



## Water Resources and Policy Initiatives Conference

### Where Do Engineers Fit into the Water Equation?

**Michael R. Markus, P.E., D.WRE, BCEE, F.ASCE**

**General Manager**

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# California Water



- ▶ Imported Supplies
- ▶ Groundwater
- ▶ Storm Water
- ▶ Water Transfers
- ▶ Desalination
- ▶ Water Recycling



# Orange County Water District (OCWD)

- ▶ District has 216 employees
  - ▶ Engineers
  - ▶ Chemists
  - ▶ Hydrogeologists
  - ▶ Plant operators
  - ▶ Heavy equipment operators
  - ▶ Maintenance & electricians
  - ▶ Research scientists
  - ▶ Finance
  - ▶ Natural resource biologists



# OCWD Operational Facilities

Prado  
Dam



- ▶ Operates 400 acre constructed wetlands to remove nitrogen from a portion of the river flows feeding Prado Dam and stores water behind the dam to increase storage.
- ▶ Santa Ana River (SAR) Facilities in Anaheim and Orange capture water for groundwater recharge. OCWD maintains water rights to the SAR downstream of Prado Dam.
- ▶ Groundwater Replenishment System/Seawater Barrier



Santa Ana River Facilities

Groundwater Replenishment  
System



# Santa Ana River Watershed

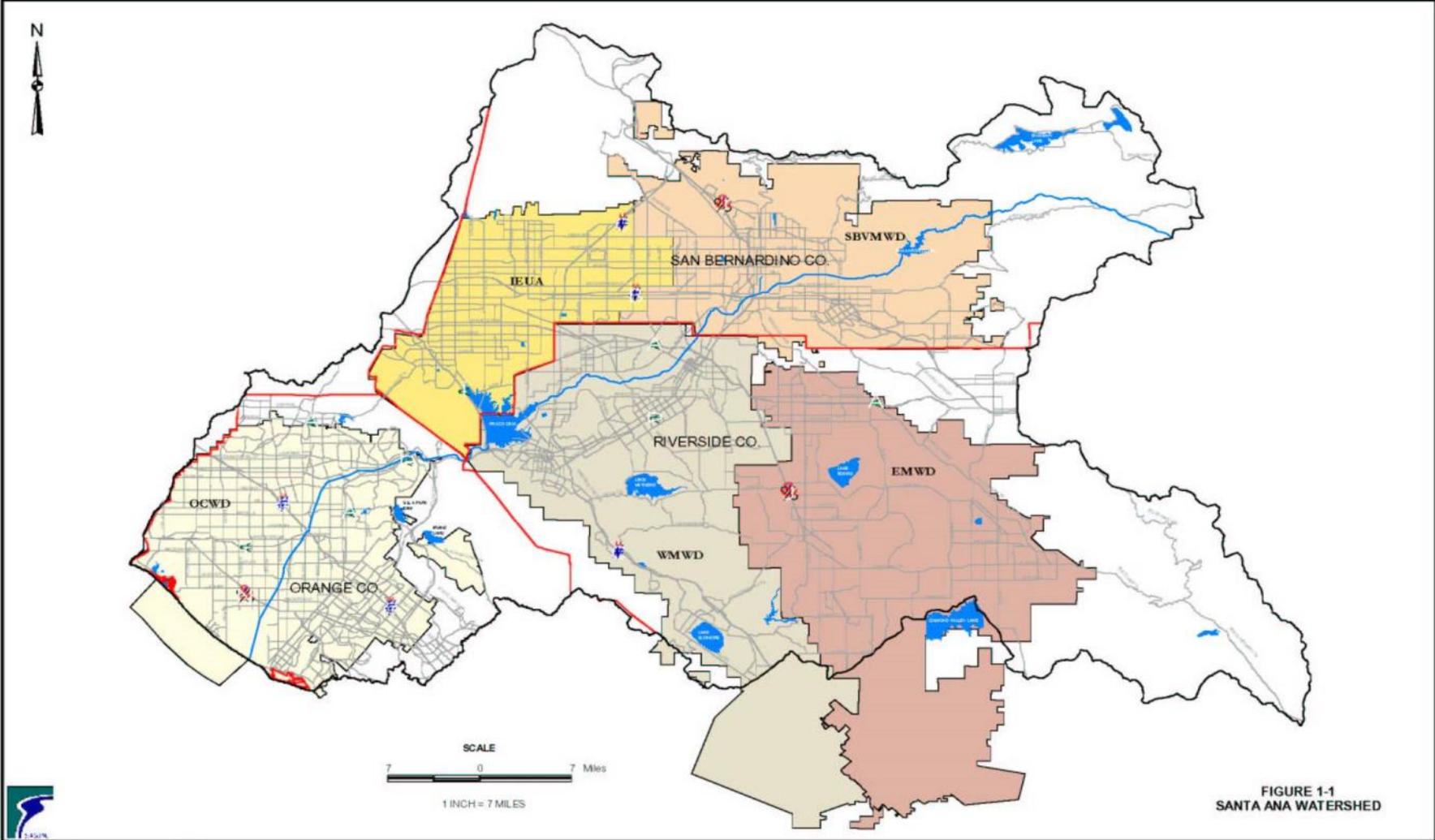
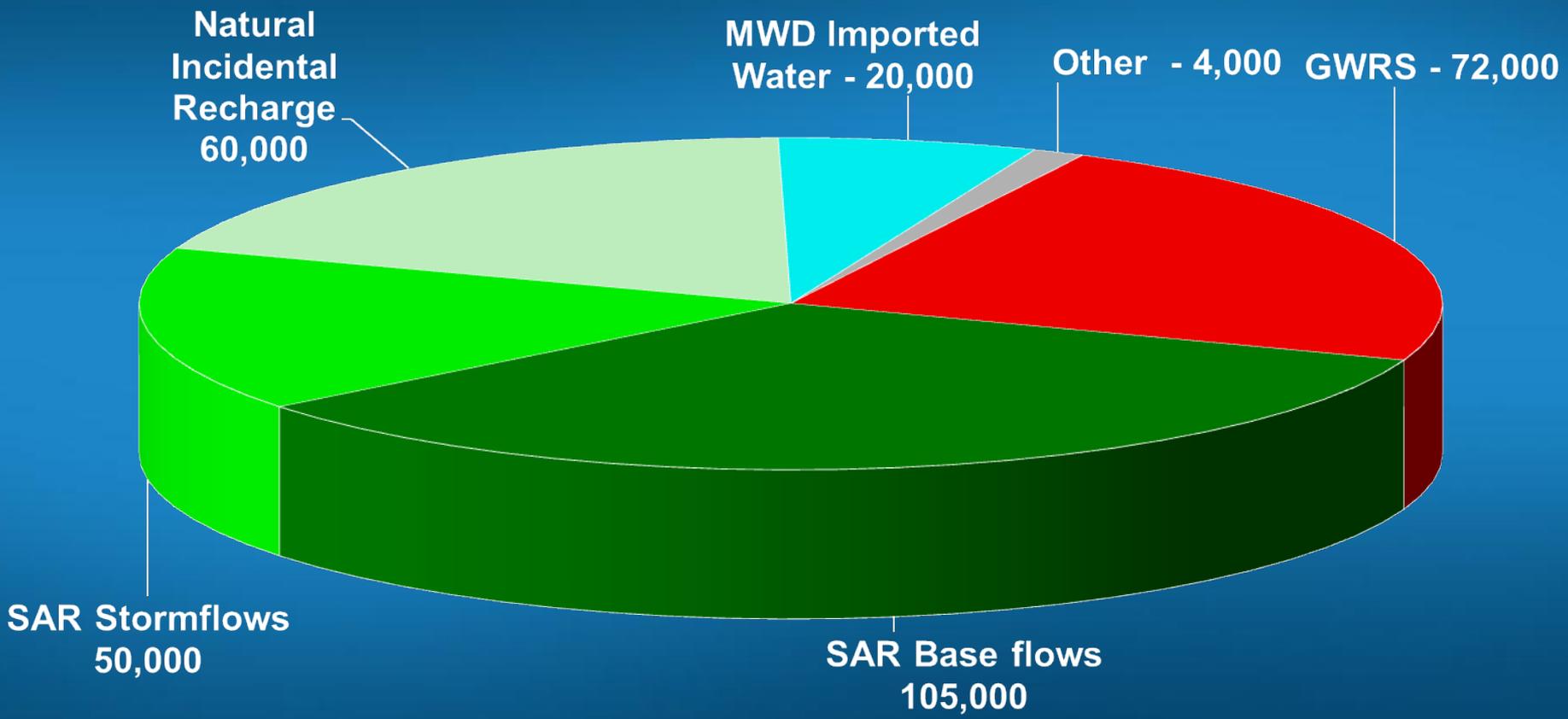


FIGURE 1-1  
SANTA ANA WATERSHED



# OCWD Water Supply Sources (Acre-feet per year)



# Various Projects



# The Groundwater Replenishment System (GWRS)

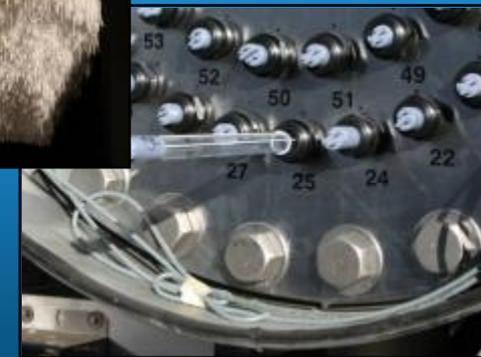
- ▶ New 70-million-gallons per day, \$481 million, advanced water purification facility
- ▶ Takes sewer water that otherwise would be wasted to the ocean, purifies it to near distilled quality and then recharges it into the groundwater basin
- ▶ Provides a new 72,000 acre-feet per year source of water, which is enough water for nearly 600,000 people
- ▶ Operational since January 2008
- ▶ Largest planned indirect potable reuse project in the world



# The GWRS Purification Process

100% of water is treated through microfiltration, reverse osmosis and ultraviolet light with hydrogen peroxide

- ▶ Microfiltration: Tiny, straw-like plastic membranes filter out bacteria, particles and protozoa
- ▶ Reverse Osmosis: Water is forced through the molecular structure of the RO membranes where dissolved chemicals, pharmaceuticals and viruses are removed
- ▶ Ultraviolet Light with Hydrogen Peroxide: As a safety barrier, water is exposed to UV with H<sub>2</sub>O<sub>2</sub> that disinfects and destroys potential harmful trace organics



# Independent Advisory Panel

- ▶ Appointed by National Water Research Institute
- ▶ Leading experts in hydrogeology, chemistry, toxicology, microbiology, engineering, public health, public communications and environmental protection
- ▶ Review operations, monitoring and water quality
- ▶ Panel makes recommendations to OCWD and regulatory agencies to assure quality and reliability



# Regulatory Oversight

- ▶ Regional Water Quality Control Board issues permits for recycling
- ▶ CA Department of Public Health regulates drinking water and establishes reclamation criteria
  - ▶ Treatment
  - ▶ TOC limit
  - ▶ Travel time
  - ▶ Blending
- ▶ No federal role regulating reuse
- ▶ CDPH hearing findings and recommendations incorporated into permit by Regional Board



# Public Outreach

- ▶ Many projects stopped by public and political opposition
- ▶ Outreach began early, over 10 years prior to start-up
- ▶ Researched public concerns
- ▶ Face to face presentations
- ▶ Community leaders
- ▶ Measured effects of outreach
- ▶ Community support
- ▶ Outreach continues today, assisted by media interest
- ▶ No active opposition



# Benefits of GWRS

- ▶ Creates a new local water supply
- ▶ Reuses a wasted resource
- ▶ Expands the seawater barrier
- ▶ Increases water supply reliability
- ▶ Offsets imported water cutbacks
- ▶ Costs less than imported water
- ▶ Takes half the energy of importing water and one-third of the energy to desalinate seawater
- ▶ Improves quality of water in the basin



# Award-Winning Facility

More than 35 awards given to GWRS including:

- ▶ Stockholm Industry Water Award
- ▶ American Society of Civil Engineers (ASCE) Outstanding Civil Engineering Achievement Award



ASCE Outstanding Civil Engineering Achievement Award



Stockholm 2008 Industry Water Award

# GWRS Initial Expansion Project

- ▶ **\$142 million**
- ▶ **Site mobilization began late 2011, broke ground in January 2012**
- ▶ **Expansion Project creates additional 31,000 AFY of new local water, enough to serve 250,000 people**
- ▶ **Total capacity of plant will be 103,000 afy, which is enough water for 850,000 people**
- ▶ **Complete in early 2015**



# Necessary Tools

- ▶ Today's Engineer has to be equipped with the necessary tools to be successful.
- ▶ Non-core classes should include:
  - ▶ Finance
  - ▶ Communications
  - ▶ Speech
  - ▶ Writing





# Suggestions

- ▶ Get involved in professional societies
- ▶ Take the EIT your senior year
- ▶ Get your professional registration (a must!)
- ▶ Seek out a mentor
- ▶ Get an advanced degree
- ▶ Volunteer for field assignments
- ▶ Continue to stay involved in professional societies

# Thank You

