





PUBLIC WORKS DEPARTMENT WATER RESOURCES DIVISION

# DIVERSITY - THE KEY TO WATER SUPPLY RELIABILITY

Ocean Water Desalination Forum Joshua Haggmark, Water Resources Manager December 1, 2016





# Outline

- Background
  - Water Demands & Supplies
- Drought Impacts to Supply
- Drought Planning and Response
- Desalination Project Overview
- Next Long Term Supply Plan Update





### **Summary of Water Service Area**

- Population: 193,000
- Service Connections: 27,000
- 5 Million Tourist Annually
- Annual Water Budget \$45M
- Water Usage:
  - 1980's: 16,000 AFY
  - 2000-2013: ~14,000 AFY
  - Current: 10,000 AFY







#### Per Capita Potable Water Use

- Pre-Drought:
  - State-wide Average: 196 gpcd
  - Central Coast Region Average: 147 gpcd
  - City of Santa Barbara Average: 127 gpcd
- City of Santa Barbara Drought Response:
  - Overall: 87 gpcd
  - Residential Customers Only: 62 gpcd





#### Water Demands by Customer Type







#### Water Supply Diversity = Climate Change Resiliency







#### **Potable Water Sources**







#### Conservation

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- An element of any good water supply plan
- Strength:
  - Lowest Cost Supply
  - Environmental Sustainable
  - Demand Reductions
- Weakness:
  - Limited
    - There are Limits to how much you can reduce demands
    - Not Drinkable
  - Variability
    - Often decreases during droughts without additional measures
    - Requires constant outreach and education
    - Drought Fatigue



#### www.WaterWiseSB.org





#### **Surface Water**

- Cachuma and Gibraltar Reservoirs
- Strength:
  - Lower Cost Supply
  - Low Energy Demand
  - Storage for Peak Demands
- Weakness:
  - Weather Dependent
  - Water Quality
  - Siltation
  - Environmental Concerns
    - *i.e. Steelhead Recovery*
  - Isolated from South Coast







#### Groundwater

- Strength
  - Local Supply
  - On Demand
  - Lower Cost Supply
- Weakness:
  - Weather Dependent
  - Limited Supply
  - Contamination
  - Variable water quality
  - Seawater Intrusion







#### **Non-Potable Recycled Water**

- Strenght
  - Reliability
    - Local Water Supply
    - Not Weather Dependent
  - Expandable
- Weakness:
  - Cost
    - Must be subsidized to attract users
  - Limited Uses
  - Parallel Infrastructure







#### **State Water**

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- Strength:
  - High Quality Water
  - Flexibility with Delivery and Storage
  - Maximize use of State's Available Water
  - Water Banking
- Weakness:
  - Cost
  - Vulnerable to Natural Disasters
  - Variable Availability
    - Weather Dependent
    - Environmental Concerns







## Desalination

- Strength:
  - Dependability
    - Local Supply
    - Not Weather Dependent
  - Expandable
  - High Quality Water
- Weakness:
  - Cost
  - Energy Consumption
  - Environmental Concerns









#### **DROUGHT IMPACTS TO WATER SUPPLY**



#### U.S. Drought Monitor California



#### October 11, 2016 (Released Thursday, Oct. 13, 2016) Valid 8 a.m. EDT

#### Drought Conditions (Percent Area)

	None	D0-D4	D1-D4	D2-D4	D3-D4	D4
Current	0.00	100.00	83.59	62.27	<b>4</b> 2.80	21.04
Last Week 10/4/2016	0.00	100.00	83.59	62.27	<mark>4</mark> 2.80	21.04
3 Month s Ago 7/12/2016	0.00	100.00	83.59	59.02	<mark>4</mark> 2.80	21.04
Start of Calendar Year 12/29/2015	0.00	100.00	97.33	87.55	69.07	<mark>44.8</mark> 4
Start of Water Year 9/27/2016	0.00	100.00	83.59	62.27	<mark>4</mark> 2.80	<mark>21.04</mark>
One Year Ago 10/13/2015	0. 14	99.86	97.33	92.36	71.08	46.00

#### Intensity:



The Drought Monitor focuses on broad-scale conditions. Local conditions may vary. See accompanying text summary for forecast statements.

Author: Brian Fuchs National Drought Mitigation Center



http://droughtmonitor.unl.edu/

#### SantaBarbaraCA.gov/Water

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Year	Rain (in.)	% of AVG		
1947-1948	12.39	44%		
1948-1949	15.10	53%		
1949-1950	16.84	59%		
1950-1951	11.07	39%		
1951-1952	50.15	177%		
Total	105.55	-		
1986-1987	10.71	38%		
1987-1988	24.95	88%		
1988-1989	14.71	52%		
1989-1990	11.80	42%		
1990-1991	30.62	108%		
Total	92.79	-		
2011 2012	44.00	500/		
2011-2012	14.80	52%		
2012-2013	8.88	31%		
2013-2014	13.04	46%		
2014-2015	13.41	47%		
2015-2016	13.24	47%		
Total	63.37	New Record Drought		

Avg. Annual Rainfall at Gibraltar Reservoir = 28.4"





#### **Gibraltar Reservoir**

- Storage as of 11/30/16
  - O Acre Feet
     (0% of
     capacity)
  - City of Santa Barbara







#### Lake Cachuma

- Storage as of 11/30/16
  - 14,662 Acre
    Feet
    (7% of
    Capacity)
- Bureau of Reclamation







#### Cachuma is Critical for storage/conveyance of imported water







#### **DROUGHT PLANNING AND RESPONSE**





### Water Supply Plan

- Adopted 2011 Long Term Water Supply Plan looks out to 2030
  - Increase Reliability through further diversification of Water Supplies
    - Maintaining demands while increasing sources of supply
  - Strong conservation efforts to hold demands steady under modest plans for growth
  - Based on the worst drought of record (1947-1952)
     Now the second worst!





#### **1989 Drought vs Current Drought**

**City of Santa Barbara Water Demand** Moving 12-Month Production to Serve Potable + Recycled Systems



City of Santa Barbara - Public Works Department





#### **Drought Response Summary**

- Planned Demand Reduction
  - Outreach
  - Rates
  - Regulations
- Increased Groundwater Pumping
- Import Banked and Purchased Water
- Desalination



Charles Meyer Desalination Plant





#### Water Supply Strategy

(based on no reservoir inflows, 35% State Water Allocation, 40% conservation)



ov/Water





#### **DESAL PROJECT SUMMARY**



## **Desal Plant History**

- Constructed in 1992 under an Emergency Permit
  - Goleta and Montecito were partners
- Placed in Long Term Standby Mode in 1994
- Permanent Permitting was Completed in 1996
- Desalination Facility has been part of the City's Long Term Water Supply Plan since 1994
- Awarded Contract for Reactivation in July 2015



#### **Overview of Desalination Facilities**

- Intake: 2,500-ft off shore
- Desalination Plant:
   525 Yanonali Street

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- Outfall: 8,720-ft off shore shared with El Estero WWTP
- Initial Start-up Capacity 3,125 AFY
- Scheduled to be online by March 2017
- Expandable to 10,000 AFY

























# **Cost Summary**

- Reactivation Costs:
  - ~\$60 million (State Revolving Fund Loan)
    - Annual debt service of \$3.2M/Year over 20 years at 1.6% interest
- Operation Costs
  - 5 Year Contract for Operation
  - \$1.5M/Year for Standby
  - \$4.1M/Year for Operation at 3,125 AFY
    - Works out to be \$1,400/AF





## **Water Supply Planning**

- Next update to Long-Term Water Supply Plan will continue to emphasis Reliability to address:
  - Current Drought & Climate Change
  - Sedimentation in Reservoirs
  - Anticipated Environmental Restrictions
  - New Water Sources
    - Role of Desal
    - Potable Reuse
    - Regional Groundwater Banking Programs











## **End of Presentation**

• Drone Video of Lake Cachuma





### **Monthly Supply Mix**







#### **City's Projected Cachuma Storage & Supply Shortfall**







#### **IDE's Proposed Layout**



City of BARBARA



### **Loan Summary**

- Drinking Water State Revolving Fund Loan
  - \$55M
  - 1.6% Interest
  - 20 years
  - \$3.2M Annual Debt Service