Elements of On-Farm and Basin-Level Agriculture Water Use Efficiency

…in the Kings Basin

David Orth
General Manager
Kings River Conservation District

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- Aspects of Crop Selection
  - Rotation
  - Variable Market
  - Changing Consumer Preferences
- Soil type (geology)
- Salinity Management
- Economic Viability

Key Elements of On-Farm Efficiency

- Basin Uses
  - Urban, agriculture, recreation, riparian and wetlands, fisheries
- Groundwater Conditions
  - Elevations – Depressed? Perched?
  - Water Quality
- Basin Efficiency maximized by using available resources to support needs in a balanced manner (conjunctive use)

Key Elements of Basin Efficiency

- Upper Kings Basin IRWM Authority
- Coordinated Groundwater Monitoring & Management
- Kings River Fisheries Management Program
- Southern San Joaquin Valley Water Quality Coalition
- USDA NRCS Ag Water Enhancement Program (AWEP)
- On-farm Efficiency Program

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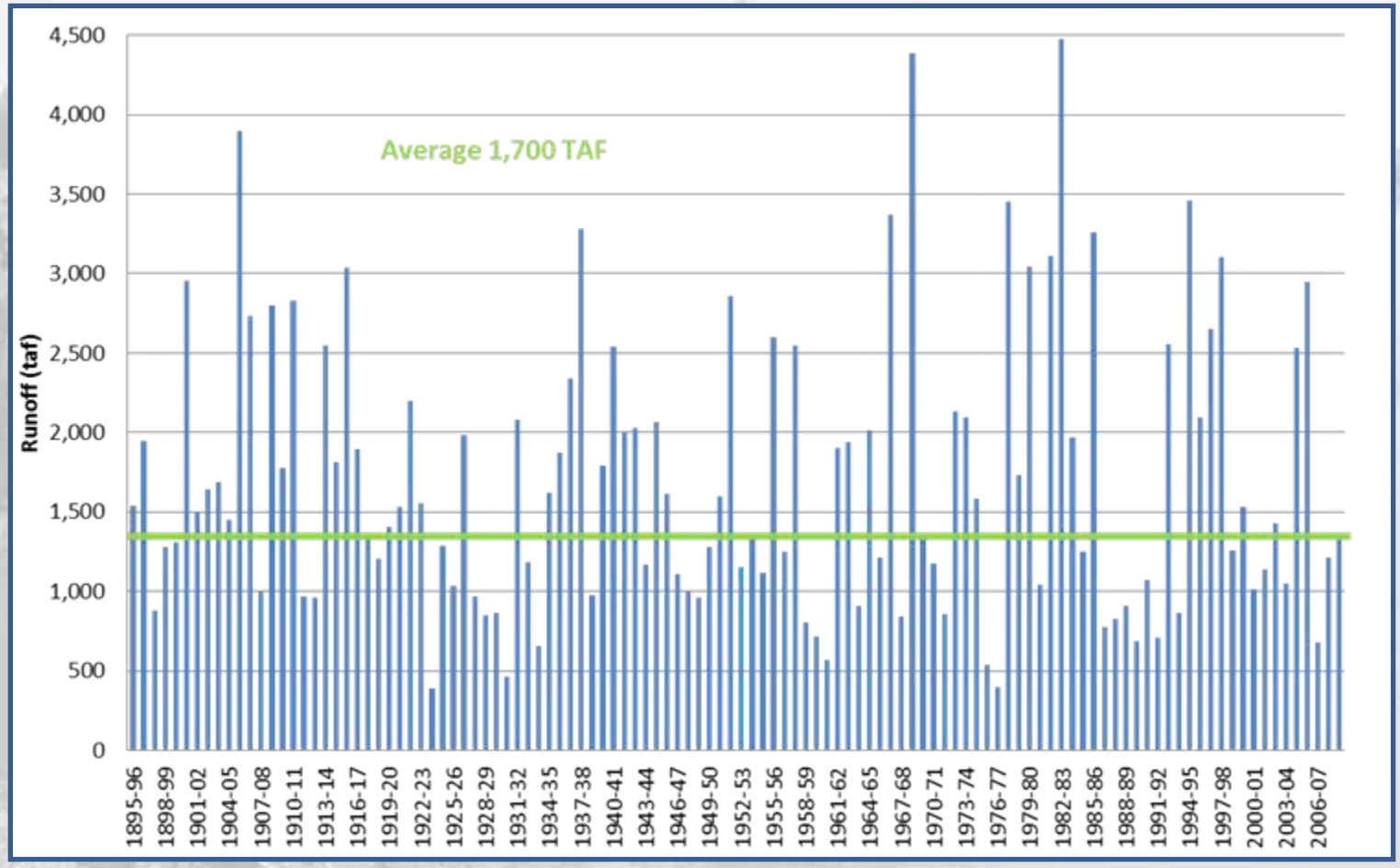
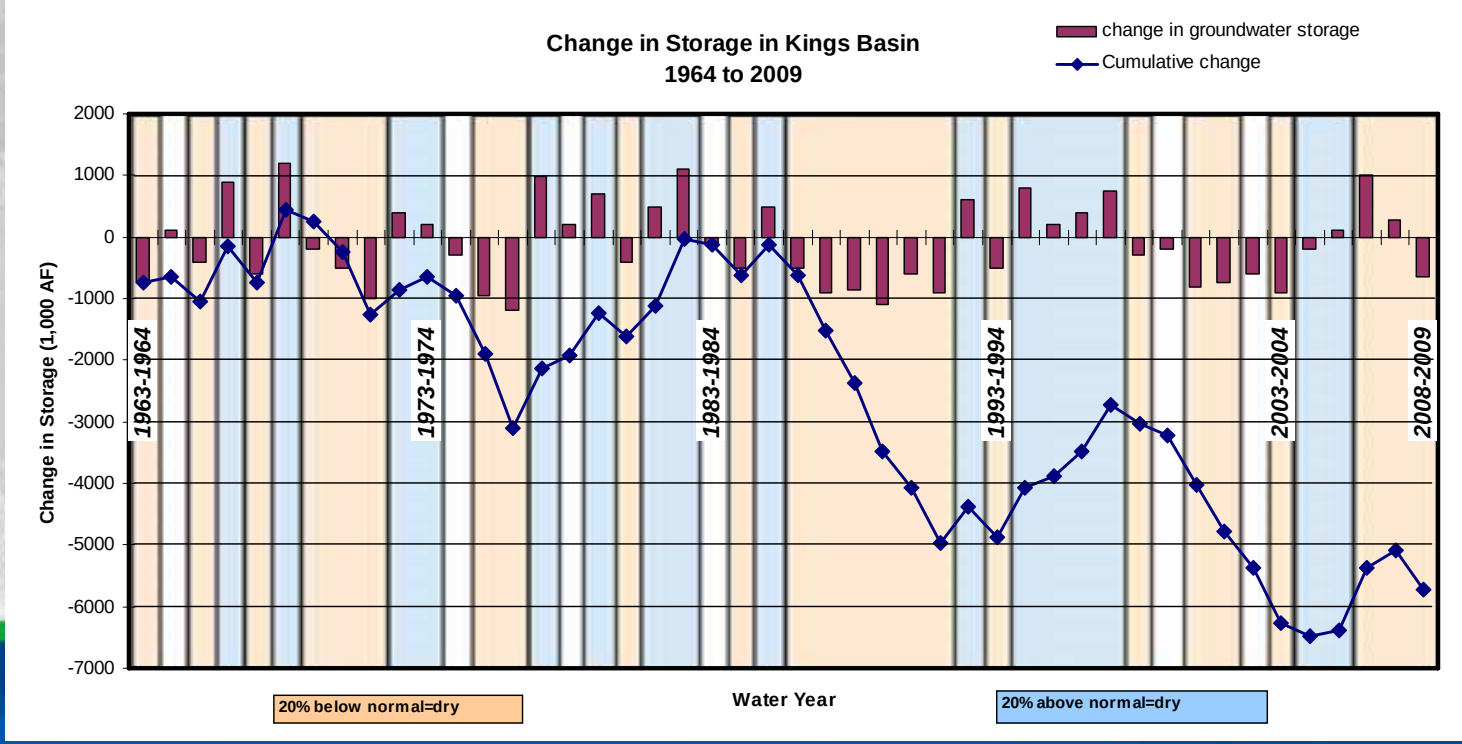
Knitting Together through Collaborative Programs

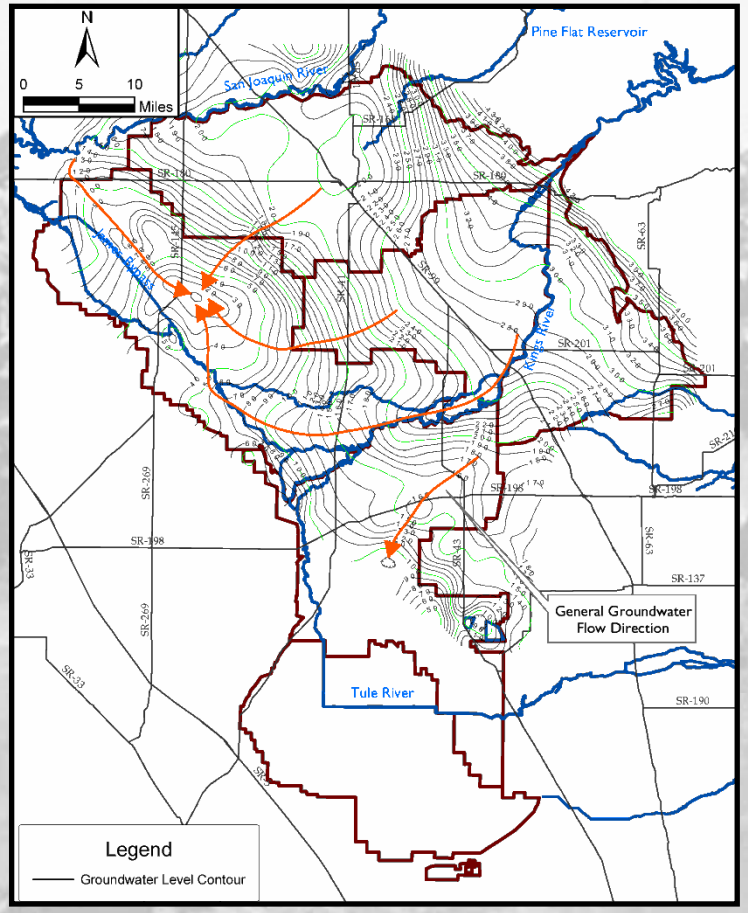


Kings River
Historical Water Year Runoff

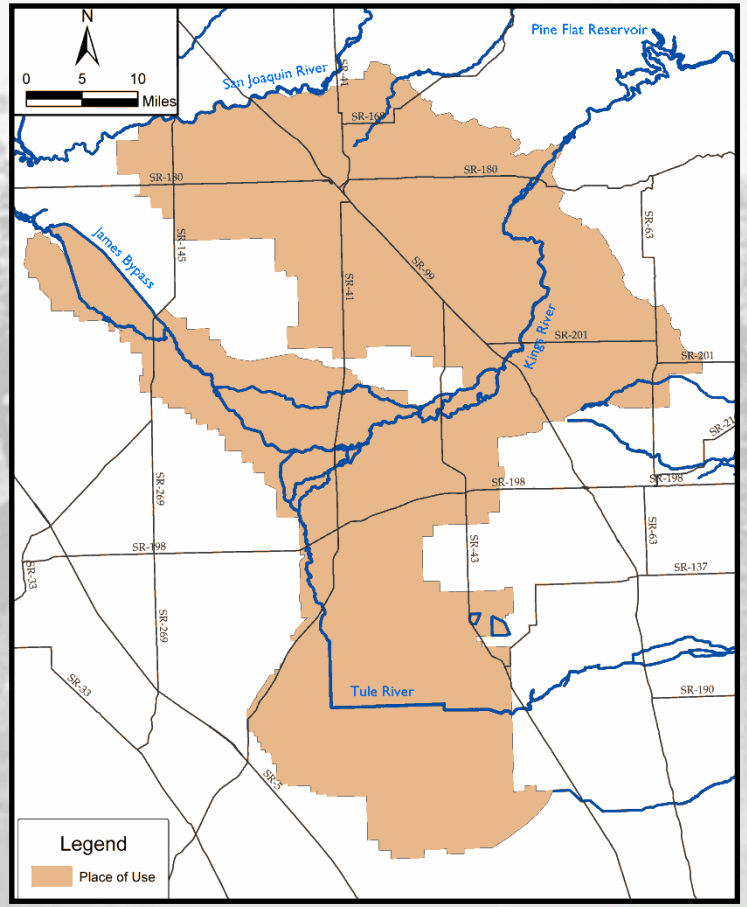
- Kings Basin GW Overdraft
  - Regional Supply Characteristics: closed system, conjunctive use basin
  - Average annual overdraft (1963 to 2009) approximately 120 TAF.
  - Largest GW depression located near Raisin City, beyond the Kings River place of use.



Kings Basin Groundwater Conditions



GW FLOW



PLACE OF USE

Kings Basin Groundwater Conditions

- USDA NRCS Agriculture Water Enhancement Program (AWEP)
  - KRCD is the cooperating local agency assisting NRCS with administering the $14M grant.
  - Program seeks to improve irrigation system efficiency through augmentation of micro-irrigation and tail water recovery systems for 650 growers on 27,000 acres.
  - Application review and irrigation design incorporate aspects of local water supply, soil recharge potential, etc. to encourage conjunctive use efficiency practices.
  - In 2010 -11 approx. $3,500,000 benefitted 96 farmers and 4,426 acres in the Kings and Tulare Lake subbasins. An additional 275 farmers and 11,000 acres will benefit in 2012 and 2013.

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Kings Basin Conjunctive Use Efficiency Activities

KRCD On-Farm Water Management Program

- All services are free of charge.
- District provides farmers with full evaluation of existing irrigation practices, including well pump tests.
- Weekly updated "AgLine" information system on KRCD Website provides (among other tools) a 7-day crop water use forecast, total crop water use season-to-date data, and an irrigation Run Time Calculator.

Kings Basin Conjunctive Use Efficiency Activities

The Efficiency of Conjunctive Use

- In the Kings Basin region, local water professionals are focused on a basin-level management approach that goes beyond only “agricultural water use efficiency”, and which purposely incorporates all aspects of agriculture/urban use and wet-year/dry-year strategies to address the region’s supply variability.
- The principal of “conjunctive use efficiency”, has been determined to be the highest priority water management objective for the Kings Basin region (i.e. limiting the loss of floodwaters, which in turn lessens the need for new supplies and creates a more capable water infrastructure.)

Refining WUE Principals at the Local Level

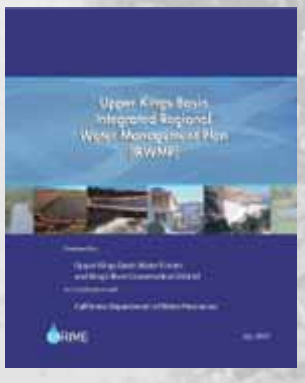
Upper Kings Basin IRWM Authority

- Planning framework designed to bridge information on groundwater basin assessment, and supply and demand for managing agriculture and urban water resources.
- Includes investments in water use efficiency, conservation, supply enhancement, groundwater and surface water management, preserving water quality and environmental stewardship.
- Example efficiency and conservation projects:

  1) Residential and agriculture water meter implementation

  2) Surface water treatment facilities

  3) Irrigation District / City water exchanges



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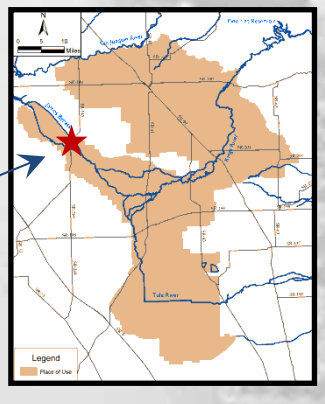
Kings Basin
Conjunctive Use Efficiency Activities

Project Title	Program	Agency	Grant Amount
UKBWF IRWMP	Prop 50 IRWM Planning	DWR	$500,000
Kings IGSM	Prop 50 IRWM Services Contract	DWR	$500,000
FID Waldron Pond Groundwater Banking Facility	Prop 13 IRWM	DWR	$4,615,072
AID/City of Dinuba Coordinated GW Storage Project	Prop 13 IRWM	DWR	$2,974,651
UKBWF IRWMP Implementation 1 (FID, City of Fresno, AID)	Prop 50 Round 2 IRWM Implementation	SWRCB	$6,064,375
UKBIRWMA IRWMP Implementation 2 (FID & City of Fresno)	Prop 50 Supplemental Round (Mini 50)	DWR	$2,099,868
KRC Kings Ribbon of Gems Implementation North Riverside Park	Prop 84 Round 1 River Parkways	Resources Agency	$284,674
UKBIRWMA DAC Outreach and Planning Project	Prop 84 IRWM Services Contract	DWR	$500,000
UKBIRWMA IRWMP Update	Prop 84 IRWM Round 1 Planning	DWR	$236,890
		Cumulative Grant Funding = $17,775,530 **Cumulative Cost of Projects = ~$30,220,000**	

Kings Basin Recent IRWM Successes

McMullin On-Farm Flood Capture and Recharge Project

- Located on the southern edge of the Raisin City groundwater depression.
- Captures river flood flows for the purpose of on-farm conjunctive use activities (i.e. direct recharge, in lieu recharge, irrigation) near the boundaries of the Kings River place of use.
- Accounting for all phases, the project has the potential to capture and utilize 30,000 AF/month for direct recharge in the winter, 4,800 AF to replenish soil moisture, and an average of 5,400 AF/month for in-lieu recharge during the spring.



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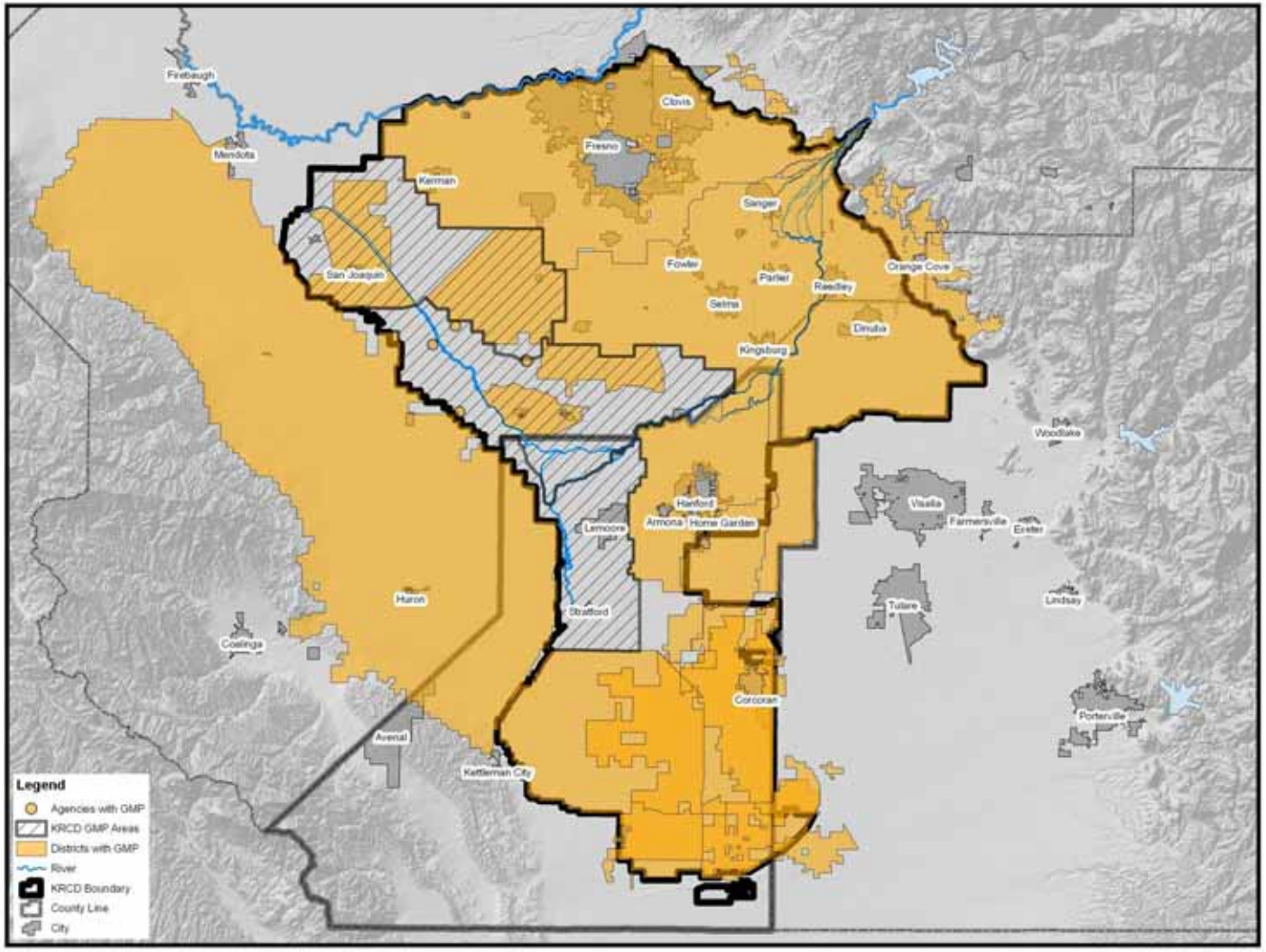

Kings Basin Groundwater Monitoring

Conclusions

- The relationship between on-farm efficiency and basin-wide efficiency is complex and variable based on basin conditions and priorities

- On Farm Efficiency, combined with efficiency and conservation from other in basin uses can provide integrated benefits to water users and environmental uses

- If seepage, run off, and deep percolation make contributions to soil moisture available to crops, groundwater, wildlife habitat, and recreation, it can not be counted as lost.

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Basin Balance through Conjunctive Use Efficiency

Questions?