

Application Efficiency: Grains 2001

Grains include wheat, oats, barley, etc.

Table 1 - Application Efficiencies for different Irrigation Systems

Irrigation System	Application Efficiencies (%)		
	Low	Mean	High
Surface Irrigation			
Wild Flood	50	68	86
Border	62	73	83
Basin	72	83	93
Furrow	60	73	85
Surface - Sprinkler Side-Roll	60	68	75
Surface - Sprinkler Hand-Move	60	68	75
Sprinkler			
Permanent	70	78	85
Hand-Move	60	70	80
Linear-Move	73	82	90
Side-Roll	60	70	80
Micro-Mini	73	81	88
Hose-Pull	70	73	75
Center - Pivot	70	80	90
Drip			
Above ground	77	86	95
Buried drip	77	86	95

Table 2 - Application Efficiency Estimates

Code	Hydrologic Region	Application Efficiency (%)		
		Low	Mean	High
1	North Coast	62.9	73.3	83.5
2	San Francisco Bay	55.9	72.7	85.4
3	Central Coast	58.1	64.1	70.1
4	South Coast	60.9	69.4	77.8
5	Sacramento River	58.7	72.4	83.9
6	San Joaquin River	60.5	72.2	83
7	Tulare Lake	61.3	71.7	82.1
8	North Lahontan	60.8	69.5	77.6
9	South Lahontan	61.2	71.2	81.1
10	Colorado River	62.1	72.4	82.8
	Statewide	60.6	72.0	82.6

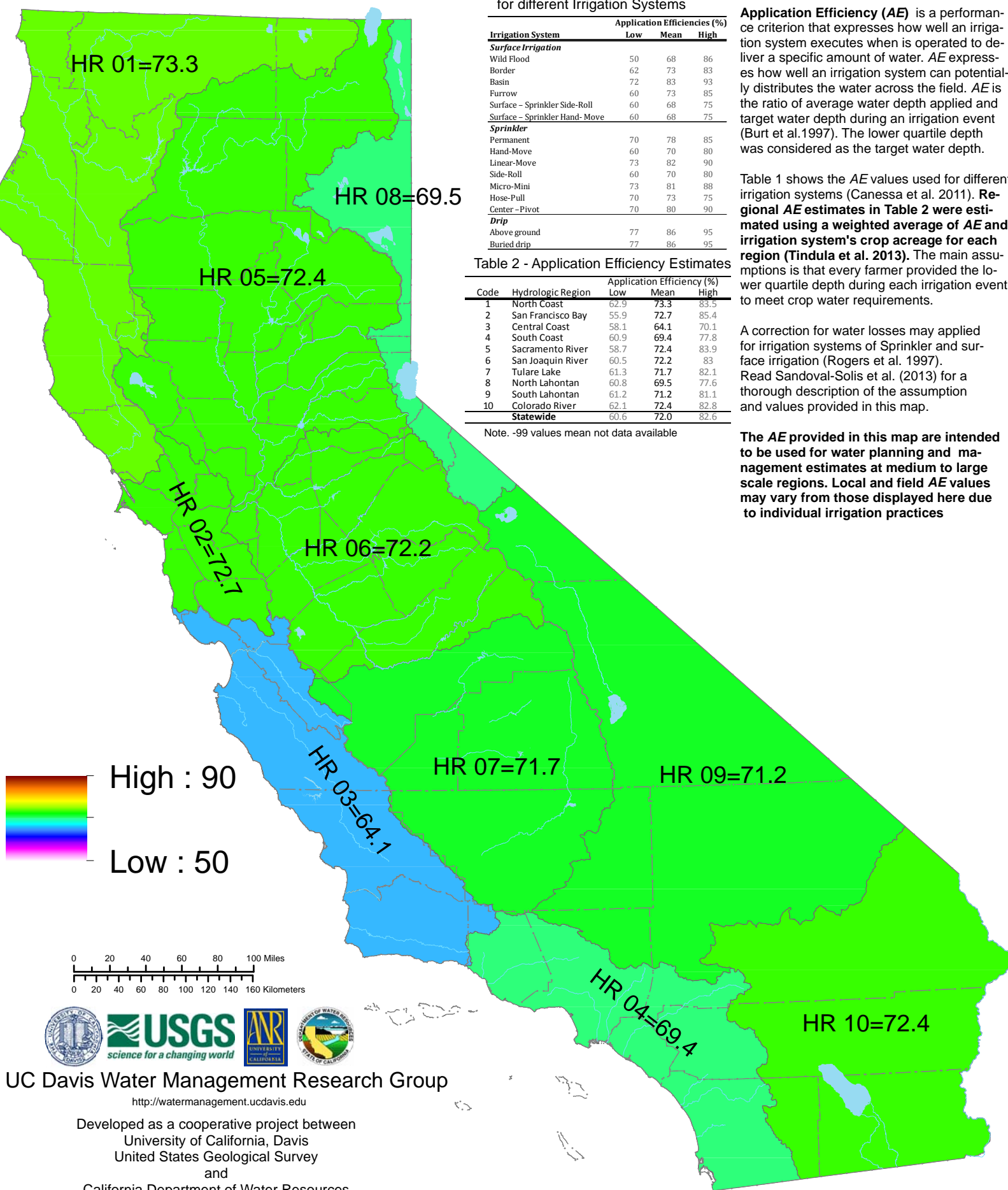
Note: .99 values mean not data available

Application Efficiency (AE) is a performance criterion that expresses how well an irrigation system executes when is operated to deliver a specific amount of water. AE expresses how well an irrigation system can potentially distributes the water across the field. AE is the ratio of average water depth applied and target water depth during an irrigation event (Burt et al.1997). The lower quartile depth was considered as the target water depth.

Table 1 shows the AE values used for different irrigation systems (Canessa et al. 2011). **Regional AE estimates in Table 2 were estimated using a weighted average of AE and irrigation system's crop acreage for each region (Tindula et al. 2013).** The main assumption is that every farmer provided the lower quartile depth during each irrigation event to meet crop water requirements.

A correction for water losses may applied for irrigation systems of Sprinkler and surface irrigation (Rogers et al. 1997). Read Sandoval-Solis et al. (2013) for a thorough description of the assumption and values provided in this map.

The AE provided in this map are intended to be used for water planning and management estimates at medium to large scale regions. Local and field AE values may vary from those displayed here due to individual irrigation practices



UC Davis Water Management Research Group

<http://watermanagement.ucdavis.edu>

Developed as a cooperative project between
University of California, Davis
United States Geological Survey
and
California Department of Water Resources

Map prepared by P.I.: Samuel Sandoval Solis, Ph.D. © 2013.

Burt, C.M., Clemmens, A.J., Strickoff, T.S., Solomon, K.H., Bliesner, R.D., Hardy, L.A., Howell, T.A., Eisenhauer, D.E. (1997). "Irrigation Performance Measures: Efficiency and Uniformity." *Journal of Irrigation and Drainage Engineering*, (123)6, 423-442.
Canessa, P., Green, S., and Zolotarev, D. (2011). "Agricultural Water Use in California: A 2011 Update." *Hydrology*, K., ed. Center for Irrigation Technology, California State University, Fresno, Fresno, CA.
Rogers, D.H., Lamm, F.R., Alan, M., Troen, T.P., Clark, G.A., Barnes, P.L., and Markon, K. (1997). "Efficiencies and Water Losses of Irrigation Systems." *Irrigation Management Series*, Research and Extension Engineers, Kansas State University.
Tindula, G.N., Oring, M.A., and Snyder, R.L. (2013). "Survey of Irrigation Methods in California in 2010." *J. of Irrigation and Drainage Engineering*, ASCE, in press.
Sandoval-Solis, S., Oring, M., Snyder, R., Williams, K.E., and Rodriguez, J.M. (2013). "Spatial Analysis of Application Efficiencies in Irrigation Systems for the State of California." Final report, U.S. Geological Survey, California Institute for Water Resources.
<http://watermanagement.ucdavis.edu/library/>