

# **Water Sustainability in an Unsustainable Climate**

**Drought Proof Solutions for  
California**

**October 22, 2015**



A close-up photograph of a young girl with dark hair, wearing a white shirt, drinking water from a clear glass. The background is a blurred outdoor setting with greenery and a light-colored wall. The text is overlaid on the right side of the image.

**Q:What is our  
most  
expensive  
glass of water?**

**A:The one you  
don't have.**

# 1. Lake Oroville



July 20, 2011 vs August 19, 2014

# 1. Lake Oroville



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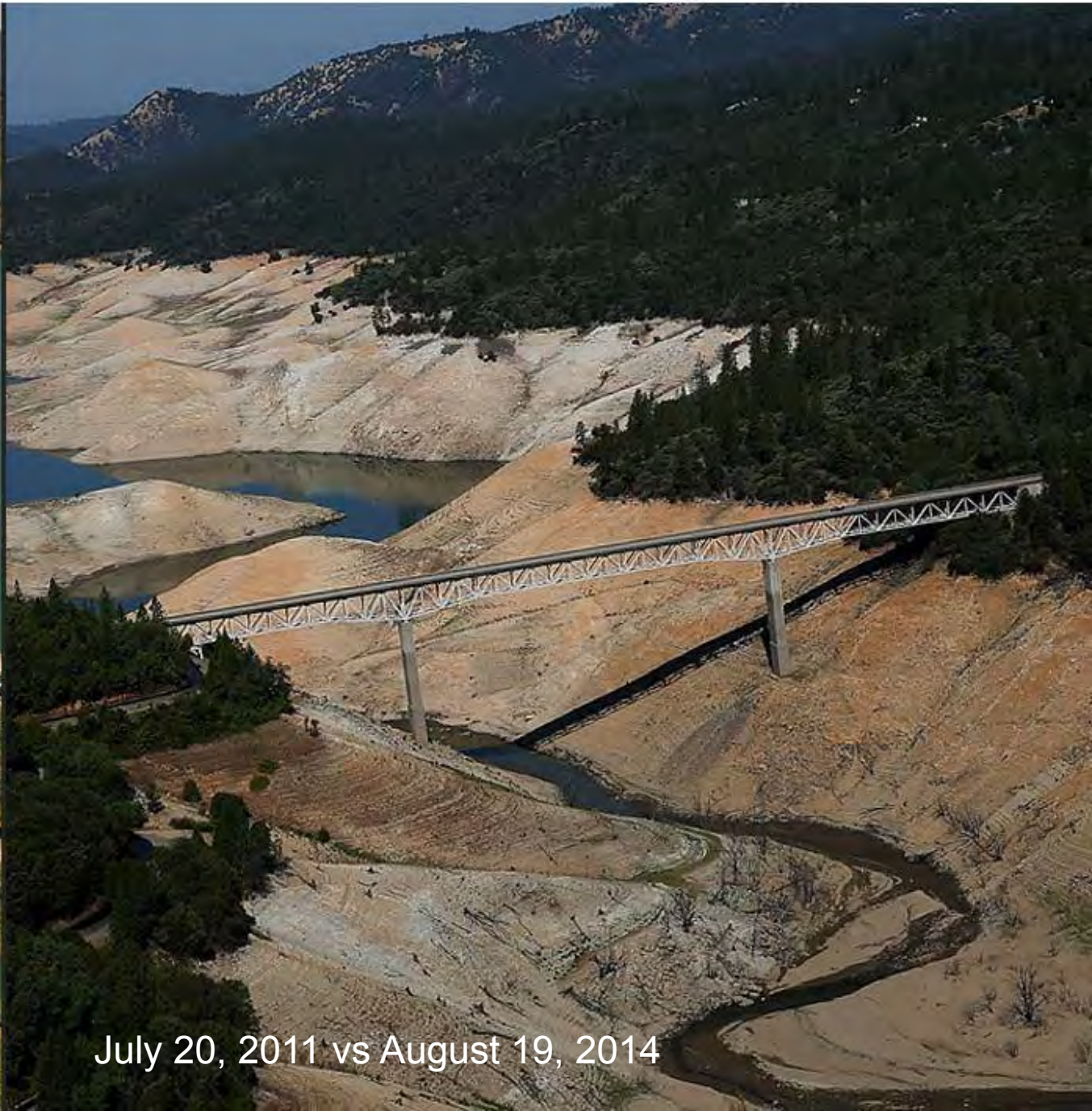
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July 20, 2011 vs August 19, 2014

## 2. Folsom Dam



July 20, 2011 vs August 19, 2014

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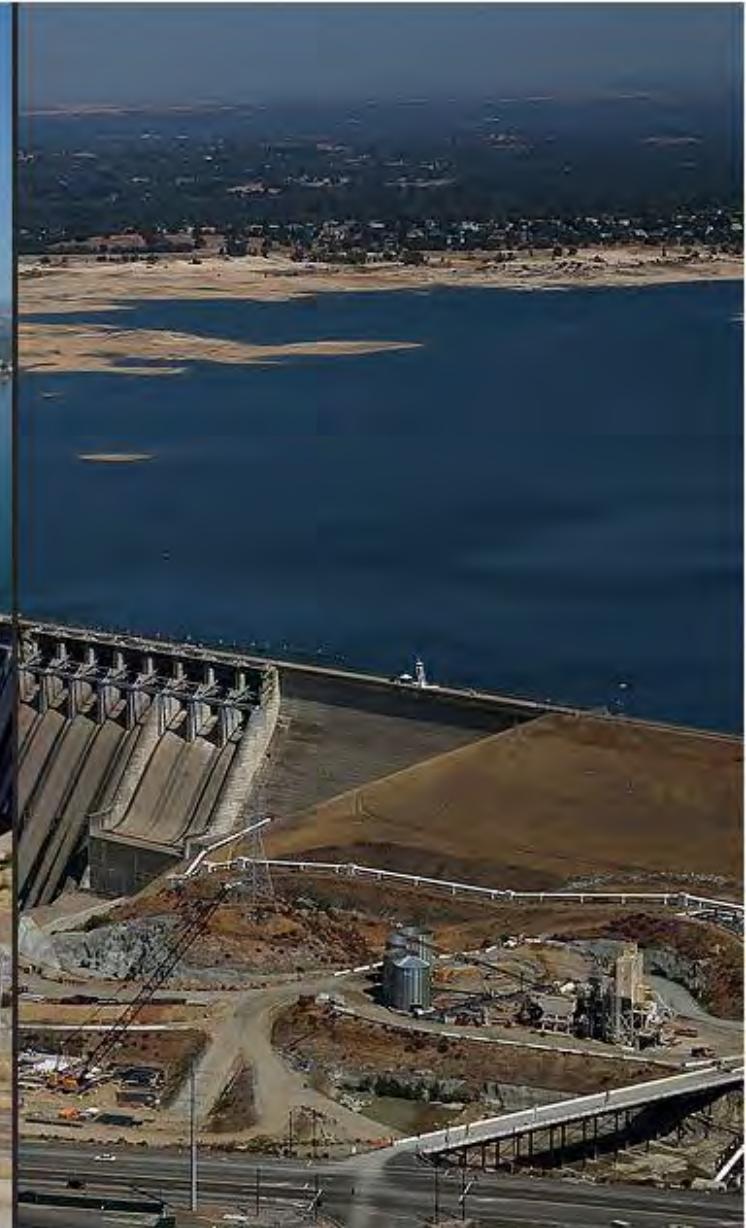
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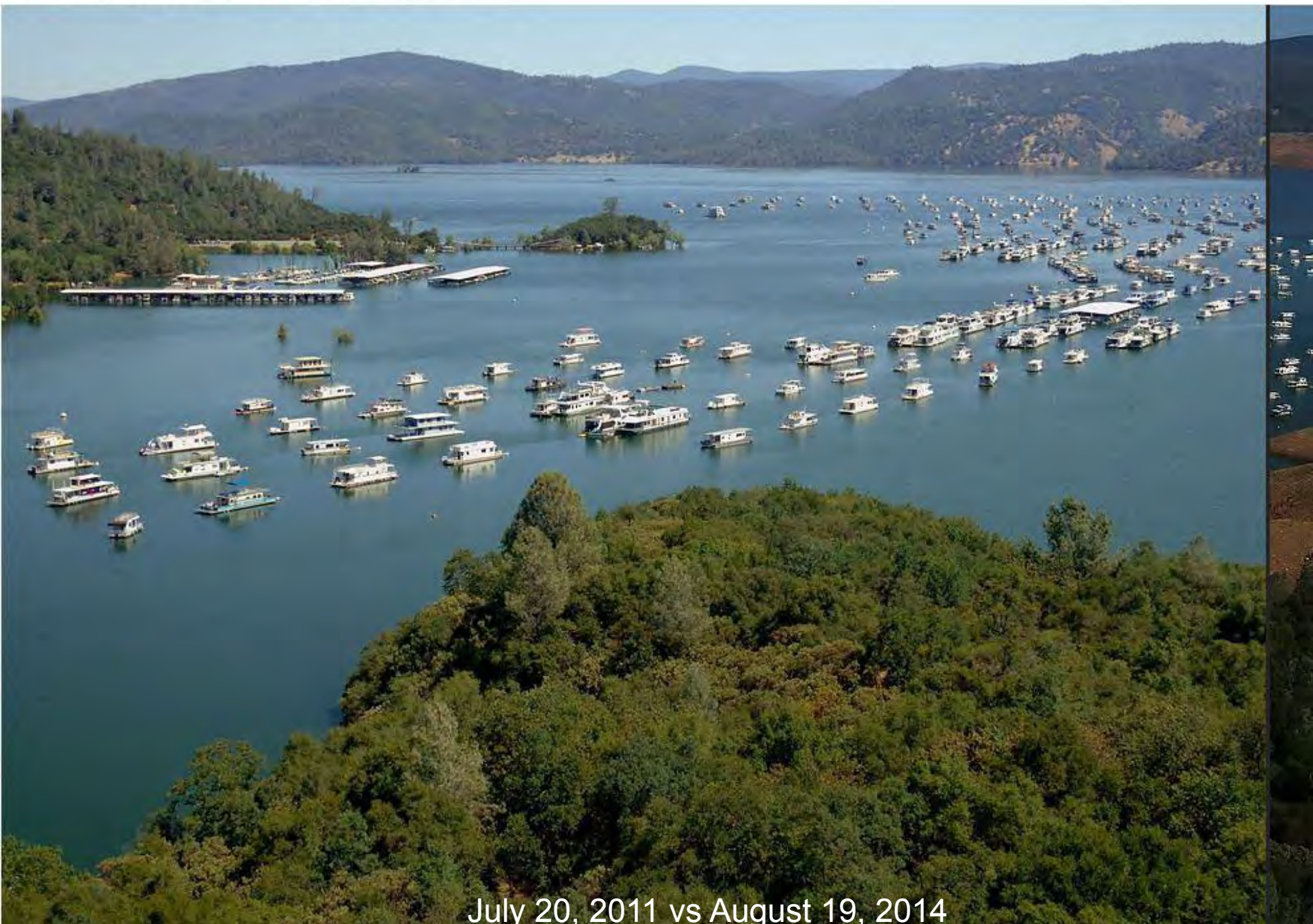


# 5. Bidwell Marina at Lake Oroville



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## 7. Satellite View of California



January 2013 vs January 2014

## 7. Satellite View of California



January 2013 vs January 2014

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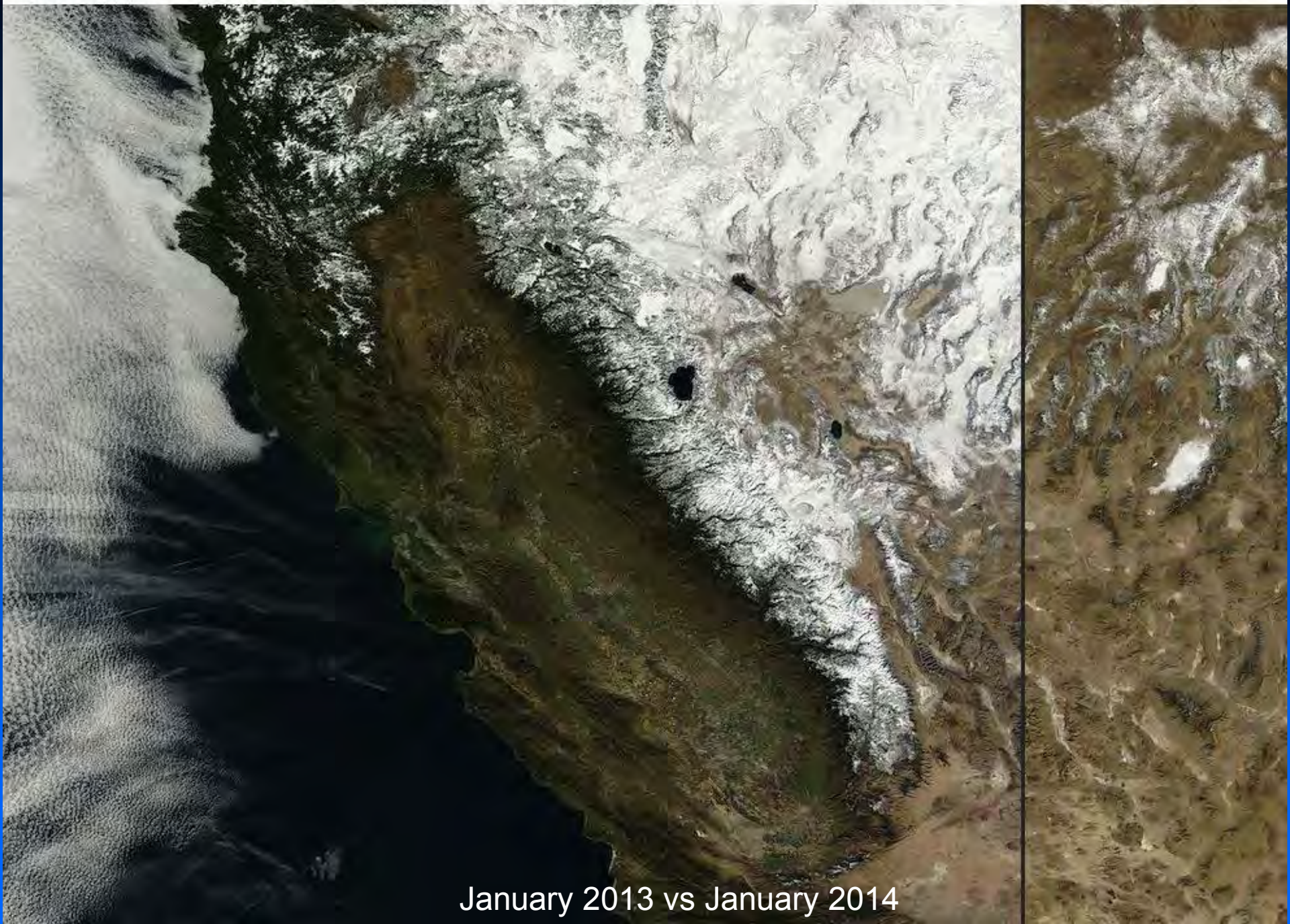
January 2013 vs January 2014

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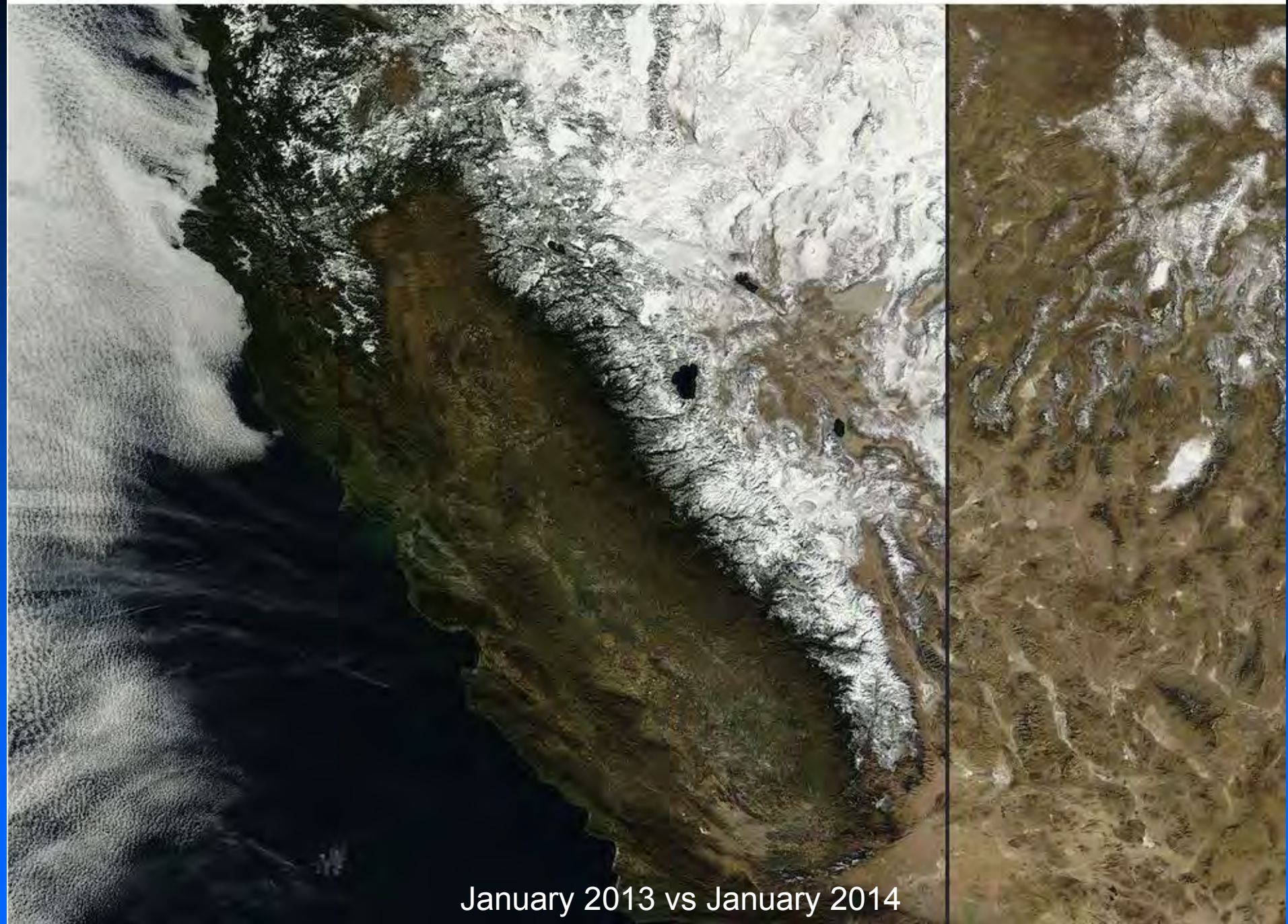
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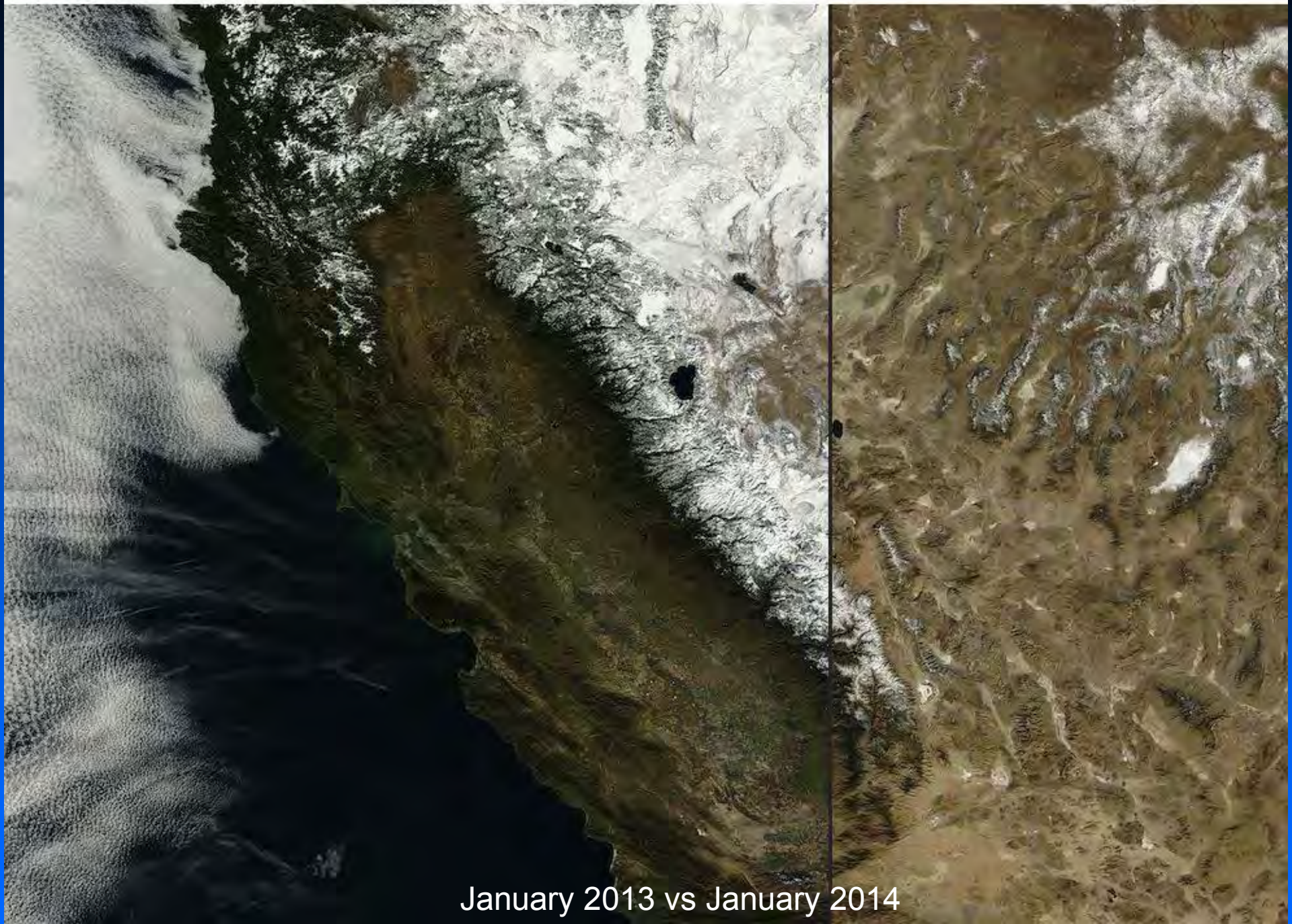
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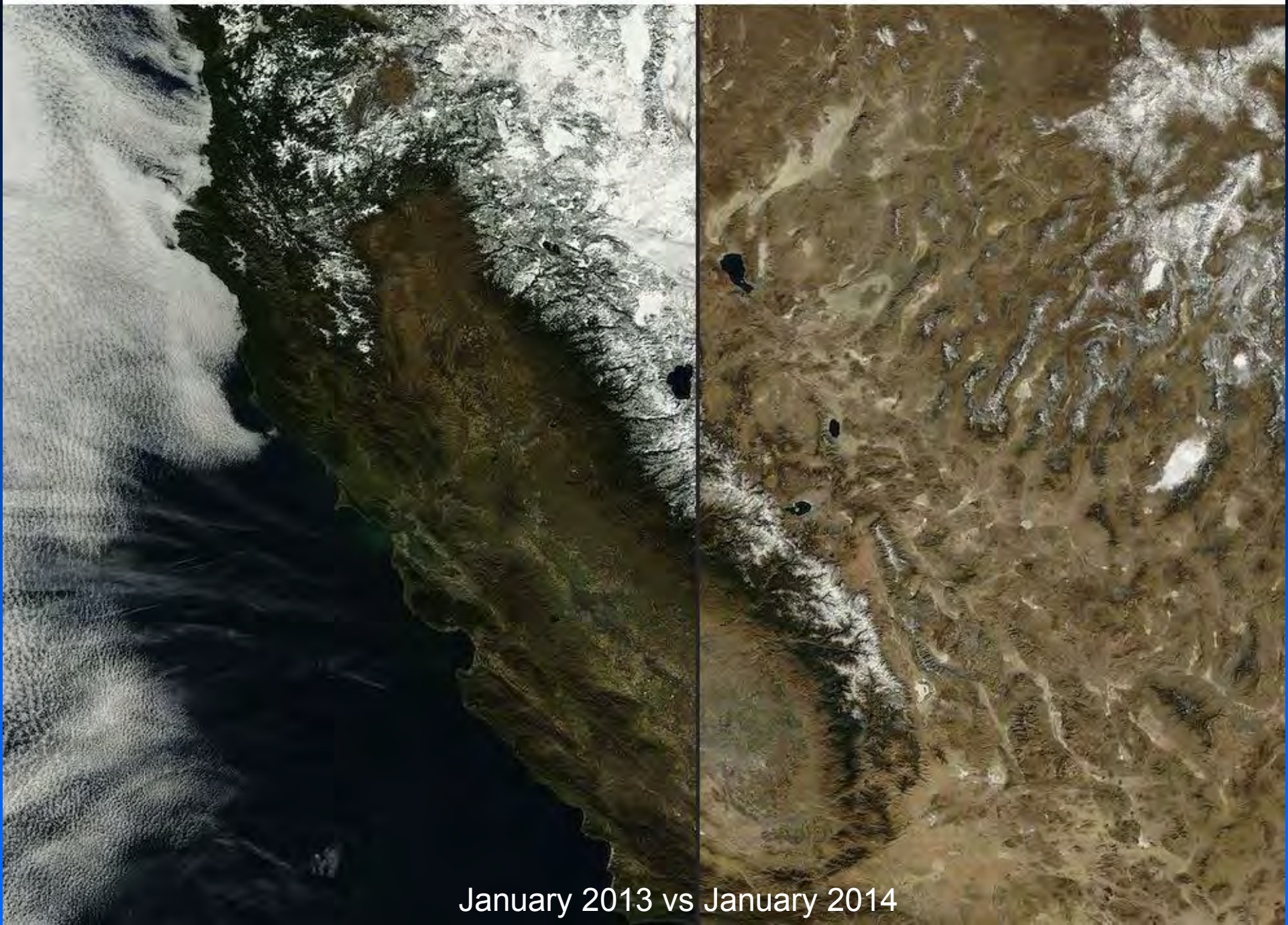
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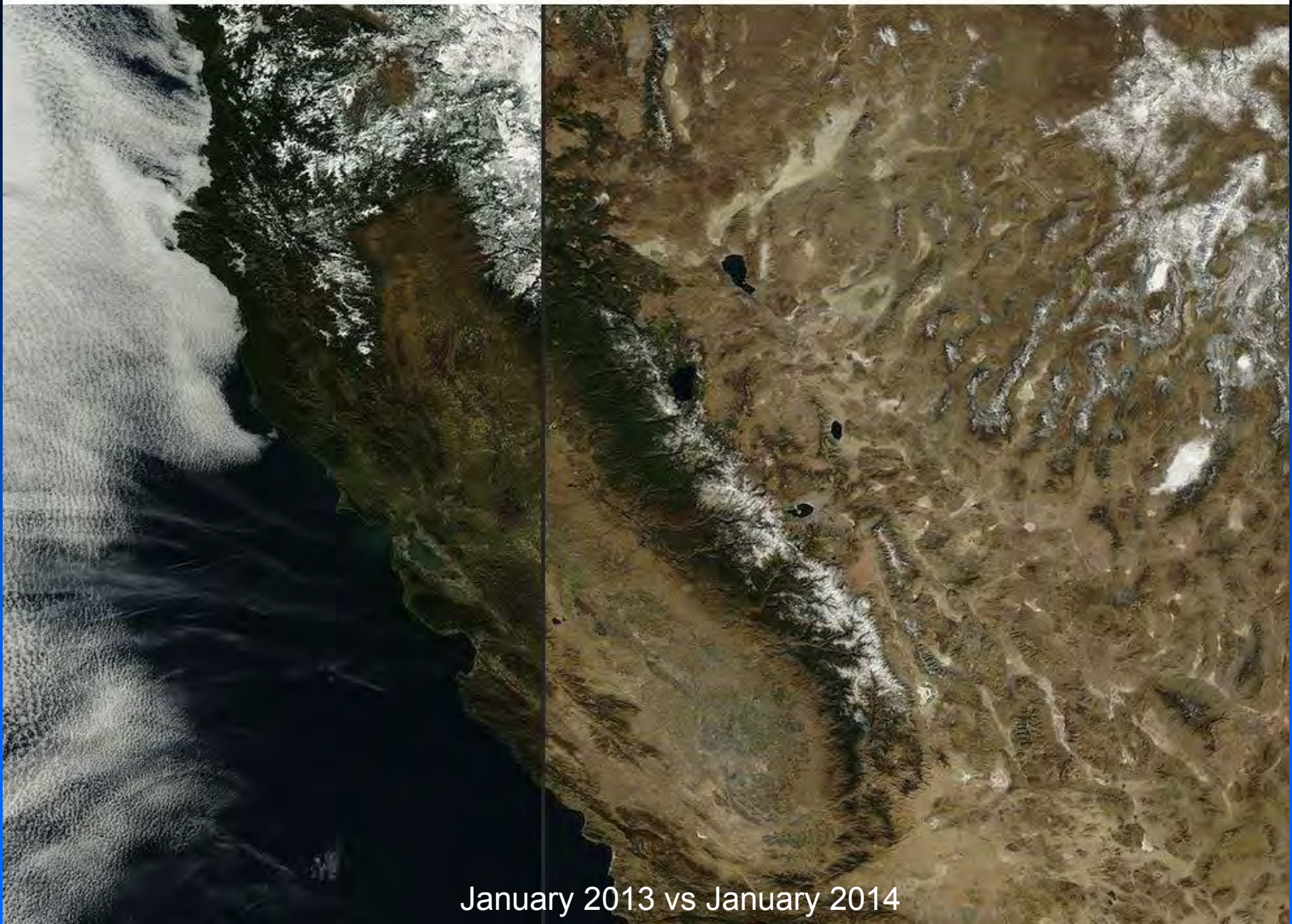


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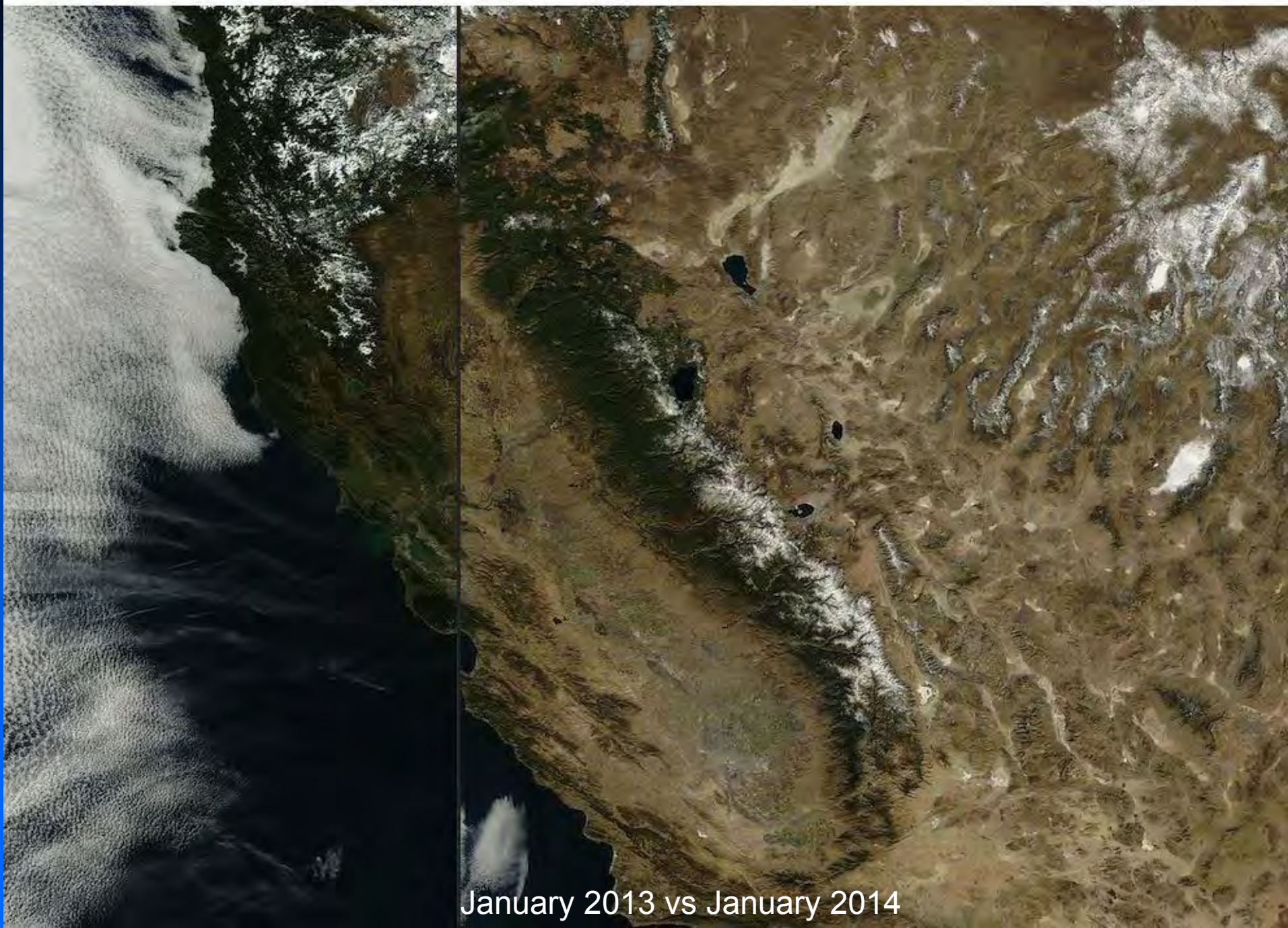
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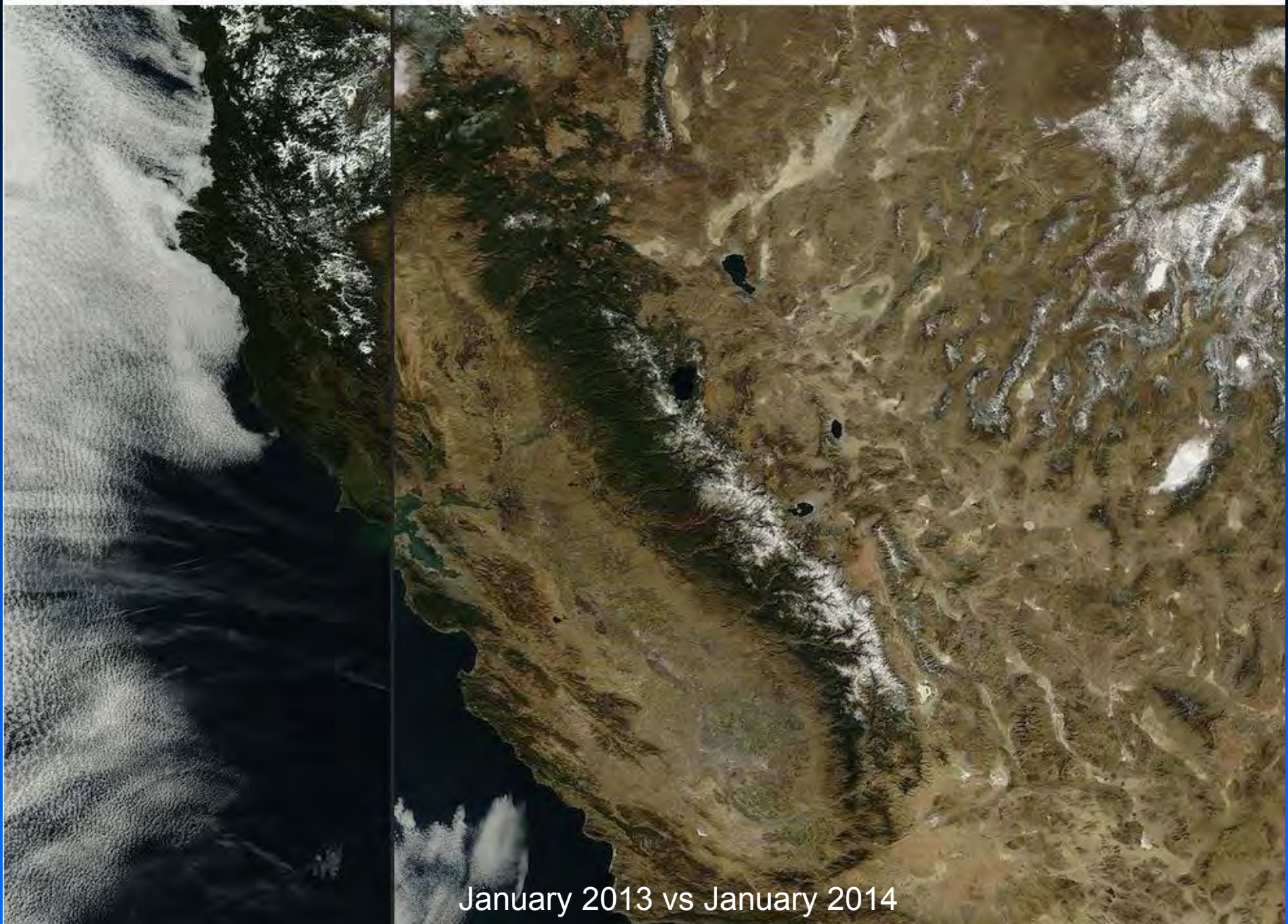
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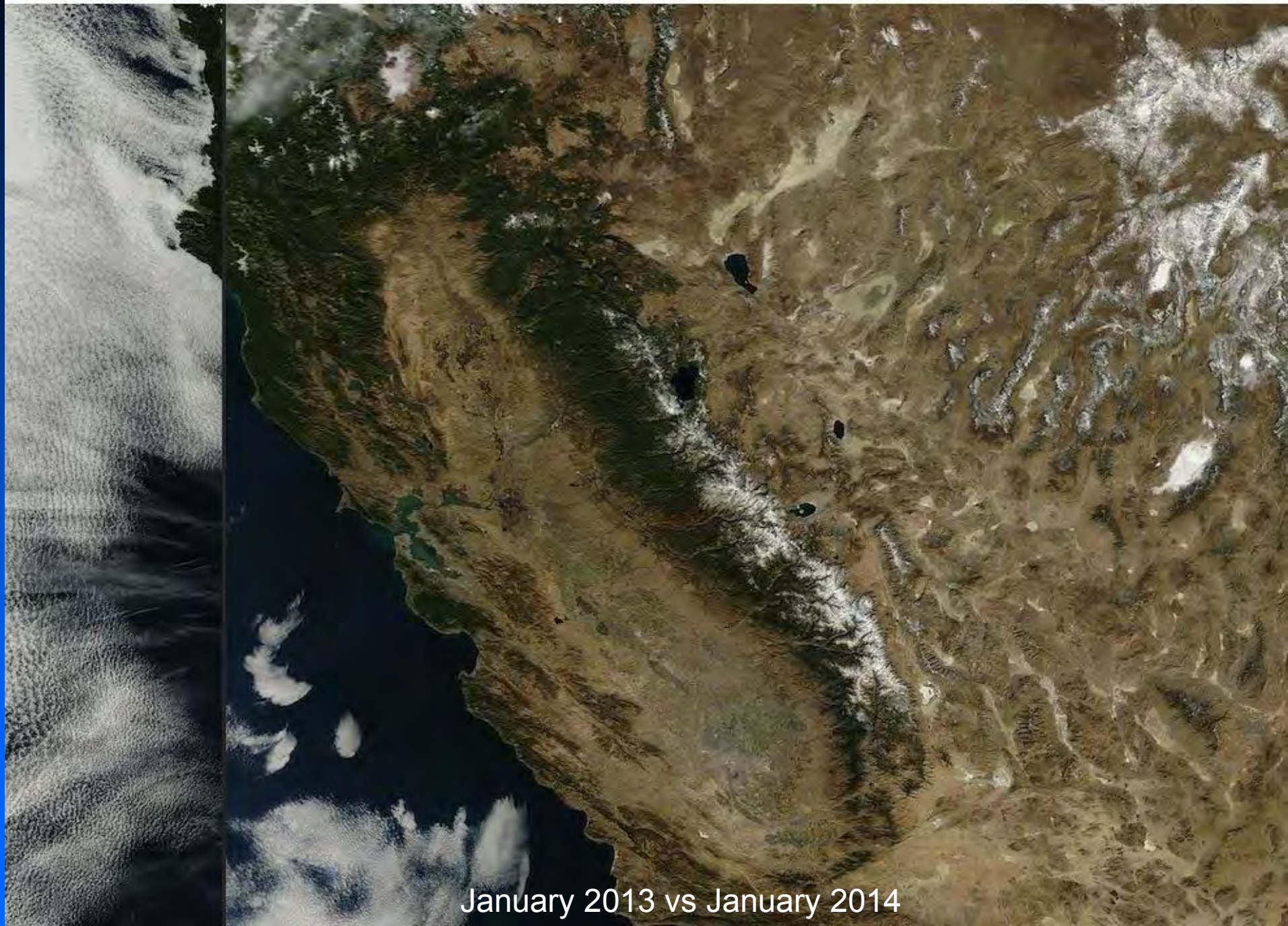


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January 2013 vs January 2014



Ventura County

# West Basin Municipal Water District

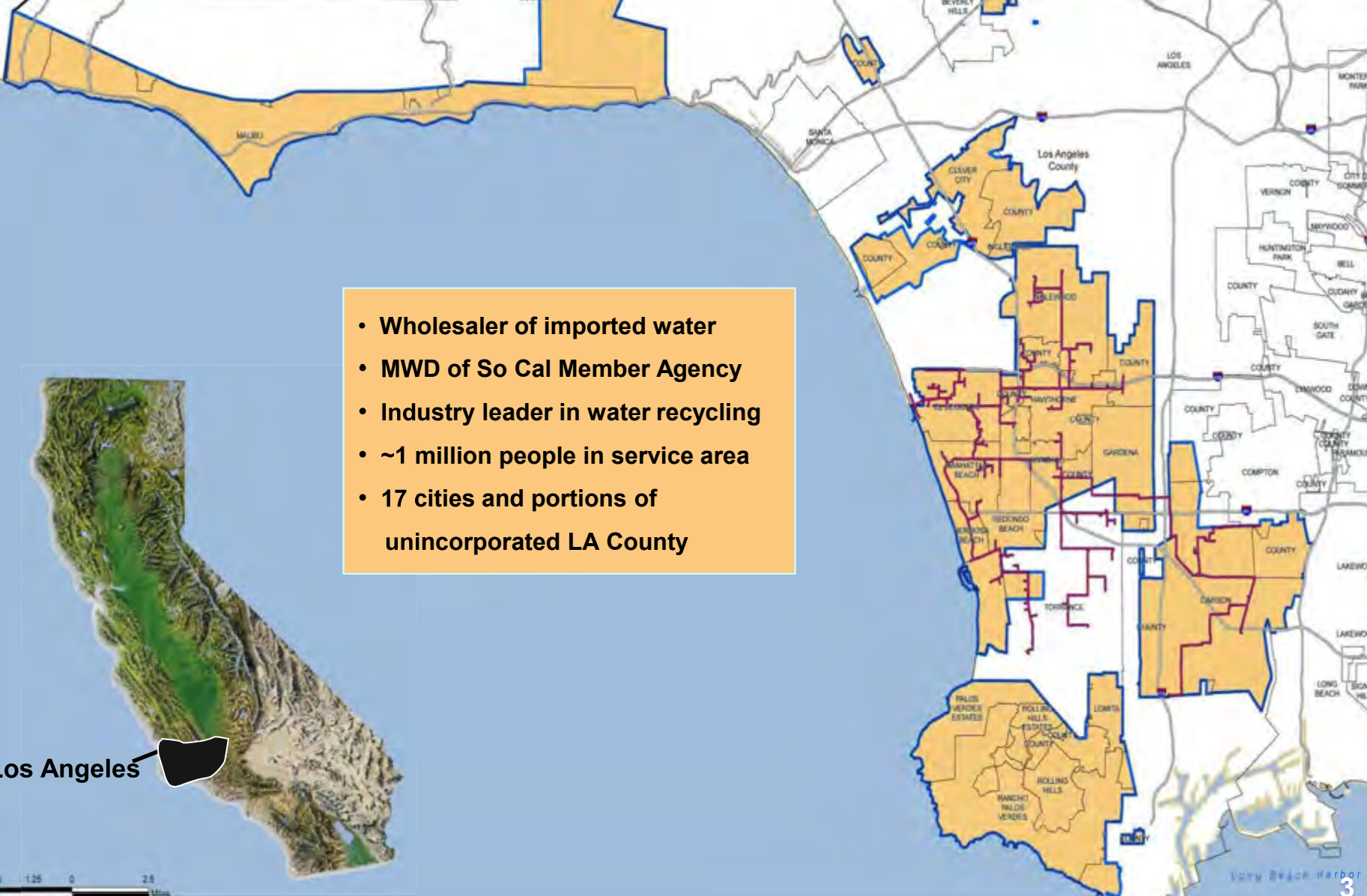
CALABASAS

COUNTY

COUNTY

**WBMWD Recycled Water Pipeline**  
 WBMWD Recycled Water Pipeline

**WBMWD Service Area Boundary**  
 WBMWD Service Area Boundary



- Wholesaler of imported water
- MWD of So Cal Member Agency
- Industry leader in water recycling
- ~1 million people in service area
- 17 cities and portions of unincorporated LA County




Los Angeles



# Where Does California's Water Come From?



- 
- 1. Warmest Winter on Record**
  - 2. Lowest Snow Pack Ever Recorded**
  - 3. Lowest Runoff Ever for LA Aqueduct**
  - 4. Colorado River Basin Close to its FIRST EVER Historic Shortage Allocation**

**Dry Winter**

# Colorado River Basin



# Normal Winter Keeps ET Low



# Native Plants Use Water When Snow Melts



1. 80% Snowpack - Only 40% Runoff
2. Why? Warm Winter - ground neverfroze, vegetation grew sooner and when snow melted soaked into ground and used by vegetation before reaching River

# April 1, 2015 Snowpack



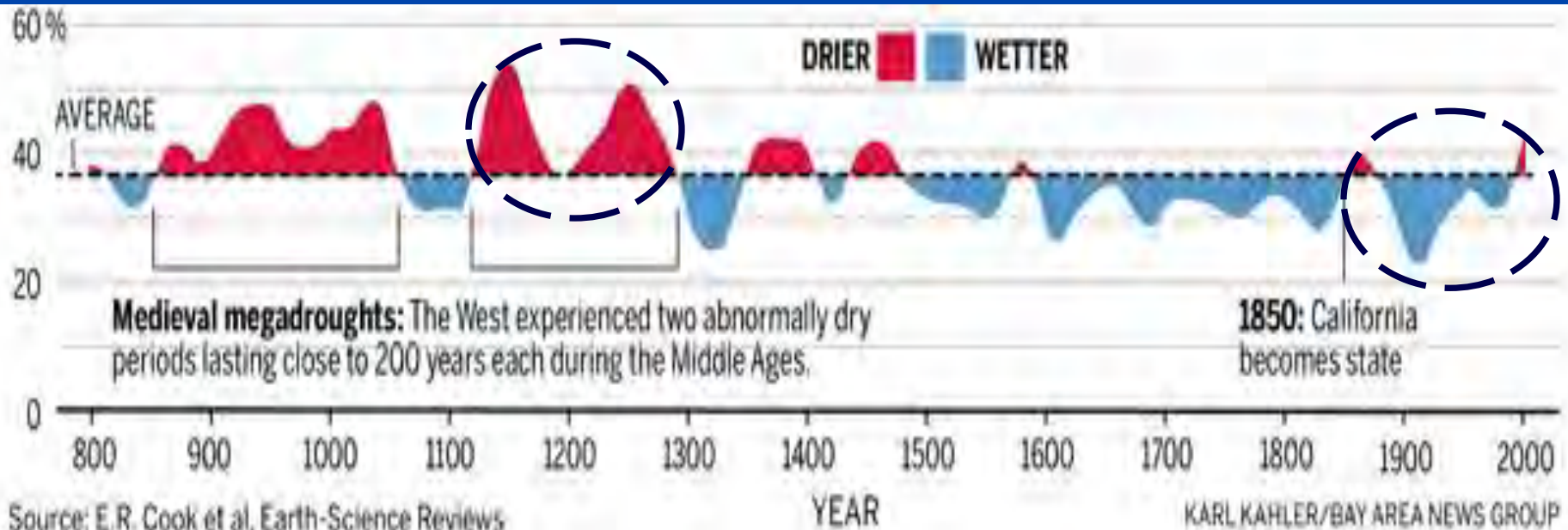
**First Time Ever Statewide  
Mandatory Cut in Urban Usage -  
25%**



# Food for Thought: First Four Years of a Mega-Drought?



## A 200-Year Drought?



A polar bear is shown standing on a small, isolated piece of ice in the middle of a vast, blue sea. The bear is looking upwards and to the left. The water is a deep, clear blue, and the ice is a pale, translucent blue. The bear's fur is white and appears slightly matted. The overall scene conveys a sense of isolation and the impact of climate change.

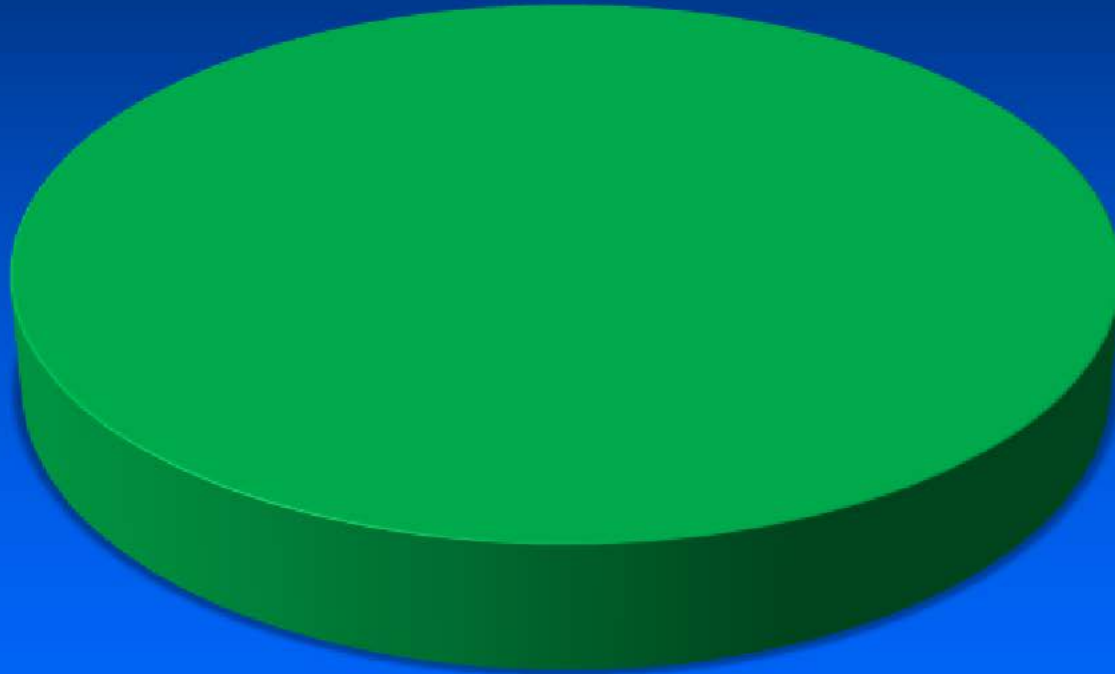
**Cannot Use Recent Past to Predict  
the Future**

**Is This the New Normal?**

# The West Basin Story

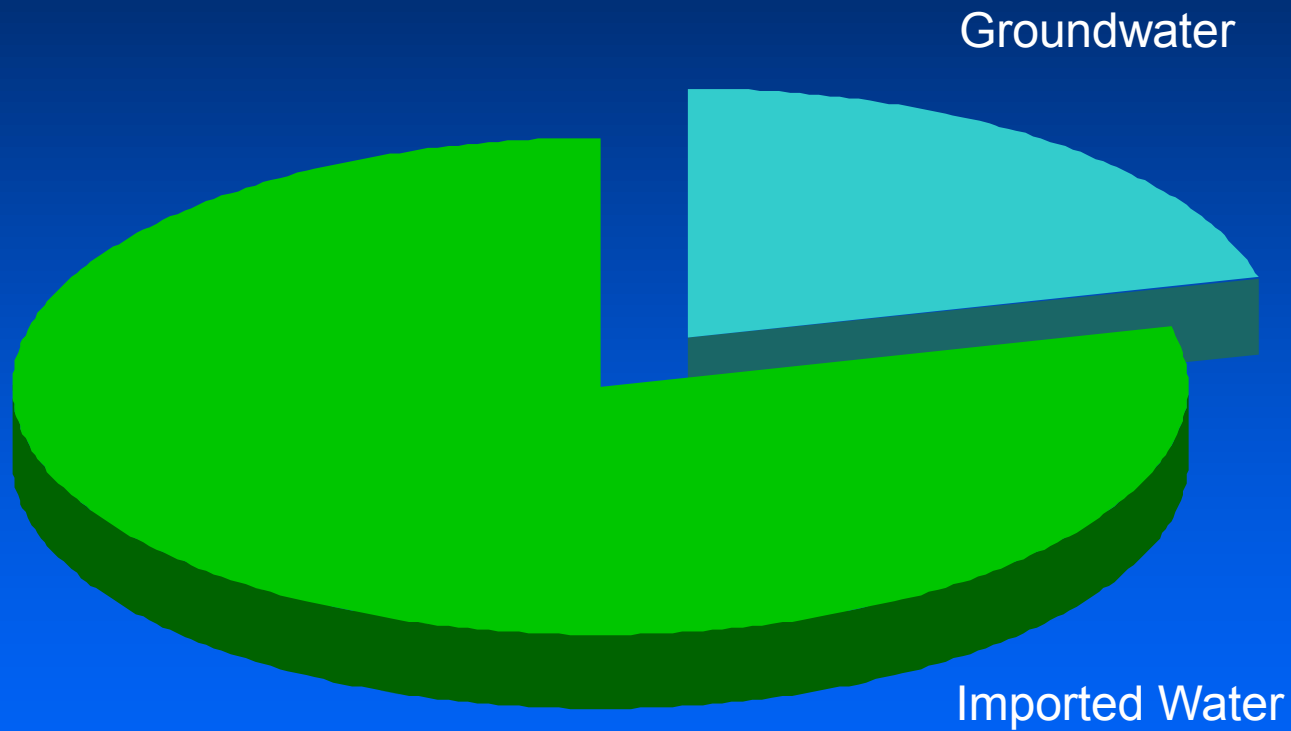


Ground Water



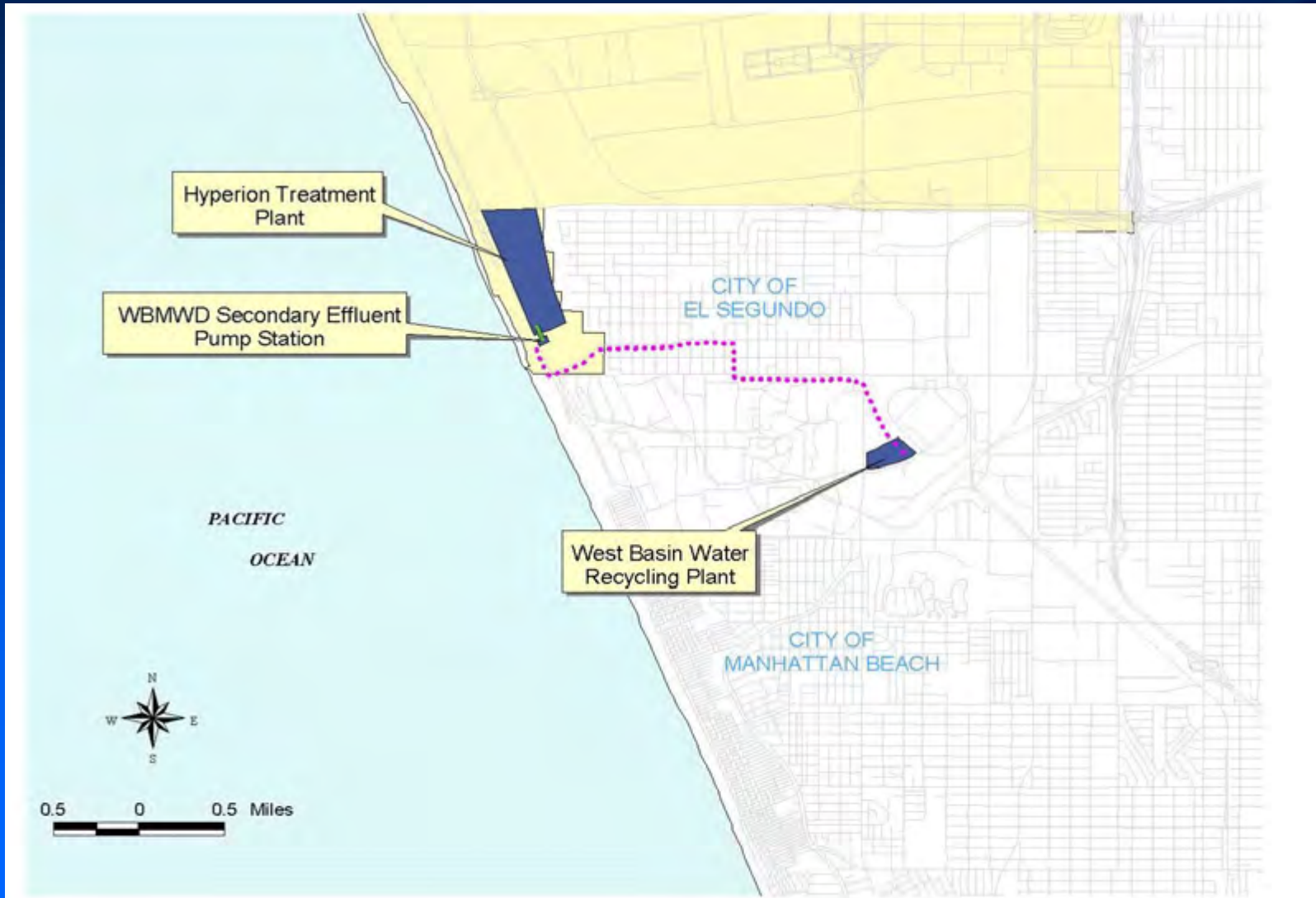
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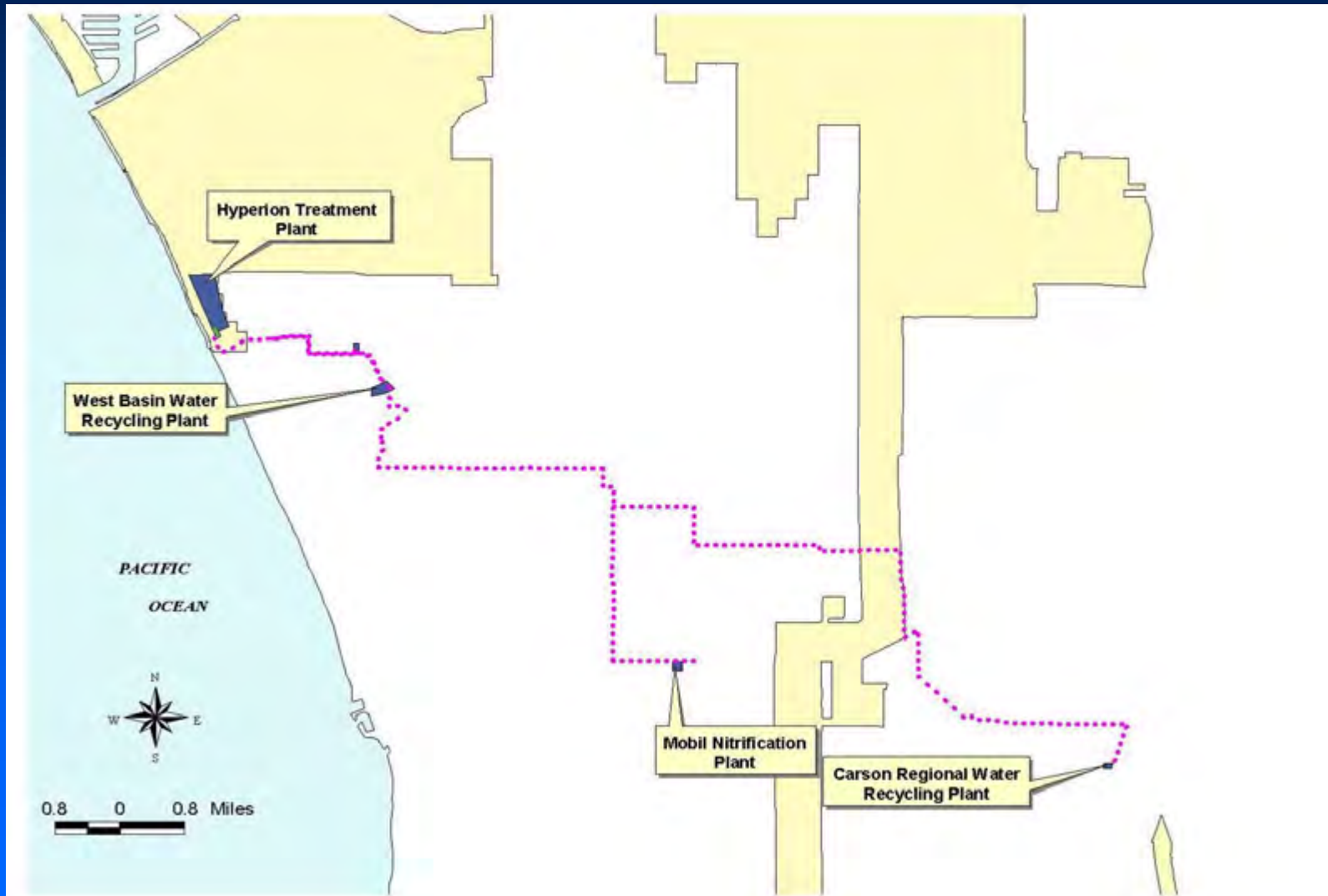
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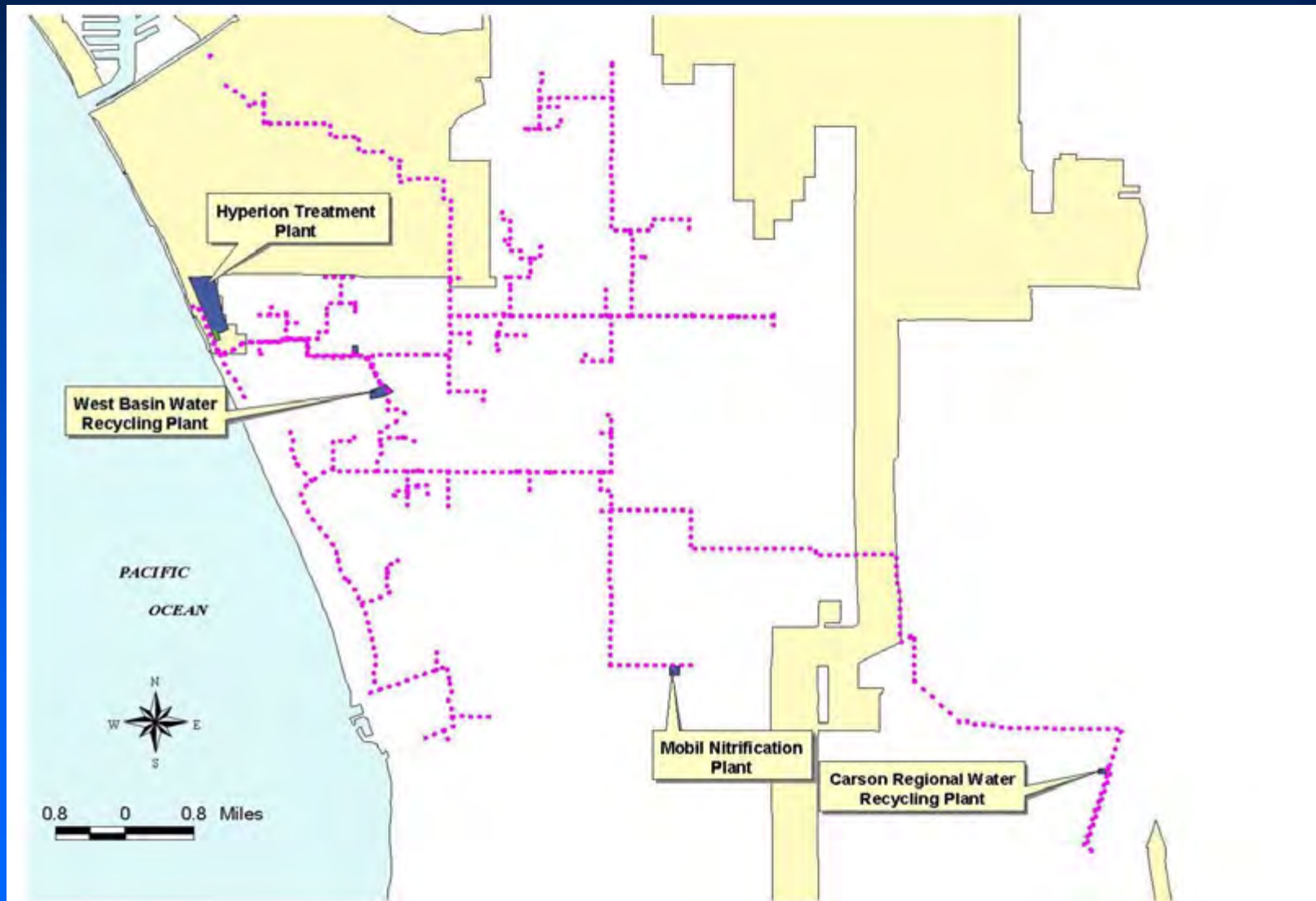


# Edward C. Little Water Recycling Facility

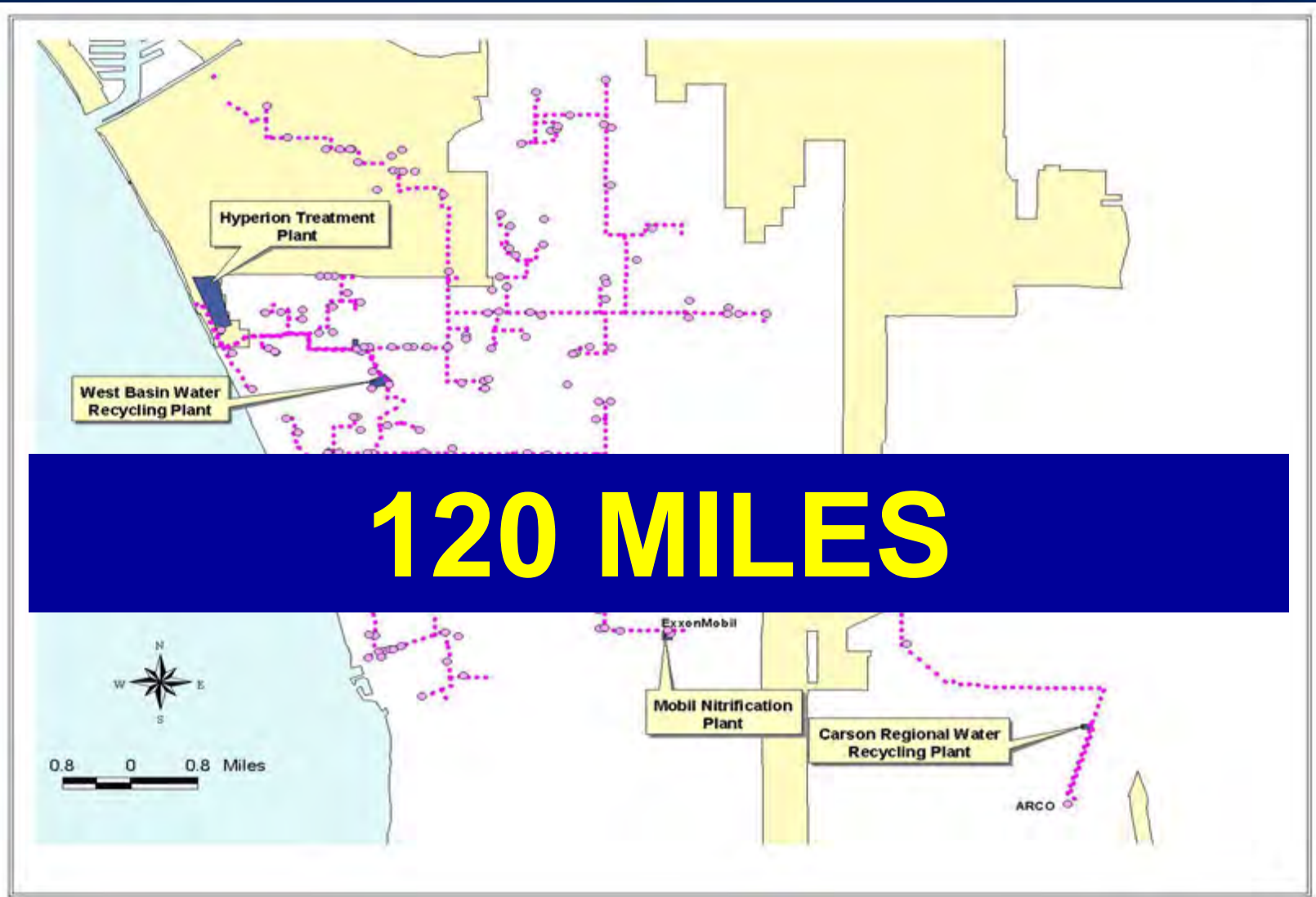














# 1. Tertiary (Irrigation) Water



**Filtered/Chlorinated  
Secondary Effluent**

## 2. Nitrified (Cooling Tower) Water



**Biological Removal of Ammonia In  
the Irrigation Water**

# 3. Low-Pressure Boiler Feed (Single Pass RO)



**Removes 97% of Minerals**

4.

# Indirect Potable Reuse

## Ozone/ Micro Filtration/Reverse Osmosis/UV Peroxide



**Removes 98% organics, 97% minerals and oxidizes remaining organics**



# 5. High-Pressure Boiler Feed (Double Pass RO)



**Removes 99.7% of Minerals**



# Designer Waters



3



Indirect Potable Reuse: Barrier

**Saved 165 Billion Gallons of Water**

2



Nitrified Water

Reverse Osmosis: Single Pass

5



Reverse Osmosis: Double Pass

# Designer Water No. 6



**Tertiary Membrane Bioreactor**



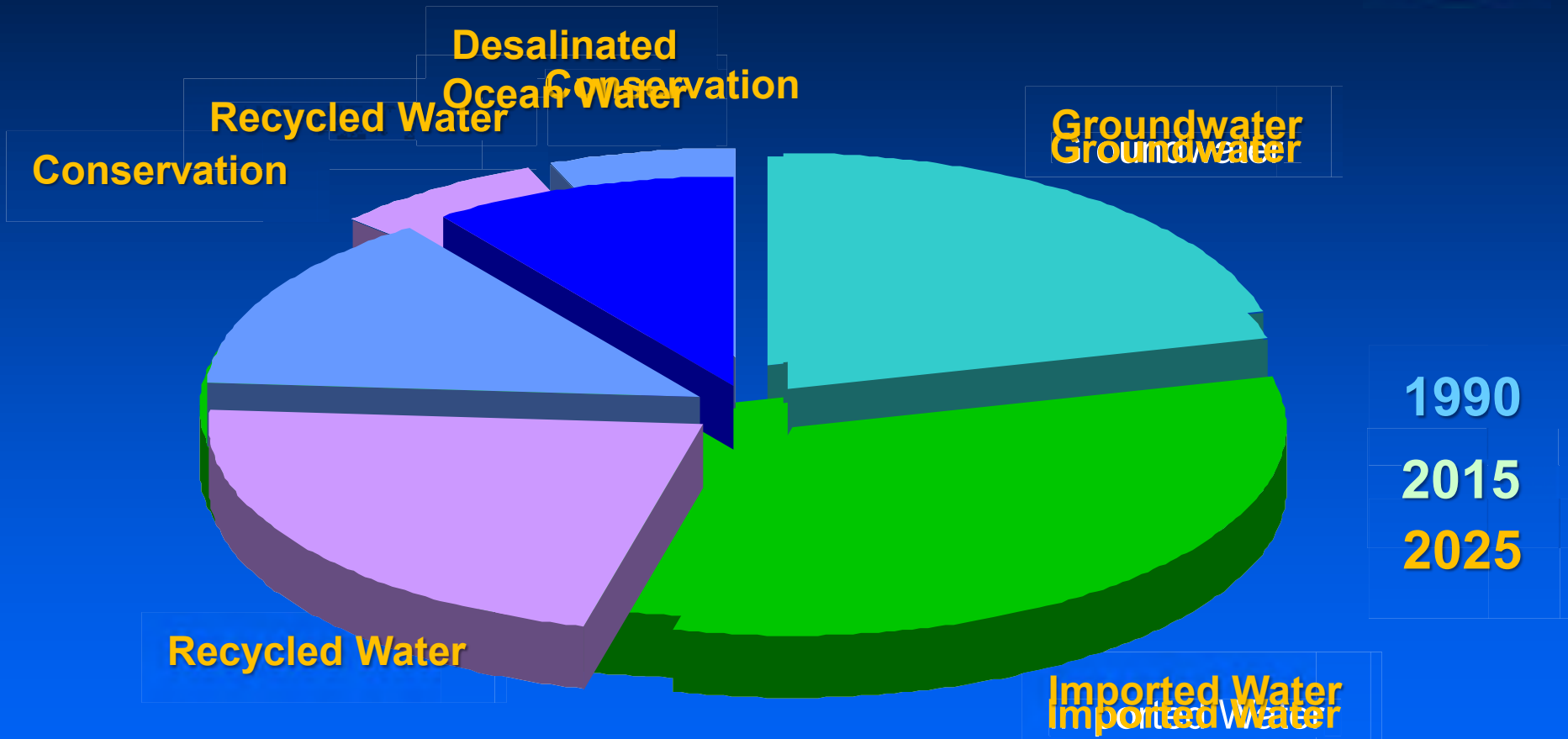


# “What Does the Public Think?”

## Favor

1. Voluntary conservation	91%	←
2. Recycled water	81%	←
3. Ocean-water desalination	75%	←
4. Build new dams	63%	
5. Increase imported water	56%	
6. Mandatory conservation	48%	
7. Increase the price of water	32%	

# West Basin Water Supply Portfolio





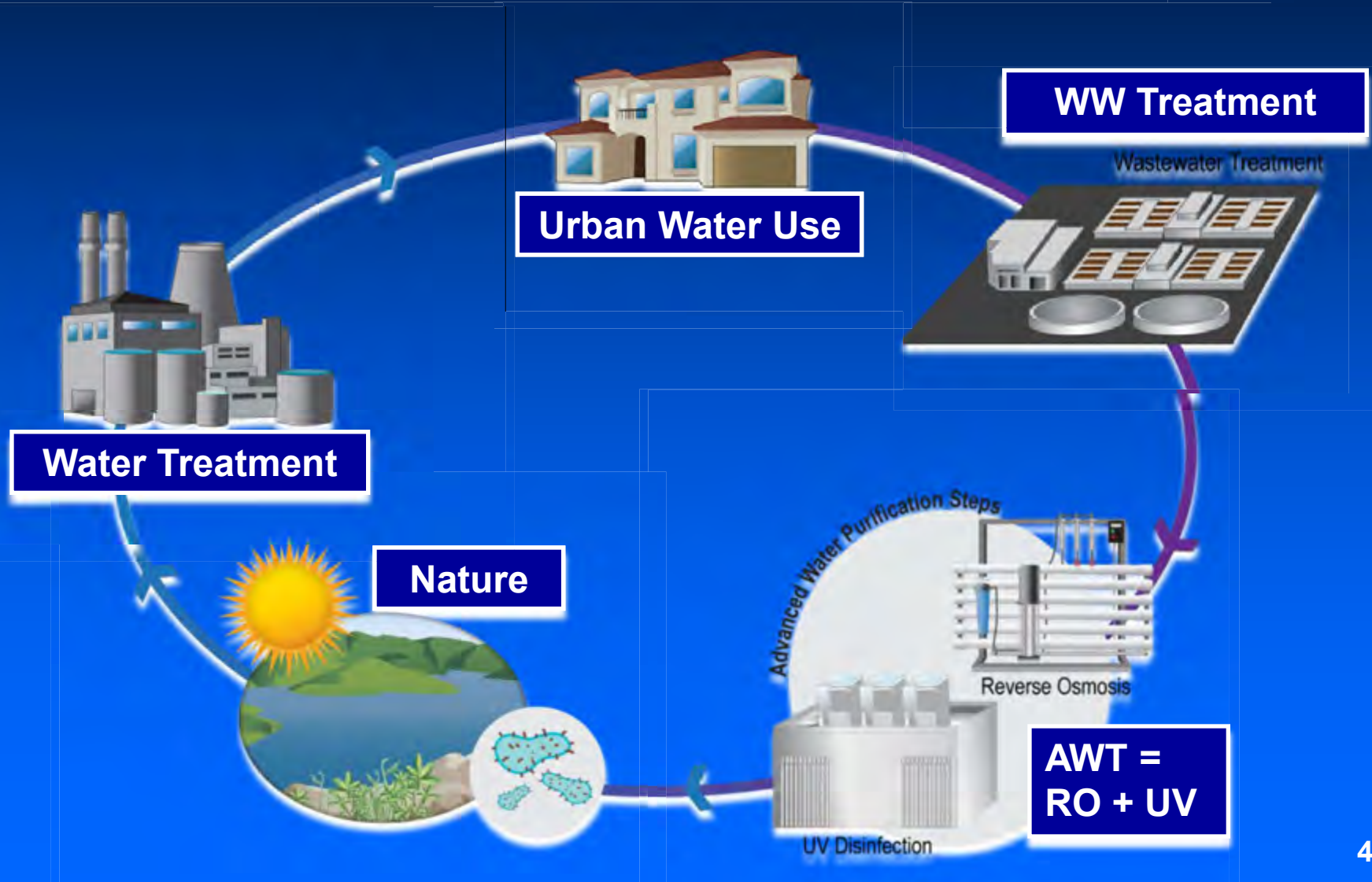
# **What are the New Drought Proof Drinking Water Supplies that Could be Added to our Region?**



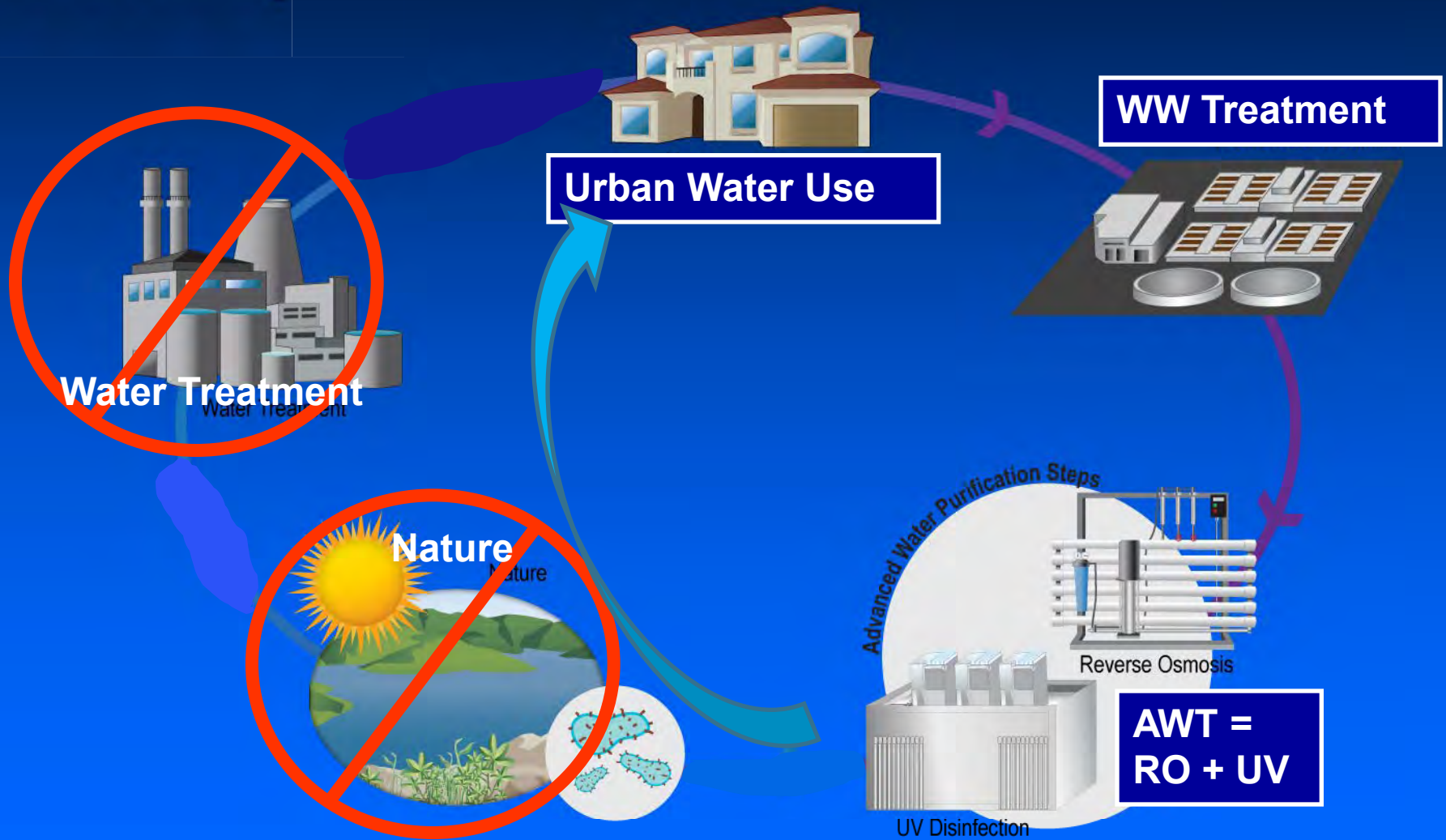
# Answer:

1. Direct Potable Reuse
2. Ocean Desalination

# Indirect Potable Reuse Concept



# Direct Potable Reuse Concept



**Don't you want spaceship technology  
in your local community?**





# What is Ocean Desal?





# Where Can Desalination Work?



**87%** of Californians live along the coast, prompting communities and industry to explore desalination options



SAEED ALMADANI 2008

# Water Is Water?



1. The same amount water exists as it did 4.5 billion years ago.
2. Every molecule has been used, cleaned and reused.
3. And every molecule has mingled with bad things and today we have the technology to clean and separate water molecules.
4. And in the process we can create water that can do anything





# The Race is on: Direct Potable Reuse or Ocean Desalination?



West Basin Municipal Racetrack Presents The Race of the Century...

# Ocean Desal vs Direct Potable Reuse!!!

Serving 17 Coastal L.A. Cities & One Million Spectators





# Welcome to the Famous West Basin Municipal Race Track!





# What has WBMWD's Race Track Accomplished in Water Sustainability?





# Public Acceptance

DPR

VS

Ocean Desal







START

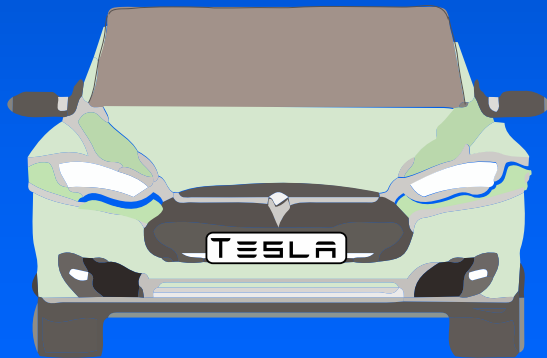


# Environmental Community

DPR

VS

Ocean Desal





FINISH  
START



# Drought Proof

DPR

VS

Ocean Desal





FINISH  
START



# Cost

DPR

VS

Ocean Desal





FINISH  
START

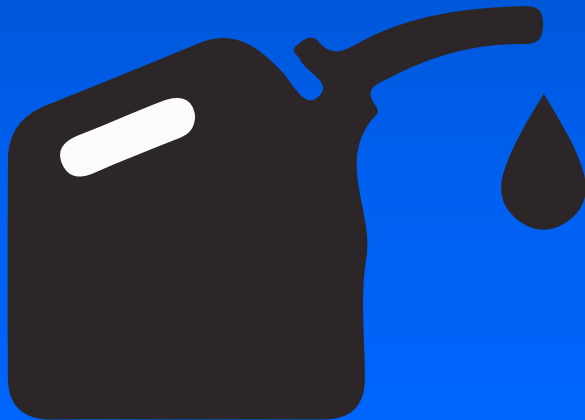


# Energy Usage

DPR

VS

Ocean Desal







FINISH  
START

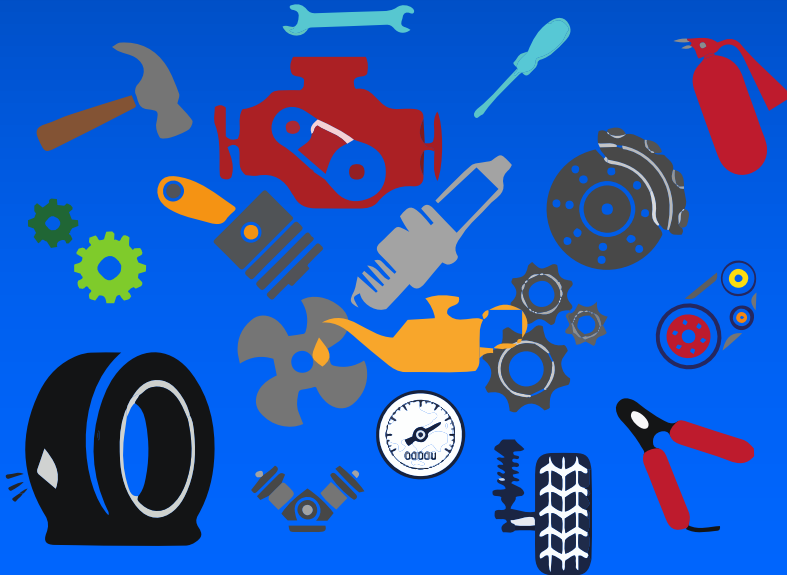


# Treatment Technology

DPR

vs

Ocean Desal



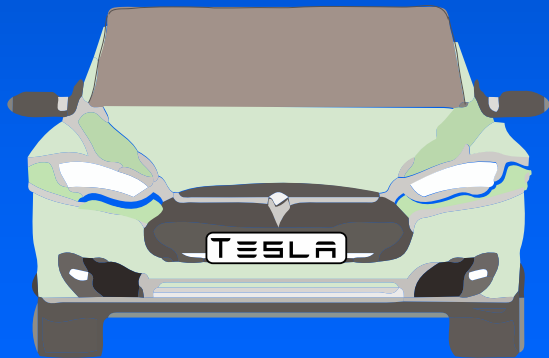


# Environmental Impact

DPR

VS

Ocean Desal





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START

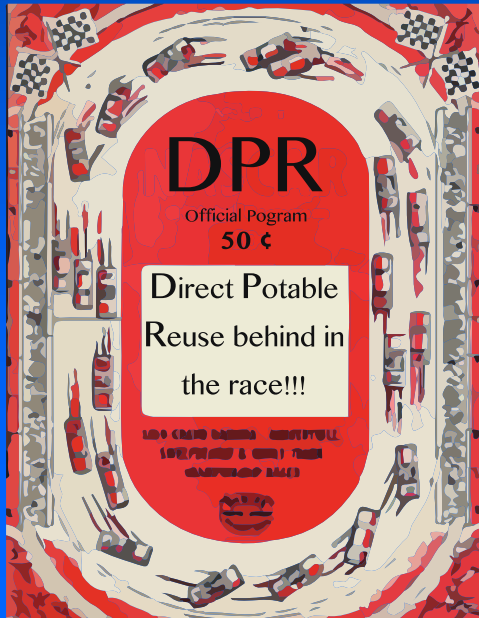


# Permitting

DPR

VS

Ocean Desal





FINISH  
START



# Ocean Desal Wins the Race!!!

-DPR finishes second!

Ocean Desal



DPR

2<sup>nd</sup>

1<sup>st</sup>



# 5 Lessons Learned



1. Cannot Use Past to Predict Future
2. Diversify Portfolio for Drought Resiliency
3. New Source Available in Every Urban Community is Water Recycling
4. Ocean Desal is Ahead of Direct Potable Reuse
5. It's not about Water Availability, it's about Economics





**“Genius is 1% inspiration and 99% perspiration” — Thomas Edison**

**Thank You!**

Rich Nagel P.E.  
General Manager

West Basin Municipal Water District  
(310) 660-6210

[richardn@westbasin.org](mailto:richardn@westbasin.org)