Ocean Water Desalination Program Update

Special Committee on Desalination and Recycling

August 25, 2009

www.westbasin.org

West Basin's Water Reliability 2020 Program

	1990	2009	2020
Imported Water	80%	66%	33%

$500 Million $900 Million

www.westbasin.org

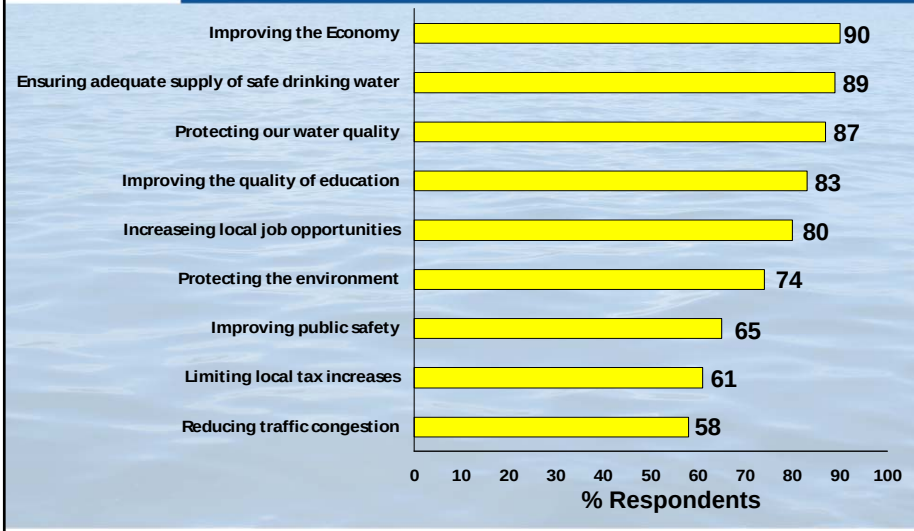
Public Support & Perception

Conducted 3 Poll Surveys:

Year	Support for Desal
2002	70%
2008	75%
2009	74%

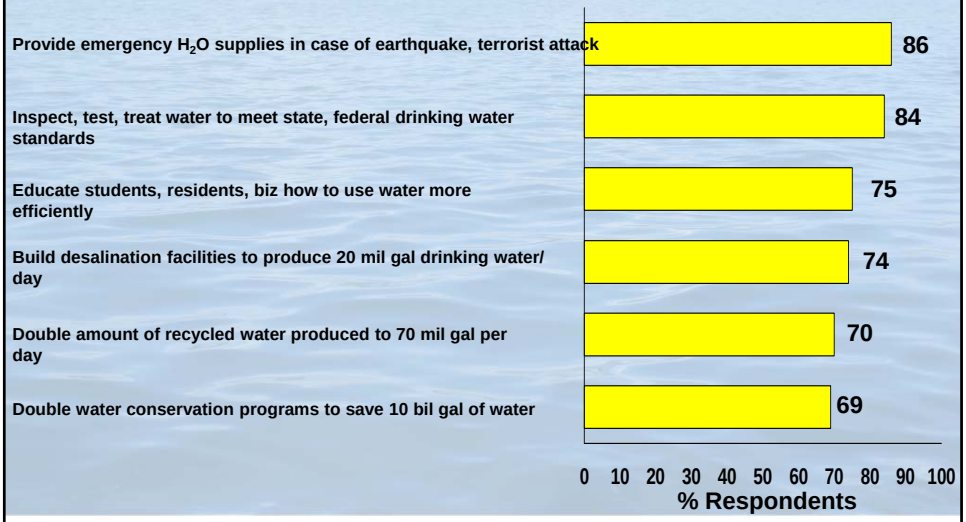
www.westbasin.org

Importance of Issues



www.westbasin.org

Projects & Services



www.westbasin.org

Status of West Basin's Ocean Water Desalination Program

www.westbasin.org

Desalination Drivers

- **Economics**
  - Intake/Discharge
  - Pretreatment
  - Fouling
  - Flux
  - Power cost
  - Capital Improvements
- **Water Quality**
  - Drinking water
  - Compatibility and integration
- **Environmental**
  - Impingement/Entrainment
  - Concentrate
  - Energy Usage

www.westbasin.org

Ocean Water Desalination Pilot Plant

Ocean Water Desalination Technology

- **Technology**
  - Disc filter & granular media filtration (GMF) pre-screening
  - Micro & ultrafiltration pretreatment
  - Reverse osmosis
- **Disc Filter/GMF: Large solids separation**
- **MF/UF: Fine solids separation**
- **RO: Dissolved solids separation**

www.westbasin.org

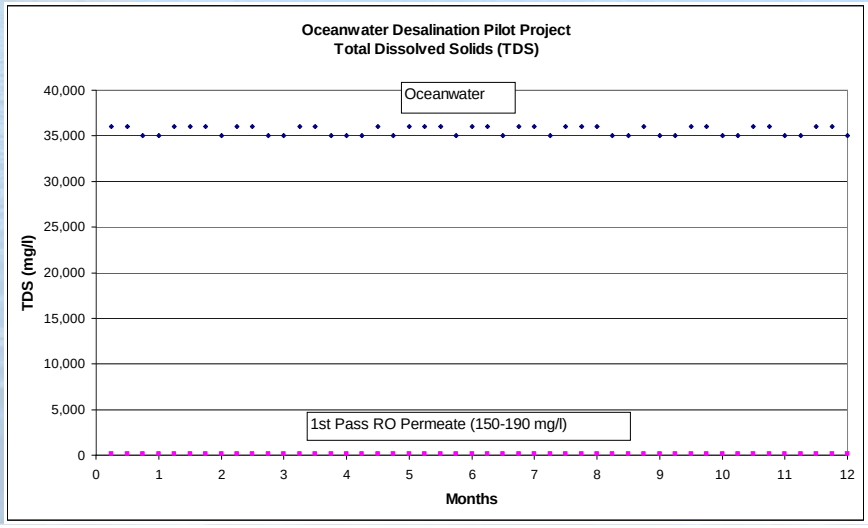
Pilot Plant Accomplishments: 2002 - 2009

www.westbasin.org

Pilot Plant – Lessons Learned

Ocean Water is an Excellent Source Water

Pilot Plant – Lessons Learned



www.westbasin.org

Pilot Plant – Lessons Learned

Prescreening is Essential for Optimum Performance

Disc Filter

High Rate Media Filter

Basket Strainer

www.westbasin.org

Pilot Plant – Lessons Learned

MF & RO Provide High Quality Drinking Water

Memcor Microfiltration Unit

Reverse Osmosis

www.westbasin.org

Pilot Plant – Process Summary

- **~50% Recovery on single pass RO is optimum**
- **MF/UF pretreatment produces consistently excellent quality**
- **RO Membrane fouling:**
  - Dependent on source water characteristics (i.e. Temp., organics, suspended solids, etc.)
  - Negligible on cold water source during non-red tide
  - More challenging on power plant post-condenser source water
  - Can result from Red Tides
- **Product water meets all MCL's**

www.westbasin.org

Pilot Plant – Water Quality Summary

- **Water quality target/drivers:**
  - Chlorides < 100 mg/l
  - Boron < 0.5 mg/l
- **Water quality targets provide assurance for:**
  - Industry integration
  - Horticulture concerns
  - Corrosion control issues

- **Water quality solutions for Chloride & Boron:**
  - Blending
  - Partial 2nd pass RO treatment

www.westbasin.org

Pilot Plant – Lessons Learned

Red Tides Are Managed Via Design & Operation

www.westbasin.org

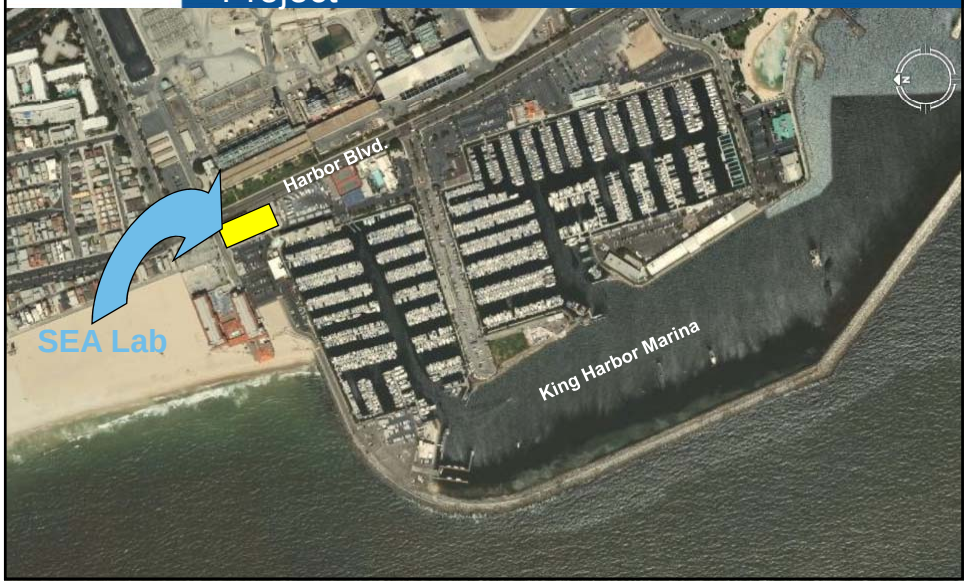
Red Tide Buoy Research Program

- **Water quality & nutrient sensors**
  - Monitors algal bloom development
  - Acts as sentinel buoy to warn of pending algal blooms
  - Allows operations to be adjusted during algal bloom
- **Near surface and at ocean floor**
- **ComLink transmits data to USC**
- **Data continuously updated on USC web site**

Buoys launched at Redondo Beach and El Segundo in 2009

www.westbasin.org

Next Phase: 0.5 MGD Demonstration Project



Demonstration Project Objectives

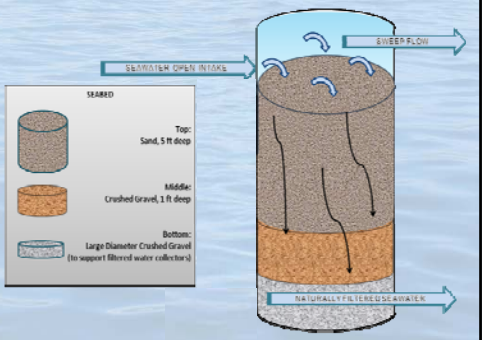
- Environmentally Responsible Desalination
  - Intake Technology Evaluation
  - Comprehensive Impingement & Entrainment Stu
  - High Salinity Aquarium
- Process & Energy Optimization
- Public Outreach & Education

www.westbasin.org

Demonstration Project - Intake Technologies

Passive Screen

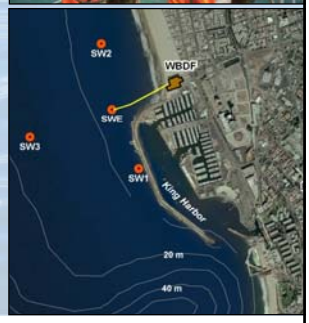
Seabed Infiltration Gallery Pilot



www.westbasin.org

Demo Project: Impingement/Entrainment Stud

- Establish baseline characterization of larval stages, fish eggs and invertebrate species
- Evaluate operational effectiveness of intake technologies
- Model potential impacts to local fish and invertebrate populations
- Evaluate corrosion and biofouling of intake technologies



www.westbasin.org

Demonstration Project – High Salinity Aquarium

- Research high salinity Impac on local marine species
- Establish regulatory limits fo concentrate discharge
- Public education tool to demonstrate diminimus impacts of concentrate

www.westbasin.org

Demo Project: Process & Energy Optimization

- Maximize Energy Efficiency
  - High efficiency pumps
  - Low energy membranes
  - Use of energy recovery devices
- Optimize process controls
  - Minimize chemical use
  - Maximize membrane life cycle

www.westbasin.org

Demonstration Project – Education/Outreach

www.westbasin.org

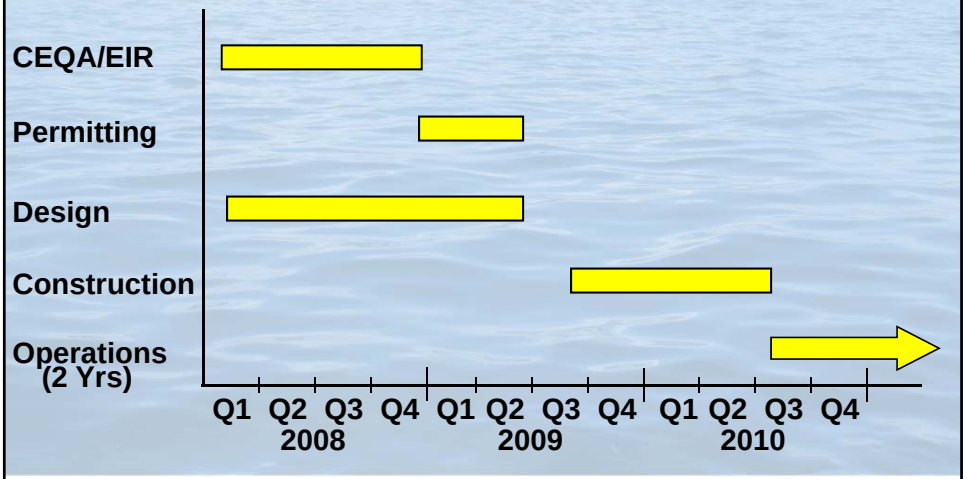
Demonstration Project – Regulatory Permitting

All permits were received within 6 months

- Federal
  - U.S. Army Corps of Engineers
  - NOAA/NMFS
  - U.S. Fish & Wildlife Service
  - U.S. Coast Guard
  - U.S. Environmental Protection Agency
- State
  - California Coastal Commission
  - L.A. Regional Water Quality Control Board
  - California Department of Fish & Game
- Local
  - City of Redondo Beach
  - South Coast Air Quality Management District
  - L.A. County Sanitation District
- Private
  - AES Redondo Beach, LLC
  - Los Angeles Conservation Corps

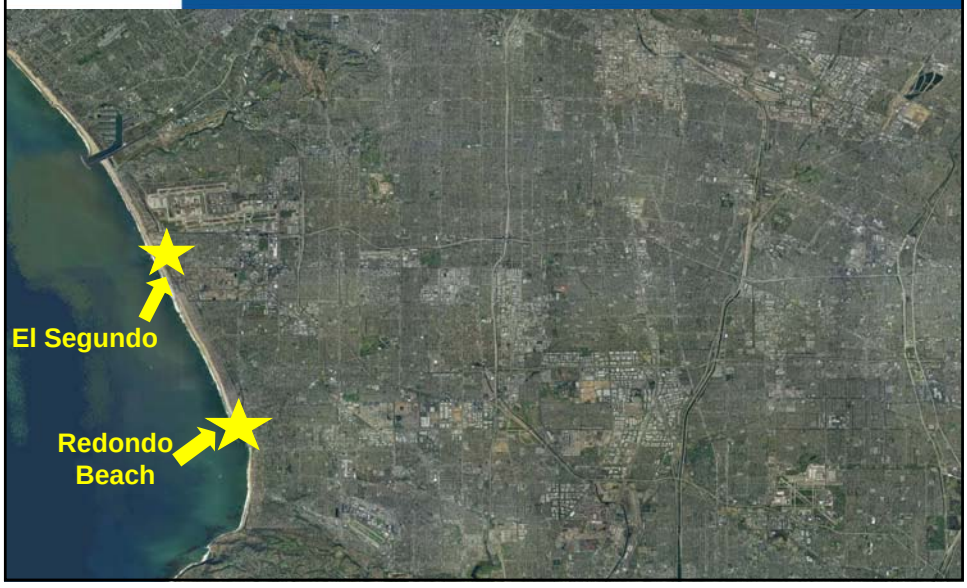
www.westbasin.org

Demonstration Project Schedule



www.westbasin.org

Potential Full-Scale Project Sites



Full-Scale Status

- Evaluating full-scale sites
- Project sites could support 20 MGD, 100 MGD or larger project
- Siting availability expected within current fiscal year
- Expect to initiate environmental & planning process this fiscal year

MWD Role

- Assistance w/Ocean Desalination Policy development
- MWD IRP element
- Water quality integration issues
- Institutional issues