IRP Member Agency Technical Workgroup

Local Resources (Part 1 of 2)
June 24, 2015

IRP Member Agency Workgroup Process

- April 2015
  - IRP/RUWMP Kick-off 4/8
  - Water Use Efficiency Meeting 4/16
  - Uncertainty 4/22
- May 2015
  - Imported Supplies 5/18
  - Water Use Efficiency Meeting 5/20
  - Groundwater (1 of 2) 5/27
- June
  - Groundwater (2 of 2) 6/11
  - Water Use Efficiency Meeting 6/18
  - Local Resources (1 of 2) 6/24

IRP Committee Items

June 23, 2015

- Tony Zampiello, AGWA – Groundwater Issues
- Mark Pestrella, LACDPW – Stormwater Issues
- Update from the IRP technical process

Presentation Overview

- Meeting objectives
- Review of modeling forecast and assumptions
- Issue paper input and discussion
- Next steps

IRP Local Resources Discussion Objectives

- Review and receive input on IRP technical approach
  - Identify additional technical refinements to be completed
- Provide an overview of local resources topics impacting the IRP
- Facilitate discussion of local resources issues
  - Identify and quantify future potential and risk
  - Collect policy and implementation issues for consideration by the Board

IRP Local Resources
Meeting 1 of 2

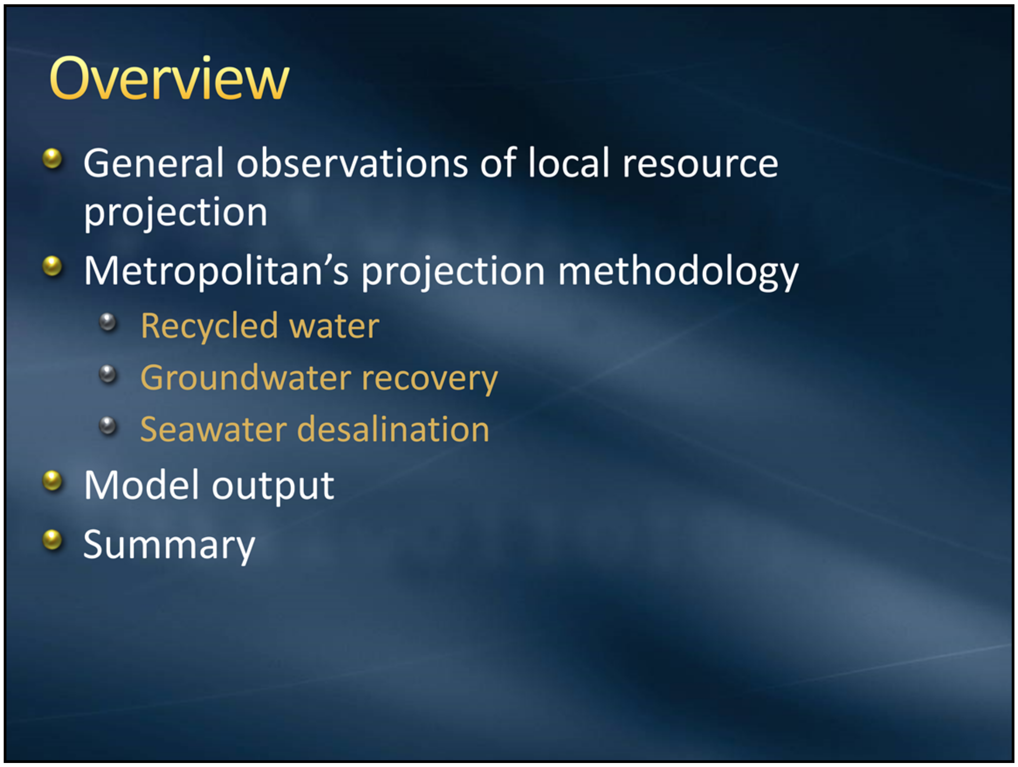
- Review of technical modeling and assumptions
  - Recycling
  - Groundwater recovery
  - Seawater desalination
- Issue paper input and discussion
  - Recycled water
  - Seawater desalination
  - Graywater
  - Stormwater
  - Synergy

IRP Local Resources

Meeting 2 of 2

- Review of technical modeling and assumptions
  - Surface water
  - Los Angeles Aqueduct
- Issue paper addendum outline
- Review of local projects inventory
  - Quantification of potential development
- Other local resources topics
  - Foundational actions
  - Local resources and the WSAP
  - Water-energy nexus

Review of Modeling Forecast and Assumptions

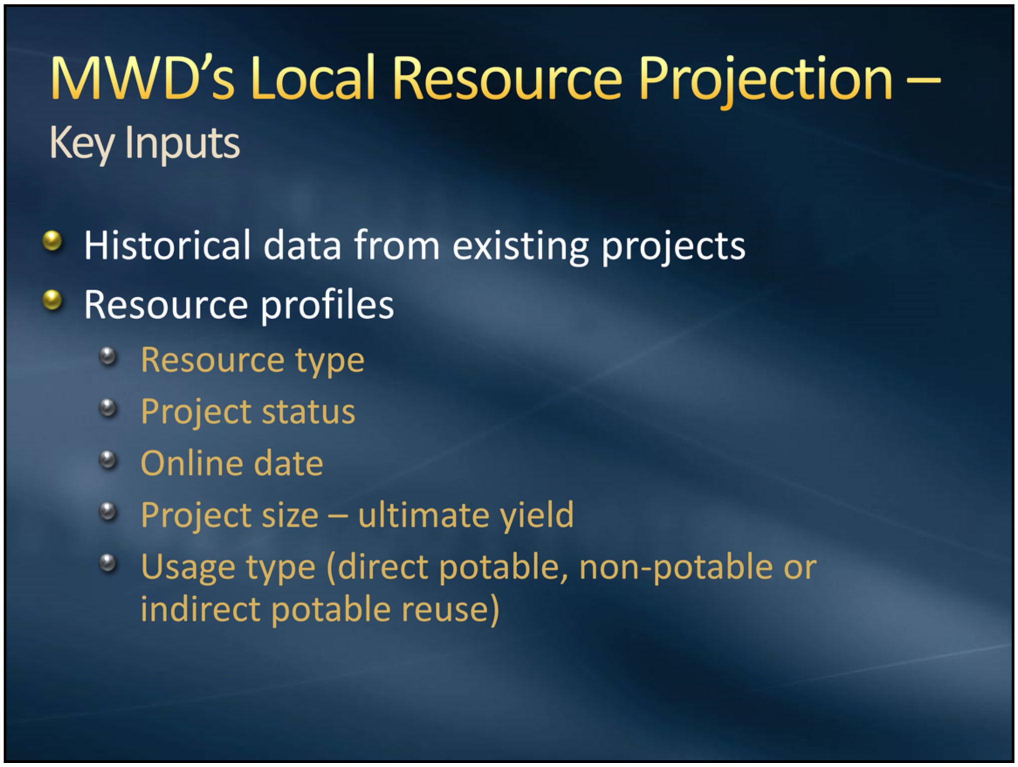


In this part of the presentation, I will be going over our forecasting methodology for local resources.

First, I will address our concerns with projections from member agencies. And then summary.

Long-term local resource projections tend to rely on professional judgment that resulted in optimistic forecasts by projecting at full capacity or ultimate yield, though sometimes not supported by historical data. I will show you later in the presentation why projecting at ultimate yield is too optimistic compared to past production.

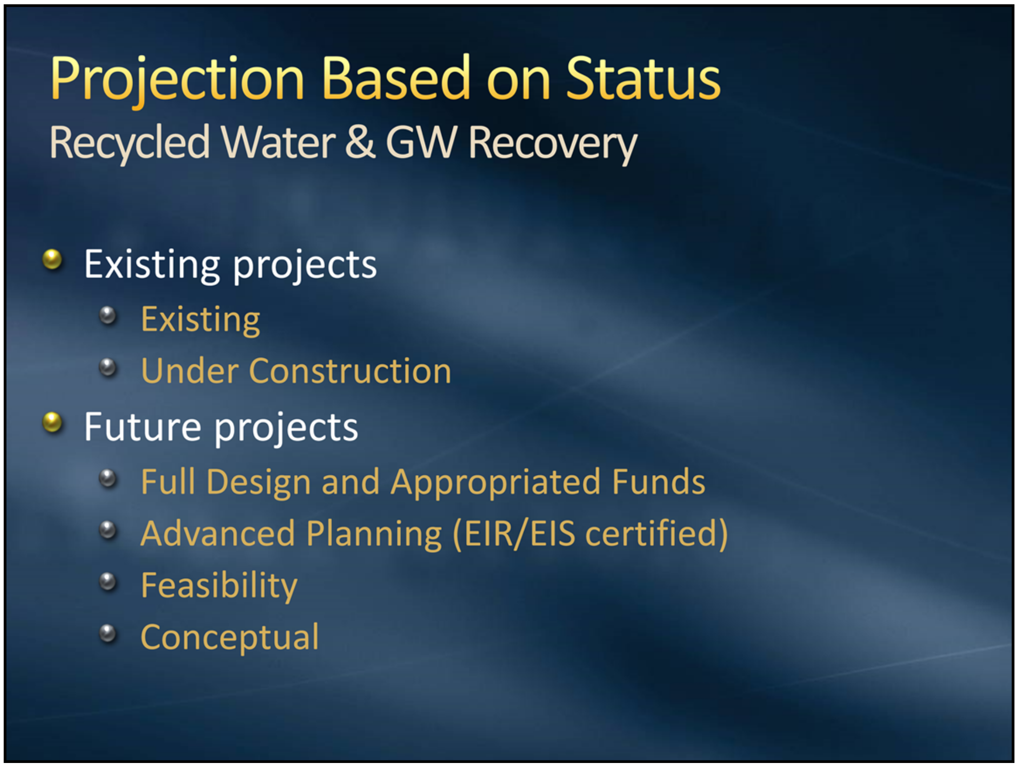
On the regional level, it is every difficult to compare and aggregate local resource forecasts when different forecasting methodologies are used.



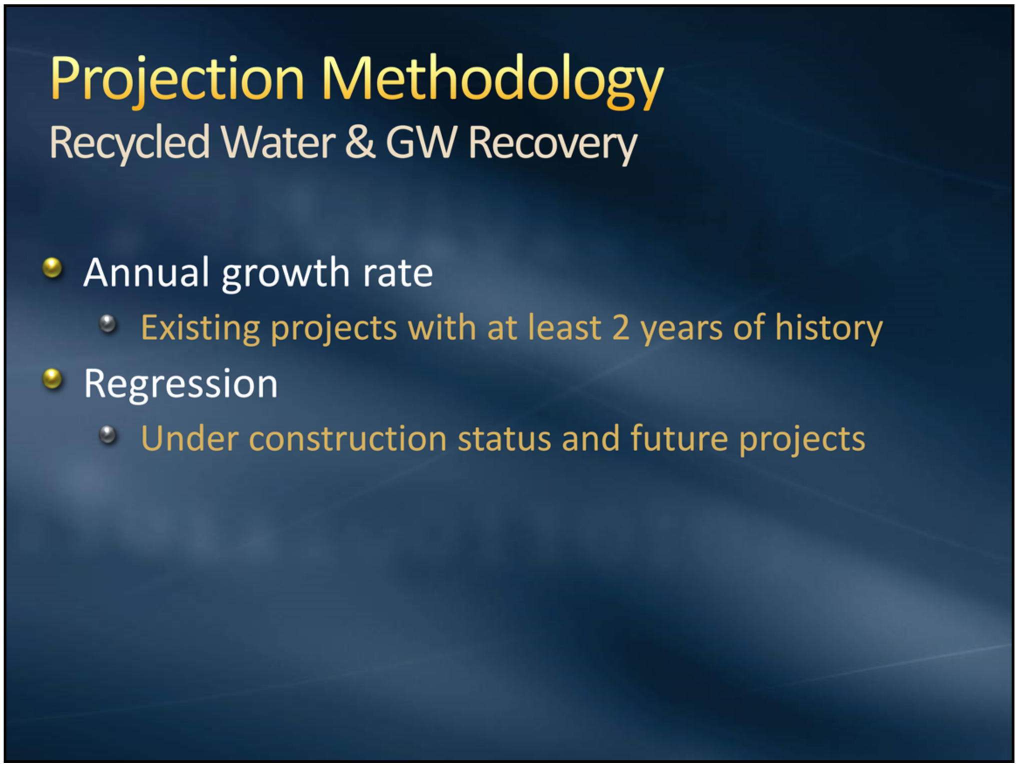
We use historical data to help us develop long-term forecasts for existing and future projects.

The forecast models consider the following resource profiles…

Resource types: recycled water, groundwater recovery, and seawater desalination
Project status: Existing, under construction, full design & appropriated funds, advanced planning (EIR/EIS certified), feasibility, and conceptual
Usage type: in this case, indirect potable reuse takes on a different growth profile.



Projects are grouped into 2 categories, by status. The first category is made up of existing projects that are already producing and projects that are under construction. Second category is future projects with statuses ranging from full design and appropriated funds to conceptual.



For existing projects, we use historical production to formulate the annual rate of growth.

Future projects, we use historical production data to develop regression models.

Projects with 1 year of production uses the maximum of the first year production value or regression-based estimate.

Existing Projects: Annual Growth Rate

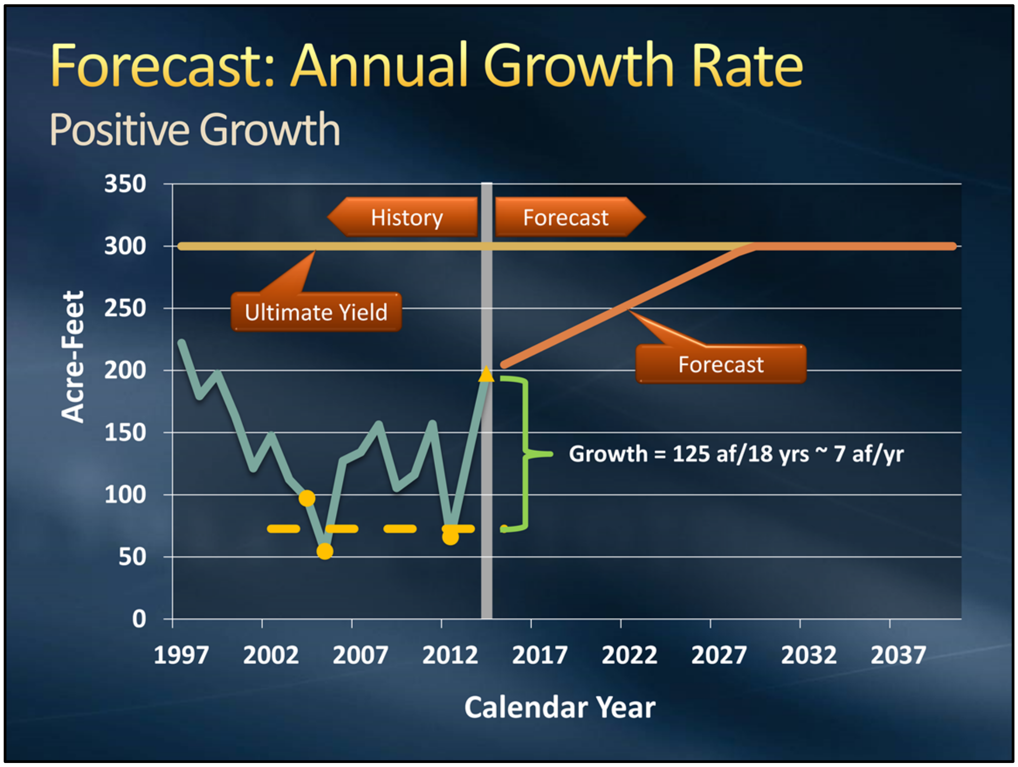
- Based on production data
  - 3 lowest historical and most recent year production values
  - Number of years in operation
  - Less affected by fluctuations in production
  - Applied to all existing local resource projects

$$annual\ growth\ rate = \frac{last\ year's\ production\ - avg.(3\ lowest\ values)}{total\ number\ of\ production\ years}$$

The annual growth rate is the difference between the last year’s production and the average of 3 lowest production values, divided by the number years in operation.

This growth rate is then applied to every forecast year, capping at the project ultimate yield.

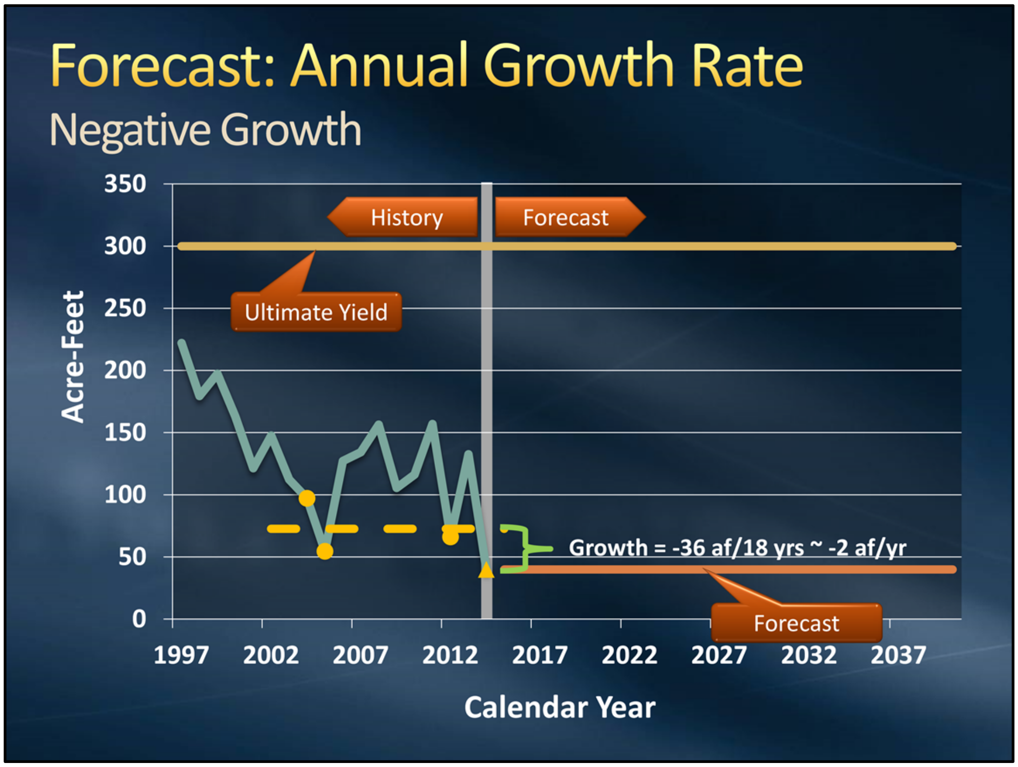
This method is less affected by production fluctuations seen in most projects.



Here's an example.

This is 18 years of production history. The 3 yellow dots are the lowest production values and the yellow triangle is last year's production.
For whatever reasons, the production fluctuates between 150 and 50 acre-feet in the past 13 years. In 2014, it produced almost 200 acre-feet. In 18 years of production, it never reach its ultimate yield, 300 acre-feet.

The annual growth rate takes difference between the last year's production, about 200 AF and the average of the 3 lowest values, about 70 AF. The difference is divided by the number of production years, 18 years. The growth rate is 7 AF/Yr. We apply this growth rate every year until it reaches the ultimate yield, at 300 AF and capped it there.



So, what if last year's production fell below the average of the 3 lowest values? This results in a negative growth rate.

In this case, we set the projection at the same value as the last projection year. We would not have a declining projection.

This approach gives the project the benefit of the doubt that, at the minimum, it will perform at the same level as last year, not worst.

Future Projects: Regression-Based

Recycled Water

- Four different regression equations
  - Based on existing production history
  - Separated by project size, except for IPR
  - Estimating production over time

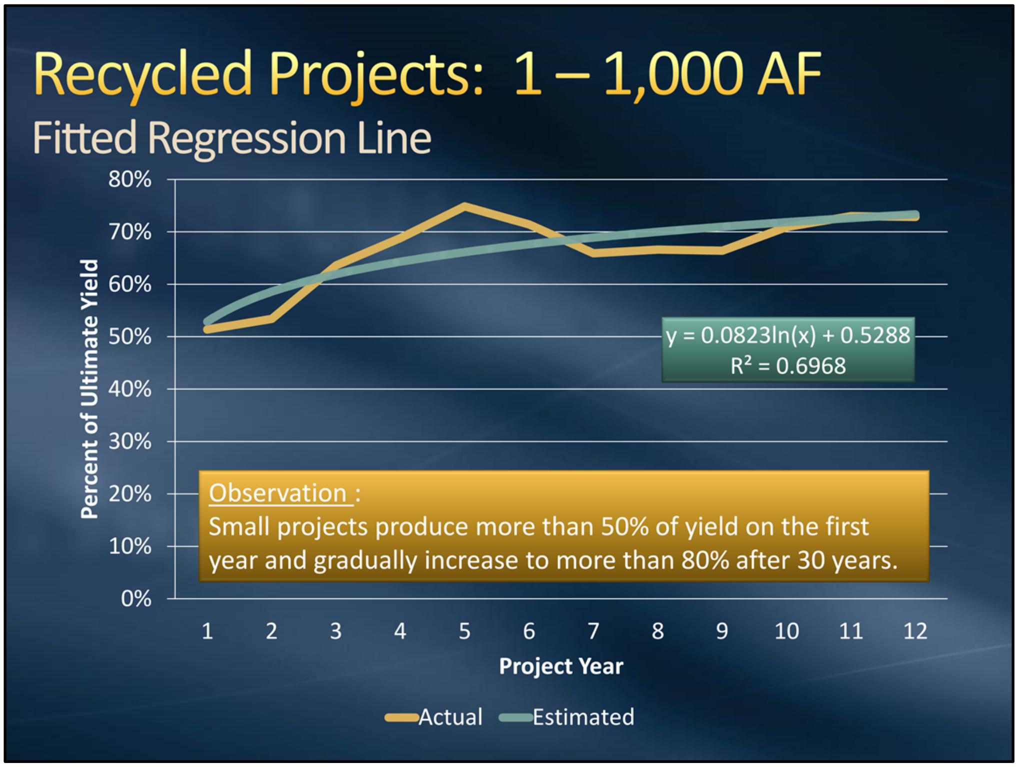
Project Capacity (AF)	Functional Form	No. of Project Years	No. of Projects	R^2
1-1000	Linear-Log	12	34	0.70
1001-5000	Linear-Log	11	20	0.84
5001+	Linear-Linear	17	10	0.97
IPR	Linear-Log	6	2	0.85

For future projects, we develop regression-based models using on historical data.

We analyzed the data we have from the past 2 decades created 4 different classes of models based on sizes and use to improve the forecasts.

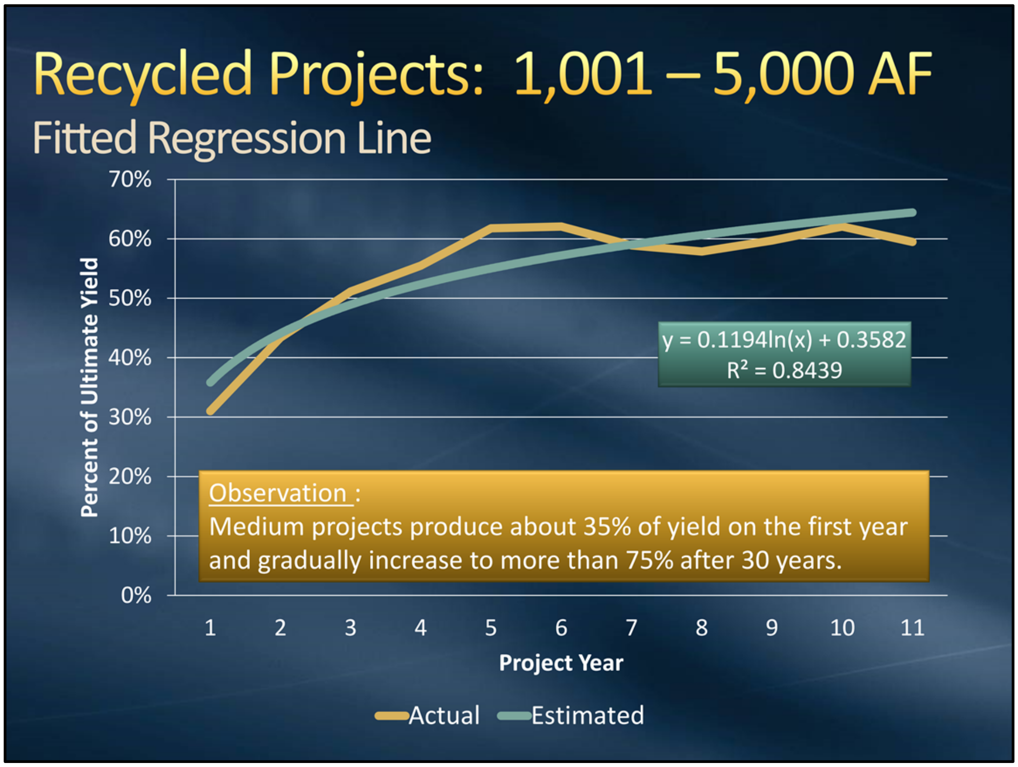
We saw by grouping the projects by these sizes, there is a slightly different production growth pattern.

Lastly, we saw a different growth rate for Indirect Potable Resuse, especially for advanced treated water. In this case, we created a model based on OCWD's GWRS projects. We feel that if other IPR from advanced treated water will have a similar ramp rate.

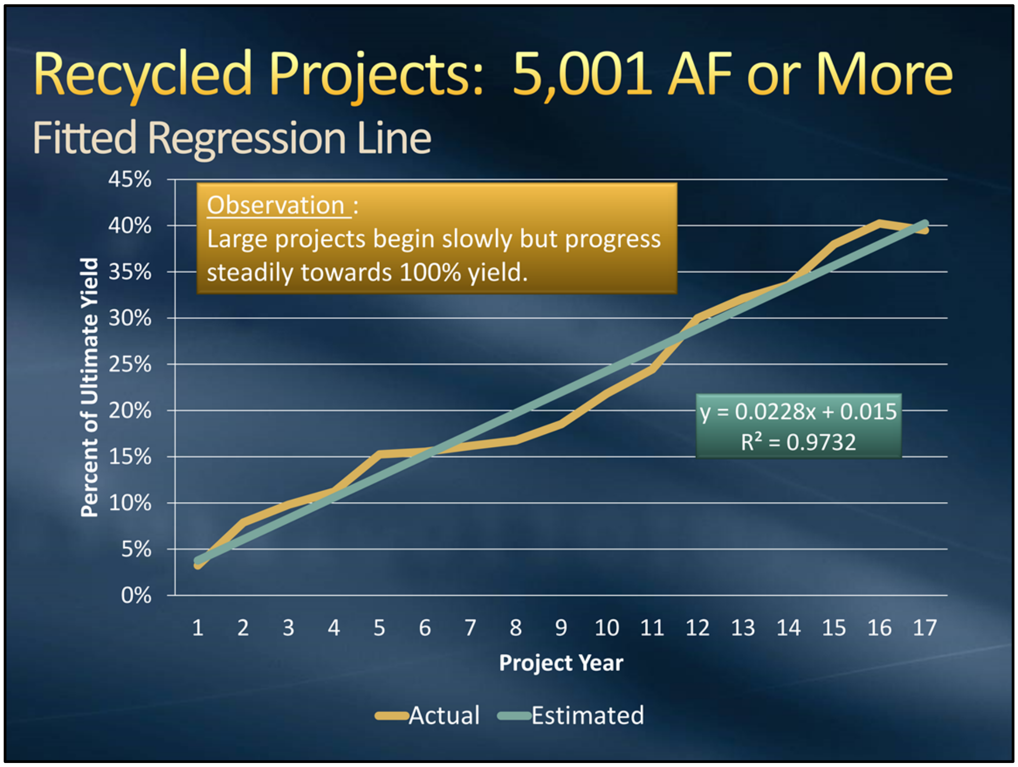


Here's the regression equation for projects size from 1 to 1000 AF. The brown line is the historical production expressed in percent of ultimate yield. The blue line is the fitted regression line. The R-squared is 0.70. Statistically speaking, it's a relatively good fit.

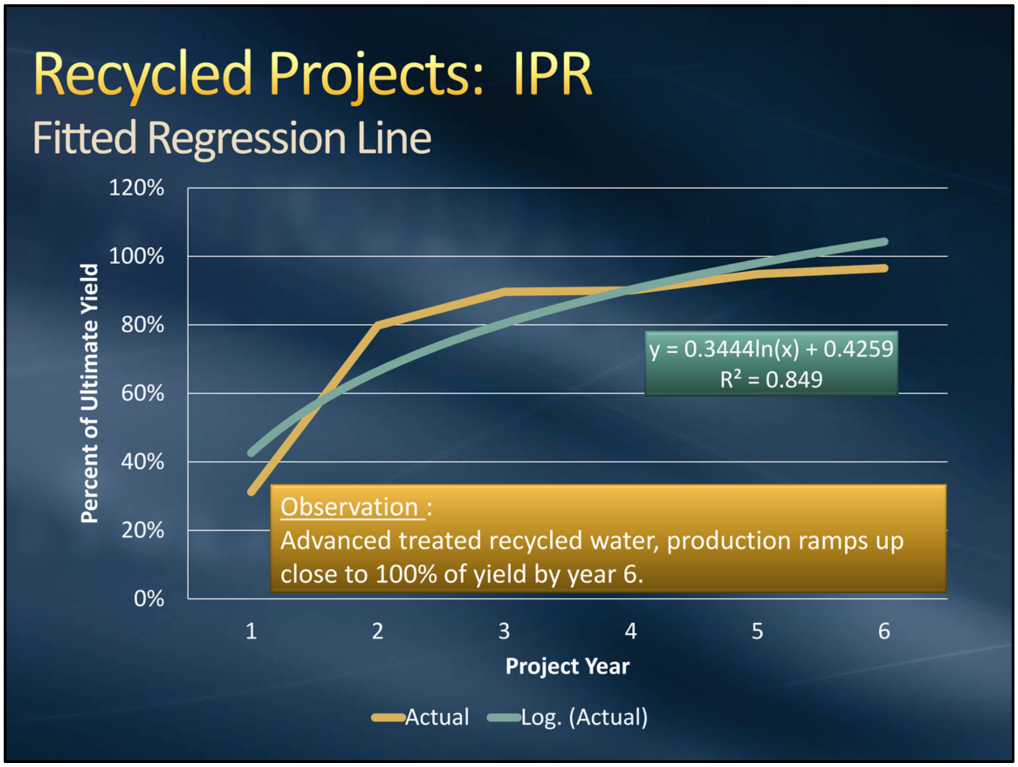
R-squared is a statistical measure of how close the data are to the fitted regression line.



This is regression is for projects between 1001 and 5000 AF.



This is for large projects. The growth rate is linear over time, eventually reaching 100 percent of ultimate yield.



Lastly, this graph uses the 6 years of data from GWRS. The fitted regression line reaches 80% by year 3 and nearly 100% by year 6. The projection would cap at ultimate yield.

Recycled Water – Expected Yield
By Project Size and Year

Project Capacity (AF)	Year					
	1	10	20	30	40	50
1-1,000	53%	72%	78%	81%	83%	85%
1,001-5,000	36%	63%	72%	76%	80%	83%
5,001+	4%	24%	47%	70%	93%	100%
IPR	31%	+97%				

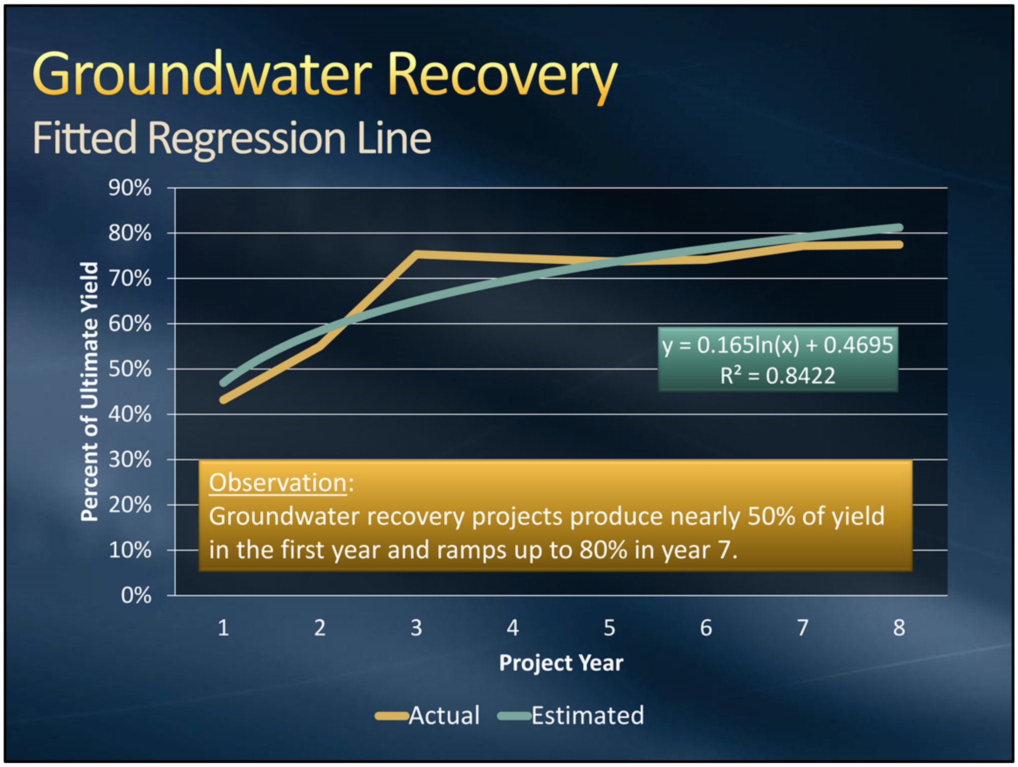
This table shows the results of each of the model.

Future Projects: Regression-Based
Groundwater Recovery

- One regression equation
  - Based on existing project production history
  - Estimating production over time

Project Capacity (AF)	Functional Form	No. of Project Years	No. of Projects	R^2
All	Linear-log	8	20	0.84

We use the same approach to forecasting future groundwater recovery projects.

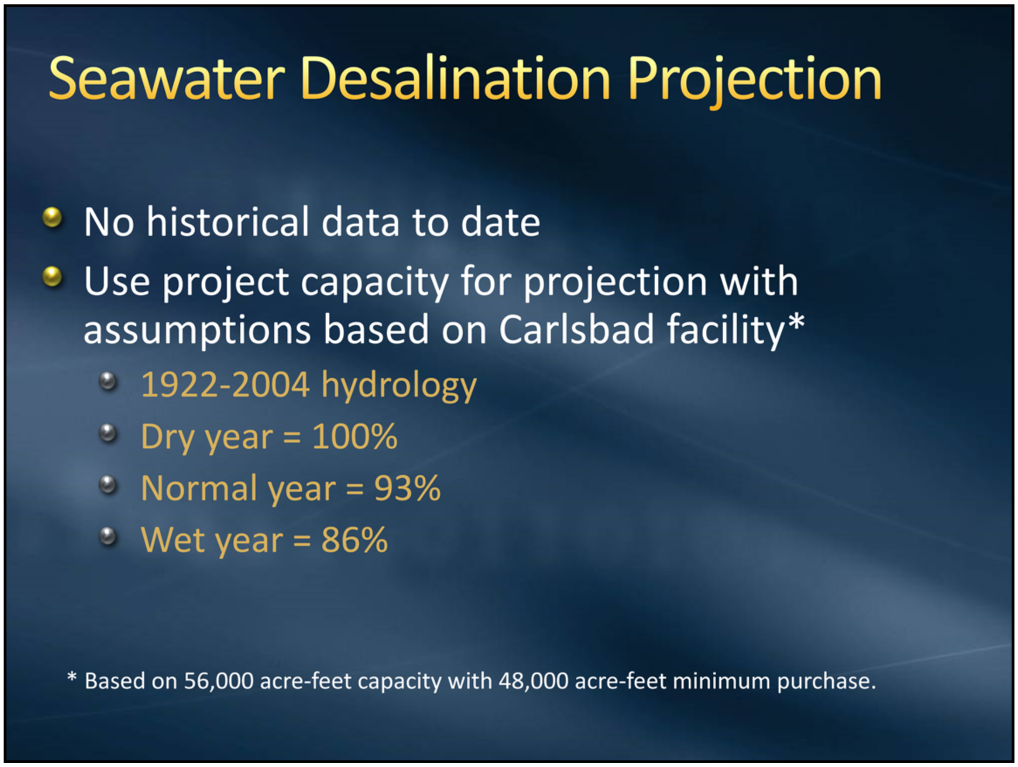


The fitted regression line reaches 80% of ultimate yield in 7 years.

GW Recovery – Expected Yield

Project Capacity (AF)	Year			
	1	10	20	30
All	47%	85%	96%	100%

The result of the regression model for groundwater recovery projects.

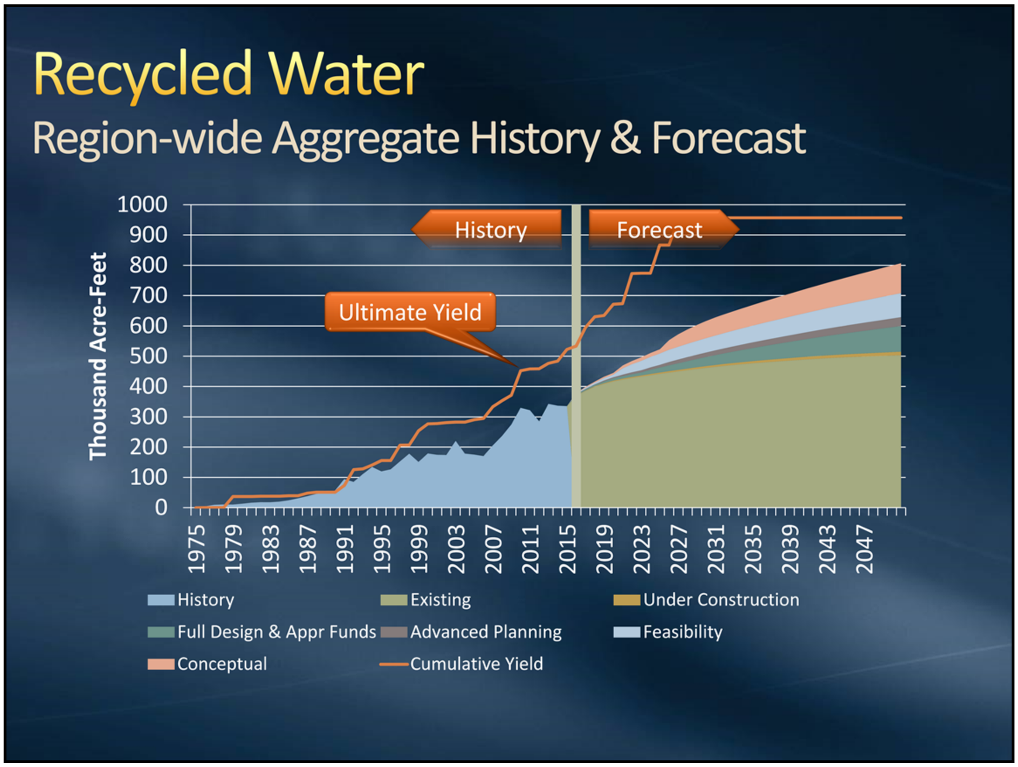


To date, we do not have historical production data for seawater desalination projects.

In this case, we use the best information we have on hand: Carlsbad Seawater Desalination Project.

The project parameter is a minimum production of 48,000 AF for wet years and 56,000 for dry-year. Normal year assumes 52,000 AF.

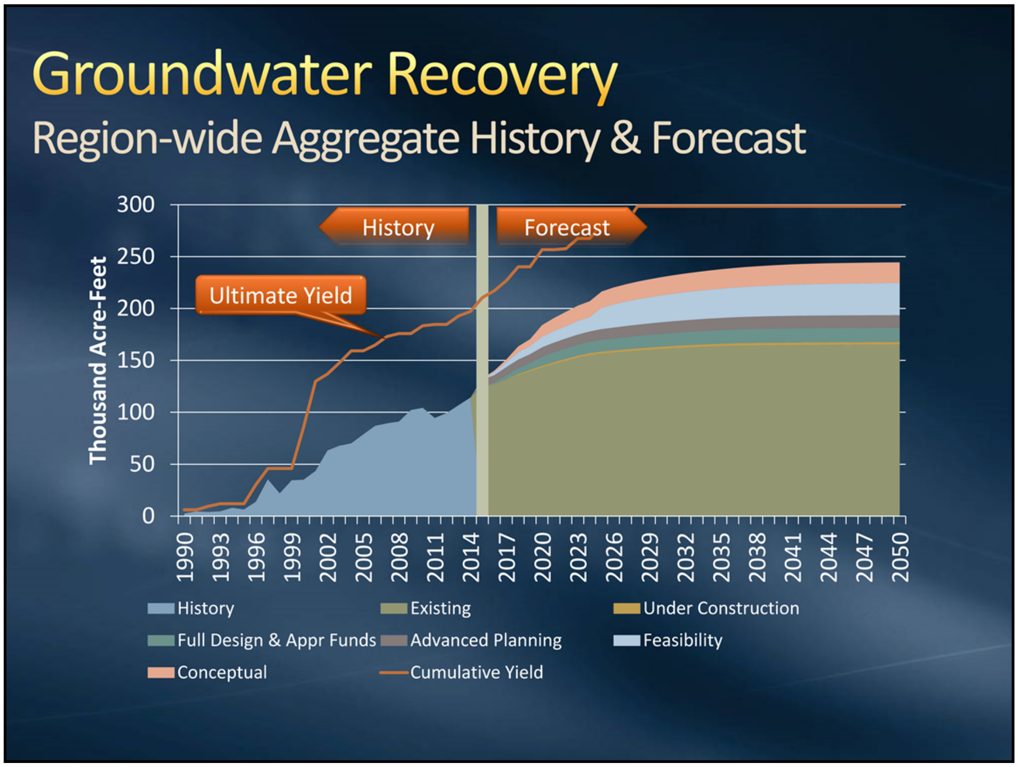
Model Output



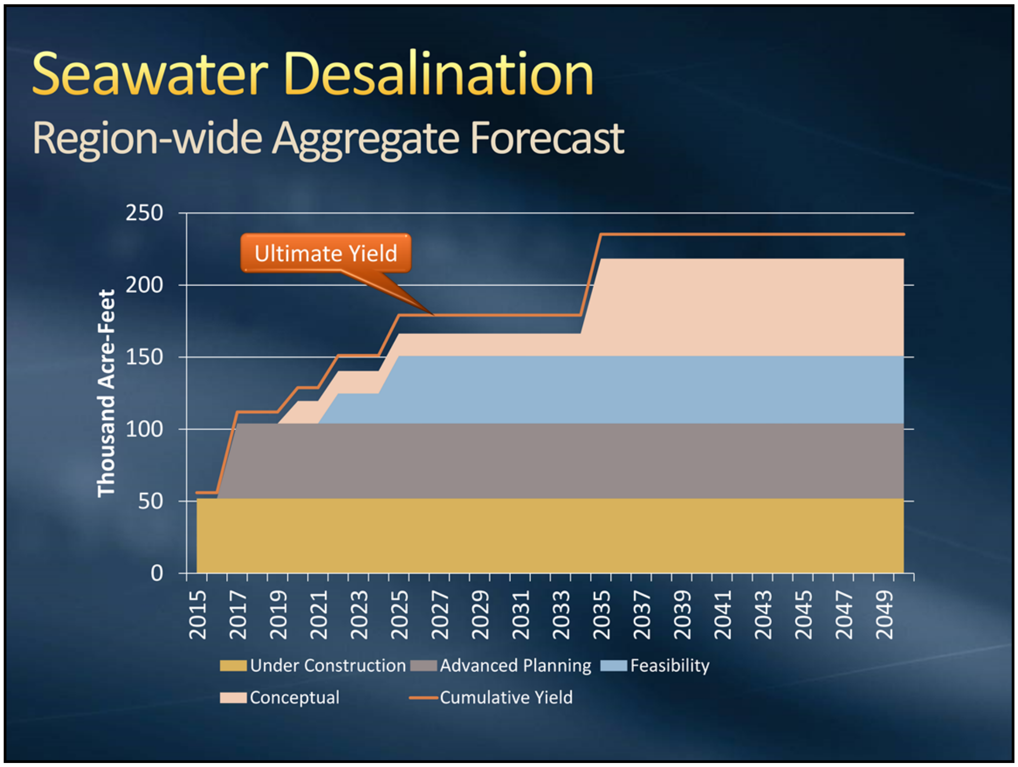
This graphic shows historical production, forecasts by status, and the cumulative yield.

Notice how the production is lower than the ultimate yield for most the 40 years history.

The results from our forecasting models follows the same trend. Numerically, it's about 15% below the ultimate yield in 2050.



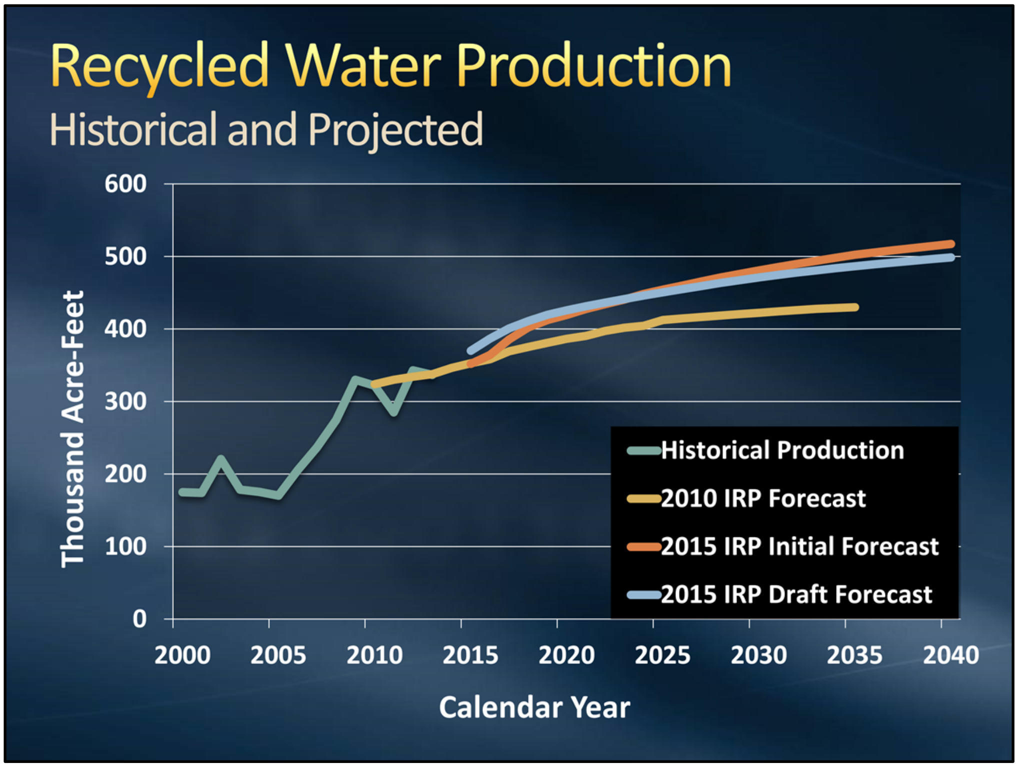
This graphic shows the model results for groundwater recovery.



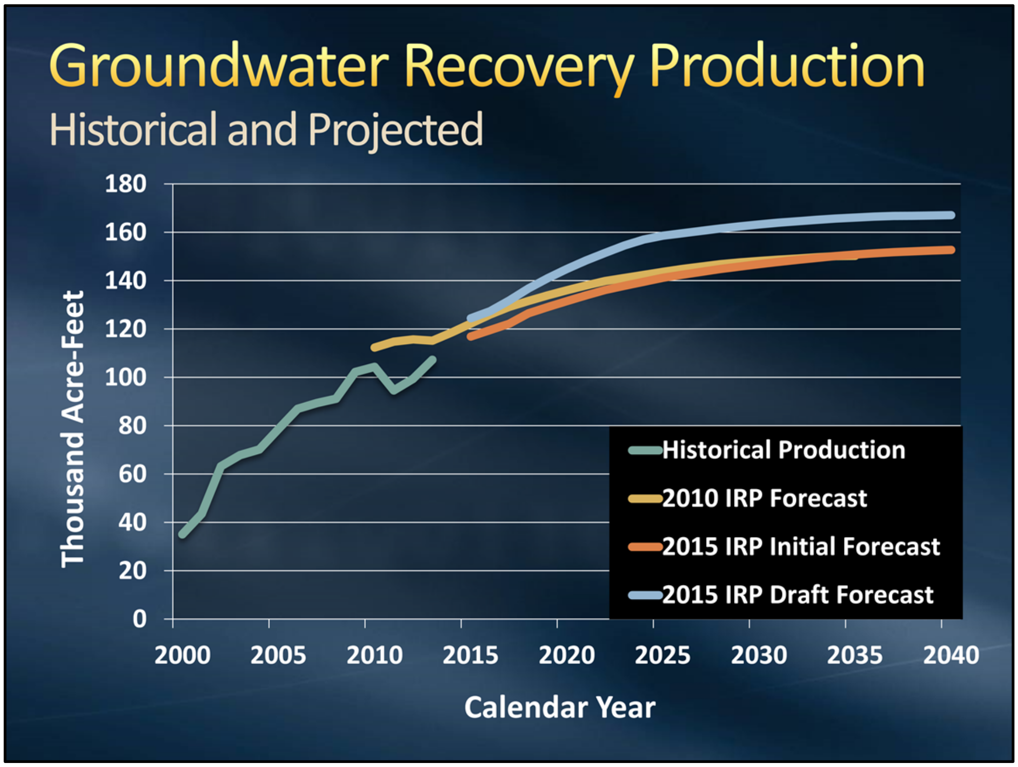
Based on our assumptions, the seawater desalination projections are about 8% below ultimate yield. We feel this forecast is reasonable because of down time for maintenance.

Base Forecast

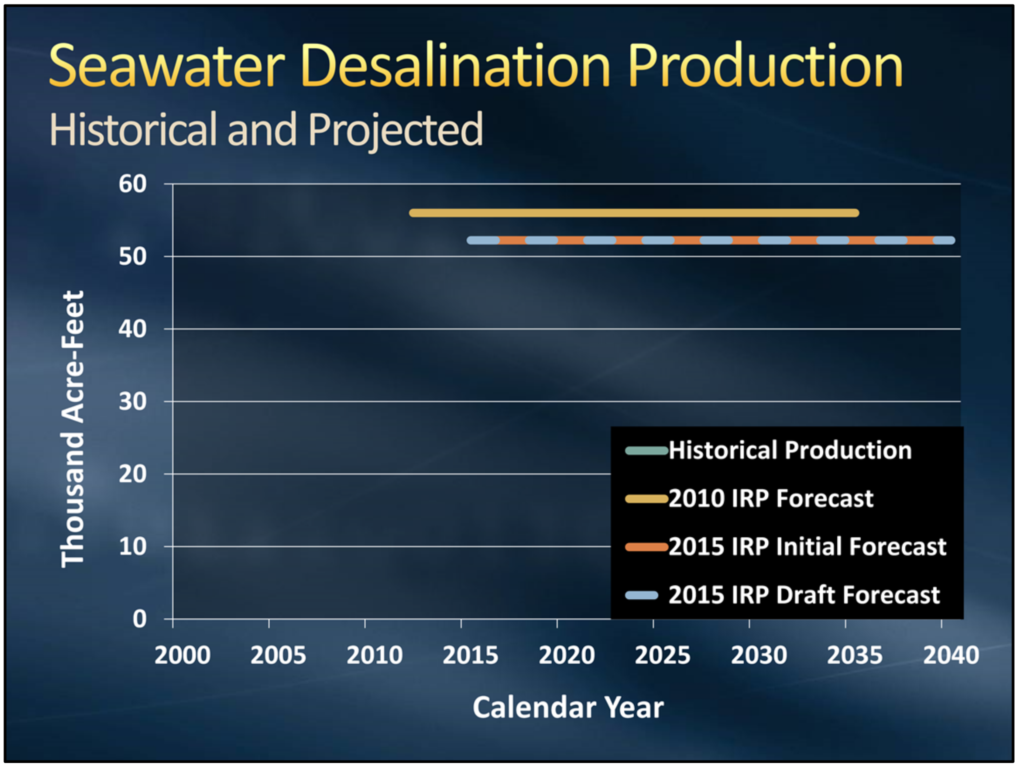
(Existing & Under Construction Projects)



Since the 2010 IRP, XXX TAF had been added to Metropolitan's Local Resources Program. In addition, XXX acre-feet had been added without Metropolitan's financial assistance.



Mike, what changed from 2010 to 2015 so that forecast is less?



56,000 is max capacity (dry-year production)
48,000 is average year production (average and wet year production)
Graph shows 52,240 as average based on hydrology

We feel that there should be a consistent methodology for forecasting local resources projects in our service area.


Issue Paper Input and Discussion

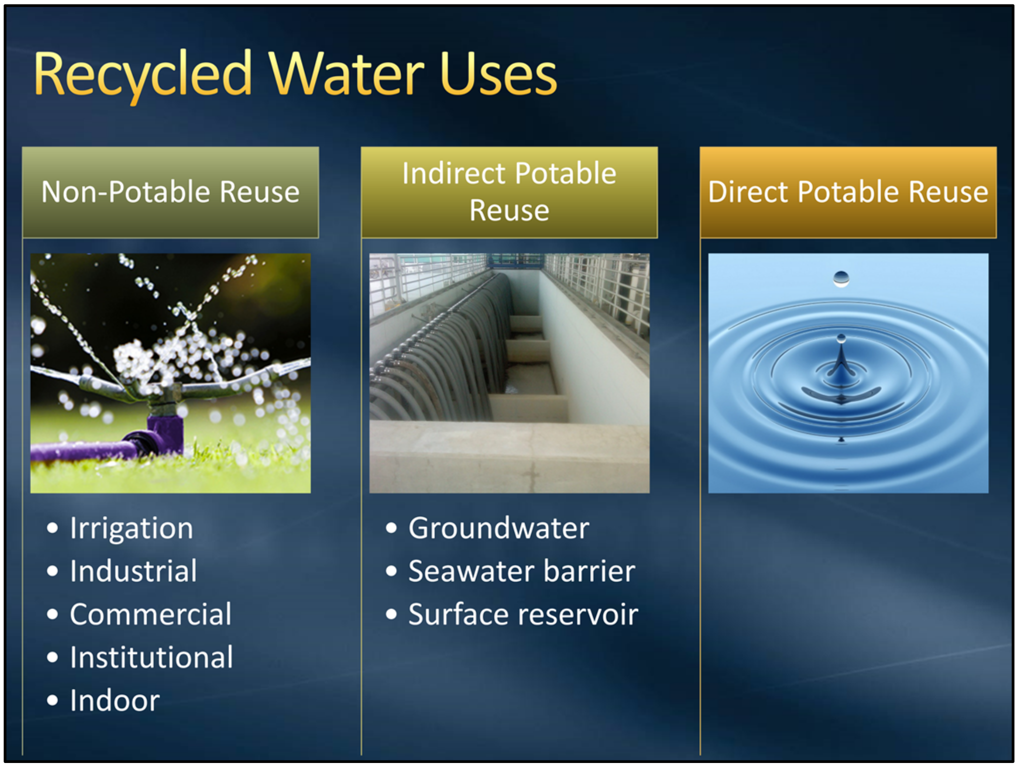
Information for the IRP can be placed into three categories (information that…):

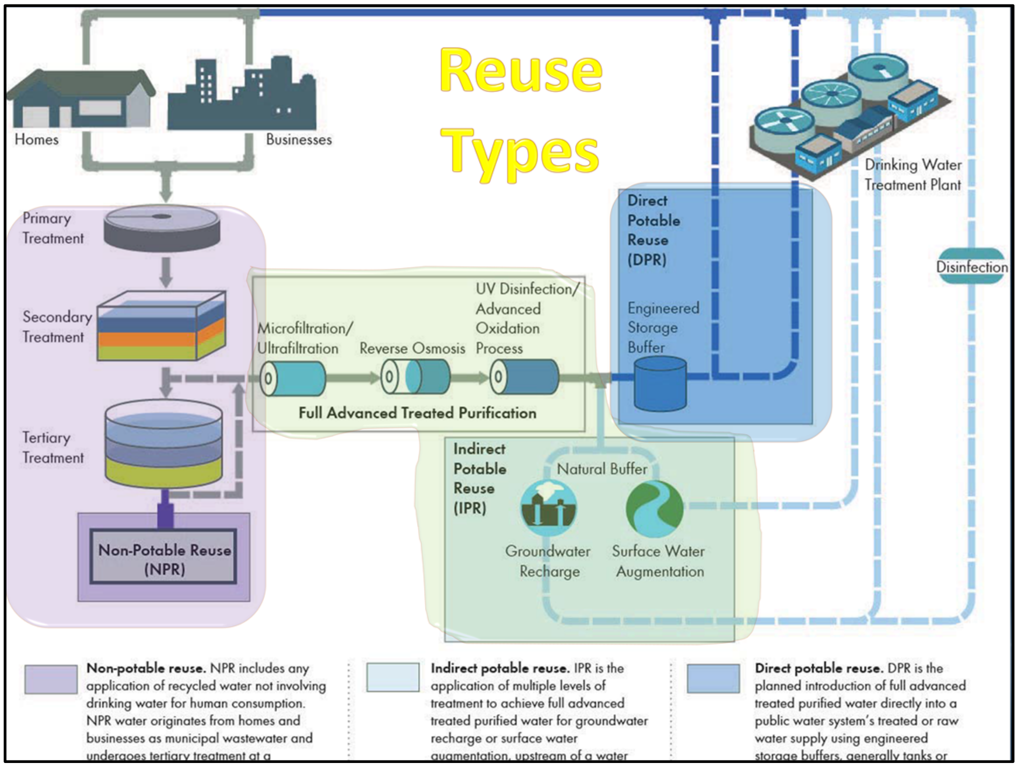
1) Informs the forecast
2) Feeds the issue paper (discuss conservation issues)
3) Will be flagged to add to a subsequent Board discussion on policies and implementation

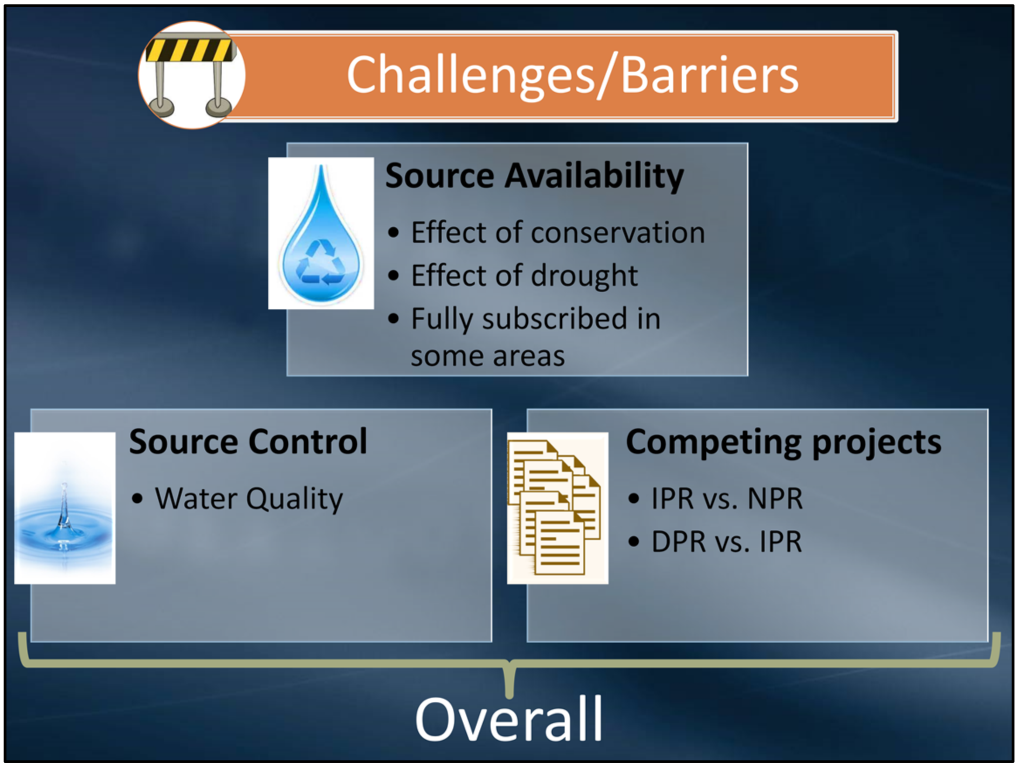
All three feed the policy implementation discussion

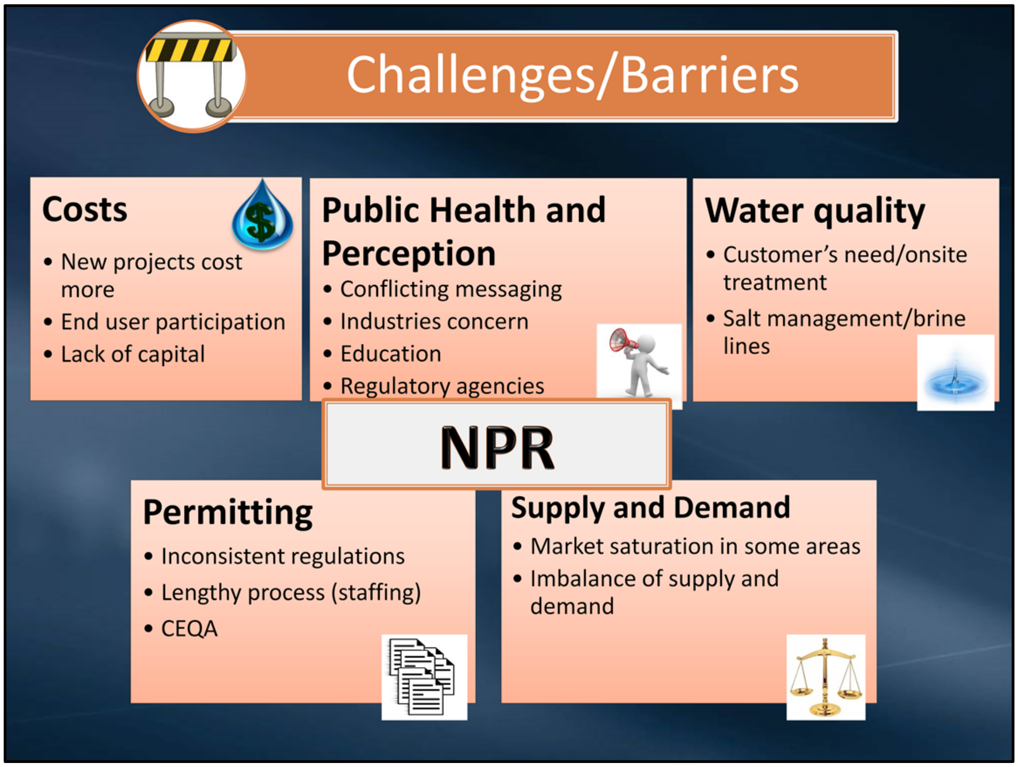
Also have flagged (and will continue to flag) policy items, which we will go through at the end

Recycled Water

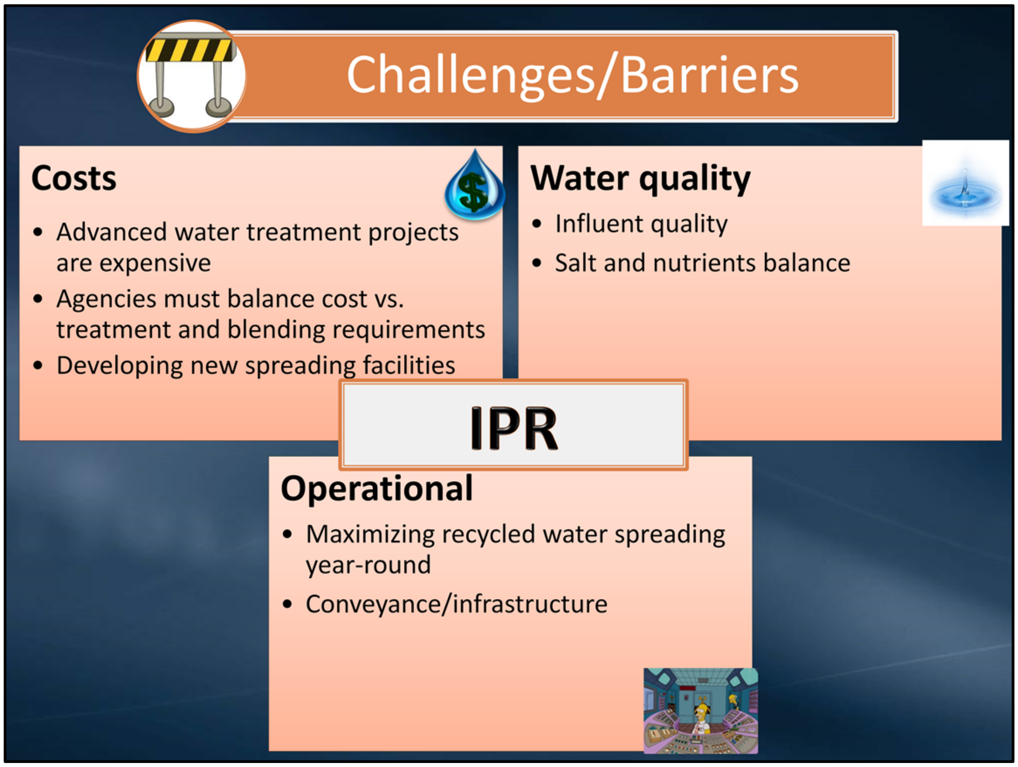

Recycled Water Uses
Non-Potable Reuse
Indirect Potable Reuse
Direct Potable Reuse
• Irrigation
• Industrial
• Commercial
• Institutional
• Indoor
• Groundwater
• Seawater barrier
• Surface reservoir


Reuse Types
Homes
Businesses
Primary Treatment
Secondary Treatment
Tertiary Treatment
Non-Potable Reuse (NPR)
Microfiltration/ Ultrafiltration
Reverse Osmosis
UV Disinfection/ Advanced Oxidation Process
Full Advanced Treated Purification
Direct Potable Reuse (DPR)
Engineered Storage Buffer
Drinking Water Treatment Plant
Disinfection
Indirect Potable Reuse (IPR)
Natural Buffer
Groundwater Recharge
Surface Water Augmentation
Non-potable reuse. NPR includes any application of recycled water not involving drinking water for human consumption. NPR water originates from homes and businesses as municipal wastewater and undergoes tertiary treatment at a
Indirect potable reuse. IPR is the application of multiple levels of treatment to achieve full advanced treated purified water for groundwater recharge or surface water augmentation, upstream of a water
Direct potable reuse. DPR is the planned introduction of full advanced treated purified water directly into a public water system's treated or raw water supply using engineered storage buffers, generally tanks or

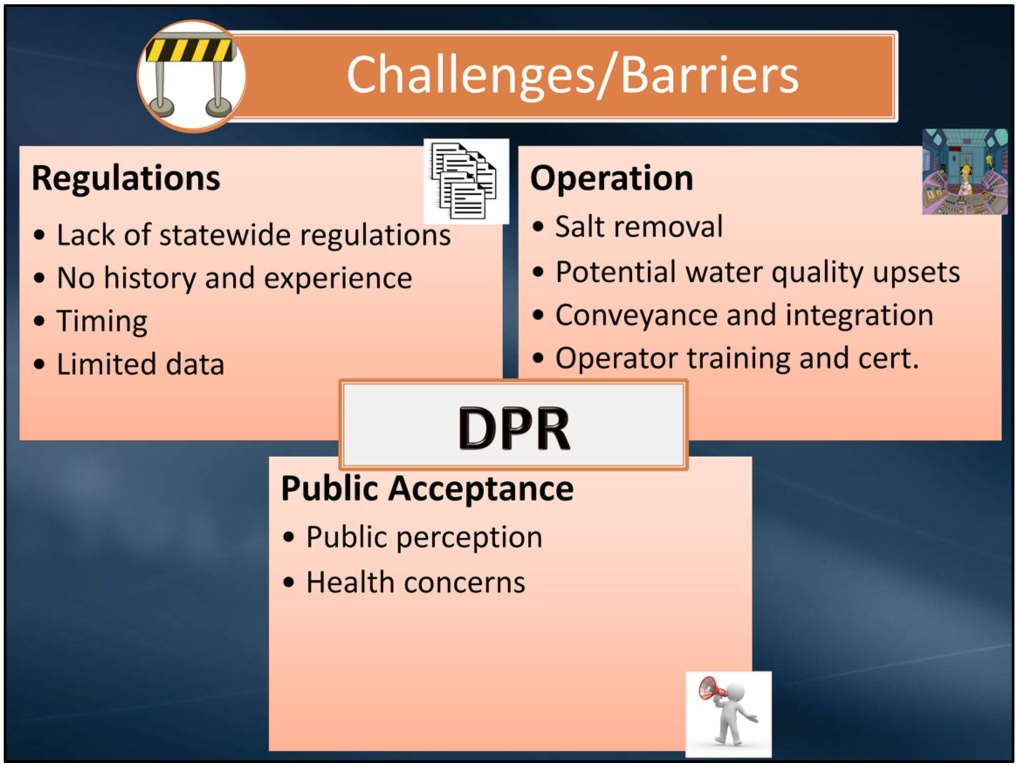

Challenges/Barriers
Source Availability
• Effect of conservation
• Effect of drought
• Fully subscribed in some areas
Source Control
• Water Quality
Competing projects
• IPR vs. NPR
• DPR vs. IPR
Overall



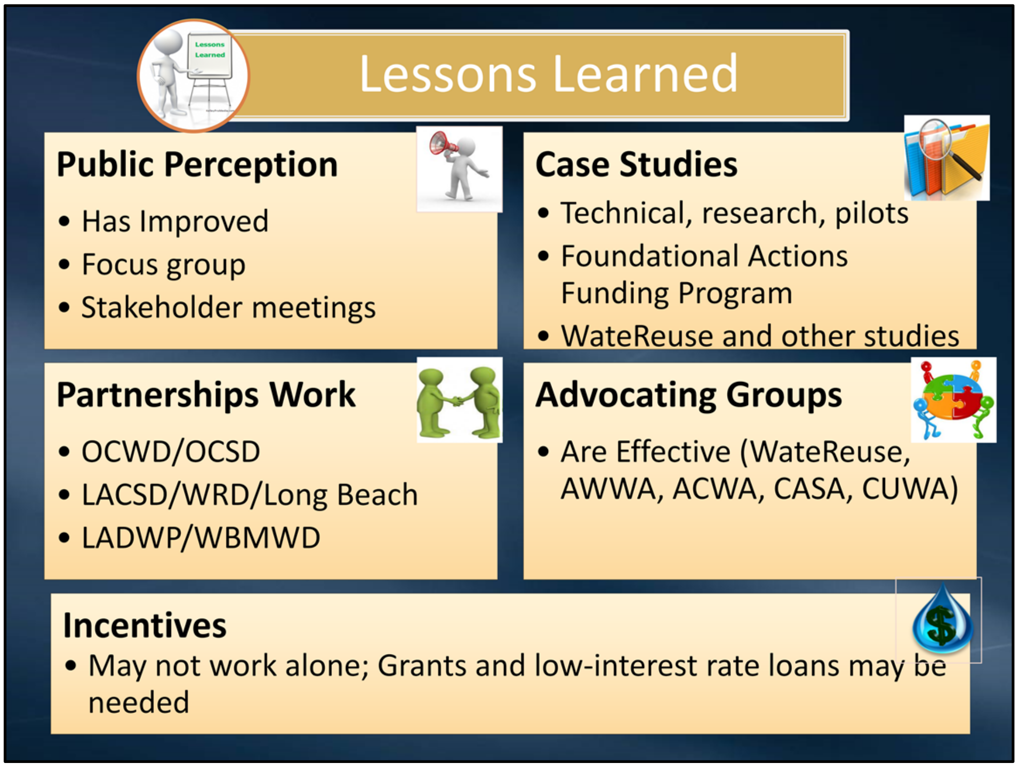
under costs – talk about increased LRP incentives but not much activity
Regulatory – consider as " waste" and perceived health impact and educate
Under CEQA – talk about process and 8 mile exemption. CEQA for similar projects



IPR has some similar issues with NPR. Here I am highlighting different issue pertaining to IPR


Challenges/Barriers
Regulations
• Lack of statewide regulations
• No history and experience
• Timing
• Limited data
Operation
• Salt removal
• Potential water quality upsets
• Conveyance and integration
• Operator training and cert.
DPR
Public Acceptance
• Public perception
• Health concerns

Opportunities
Technical
• Technological advancement
• Real-time monitoring
• Information sharing
• Studies (e.g. GIS)
Regulatory
• Recent changes to recharge regulations
• Upcoming regulations on surface water augmentation and DPR
Partnerships
• Among wastewater and water supply agencies
• Public outreach and education
Funding
• Prop. 1
• MWD's LRP and ORP; SDCWA's RWDF
• Partnerships
• Drought induced projects


Lessons Learned
Public Perception
• Has Improved
• Focus group
• Stakeholder meetings
Case Studies
• Technical, research, pilots
• Foundational Actions Funding Program
• WateReuse and other studies
Partnerships Work
• OCWD/OCSD
• LACSD/WRD/Long Beach
• LADWP/WBMWD
Advocating Groups
• Are Effective (WateReuse, AWWA, ACWA, CASA, CUWA)
Incentives
• May not work alone; Grants and low-interest rate loans may be needed

Recommendations

Legislation

- Continue work with member agencies on legislations to facilitate increased recycled water use

Studies

- Technical research, planning studies
- GIS map - potential projects
- Explore integrating approaches

Partnerships

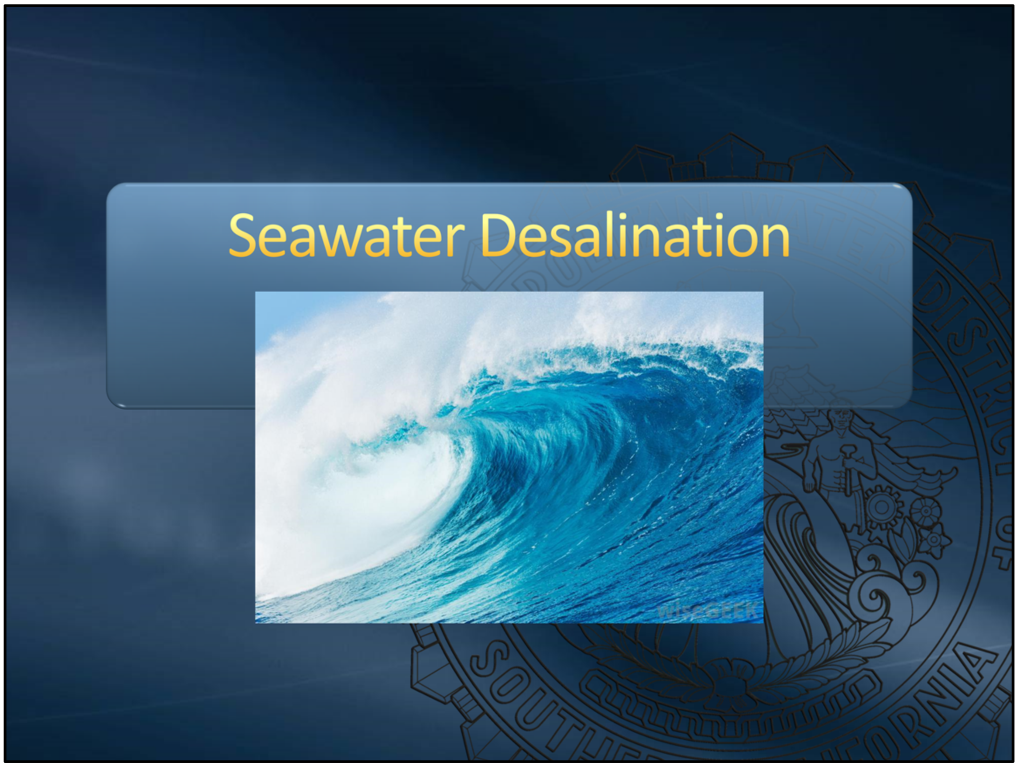
- Explore opportunities to partner with water or wastewater agencies to develop recycled water projects

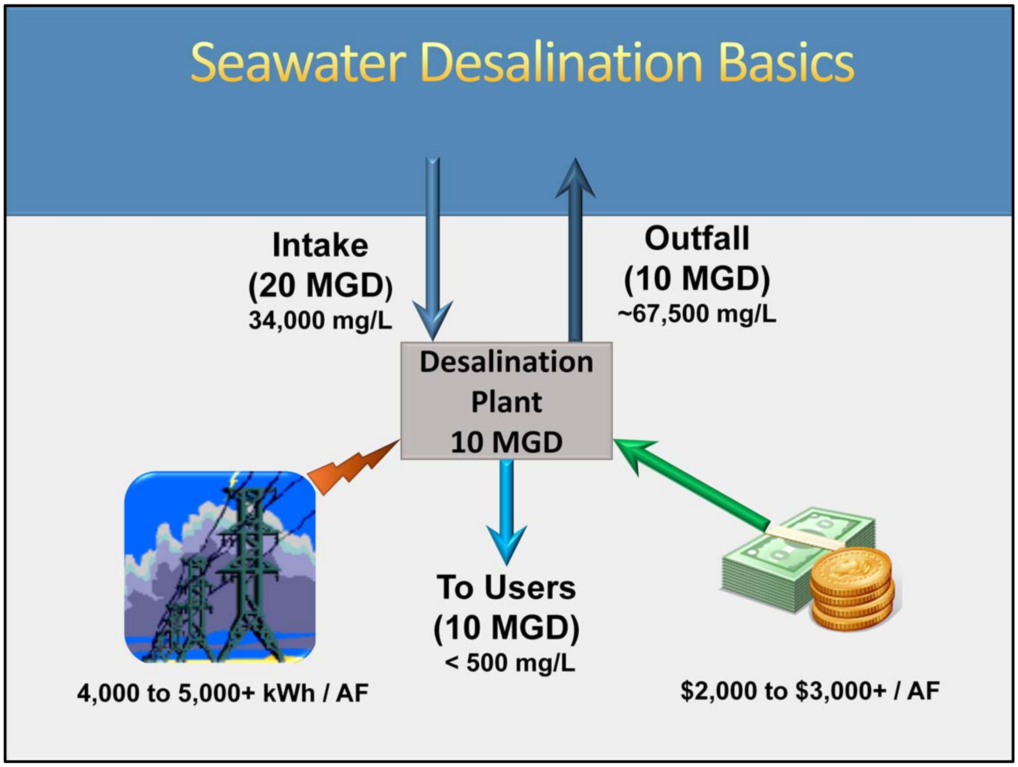
Education

- Regional uniform messaging

Overall

Explore research opportunities & tech development; Develop information sharing opportunities; Explore integrating approaches


Seawater Desalination


Seawater Desalination Basics
Intake
(20 MGD)
34,000 mg/L
Outfall
(10 MGD)
~67,500 mg/L
Desalination
Plant
10 MGD
To Users
(10 MGD)
< 500 mg/L
4,000 to 5,000+ kWh / AF
$2,000 to $3,000+ / AF

Background

Overview

- Worldwide acceptance

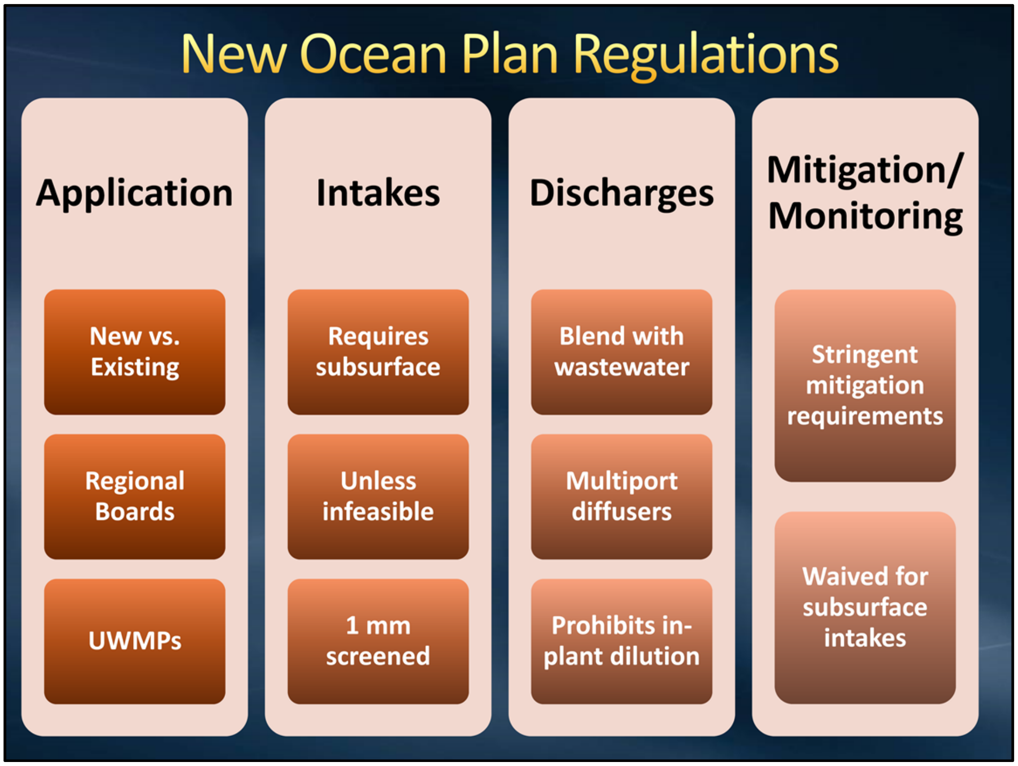
Benefits

- Supply diversity
- Reliability / resiliency
- Water quality, flexibility

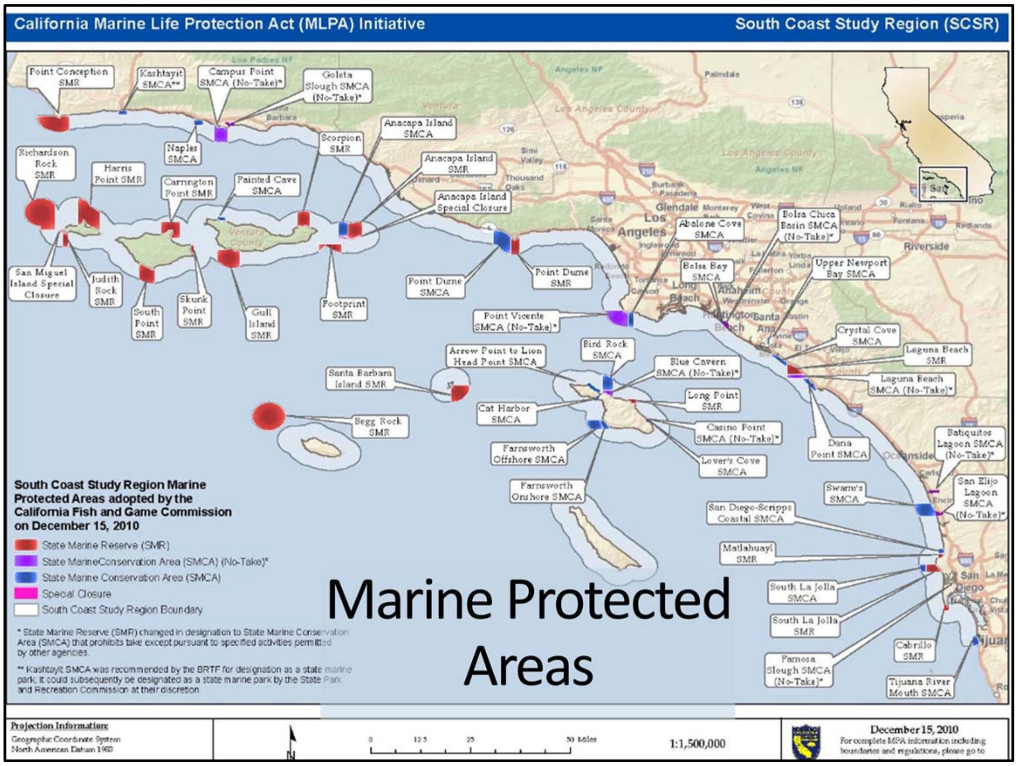
Project Status Update

- Need project updates


Challenges/Barriers
Environmental
• California's marine environment is fragile
Ocean Plan Regulations
• Application
• Intakes, outfalls, and discharge limitations
• Mitigation and monitoring
Permitting
• Coastal Commission Intake Expert Panel
• Once Through Cooling
• Marine Protected Areas


New Ocean Plan Regulations
Application
New vs. Existing
Regional Boards
UWMPs
Intakes
Requires subsurface
Unless infeasible
1 mm screened
Discharges
Blend with wastewater
Multiport diffusers
Prohibits in-plant dilution
Mitigation/ Monitoring
Stringent mitigation requirements
Waived for subsurface intakes

Marine Protected Areas



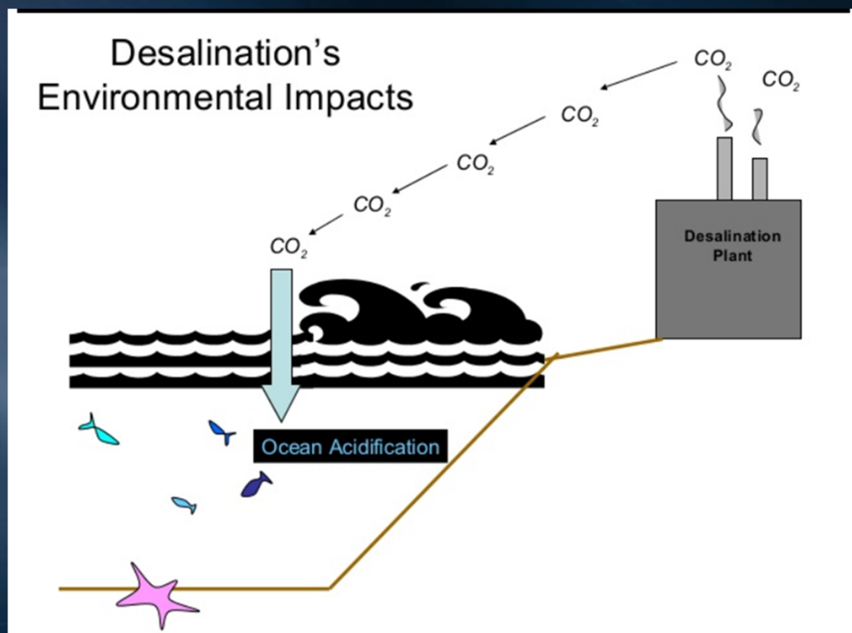
Challenges/Barriers

Costs
- Capital and unit costs
- Pre-construction costs

Energy
- Energy use / GHG emissions
- Sea level rise

Communication
- Local community opposition
- Public perception

Anti-Desalination Messaging



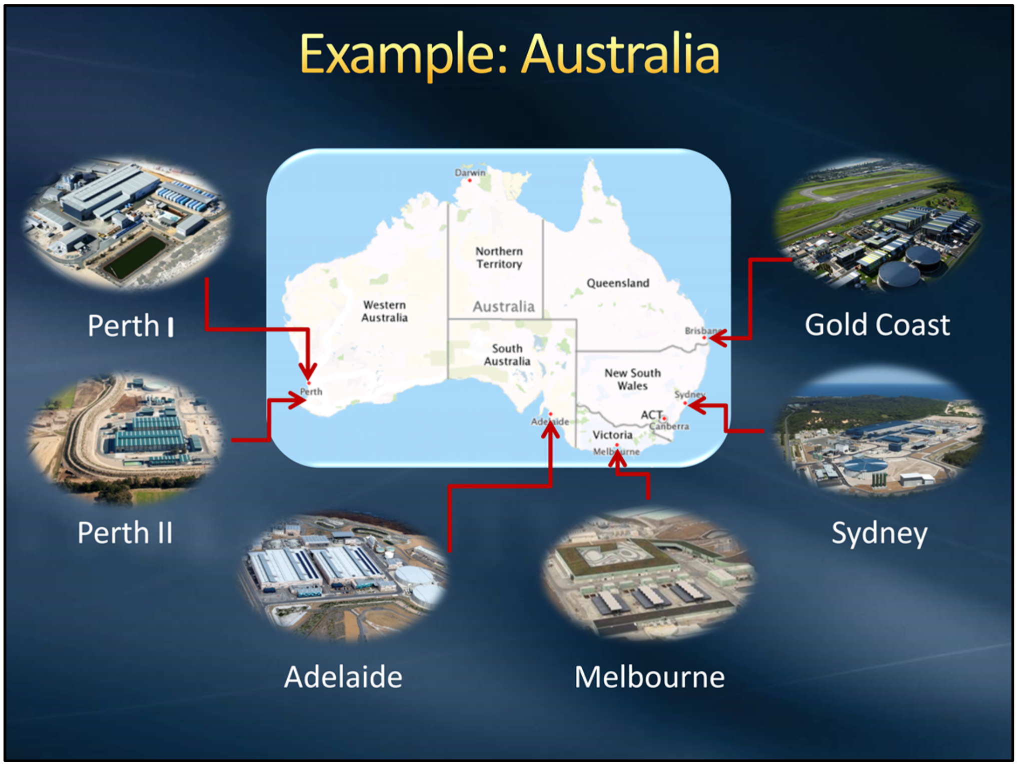
http://doconmontereybay.org/2010/12/06/desalination-of-the-sea-around-us-2/

Lessons Learned

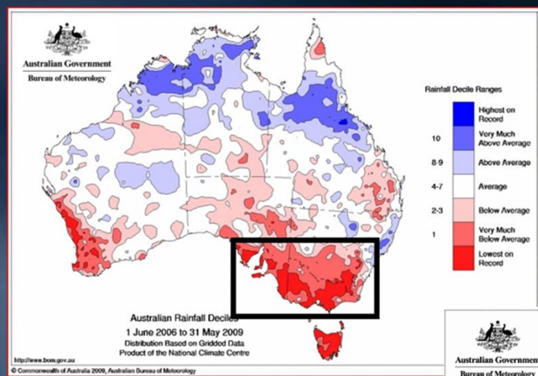
California Case Studies
- Carlsbad
- Santa Barbara
- Santa Cruz / Soquel Creek

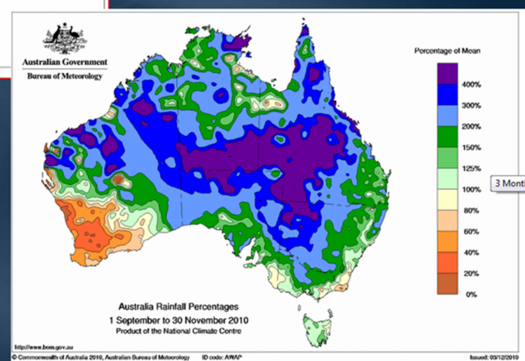
International Case Studies
- Australia
- Spain
- Israel / Middle East

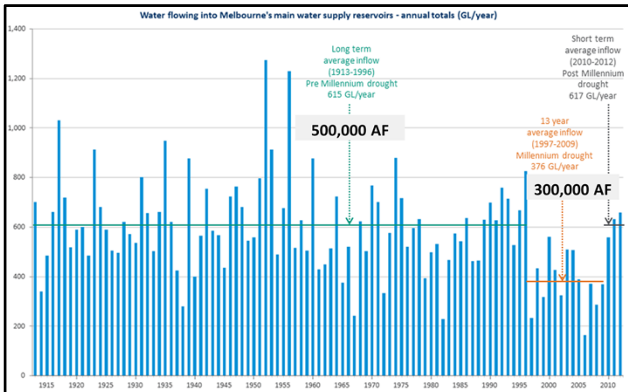
Integration / Other studies
- Facilities and operations
- Blending / water quality
- Local pilot studies

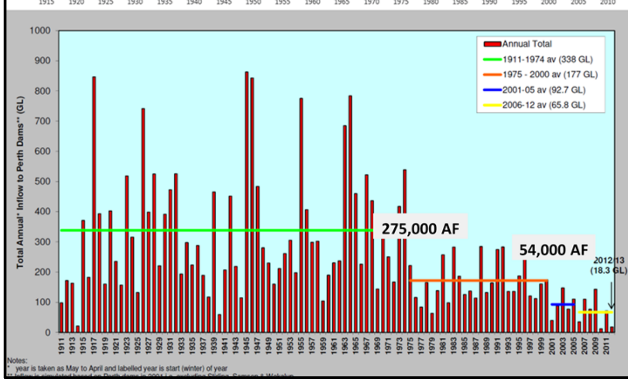

Example: Australia
Perth I
Perth II
Adelaide
Melbourne
Gold Coast
Sydney
Northern Territory
Western Australia
Queensland
Australia
South Australia
New South Wales
ACT
Victoria
Darwin
Perth
Brisbane
Sydney
Canberra

Millennial Drought – Record Floods









Reservoir Inflow

Melbourne

Drought Ends

Perth

Drought Intensifies

Source: A Tale of Two Cities: Desalination and Drought in Perth and Melbourne (NCEDA 2013)

Status

	Commissioned	Capacity	Cost (billions)	Status (May, 2013)
Perth I (Kwinana)	Feb-2007	38 MGD	$0.37	**Operating 100%**
Gold Coast (Tugun)	Jan-2009	36 MGD	$0.94	**Standby** (will restart when reservoir < 60%)
Sydney (Kurnell)	Apr-2010	66 MGD (Exp. 132)	$1.44	**Standby** (will restart when reservoir < 70%)
Perth II (Binningup)	Sep-2011 Sep-2013	80 MGD (40 + 40)	$1.27	**Phase I: operating 100%** **Phase II: operating 100%**
Melbourne (Wonthaggi)	Dec-2012	120 MGD	$3.80	**Standby**
Adelaide	Jan-2013	72 MGD	$1.50	**Two-year performance test** (will be placed on standby in 2014)
Total		**412 MGD (461 TAF)**	**$9.32**	

Sources: Water Desalination Report (May-2013), NCEDA Presentation (Feb-2013))

Distribution System Integration

Facilities and Operations

- Pressure zones
- hydroelectric generation
- Pipeline capacities
- Minimum treatment plant flows
- Stranded investment risk

Water Quality

- Corrosion
- Bromide: disinfectant residual decay and by-product formation
- Boron
- Aesthetics



Opportunities

Permit Coordination

- Agreement between permitting agencies
- Governor's water action plan

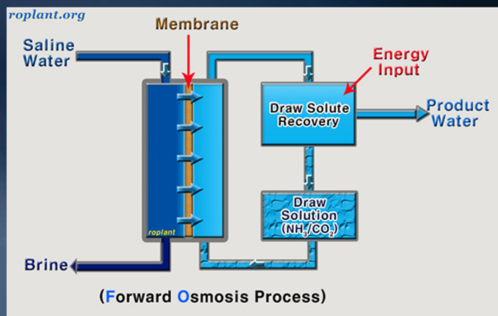
Funding

- Project funding
- Research funding

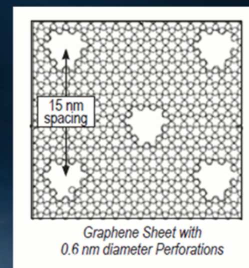
Innovation

- Intake technology
- Desalination technology
- Partnership approaches

Emerging Technologies



Forward Osmosis



Graphene

Renewable Energy (WaterFX)

Desalination Chip

Recommendations

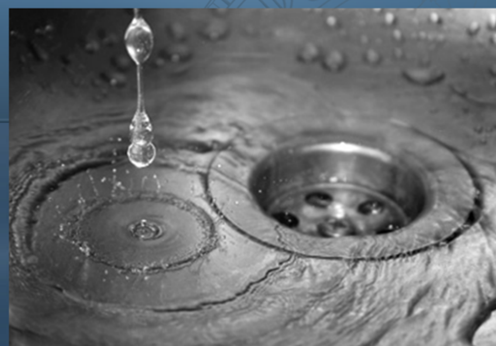
Research and Studies

- Research new technologies
- Study regional desalination issues
- Explore developing new programs

Communications and Regulatory

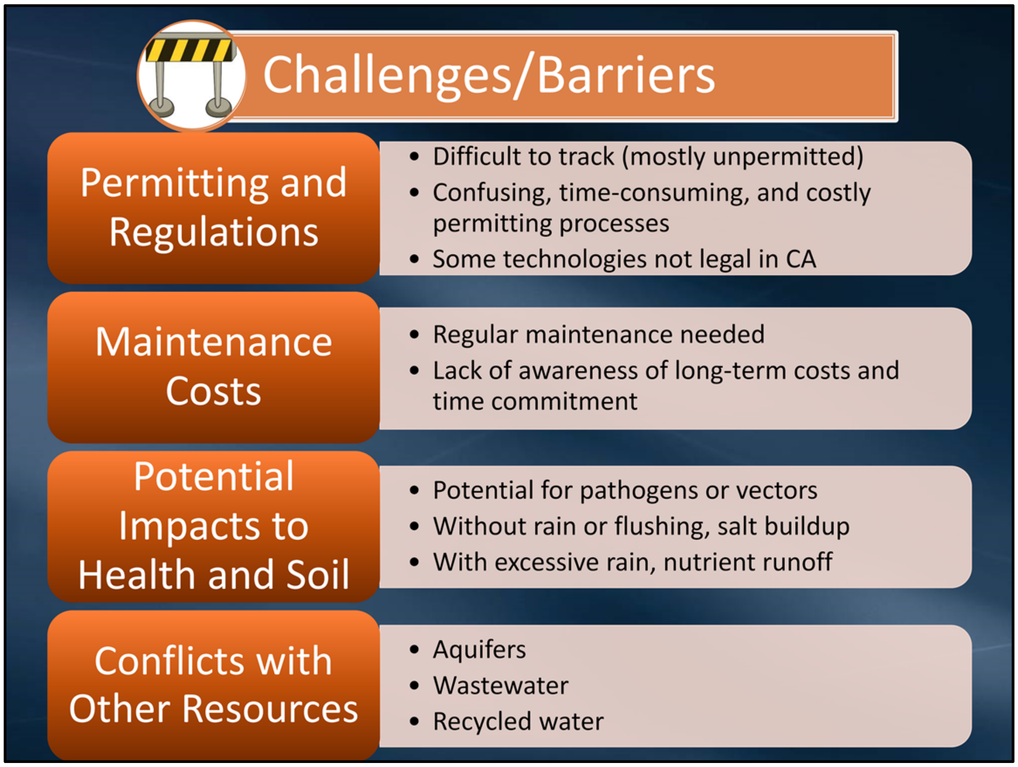
- Continue support for CalDesal
- Promote consistent messaging
- Build technical capacity

Graywater



Background

- Graywater includes wastewater from bathtubs, showers, bathroom washbasins, clothes washing machines, and laundry tubs
  - Graywater does not include wastewater from kitchen sinks or dishwashers
- California formerly had some of the most stringent standards in the country
  - Significantly reduced institutional barriers since 2009


Challenges/Barriers
Permitting and Regulations
Difficult to track (mostly unpermitted)
Confusing, time-consuming, and costly permitting processes
Some technologies not legal in CA
Maintenance Costs
Regular maintenance needed
Lack of awareness of long-term costs and time commitment
Potential Impacts to Health and Soil
Potential for pathogens or vectors
Without rain or flushing, salt buildup
With excessive rain, nutrient runoff
Conflicts with Other Resources
Aquifers
Wastewater
Recycled water

August 2009 – CA adopted Chapter 16a, Nonpotable Water Reuses Systems, made permanent January 2010

Pioneers use of permit-free laundry systems in CA.

Establishes 3 types of systems with different permitting requirements

Basic "laundry-to-landscape" systems no longer require permits or inspections

November 2009 – the CBSC voted unanimously to approve the California Dual Plumbing Code

Establishes statewide standards for potable and recycled systems in CII

Published in 2010 CPC, Chapter 16 A, Part II

Effective January 2011.

Left intact when the CBSC adopted the 2013 CA Plumbing Code

SB 518 (Ch. 622, 2010)

Requires that CBSC, as part of triennial review, adopt building standards for graywater in nonresidential occupancies; also terminated DWR's authority to adopt standards for nonresidential

DWR no longer has authority on graywater standards for either residential or nonresidential

AB 849 (Ch. 577, 2011)

Removed authority of a city, county, or local agency to prohibit the use of graywater

Local jurisdictions may only adopt standards that are more restrictive than state requirements

An ordinance must include local conditions that necessitate more restrictive

Governor's Executive Order B-29-15, issued on April 1, 2015

Among other provisions, directed enforcement of statewide mandatory urban water restriction by 25% compared with 2013 use, and directs CA Energy Commission , jointly with DWR and SWRCB, to implement a Water Energy Technology (WET) program to deploy innovative water management technologies

"Integrated on-site reuse systems" mentioned in the executive order, point #17

Lessons Learned

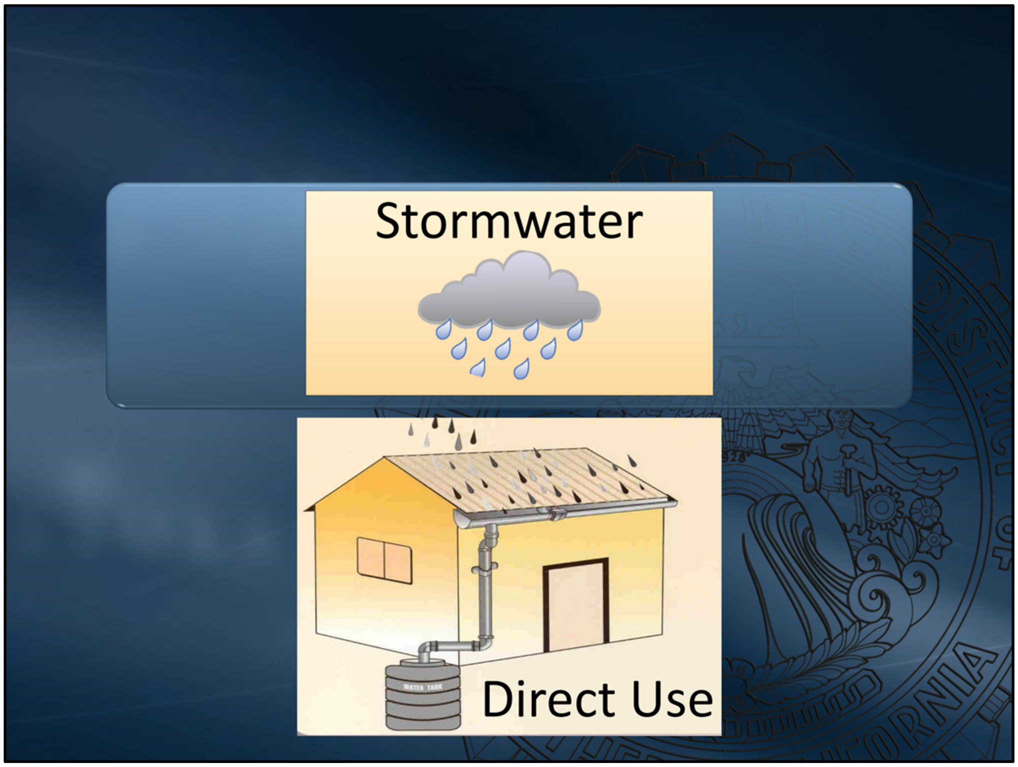
Costs and Limitations

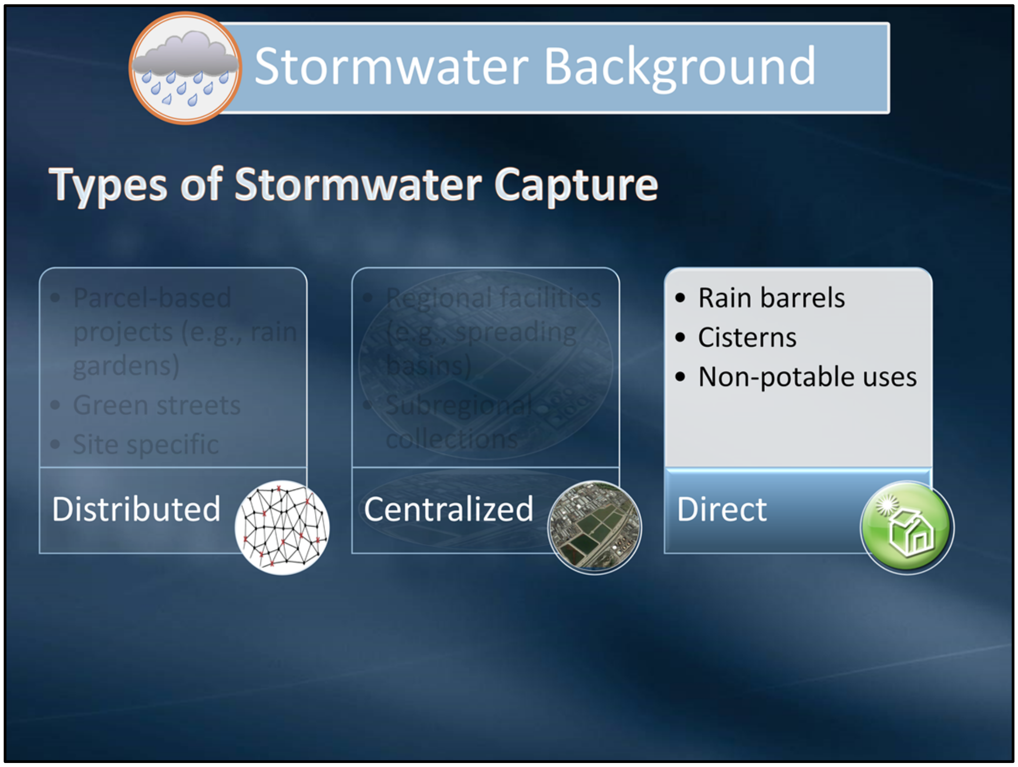
- Customers need to be made aware of potentially prohibitive costs and limitations

Permitting

- Administrative burden on customers can be eased in compliance with new regulations
- Homeowners and “non-techie” people intimidated by permitting cases
- Learn from successful programs


Recommendations
Research
• Continue to encourage research on graywater potential and impacts
Education
• Public information efforts needed to build awareness of graywater opportunities and costs


Stormwater
Direct Use



Previously talked about distributed and centralized.

Challenges/Barriers

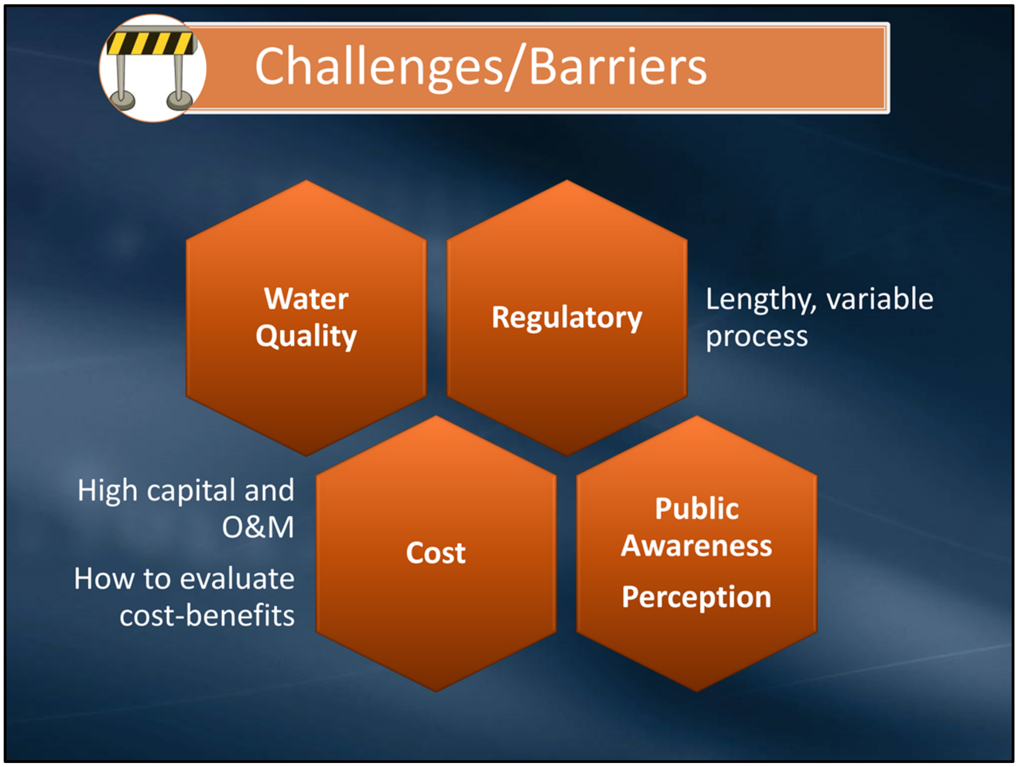
Challenges
- Only used during rainy season
- O&M
- Could reduce groundwater recharge

Opportunities
- Non-potable municipal use (i.e. restrooms, onsite irrigation)
- Public outreach

Lessons Learned
- O&M may not happen
- Municipal projects take time
- Case studies

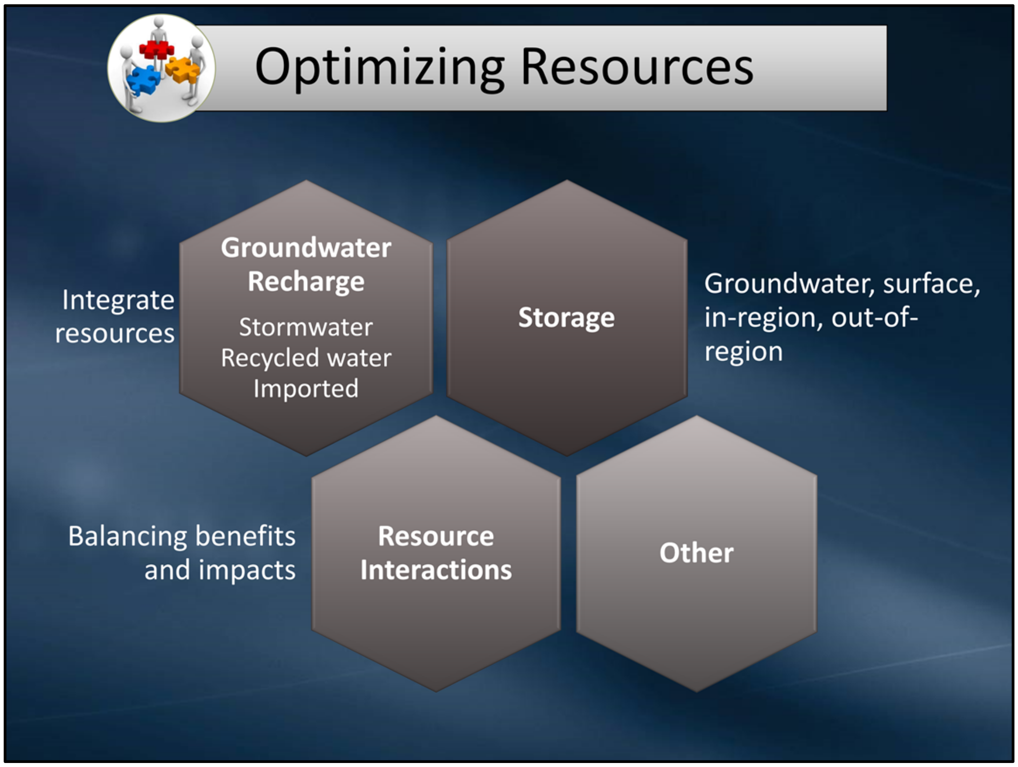
Recommendations
- Business case for providing incentives
- Continue to provide open discussion/coordination

Synergy

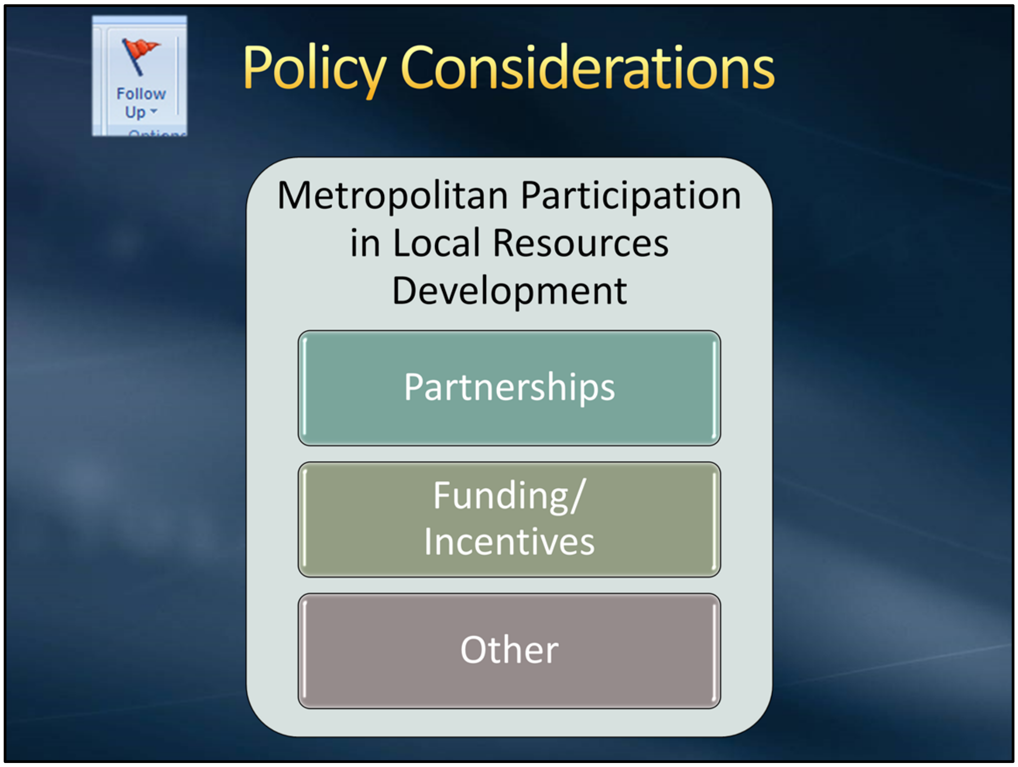


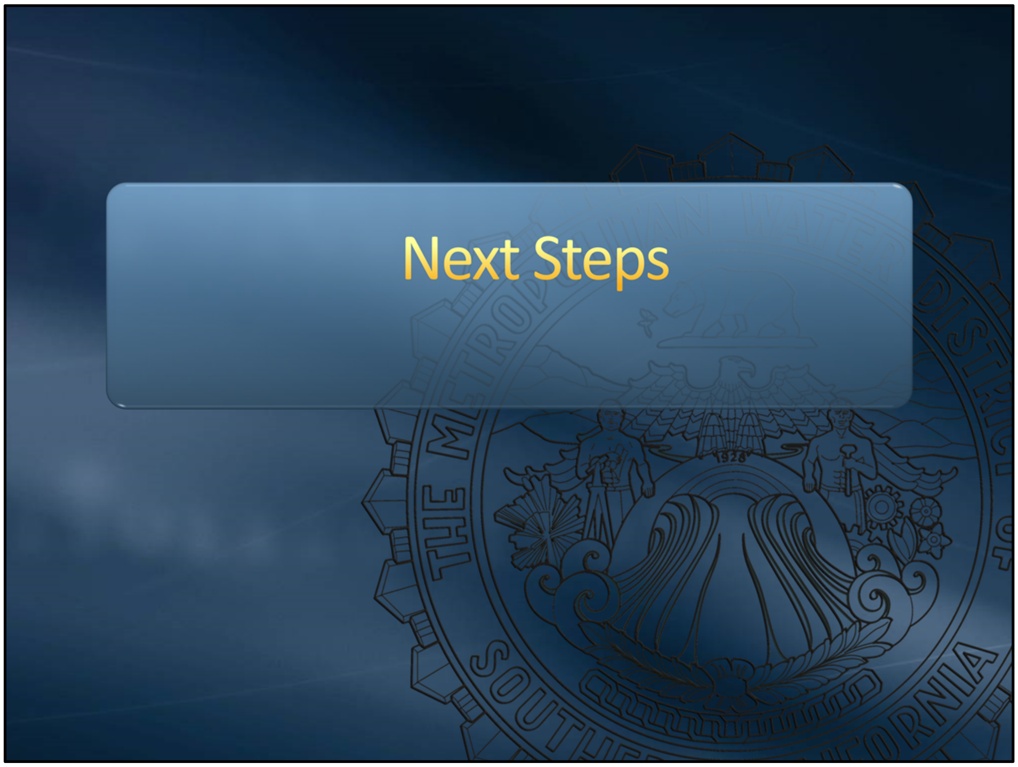
And conflicts with other sources

Heightened awareness and new regulatory pathways (e.g., AWT can be used as blend water)


Optimizing Resources
Integrate resources
Groundwater Recharge
Stormwater
Recycled water
Imported
Storage
Groundwater, surface, in-region, out-of-region
Balancing benefits and impacts
Resource Interactions
Other

Explore integrated approaches (optimizing resource interactions)
Integrating programs: existing and new funding, research, etc. programs


Follow Up
Policy Considerations
Metropolitan Participation in Local Resources Development
Partnerships
Funding/ Incentives
Other


Next Steps

IRP Technical Update Next Steps

- Incorporate feedback from this workgroup
- Return with preliminary results in early August
- Issue Paper addendum
  - Outline – July 8th
  - Review draft – August 3rd
- Compile policy and implementation issues for Board policy process

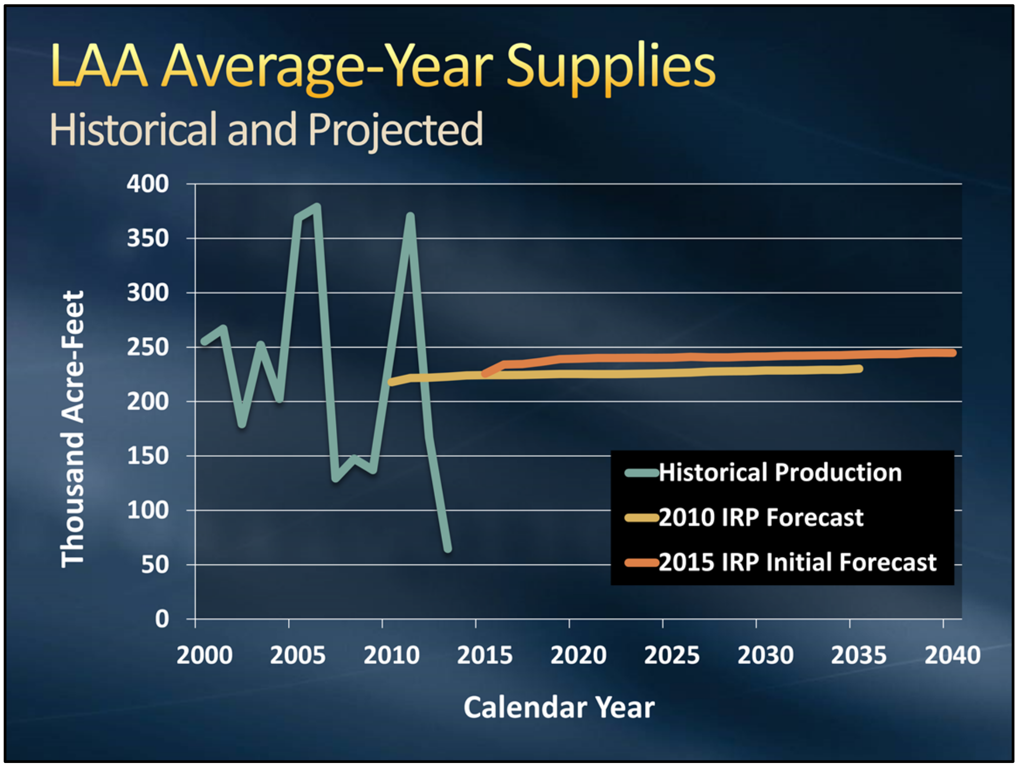
Upcoming Technical Process Activities

July 2015

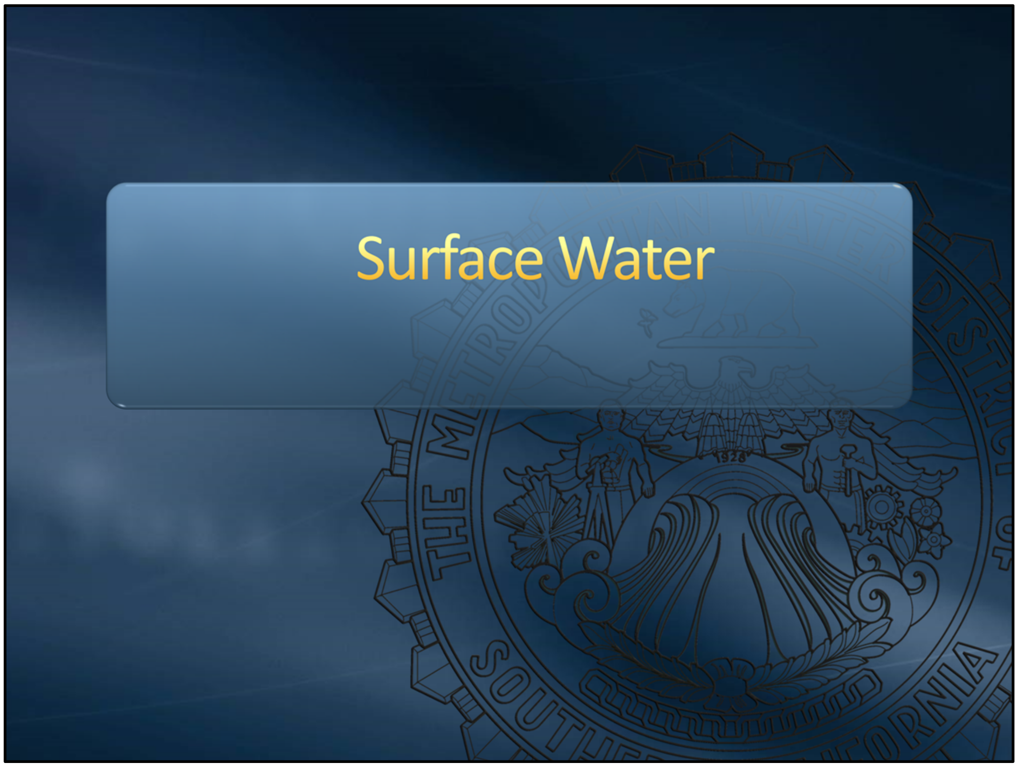
- Member Agency Workgroup July 8th
  - Local Resources (part 2 of 2)
- Water Use Efficiency Meeting July 16th
- Member Agency Workgroup July 22nd
  - Retail Demands and Conservation
- IRP Committee Meeting July 28th
  - Dr. Patrick Reed, Cornell University – Uncertainty Planning
  - Brad Udall, Colorado State University – Climate Change Science

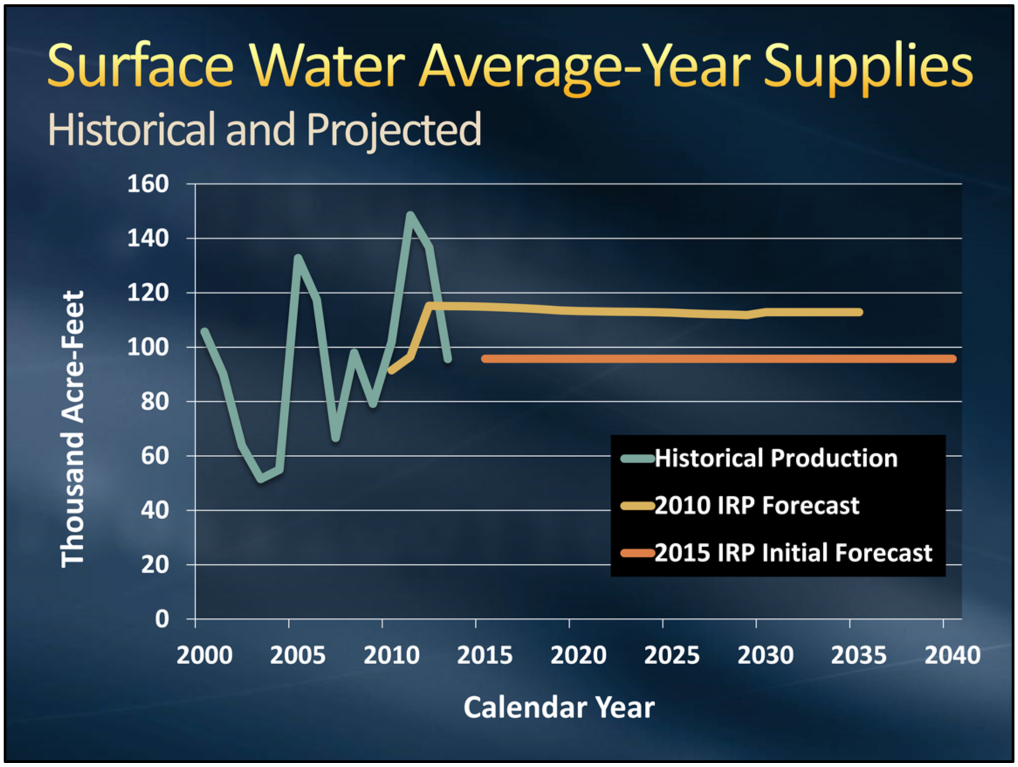

THE METROPOLITAN WATER DISTRICT OF
SOUTHERN CALIFORNIA


Los Angeles Aqueduct



Increase due to forecast methodology


Surface Water

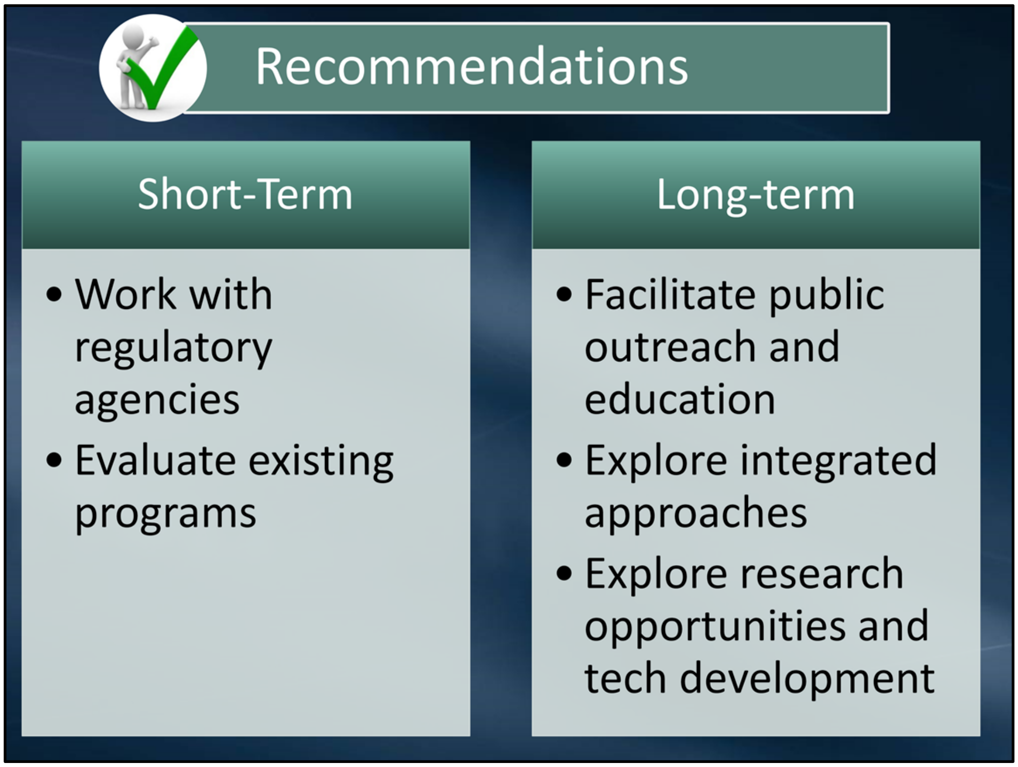


Surface Water Average-Year Supplies
Historical and Projected
Thousand Acre-Feet
160
140
120
100
80
60
40
20
0
2000
2005
2010
2015
2020
2025
2030
2035
2040
Calendar Year
Historical Production
2010 IRP Forecast
2015 IRP Initial Forecast

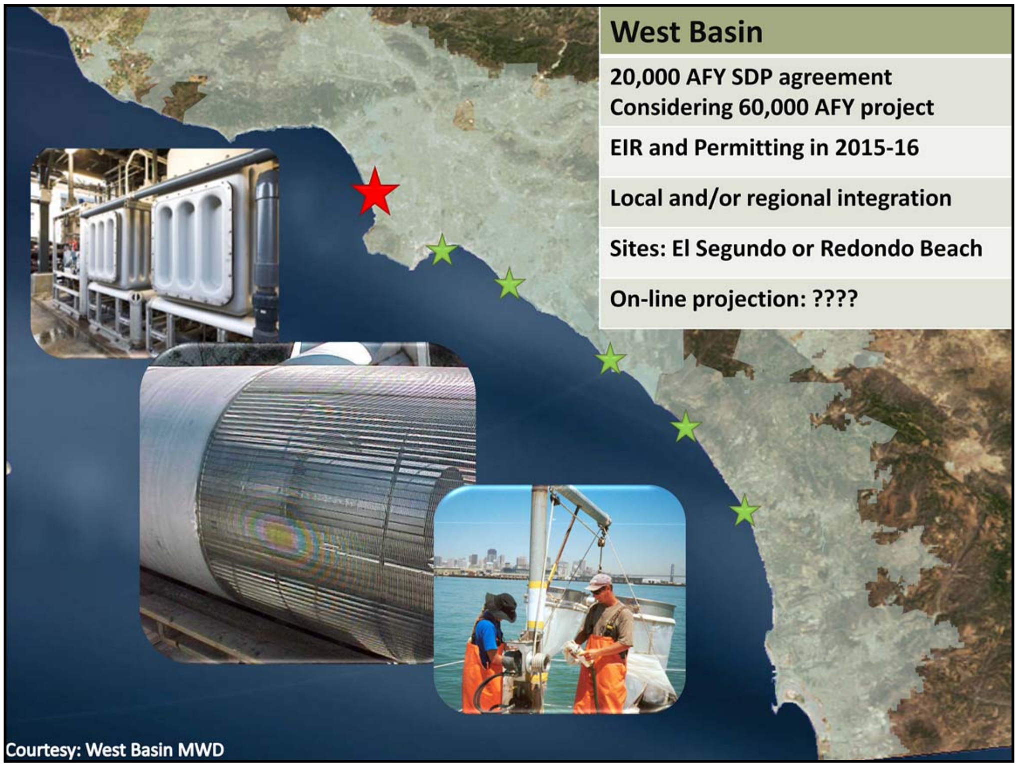
Extra Slides

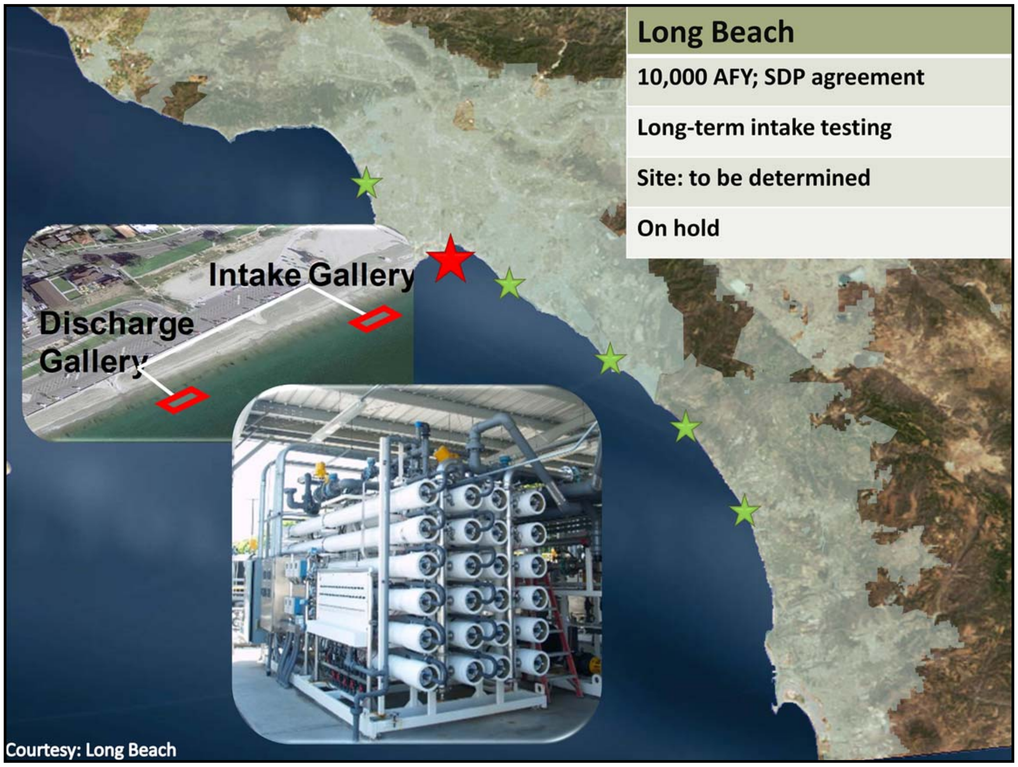

Opportunities
Partnerships
AWT projects may require less blend water
Collaborative efforts (e.g. One Water LA)
More cost effective if done together
Water Supply
Local vs. regional storage
Use of AWT projects for blending to reduce imported water requirement

Technical



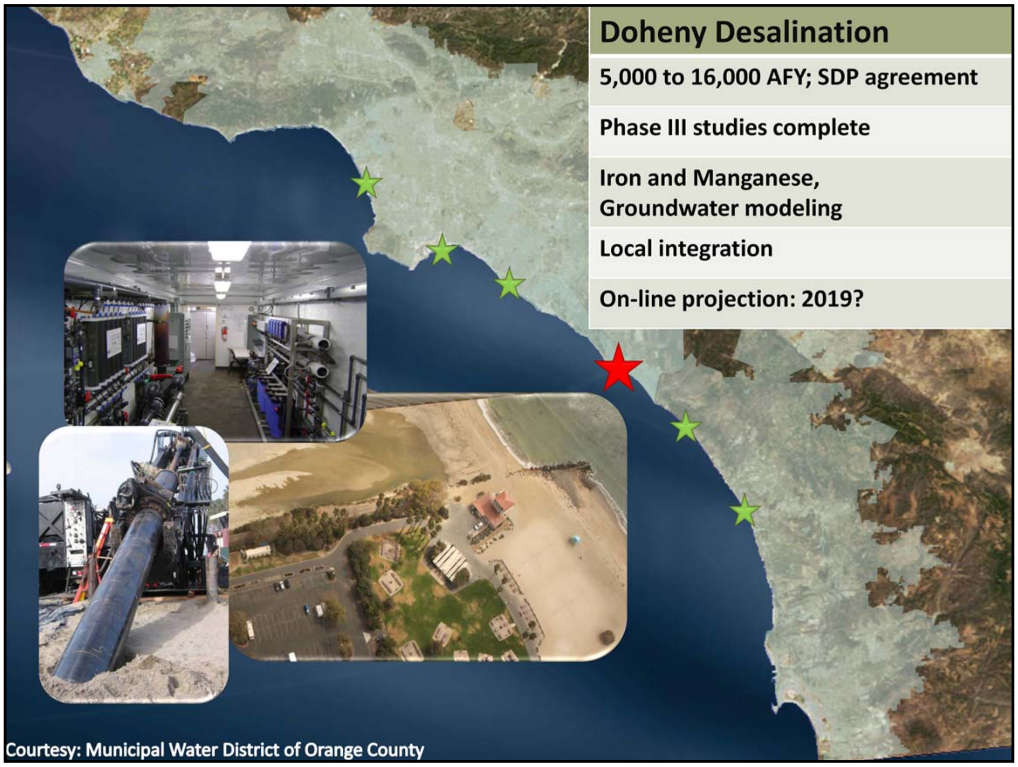
Explore integrated approaches

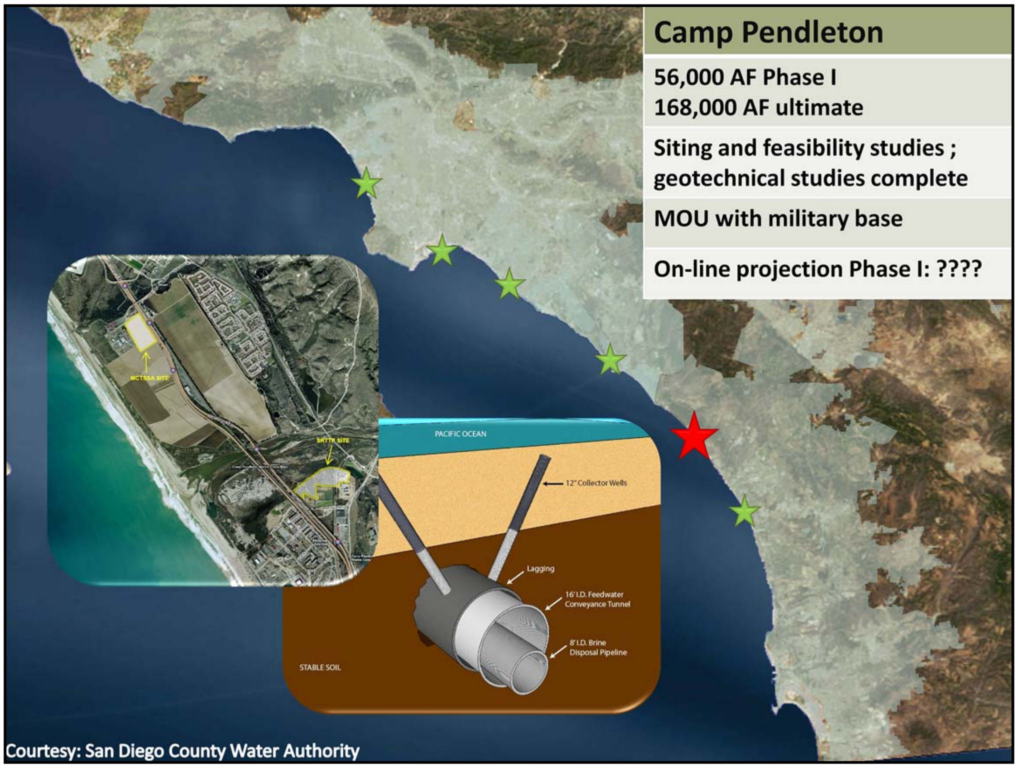

West Basin
20,000 AFY SDP agreement
Considering 60,000 AFY project
EIR and Permitting in 2015-16
Local and/or regional integration
Sites: El Segundo or Redondo Beach
On-line projection: ????
Courtesy: West Basin MWD

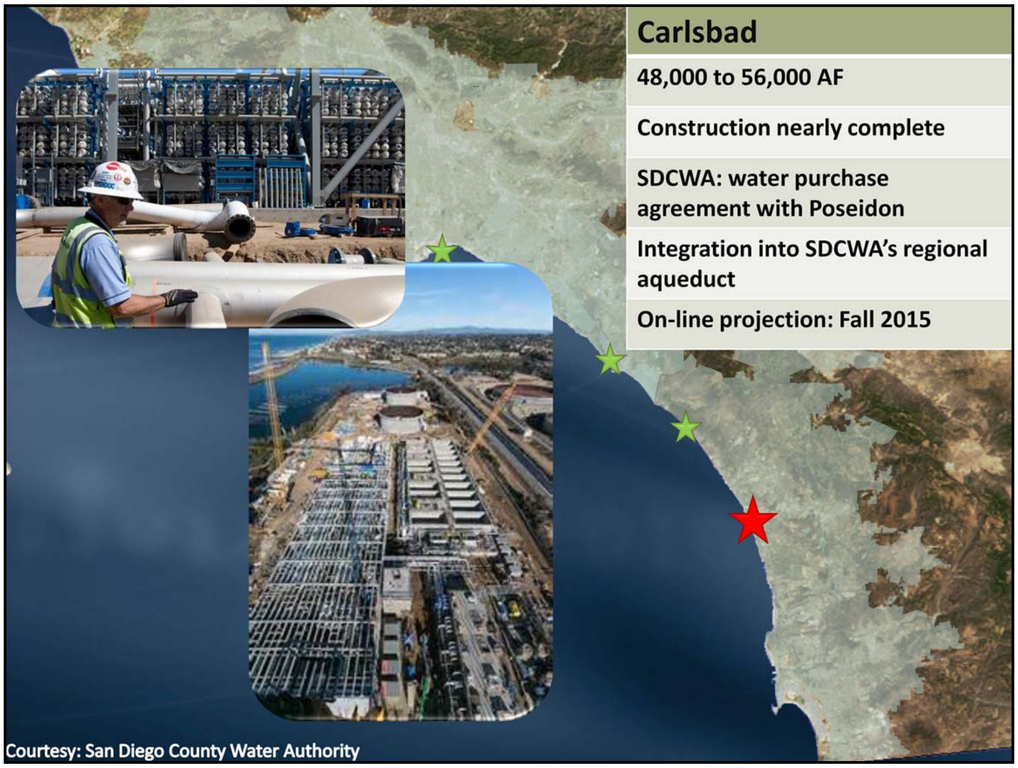


Long Beach
10,000 AFY; SDP agreement
Long-term intake testing
Site: to be determined
On hold
Intake Gallery
Discharge Gallery
Courtesy: Long Beach

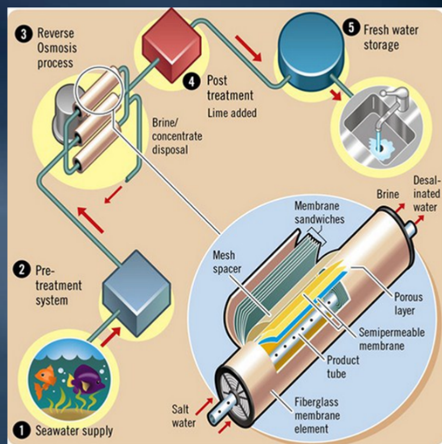

Huntington Beach
56,000 AF
OCWD adopted term sheet in April
Permitting: Coastal Commission in intake permit: 2015
On-line projection: 2019?
Courtesy: Municipal Water District of Orange County


Doheny Desalination
5,000 to 16,000 AFY; SDP agreement
Phase III studies complete
Iron and Manganese,
Groundwater modeling
Local integration
On-line projection: 2019?
Courtesy: Municipal Water District of Orange County


Camp Pendleton
56,000 AF Phase I
168,000 AF ultimate
Siting and feasibility studies ; geotechnical studies complete
MOU with military base
On-line projection Phase I: ????
MCTSSA SITE
SRTTP SITE
PACIFIC OCEAN
12" Collector Wells
Lagging
16' I.D. Feedwater Conveyance Tunnel
8' I.D. Brine Disposal Pipeline
STABLE SOIL
Courtesy: San Diego County Water Authority


Carlsbad
48,000 to 56,000 AF
Construction nearly complete
SDCWA: water purchase agreement with Poseidon
Integration into SDCWA's regional aqueduct
On-line projection: Fall 2015
Courtesy: San Diego County Water Authority

Energy and Reverse Osmosis



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Pressure: 800+ PSI

Edmonston: 1,900 ft.

RO process diagram courtesy: Wordpress.com

~ 80% of Israel's potable supply

Plant	Capacity MGD	Max Daily MGD	On-line date
Ashkelon	104	104	2005
Palmachim (under expansion)	79	79	2007
Hadera	121	139	2009
Soreq	143	165	2013
Ashdod	72	101	Mid-2014
Total	**519** (582,000 AFY)	**588** (658,000 AFY)	

NOTE: Israel recycles 75% of its wastewater for irrigation.

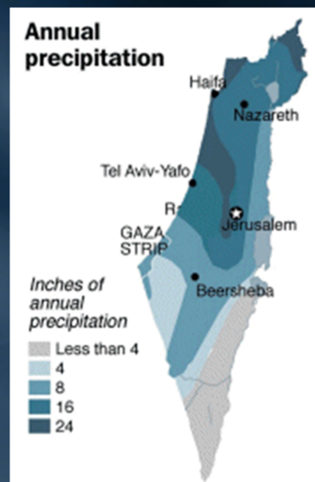
Source: Water Desalination Report, June 2013

98

Example: Israel

Population: 8 million

Precipitation



National Grid

Managing Demand Risk

Sharing 2.5 MGD of Desalinated Water

City of Santa Cruz

- Would use up to 2.5 million gallons per day (May-October)
- Operate during droughts, approx. 1 or 2 in 7 years
- Potentially use 3 in 10 years for HCP.

Soquel Creek Water District

- May use ~1.5 million gallons per day (year round)
- (1) Operate to restore groundwater basin (could take 10+ years) then (2) at a lesser amount to sustain protective groundwater levels