

Urban landscape water use in California – the potential for real savings

Jay Lund

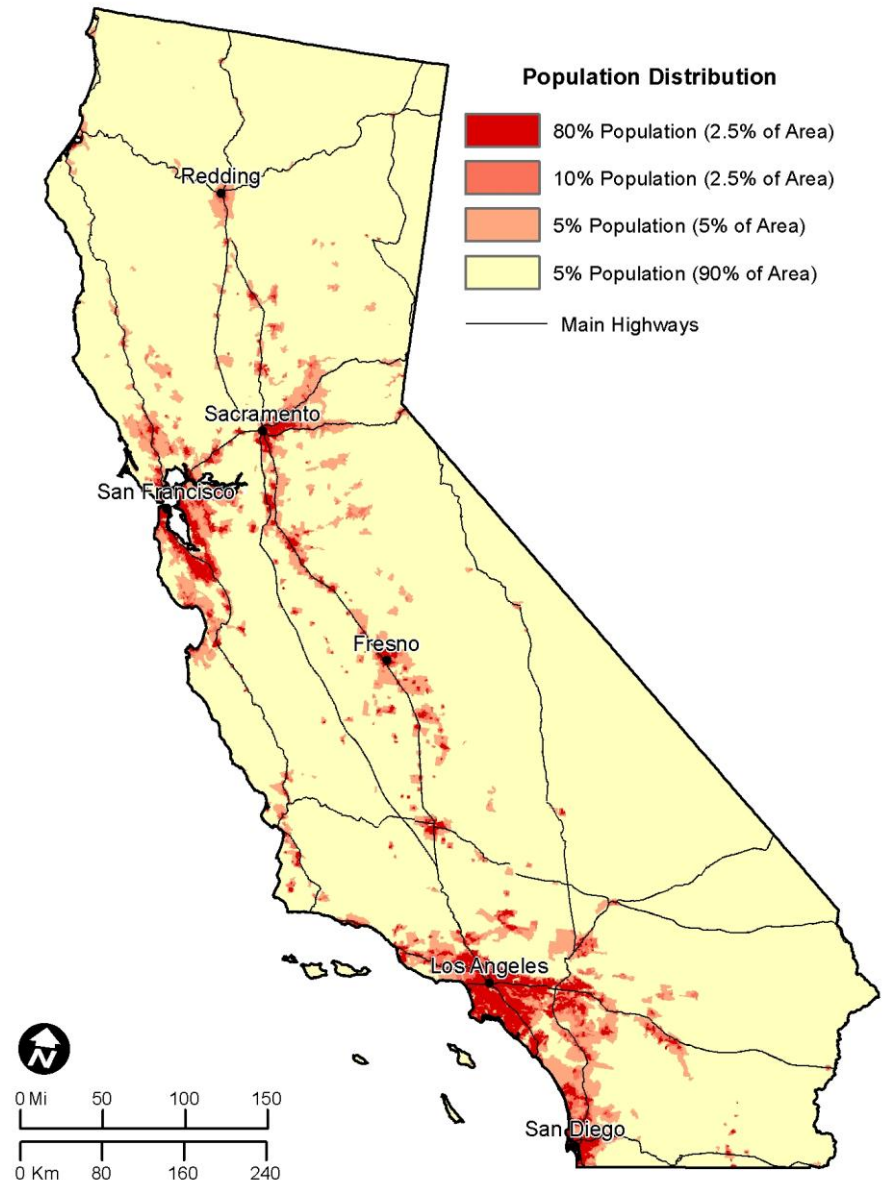
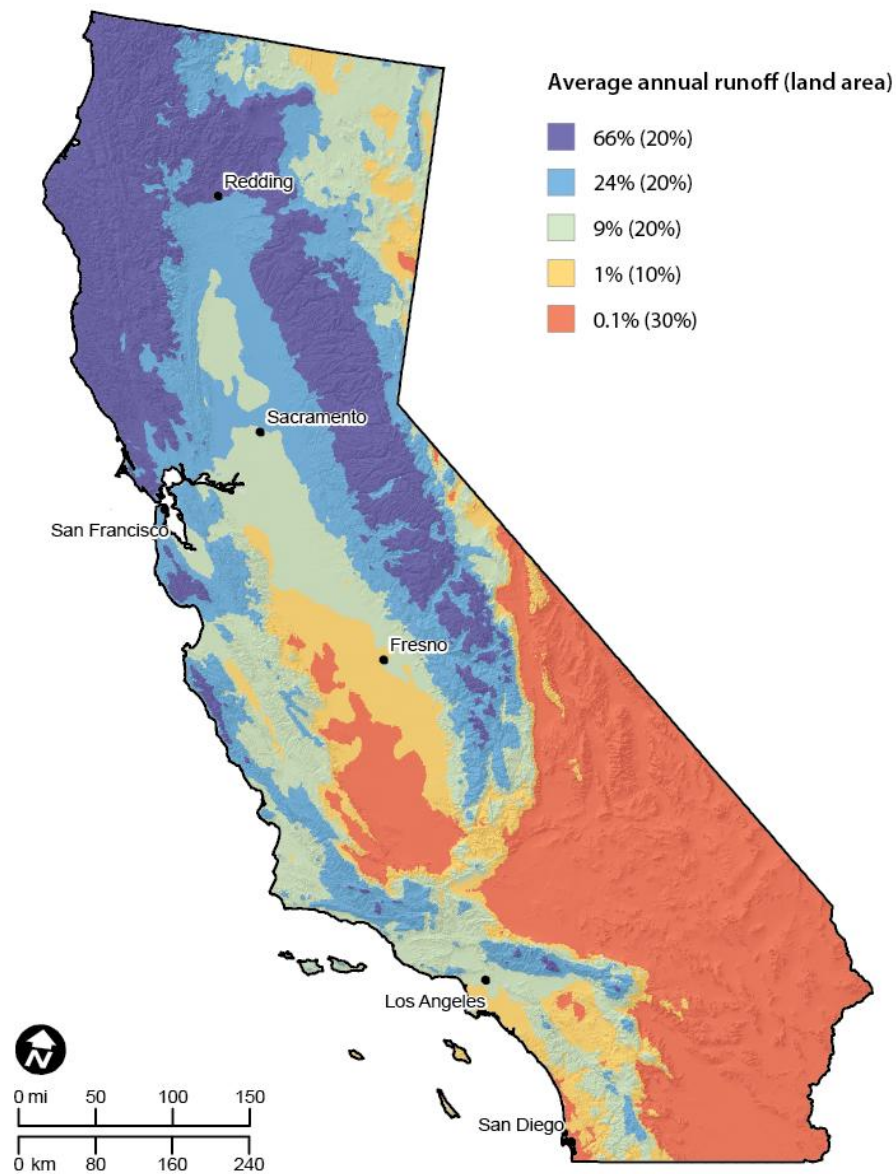
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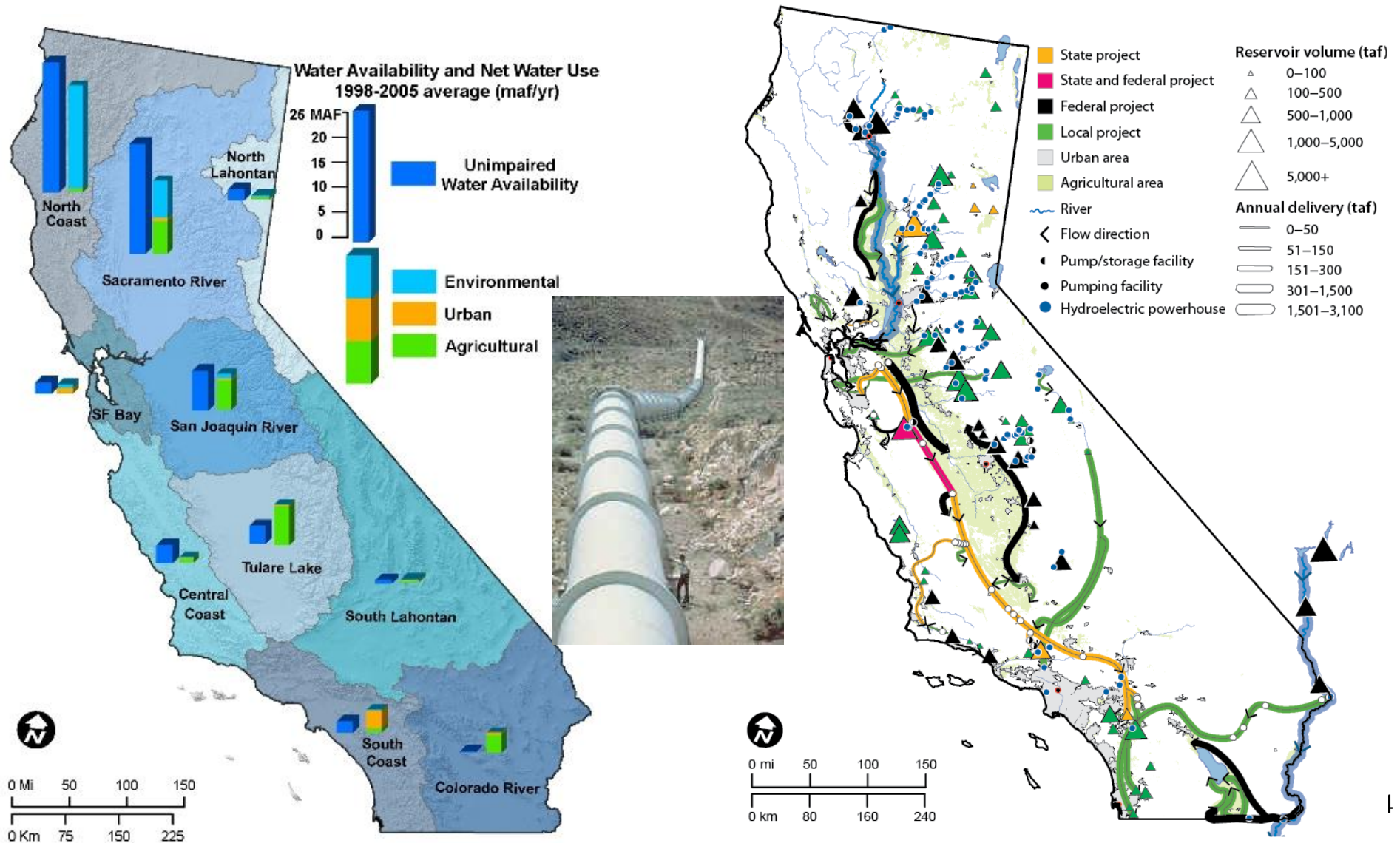
Outline

- California water
- Urban landscape water use
- Comparisons of California and Australia
- Can saved water be reused?
- Conclusions

Water and People in California



California depends on an engineered statewide network



Effects of Climate and Land Use

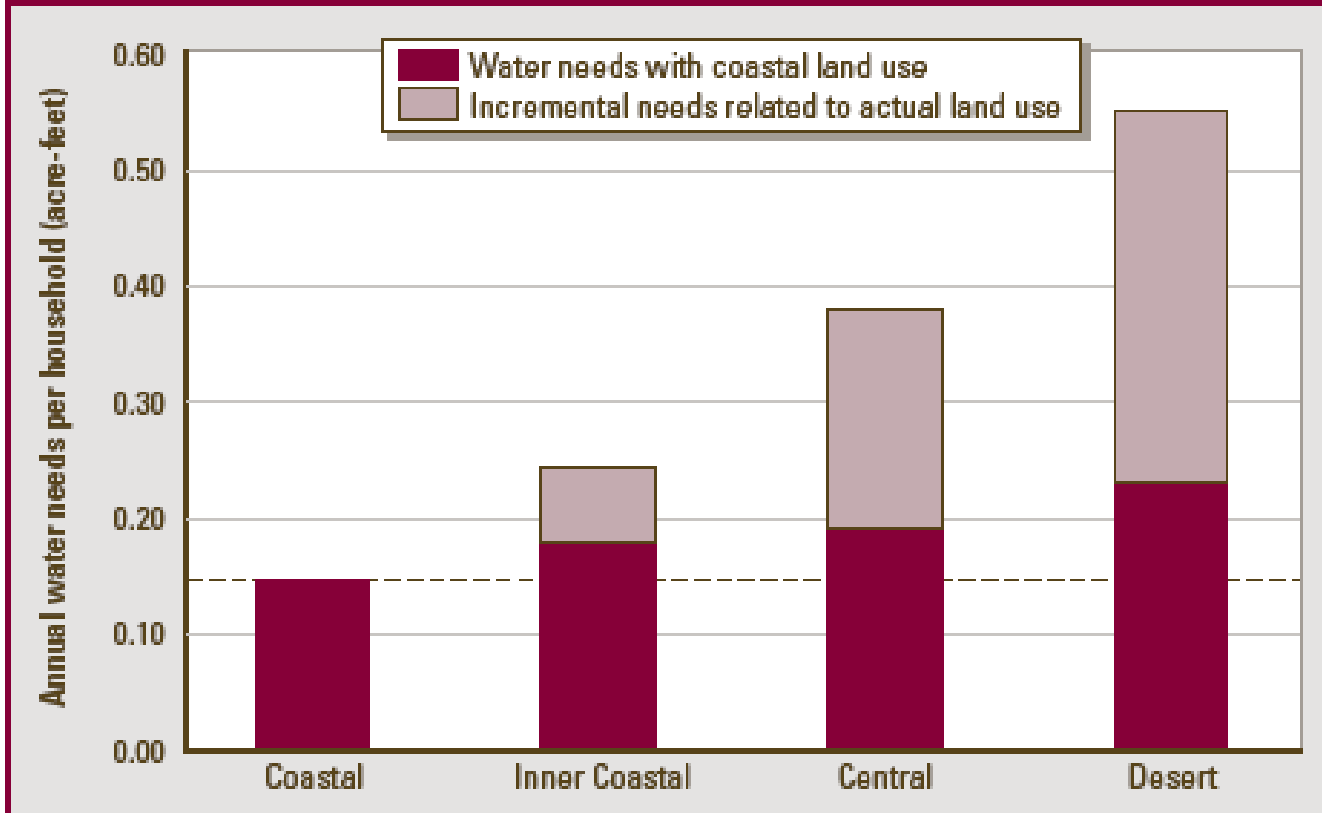
- Average Water Requirements of Turf Grass for Small Single-Family Lots

Region	Yard Size (sf)	Weighted Average ET0 (inches/year)	Annual Water Requirements (af)	Increase over Region with Lowest Need
San Francisco Bay Area	6,308	45.9	0.19	—
South Coast	7,623	49.8	0.25	31%
San Joaquin Basin	7,060	54.4	0.26	33%
Tulare Basin	7,711	56.2	0.29	50%
Sac. Metro region	8,129	56.8	0.31	59%
Inland Empire	8,858	56.2	0.33	72%

Effects of Climate and Land Use

- Larger lawns & warmer, drier climate increase landscape water use
- Landscape type will also affect!

Figure 8. Effects of Climate and Land Use on Outdoor Water Needs of Turf Grass



Hanak and Davis, 2009

AU and CA urban water use

- Urban CA could reduce use by 30-50+% with AU use rates.

Location	Residential Use, gpcd
Portland, OR	58
Albuquerque, NM	74
Tucson, AZ	97
Denver, CO	104
California	104
San Francisco	46
Oakland/East Bay	73-83
San Diego	73-92
San Jose	81-85
Los Angeles	91-99
Sacramento	113-120
Australia	54
Melbourne	40
Brisbane	45
Canberra	50
Sydney	55
Perth	75

Cahill and Lund, 2009

Biggest difference in AU and CA use is usually outdoors

	California				Australia					
	East Bay Area		California		Perth		Melbourne		Gold Coast	
End Use	Use, gpcd	% of total	Use, gpcd	% of total	Use, gpcd	% of total	Use, gpcd	% of total	Use, gpcd	% of total
Toilet	20	21%	13	10%	9	9%	8	13%	5	13%
Shower/Bath	15	16%	13	10%	14	14%	14	24%	15	37%
Washing Machine	14	15%	10	8%	11	11%	11	19%	8	19%
Faucets	10	11%	11	9%	7	7%	7	12%	7	17%
Leaks	5	5%	10	8%	2	2%	4	6%	1/2	1%
Other	1	1%	2	1%	1	1%	1	1%	1/2	1%
Outdoor	30	32%	67	53%	55	56%	15	25%	5	12%
Total	95	100%	126	100%	99	100%	60	100%	42	100%

Cahill and Lund, 2006

Melbourne 25"

Queensland 48"

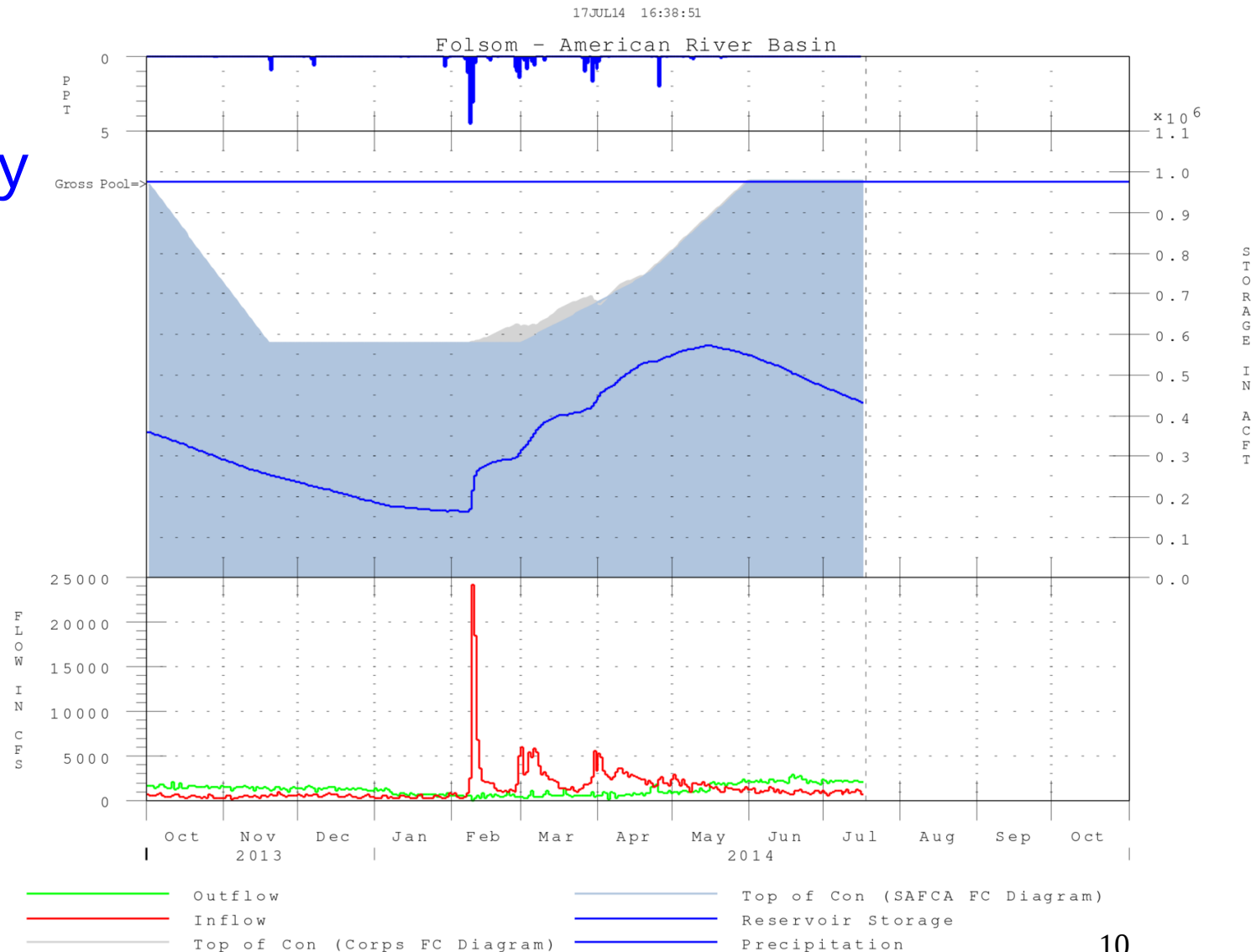
Perth 29"

Can saved water be reused?

- Little inland landscaping water is “wasted” on a regional scale
- Landscape evaporation is lost by vegetation
- Inland “overwatering” mostly returns to streams or recharges aquifers – is used by others already
- Some inland stormwater management costs
- In coastal areas, almost all water use is consumptive, and is not reused – is “wasted”
- Reducing CA urban use to AU levels, reduces use by 2.1 maf, but makes only 1.5 maf/yr available for use

Folsom Reservoir 2014

- Drawdown until February
- Still low
- What of next year?

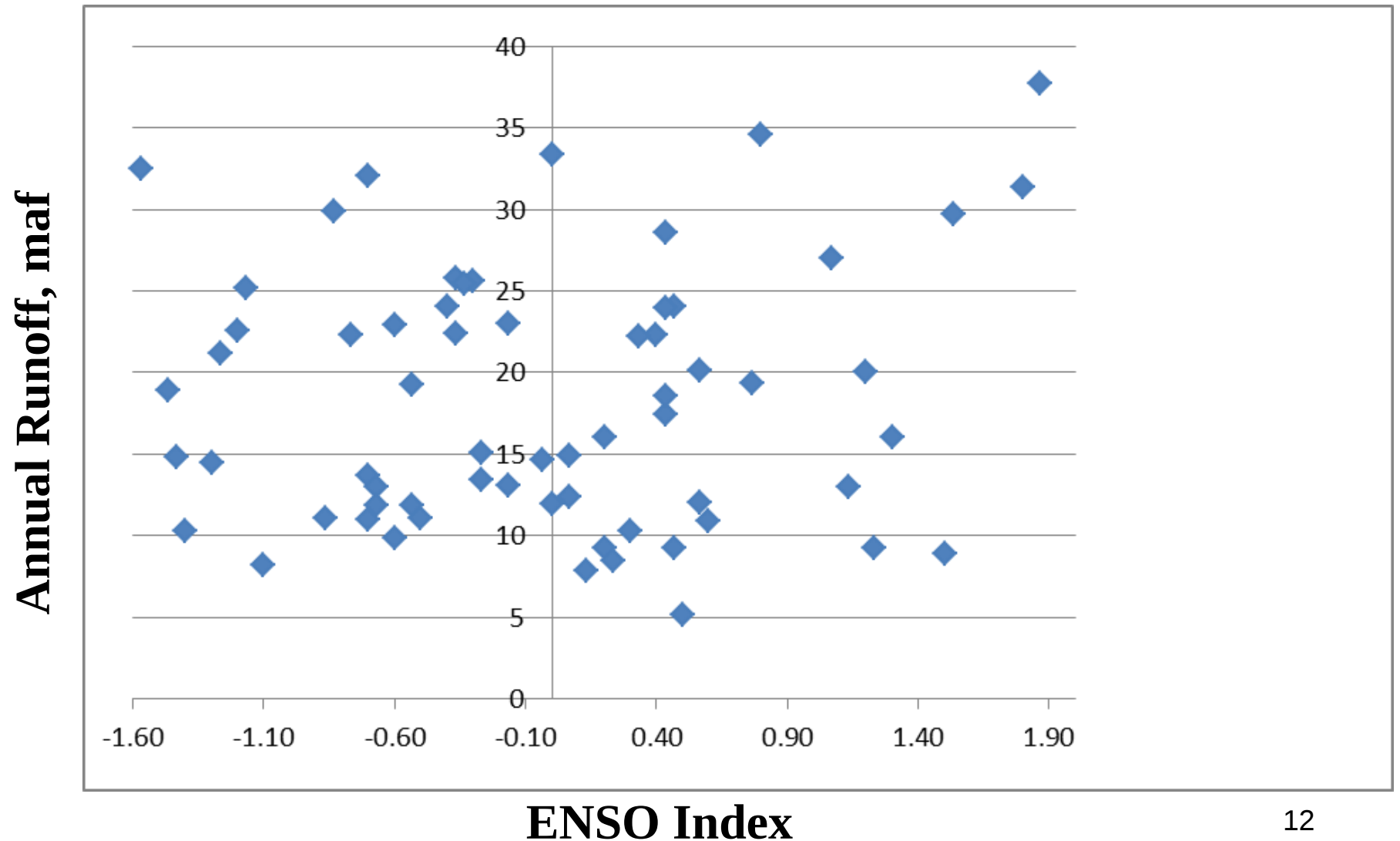


Will next year be dry?

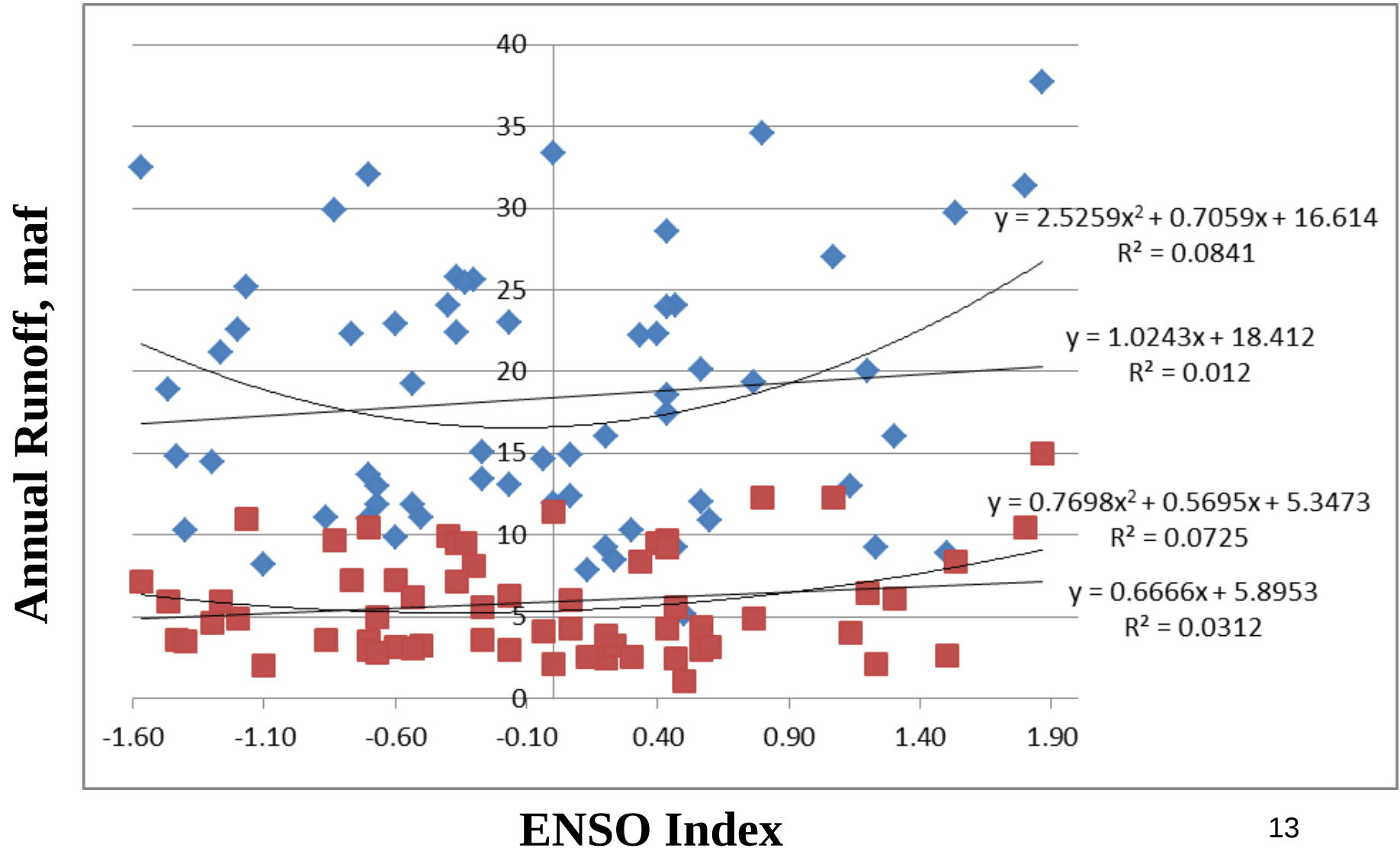
(from historical data, 1906-2013)

	<u>Probability next year</u>			
	<u>Sacramento Valley</u>		<u>San Joaquin Valley</u>	
<u>Next Year</u>	<u>Historical</u>	<u>Critical now</u>	<u>Historical</u>	<u>Critical now</u>
Critical	0.13	0.29	0.18	0.55
Dry	0.21	0.35	0.14	0
Below Normal	0.18	0.07	0.16	0.15
C,D	0.34	0.64	0.32	0.55
C,D, BN	0.52	0.71	0.48	0.7
AN, W	0.48	0.29	0.52	0.3

Streamflow and El Nino (maf)



El Nino and drought



Conclusions

- Landscape watering is the biggest single urban and residential water use
- Almost half average California urban use
- Conserved landscape water saves more than conserved indoor water use
- Smaller lot sizes, xeriscaping, and cooler climates reduce landscape water use
- Australia has much less outdoor/landscape use than California
- Next year could easily be dry as well