Solving Seawater Intrusion in the Central and West Coast Basins of Coastal Los Angeles County....for Now

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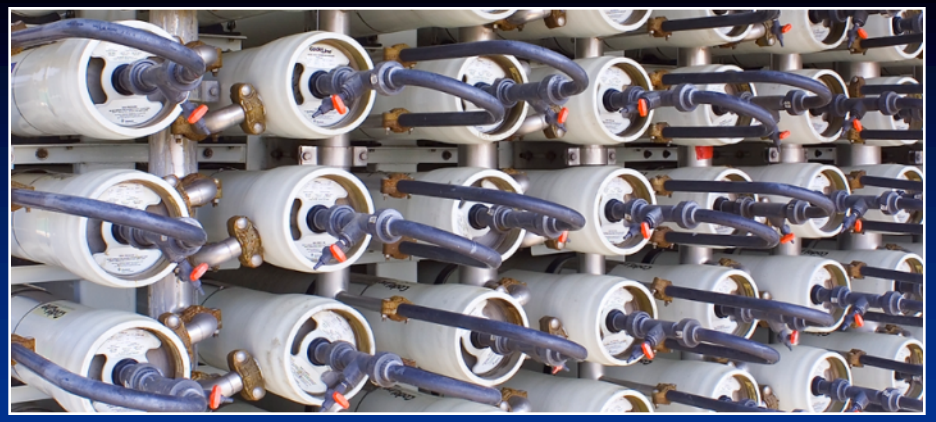
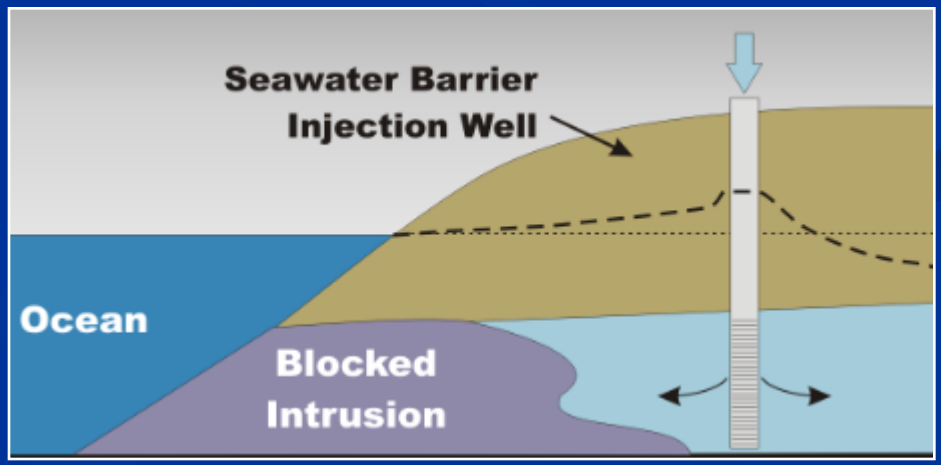
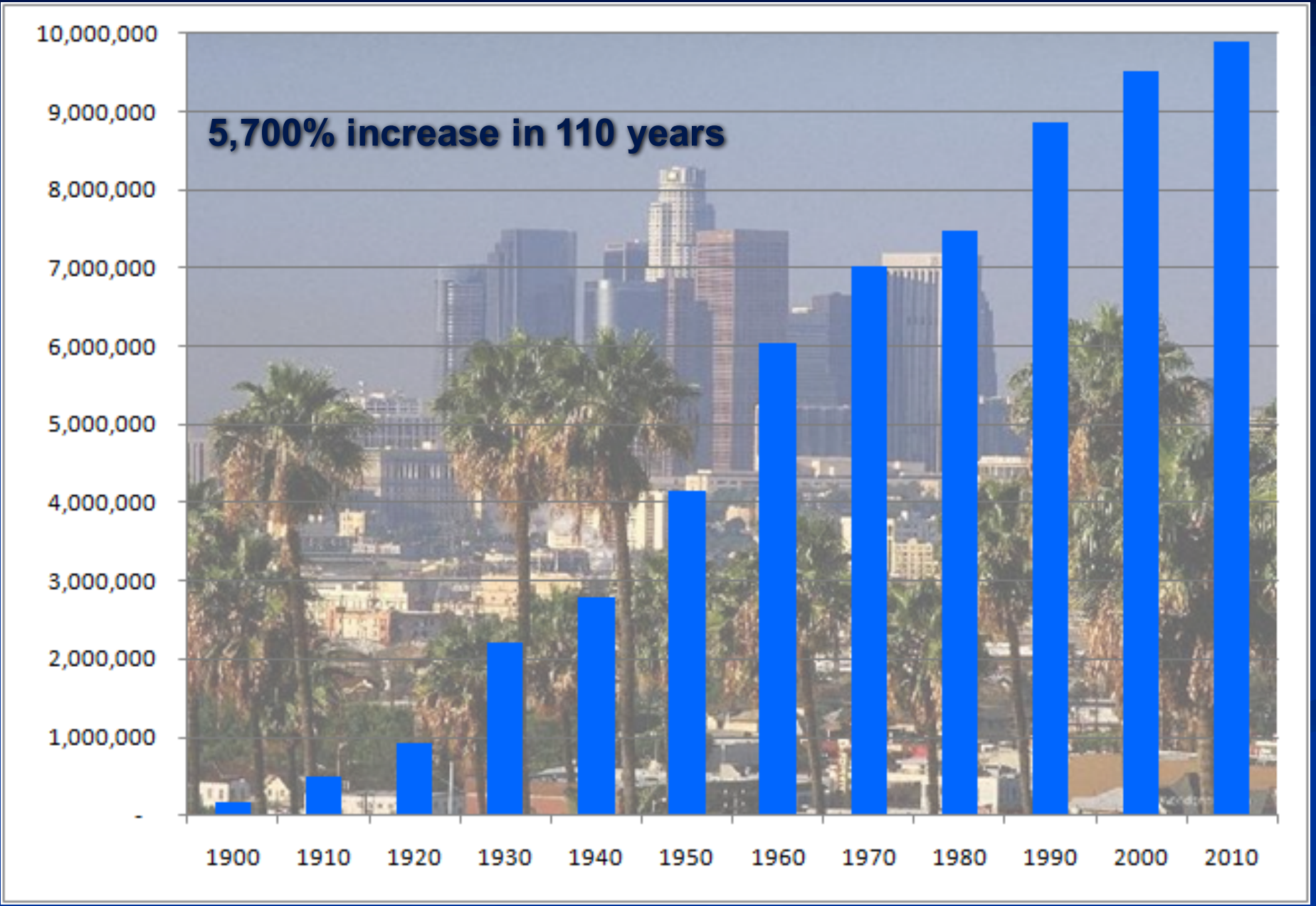
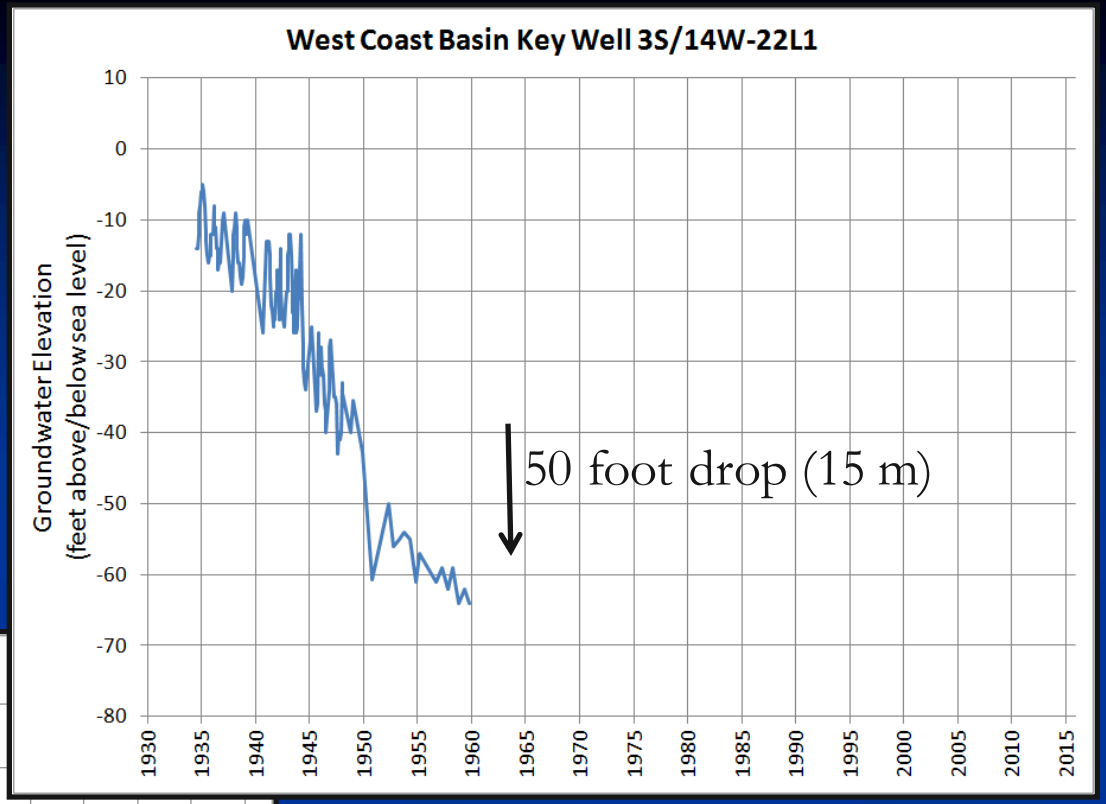


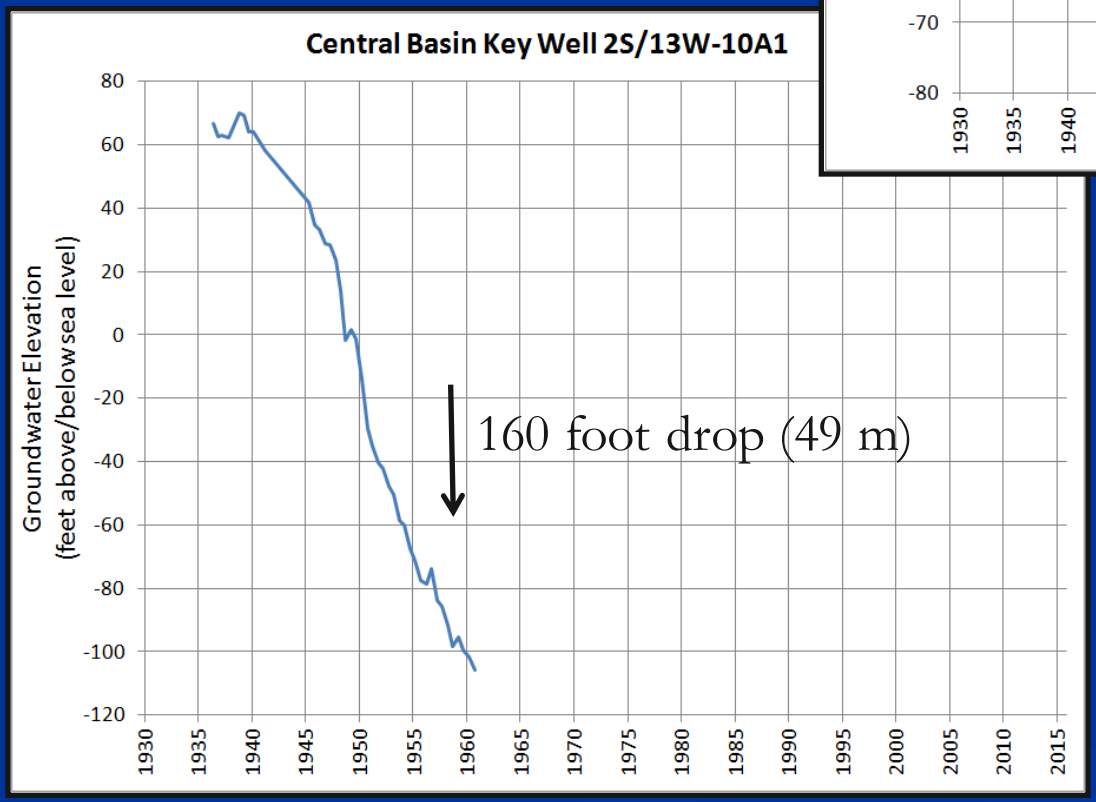


LA County Population Growth



1930s – 1950s Pumping Double Natural Replenishment





Unsustainable. Severe Overdraft. Wells Went Dry. Seawater Intrusion. Great threat to local water supply.

STATE OF CALIFORNIA
DEPARTMENT OF PUBLIC WORKS
DIVISION OF WATER RESOURCES

EARL WARREN, Governor
C. H. PURCELL, Director of Public Works
EDWARD HYATT, State Engineer

BULLETIN No. 53

SOUTH COASTAL BASIN INVESTIGATION

OVERDRAFT ON GROUND WATER BASINS

1947

STATE OF CALIFORNIA
DEPARTMENT OF WATER RESOURCES
DIVISION OF RESOURCES PLANNING

BULLETIN No. 63

SEA WATER INTRUSION IN CALIFORNIA

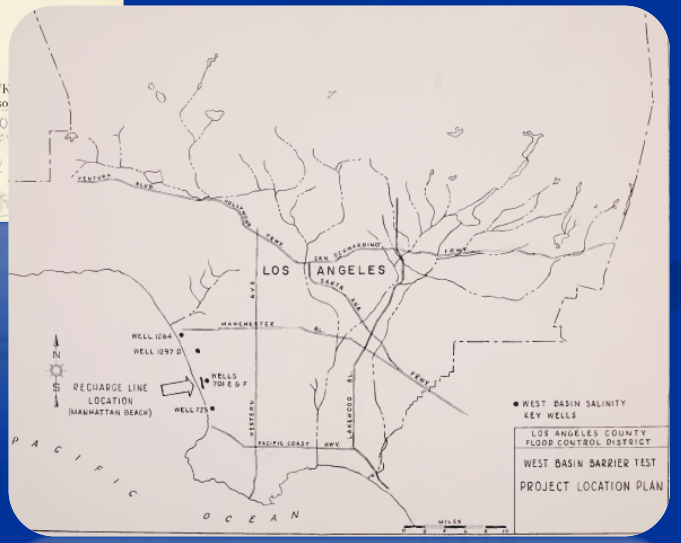
APPENDIX B
REPORT BY
LOS ANGELES COUNTY
FLOOD CONTROL DISTRICT
ON
INVESTIGATIONAL WORK FOR PREVENTION AND CONTROL OF SEA WATER INTRUSION, WEST COAST BASIN EXPERIMENTAL PROJECT, LOS ANGELES COUNTY

As Directed by Chapter 1500, Statutes of 1951

GOODWIN J. KNIGHT
Governor

HARVEY O. BANK
Director of Water Reso

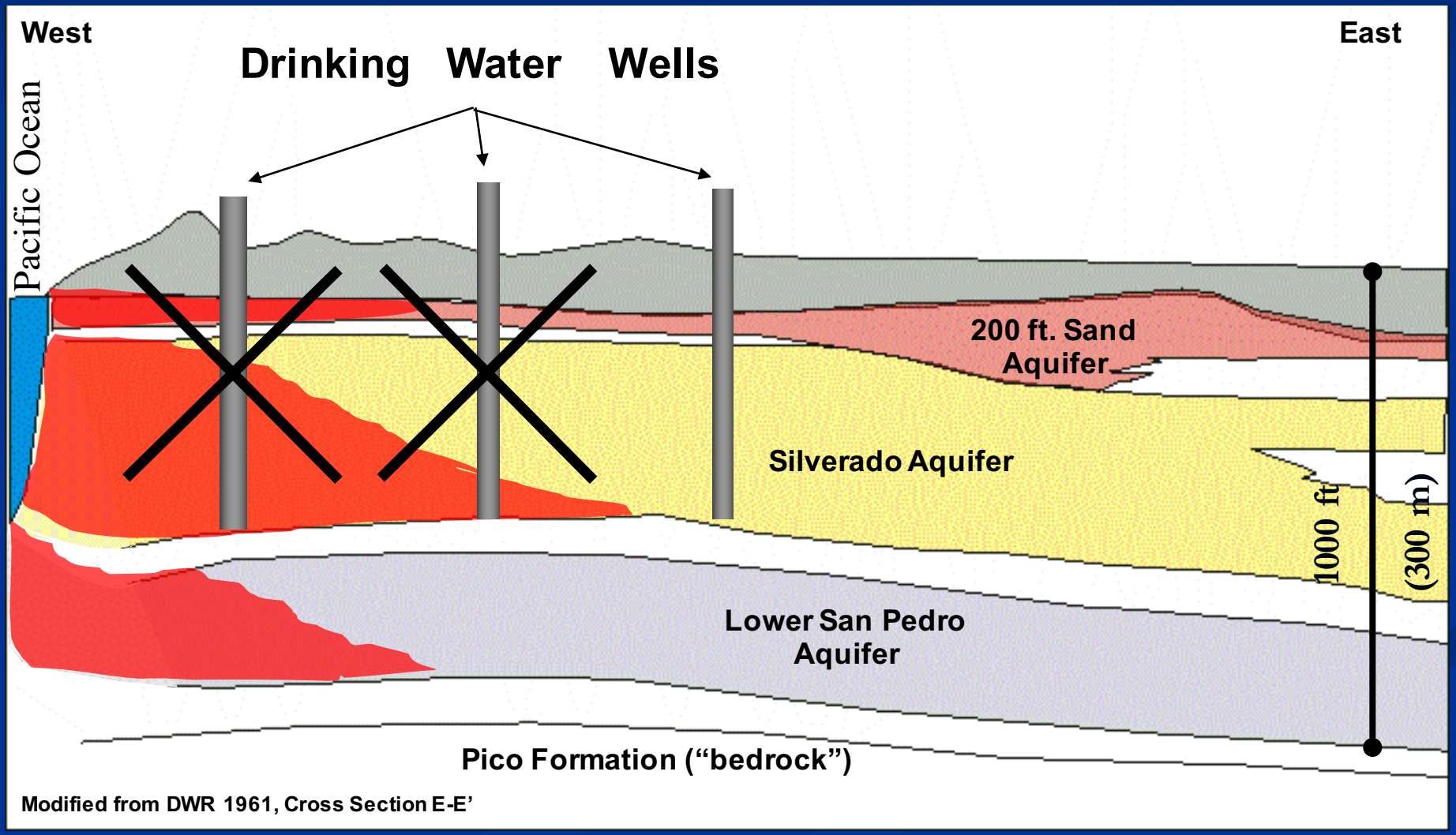
March, 1957

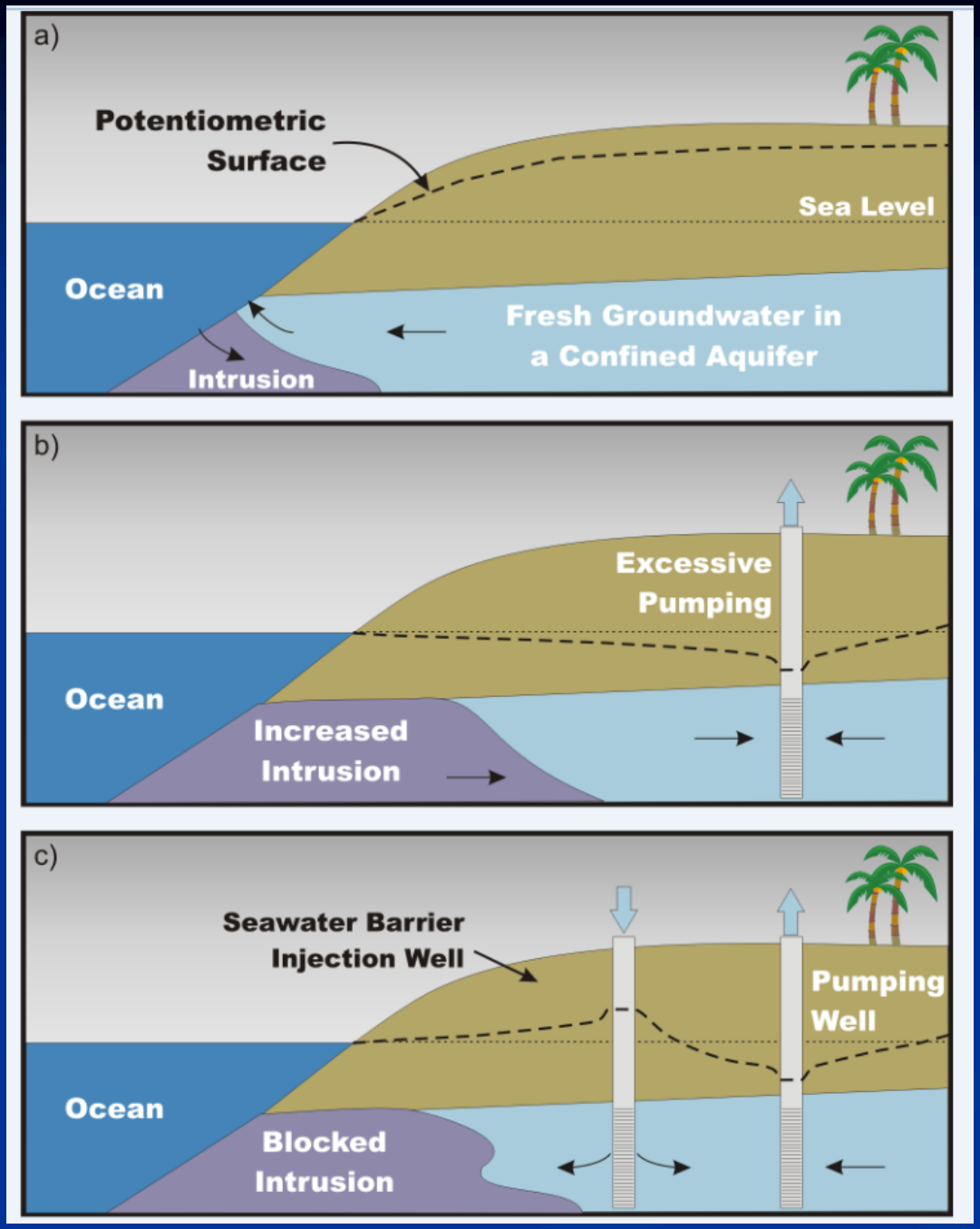


With Population Growth Came Groundwater Pumping Greater than Natural Replenishment… Overdraft and Seawater Intrusion


By 1950s, groundwater was below sea level in half of the basins,
resulting in Sea Water Intrusion Several miles inland along the Coast
PV Hills

Sea Water Intrusion

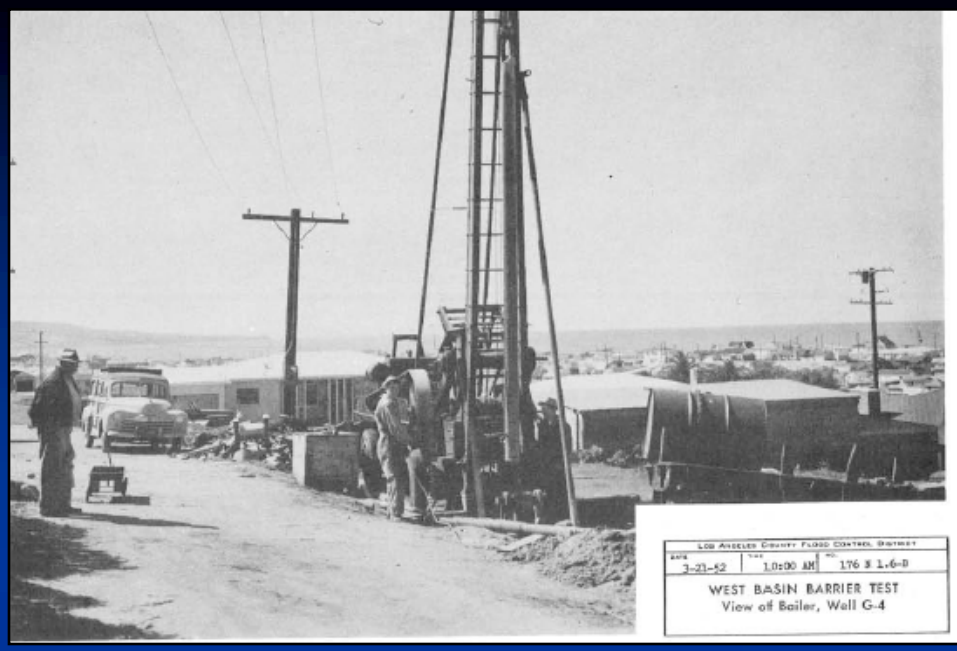




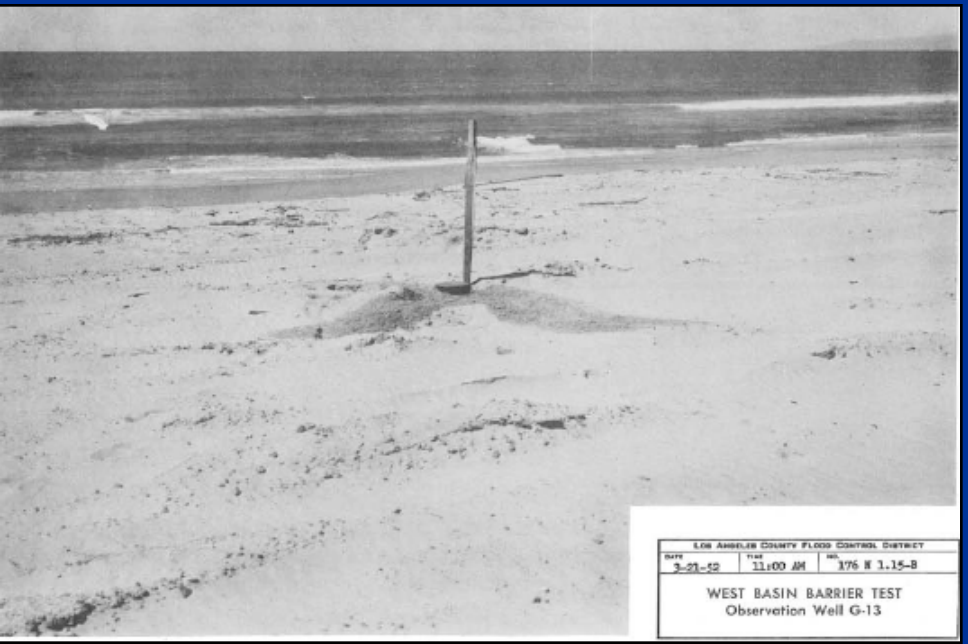
All coastal aquifers likely have minor seawater intrusion, even if not in overdraft

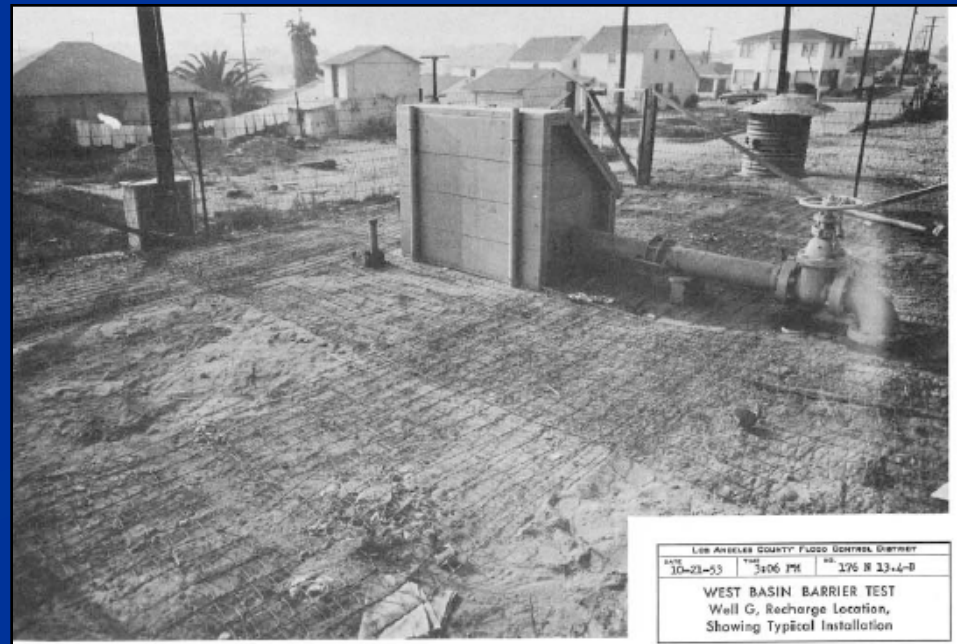
But heavy pumping can increase rate and distance of intrusion.

Seawater intrusion barriers can block the inflow of salt water and replenish the basins with fresh water

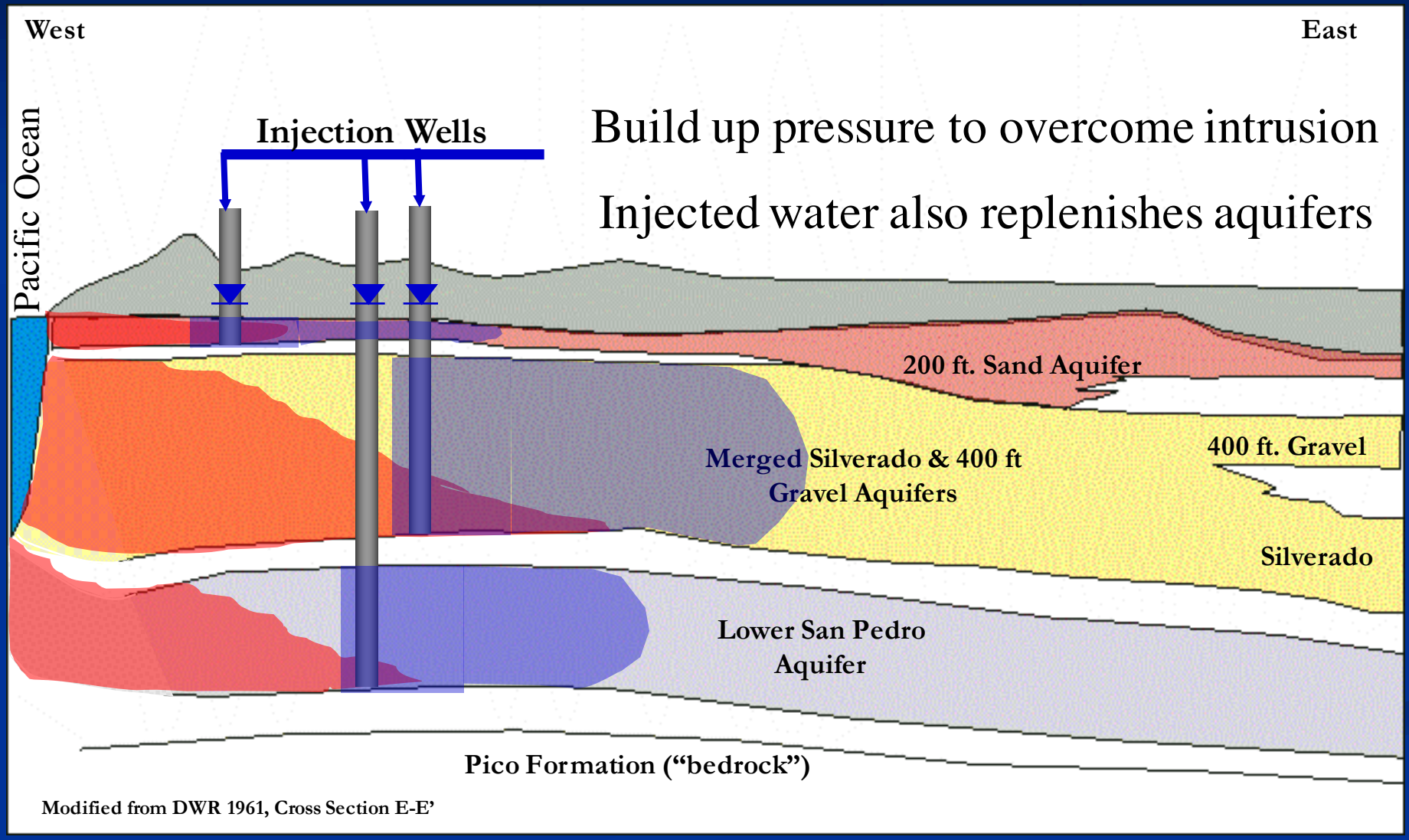


Initial Barrier Tests 1952 - 1954

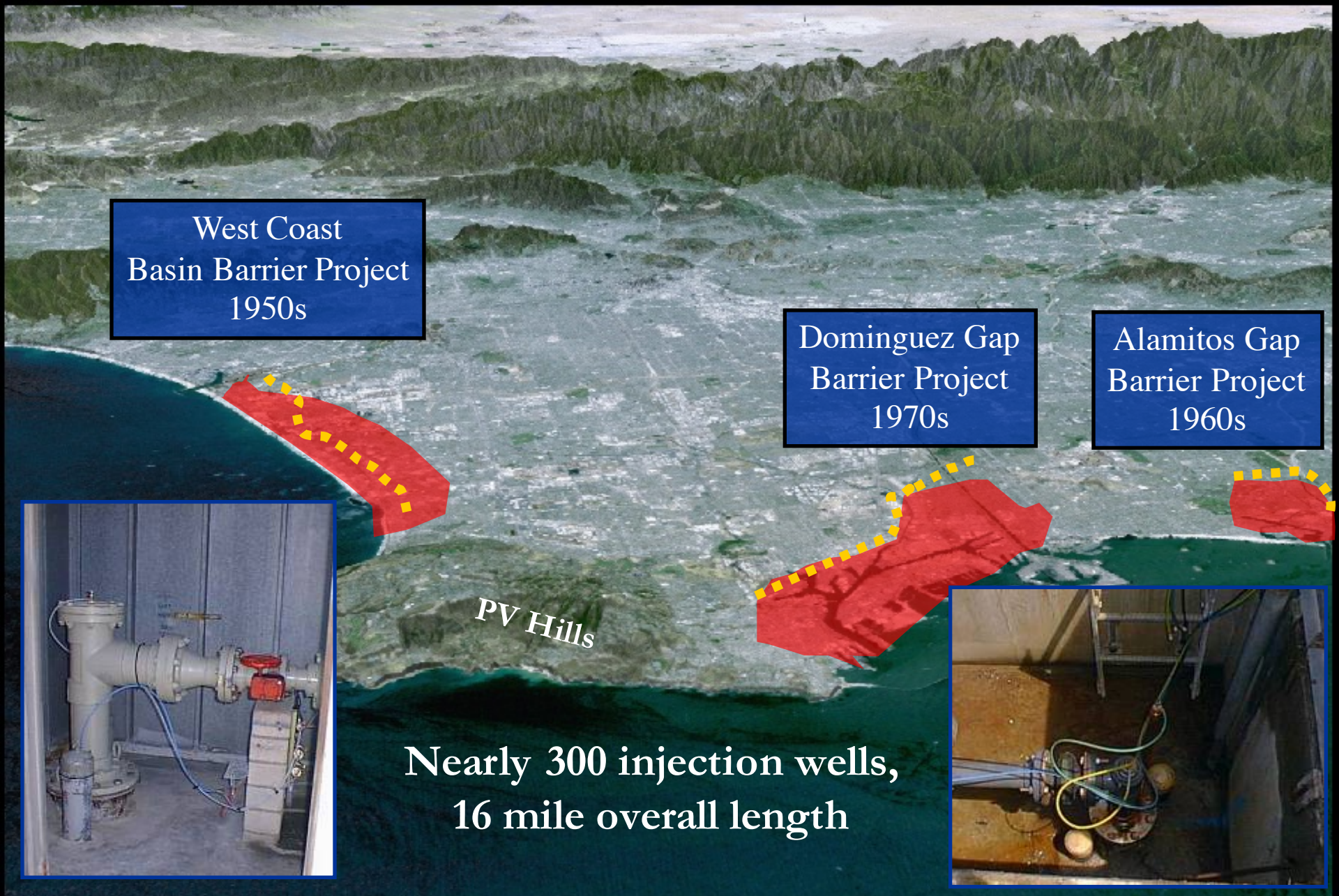




Seawater Barrier Wells



Sea Water Barrier Wells - LACFCD



Water for the Barriers

- Treated Drinking Water (potable) from MWD (imported water):
  - Exclusive source 1953 – 1995.
  - Partial Source 1995 – Present.
  - 1.5 Million acre-feet to date.

- Advanced Treated Recycled Water:
  - Since 1995 at West Coast Barrier (WBMWD).
  - Since 2005 at Alamitos Barrier (WRD).
  - Since 2006 at Dominguez Barrier (City of LA).
  - 184,000 acre-feet to date.

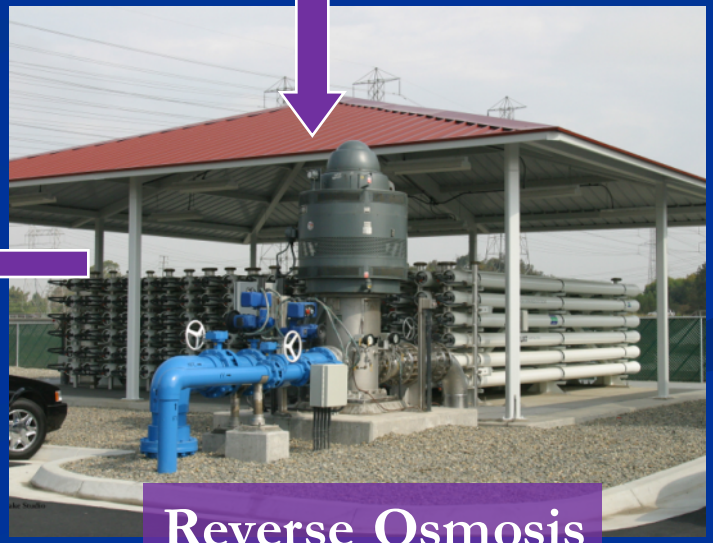
- Goal is to move towards 100% recycled water at all three barriers (Water Independence Now–WIN).

WIN
WATER INDEPENDENCE NOW

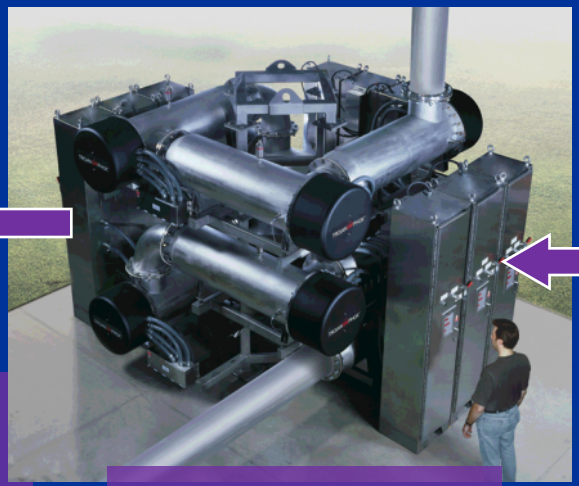
Advanced Treated Recycled Water for Barriers

Secondary or Tertiary Wastewater

Microfiltration



Reverse Osmosis



Ultra Violet Light

Advanced Oxidation H2O2

To Barriers

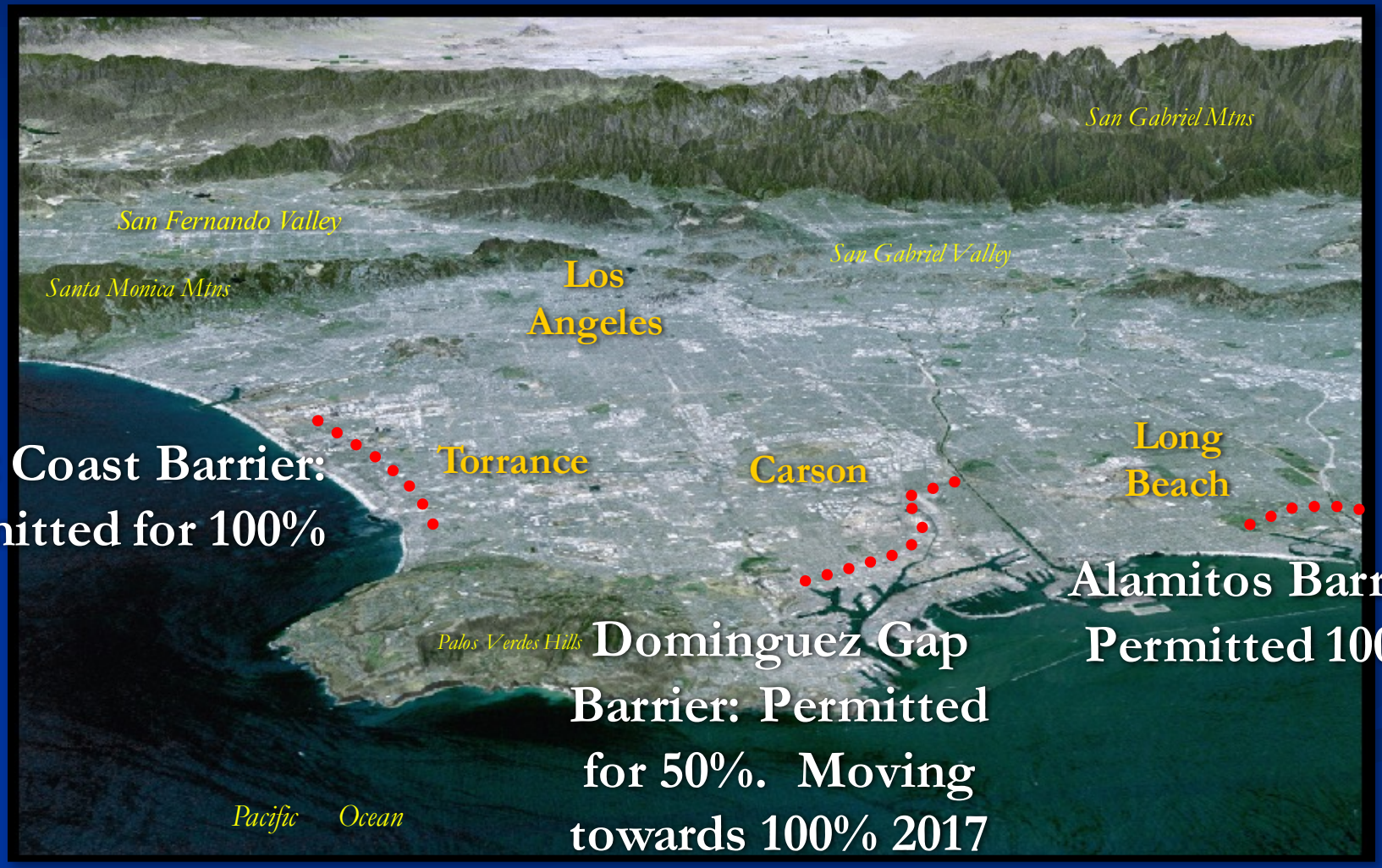
Barrier Injection Amounts & Costs

- Injection Amounts (2016-17 estimate):
  - Potable Water: 6,260 af
  - Recycled Water: 26,040 af (81%)

    32,300 af
- Total Cost of Water:
  - Potable Water: $ 8.5 million ($1360/af)
  - Recycled Water: $18.4 million ($ 707/af)

    $26.9 million

Going to 100% Recycled at Barriers

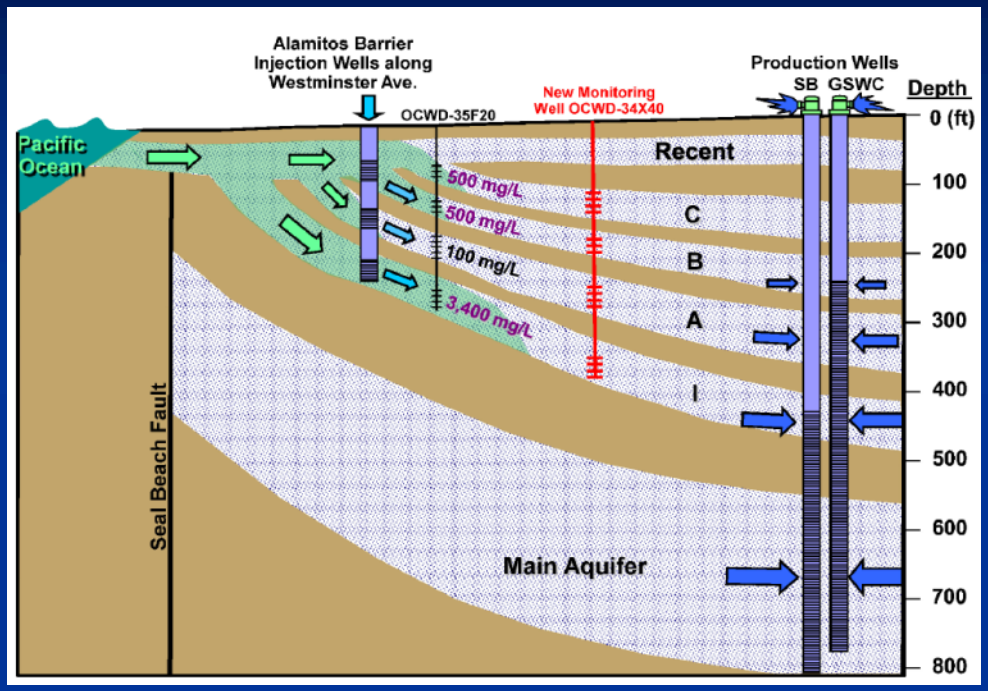


West Coast Barrier: Permitted for 100%

Dominguez Gap Barrier: Permitted for 50%. Moving towards 100% 2017

Alamitos Barrier: Permitted 100%

Seawater Barrier Models



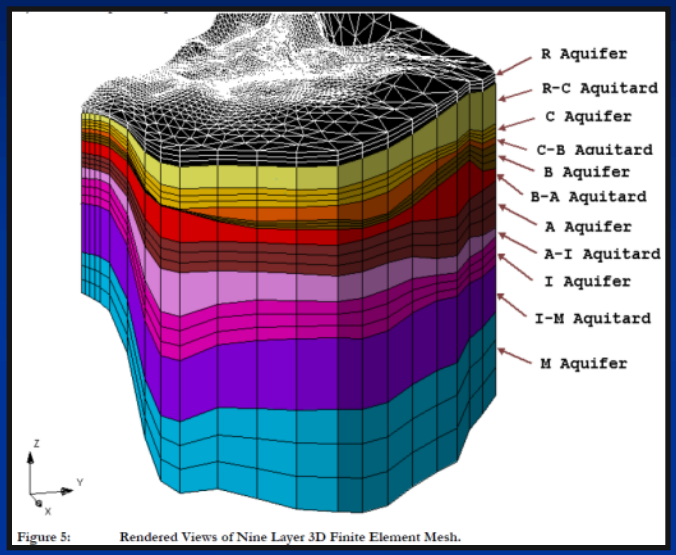
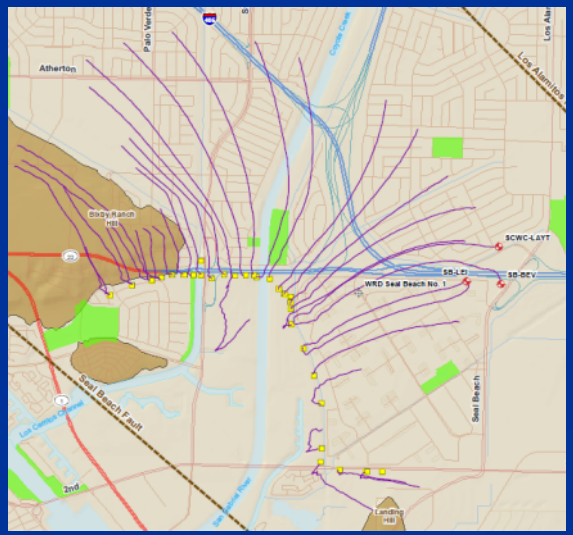
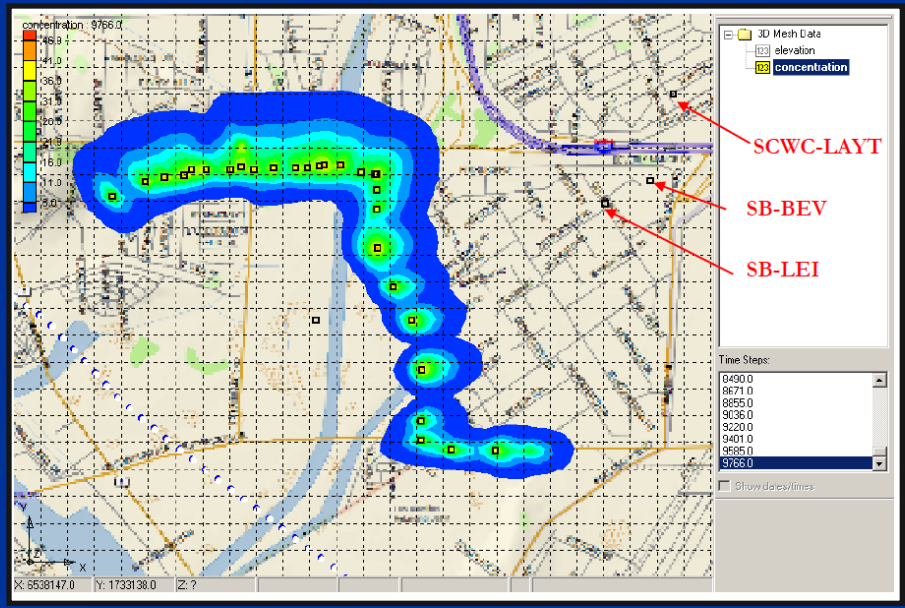


Figure 5: Rendered Views of Nine Layer 3D Finite Element Mesh.





Summary

- Seawater barrier injection wells have been a proven deterrent to intrusion for over 60 years. Steep inland gradients caused by groundwater pumping are the main driver for the intrusion.
- Recycled water is an effective injection source for the barriers to offset the need for potable water use.
- WRD's goal is to have the barriers at 100% recycled water in 2017.
- Impact of increased pumping and/or sea level rise may require additional injection and/or additional wells. Modeling can help predict the impacts.

Thank You