LA SUSTAINABLE WATER PROJECT: LA RIVER WATERSHED

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LA RIVER WORKSHOP

10/16/17

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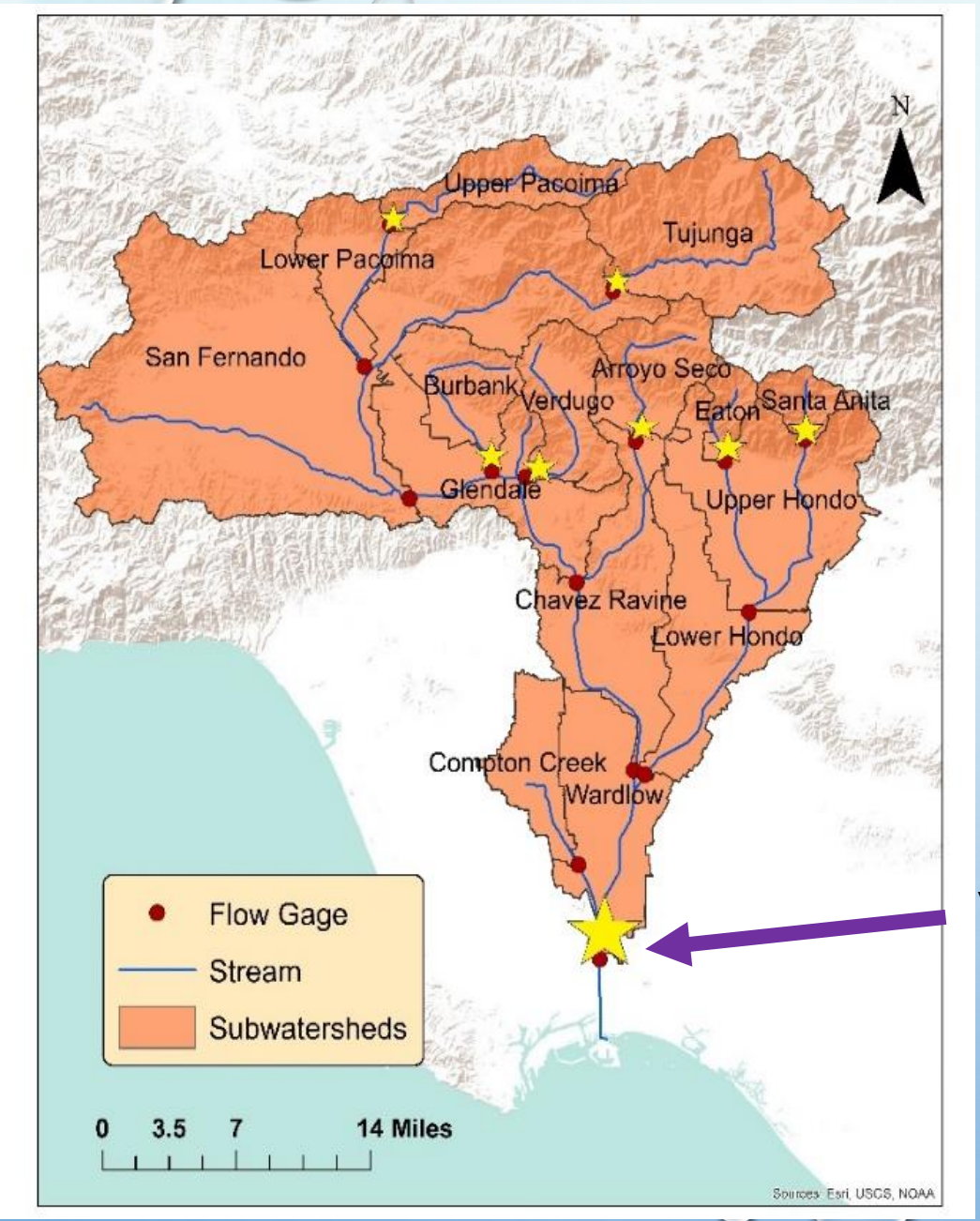
LA SUSTAINABLE WATER PROJECT OVERVIEW

- CITY OF LA
  - OPPORTUNITIES TO IMPLEMENT INTEGRATED WATER MANAGEMENT
  - MEET WATER QUALITY STANDARDS
    - MAXIMIZE REUSE, MAXIMIZE STORMWATER CAPTURE, MAXIMIZE LOCAL WATER SUPPLY
  - ANALYSIS OF POLICY AND REGULATORY CHALLENGES AND OPPORTUNITIES
  - ANALYSIS OF ECONOMICS COSTS AND BENEFITS
- STUDY AREAS
  - BALLONA CREEK / HYPERION WATER RECLAMATION PLANT (WRP) / WEST COAST, CENTRAL, SANTA MONICA, AND HOLLYWOOD GROUNDWATER BASINS
  - DOMINGUEZ CHANNEL & MACHADO LAKE / TERMINAL ISLAND WRP / WEST COAST AND CENTRAL GROUNDWATER BASINS
  - LOS ANGELES RIVER / DONALD C. TILLMAN, LA GLENDALE, BURBANK WRPS / UPPER LA RIVER AREA GROUNDWATER BASINS

LA RIVER WATERSHED STUDY AREA



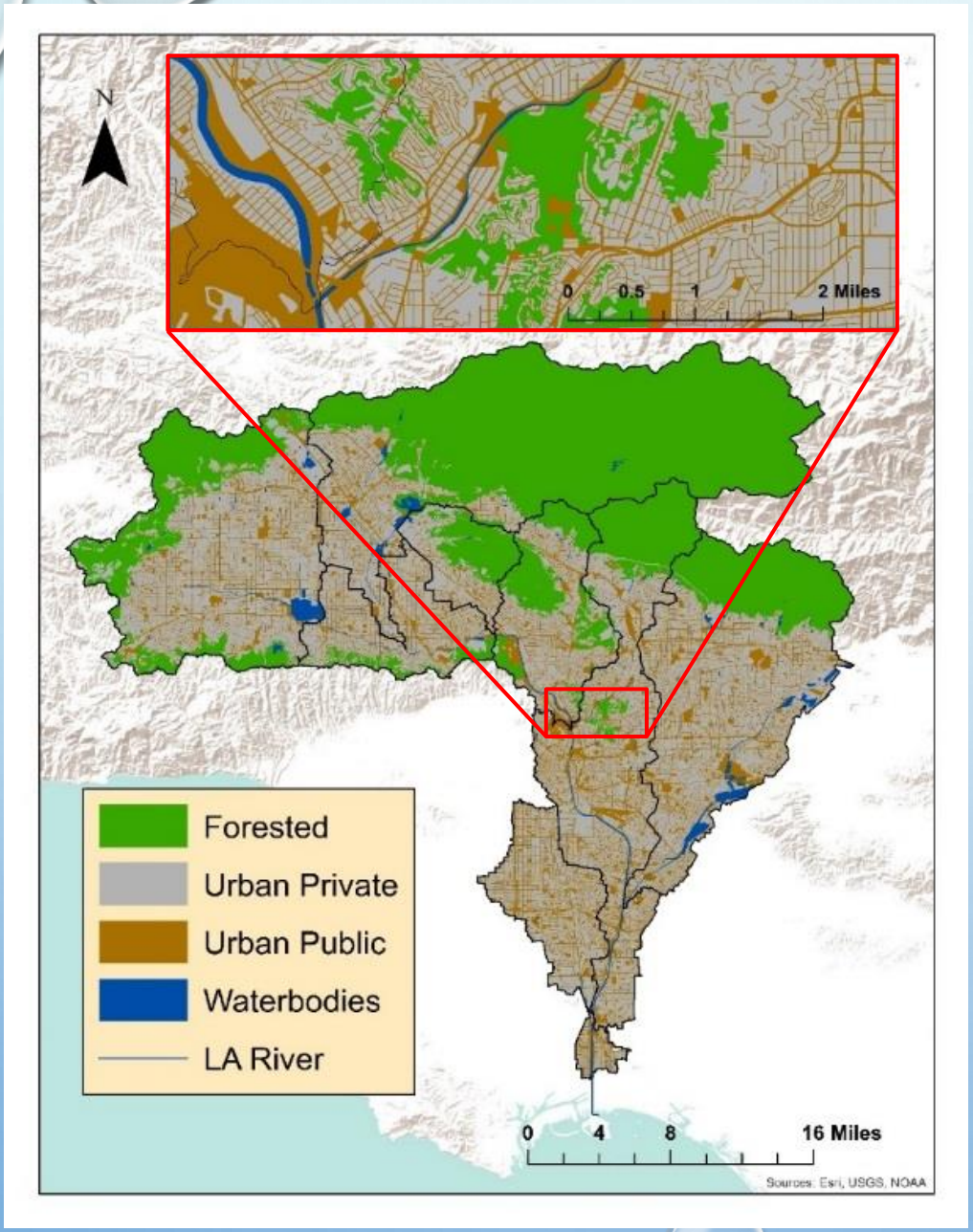
825 square mile watershed

Approximately 35% of watershed within LA City boundary

Measured flows at Wardlow Gage: 274,000 AFY (2004-2013)

Wardlow Gage

LA RIVER WATERSHED LAND USES



Highly developed, lots of undeveloped forested land at top of watershed

WATER QUALITY MODELING DECISION MATRIX

		Los Angeles River Scenarios BMPs	Baseline No BMPs	1a BR	1b PP + BR	2a VS + DP	2b PP + VS + DP	3a VS + IT	3b PP + VS + IT
		Volume Capture	0	10,396	10,396	10,396	10,396	10,396	10,396
		Storm Capture %	0	85th %	85th %	85th %	85th %	85th %	85th %
Ancillary Criteria		Cost (Billions)	-	6.60	6.80	3.80	5.20	3.80	5.20
		BMP area (mi^2)	-	10.8	5.8	14.4	9.6	14.4	9.6
		Infiltration (% of Precip)	-	20.8%	22.0%	16.4%	20.4%	22.6%	22.9%
		Infiltration (Million AFY)	-	0.16	0.17	0.13	0.16	0.17	0.17
		Peak Flow Reduction	-	47.0%	53.0%	29.0%	46.0%	55.0%	57.0%
Water Quality Criteria		Dry Weather Days/yr	333	358	360	350	358	361	361
		DW Total Possible Exceedances/yr (Cu, Pb)	2997	3222	3240	3150	3222	3249	3249
		DW Total Possible Exceedances/yr (Zn)	333	358	360	350	358	361	361
	Dry Weather Exceedances/yr	Concentration Based TMDL (Cu)	13	47	49	35	39	43	44
		Concentration Based TMDL (Pb)	0	12	13	7	10	16	14
		Concentration Based TMDL (Zn)	3	8	8	3	7	9	9
		Load Based TMDL (Cu)	307	68	71	62	69	75	75
		Load Based TMDL (Pb)	127	51	53	47	52	57	57
		Load Based TMDL (Zn)	214	18	18	15	18	19	19
		Wet Weather Days/yr	32	7	5	15	7	4	4
		WW Total Possible Exceedances/yr (Cu, Pb, Zn	32	7	5	15	7	4	4
	Wet Weather Exceedances/yr	Concentration Based TMDL (Cu)	5	1	2	1	1	0	2
		Concentration Based TMDL (Pb)	2	0	0	0	0	0	0
		Concentration Based TMDL (Zn)	14	5	5	2	5	2	4
		Load Based TMDL (Cu)	6	1	2	0	1	0	2
		Load Based TMDL (Pb)	2	0	0	0	0	0	0
		Load Based TMDL (Zn)	14	6	5	3	6	2	4
		Cu Average Annual Load % Reduction	-	71.0%	60.8%	58.6%	55.6%	77.2%	61.2%
		Pb Average Annual Load % Reduction	-	83.1%	62.9%	59.7%	53.9%	79.4%	59.7%
		Zn Average Annual Load % Reduction	-	83.6%	63.1%	62.4%	59.4%	80.1%	59.9%

LOW IMPACT DEVELOPMENT EFFECTS

Los Angeles River	% Redeveloped (2028)	Redeveloped Area (mi^2)	Volume Captured (AF)
Residential	12%	35.9	1,436
Commercial	10%	5.9	235
Industrial	22%	10.9	437
Educational	10%	1.8	70
	Pre - redevelopment	Post - redevelopment	% Reduction
Volume Captured (AF)	10,396	8,218	20.95%

City of LA-type LID ordinance implemented across the watershed. These numbers could be greatly expanded by expanding ordinance to include resale, and by establishing partnerships with NGOs to increase voluntary implementation.

WHAT MAKES UP THE LA RIVER FLOWS?

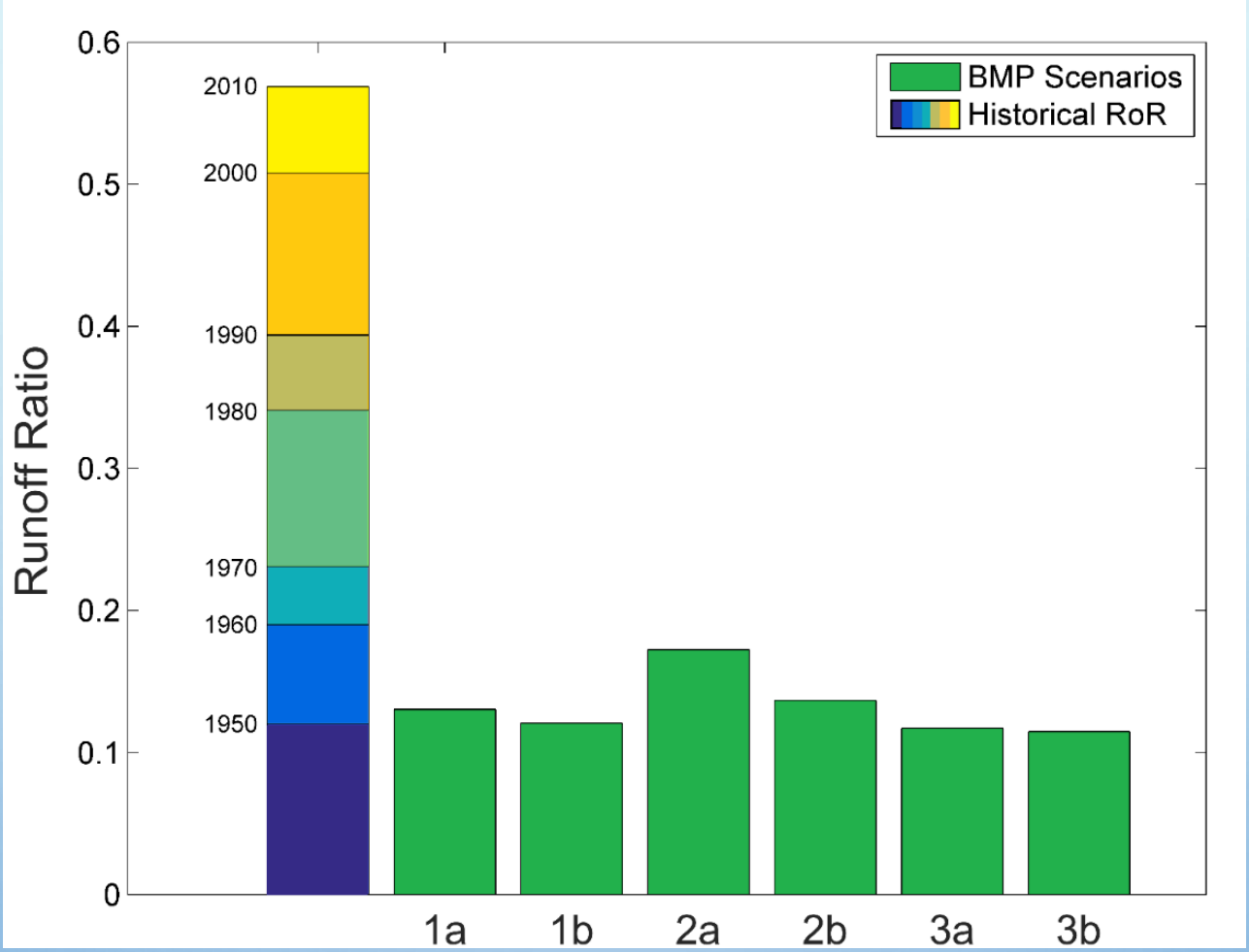
- CURRENT STATE:
  - WATER RECLAMATION PLANT (WRP) EFFLUENT DISCHARGE
  - URBAN RUNOFF
  - RISING / UPWELLING GROUNDWATER
- BUT FLOWS ARE CHANGING –
  - MORE RUNOFF WILL BE CAPTURED AS WATERSHED SCALE BMP PROGRAMS (E.G., EWMPS) ARE IMPLEMENTED & LID PRACTICES MORE BROADLY INSTALLED
  - INCREASED FOCUS ON LOCAL WATER SUPPLY MAY LEAD TO REUSE OF ADDITIONAL WRP EFFLUENT (CURRENTLY DISCHARGED INTO LAR)
  - INCREASED USE OF ULARA GROUNDWATER BASINS MAY LEAD TO LESS OR NO RISING GROUNDWATER.

BMPS REDUCE LAR FLOWS

Season	Modeling Flow (2004-2013), no BMPs			Flow with BMPs		
	CFS	MGD	AFY	CFS	MGD	AFY
Fall	134	87	97,000	91	59	66,000
Winter	188	122	136,000	100	65	72,000
Spring	178	115	129,000	89	58	64,000
Summer	142	92	103,000	87	56	63,000

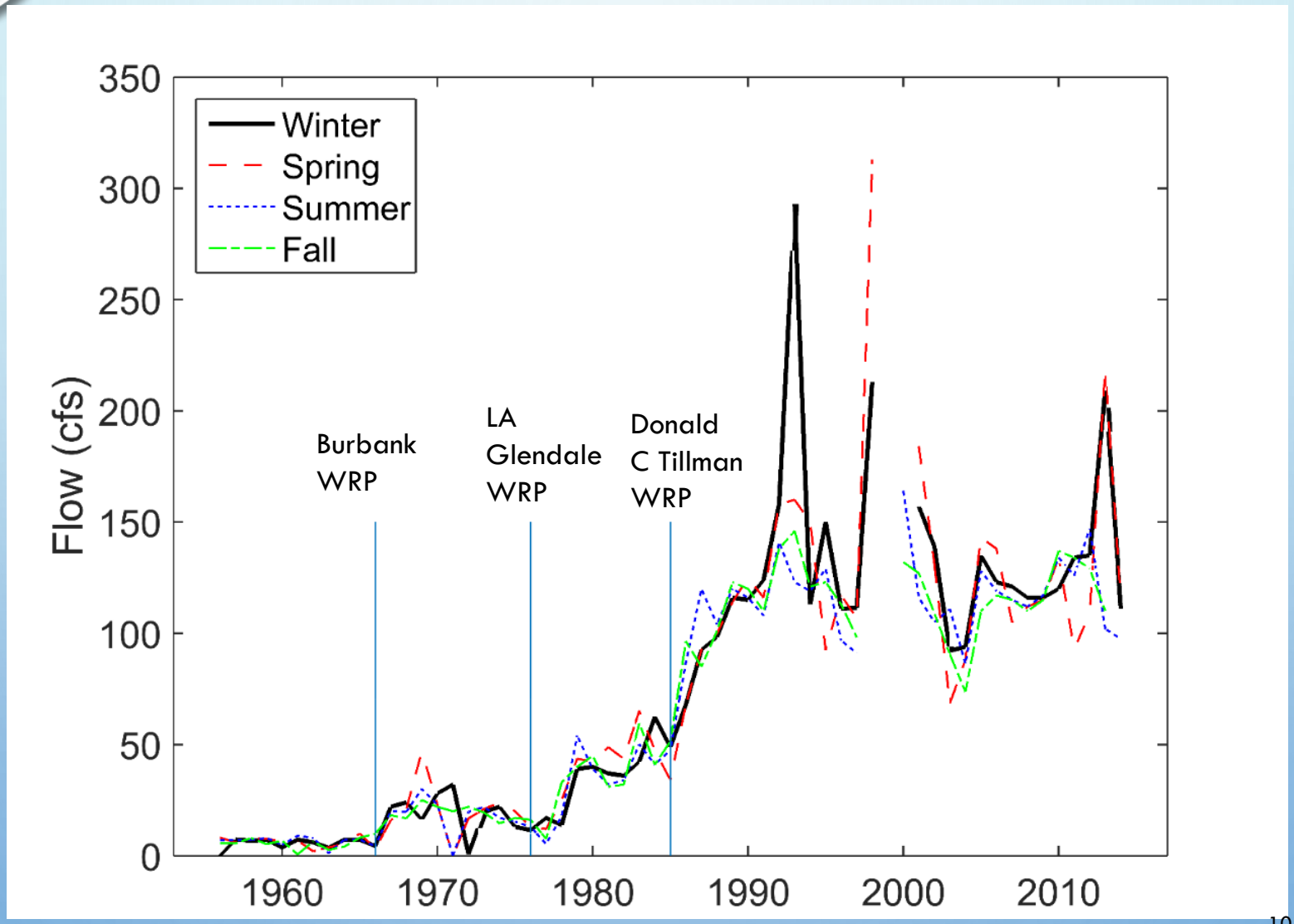
Modeled median seasonal flows at Wardlow Gage with and without BMPs.

RUNOFF RATIOS



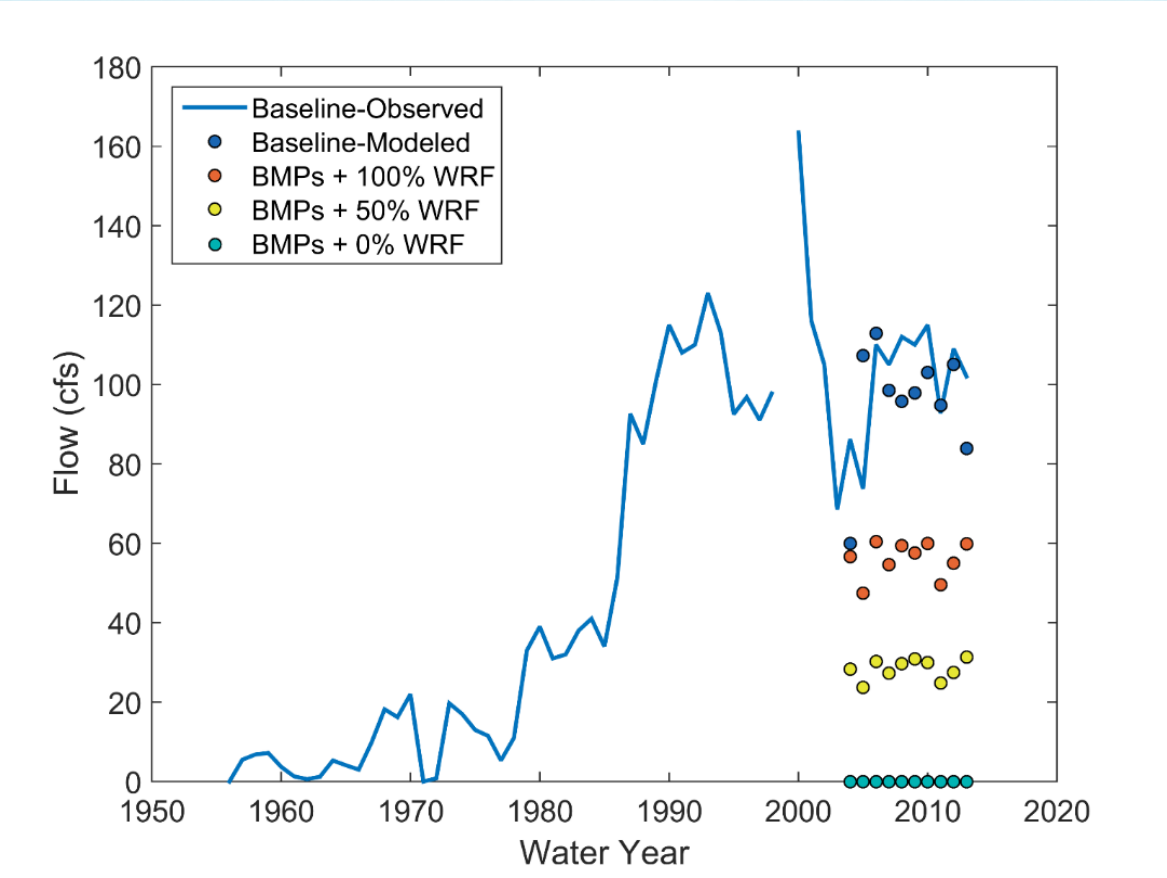
- BMPs also influence the volumes of water that run off the watershed
- Historical (1940 – 2010 data) runoff ratios and runoff ratios after implementing BMPs (2004-2013 data)
- Runoff ratios post BMPs are similar to those in the 1950s and 1960s

HISTORIC SEASONAL ANNUAL MINIMUM FLOWS IN THE LAR



Historic seasonal annual minimum flows in the LAR, measured at the Wardlow gage; blue vertical lines represent Water Reclamation Plants coming online

MODELED ANNUAL MINIMUM FLOWS CHANGE AT WARDLOW GAGE



Annual minimum flows at the Wardlow gage (blue line) compared with modeled flow before BMPs (blue points, 2004-2013 data), and post-BMP flows with varying amounts of WRP flow (0% - aqua, 50% - yellow, 100% - orange points)

In modeled scenarios with no water reclamation plant effluent flows discharged to LAR and implementation of BMPs to manage 85th percentile storm, annual minimum flows go to zero at Wardlow Gage

LOW FLOWS (7Q10)

Gage	Time Period	Years	7Q10 (cfs)
Wardlow	1956-1985	30	42.2
Wardlow	1986-2014	29	157
Arroyo Seco	1917-2014	98	1.7

7Q10 flow volumes (defined as the lowest average discharge over a period of one week with a recurrence interval of 10 years) shift in 1986 when DCTWRP comes online

No 7Q10 flow change was observed at Arroyo Seco, a less developed watershed (gage just below forested area), from 1917-2014 (~2 cfs over entire period).

CONCLUSIONS

- CHANGES TO THE CURRENT SOURCES OF FLOW TO THE LA RIVER CAN REDUCE FLOWS IN THE CHANNEL TO ZERO, IN PARTICULAR DURING MINIMUM FLOWS
- LOW FLOWS NEAR THE OUTLET OF THE LA RIVER WERE MUCH LOWER IN THE EARLY- TO MID- 20TH CENTURY THAN CURRENTLY.
- CURRENT FLOW VOLUMES IN LA RIVER MAY NOT BE NECESSARY IN ORDER TO SUSTAIN ALL BENEFICIAL USES AND SHOULD NOT BE ASSUMED NECESSARY IN PLANNING STUDIES FOR THE LA RIVER.
- STUDY NEEDS TO BE DONE TO QUANTIFY TRUE MINIMUM FLOW REQUIREMENT TO SUPPORT USES AND NEEDS (FLOOD CONTROL, WATER SUPPLY, ENHANCED HABITATS, RECREATION, ETC) AND DETERMINE IF THIS FLOW IS CLOSER TO HISTORICAL 10-15 CFS THAN CURRENT ~90-100 CFS

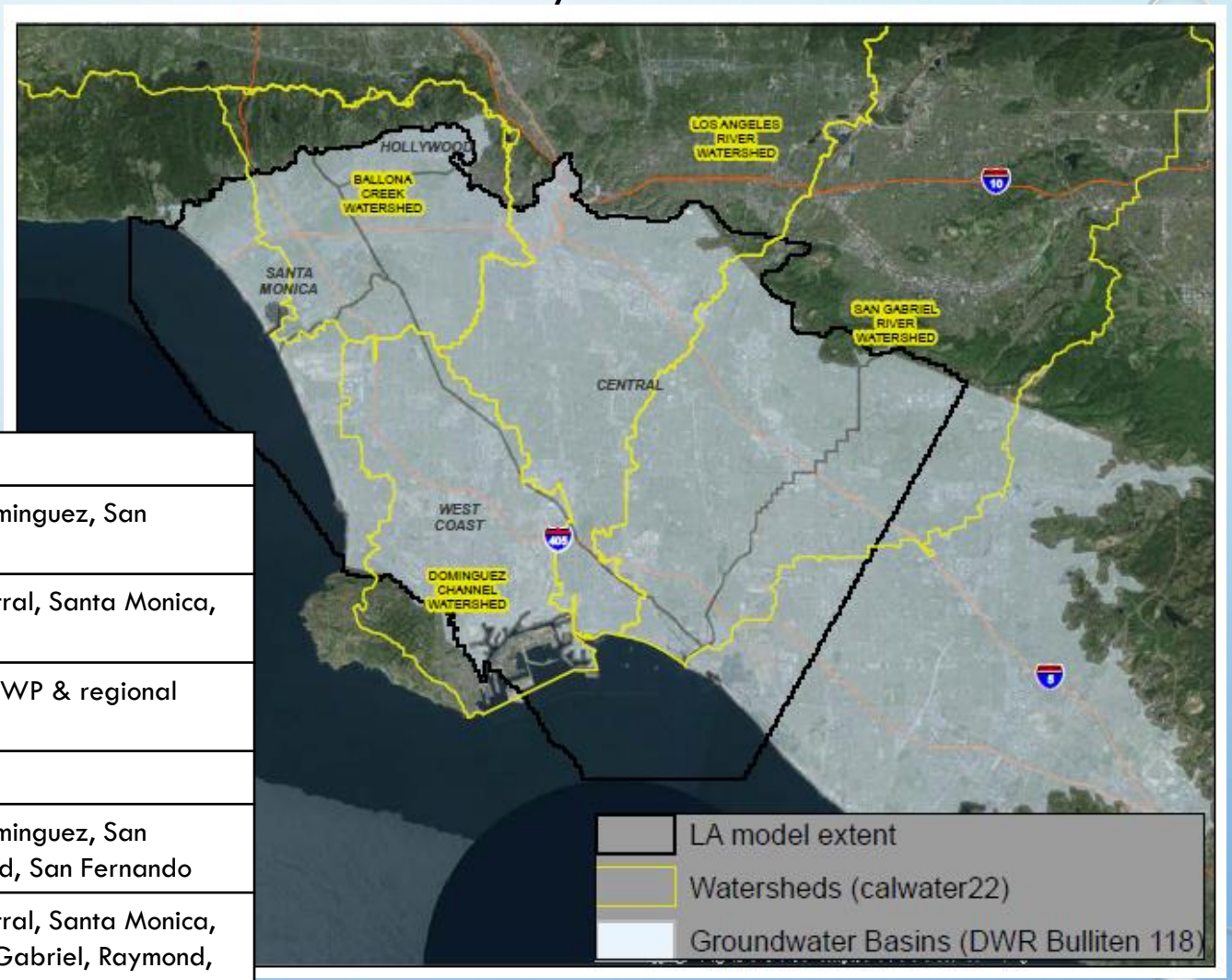
FUTURE RESEARCH: LA RIVER STUDY

- MULTIPLE NEEDS AND USES IN THE LA RIVER
  - HABITAT
  - RECREATION
  - MUNICIPAL WATER SUPPLY
  - FLOOD CONTROL

- STUDY TO ASSESS APPROPRIATE FLOWS TO SUPPORT ALL NEEDS AND USES MUST BE CONDUCTED
  - BENCHMARKS
  - METRICS
  - MONITORING
  - CLEAR VISION OF WHAT FUTURE LAR SHOULD LOOK LIKE

FUTURE RESEARCH - SURFACE / GROUNDWATER

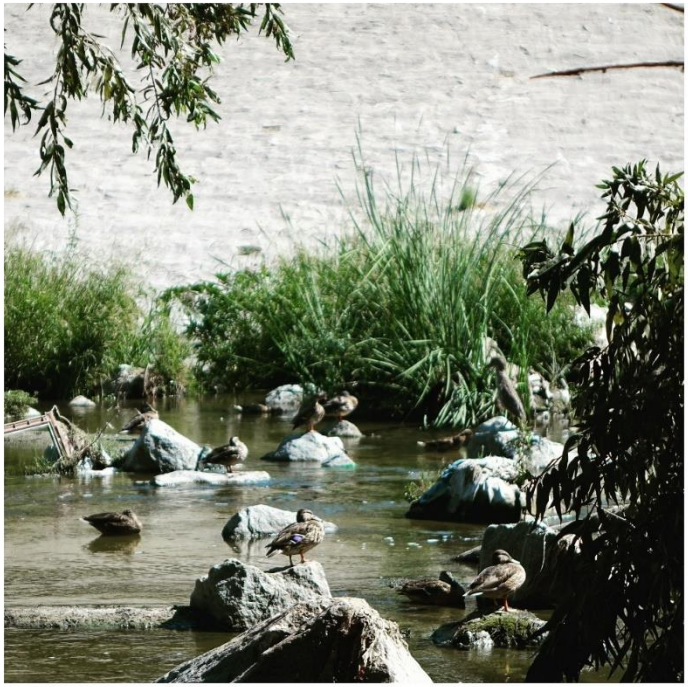
Phase 1	
Surface Model Watersheds	Ballona, LAR, Dominguez, San Gabriel
Groundwater Model Basins	West Coast, Central, Santa Monica, Hollywood
Climate Data	Historic from LADWP & regional CIMIS stations
Phase 2	
Surface Model Watersheds	Ballona, LAR, Dominguez, San Gabriel, Raymond, San Fernando
Groundwater Model Basins	West Coast, Central, Santa Monica, Hollywood, San Gabriel, Raymond, San Fernando
Climate Data	2041-2060 projections accounting for likely changes in precipitation extremes, from future Alex Hall project



PUBLICATIONS

SUSTAINABLE LA WATER PROJECT REPORTS:

- LA RIVER WATERSHED, SEPTEMBER 2017
  HTTPS://GRANDCHALLENGES.UCLA.EDU/HAPPENINGS/2017/09/19/LOS-ANGELES-SUSTAINABLE-WATER-PROJECT-LOS-ANGELES-RIVER-WATERSHED/
- DOMINGUEZ CHANNEL AND MACHADO LAKE WATERSHEDS, AUG 2017.
  HTTPS://GRANDCHALLENGES.UCLA.EDU/HAPPENINGS/2017/08/03/NEW-UCLA-REPORT-LOOKS-AT-IMPROVING-WATER-QUALITY-AND-SUPPLY-IN-L-A-S-DOMINGUEZ-CHANNEL-AND-MACHADO-LAKE-WATERSHEDS/
- BALLONA CREEK WATERSHED, NOVEMBER 2015
  HTTPS://GRANDCHALLENGES.UCLA.EDU/HAPPENINGS/2015/11/13/100-LOCAL-WATER-FOR-LA-COUNTY/
- OVERALL CITY-WIDE REPORT, LATE 2017




Questions?