	165,909	140,182	142,680	115,000
WELL	134,734	113,720	80,944	123,718	121,073	115,244	119,186	122,778	127,950	149,000
TOTAL	303,936	271,950	263,032	328,007	316,564	270,964	285,095	262,960	270,630	264,000

Factors Affecting Future GW Pumping

- Does Demand Remain Constant *i.e.* GW Replaces All Lost CAP
  - Or Reduce Acres to Match GW Capability
  - Effects of Ag Economy
- Infrastructure: Can CAP be replaced by GW where needed
  - New Pipelines to Connect More Wells to Canal System
  - More Point Sources - Reduce "GW Poor/Dry" Areas
    - Rehab Old
    - Drill New (Partnering for Recovery May Help)
  - Redundancy to Match Farm System Capacities (Even More Wells!)
- Cost of Increased GW Water Pumping
  - Cost of Maintaining More Wells
  - More Energy Needed for Groundwater Pumping
    - » Drought Reduces Hydropower Availability
    - » Increased Use of Supplemental Power – Spot Market
  - Increased Depths to Groundwater
    - » More Energy per Unit Produced
    - » Potential Quality Degradation
    - » Risk Return of Subsidence