



BABCOCK Laboratories, Inc.

The Standard of Excellence for Over 100 Years

**Over 40 Years of Service to
SAWPA**

Allison Mackenzie, CEO



BABCOCK Laboratories, Inc.
The Standard of Excellence for Over 100 Years

Testing Services

- Babcock Labs provides analytical testing services in support of SAWPA and its member agencies
 - Brine Line water quality and regulatory compliance
 - Industrial waste/discharge
 - Critical sampling points within line
 - Help manage basin water quality





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Babcock History

- Have provided analytical testing services to the Inland Empire region since 1906
- Supported SAWPA's early major watershed studies by providing member agencies' water quality data
- Support most SAWPA programs in one way or another





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Babcock Expertise

- We provide vital expertise in environmental chemistry and microbiology to the region
 - Longstanding working relationships with EMWD, WMWD, IEUA, SBVMWD, and OCWD
 - Knowledge of local regulatory requirements
 - Helped State develop first perchlorate method
 - Involved in pharmaceutical and personal care product testing project to identify concerns
 - Been, and continue to be, involved in emerging constituents task force (recently rebooted for PFAS)



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Babcock Location

- Centrally located laboratory for the region
 - Intimate knowledge of water challenges and concerns affecting Inland Empire region and Santa Ana Watershed
 - Located near the SAWPA headquarters in Riverside, the geographic center of the watershed
 - Employee-owned laboratory that contributes to the economic success of the region





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Babcock Contributions

- Part of the collaborative nature of SAWPA
 - We are industry experts
 - We provide water quality data to help meet the basin monitoring program objectives
 - We are committed to helping SAWPA and its agencies achieve a sustainable Santa Ana River Watershed





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Babcock Laboratories, Inc.
Riverside, CA, USA

Virtual Tour



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Questions?



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Thank You!

Weather Modification for Water Supply

Santa Ana Watershed Project Authority
Riverside, CA
June 4, 2019

Tom Ryan
Metropolitan Water District
of Southern California

Presentation Outline

- Background
- Programmatic Issues
 - Building support
 - Cloud rustling / downwind effects
 - Potential environmental / health effects
 - Increased snowload
 - Permitting
 - ASCE Guidance
- Recent Research
- Operational Projects



WxMod Purposes & Process

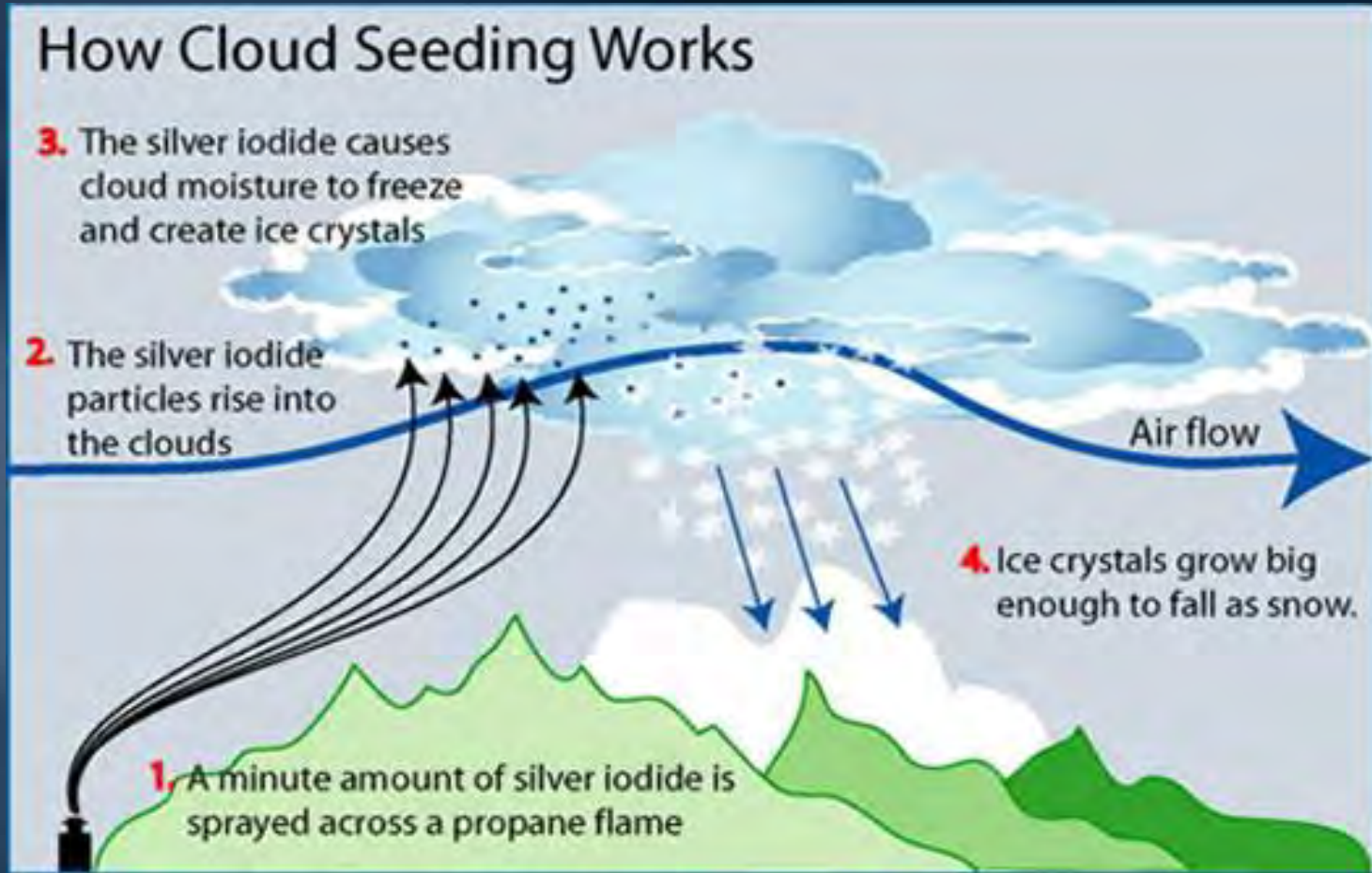
- “Natural” weather
 - Dust, ash, pollution nuclei
- Precipitation augmentation and snowpack enhancement, hail suppression, fog dispersal
- Super-cooled Liquid Water (SLW)
 - Silver iodide (AgI) as nuclei
- Ground (generators, flares) or aerial based
- 10% increase in precipitation
 - Within range of variability
- Not a drought buster

WxMod History

- Background
 - Started in the U.S. in 1940s
 - Overselling, minimal science
 - Misconceptions remain
- Advances since the 1940s
 - WX forecasting
 - Measurement
 - Computing
 - Seeding methods



Winter Conceptual Model



Cloud Seeding Generator



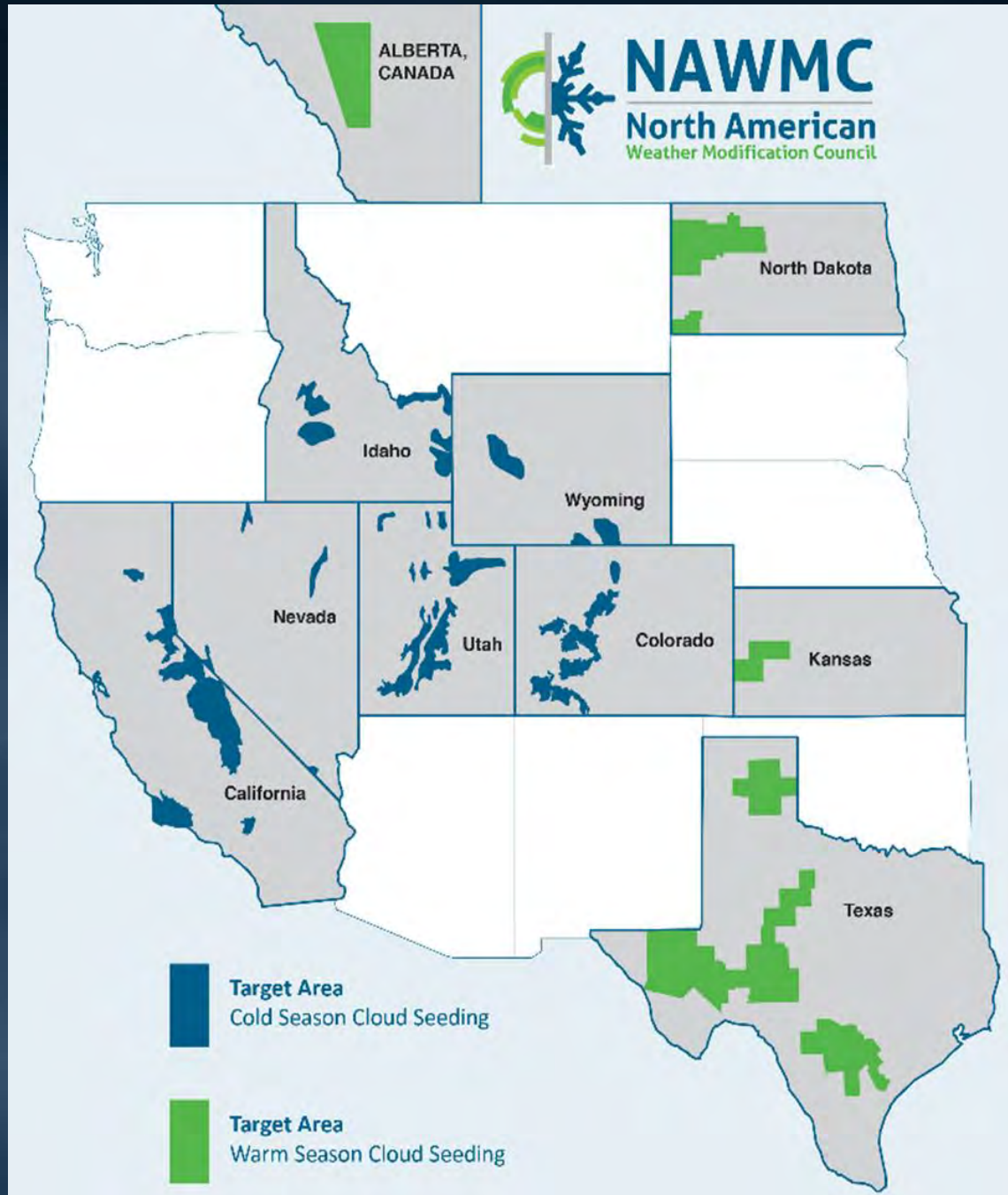
WxMod Users & Costs

- 150 programs in 40 countries and 11 states
 - Ski areas, Power utilities
 - Insurance companies
 - Water resources agencies
 - Conservation, and Irrigation districts
 - Research institutes
- Costs
 - \$4-40/AF, including planning



North American Projects

- Local sponsorship
- Education
- Outreach



Cloud Rustling

- Downwind Effects Misconception
 - “Robbing Peter to pay Paul”
 - WxMod activates precipitation otherwise unavailable
 - Long-term research (44+ studies) consistently shows no precipitation decreases; some downwind increases shown



Potential Environmental Effects

- Agl is not soluble or biologically available
- 50 years of physical, biological, aquatic, soils & vegetation studies found:
 - Subtle or indiscernable effects
 - Potentially beneficial (more runoff)
- Strong studies with credible results
- Newer assessment methods and regulations suggest continued research
- Consider cumulative effects, monitoring

Potential Health Effects

- Silver Iodide (AgI)
 - Not been measured above background
- Human effects
 - No effects found in 50 years
 - More silver exposure in tooth fillings
 - More iodine in salt on food
- Concentrations
 - EPA drinking water quality 0.1 mg/l
 - U.S. Public Health Service level 0.5 mc/l
 - Seeded rainfall is 0.1 mc/l

Increased Snowload

- Avalanche
 - Suspension criteria
- Snow removal
 - Similar amount of effort required
- Flooding potential
 - Agency coordination
- Crop yield / pasture value
- Economic trade-offs
 - Snow removal v. water supply / tourism



Licensing and Permitting

- Operators licensed
- Project permits issued
 - Conditions and safeguards
 - Record keeping and annual reporting
- State statutes
 - Governmental immunity
- Liability insurance
- Separate from environmental
- Few legal challenges



ASCE Guidance

- Design and Operation of Precipitation Enhancement Projects (42-17)
- Manual on Engineering Practice #81, Guidelines for Cloud Seeding to Augment Precipitation (3rd edition)
- Design and Operation of Hail Suppression Projects (39-15)
- Design and Operation of Supercooled Fog Dispersal Projects (44-13)

Colorado River Basin Augmentation

- Seven Basin States Agreements
 - Fund supplemental operations
- Collaboration Began in 2006
 - Operations, research, modernize, optimize
 - 20+ projects, 20+ pieces of equipment
 - Expenditures over \$5 million
 - 40+ partners
- Colorado River System Water
 - Local, regional and system-wide benefits

Colorado River Basin Target Areas



Wyoming WxMod Pilot Program

- State funded \$15 million over 10 years
- Randomized cross-over experiment
- Independent evaluation by NCAR
- Radiometers, snow chemistry, high resolution precipitation gauges

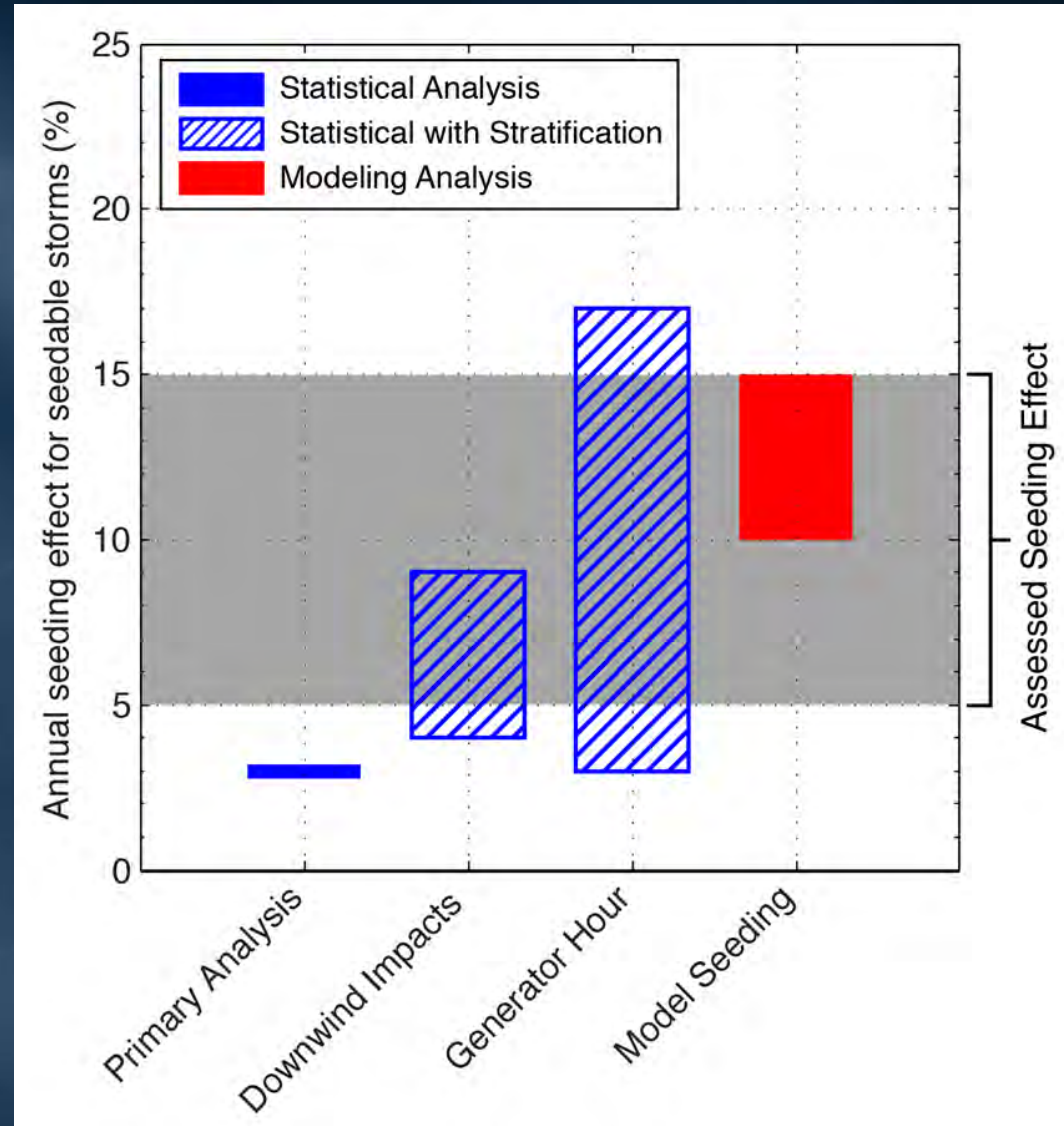


WWMPP Target Areas



WWMPP Conclusions

- Estimate of seeding effect by simulation of seeded and natural clouds for three seasons (about 1/2 of the cases) shows 10-15% increase



WWMPP Conclusions

- Statistical, physical, and modeling analysis shows cloud seeding is a viable technology
- Climatology study demonstrates that 30% of wintertime precipitation fell from seedable storms
- Half the time that seedable conditions were met there was no precipitation, indicating cloud seeding opportunities

SNOWIE – Idaho Power Company

- Seeded & Natural Orographic Wintertime clouds: the Idaho Experiment
 - NSF funded \$2.1 million to study winter precipitation processes
 - 2017 Field campaign in Payette Basin
- Goal
 - Determine physical processes by which cloud seeding effects winter precipitation
- Field Effort
 - 75+ instruments, 4 PI's, 11 scientists operating and analyzing data

SNOWIE

- Collaboration
 - National Center for Atmospheric Research (NCAR)
 - Universities of Wyoming, Illinois, Boise State, and Colorado, Boulder
- Activities
 - Research seeding aircraft
 - DOW radar
 - Silver sampling
 - Ice nuclei counter



SNOWIE Publications

- National Academy of Sciences:
SNOWIE provided the ‘... first unambiguous observations of the physical chain of events following introduction of glaciogenic cloud seeding aerosol into supercooled liquid orographic clouds.’
- Bulletin of the American Meteorological Society:
‘Measurements from SNOWIE address long-standing questions about the efficacy of cloud seeding, starting with documenting the physical chain of events following seeding’
- Numerous publications forthcoming

California Projects

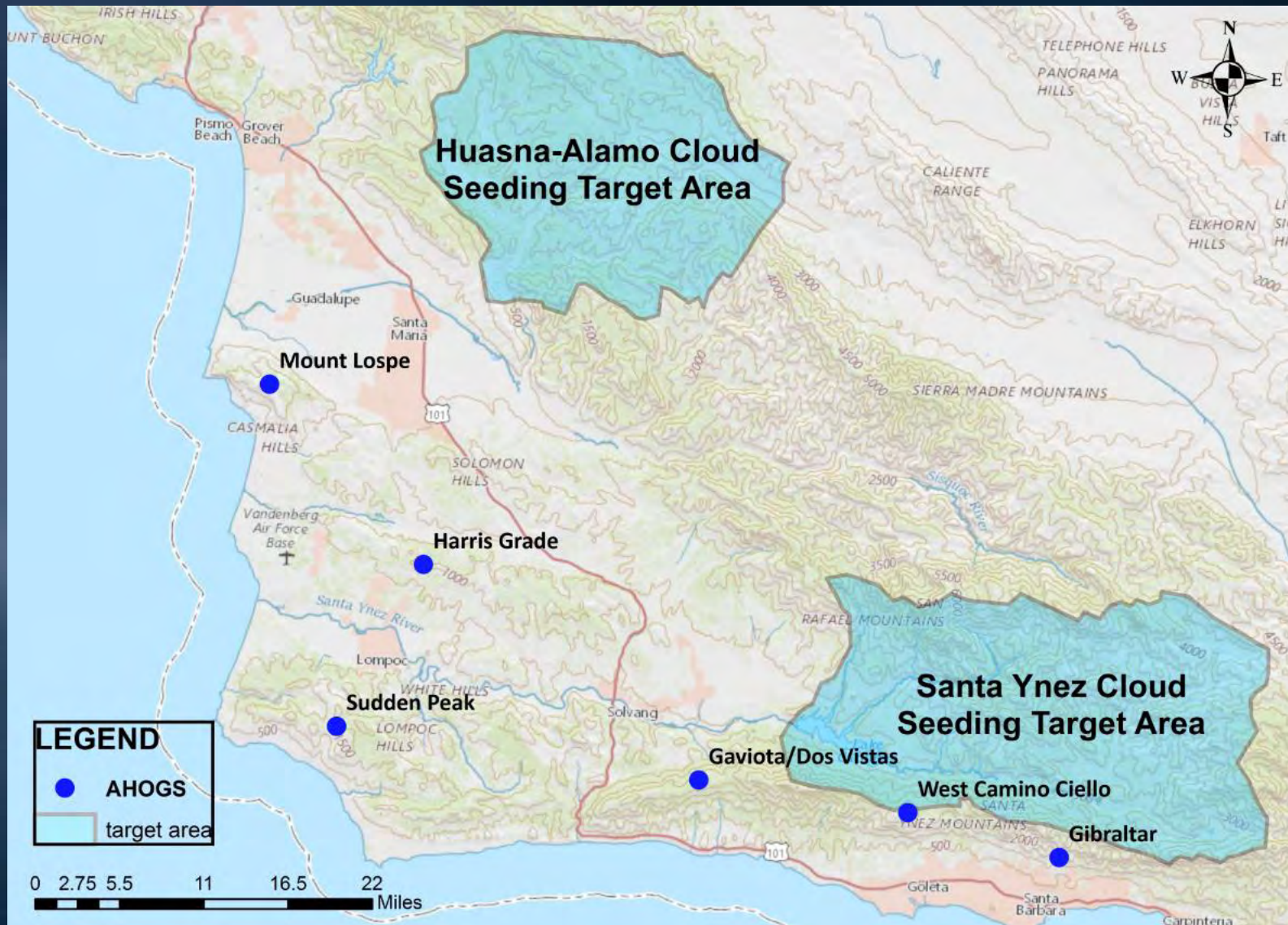
- Since the 1950s
- 12-15 per year
- Winter orographic
- Water and power
- Described in California Water Plan



Santa Barbara County Water Agency

- Additional winter rain since 1981
 - Six ground sites (flares) plus aerial seeding
- Targets are Lake Cachuma and Twitchell reservoir
- 11 water purveyor participants
 - Cities, companies, and conservation and water districts
- Targets and method varies annually due to fires
 - 9-20% increase in precipitation
- Budget varies between \$156,000-400,000/year

Santa Barbara Target Areas



Los Angeles County Public Works

- San Gabriel Mountains watersheds
 - Pacoima, Big Tujunga, and San Gabriel dams
- Past operations in 1961-75, 1991-93, 1997-2002
- 6 Agl generators & 4 remotely controlled flare sites
- Some seeding in 2015-16,
fires encouraged suspension since
- CEQA - Mitigated Negative Declaration



Summary

- Advances since the 1940s, misconceptions remain
- +5-15% increase within range of variability
- Cost-effective part of water operations portfolio
- None or positive downwind effects
- No environmental or health effects
- Local leadership, education, support is important
- Number of projects increasing
- Recent research answering key questions

Questions?





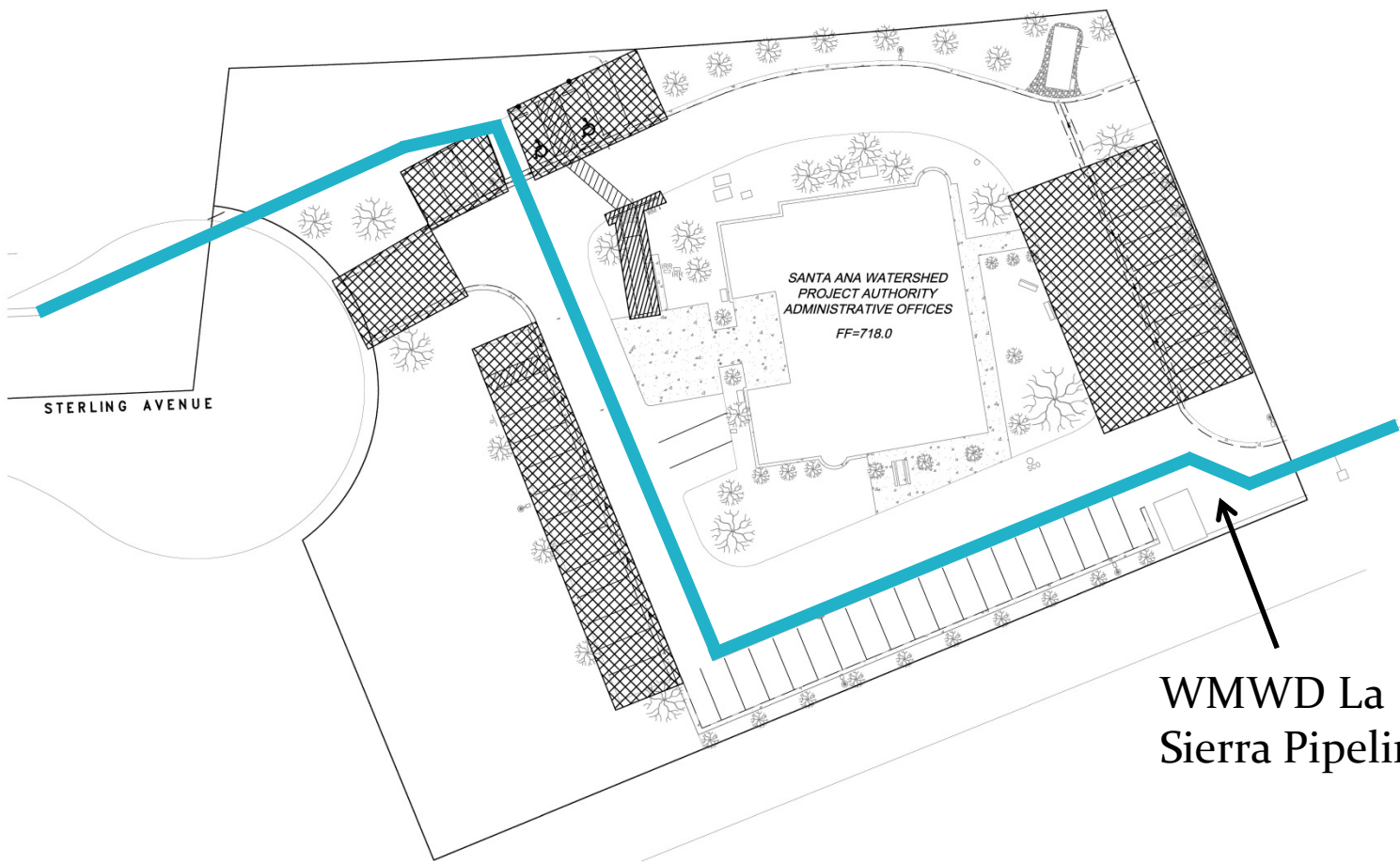
SAWPA Parking Lot Restoration and Improvements

Item 7.A.

June 4, 2019

Recommendation

- Authorize the General Manager to execute the Memorandum of Understanding (“MOU”) between SAWPA and WMWD establishing the terms and conditions for the restoration and improvements to the SAWPA parking lot.



SAWPA SCOPE OF WORK



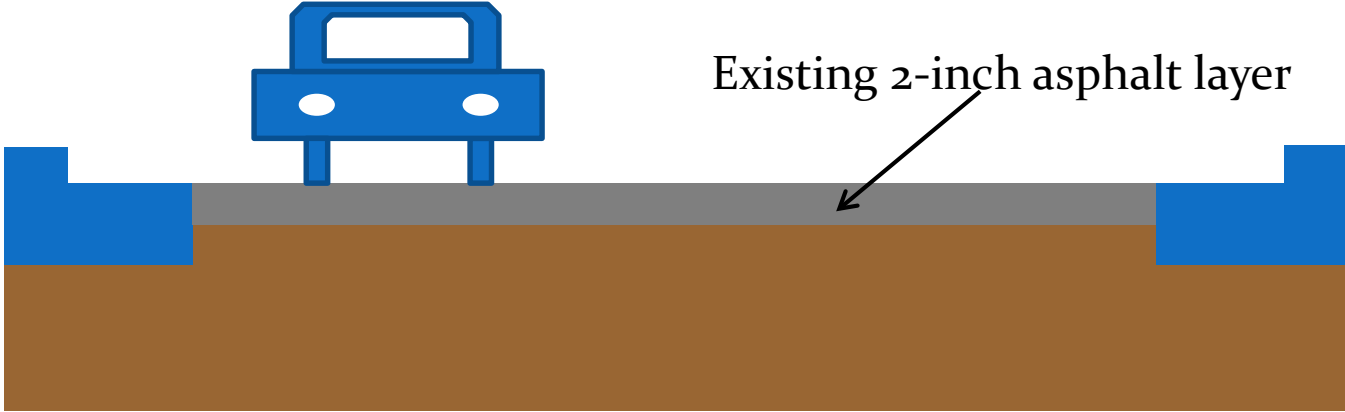
ADA SCOPE OF WORK



BALANCE OF WORK:
WMWD

WMWD La
Sierra Pipeline

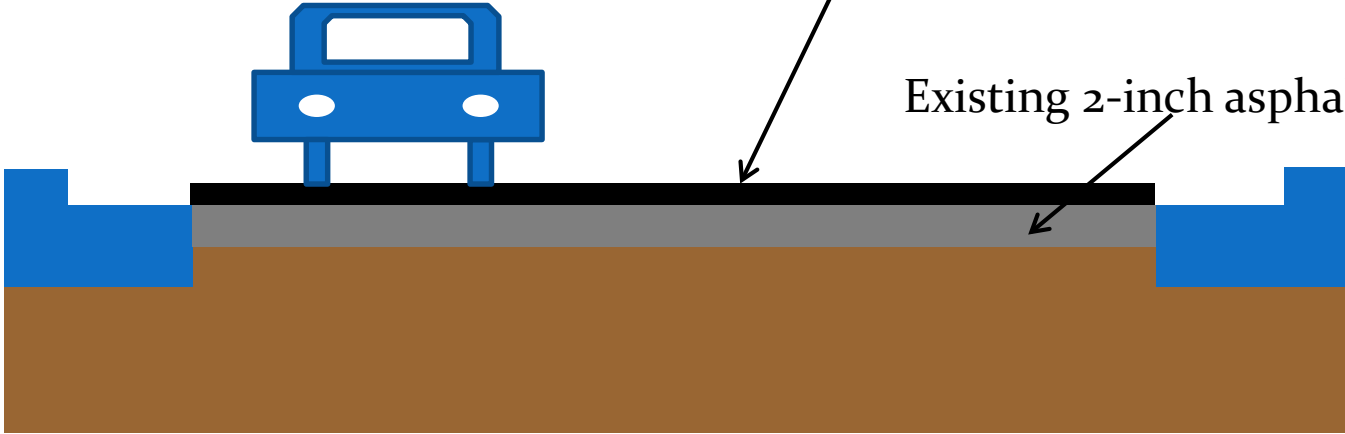




Existing 2-inch asphalt layer

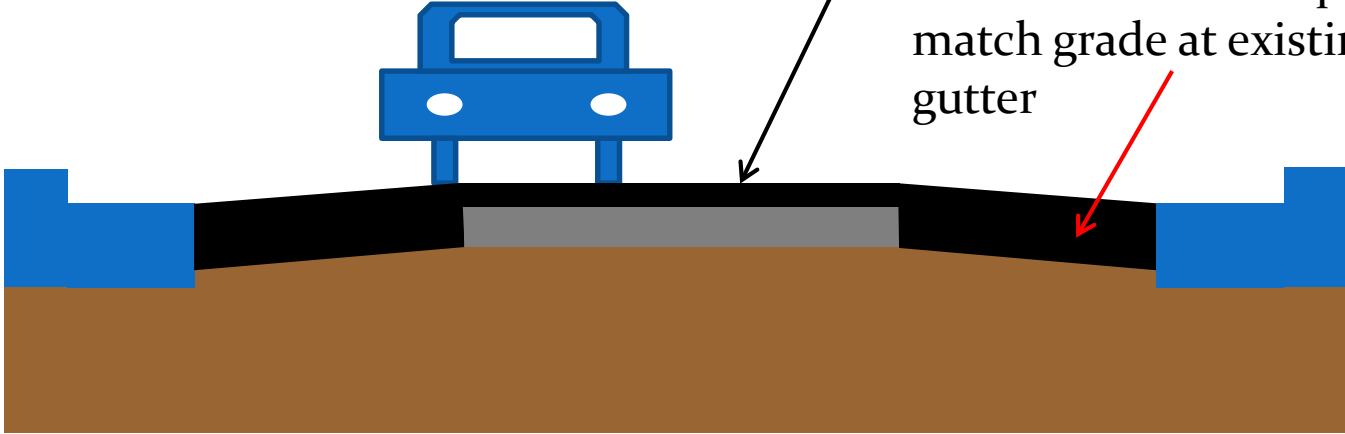
Proposed 1-inch additional asphalt layer

Existing 2-inch asphalt layer



Proposed 1-inch additional asphalt layer

Over-excavation required to match grade at existing gutter



Estimated Cost

Item	Total Cost (Estimated)	SAWPA Share	WMWD Share
Parking lot re-surfacing	\$71,000	\$23,200 (32.7%)	\$47,800 (67.3%)
Additional 3 parking stalls, ADA improvements	\$24,000	\$24,000 (100%)	-

Recommendation

- Authorize the General Manager to execute the Memorandum of Understanding (“MOU”) between SAWPA and WMWD establishing the terms and conditions for the restoration and improvements to the SAWPA parking lot.



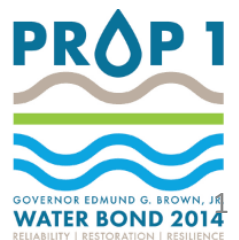
Questions??

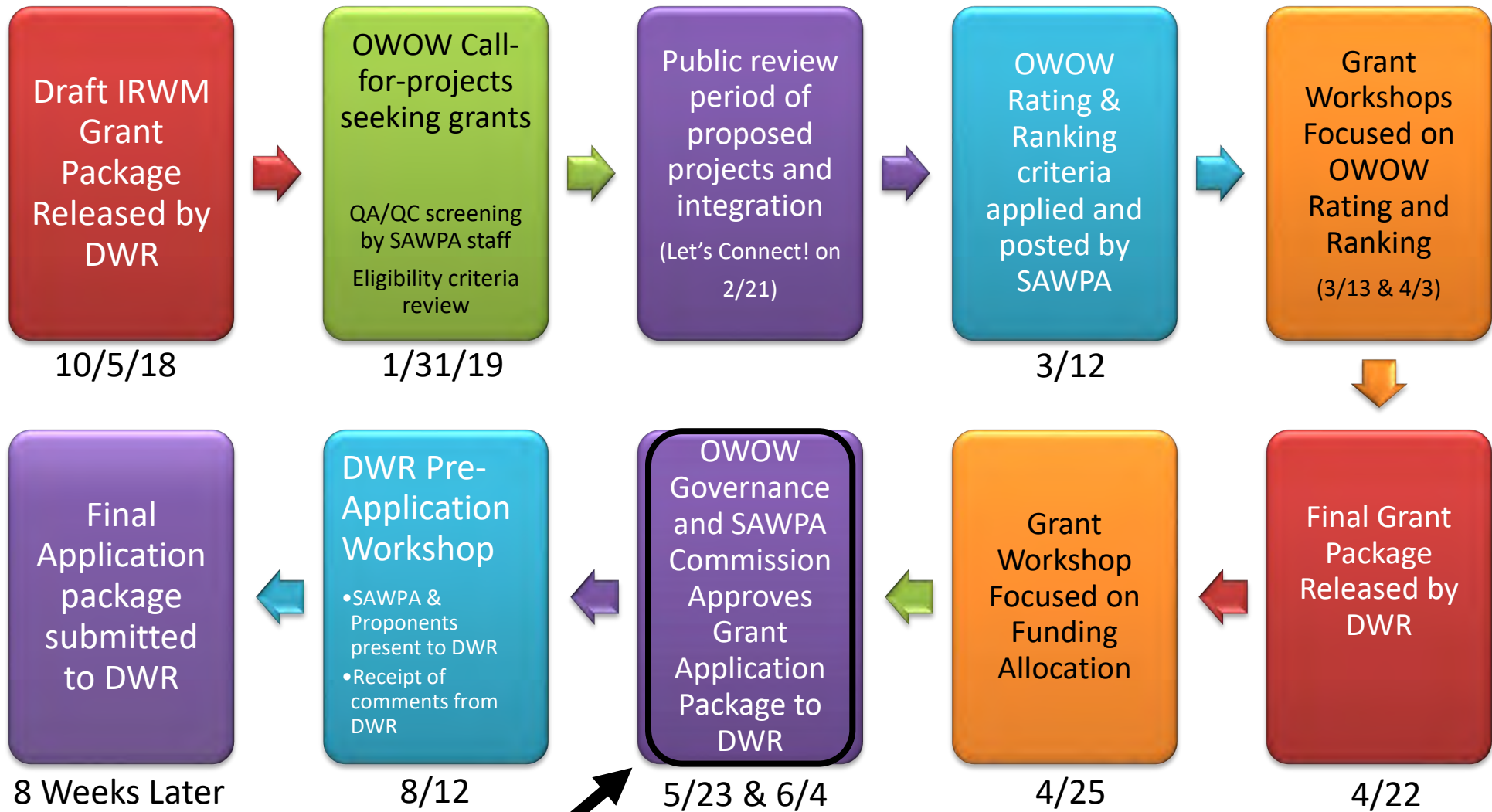


Proposition 1 Round 1 Integrated Regional Water Management Project Selection and Funding Allocation

SAWPA Commission

June 4, 2019





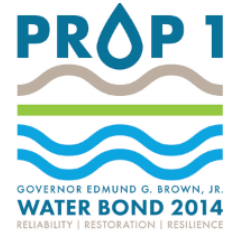
We are here

The schedule has been updated based on the final DWR Grant Package released on April 22.





Available Grant Funding for Santa Ana Funding Area



	Disadvantaged Community Implementation*	General Implementation**
Prop 1 Round 1:	\$2,094,750	\$20,828,750



Total for Funding Area = \$22,923,500



Projects Submitted Through OWOW = 28

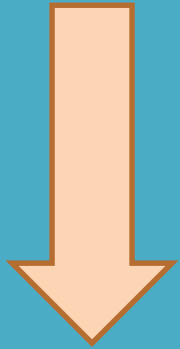
*35% of total DAC Set Aside from DWR.
**50% of funds allocated to Funding Area.



OWOW Funding Available

General and DAC

\$16,674,875



Small Budget
(10%)
and
Large Budget
(90%)

- OWOW funding reduced from \$22.9M to \$16.7M per negotiations with North OC Stakeholders
 - Reduced per the 30% allocation for North OC Stakeholders as previously discussed.
- SAWPA used the \$16.7M amount to run the funding scenarios for the OWOW workshops
 - SAWPA and North OC Stakeholders have conditionally approved a MOU that codifies the negotiations.



Large Budget Projects - Upper Watershed

400

Rank	Project Name	Agency Name	Weighted Score	Watershed Wide	DAC %	Grant Request
1	Replenish Big Bear	BBARWA	699.90	N	77%	\$43,715,000
2	Evans Lake Tributary Restoration and Camp Evans Recreation	SBVMWD	643.89	N	26%	\$2,000,000
3	Well 30 Wellhead Treatment Project	MVWD	526.26	N	5%	\$5,000,000
4	Regional Comprehensive Landscape Rebate Program & Accelerated Leak Detection and Meter Testing	EWMD	424.44	Y	24%	\$5,755,115
5	Joint IEUA-JCSD Regional Water Recycling Program	IEUA	401.53	N	10%	\$16,555,000
6	Well 34 Wellhead Treatment and Montclair Basin Improvements Project	IEUA	298.39	N	11%	\$2,535,000
7	Salinity and Groundwater Enhancement	YVWD	246.87	N	23%	\$13,606,000
8	San Jacinto Valley Watershed Conservation & In-Lieu Recycled Water Program	EMWD	244.25	N	37%	\$8,950,000
9	Beaumont Cherry Valley Water District Recycled Water Facility	BCVWD	170.26	N	49%	\$2,196,933
10	Wilson III Basin Project	Yucaipa City	143.83	N	22%	\$2,409,000
11	Hawker Crawford Channel	SBCFCD	101.49	N	21%	\$3,377,000
12	2019 Canyon Lake Dredging Project	LESJWA	93.87	N	31%	\$3,000,000



Small Budget Projects

Rank	Project Name	Agency Name	Weighted Score	Watershed Wide	DAC %	Grant Request	Grant Award
1	Physical Harvesting of Algal Biomass in Lake Elsinore – Pilot Program	Lake Elsinore City	703.60	N	30%	\$297,000	\$297,000
2	Enhancements to Watershed-Wide Water Budget Decision Support Tool	SAWPA	612.33	Y	25%	\$500,000	\$500,000
3	Santa Ana Mountains Watershed Protection Project	CNF	350.47	N	7%	\$497,998	\$497,998
4	Every Neighbor Caring for Our River	IEWK	322.66	N	28%	\$475,000	
5	Santa Ana Watershed Literacy Guide and Interpretation Toolkit	CBWCD	290.26	N	28%	\$290,000	
6	Coastkeeper Smartscape	OCCK	281.90	N	21%	\$100,000	
7	Clean Camp Coalition	IEWK	281.62	N	26%	\$434,000	
8	Best Practices for Commercial, Institutional, and Municipal-Scale California Native Landscapes Guidebook	CBWCD	269.65	Y	23%	\$67,950	
9	Advancing Sustainable Landscapes in the Santa Ana River Watershed	Pacific Institute	261.91	Y	23%	\$95,000	

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Proposed Funding Allocation for Projects

Total Projects = 8 OWOW; 4 North OC

Upper
Watershed
(60%)

Project	Grant
Replenish BB	\$2,765,588
Evans Lake	\$2,000,000
Well 30	\$3,431,225
National Forest	\$497,998
EMWD/MWDOC	\$1,184,469
IEUA/JCSD	\$2,617,971
Total	\$12,497,250

Watershed-
Wide
(10%)

Project	Grant
SAWPA Budgets	\$500,000
EMWD/MWDOC	\$1,582,875
Total	\$2,082,875

North OC
Stakeholders
(30%)

Project	Grant
Project 1	?
Project 2	?
Project 3	?
Project 4	?
Total	\$6,248,625

DAC

Project	Grant
Replenish BB	\$1,797,750
Lake Elsinore	\$297,000
Total	\$2,094,750



Total for Funding Area = \$22,923,500

Path Forward

- Coordination with North OC Stakeholders to gather pre-application material from North OC selected projects.
- Pre-application workshop with DWR has been set for August 12 here at SAWPA.
- Resolution will be brought to the SAWPA Commission authorizing the submission of the OWOW Proposition 1 IRWM grant proposal



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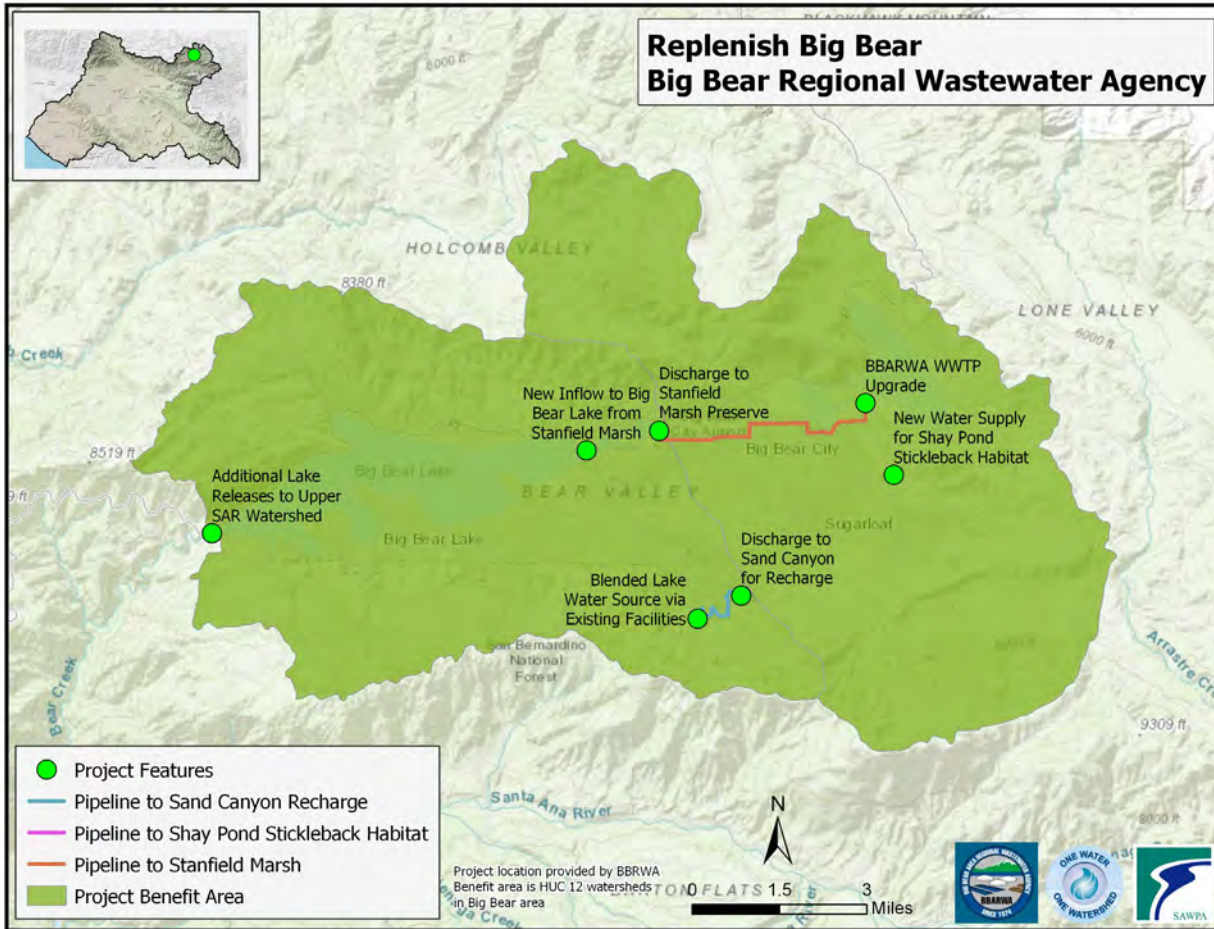
Recommendation

- That the SAWPA Commission approve the funding allocation and portfolio of projects for OWOW Proposition 1 Round 1 Integrated Regional Water Management Grant Funding.

Questions?

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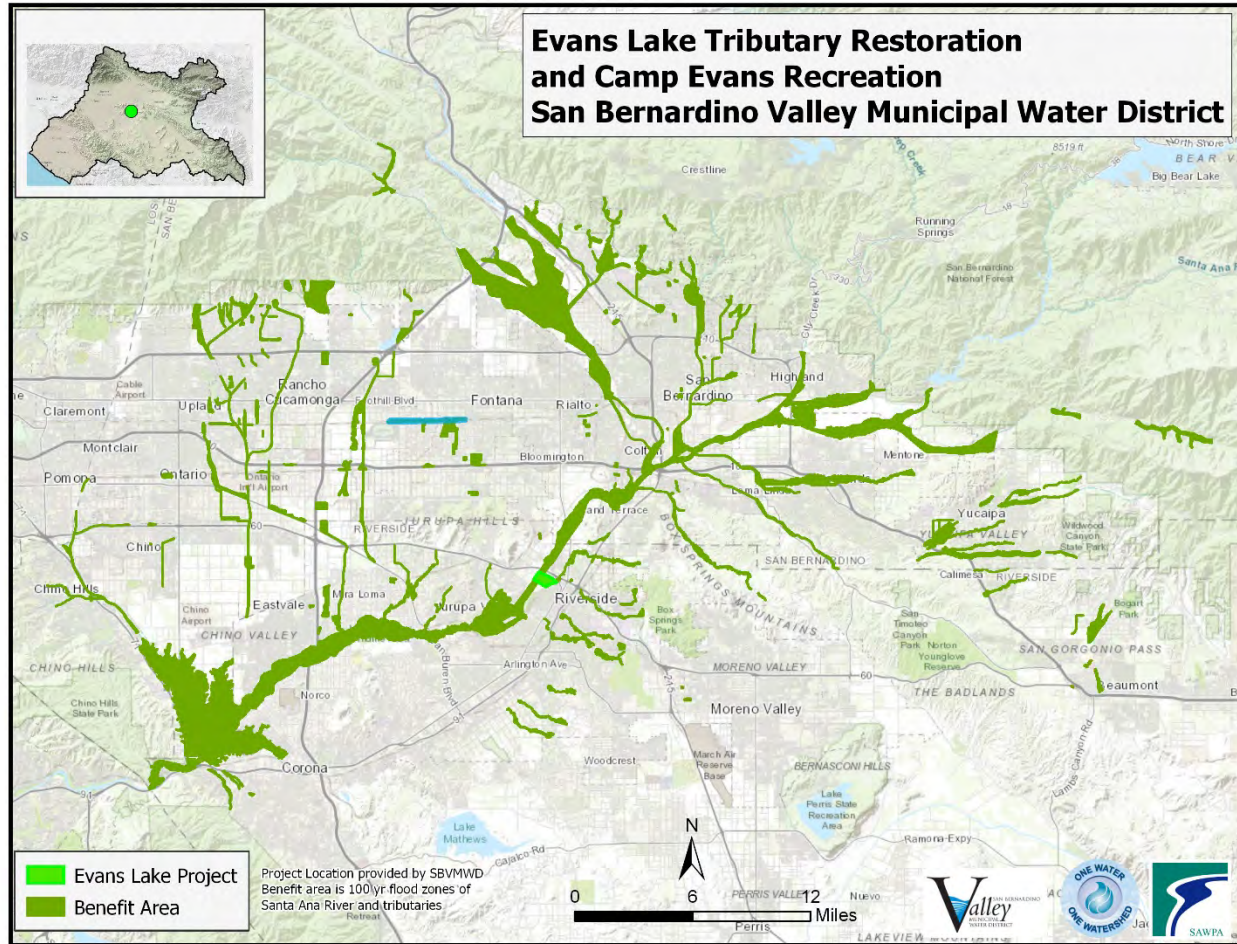
Replenish Big Bear



- Provides Big Bear Regional Wastewater Agency with recycled water treatment plant upgrades.
- Creates new supply of water to watershed and restores and protects sensitive habitat.
- Provides sustainable groundwater supply and optimizes water resource management in the upper watershed.

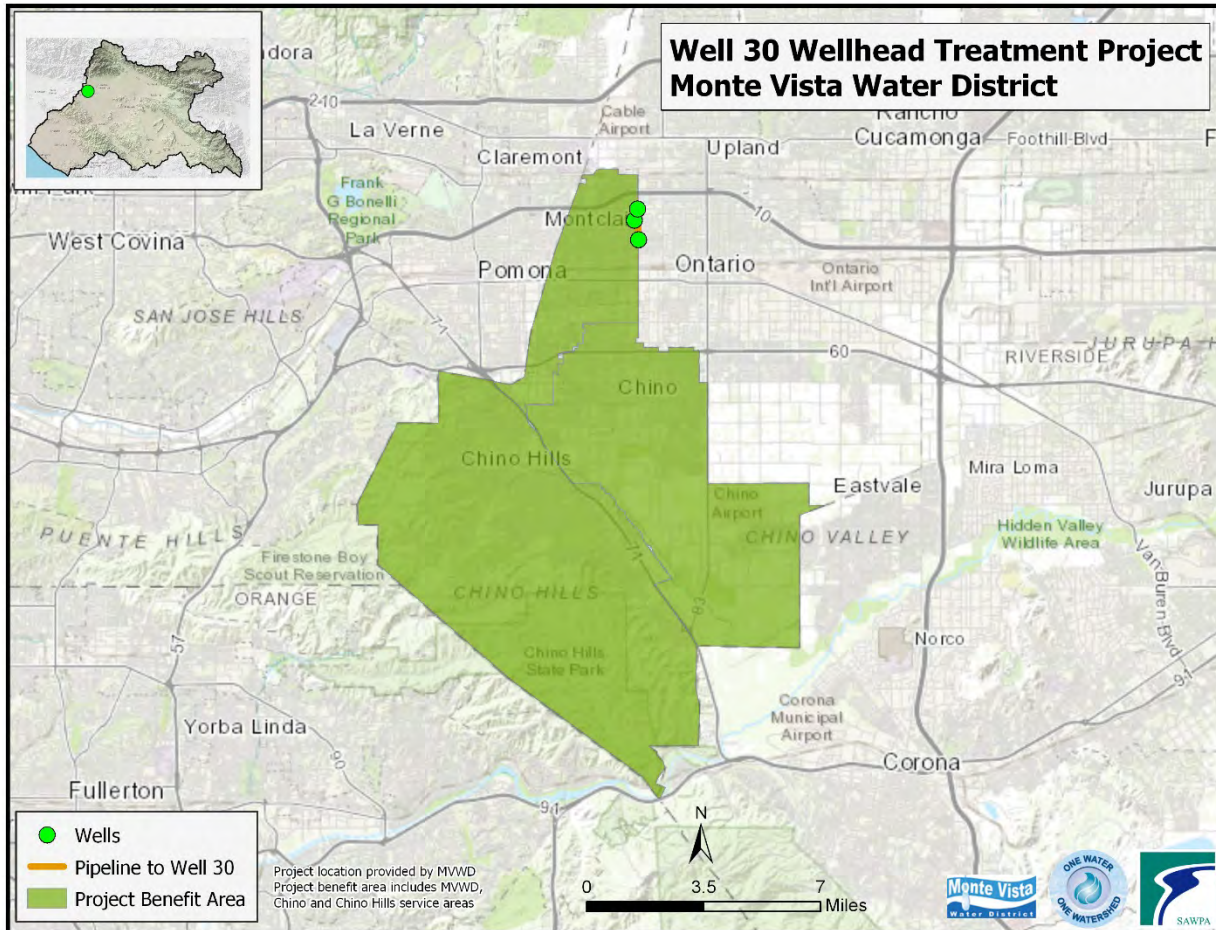
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Evans Lake Tributary Restoration and Camp Evans Recreation



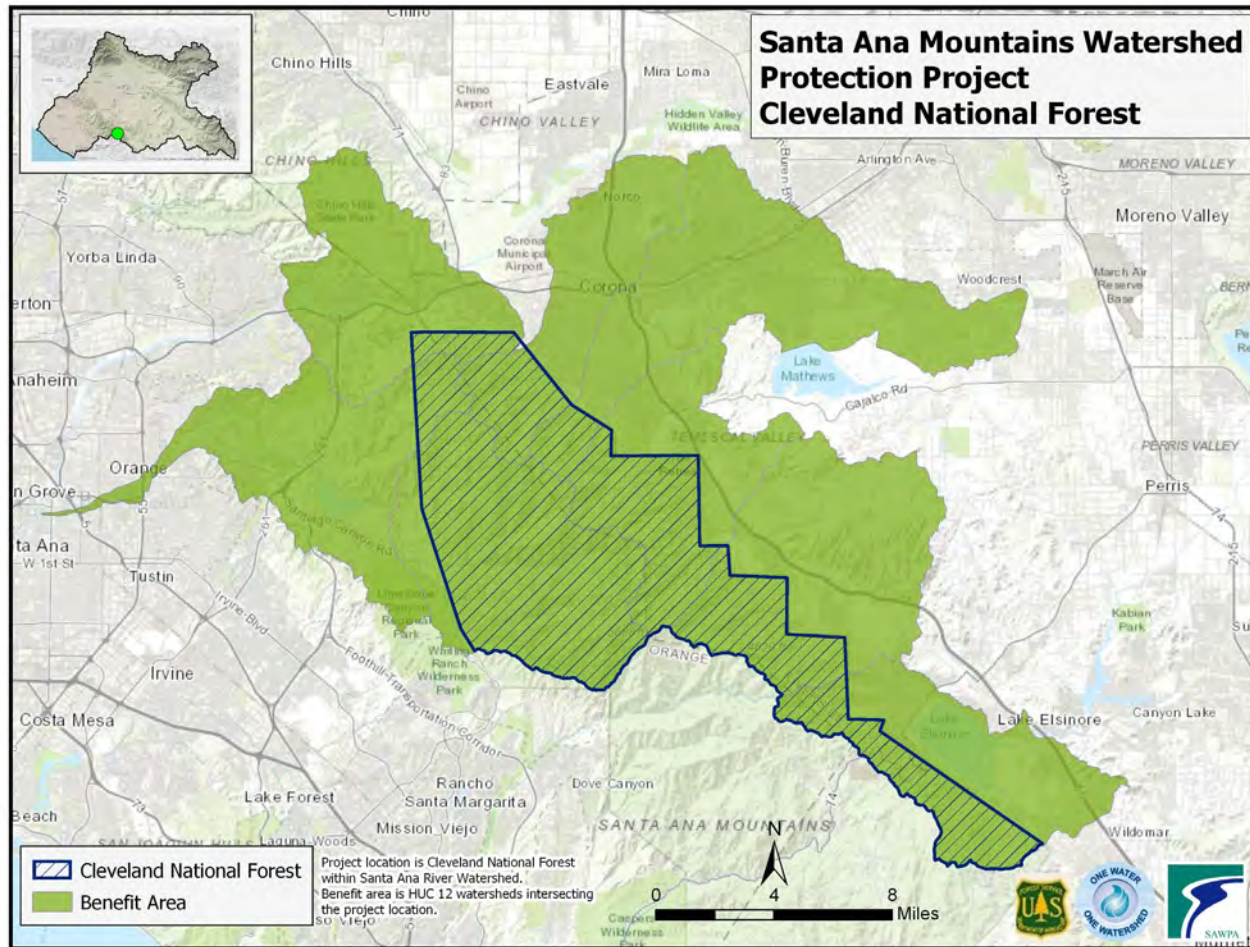
- Creates recreation and education facilities, and aquatic and terrestrial habitats near Evans Lake.
- Establishes and maintains aquatic habitat restoration for native aquatic species such as threatened Santa Ana sucker.
- Restored habitats would be monitored and maintained in perpetuity by the Upper Santa Ana River Habitat Conservation Plan.

MVWD – Well 30 Wellhead Treatment Project



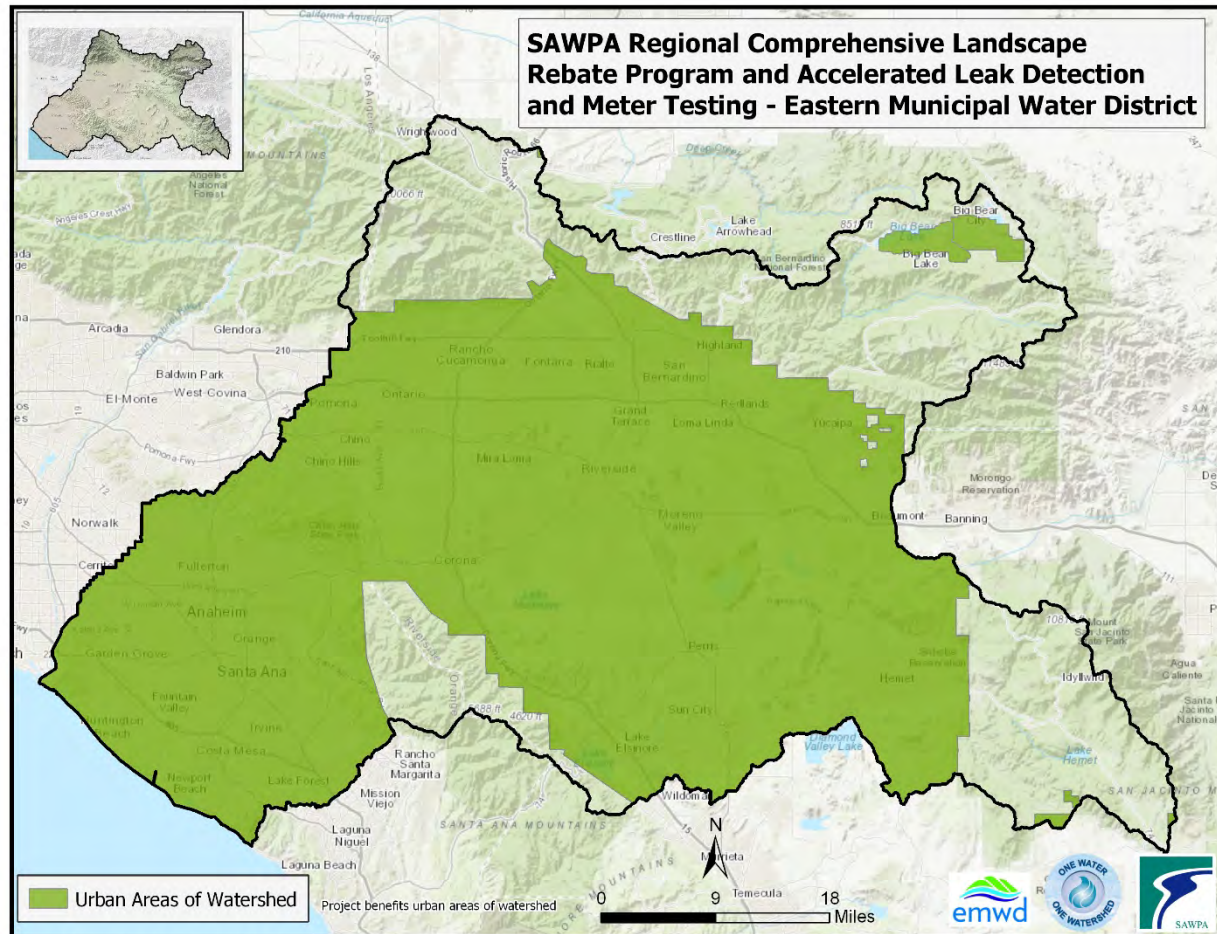
- Groundwater treatment plant that implements anion exchange and GAC to treat nitrates, perchlorate and 1,2,3 TCP in contaminated groundwater for potable drinking water.
- Reactivation of three wells that will increase supply by 6,450 acre-feet per year.

Santa Ana Mountains Watershed Protection Project



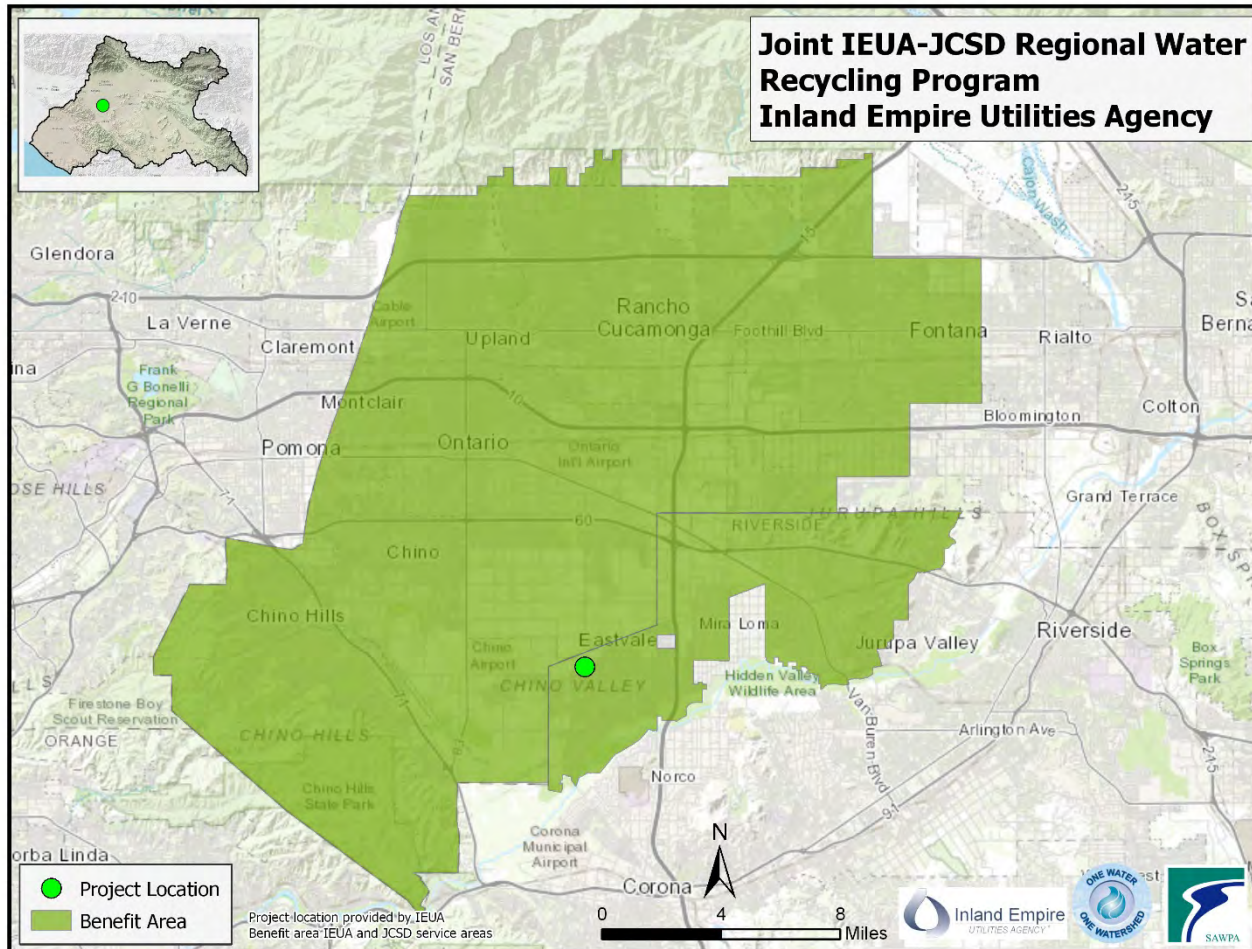
- Provides and maintains 651 acres of fuel breaks on National Forest System lands along the crest of the Santa Ana Mountains over the next 7 years.
- Reduces the probability of future wildfire events that negatively impact soil, water quality, and vegetation.

Regional Comprehensive Landscape Rebate Program and Accelerated Leak Detection and Meter Testing



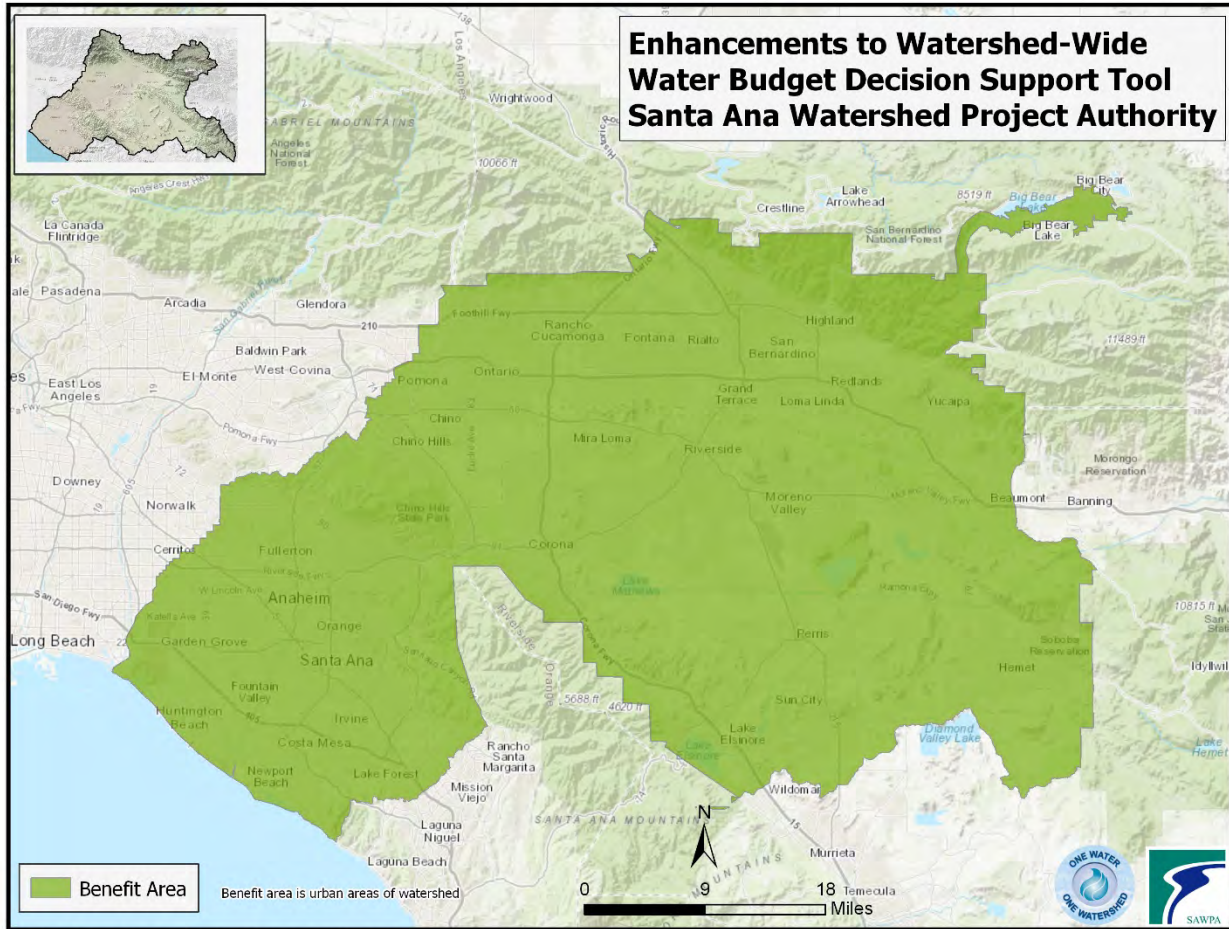
- Collaboration among 6 agencies to create an education and incentive program to transform urban landscapes and increase water efficiency.
- Program will be customized to each agencies need for turf removal, weather based irrigation timers, updated sprinkler nozzles and landscape design assistance.

Joint IEUA-JCSD Regional Water Recycling Program



- Recycled water intertie project that includes two pump stations and 38,000 LF of pipe to maximize use of recycled water throughout the Chino Basin.
- Provides ~4,000 AFY of recycled water from Western Riverside County Regional Water Authority treatment plant for regional uses and groundwater replenishment.

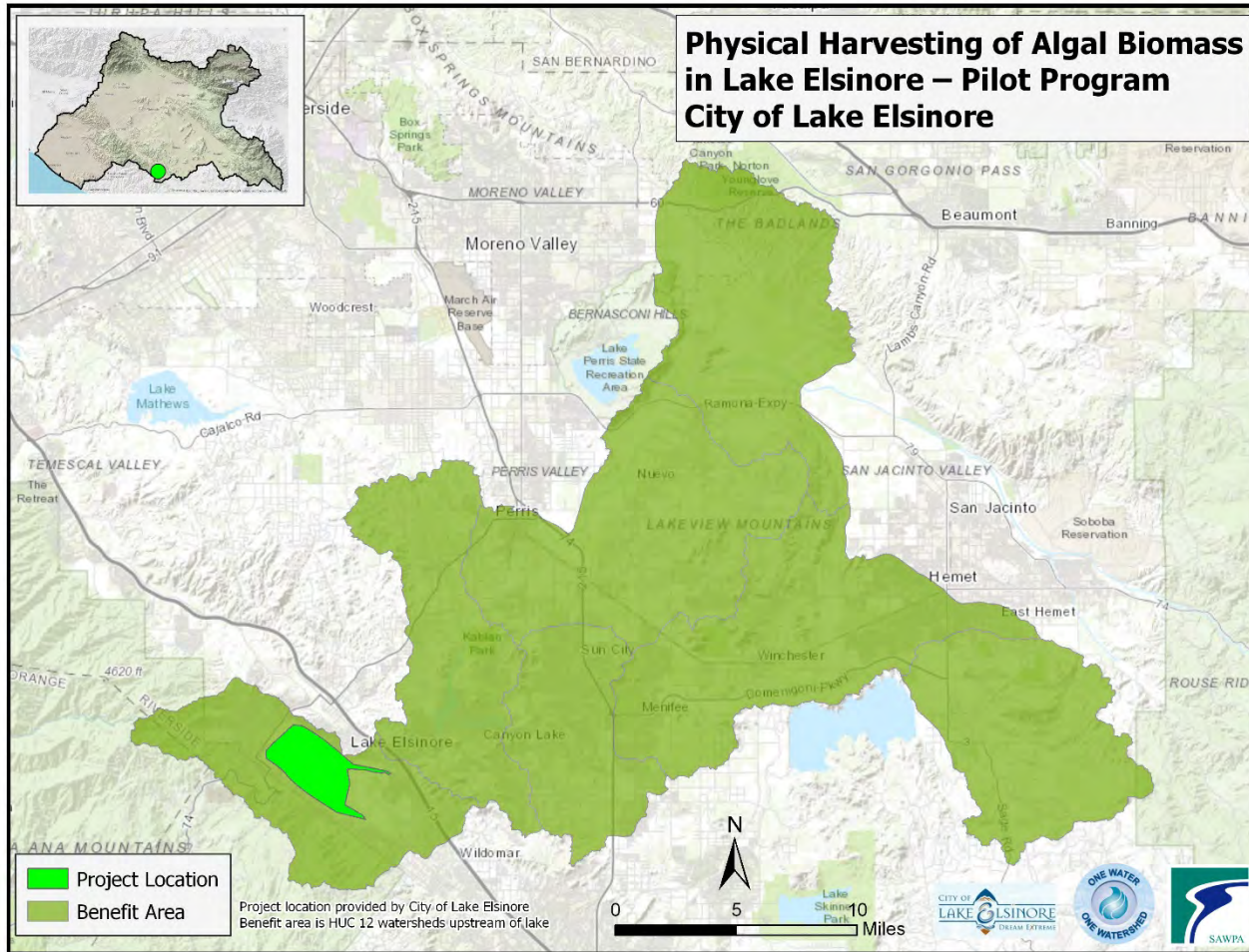
Enhancements to Watershed-Wide Water Budget Decision Support Tool



- Develops an Urban Landscape Assessment Tool to measure, classify, monitor, and report on landscape water demands for the Santa Ana River Watershed.
- Assists over 70 retail agencies in complying with State regulations that require water agencies to adhere to agency-wide water budgets.

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Physical Harvesting of Algal Biomass in Lake Elsinore



- Removal of excessive algae growth to attain newly revised total maximum daily loads (TMDLs) and improve and maintain the health of the lake.
- Project will consist of an in-situ floating barge with rotating panels to capture algae.
- Mechanical racks move algae into holding tanks on barge.



**SAWPA Building Improvements
Notice Inviting Bids
CEQA Notice of Exemption**

Item 7.E.

June 4, 2019

Recommendation

- Authorize the General Manager to issue a Notice Inviting Bids for the Santa Ana Watershed Project Authority Building Renovations and to file a Notice of Exemption with the Riverside County Clerks' Office.

SAWPA Building Improvements - Schedule

Activity	Schedule
Advertise Bids	June 5, 2019
Pre-bid meeting	June 11, 2019
Bid opening	June 17, 2019
Start work	July 8, 2019
End work	August 5, 2019

Recommendation

- Authorize the General Manager to issue a Notice Inviting Bids for the Santa Ana Watershed Project Authority Building Renovations and to file a Notice of Exemption with the Riverside County Clerks' Office.



Questions??