



## **High-Resolution Energy Intensity Analysis**

A collaborative project between PG&E, East Bay MUD, and CWEE

Bay Planning Coalition – September 12, 2013

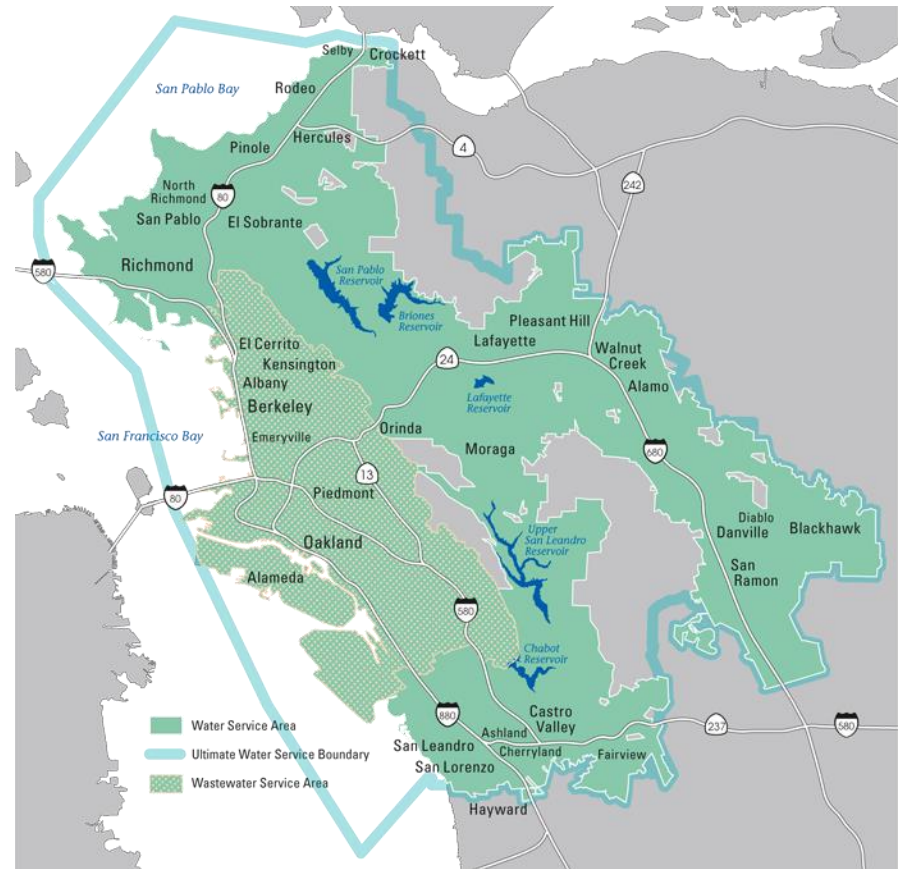
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# Water-Energy: Problem Definition

- Understanding energy intensity (EI)...
  - What is the opportunity?
    - Increase energy efficiency (EE) of water infrastructure
    - Additional incentive for water conservation
    - Demand Management
  - Why is it important?
    - Scope EE program design (Estimation)
    - Monitor and verify (M&V) energy/GHG savings (Measurement)
  - Why is it challenging?
    - Requires systems approach
    - Agency specific; dynamically varies in space and time
    - Balance between accuracy and analytical burden

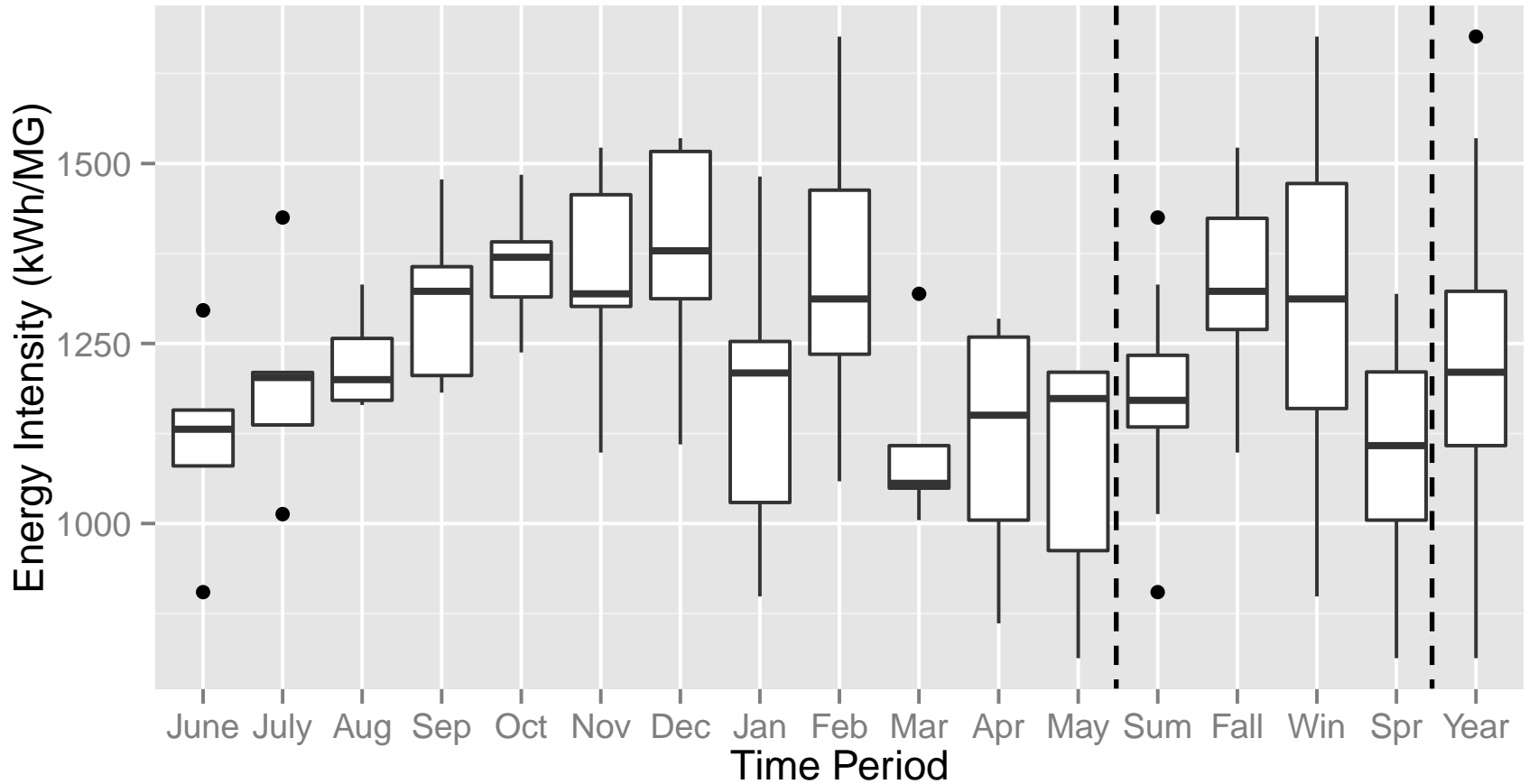
# Project Goals

- Explore and estimate the variability of energy intensity across the EBMUD system
  - Temporally
  - Geographically
- Develop framework for scaling the approach
- Discuss options for best pathway forward



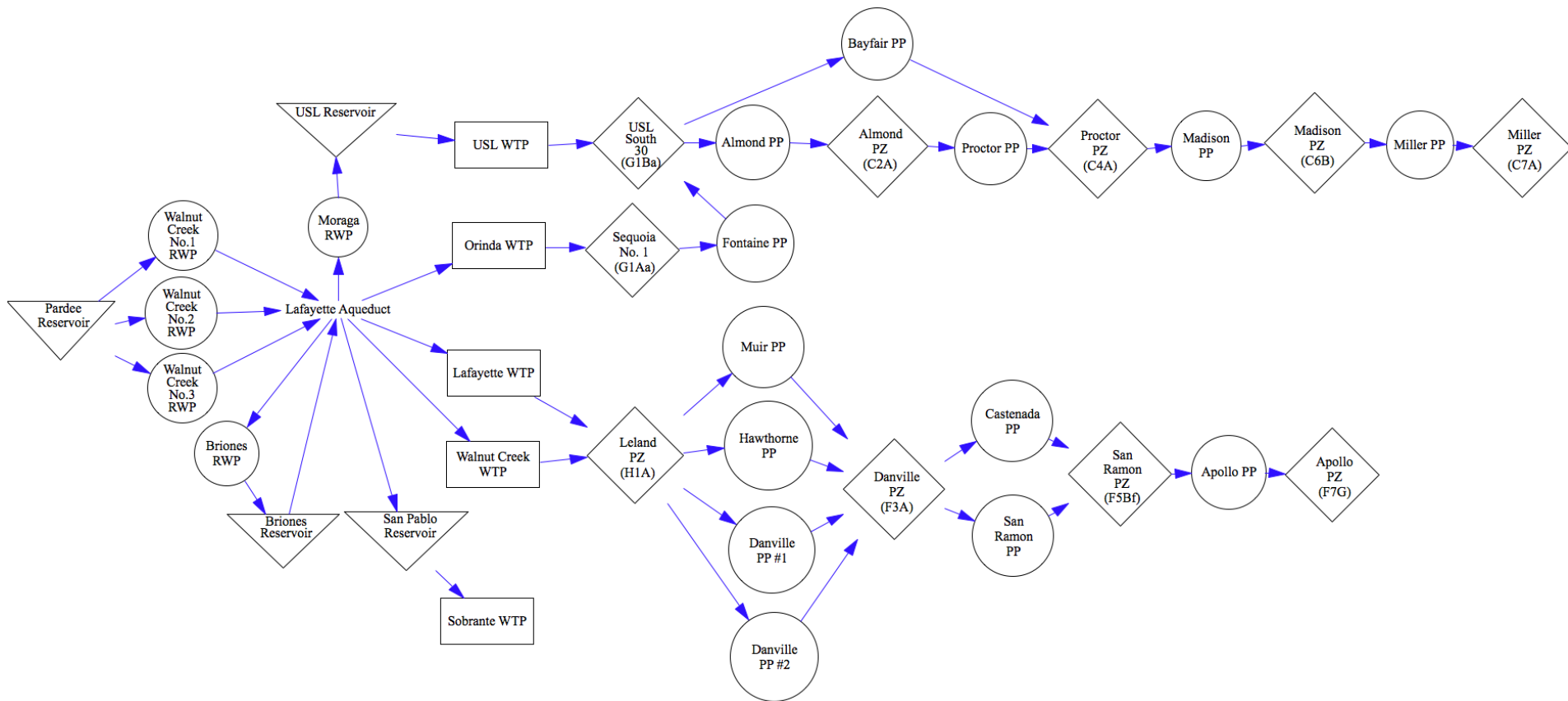
# Outdoor Water Use EI

Outdoor EI = raw water pumping + water treatment + distribution  
June 2006 – May 2012

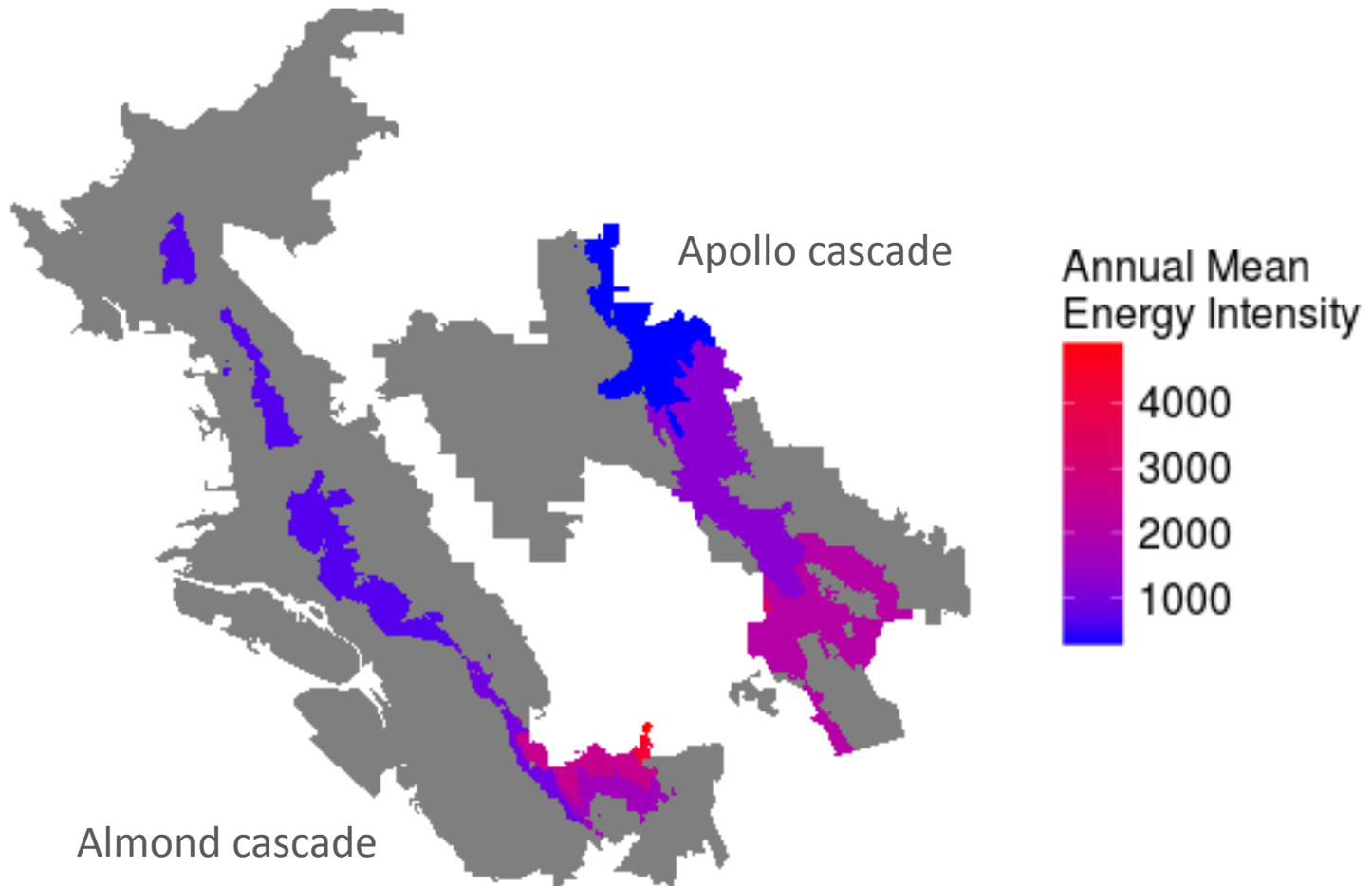


- Monthly averages fluctuate 10-12% around the annual mean (1,224 kWh/MG)
- Distinct seasonal pattern (December peak, May low)

# EBMUD Pilot Pressure Zones

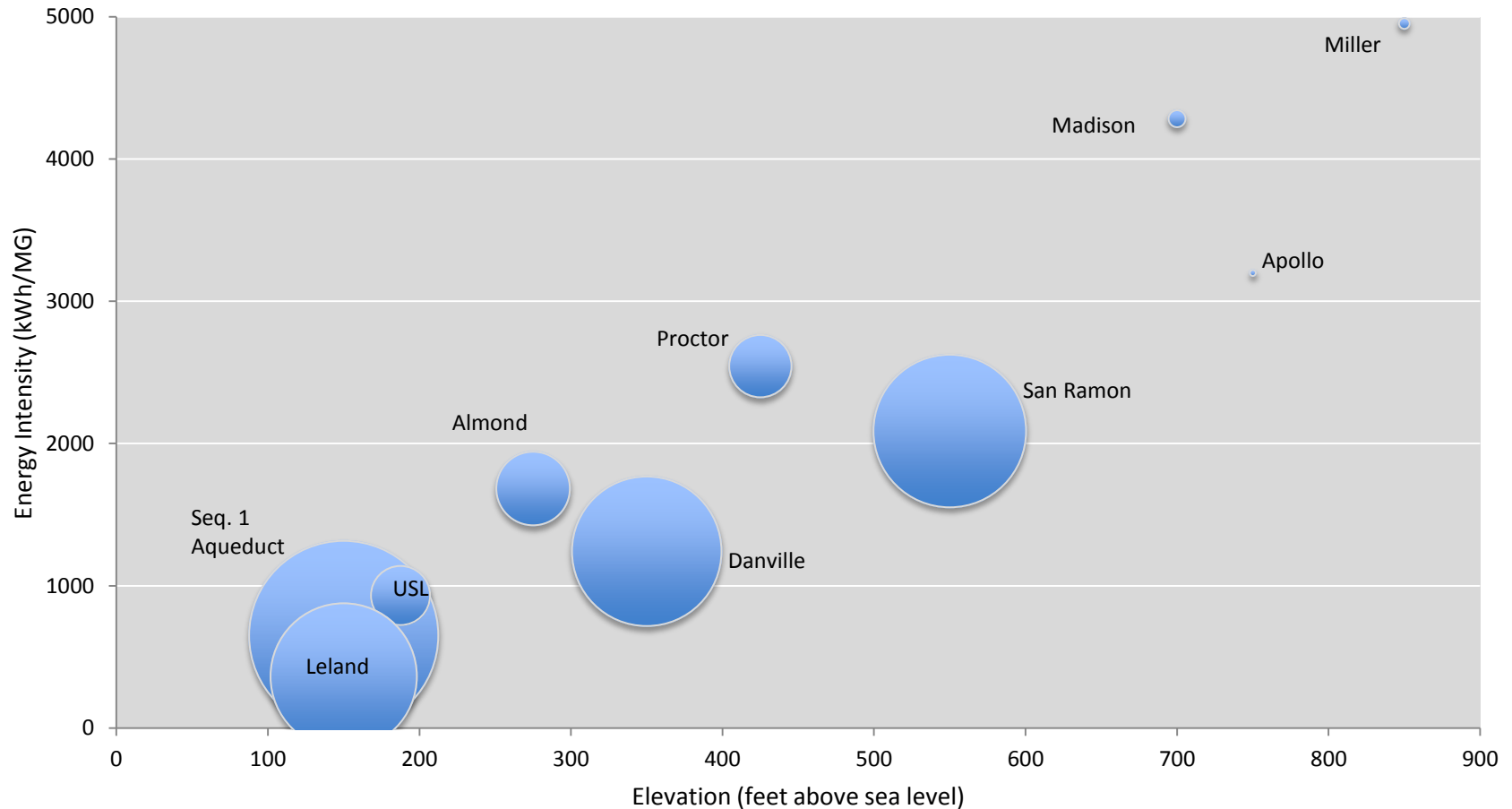


# Energy Intensity Map



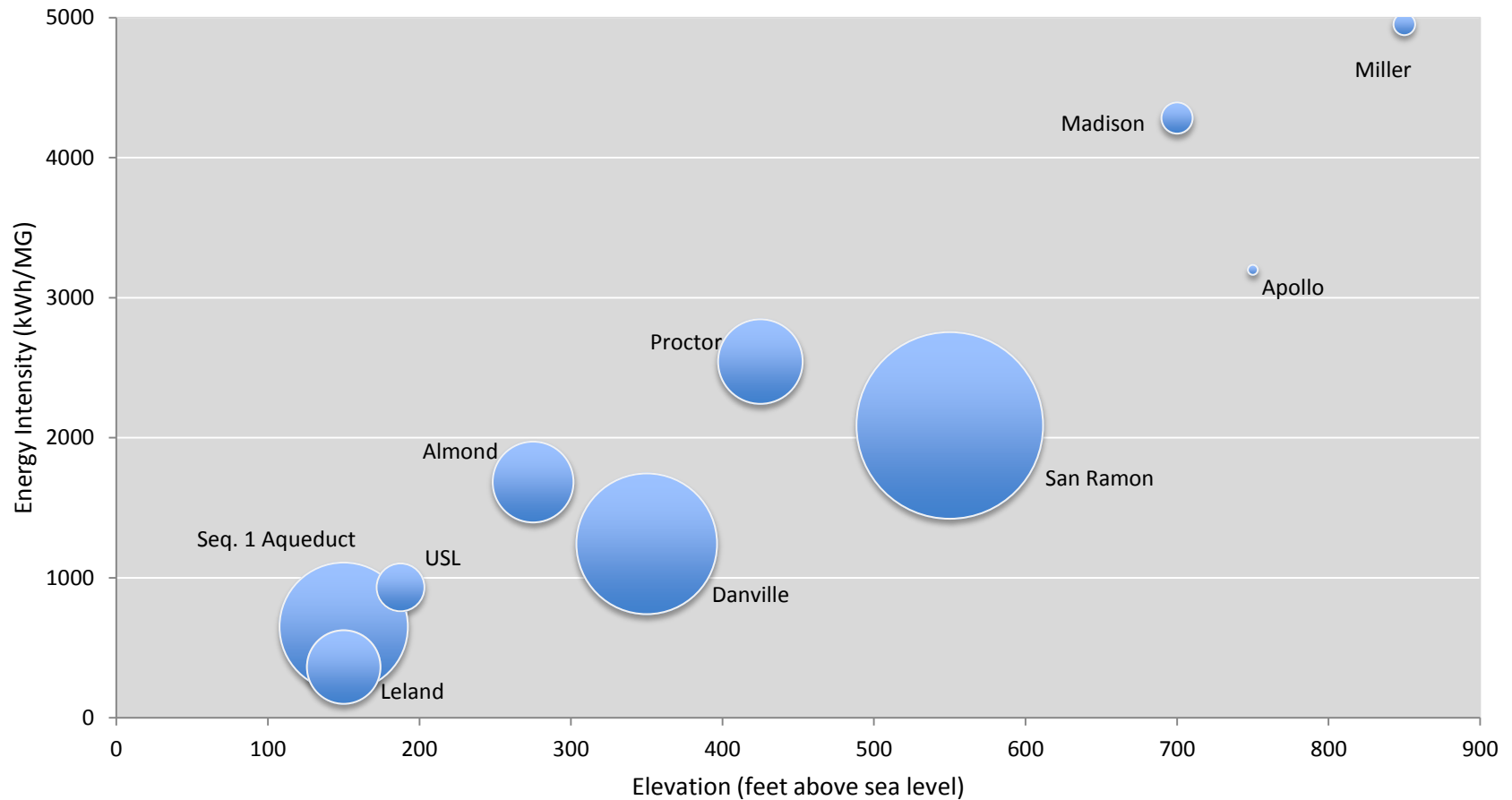
Outdoor energy intensity for pilot pressure zones

# East Bay Municipal Utility District: Spatial Variation in Energy Intensity (EI)



Size of the bubbles = relative water consumption by zone

# East Bay Municipal Utility District: Spatial Variation in Energy Intensity (EI)



Size of the bubbles = relative embedded energy (kWh) by zone



# Scaling Challenges

- Temporal and spatial variability exists
- Some options to capture variation:
  - Seasonal or monthly estimates
  - Spatial zones at every 200ft of elevation (~1000 KWh/MG)
- Creates a data management and analysis burden to roll out assessment
- Top-down calculators can estimate EI, but still left with M&V challenges

# Scaling Opportunity

- Data exists for high resolution assessment
  - Viable for any water agency with SCADA data
- Universal analytics/visualization can be rapidly scaled
- Up-front costs, but then “living” database
- Two pathways to enable EE programs through water conservation:
  - Project scoping AND Monitoring & verification
  - Geographic and seasonal targeting

# Thanks!

