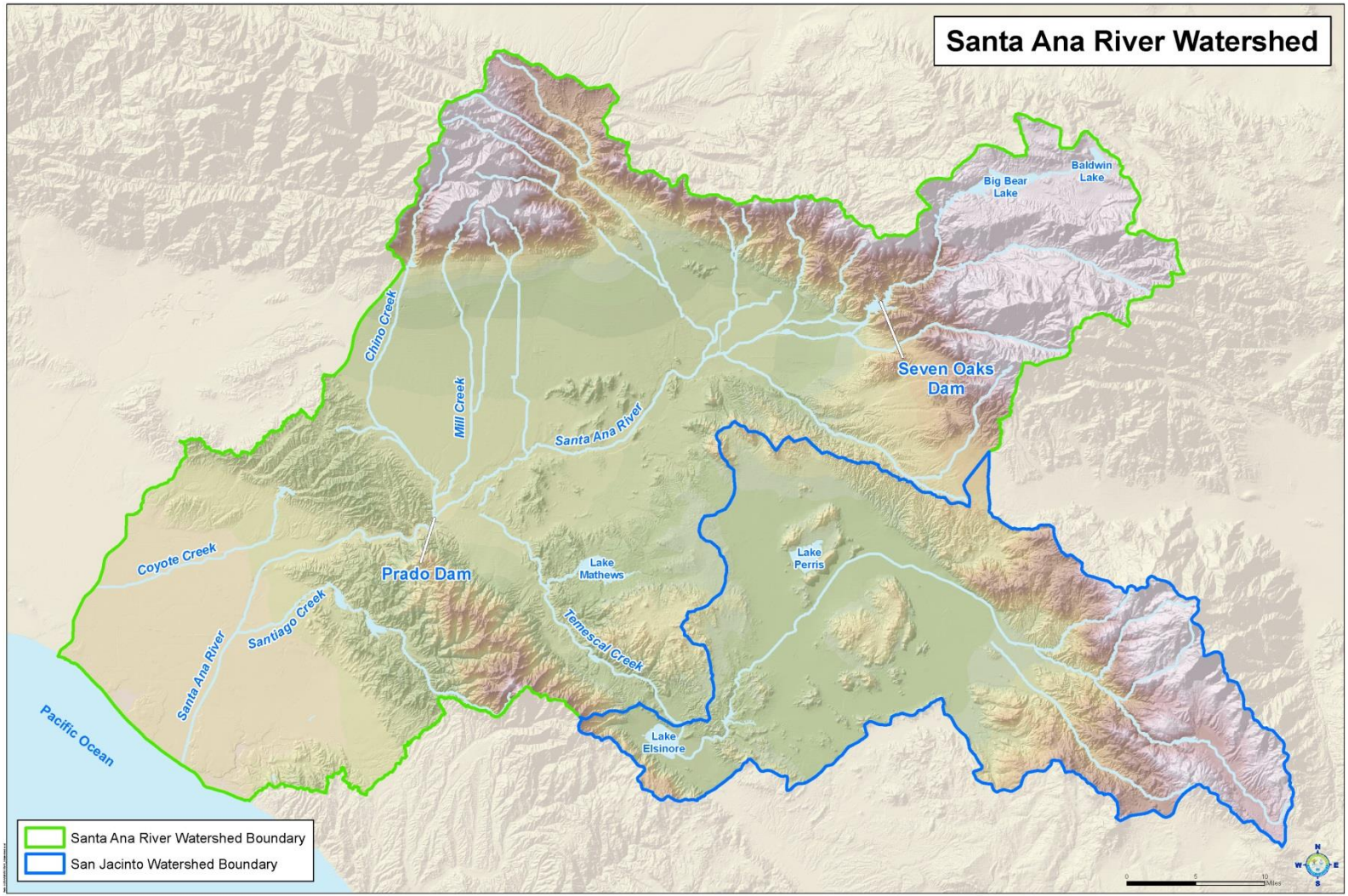
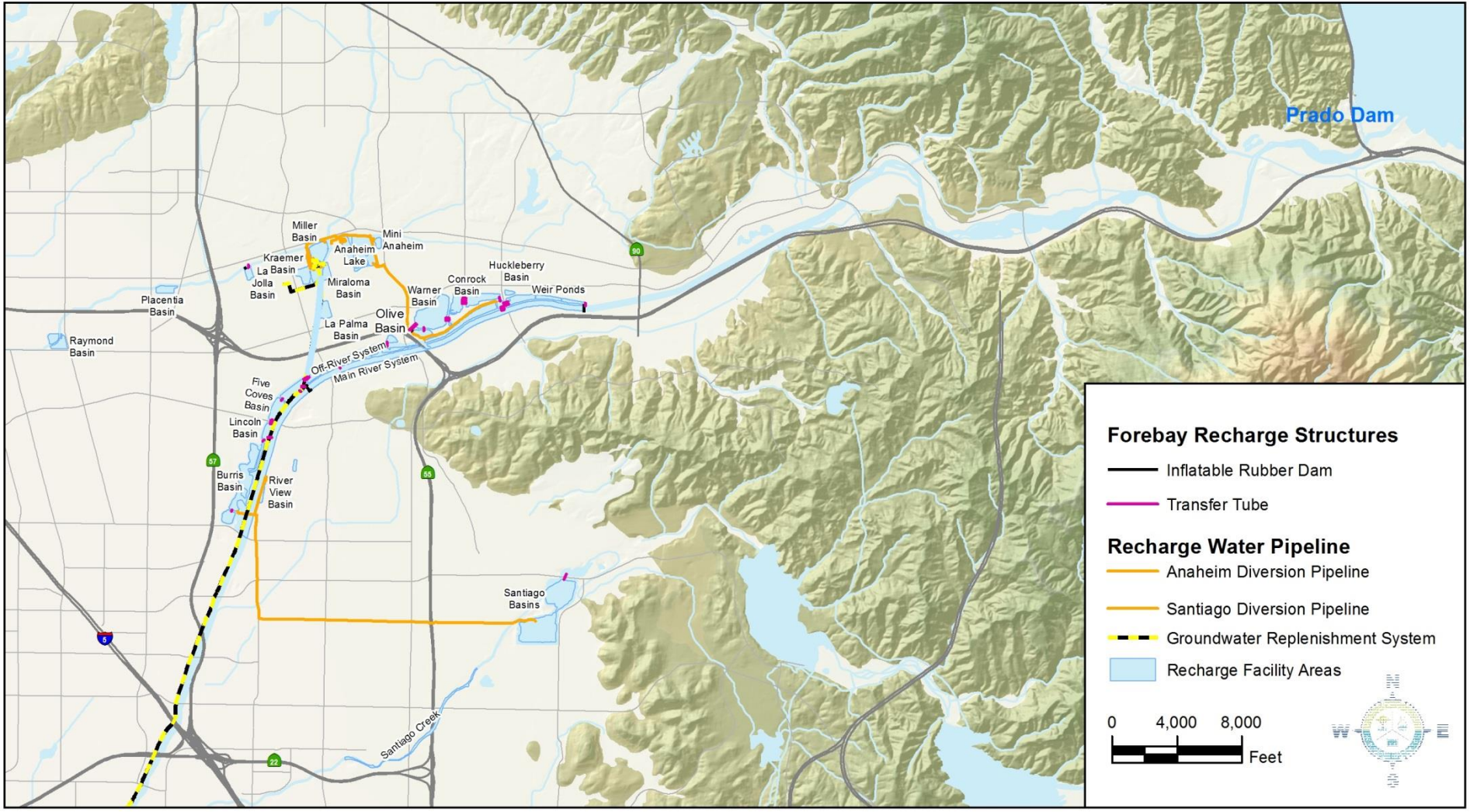
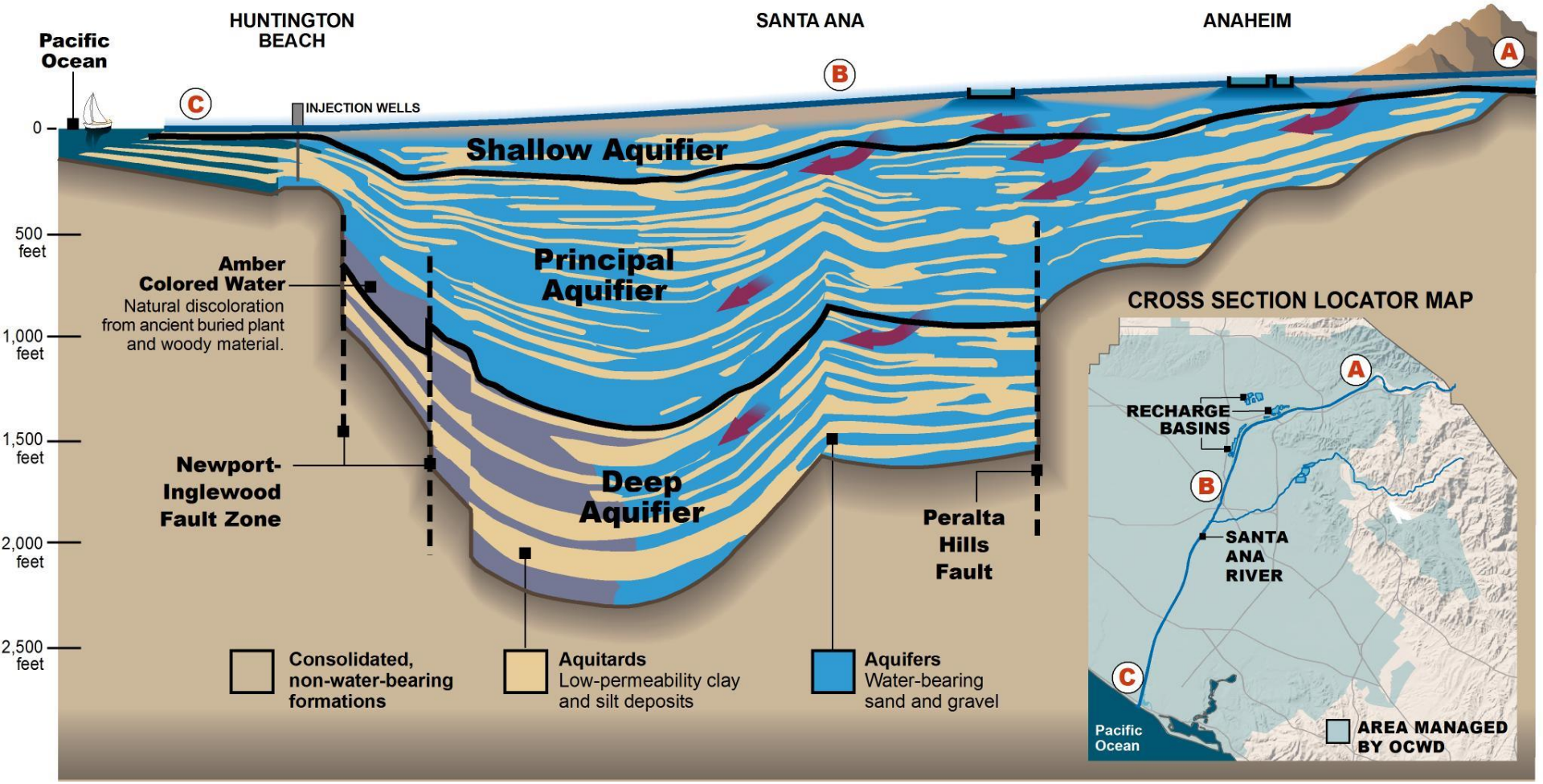
Water Conservation at Prado Dam

Seasonal Forecasting Workshop
May 17, 2017

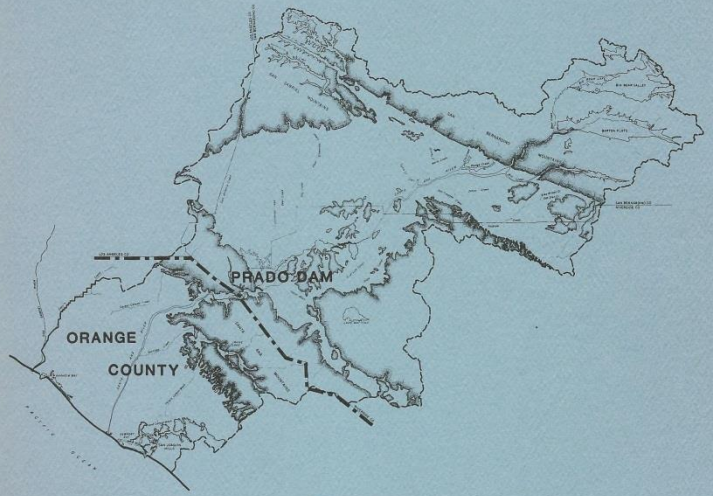
Photo courtesy of Chris Jones, USACE (1-17-2017)


Santa Ana River Watershed
Baldwin Lake
Big Bear Lake
Chino Creek
Mill Creek
Seven Oaks Dam
Santa Ana River
Coyote Creek
Prado Dam
Lake Mathews
Lake Perris
Santiago Creek
Santa Ana River
Temescal Creek
Pacific Ocean
Lake Elsinore
Santa Ana River Watershed Boundary
San Jacinto Watershed Boundary
N
W
E
S
0
5
10
Miles


Prado Dam
Miller Basin
Mini Anaheim
Anaheim Lake
Kraemer Basin
La Jolla Basin
Miraloma Basin
Placentia Basin
Raymond Basin
Olive Basin
La Palma Basin
Warner Basin
Conrock Basin
Huckleberry Basin
Weir Ponds
Off-River System
Main River System
Five Coves Basin
Lincoln Basin
Burris Basin
River View Basin
Santiago Basins
Santiago Creek
Forebay Recharge Structures
Inflatable Rubber Dam
Transfer Tube
Recharge Water Pipeline
Anaheim Diversion Pipeline
Santiago Diversion Pipeline
Groundwater Replenishment System
Recharge Facility Areas
0
4,000
8,000
Feet
W
E


Pacific Ocean
HUNTINGTON BEACH
SANTA ANA
ANAHEIM
A
B
C
INJECTION WELLS
0
500 feet
1,000 feet
1,500 feet
2,000 feet
2,500 feet
Shallow Aquifer
Principal Aquifer
Deep Aquifer
Amber Colored Water
Natural discoloration from ancient buried plant and woody material.
Newport-Inglewood Fault Zone
Peralta Hills Fault
Consolidated, non-water-bearing formations
Aquitards
Low-permeability clay and silt deposits
Aquifers
Water-bearing sand and gravel
CROSS SECTION LOCATOR MAP
RECHARGE BASINS
SANTA ANA RIVER
Pacific Ocean
AREA MANAGED BY OCWD

PRADO DAM
WATER CONSERVATION STUDY



Prepared For

Orange County Water District

Camp Dresser & McKee, Inc.

October 1985

US Army Corps
of Engineers
Los Angeles District

RECONNAISSANCE REPORT

FOR THE OPERATION OF PRADO DAM FOR WATER CONSERVATION

**DRAFT REPORT AND
ENVIRONMENTAL IMPACT STATEMENT
OCTOBER 1990**

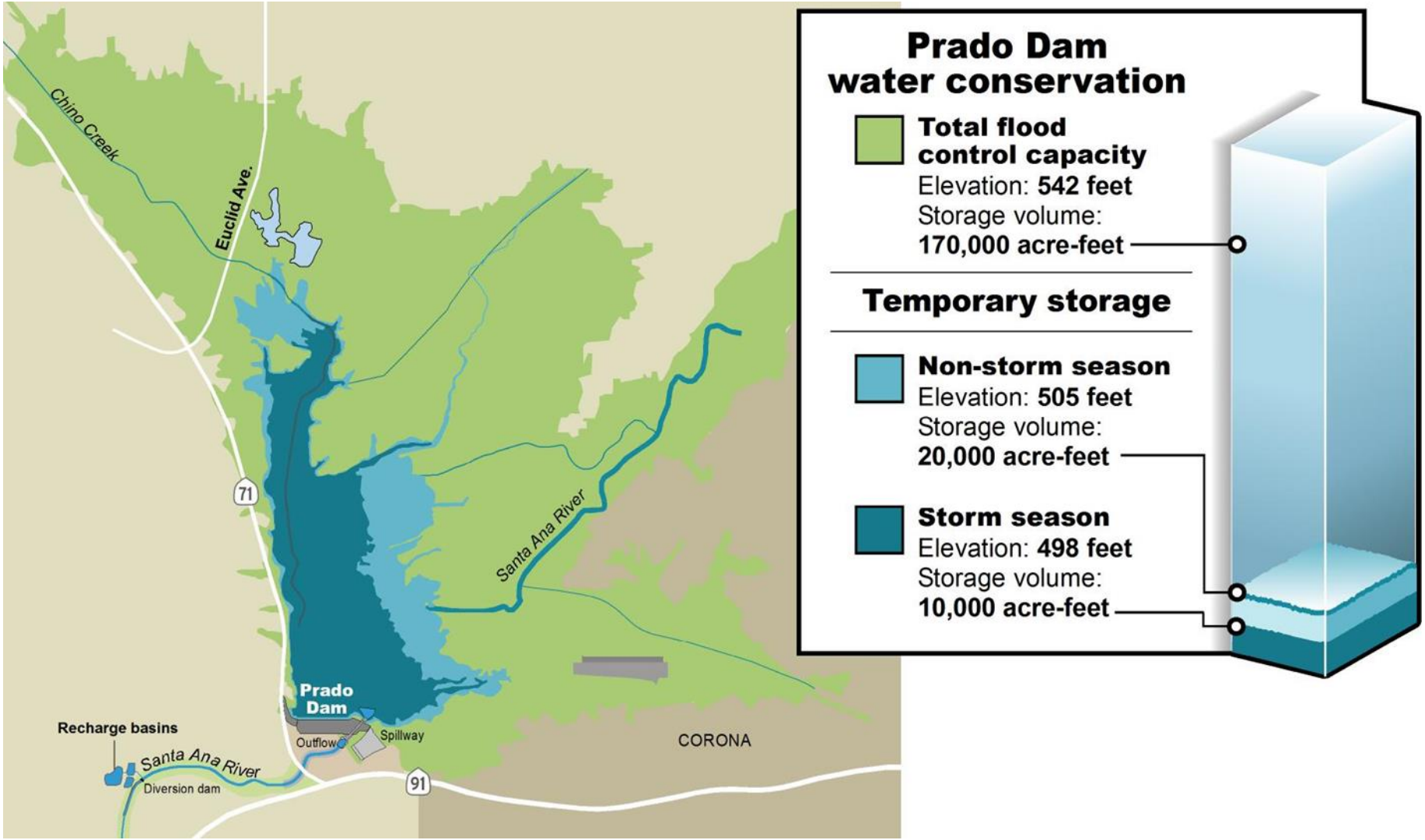
Santa Ana River Basin, CA

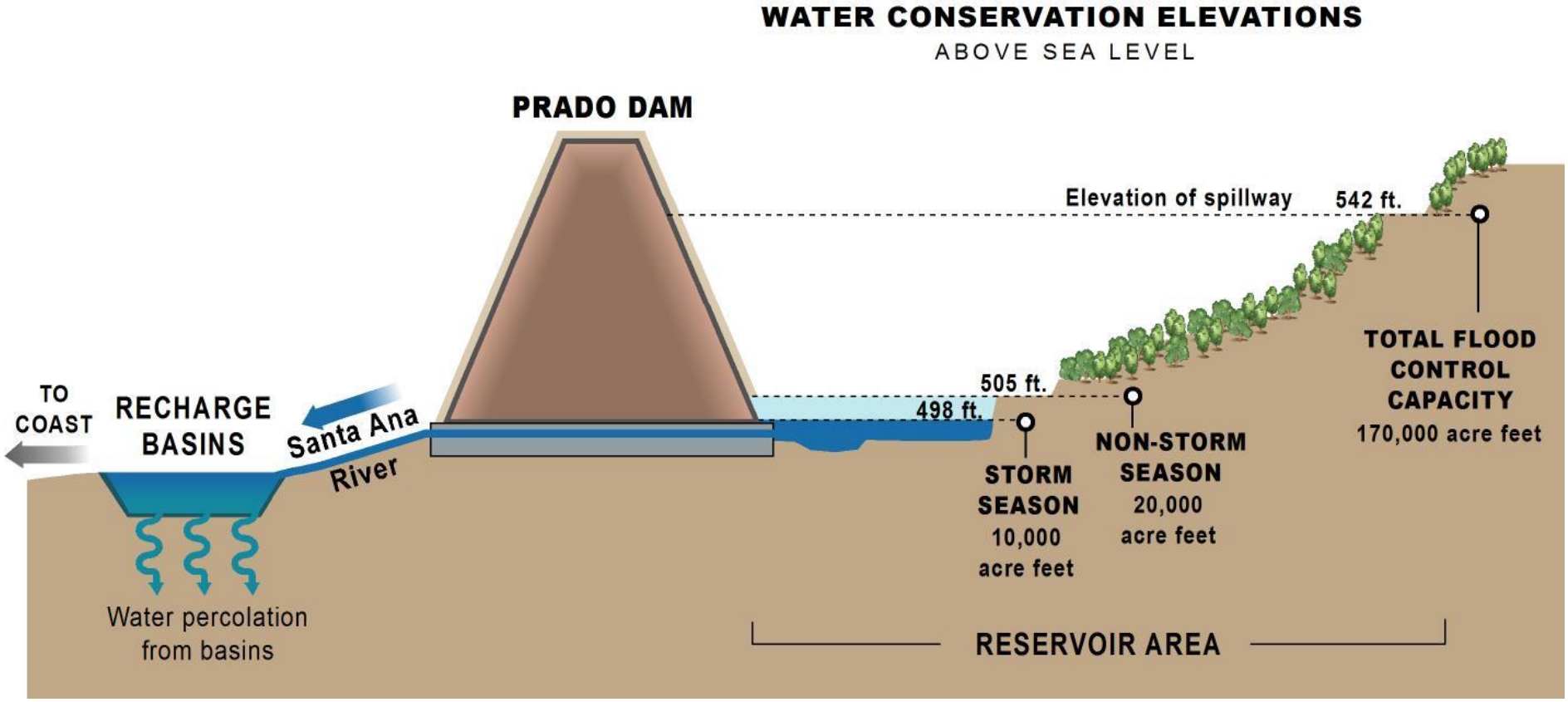
Summary of Prado Water Conservation through Time

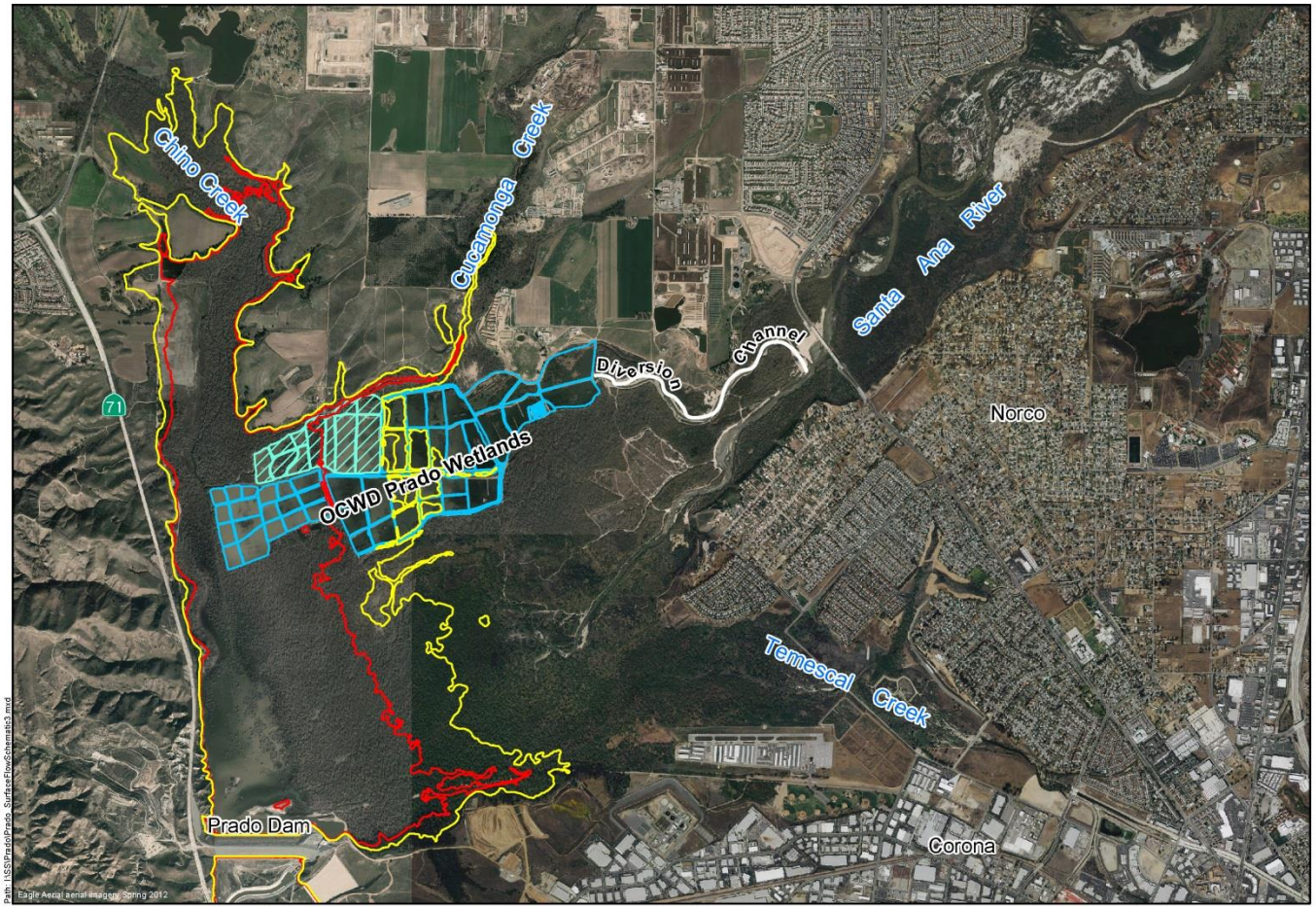
Year	Flood Season	Non-Flood Season
1969 revision to reservoir regulation schedule	490 ft	
1990 update to water control manual	494 ft	
1993 MOA	494 ft	505 ft
2006 MOA	498 ft	505 ft

Summary of Current Water Conservation Program

- Stormwater capture to elevation 498 feet October through February
- To elevation 505 feet March through August
- Release of captured stormwater from Prado Dam at rate that can be recharged downstream by OCWD (350-500 cfs)
- Does not impact flood risk management function of dam


Prado Dam
water conservation
Total flood
control capacity
Elevation: 542 feet
Storage volume:
170,000 acre-feet
Temporary storage
Non-storm season
Elevation: 505 feet
Storage volume:
20,000 acre-feet
Storm season
Elevation: 498 feet
Storage volume:
10,000 acre-feet
Chino Creek
Euclid Ave.
71
Santa Ana River
Prado
Dam
Outflow
Spillway
Recharge basins
Santa Ana River
Diversion dam
91
CORONA


WATER CONSERVATION ELEVATIONS
ABOVE SEA LEVEL
PRADO DAM
Elevation of spillway
542 ft.
TOTAL FLOOD CONTROL CAPACITY
170,000 acre feet
505 ft.
498 ft.
NON-STORM SEASON
20,000 acre feet
STORM SEASON
10,000 acre feet
TO COAST
RECHARGE BASINS
Santa Ana River
Water percolation from basins
RESERVOIR AREA


Chino Creek
Cucamonga Creek
Santa Ana River
Channel
Diversion
71
OCWD Prado Wetlands
Norco
Temescal Creek
Prado Dam
Corona
Path: I:\SS\Prado\Prado_SurfaceFlowSchematic3.mxd
Eagle Aerial aerial imagery, Spring 2012
N
W
E
S
0 1,000 2,000
Feet
2008 Prado Water Conservation Elevations (feet, MSL) NGVD29
498
505
OCWD Prado Wetlands
Splatter S Ponds
Prado Basin

Efforts to Increase Stormwater Capture at Prado

- Seeking stormwater capture to elevation 505 feet in flood season
- Permanent change to 505 feet year-round being evaluated in Prado Basin Feasibility Study being conducted by Corps with OCWD as local sponsor
- Temporary deviation to 505 feet approved this flood season
- Seeking to implement temporary deviation for 5-year period to serve as a bridge until Feasibility Study is completed & DSAC rating is raised after SAR Mainstem is completed

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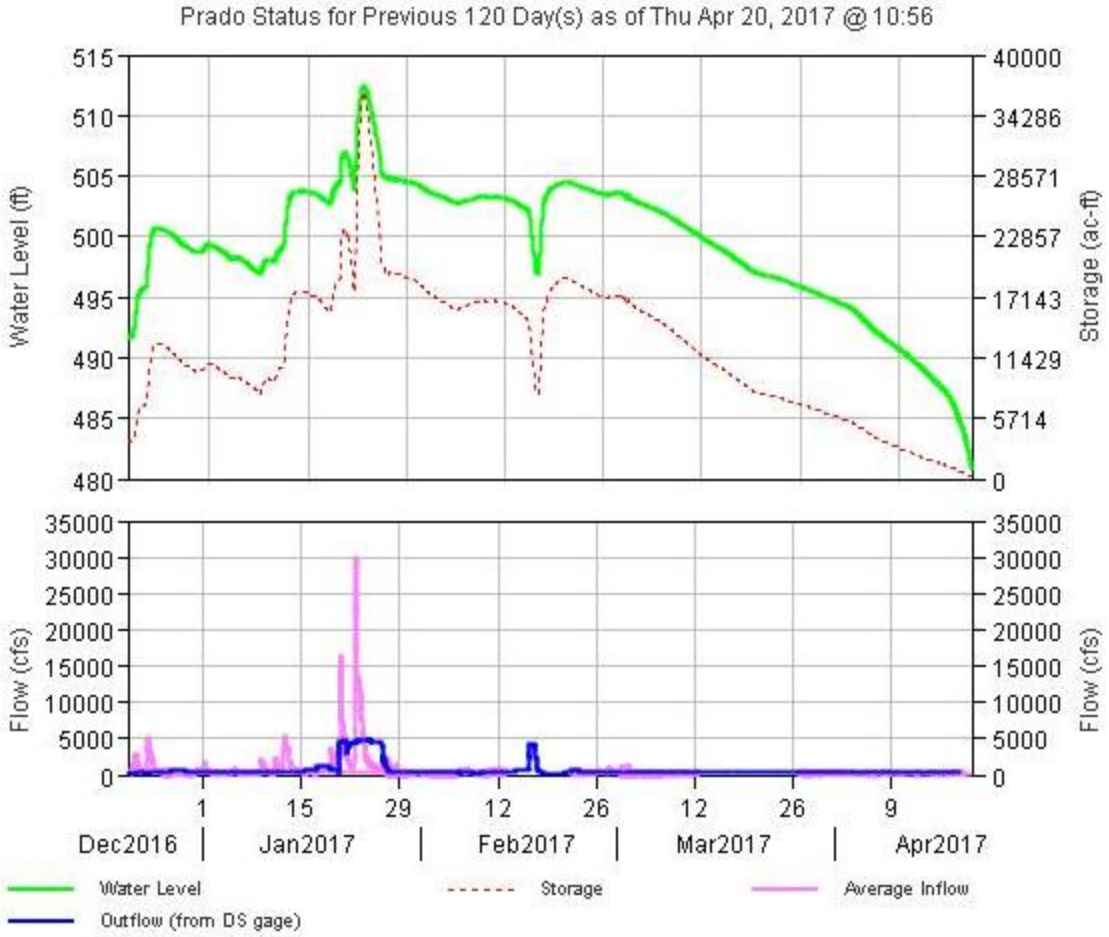

Source: USACE, 2017

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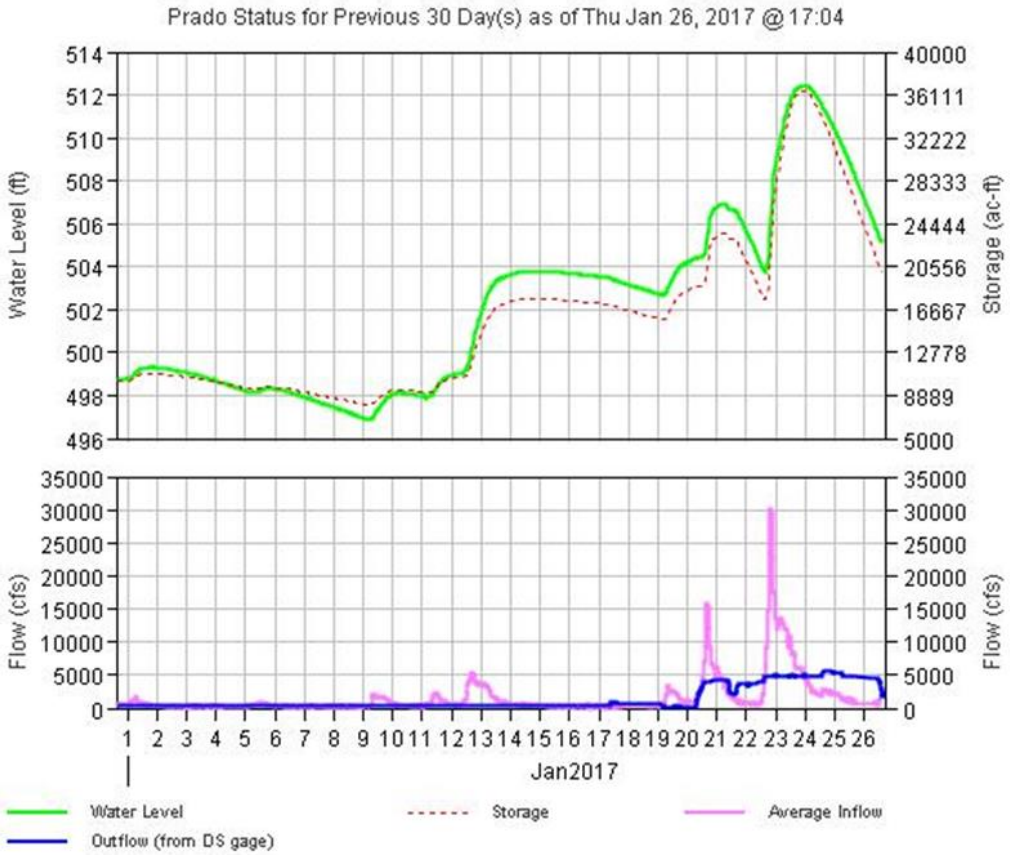

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US Army Corps of Engineers
Los Angeles District
Reservoir Regulation Section

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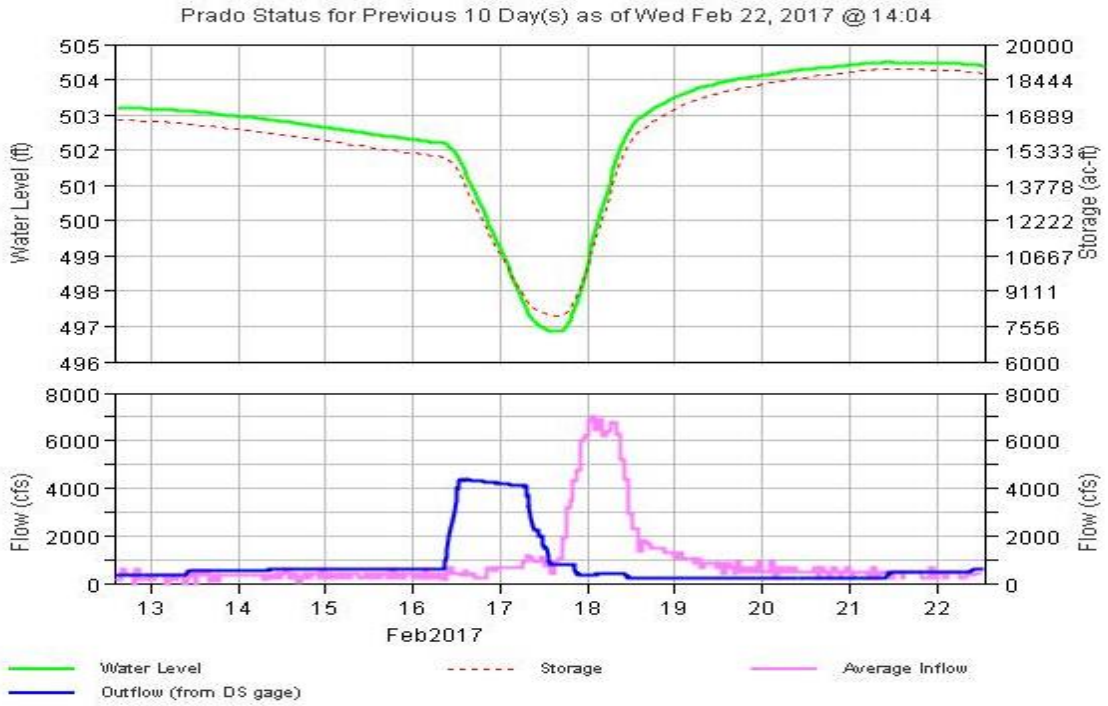

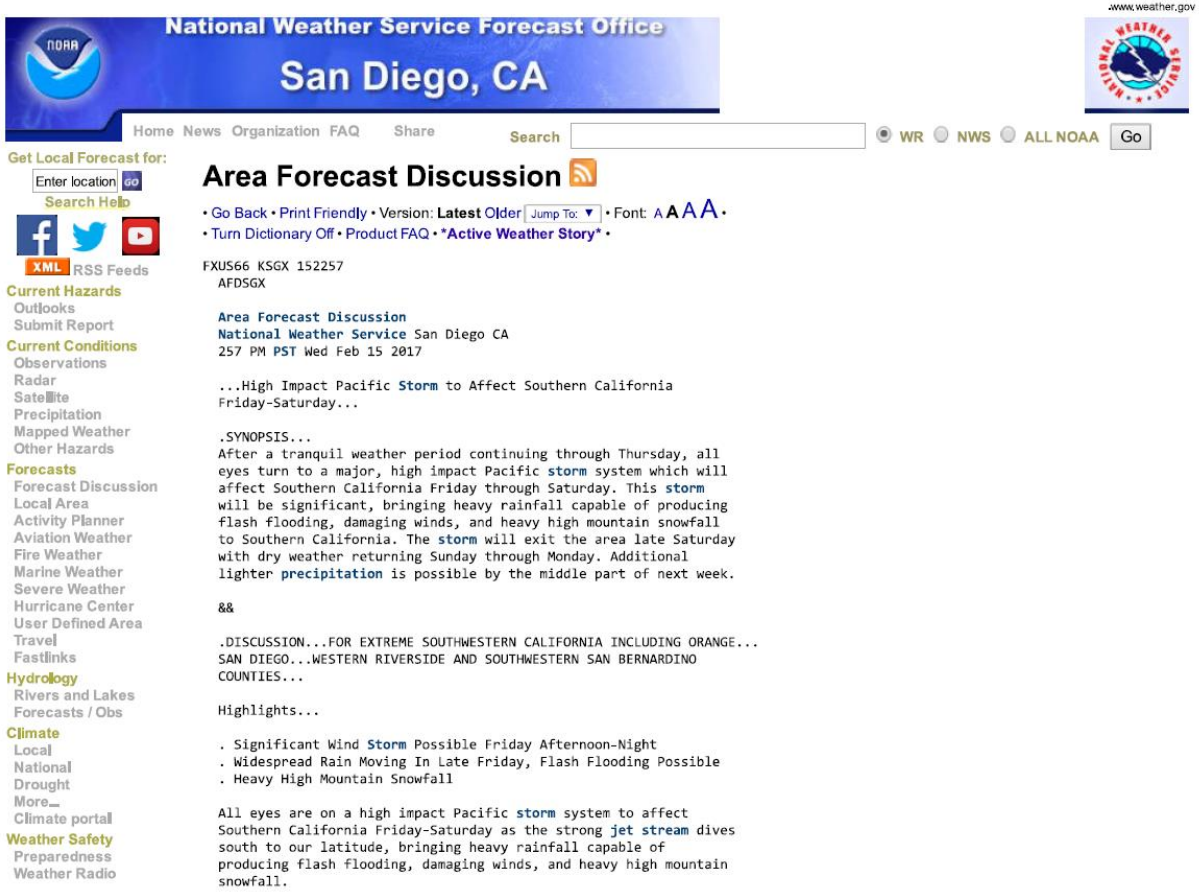

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San Diego, CA

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Severe Weather
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Preparedness
Weather Radio

Area Forecast Discussion

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AFDSGX

Area Forecast Discussion
National Weather Service San Diego CA
257 PM PST Wed Feb 15 2017

...High Impact Pacific Storm to Affect Southern California Friday-Saturday...

.SYNOPSIS...
After a tranquil weather period continuing through Thursday, all eyes turn to a major, high impact Pacific storm system which will affect Southern California Friday through Saturday. This storm will be significant, bringing heavy rainfall capable of producing flash flooding, damaging winds, and heavy high mountain snowfall to Southern California. The storm will exit the area late Saturday with dry weather returning Sunday through Monday. Additional lighter precipitation is possible by the middle part of next week.

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.DISCUSSION...FOR EXTREME SOUTHWESTERN CALIFORNIA INCLUDING ORANGE... SAN DIEGO...WESTERN RIVERSIDE AND SOUTHWESTERN SAN BERNARDINO COUNTIES...

Highlights...

. Significant Wind Storm Possible Friday Afternoon-Night
. Widespread Rain Moving In Late Friday, Flash Flooding Possible
. Heavy High Mountain Snowfall

All eyes are on a high impact Pacific storm system to affect Southern California Friday-Saturday as the strong jet stream dives south to our latitude, bringing heavy rainfall capable of producing flash flooding, damaging winds, and heavy high mountain snowfall.

NWS San Diego, 2-15-2017

Area Forecast Discussion
National Weather Service San Diego CA
257 PM **PST** Wed Feb 15 2017

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NWS San Diego, 2-15-2017

A **moisture** band ahead of the low (Atmospheric River/AR) will funnel into Southern California by late Friday. This along with anonymously strong low level wind fields will result in excellent transport of **moisture** into the area (Integrated Water Vapor Transport/IVT fields showing a 1 in 5+ year return interval). This leads to not only a heavy rainfall concern, but also a significant concern for damaging winds.

The latest model trends have shown a disparity in **storm**/rainfall timing with the greatest model difference being the 12Z **NAM** and its related NAM-based **WRF** run, showing the **trough** becoming negatively tilted and as such slowing down the **storm** and delaying the onset of precip across Southern California. However, **GFS** and **ECMWF** continue to show at least reasonable run-to-run consistency, so the forecast continues to be weighted in this direction. **GFS** has slowed by a few hours, so the **ECMWF** is fastest.

Current assessment has the most likely rain timing moving into Orange County and SW SBD/Riverside during the afternoon on Friday and taking its time to reach San Diego, but is expected to do so by Friday evening. If the **storm** speeds up, it could begin earlier and likewise a slower movement would delay precip onset.

Ahead of the storm, models are in agreement in showing a strengthening **low level jet** with H85 winds increasing to around 50 kt. **NAM** showing 60 kt low level winds. This wind energy will move across the area as the **storm** moves southeast. Greatest high wind impact looks to be Friday afternoon through Friday evening...but again this will depend on the **storm** timing. However, confidence is higher that damaging winds will occur. As this **low level jet** moves across the area, Southerly winds will strengthen with sustained winds possibly reaching around 30 mph along the coast. Southerly strong wind gusts of 50-60 mph will be possible area wide, capable of downing trees, creating travel trouble with debris or downed trees on roadways, and dangerous cross winds to high profile vehichles, especially on east-west oriented roadways. This could be a significant wind **storm** for the area. A further southward placement of the low would lessen the wind potential. This is possible, so will be monitoring model trends, but at this time confidence is high enough that a **High Wind Watch** was issued for the entire area (Winter **Storm Watch** for the mountains - with high winds there along with heavy snowfall above 6000 ft.)

Rainfall amounts from the previous forecast remain fairly unchanged. 2-4 inches are forecast for Orange County with around 5 inches for the Santa Ana Mountains. The Inland Empire is forecast to receive 2-3 inches. Coastal mountain slopes of the San Bernardino County mountains will likely see the highest totals with the southerly, moist upslope where >5" inches is possible...especially the San Gabriel coastal slopes where it looks like the **moisture**/AR plume

NWS San Diego, 2-15-2017

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